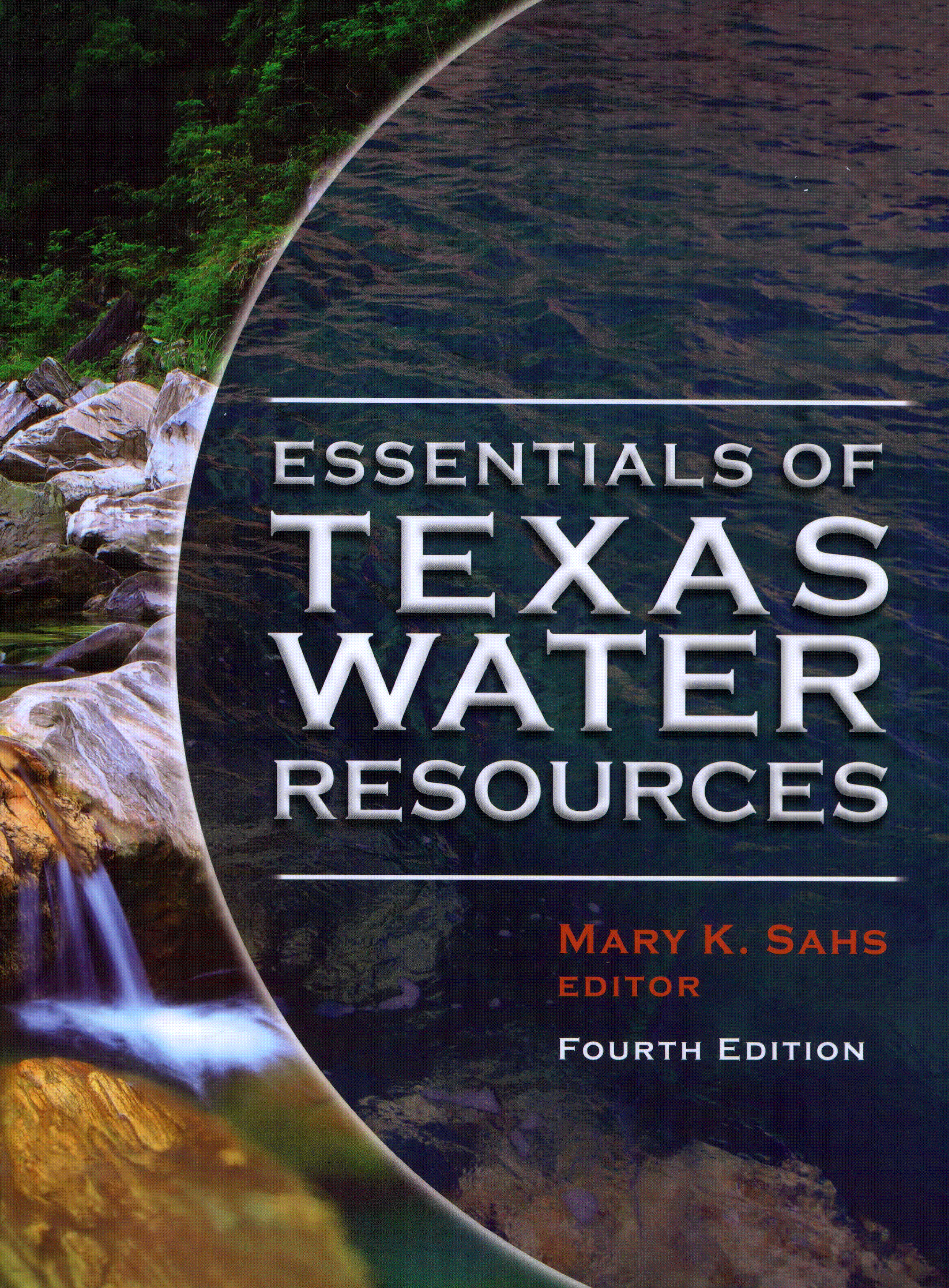

Essentials of Texas Water Resources

Mary K. Sahs
Editor

Fourth Edition

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Texas Water Resources

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The State Bar of Texas is proud to present this fourth edition of *Essentials of Texas Water Resources*, a landmark treatise that provides attorneys and water law professionals with a comprehensive tool for understanding the growing field of water law.

On behalf of the State Bar, I would like to thank the Environmental and Natural Resources Law Section for its continued efforts on this project. The State Bar is committed to a continuing legal education program that includes publications designed to improve professional competence. We are grateful to the section for its contribution in furtherance of that commitment.

We would especially like to thank the book's editor, Mary K. Sahs. Her leadership and dedication in bringing this project to fruition have been fundamental in essential updating and expansion of the book. Without her diligence, knowledge, and tireless effort, we would not have been able to provide this valuable work for you to use in your practice.

Allan K. Dubois

Allan K. Dubois
President, State Bar of Texas

Foreword

My review of this remarkable volume prompted two immediate impressions. The first is the complexity of water management in Texas. The state's rich history and vast diversity have encouraged equally diverse views of water's value and how water resources should be shared. Informed discussion of water issues requires a grasp of science, law, politics, economics, and the human psyche in equal measures. During sixteen years as a member of the Texas House Natural Resources Committee, including six as chair, I learned how difficult it can be to reach consensus on water issues. As chief executive of a large urban utility since 2008, I have experienced firsthand the consequences of unresolved water discord at the state and regional levels. As both a legislator and utility manager, I have on happy occasion experienced the satisfaction that accompanies consensus and successful resolution of a common water challenge. I hope such occasions can become more frequent.

The population of the state of Texas is expected to grow at a dramatic rate in the next fifty years. We will require water to live and thrive. Texas enjoys enormous supplies of water, but those supplies are not readily accessible, and are not generally where they need to be. Our society, economy, and climate are changing. We must change as well. We must do a better job of conserving water, moving water, pricing water, storing water, developing water, and sharing water with our environment, most particularly including the incredible bays and estuaries of the Texas coast.

Experience has taught me that consensus and change begin with education. This fourth edition of *Essentials of Texas Water Resources* is an extraordinary collection of essential information about the state's water challenges. I hope it will find its way to the bookshelf of every state legislator, local official, community advocate, and water professional.

This leads me to my second impression. The world of water management is relatively small, and I am proud to be part of it. This volume reflects thousands of hours of volunteer work by eighty of the state's most experienced and accomplished water practitioners from across the private and public spectrum. They have given their time and shared their expertise for no other purpose than educating others and making this state a better place to live. As editor for four editions, Mary Sahs has contributed incalculable time to this effort. Her dedication, sharp pen, and sharper mind have ensured a product that will serve us well for years to come. We owe a debt of gratitude to her, the authors, and the State Bar of Texas.

—Robert R. Puente
President and Chief Executive Officer
San Antonio Water System

Preface

The prolonged drought serving as a backdrop to the third edition of this book has finally broken, with plentiful rain in all parts of the state. Changes to the fourth edition reflect lessons learned during this serious period, particularly the addition of chapters on reuse, aquifer storage and recovery, and desalination, and the editor's effort to reflect the state's shift in emphasis in water resource planning and management due to the dry conditions.

Generally, Parts A (Overview of Dual System of Water Rights: Surface Water and Groundwater), B (Surface Water), and C (Groundwater) have remained the same, with each chapter updated to reflect developments in the topic since the third edition. The exception is the decision to eliminate chapter 10, "Special Issues in Water Rights Permitting," rolling certain subject matter into existing chapters and expanding the reuse discussion into a separate chapter. Part D (Water Planning) now focuses on the state and regional water planning process, the groundwater management area joint planning, and drought planning and response. Efforts have been made to integrate these chapters in a manner that illustrates the growing sophistication of Texas water planners and stakeholders and to reflect the dichotomies and dilemmas posed by the dual legal system for surface water and groundwater. Part E has been renamed "Selected Water Management Strategies" in an effort to mirror the approach taken by the State Water Plan. Chapters on water conservation, reuse, desalination, aquifer storage and recovery, and reservoirs are included. Except for updates, Part F, covering drinking water supply issues, remains the same, although a decision was made to eliminate the chapter on local oversight of water availability for land development. Although legislation was passed within the past decade, there has been little activity under those laws. The previous Part E has been moved to Part G and includes virtually the same topics, some updated and some completely rewritten. Of note is the newly authored chapter on the economics of water.

I want to thank my assistants, Kathryn Miles and Monica Clanton, for their continued cheerful help wrangling authors, peer reviewers, and manuscripts. Kathryn has moved on to other endeavors and she will be sorely missed on this project.

David Ashmore has remained as the project manager, and I could not ask for a more efficient, thoughtful, and excellent supporter. The staff of TexasBarBooks remains responsive and professional, and committed to ensuring the legacy of this important treatise. My eternal thanks go to Diane Morrison, Senior Editor, and her entire staff.

The Executive Committee of the Environmental and Natural Resources Law Section remains supportive. Royalties from this publication have continued to fund Section projects designed to maintain the high standards of the environmental and natural resources bar in Texas.

I want to thank all the authors who contributed to this edition. Many hours of scholarship and writing went into producing the most up-to-date compendium of Texas water resource topics. Also, I would like to acknowledge the contributions of the following authors (in alphabetical order) who participated in previous editions but who do not appear as authors in this edition. They were critical to laying the groundwork for the expanded subject matter presented here: Robert M. Avera, William E. Avera, Rebecca Barho, Bill Billingsly, Nohl P. Bryant, Felipe Chacón, Todd Chenoweth, Elaine Darby, Craig Douglas, Ross Henderson, Bill Medaille, William F. Mullican, III, Stuart D. Norvell, Kenneth L. Petersen, Jr., Bane Phillippi, Travis J. Phillips, and Louis Rosenberg.

Janet McQuaid deserves special appreciation for establishing the high-quality content of the chapters on integrating water quality standards into water management programs and the impacts of water quality requirements of water supply projects. Likewise, Cynthia Smiley contributed substan-

tially to the previous edition of the chapter covering dredge and fill permits, and Tom Bohl coauthored "Multi-Jurisdictional Water Rights" in previous editions. Robin Smith's chapter on special issues in water rights permitting no longer appears in this edition. The topics have generally expanded, warranting separate chapters. Thanks go to Steve Morton and Janessa Glenn. Their chapter covering local oversight of water availability for land development is no longer included. Special thanks go to Richard Golladay and Robbie Searcy for their insightful comments on the water-energy chapter. Others are acknowledged in footnotes associated with specific chapters.

I am grateful to Douglas Caroom, Lyn Clancy, and Matthew Webb for their peer review of selected manuscripts.

Without the time and effort contributed by these individuals, the fourth edition would not have been possible.

I continue to be amazed and entranced by the complexities, intricacies, political machinations, regulatory rigor, unpredictability, excitement, intrigue, passion, fear, brilliance, commitment, greed, and intensity associated with water resource issues. At moments when I consider retiring from the practice of law, a question by an unsuspecting person sets my thoughts flying and ignites the educator in me—and I am, once again, off and running, steeped in the subject of water, planning future editions.

—Mary K. Sahs
Editor

Mary K. Sahs has an active legal practice, focusing on environmental and administrative law, with an emphasis on water law. With many years of experience as an attorney at the state's environmental agency as well as in private practice, she is familiar with the roles and views of government, the public, and the regulated community in the management, conservation, and protection of water resources. A 1985 honors graduate of the University of Texas School of Law, Ms. Sahs is a frequent speaker and author on environmental and water law issues and the coeditor of West's Texas Practice Series on Environmental Law. Since 2009, she has been named one of the best lawyers for water law in Texas in the annual editions of The Best Lawyers in America.

Acknowledgments

Water resources and water law are critical topics in today's world, particularly with Texas's growing population and economy, and this book serves as a valuable reference for all those exploring these subjects in more detail. Since the publication of the first edition of *Essentials of Texas Water Resources* in 2009, the editor and the many chapter authors have worked hard to capture and describe long-standing principles along with recent developments affecting Texas water resources and water laws, in a single volume designed to serve not only attorneys but also industry representatives, public officials, and other stakeholders. This fourth edition of the book incorporates an even broader scope of relevant and timely information.

Our section appreciates the generous contributions of time and talent provided by the contributing authors for this fourth edition, as well as by the authors in each of the earlier editions. We have enjoyed a great working relationship with the team at the State Bar and TexasBarBooks who have worked hard to make this a successful project. And we are certainly grateful for the dedicated work of the editor, Mary Sahs, and her assistants for the substantial efforts required to produce and continually update this impressive book.

Thank you to all of those involved in this publication.

—Allison K. Exall
Chair, Environmental and Natural Resources
Law Section, State Bar of Texas

Essentials of Texas Water Resources

Fourth Edition

CHAPTER 1

Scientific, Legal, and Ethical Foundations for Texas Water Law

Gabriel Eckstein[1] and Amy Hardberger[2]

I. Introduction to Water Law

Water law is the field of law concerned with the ownership, allocation, and use of water resources, both surface and subsurface. Although most closely related to property law, recent developments in other legal fields, especially in environmental law, have heavily influenced the interpretation, application, and development of water law. As a result, water law today encompasses a broad perspective and often takes into account individual and community rights, environmental issues, commerce and economics, and other societal and legal concerns.

Significantly, modern water law is an interdisciplinary practice. In light of the continuously expanding body of knowledge of the hydrologic cycle, groundwater flow, wetlands, and fresh water resources in general, the field has expanded to include scientific considerations related to the management, use, and allocation of water resources. It is now no longer enough merely to be versed in water law. Rather, a water lawyer today must understand technical concepts such as hydrostatic pressure and Darcy's law, flow regimes, drainage basins, ecosystems needs, consumptive uses, and crop yields.

Ultimately, though, water law advances societal values and goals related to water management and conservation. It is a means for bridging the gap between the demand for water and the availability of the resource. And therein lies the challenge—learning to practice water law to better society as well as to ensure the client's interests.

Section I of this chapter provides an overview of the scientific, legal, and ethical foundations that are pertinent to Texas water law. Section II discusses the availability of water in Texas and beyond, and section III addresses the hydrologic cycle and its relevance to water law. Section IV covers some of the basic concepts of the science of water that are particularly significant for understanding and applying water law. Last, sections V and VI discuss the value and ethic of water.

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1. Gabriel Eckstein is a Professor of Law at Texas A&M University School of Law, is a member of the executive boards of the International Water Resources Association and the International Association for Water Law, and directs the International Water Law Project at www.InternationalWaterLaw.org.

2. Amy Hardberger is an Associate Professor at St. Mary's University School of Law. Prior to working at St. Mary's, she was an attorney in Environmental Defense Fund's Texas office. She is a professional registered geologist in the state of Texas.

II. Water, Water Everywhere

A. Available Water Resources in Texas

1. Surface Water

With 191,000 miles of streams and rivers, 15 major river basins, and 188 major water supply reservoirs in Texas, surface water is an integral part of the Texan culture, history, and economy. Texas Water Development Board, *Water for Texas 2012* 159 (2012) [hereinafter 2012 State Water Plan], *available* at www.twdb.state.tx.us/waterplanning/swp/2012/. Surface water is also a significant water source for Texas citizens, constituting 40 percent of the total water used in 2008. Of the major rivers in Texas, eight are designated coastal basins. 2012 State Water Plan, at 159. These basins affect the health of the bays and estuaries along the Texas coastline and provide one of the few sources of fresh water to communities in those regions.

Many of these rivers start their journey at a spring, where water bubbles out of the ground to start its passage above ground. Springs are responsible for the location of numerous Texas cities and are an integral part of Texas culture. *See* Gunnar A. Brune & Helen C. Besse, 1 *Springs of Texas* (new ed. 2002) [hereinafter Brune & Besse]; Larry McKinney, *The State of Springs*, *Texas Parks & Wildlife* 26, 29 (July 2005) [hereinafter McKinney, *The State of Springs*], *available at* www.tpwmagazine.com/archive/2005/jul/ed_1/. A 2003 U.S. Geological Survey database listed 1,891 springs in Texas, although some experts think the total is more than twice that. Franklin T. Heitmuller & Brian D. Reece, *Database of Historically Documented Springs and Spring Flow Measurements in Texas*, U.S. Geological Survey Open-file Report 03-315 (2003), *available at* http://pubs.usgs.gov/of/2003/ofr03-315/; McKinney, *The State of Springs*, at 29. The majority of the springs cataloged are in the Hill Country region of Central Texas; historically, however, springs have flowed throughout Texas even if they do not do so today. *See* Brune & Besse. The disappearance of Texas springs over the past thirty years marks the loss of both a water resource and a piece of the state's history. Wendee Holtcamp, *Aquatic Islands in a Sea of Land, Texas Parks & Wildlife* 36, 41 (July 2005), *available at* www.tpwmagazine.com/archive/2005/jul/ed_3/.

In addition to its river basins, Texas has a large system of reservoirs that provide water to its citizens. Much of Texas's potable surface water supply comes from the state's 188 major reservoirs with a storage capacity of at least 5,000 acre-feet. 2012 State Water Plan, at 159. These reservoirs were constructed primarily in the 1960s and 1970s to provide a source of fresh water for municipal, industrial, agricultural, flood control, and electricity generation purposes. Today, reservoirs constitute more than half of the state's available surface water. The 2012 State Water Plan recommended construction of twenty-six new major reservoirs to produce an estimated 1.5 million acre-feet per year by 2060. 2012 State Water Plan, at 236. Under Senate Bill 3, 80th Legislative Session, the legislature designated all twenty-six proposed reservoir sites as "sites of unique value for the construction of a reservoir." Act of June 16, 2007, 80th Leg., R.S., ch. 1430 (codified at Tex. Water Code § 16.051(g-1)). See Chapter 27 of this book regarding reservoirs.

2. Groundwater

In addition to surface water, Texas is heavily dependent on its groundwater resources. Nearly 140,000 water wells have been inventoried by the Texas Water Development Board. *See* Texas Water Development Board, *Groundwater Data, available at* www.twdb.state.tx.us/groundwater/data/. The state officially recognizes nine major and twenty-one minor aquifers that, together, provided 60 percent of the water used in Texas in 2008. 2012 State Water Plan, at 163. These thirty aquifers, however, do not represent all the groundwater in Texas. Although they are excluded from the official count because of their size or significance, numerous other aquifers scattered throughout the state are important locally to homeowners, farmers, ranchers, and various businesses. Texas Water Development Board, 2 *Water for Texas 2007* 186 (2007) [hereinafter 2007 State Water Plan].

As a result of Texas's heavy reliance on groundwater, many of the state's aquifers have been pumped in excess of natural recharge. For example, while the Panhandle gets 88 percent of its water from the Ogallala Aquifer, that aquifer's supplies are expected to decline 37 percent by 2060. 2012 State Water Plan, at 34. Other regions heavily dependent on groundwater include the San Antonio region, which relies on the Edwards Aquifer for more than 90 percent of its drinking water, and far west Texas, where two major and six minor aquifers meet 75 percent of the region's water needs. San Antonio Water System, *Edwards Aquifer Pumping Rights Acquisition*, www.saws.org/Your_Water/WaterResources/projects/edwards.cfm; 2012 State Water Plan, at 48. If Texas follows the trend seen in the rest of the world, dependency on aquifers will continue to increase. *Cf. Water For People, Water For Life; The United Nations World Water Development Report* at 78, U.N. Sales No. 92-3-103881-8 (2003) (asserting that groundwater today is "the world's most extracted raw material").

Due to the decline of several aquifers, groundwater availability is projected to decrease from 13.3 million acre-feet per year in 2010 to 10.1 million acre-feet per year in 2060. 2012 State Water Plan, at 165–66. Some of these reductions in available water have already been observed, including declines in groundwater levels averaging one hundred feet or more per year. 2007 State Water Plan, Vol. II, at 176. Not surprisingly, the largest decrease in levels was in the Trinity Aquifer in the Dallas–Fort Worth area, which has some of the densest population in the state. Similar impacts are expected in the future based on population predictions. Steve Satterwhite & Richard Whittaker, *There's Not Enough*, *The Texas Observer*, Apr. 6, 2007, available at www.texasobserver.org/2463-theres-not-enough-as-the-drought-saps-rural-texas-lawmakers-confront-a-state-thats-running-out-of-water/.

Because aquifers are not visible, the state is continually updating their boundaries and trying to understand their characteristics. The Texas Water Development Board, in cooperation with other state and federal agencies, monitors groundwater across the state. 2012 State Water Plan, at 25–28. Local groundwater conservation districts also track changes in water levels and attempt to quantify available water in their areas. In addition to quantity, water quality is critical to availability and usefulness. A statewide monitoring program samples hundreds of sites with the goal of ensuring clean drinking water for Texas citizens. 2012 State Water Plan, at 28. For effective water planning, water source characteristics must be evaluated in relation to how the water is currently used as well as how it will be needed in the future.

3. *Brackish and Saline Water*

In addition to fresh groundwater resources, studies estimate that there are 2.7 billion acre-feet of brackish water below the surface in Texas. Neena Satija, *Brackish Water Abounds, but Using It Isn't Simple*, *The Texas Tribune*, Jan. 8, 2014, *available at* www.texastribune.org/plus/water/vol-2/no-2/plenty-brackish-water-underground-still-elusive/; Texas Water Development Board, *Desalination: Brackish Groundwater* (2013), *available at* www.twdb.state.tx.us/publications/shells/desal_brackish.pdf. Brackish refers to nonpotable water with a high total dissolved solid (TDS) content. Brackish TDS content typically ranges from 1,000 milligrams per liter (mg/l) to 10,000 mg/l. Seawater has over 10,000 mg/l TDS, and potable water is below 1,000 mg/l.

Until recently, brackish and saline water resources received very little attention in Texas. As the state's population and water demand increased, and as better treatment technology became available, these nonpotable sources are now recognized for their potential. Texas currently has forty-six desalination plants with a collective capacity of 123 million gallons per day (MGD) (approximately 375 acre-feet per day), and many more are proposed. Texas Water Development Board, *Answers to Frequently Asked Questions*, www.twdb.state.tx.us/innovativewater/desal/faq.asp#title-16. The world's largest inland brackish desalination treatment plant is in El Paso, which can produce up to 27.5 MGD (approximately 84.5 acre-feet per day). Currently, there are no large-scale seawater desalination plants in Texas. Although the technology exists, it is still seen as cost-prohibitive. In addition to treating the water, there are large energy costs associated with transportation, since most of the major municipal centers are located away from the coast. One of the benefits of brackish water, in addition to its abundance, is that it is often regionally located, which reduces transportation needs and overall cost.

Understanding the science of a brackish aquifer can be critical to protecting fresh groundwater. Brackish groundwater can occur independently in a formation or can be collocated with fresh groundwater. In Texas, brackish groundwater is found in nearly all the state's major and minor aquifers, as well as in deeper, less productive formations. LBG-Guyton Associates, *Brackish Groundwater Manual for Texas Regional Water Planning Groups* viii (Texas Water Development Board 2003), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/2001483395.pdf. In aquifers where fresh and brackish groundwater exist together, overpumping of one can cause migration of the other. This relationship can also cause fresh and brackish waters to mix, thereby increasing treatment costs and causing other unintended consequences.

B. Water Use Patterns in Texas

Water availability and use patterns in Texas have experienced dramatic changes over the past century. A growing population and a dynamic economy, coupled with all too frequent droughts (at least one severe drought every decade for the past century), engendered an evolution in water resource management that has forever left its mark on the state. *See* 2012 State Water Plan, at 13–19; Joe G. Moore, Jr., *A Half Century of Water Resources Planning and Policy, 1950–2000, in Water for Texas* 7 (Jim Norwine et al. eds., Texas A&M University Press 2005); Rima Petrossian, *Water Use Patterns and Trends: The Future in Texas, in Water for Texas* 52.

In recent years, for example, the state's burgeoning population has spurred a shift from agricultural to municipal water use. In 1974 irrigation accounted for more than 75 percent of the total water used in the state, but by 2004 that percentage had dropped to less than 60. *See* Texas Water Development Board, *Historical Water Use Estimates*, www.twdb.state.tx.us/waterplanning/waterusesurvey/estimates/ [hereinafter Historical Water Use]. In contrast, during the same time frame, municipal use grew from 11 percent to nearly 25 percent of the total water used in Texas. The bulk of that increase came from municipal use of surface water resources, which increased from 18.8 percent to more than 40 percent of all surface water used in Texas, while municipal use of groundwater accounted for 8 percent of all groundwater used in the state in 1974, peaked at 20.5 percent in the late 1980s, and then settled at 13.75 percent in the early 2000s. *See* Historical Water Use. In addition to population growth, other reasons for the decrease in water use for irrigation include a decrease of irrigated land from 8.6 million acres in 1974 to 6.35 million acres in 2000 and the use of improved water conservation techniques. See Amy Hardberger, *From Policy to Reality: Maximizing Urban Water Conservation in Texas* 3, Environmental Defense Fund (2008), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1873540 [hereinafter *From Policy to Reality*]. Irrigation demand is expected to decline over the planning horizon by 17 percent over the next fifty years in part due to improvements in irrigation efficiency and the loss of irrigated farmland to urban development in some regions. 2012 State Water Plan, at 141.

Other noteworthy trends in Texas water-use patterns can be identified. Between the 1950s and late 1970s, the average per capita municipal use statewide rose from around 100 gallons per day to 182 gallons per day. See From Policy to Reality, at 3. That rate declined in the 1980s and leveled off at around 158 gallons per capita per day in the mid-1990s. Over the last decade, it has fluctuated between 150 and 182, with the highest rates coinciding with drought periods. *See* Texas Water Development Board, *Annual Statewide Water Use—Updated June 12, 2015*, *available at* www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/data/TexasStatewideReport_6_12_15_Revision.pdf. During dry conditions, water consumption can increase considerably due to outdoor watering, accounting for 50 to 80 percent of a home's water use. Texas Water Development Board, *Conserving Water Outdoors*, *available at* www.twdb.texas.gov/publications/brochures/conservation/doc/ConservingWaterOutdoor.pdf.

Another significant trend can be seen in the state's industrial and manufacturing sector, whose water use has been relatively consistent over the past thirty years. In 1974, the sector used almost 1.6 million acre-feet of water. That number has fluctuated downward on occasion, reaching as low as 1.37 million acre-feet in 2000. In 2010, it was at 1.7 million acre-feet and projected to increase to 2.9 million acre-feet by 2060; however, in 2012 the sector used only a little over 1 million acre-feet. *See* Historical Water Use; 2012 State Water Plan, at 140. Likewise, as a percentage of the total water used in the state, use by the industrial and manufacturing sector has reliably fluctuated between 8.4 and 10.8 percent during the past thirty years and in 2004 was 9.9 percent of the total water used in Texas. The 2012 dip in demand reduced this sector's percentage of total water use to 6.6 percent. *See* Historical Water Use.

In addition, the continuing growth in shale gas and oil drilling in Texas, especially efforts that use hydraulic fracturing techniques ("fracking"), is increasing the amount of water use. *See* James Bene et al., Northern Trinity/Woodbine Aquifer Groundwater Availability Model, *available at* http://rio.twdb.state.tx.us/RWPG/rpgm_rpts/0604830613_BarnetShale.pdf. In the last few years, shale growth has increased exponentially in many areas of the state including the Eagle Ford Shale in the southeast. Similarly, enhanced recovery production has expanded in the Permian Basin. In 2014, the Texas Railroad Commission issued more than five thousand drilling permits for the Eagle Ford, nearly one thousand for the Barnet Shale, and more than ten thousand for the Permian Basin. *See* Texas Railroad Commission, *Eagle Ford Shale Information*, www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/eagle-ford-shale/; Texas Railroad Commission, *Barnett Shale Information*, www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/barnett-shale-information/; Texas Railroad Commission, *Permian Basin Information*, *available at* www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/permian-basin/. These wells rely almost entirely on groundwater for the fracking process. Of particular concern is the failure of the State Water Plan to include in its water use and availability projections data on the significant amounts of water used in such operations. The 2012 State Water Plan indicates that water use in the mining sector, which includes fracking operations, will be monitored during the next regional water planning cycle. 2012 State Water Plan, at 140. See Chapter 20 of this book for a discussion of regional and state water planning.

C. Future Uses and Needs in Texas

Although everyone agrees that the demand for water in Texas will increase, the amount of that increase and the best way to prepare for that need are subjects of ongoing debates. The state is projected to grow from approximately 25.4 million people in 2010 to 46.3 million by 2060. 2012 State Water Plan, at 132. Moreover, water use by the industrial and manufacturing sector is expected to intensify in the next few decades and grow to 2.9 million acre-feet by 2060. 2012 State Water Plan, at 140. These additional people and the increased business and industry in Texas will require more water. To complicate issues, growth is not predicted to be equal across the state. Some areas will grow more than others, and additional water resources will be needed.

Based on current water use rates, between 2010 and 2060 municipal water demands for the state are expected to nearly double, from 4.9 million acre-feet to 8.4 million acre-feet. 2012 State Water Plan, at 3, 136. Assuming Texas maintains the use patterns of the 2000s, more than 50 percent of the state's population in 2060 will face a water need of at least 45 percent of their projected demand during a repeat of drought conditions if no additional supply is created. 2012 State Water Plan, at 177. The good news is that water demand is not predicted to escalate in the same ratio as population. Texas's water demand is expected to increase only 22 percent, from 17.5 million acre-feet in 2000 to a total of 21.6 million acre-feet in 2060. 2012 State Water Plan, at 136. One significant reason for the moderate total increase is that more water is expected to shift from agricultural uses to municipal uses. 2012 State Water Plan, at 136.

Using water differently through a better understanding of conservation and efficiency can also alter these predictions. The cities of El Paso and San Antonio exemplify the impact that conservation and efficiency measures can have on reducing demand. In 2000, El Paso's water projections showed that the city's water supply would be completely depleted in twenty-five years. E. Dan Klepper, *¡Agua Caliente!*, *Texas Parks & Wildlife* 16–17 (July 2002). Using a combination of diversification of supply, technology, and efficiency programs, the city has been able to stabilize its water usage even though its population increased. Conservation efforts have reduced per capita consumption from 210 gallons a day to less than 140. David Crowder, *Water Supply Plentiful as Boom Nears*, *El Paso Times*, Jan. 29, 2007, *available at* www.elpasotimes.com/ci_5108854. Similarly, San Antonio has reduced its per capita water use by 40 percent despite a 70 percent population increase since 1980. David McLemore, *S.A. Sets Conservation Example*, *Dallas Morning News*, Apr. 2, 2007.

Although conservation measures should be included in any water planning effort, the future of Texas water cannot rely entirely on conservation. Other solutions must be found. The 2012 State Water Plan reviews the state's current water resources and summarizes sixteen regional plans created by local planning groups based on area water resources. 2012 State Water Plan, at 2. See also Chapter 20 of this book for further discussion of state water planning. Based on this information, the 2012 State Water Plan proposes a series of water management strategies in an effort to plan for Texas's water future. Some of these are more controversial than others. For example, a large portion of the proposed future water would come from new reservoirs. 2012 State Water Plan, at 190. Many groups question this solution for political reasons, while others raise issues such as environmental impacts and evaporation rates and sedimentation, which are common in reservoirs, particularly in climates similar to those found in Texas. Elena Schneider, *Reservoirs Make Comeback in Parched Texas*, *The Texas Tribune*, Mar. 4, 2013, *available at* www.texastribune.org/2013/03/04/reservoirs-make-comeback-parched-texas-landscape/. Other proposed water management strategies include improved management of existing supply, water reuse, desalination, long-haul transport, and changes in agricultural practices. In spite of the debates over which approach is best, one thing is clear: the future of Texas is inextricably tied to the threat of water scarcity, and solutions must be found. For these solutions to be effective, the science must first be understood.

III. Water and the Hydrologic Cycle

A. Understanding the Hydrologic Cycle

Unlike other natural resources, "the total volume of water in nature is fixed and invariable." David Keith Todd, *Groundwater Hydrology* 13, 14–16 (John Wiley 2d ed. 1980) [hereinafter Todd]. This is referred to as the world water budget. R. Allen Freeze & John A. Cherry, *Ground Water* 5 (Prentice Hall 1979) [hereinafter Freeze & Cherry]. Although the total quantity is unchanging, the form and the location of the water are constantly shifting. The hydrologic cycle, also known as the water cycle, is the continuous circulation of water—solid, liquid, or gas—on earth. (See Plate 1, Diagram of the Hydrologic Cycle, U.S. Geological Survey, *The Water Cycle—USGS Water Science School*, *available at* http://ga.water.usgs.gov/edu/watercycle.html.) *See* C.W. Fetter, *Applied Hydrogeology* (Prentice Hall 3d ed. 1994) [hereinafter Fetter]; Michael Price, *Introducing Groundwater* (Routledge 1996) [hereinafter Price]. This persistent and perpetual cycle has no beginning or ending. Water falls to the earth's surface as precipitation, such as rain, snow, or sleet, and flows over the earth's surface into fluid bodies, including rivers, lakes, and wetlands, or solid bodies, such as snow and ice, or seeps into the ground to become groundwater. Fetter, at 5–6; Price, at 15–16. Throughout its surface travels and especially when it reaches large bodies of water, much of the water evaporates through the effects of solar energy and returns to the atmosphere, where it continues in the cycle. Fetter, at 5–6; Price, at 15–16.

As for the water that seeps into the ground, in most cases the earth acts as a conduit allowing it to travel back to the surface where it can discharge, only to evaporate into the atmosphere to start the cycle again. Todd, at 13–15. Water typically percolates into the earth vertically downward until it reaches the groundwater table, where it flows in a more lateral direction through the porous spaces in the geologic formation. The rate of percolation into the subsurface and the flow of groundwater within aquifers are considerably slower than surface water flow, but both eventually allow water to return to the atmosphere and continue in the cycle. Price, at 17.

Normally, such water emerges in natural discharge sites, such as springs, rivers, lakes, lagoons, swamps, and the sea. Herman Bouwer, *Groundwater Hydrology* 293 (McGraw-Hill 1978) [hereinafter Bouwer] (noting that springs are the most conspicuous avenues for the natural return of groundwater to the surface). Plants also consume or absorb some water, which they then transpire through their leaves back into the atmosphere. Price, at 15–16 (discussing the processes of interception and transpiration of water by foliage). Other groundwater can remain in the ground as aquifer storage, which serves as an underground reservoir from which humans withdraw needed fresh water. However, due to the growing need for water, pumping of groundwater from wells is one of the greatest sources of aquifer discharge, the consequence of which is to remove water, at least temporarily, from the hydrologic cycle. Although the cycle may appear complex, its foundation hinges on the relationship between water in its various settings, including the surface and subsurface.

B. Surface Water and Groundwater Interrelationship

Groundwater is a significant component of the hydrologic cycle. This is especially evident given the vast quantity of water found under the ground. Price, at 2. From a hydrologic point of view, however, groundwater is neither similar nor dissimilar to surface water resources. Ground and surface waters are, in fact, part and parcel of the same thing, namely, water moving through the various stages of the hydrologic cycle. Thomas C. Winter et al., *Ground Water and Surface Water, A Single Resource*, U.S. Geological Survey Circular 1139, 76 (1998) [hereinafter Winter et al.], *available at* http://pubs.usgs.gov/circ/circ1139 (emphasizing the importance of considering groundwater and surface water collectively). Groundwater can assist surface water by sustaining stream flow when surface runoff is low; likewise, surface recharge features, including stream beds, can assist in aquifer replenishment. Todd, at 16. The relationship between these water sources is natural; however, it is not inalterable and can be influenced by external influences. See Chapter 5 of this book regarding conjunctive management and use.

C. Climate Change and the Hydrologic Cycle

Unfortunately, the hydrologic cycle is not immune to the impacts of mankind. In addition to the dewatering of surface water and groundwater resources created by pumping, global climate change affects many aspects of the hydrologic cycle. Intergovernmental Panel on Climate Change, *Summary for Policymakers* 7 (2007) [hereinafter IPCC]. Human activities, such as burning fossil fuels and clearing forests, have released large quantities of carbon dioxide and other global warming gases into the atmosphere. *Massachusetts v. EPA*, 549 U.S. 497, 504–07 (2007). These gases trap the sun's heat and slow its escape back into space, thereby threatening to disrupt the delicate balance needed to sustain earth's ecosystems.

During the past one hundred years, average temperatures worldwide have risen more than one degree Fahrenheit. The year 2014 was the warmest year on record since recordkeeping began in 1880, and 2011 was the driest in Texas. *See* National Aeronautics and Space Administration, *NASA, NOAA Find 2014 Warmest Year in Modern Record* (Jan. 16, 2015), www.nasa.gov/press/2015/january/nasa-determines-2014-warmest-year-in-modern-record; State Impact Texas, *Everything You Need to Know About the Texas Drought*, http://stateimpact.npr.org/texas/tag/drought/. One of the most important potential impacts of climate change is its effect on water resources. A 2007 report of the United Nation's Intergovernmental Panel on Climate Change (IPCC) predicted a 10–30 percent decrease in river runoff and water availability in dry climates at midlatitudes as early as mid-century. IPCC, at 7.

The hydrologic cycle varies in terms of time, space, and scale. Although precipitation rates fluctuate, rain falls nearly everywhere, and the return of that water through evaporation is almost universal. Winter et al., at 2. As a consequence, some water never reaches an ocean before being returned to the atmosphere. Climatic changes can exacerbate these tendencies or shift the location of the water so that while the world water budget remains constant, the location of the water is rebalanced. See Michael Overman, *Water: Solutions to a Problem of Supply and Demand* 45 (Doubleday 1969). Some areas may have very little water, resulting in scarcity and droughts, while other areas have more than is needed, resulting in destructive floods and storms.

Texas is unique in its range of geographic and topographic regions. The local climate is determined by fronts coming in from the north and moist air from the Gulf of Mexico. *The Impact of Global Warming in Texas* 42 (Gerald R. North et al. eds., University of Texas Press 1995) [hereinafter *Impact of Global Warming*]. These forces are critical in determining much of the state's weather patterns. Even a small shift in these systems may have large impacts on the state's water supply and may alter these geographic provinces. For example, if the dry climate of West Texas migrates eastward, it could transform the Hill Country.

If the model predictions about climate change are correct, global warming could significantly impact Texas's water resources. Models show that Texas may be subject to increasing temperatures that could reduce soil moisture, which affects agricultural water needs as well as the amount of water percolating through the subsurface. *Impact of Global Warming*, at 42. More heat could also result in increased evaporation, possibly affecting the economics and reliability of reservoirs and other surface water resources. Furthermore, climate change may alter precipitation patterns in Texas, shifting or decreasing rainfall across parts of the state. Decreased rainfall will diminish river flows and aquifer recharge and affect water supply planning.

The hydrologic cycle and climate change are natural processes. Because water is an integral part of human life and development, law and policy are injected into the natural process as a means for managing water resources for the benefit of people and communities. This interaction creates new and varying definitions and interpretations of nature's mechanisms that must be understood in their proper context. Unfortunately, climate change and its potential impacts have not been integrated into the Texas State Water Plan or Texas policy.

D. Relationship of the Hydrologic Cycle to Water Law

"The hydrologic cycle controls the distribution of water available for human use on the earth's surface. Water law is a function of the incomplete fit between water availability and the demand for various uses." A. Dan Tarlock, *Law of Water Rights and Resources*, *Environmental Law Series* 2-2 (West 1998 & Supp. 2006). A common shortfall in water law is the failure to consider the entire hydrologic cycle. In Texas, for example, surface water and groundwater are regulated under different legal regimes. Whereas surface water is primarily managed under a state-run prior appropriation permit system, groundwater is owned by surface owners under the right of capture. Ownership rights can be regulated by local groundwater conservation districts where they are present. See Chapter 3 of this book regarding surface water law, Chapter 4 regarding groundwater law, and Chapter 5 regarding conjunctive management and use.

The consequence of these disparate regulatory structures is that interrelated surface water and groundwater are often managed independently and with little thought to their impact on each other. An example of this situation is the elimination of Comanche Springs in Fort Stockton, Pecos County, Texas, in the late 1950s. These surface springs became dry because of overpumping of the Edwards-Trinity Plateau Aquifer, which was drained in accordance with the rule of capture. Brune & Besse, at 357. Pumping for fruit irrigation dried up this "oasis in the desert" and severely affected the local community, which had used the springs as a tourist attraction. Art Chapman, *Running Dry*, *Fort Worth Star-Telegram*, Feb. 14, 2007, at B4; *see also Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.).

Some water law principles can be considered in the context of the hydrologic cycle. Perhaps the simplest way is through the application of conjunctive use principles. Though not incorporated into Texas law, conjunctive use principles recognize the relationship between surface water and groundwater and seek to regulate water as a system and not as individual resources. While not mandated under Texas law, conjunctive use is applied in the management of the Edwards Aquifer and the various springs fed by that aquifer. *See* Todd H. Votteler, *The Little Fish That Roared: The Endangered Species Act, State Groundwater Law, and Private Property Rights Collide over the Texas Edwards Aquifer*, 28 Envtl. L. 845 (1998) [hereinafter Votteler].

IV. The Legal and Scientific Language of Water Resources

One of the more troublesome aspects of water law can be the divergence often encountered between legal and scientific definitions, as well as among subfields of the law. Although the vocabulary used by the various communities can overlap, the meanings ascribed by each to various terms and concepts may differ significantly. For example, the scientific understanding of "surface water" is markedly different from the legal meaning provided under the Texas Water Code (see below). Moreover, that term has different legal definitions depending on whether it is used in the context of water quality standards or water rights (see below). At the very least, such differences can result in confusion or misunderstanding. At worse, they can result in distinctions that fail to reflect scientific reality or misapply the law. Accordingly, it is imperative that anyone who enters the field of water law be well versed in the scientific and the various legal understandings of the terms and concepts relevant to the subject matter.

A. Understanding Surface Water

Surface water is the water resource most familiar and understandable to people because, unlike groundwater, it is visible and tangible. Generally surface water is what it sounds like: water that exists on the surface of the earth. It can take many forms, but most commonly it occurs as rivers, streams, lakes, wetlands, and reservoirs. Surface water also includes the solid forms of water—snow and ice. Winter et al., at 1.

As a legal matter, when "surface water" is discussed with reference to water rights the phrase is often used interchangeably with the term "state water." Under section 11.021(a) of the Texas Water

Code, "state water" is defined as "[t]he water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state." Tex. Water Code § 11.021(a). By definition and by case law interpretation, it does not include "diffused surface water." *See Dietrich v. Goodman*, 123 S.W.3d 413, 417–18 (Tex. App.—Houston [14th Dist.] 2003, no pet.).

Diffused surface water refers to "water or natural precipitation diffused over the surface of the ground until it either evaporates, is absorbed by the land, or reaches a bed or channel in which water is accustomed to flowing." *Raburn v. KJI Bluechip Investments*, 50 S.W.3d 699, 704 (Tex. App.—Fort Worth 2001, no pet.) (citations omitted); *Dietrich*, 123 S.W.3d at 418–19. As a result, and in contrast to the scientific understanding of the term, diffused water is never found in a natural watercourse. *Dietrich*, 123 S.W.3d at 418. Accordingly, diffused water belongs to the landowner until it enters a natural watercourse. State water does not include diffused surface water or groundwater. State water in Texas is the property of the state. *See* Tex. Water Code § 11.021(a).

Based on the above definition, only water in a watercourse constitutes state water. A watercourse, however, entails a precise understanding. As defined by Texas case law, a "watercourse" is any "body of water flowing in a reasonably definite channel with bed and banks." *Watts v. State*, 140 S.W.3d 860, 866 (Tex. App.—Houston [14th Dist.] 2004, pet. ref'd) (quoting *Black's Law Dictionary* 1585 (7th ed. 1999)). To constitute a watercourse, the body of water must have (1) a bank and bed, (2) a current of water, and (3) a permanent supply source of water. *Hoefs v. Short*, 273 S.W. 785, 786–87 (Tex. 1925); *see also* 30 Tex. Admin. Code § 297.1(59) (defining a "watercourse" as "[a] definite channel of a stream in which water flows within a defined bed and banks, originating from a definite source or sources" and noting that the "water may flow continuously or intermittently, and if the latter with some degree of regularity, depending on the characteristics of the sources").

Permanent does not mean continuous, but rather an established source of water that occurs with some regularity such that it "establish[es] and maintain[s] a running stream for considerable periods of time." *Hoefs*, 273 S.W. at 788. In some cases, it can include streams that may be dry for extended periods of time. *Hoefs*, 273 S.W. at 787. Moreover, according to the *Watts* court, a watercourse "may be either artificial, *i.e.*, man-made, or natural." *Watts*, 140 S.W.3d at 866 (citing *Black's Law Dictionary* at 1586). As a result, under Texas law, the vast majority of Texas lakes, rivers, streams, channels, and other conduits of water are watercourses.

Outside of the Texas Water Code, the legal definition of "surface water" in Texas varies. One Texas court of appeals indicated that "[i]n common usage, the term simply means 'natural water that has not penetrated much below the surface of the ground.'" *Dietrich*, 123 S.W.3d at 417 (citing Webster's Third New International Dictionary 2300 (1993)). This "common" understanding appears to comport with the general definition provided for surface water under chapter 30 of the Texas Administrative Code, which encompasses—

> [l]akes, bays, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, wetlands, marshes, inlets, canals, the Gulf of Mexico inside the territorial limits of the state [from the mean high water mark (MHWM) out 10.36 miles into the Gulf], and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, navigable or nonnavigable, and including the beds and banks of all water-courses and bodies of surface water, that are wholly or partially inside or bordering the state or subject to the jurisdiction of the state; except that waters in treatment systems that are authorized by state or federal law, regulation, or permit, and which are created for the purpose of waste treatment are not considered to be water in the state.

30 Tex. Admin. Code § 307.3(a)(66). That definition, however, is applicable only with regard to surface water quality standards as provided for by the Texas Commission on Environmental Quality. See also Chapter 39 of this book discussing the definition of surface water in relation to flood management.

1. Headwaters and Mouth of a River

Rivers are large natural streams of water flowing in channels and emptying into larger bodies of water. Brian J. Skinner & Stephen C. Porter, *Physical Geology* 270 (John Wiley 1987). The beginning of a river is its source, also called the headwaters. It is the original point from which the river flows. Located at higher elevations, the source may be fed by an underground spring or by runoff from rain, snowmelt, or glacial melt. E.C. Pielou, *Fresh Water* 81–82 (University of Chicago Press 1998) [hereinafter Pielou]. In contrast, the river mouth is the end point of a river; it is the place where a river flows into a larger body of water, such as another river, a lake, or an ocean. V.N. Mikhailov, *Principles of Typification and Zoning of River Mouth Areas*, 31 Water Res. 1 (Jan. 2004).

2. Tributary

River systems consist of a network of links and nodes that make up the middle portion of a river. These links and nodes are called tributaries. Michael A. Summerfield, *Global Geomorphology* 208–09 (Longman 1991) [hereinafter Summerfield]. A tributary is a stream that flows into and contributes to a larger stream or another body of water. *Cf.* Tex. Water Code § 41.009 (defining "tributary" in the Rio Grande Compact to mean "any stream which naturally contributes to the flow of the Rio Grande") *and* Tex. Water Code § 46.013 (defining "tributary" in the Red River Compact to mean "any stream which contributes to the flow of the Red River"). As more and more tributaries join together, the flow accumulates and expands the size of the river. Summerfield, at 208–09. Some rivers have many branches, or bifurcations, of tributaries, while others do not. Often the amount of bifurcation is attributable to the types of rock and soil found in the area as well as the length of overland flow. The longer the flow distance of a river, the more branches it is likely to have. Because water supply in a river is achieved through accumulation, the flow of each tributary is important, and its absence can have impacts downstream. Summerfield, at 208–09.

3. Watershed, Drainage Basin, and Catchment Area

A watershed is the area of land surface in which water, generated by precipitation, flows or drains from the land into a particular river, stream, or the ocean. Summerfield, at 207; Environmental Protection Agency, *Water Science Glossary of Terms*, http://water.usgs.gov/edu/dictionary.html#W. A watershed can also be referred to as a drainage basin or catchment area. It is the "fundamental geographic unit of hydrology" and is the most important factor through which to understand local precipitation and runoff. Office of Technology Assessment, *Water Supply: The Hydrologic Cycle* 37, *in Perspectives on Water Uses and Abuses* (David H. Speidel et al. eds, Oxford University Press 1988). Drainage basins are generally well defined and can be identified by tracing a line along the highest elevations between two areas on a map. Areas of higher elevation that form the boundaries of a watershed are called drainage divides. Summerfield, at 207. These irregular boundaries generally follow local topography. William S. Carlsen et al., *Watershed Dynamics* 4 (National Science Teachers Association 2004) [hereinafter Carlsen et al.].

Watersheds vary greatly in size and shapes depending on regional geology. Carlsen et al., at 4–5; Pielou, at 84–86. Large watersheds, like the area that drains into the Mississippi River, contain many smaller watersheds, or subwatersheds, that flow into the river. Carlsen et al., at 5; Coastal America, *Toward a Watershed Approach: A Framework for Aquatic Ecosystem Restoration, Protection, and*

Management (1994). Under Texas case law, "[a] 'watershed' is a topographical designation to describe an area in which surface water flows during a rain event because of gravity toward a 'watercourse' such as a river, bayou, ditch or creek." *Texas Woman's University v. The Methodist Hospital*, 221 S.W.3d 267, 275–76 (Tex. App.—Houston [1st Dist.] 2006, no pet.). Under title 30 of the Texas Administrative Code, a "watershed" "designate[s] the area drained by a stream and its tributaries, or the drainage area upstream from a specified point on a stream." 30 Tex. Admin. Code § 297.1(61). This latter definition applies to procedural and substantive water rights (30 Tex. Admin. Code chs. 295 and 297, respectively) as well as water conservation and drought contingency plans (30 Tex. Admin. Code ch. 288).

4. *Base Flow*

The water in a river consists of water from various sources. River discharge is the volume of water that passes through a given cross section of the river in a set amount of time. The quantity of discharge sustained without the addition of water from precipitation, runoff, or melting snow is called "base flow." Summerfield, at 193. Under title 30 of the Texas Administrative Code, base flow is "[t]he portion of streamflow uninfluenced by recent rainfall or flood runoff and is comprised of springflow, seepage, discharge from artesian wells or other groundwater sources, and the delayed drainage of large lakes and swamps." 30 Tex. Admin. Code § 297.1(6). Under certain circumstances, "[a]ccountable effluent discharges from municipal, industrial, agricultural, or other uses of ground or surface waters may be included" in determining base flow. 30 Tex. Admin. Code § 297.1(6). Base flow is important because it is a quantity of water that maintains a perennial or continuous stream.

5. *Underflow*

Under Texas law, the "underflow" refers to water found within the bed and banks of a river. Although this water is found within the ground, it is regarded as "state water" and is subject to prior appropriation. According to title 30 of the Texas Administrative Code, the underflow of a river refers to—

> [w]ater in sand, soil, and gravel below the bed of the watercourse, together with the water in the lateral extensions of the water-bearing material on each side of the surface channel, such that the surface flows are in contact with the subsurface flows, the latter flows being confined within a space reasonably defined and having a direction corresponding to that of the surface flow.

30 Tex. Admin. Code § 297.1(55).

6. *Environmental Flows*

"Environmental flows" is a term that refers to both instream flows and fresh water inflows into bays and estuaries. At its most basic level, "instream flows" means the water in streams, rivers, and lakes. *See* Tom Annear et al., *Instream Flows for Riverine Resource Stewardship* 1 (Instream Flow Council 2002) [hereinafter Annear et al.]. Instream flows support a variety of fishery and aquatic wildlife resources and the ecological processes of riverine systems. Annear et al., at xix. Fresh water inflows into bays and estuaries is the water necessary to sustain a broad range of biological needs in those coastal systems. Rivers serve many functions, including moderating floods and droughts, renewing soil fertility, often recharging certain aquifers, and providing habitat and breeding sites for fish and wildlife. Sandra Postel & Brian Richter, *Rivers for Life: Managing Water for People and Nature* 2 (Island Press 2003). Fresh water from rivers meets and mixes with seawater in estuaries, dynamic systems that in Texas create diverse wetlands that support the production of 100 million pounds of seafood annually and sustain a birding paradise. Larry McKinney, *Texas: The State of Rivers*, *Texas Parks & Wildlife* 23 (July 2004), *available at* www.tpwmagazine.com/archive/2004/jul/ed_2/. In 2007, as part of the omnibus bill S.B. 3, the state legislature enacted a new statutory scheme for protecting the environmental flows that support the state's riverine and bay systems. See Chapter 11 of this book regarding environmental flows.

B. Understanding Groundwater

Groundwater makes up only three-quarters of 1 percent of the total volume of fresh and saltwater found in nature. Nonetheless, it makes up nearly 97 percent of the fresh water readily available on earth for human use. *See* Bouwer, at 1–3.

Water is found throughout the subsurface in various quantities. The term "groundwater," however, does not encompass all subsurface waters. Rather, it specifically pertains to subsurface water found within the saturated zone of a porous geologic formation and that may be naturally or mechanically extracted. The saturated zone is the "[p]ortion of the geologic profile below the groundwater table, in which the pores or voids between the soil particles are filled with water." *Kansas v. Colorado*, No. 105, 1994 WL 16189353, at *1 (U.S. Oct. 3, 1994); *see also Shurbet v. United States*, 242 F. Supp. 736, 740 (N.D. Tex. 1961) (describing the saturated zone as "the underground area containing water-bearing material from which water can be artificially extracted"); *compare with* 30 Tex. Admin. Code §§ 330.3(134), 334.481(51), 335.1(134) (defining the saturated zone as "[t]hat part of the earth's crust in which all voids are filled with water" in the context of rules for industrial solid and municipal hazard wastes). Groundwater does not include water found in the unsaturated zone of such formations. *See Price*, at 7 (describing the difference between surface water and groundwater); Ralph C. Heath, Basic *Ground-Water Hydrology*, Water Supply Paper 2220, 1, 4 (U.S. Geological Survey, 10th prtg. 2004, rev.) [hereinafter Heath]. In the context of underground and aboveground storage tanks, the unsaturated zone is defined in chapter 30 of the Texas Administrative Code as—

> [t]he subsurface zone containing water under pressure less than that of the atmosphere (including water held by capillary forces within the soil) and containing air or gases generally under atmospheric pressure. This zone is bounded at the top by the ground surface and at the bottom by the upper surface of the zone of saturation (i.e., the water table).

30 Tex. Admin. Code § 334.2(116); *compare with* 30 Tex. Admin. Code § 334.481(62) (applicable in the context of the storage, treatment, and reuse procedures for petroleum-substance contaminated soil related to underground and aboveground storage tanks), *and* 30 Tex. Admin. Code § 335.1(165) (applicable in the context of industrial solid and municipal hazardous wastes) (describing the unsaturated zone as "[t]he zone between the land surface and the water table"). It is economically infeasible and often physically impossible to pump water from the unsaturated zone.

In Texas, "groundwater" is defined as "water percolating below the surface of the earth." Tex. Water Code §§ 35.002(5), 36.001(5); *compare with* 30 Tex. Admin. Code § 297.1(21) (defining groundwater as "[w]ater under the surface of the ground other than underflow of a stream and underground streams, whatever may be the geologic structure in which it is standing or moving"); Tex. Spec. Dist. Code § 8801.001(4) (defining groundwater as "water located beneath the earth's surface" but excluding "water produced with oil in the production of oil and gas"); 30 Tex. Admin. Code §§ 330.3(61), 334.481(28), 335.1(66); 31 Tex. Admin. Code § 601.3(6) (defining groundwater as "[w]ater below the land surface in a zone of saturation"). A groundwater reservoir is a "specific subsurface water-bearing reservoir having ascertainable boundaries containing groundwater." Tex. Water Code §§ 35.002(6), 36.001(6). Groundwater in Texas is specifically excluded from the definition of state water and is subject to the rule of capture as modified by the various groundwater conservation districts across the state. See Chapter 4 of this book for a discussion of the rule of capture.

This is true even where percolating water supplies a surface stream. *See Denis v. Kickapoo Land Co.*, 771 S.W.2d 235, 236 (Tex. App.—Austin 1989, writ denied).

The scientific definition of groundwater does not include a water quality metric. This means that nonpotable water with high TDS is included; however, Texas law does not clarify whether current groundwater laws and regulations apply to brackish groundwater. The issue was raised in the 2013 legislative session and will likely arise again.

1. Aquifer

An "aquifer" is a relatively permeable geologic formation (composed of unconsolidated material such as sand or gravel) that has sufficient water storage and transmitting capacity to provide a useful water supply via wells and springs. *See* Heath, at 6; Price, at 9; *compare with* 30 Tex. Admin. Code §§ 330.3(8), 335.1(8) (describing an "aquifer" as "[a] geological formation, group of formations, or portion of a formation capable of yielding significant quantities of groundwater to wells or springs"), § 230.2(1) (defining an "aquifer" as "[a] geologic formation, group of formations, or part of a formation that contains water in its voids or pores and may be used as a source of water supply"); *and Mitchell Energy Corp. v. Bartlett*, 958 S.W.2d 430, 434 (Tex. App.—Fort Worth 1997, writ denied) (asserting that "[a]n aquifer is an underground rock stratum with sufficient permeability to permit movement of water through it"). Accordingly, an aquifer encompasses the saturated portion or saturated zone within a porous geologic formation.

It is noteworthy that aquifers are very often in a state of flux, meaning that the volume of water contained or flowing through the geologic formation is constantly changing. These changes are the result of variations in the amount of water flowing into (recharge) and out of (discharge) the saturated zone. When the water table (see definition below) drops during a drought or when human withdrawals exceed recharge, the portion of the geologic formation that is described as an "aquifer" decreases in volume. Conversely, when the water table rises as a result of rainfall or another increase in recharge, or even a reduction in human withdrawals, the portion of the geologic formation that conforms to the definition of an "aquifer" increases in volume.

All aquifers have an impermeable base layer that prevents water from seeping to lower-lying strata, thus creating a natural water reservoir within the porous geologic formation. *See* Bouwer, at 4 (listing some materials that constitute the impermeable layer, including clays or "other fine-textured granular material, or of shale, solid limestone, igneous rock, or other bedrock"). At any given location, the land surface may be underlain by one or more distinct aquifers separated by impermeable layers (like different apartments separated by floors in a multilevel apartment building), depending on the composition of the underlying strata. *See* Fetter, at 511.

a. Unconfined or Water-Table Aquifer

An *unconfined aquifer* (see Figure 1) is an aquifer bounded by an impermeable base layer of rock or sediments, and overlain by layers of permeable materials extending from the land surface to the impermeable base of the aquifer. *See Shurbet*, 242 F. Supp. at 741 (defining an "unconfined aquifer" as an aquifer "in which the water is not confined between two impervious layers and in which the water level in a well drilled in the aquifer reflects the general level of the water table throughout the aquifer"); *see also* Heath, at 6; Price, at 10–11. Such an aquifer also may be referred to as a *water-table aquifer* because its upper limit is defined by the water table. *Cf.* Heath, at 6.

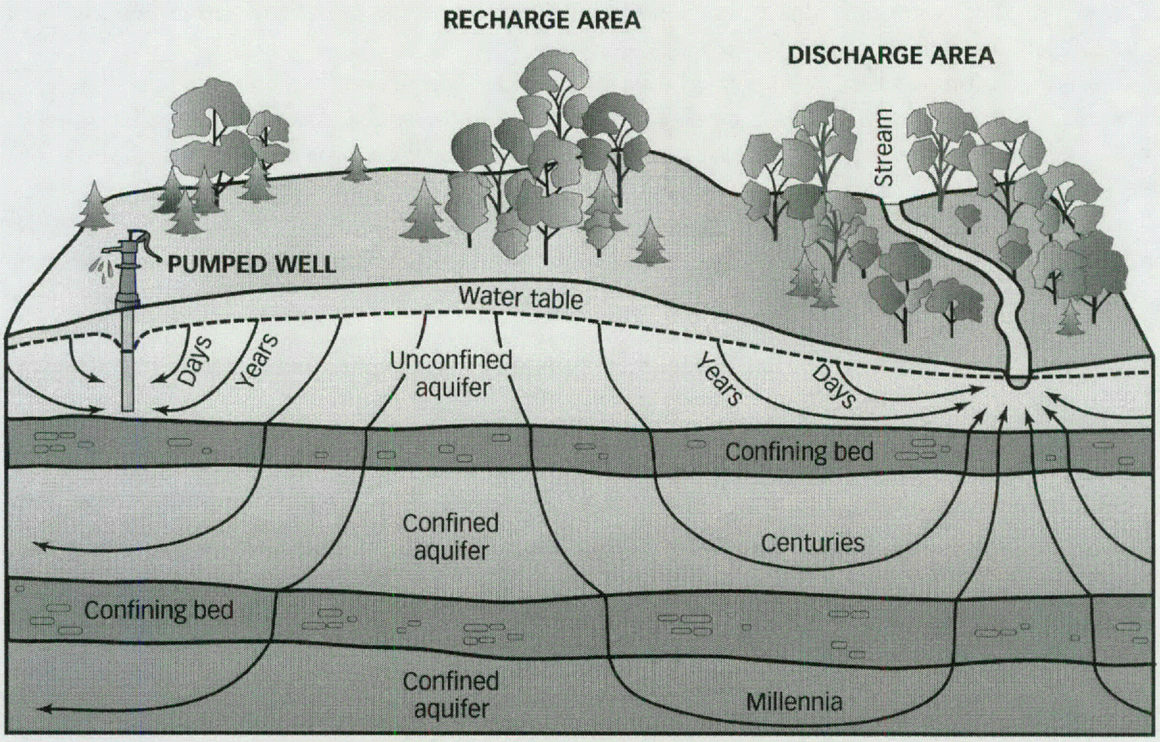

Figure 1. Diagram of an unconfined aquifer overlaying confined aquifers and groundwater flow paths with general length, depth, and travel time from points of recharge to points of discharge. Thomas C. Winter et al., *Ground Water and Surface Water, A Single Resource*, U.S. Geological Survey Circular 1139, 5 (1998), *available at* http://pubs.usgs.gov/circ/circ1139.

Although not always the case, unconfined aquifers are often directly related to a surface water body, such as a river or lake. *See* Bouwer, at 4, 6 (explaining that seepage and drainage from rivers and lakes connect unconfined aquifers to surface bodies of water). Rivers, for example, tend to have interrelated unconfined aquifers located directly underneath and following the course of the riverbed. *See* Bouwer, at 3-4 (noting that, depending on the strata underneath and beside the river, an unconfined aquifer hydraulically related to a river is generally spread out laterally on both sides of and below the river). This scenario can create considerable complications when considering the legal distinctions between a river's underflow and an interrelated aquifer (see definition of underflow above). Unconfined aquifers, however, can also exist independent of a surface body of water. The Ogallala Aquifer is an example of an unconfined aquifer with little hydraulic connection to any surface water bodies. Rex C. Buchanan et al., *The High Plains Aquifer*, Publ. Info. Circular 18 at 1 (KA Geol. Survey 2001) [hereinafter Buchanan et al.], *available at* www.kgs.ku.edu/Publications/pic18/index.html.

b. Confined or Artesian Aquifer

In contrast, a *confined aquifer* (also known as an *artesian aquifer*) (see Figure 1) is an aquifer contained between two impermeable layers—the base, or "floor," and the "ceiling" strata—that subject the stored water to hydrostatic pressure exceeding atmospheric pressure. *See Shurbet*, 242 F. Supp. at 741 (defining a confined aquifer as an aquifer that "is confined under hydrostatic pressure between two relatively impermeable beds, and in which the water level in a well drilled in the aquifer will rise above the top of the aquifer"); *see also* Heath, at 6; Price, at 10–11. If a well is drilled through the impermeable upper layer of the aquifer, the confining or hydrostatic pressure within the confined aquifer propels water through the well toward the surface. *See Shurbet*, 242 F. Supp. at 741; *see also* Fetter, at 110. The water may rise a considerable distance above the top of the aquifer and may spout above the ground surface. *See* Fetter, at 110.

As an example, consider a U-shaped tube filled with water. If one were to attach a vertical pipe (or "well") in the center of the tube between the two raised arms, water would be propelled upward into the vertical pipe at the point where it is attached. The water in the pipe would rise as a result of the pressure until it reached a point where the hydrostatic pressure equals atmospheric pressure.

Where a well is drilled into a confined aquifer, the well acts as a partial relief valve for the confining pressure in the aquifer. Water in the well will rise until the hydrostatic pressure equals atmospheric pressure. If the water level in the well rises and spouts above the ground surface, the well is called a *flowing artesian well*. *See* Heath, at 6.

Despite their name, confined aquifers are not devoid of any connection to surface water or other water resources. *See* Bouwer, at 4–5 (relating that confined aquifers may transmit water vertically to surface waters, and vice versa, through an aquitard—a layer of strata less permeable than the aquifer, but not totally impermeable). Such aquifers must have a water source and often are recharged through lateral flow of water from recharge zones located at distant higher elevations, such as mountains or high plateaus, where the aquifer crops out on the land surface. *See* Bouwer, at 5. In addition, confined aquifers can themselves discharge into rivers and lakes at lower elevations. *See* Bouwer, at 6 (noting that "[h]illside seeps and springs occur where the aquifer and its lower impermeable boundary are exposed to the atmosphere at hillsides, canyons, etc.").

c. Nonrecharging Aquifer

Aquifers that receive little or no recharge are described as nonrecharging aquifers. *Cf.* Fetter, at 288. The water in such aquifers is typically stagnant, with little if any flow. In most cases, these aquifers contain very old groundwater that has been trapped in a geologic formation for centuries or eons because the aquifer is physically isolated from sources of recharge, the surrounding formations are impermeable, or there is a paucity of recharge in an arid region. *See* Bouwer, at 7; Fetter, at 364.

Often found in arid and semiarid climates, nonrecharging aquifers are important sources of water for many parts of the United States. The Ogallala Aquifer in the central United States is an example of an unconfined aquifer with relatively limited recharge. Located at depths ranging from a few meters to hundreds of meters below the surface, the water in this aquifer is estimated to be thousands to millions of years old. *See* Manjula V. Guru & James E. Horne, The Kerr Center for Sustainable Agriculture, *The Ogallala Aquifer* (2000), *available at* http://kerrcenter.com/wp-content/uploads/2014/11/ogallala_aquifer.pdf. While the overlying strata are still relatively permeable, present-day recharge rates range from miniscule to nil. Buchanan et al., at 2, 5.

2. *Water Table*

The term "water table" generally refers to the upper limit of a saturated geologic formation (see Figure 1). *See Shurbet*, 242 F. Supp. at 740; *see also* Winter et al., at 6. This definition, however, is more applicable to unconfined aquifers. (See "unconfined aquifer" above.) A water table is more correctly described as the level in the saturated zone of a saturated geologic formation in which the hydraulic pressure is equal to atmospheric pressure. *See* Heath, at 4; *see also* 30 Tex. Admin. Code § 330.3(176) (describing the water table in the context of municipal solid waste as "[t]he upper surface of the zone of saturation at which water pressure is equal to atmospheric pressure, except where that surface is formed by a confining unit"). Thus, in an unconfined aquifer, the water table is represented by the top of the saturated zone of the geologic formation. In a confined aquifer (see "confined aquifer" above), the water table is evidenced by the level to which the water naturally rises in an unused well.

3. *Functioning of an Aquifer*

The "functioning" of an aquifer refers to how a particular aquifer works or operates as an aquifer. Aquifers typically store and transport water and dilute wastes and other contaminants; provide a habitat for aquatic biota; and serve as a source of fresh water and nutrients to aquifer-dependent ecosystems. Some aquifers even provide geothermal heat. Each of these is a function of an aquifer. All functions are dependent on the particular aquifer's hydrostatic pressure, hydraulic conductiveness, and mineralogical, biological, and chemical attributes. Moreover, those functions may be interdependent to the extent that the aquifer's continued operation depends on the continuation of the particular function or series of functions. *See generally* Heath, at 14–15 (describing the basic "functions" of groundwater systems).

4. *Groundwater Flow*

Aquifers and groundwater are sometimes mistakenly perceived as underground lakes or rivers. In reality, they are neither. In most aquifers, water is rarely stagnant (except in aquifers with no recharge) and tends to flow toward natural discharge sites, such as springs, rivers, lakes, lagoons, swamps, or the sea. *See* Bouwer, at 36 (asserting that "[u]ndergroundwater is almost always in motion"); Heath, at 20. Water in an aquifer resides in the pore spaces of a geologic formation similar to water in a sponge, where the water fills all the small holes. The material found in a geologic formation, though, is far less elastic or pliable than that of a sponge. Accordingly, water flowing through an aquifer does so by seeping through the available pore spaces.

One notable consequence of this water flow process is that the rate or velocity of flow is typically far slower than any water flow perceived on the land surface, such as in rivers and streams. Groundwater velocities commonly range from one meter per day to one meter per year. *See* W. Kenneth Hamblin & Eric H. Christiansen, *Earth's Dynamic Systems* 325 (Prentice Hall 10th ed. 2001); *see also* Heath, at 25 (noting that "[t]he rate of movement of groundwater is greatly overestimated by many people, including those who think in terms of groundwater moving through 'veins' and underground rivers at the rates commonly observed in surface streams. . . . It would be more appropriate to compare the rate of movement of groundwater to the movement of water in the middle of a very large lake being drained by a very small stream."). Although water generally flows at low velocity underground, an exception can occur in karst aquifers, such as the Edwards Aquifer. Karst aquifers generally consist of limestone. Because of the chemical composition of limestone (calcium carbonate), such aquifers are more prone to having their matrix dissolved by the water, which results in the formation of larger pores and cavities through which the water can flow at much faster rates. See Chapter 17 of this book regarding the Edwards Aquifer Authority.

The rate at which water flows in an aquifer is a function of hydraulic potential. *See* Heath, at 25. Hydraulic potential is the ability of an aquifer to transmit water. Hydraulic potential of surface water is primarily dependent on gravity and the slope of the land surface. Although gravity plays a central role in determining the hydraulic potential of groundwater, aquifer porosity and permeability (the ability of the aquifer to transmit water), the gradient or slope of the groundwater table (or the hydraulic gradient in the case of a confined aquifer), and temperature also play a significant role in determining the rate at which water will flow through the geologic formation. *See* Heath, at 20–25. Although the rate of percolation into the subsurface and the flow of groundwater within aquifers are considerably slower than surface water flow, they are relatively consistent processes. *See* Price, at 17.

5. Aquifer Recharge

Aquifers may recharge from precipitation-soaked ground, from lakes and streams, and, to some extent, from other aquifers. *See* Bouwer, at 4–6 (explaining that seepage and draining from rivers and lakes connect unconfined aquifers to surface bodies of water and that water in confined aquifers is derived mostly from rainfall in higher elevations where the aquifer is exposed to the surface); Fetter, at 512 (noting that confined aquifers may recharge from other aquifers). A recharge zone is the area from which a body of water is recharged. Freeze & Cherry, at 194; *see* 30 Tex. Admin. Code § 285.2(22) (defining "recharge zone" in the context of the Edwards Aquifer as "[t]hat area where the stratigraphic units constituting the Edwards Aquifer crop out, including the outcrops of other geologic formations in proximity to the Edwards Aquifer, where caves, sinkholes, faults, fractures, or other permeable features would create a potential for recharge of surface waters into the Edwards Aquifer. The recharge zone is identified as a geographic area delineated on official maps located in the agency's central office and in the appropriate regional office, or as amended by Chapter 213 of this title."); 30 Tex. Admin. Code § 213.3(27). Significantly, certain human activities, such as irrigation operations, dike and canal building, and damming projects, may also recharge aquifers. *See* Winter et al., at 57, 68. Aquifer recharge is a function of both gravity and the permeability of the strata lying between the aquifer and the source of the recharge. As a result, aquifers can transmit to and serve as a source of water for lakes, streams, and other aquifers.

6. Aquifer Discharge

Most aquifers have natural discharge points that allow their water to exit the aquifer. Such natural discharge zones include springs, rivers, lakes, lagoons, swamps, and the sea. *See* Bouwer, at 293. Aquifers, however, may also be discharged artificially. A well, for example, is an artificial means of aquifer discharge.

a. Cone of Depression

Water from water wells is usually produced by the use of a pump intake lowered into a water well. *See* Heath, at 30 (stating that the pump-intake action causes the water level of the well to fall). As a result of the pumping action, a pumping water well typically generates a flow of groundwater in the immediate vicinity of the well. The water converges radially from all directions on the well's intake pipe, resulting in a *cone of depression*—a curved, funnel-shaped depression in the water levels—centered at the pumping well. The largest drop in the groundwater level occurs in the center of the "funnel," that is, at the pumping well, and diminishes with distance from the pumping well. The shape and dimensions of the cone of depression—the amount of drop in the groundwater table at any given point around the pumping well—depend on the permeability of the aquifer material and the rate of pumping. *See* Heath, at 30–32.

b. Radius of Influence

The radial distance from a pumping well at which the drop in the groundwater table declines to nil is the *radius of influence* or the *radius of the cone of depression* for that particular water well at the specified rate of production. *See* Heath, at 30 (explaining that "because water must converge on the well from all directions and because the area through which the flow occurs decreases toward the well, the hydraulic gradient must get steeper toward the well"). Water outside the radius of influence (beyond the influence of the pumping well) does not flow toward the pump intake but rather in its normal flow pattern.

C. Surface Water and Groundwater Interaction

Surface water and groundwater are interrelated parts of a larger system and can interact in a range of ways. Water does not flow in only one direction; therefore, surface water can contribute to groundwater, and vice versa. As discussed above, groundwater and surface water are fundamentally interconnected in the hydrologic cycle. Understanding a water resource is incomplete without realizing the relationship between the surface and subsurface waters. Surface water percolates down into the ground to become groundwater. This water then flows laterally and eventually returns to the surface at a spring, the ocean, or other low-lying areas.

One of the more common routes of interaction is through streams. Streams can gain or lose water to the subsurface, or do both. This direction of flow is affected by many factors, including season, altitude, storm events, or local pumping. William M. Alley et al., *Sustainability of Ground-Water Resources*, U.S. Geological Survey Circular 1186, 30 (1999) [hereinafter Alley et al.], *available at* http://pubs.usgs.gov/circ/circ1186/pdf/circ1186.pdf. Lakes, wetlands, and reservoirs can have similar relationships with groundwater. Groundwater also discharges into the ocean in regions where there are low scarps and terraces and where surface water and groundwater mix in the tidal zones. Winter et al., at 42. Estuaries, which are common in Texas, create an interface between the ocean and discharges of fresh water. The addition of fresh water from rivers and groundwater is important to the maintenance and health of an estuary. Larry McKinney, *Why Bays Matter*, *Texas Parks & Wildlife* 24–25 (July 2003) [hereinafter McKinney, *Why Bays Matter*], *available at* www.tpwmagazine.com/archive/2003/jul/ed_2/.

Relationships between surface water and groundwater resources can vary in time and space. Price, at 10–11, 16. A river, for example, may discharge water into a related aquifer at one point of its course and receive water from groundwater at another, or a given stretch of a river may discharge into an aquifer during the autumn season and receive water in the spring. Understanding this association is important in water planning and anticipating water quantity and protecting water quality.

The interaction of water above and below ground extends beyond the movement between bodies of water. Groundwater flows laterally to areas of lower elevation before eventually discharging at the surface. Although this discharge can be into surface water bodies, it can also be in the form of springs or seeps. Springs occur where the water table intersects with the surface or where water from a confined aquifer is forced to the surface through fissures or fractures. Alley et al., at 43; William F. Guyton & Assoc., Texas Department of Water Resources Report 234: *Geohydrology of Comal, San Marcos, and Hueco Springs* 20 (June 1979), *available at* www.twdb.texas.gov/publications/reports/numbered_reports/doc/R234/r234.pdf. This means that a change in the water table or hydrostatic pressure can influence spring flow. If the water table drops below the surface, or if the hydrostatic pressure drops sufficiently, water in the spring ceases to flow. Springs often form the headwaters for rivers and can be an important water source as well as a cultural feature, especially in Texas. McKinney, *The State of Springs*. Therefore, their protection is intrinsic to the understanding and security of groundwater resources. See Chapter 5 of this book regarding conjunctive management and use.

1. Chemical and Physical Interaction

As water flows in both directions between the surface and the subsurface, chemical elements move with it. This transfer affects the supply of carbon, oxygen, nutrients, and other chemicals that enhance biogeochemical processes on both sides of the interface. When water enters the land surface, the chemistry of the soil is affected. The organic matter in the soil starts to degrade, lowering the pH of the water. Depending on the amount of time the groundwater remains in the ground, a range of chemical changes can take place. Winter et al., at 22–23. Groundwater chemistry cannot be separated between a surface water body and its interrelated groundwater.

Because of this interaction, contaminants can also be transported from one water resource to another, damaging the quality of both. This problem is exacerbated in a gaining stream (see definition below) when groundwater reductions decrease the surface water flow, thus further concentrating contamination in the stream. Alley et al., at 62. Almost all human activity can be a source of contamination. For example, agricultural fertilizers and pesticides can be as harmful to water quality as industrial discharges and by-products. Alley et al., at 60–61. Therefore, protection of water quality must take all related bodies into consideration.

2. *Influent and Effluent Relationship*

One of the primary ways that groundwater and surface water interact is through streams. Although this interaction can transpire in various landscapes, it occurs in three basic ways: (1) the stream can gain water from the groundwater, (2) the stream can lose water to groundwater, or (3) both can happen. Surface water resources hydraulically linked to an aquifer are often described as *influent* or *effluent* bodies of water, depending on the direction the water is flowing. *See* Fetter, at 58–59.

Water generally flows from higher elevation to lower elevation. An *influent*, or *losing*, stream or lake (see Figure 2) occurs when the groundwater table is below the bottom of a surface body of water and the soil is relatively permeable. In this situation, water percolates from the surface water body downward and recharges the underlying aquifer. Winter et al., at 9. In contrast, an *effluent*, or *gaining*, stream or lake (see Figure 2) results where the groundwater table is at an elevation higher than the intersected stream channel or lake and recharges the surface water resource. *See* Fetter, at 58–59. It is also possible that a stream can gain in some parts and lose in others. *See* Fetter, at 58–59.

This differentiation is important, especially in the context of water quality and contamination. For example, a polluted river that is effluent will not contaminate the related groundwater on either side of the river because it does not contribute water to the aquifer. Likewise, polluted groundwater on one side of an effluent river will contaminate the river, but may not affect the quality of the groundwater on the other side of the river.

Although seemingly straightforward, the relationship between rivers and groundwater can become complex. As explained, rivers that hydraulically link to an aquifer can be influent at one point of the river and effluent at another point with the same or a different aquifer. Winter et al., at 9. Moreover, a river that is influent during normal climatic conditions may temporarily become effluent during heavy rains and flooding, when the ground becomes saturated and the water table rises above the intersected river. Alley et al., at 30. Such changes can also be very localized—for example, where one side of a river is effluent and the other side is influent. Such conditions might occur as a result of heavy groundwater pumping on the second side of the river resulting in a localized lowering of the water table. Whether a river is influent or effluent at any particular point is dependent on various factors such as topography, amount and rate of precipitation, soil permeability, and hydraulic conductivity of the soil underlying the river, as well as human intervention. Alley et al., at 30.

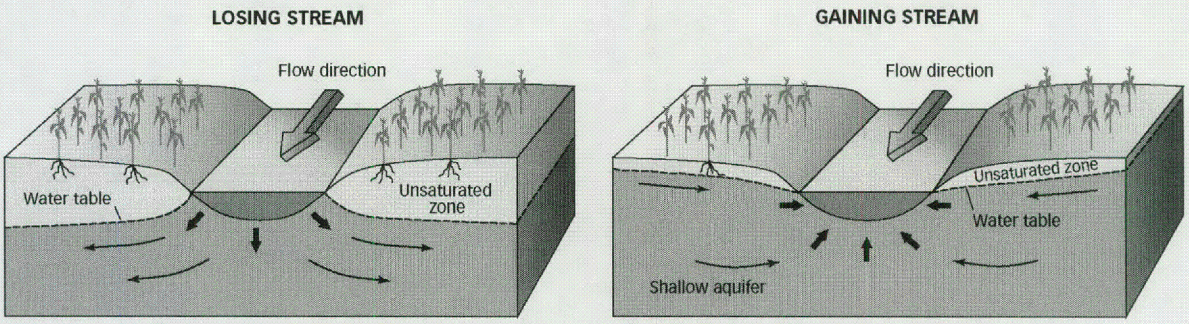

Figure 2. Aquifer-stream relationships showing an influent, or losing, stream at left and an effluent, or gaining, stream at right. Thomas C. Winter et al., *Ground Water and Surface Water, A Single Resource*, U.S. Geological Survey Circular 1139, 9 (1998), *available at* http://pubs.usgs.gov/circ/circ1139.

Groundwater can also interact with the surface water in lakes or reservoirs. A lake can receive groundwater inflow through its entire lake bed or through portions of the lake bed, or it can lose water to the subsurface through infiltration. Winter et al., at 18. Although this is similar to the stream dynamic, it is also different in several ways. Because the quantity of water in a lake is larger than in a stream, more water can be lost through evaporation than from infiltration, especially in arid climates. Also, deposits on lake bottoms and wetlands are different from those found on stream beds. This can affect water's ability to permeate the surface. Generally, lake sediments are not fine grained, particularly around their perimeters where wave motions remove fine particles, thus allowing water to flow freely between the surface and subsurface. Wetlands often have finer grained deposits and rooted vegetation, which inhibit water flow. Winter et al., at 21. Reservoirs are usually sited in stream beds so the water characteristics mirror those of rivers rather than lakes; however, over time, reservoirs can behave more like lakes. Winter et al., at 21.

D. Water Measurements

Water is measured using different units depending on the purpose of the measurement. For example, water can be measured for its rate of flow or storage capacity. The unit of measure typically used to measure the rate of water flow is *cubic feet per second* (cfs). A cubic foot of water contains 7.48 gallons. The cfs is computed by measuring the number of cubic feet of water that pass a given location in a second. Thus, a flow of 1 cfs over a 24-hour period produces approximately 1.98 acre-feet, or 646,317 gallons of water. The cfs measurement is typically used for assessing water flow rates in rivers, pipelines, canals, and other water conduits. A. Dan Tarlock et al., *Water Resources Management: A Casebook in Law and Public Policy* 6, 1037 (Foundation Press 5th ed. 2002) [hereinafter Tarlock et al.]; Joseph L. Sax et al., *Legal Control of Water Resources* 18–19 (West 3d ed. 2000) [hereinafter Sax et al.].

Storage capacity for large water resources (such as reservoirs, aqueducts, canals, and rivers) is typically measured in acre-feet. An acre-foot is the amount of water that covers 1 acre of surface area to a depth of 1 foot. One acre is roughly the size of a football field, and 1 acre-foot of water is equivalent to approximately 325,851 gallons, or 43,560 cubic feet of water. It is also roughly the quantity of water used by an average family of five in a year at a rate of 180 gallons of water per person per day. Tarlock et al., at 6; Sax et al., at 18–19.

One notable exception to the use of acre-feet as a measurement is with large quantities of fresh water, such as the amounts provided by municipal water suppliers. Such supplies are often measured in million or billion gallons per day (mgd or bgd). Tarlock et al., at 6; Sax et al., at 18–19.

Table of Common Water Measurements and Equivalents		
1 gallon	=	8.34 pounds or 0.134 cubic feet
1 million gallons	=	3.07 acre-feet
1 million gallons per day	=	1.55 cfs or 3.07 acre-feet per day
1 cubic foot	=	7.48 gallons
1 cubic foot per second (cfs)	=	646,317 gallons or 1.98 acre-feet per day
1 acre-foot	=	325,851 gallons or 43,560 cubic feet

E. Effects of Human Activity

Human activity can severely affect the distribution, quantity, and quality of water resources both above and below ground. These impacts can be short term or long term and on a range of scales. Increased pumping, pesticide usage, and urban runoff can damage the water relationship above and below the earth's surface. Winter et al., at 54. This is most easily seen where excessive withdrawal depletes the water resource. For example, well pumping near an effluent stream can lower the water table in the immediate area around a well and thereby shift the stream-aquifer relationship to an influent relationship. *See* Heath, at 32–33 (describing the response of the groundwater systems to withdrawals from wells). The converse is also possible. Extensive dewatering of an aquifer can reduce or potentially stop spring flow, stream flow, or flow into a wetland. Alley et al., at 31; Votteler, at 845.

The impact of pumping on spring flow is especially important in Texas. Many springs in North and West Texas have disappeared due to aquifer dewatering. Springs in Central Texas such as Comal Springs and San Marcos Springs are a major source of municipal water, provide habitat to several threatened and endangered species, and offer a cultural tradition. The flow in these springs is directly related to the water level in the Edwards Aquifer, which creates a complex situation in which human pumping must be carefully monitored. *See* Votteler, at 845. See Chapter 17 of this book regarding the Edwards Aquifer Authority.

Texas has more than 350 miles of coastline. Texas State Historical Association, *Texas Almanac*, www.texasalmanac.com/topics/environment/environment. Coastal areas are an interface between the continents and the ocean. Alley et al., at 44. The health of the bays and estuaries can depend on water that emanates from underground. Maintaining spring and surface water flow protects the wildlife found at the coast, which is sometimes miles away from the headwaters. McKinney, *Why Bays Matter*, at 24–25.

Another significant impact of human activity is increased evaporation. This occurs in a number of ways, but primarily through the construction of reservoirs. Micheal Overman, *Water: Solutions to a Problem of Supply and Demand* 45 (Doubleday 1969) [hereinafter Overman]. In lakes or reservoirs, up to 25 percent of the water can be lost to the atmosphere, particularly in hot climates like Texas. Overman, at 45. Widespread pumping of groundwater for irrigation purposes also increases evaporation from the increased soil moisture. Any water gained by the atmosphere is water lost in another part of the hydrologic cycle, such as stream flow or aquifer storage.

Urban construction also affects water and its relationships. Increased impervious cover can greatly reduce groundwater recharge. Overman, at 51. Precipitation falling in municipal areas is generally channeled as runoff and treated as wastewater, preventing it from adding to ground or surface water resources as it would under natural conditions. In addition, pumping and piping of water from one basin to another or inland from the sea to meet water needs alter the natural system in an area. The extent to which society allows water resources to be affected by its actions depends on the importance placed on those resources.

V. The Value of Water

The following two sections offer a perspective on the value and ethics of water as a means of encouraging cooperation over the sound management of fresh water resources. Although these notions presented are not legal or scientific principles, familiarity with these concepts is critical to the water professional who must daily make decisions about writing water legislation, drafting rules, issuing permits, entering water contracts, and dealing with a myriad of other water issues.

A. Valuing Water

The value of water is often expressed in terms of its numerical or economic worth. See Chapter 36 of this book regarding the economics of water. In 2014, for example, in addition to a base charge tied to the size of the water meter, the average Dallas, Texas, homeowner paid $1.87 per 1,000 gallons of treated water up to 4,000 gallons; $4.13 per 1,000 for the next 4,001 to 10,000 gallons used; $5.81 per 1,000 for quantities between 10,001 and 15,000 gallons; and $8.20 per 1,000 for usage above 15,000 gallons. City of Dallas, *Water Utilities Monthly Payment Rates, Effective October 1, 2015, available at* http://dallascityhall.com/departments/waterutilities/DCH%20Documents/FY16_monthly_rate_sheet.pdf. Thus, Dallas homeowners valued water at between $1.87 and $8.20 per 1,000 gallons of water (plus the base charge). Similarly, in 2004 in Medina and Uvalde counties, which overlie the Edwards Aquifer, irrigated cropland sold for between $3000 and $4000 per acre when water rights were included, while dry cropland without water rights sold for between $700 and $1200 per acre. Charles E. Gilliland et al., *Water Power, 11, No. 4 Tierra Grande*, *Journal of the Real Estate Center at Texas A&M University* (Oct. 2004), *available at* http://recenter.tamu.edu/pdf/1691.pdf. Here, landowners placed an $1800- to $3300-per-acre premium on the value of water. In both cases, water was treated as a marketable commodity and assigned an economic value.

Water, however, often defies such commodification efforts. The value of water can permeate the social fabric of peoples and communities and includes factors and characteristics that cannot easily be appraised. For example, the valuation of water may be related to the desire to maintain soil moisture levels, spring flows, and base flows in rivers and streams; a personal assessment of water's importance to human and nonhuman life; an exercise of belief related to faith or history; or the need to preserve a cultural heritage or way of life. Although not a comprehensive list of valuation methodologies, the process of valuing water is highly dependent on how the one conducting the valuation perceives water. Factors that can influence how water is perceived, and therefore valued, may include perspectives on life and the value of life itself; social and economic ideals; cultural, religious, and societal backgrounds and proclivities; and even politics. Ultimately, it must be recognized that the scales used to assess the price homeowners and landowners may be willing to pay for fresh water and those used for noneconomic valuation are often incongruous. Accordingly, to ensure that all perspectives are given their due regard, these disparate assessments must be reconciled to find some basis on which to fairly and justly allocate this singular resource.

1. Economic Valuation of Water

In an entrepreneurial society, people tend to look at water as an economic good. Under this perspective, water is considered and valued in terms of its economic potential. It is deemed a commodity—a "thing" or good that is subject to market forces, that can be bought, sold, and owned, and whose value depends on supply and demand. Thus, in places where fresh water resources are plentiful and easily accessible, water should be inexpensive. Conversely, where water is scarce, the value of water should be directly related to what the market will bear. In its purest form, the commodification of water would be available only to those who could pay for it and only in quantities that they could afford. Accordingly, this valuation methodology may be most in harmony with capitalist-based societies, which prevail in much of the world. *See generally* Andrew Morriss, *Real People, Real Resources, and Real Choices: The Case for Market Valuation of Water*, 38 Tex. Tech L. Rev. 973 (2006).

2. Noneconomic Valuation of Water

a. Anthropocentric Valuation of Water

Under the anthropocentric perspective, the value of water is directly related to its irreplaceability as a fundamental component of life. Proponents of this perspective believe water has an intrinsic value that is incalculable and therefore it is beyond valuation. This position is grounded in the belief that life itself, at least human life, is sacrosanct and that the valuation of life is inappropriate, if not completely impossible. Just as the buying and selling of people is regarded by most as an inconceivable evil, under this perspective, so is the valuation of the substance that is so necessary for creating and sustaining life. The anthropocentric perspective is often at the base of arguments for the human right to water. *See generally* Salman M.A. Salman & Siobhan McInerney-Lankford, *The Human Right to Water* (World Bank Publications 2004) [hereinafter Salman & McInerney-Lankford]; Amy Hardberger, *Life, Liberty, and the Pursuit of Water: Evaluating Water as a Human Right and the Duties and Obligations It Creates*, 4 Nw. U. J. Int'l Hum. Rts. 331 (2005) [hereinafter Hardberger], *available at* http://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=1037&context=njihr.

b. Ecocentric Valuation of Water

In a similar vein, water is regarded by some as an intrinsic component of the natural environment with a value that is incalculable. In contrast with the anthropocentric notion of the inviolability of human life, the value of water to the environment is grounded in an ecocentric perspective of life in which humanity is merely a component of the natural environment. In this view, the life of all creatures, including but not limited to humans, is inviolable. Moreover, because water is a principal source of sustenance for all life, it is likewise regarded as sacrosanct and incapable of valuation. *See generally* Kerry Turner et al., *Chapter 5 Conclusions, in Economic Valuation of Water Resources in Agriculture: From the Sectoral to a Functional Perspective of Natural Resource Management* (U.N. Food & Agricultural Organization 2004), *available at* www.fao.org/docrep/007/y5582e/y5582e09.htm; Captain Paul Watson, *Clarification on Where Director Paul Watson Stands on Various Issues*, www.ecospherics.net/pages/wonw.htm.

c. Cultural or Traditional Perspective on the Valuation of Water

The cultural or traditional perspective of water valuation is dependent on individual or collective beliefs that water has a value more significant than that based on personal enrichment or sustenance. This distinct notion of valuation is typically related to a system of beliefs based on cultural, social, religious, or historical custom. The value of water becomes incalculable, at least in the economic sense, by its very nature of being abstract and ethereal and built on a foundation of tradition, social norms, or faith. Moreover, water is incapable of valuation because it is regarded as a blessing rather than a commodity. In some communities, water is considered the lifeblood of the earth, which should not be exploited or extracted to excess lest the earth be injured or killed. In other communities, water is sacrosanct to the extent that it is a gift of the creator, a gift that cannot be withheld from anyone in need. In still others, water defines the culture to the extent that it characterizes a people's identity, religious beliefs, ceremonial practices, and daily life. In most of these cases, water is regarded as an absolute necessity, not merely to maintain individual life but as a means of maintaining the life of the people. *See generally* Katosha Nakai, *Water: It Always Has Been; It Is; It Will Be—A Cultural Perspective on the Valuation of Water*, 38 Tex. Tech L. Rev. 1027 (2006); William Greenway, *Dominion and Domination: Living Life and Living Earth, in Symposium Proceedings: Precious, Worthless, or Immeasurable: The Value and Ethic of Water*, Center for Water Law & Policy and International Center for Arid & Semi-Arid Land Studies, Texas Tech University (A.C. Corrêa & Gabriel Eckstein eds. 2006).

B. Overcoming Valuation Differences

To a great extent, the above perspectives are described in absolute terms. Reality, however, is rarely based on absolutes, and perspectives often are combined to form unique viewpoints. For example, many environmentalists have adopted a combination of the ecocentric and economic approaches to valuation and created the hybrids of environmental and ecological economics. *See, e.g.*, James Boyd, *Procurement of Water's Ecosystem Services: An Economic and Ecological Perspective, in Symposium Proceedings: Precious, Worthless, or Immeasurable: The Value and Ethic of Water*, Center for Water Law & Policy and International Center for Arid & Semi-Arid Land Studies, Texas Tech University (A.C. Corrêa & Gabriel Eckstein eds. 2006). Although none of these perspectives can claim to be definitive, it is evident that they employ disparate and often contradictory methodologies that have the potential for fomenting conflict among the proponents of the respective approaches. This is particularly likely when the water resources assessed are inadequate to meet everyone's wants or needs.

A recent controversy in Central Texas over the sale of 50,000 acre-feet of Carrizo-Wilcox Aquifer water to San Antonio for $3.4 billion provides a clear illustration of disparate perspectives and value systems that can lead to friction among stakeholders. The Vista Ridge water deal involved two private water marketers who purchased water rights from individual landowners and obtained pumping and export permits from the local groundwater district. In this unique project, the sellers are required to transport the water 142 miles from its source to the city limits before they can be paid for the water. Neena Satija, *San Antonio Approves Historic Water Project*, *Texas Tribune*, Oct. 30, 2014, *available at* www.texastribune.org/2014/10/30/san-antonio-votes-historic-water-project/. Because of concerns over groundwater depletion and dependent ecosystems, economic values clashed against Central Texas community and environmental sensibilities, and the arrangement remains highly controversial.

Overcoming these fundamental and often ingrained viewpoints and methodologies is clearly not an easy proposition. Such perspectives are often at the core of disputes and greatly depend on personal perspectives; national interests; social and economic ideals; cultural, religious, and societal backgrounds; and politics. Moreover, they often serve as the basis for legislative and regulatory action and business decision making, as well as the justifications for aggravating controversies over limited fresh water resources. Common ground may be inconceivable, but it may be found in the ethics of water.

VI. The Ethics of Water

Ethics are fundamental to human existence. They are at the core of societal decision making and define what people and communities consider important and how people interact with each other. Ethics are the tacit rules of behavior and consequences that regulate people's lives, activities, and decision making. They function as a moral compass, guiding us to what we can or cannot do, and about the amount of harm, pain, loss, and deprivation we can inflict on each other. Poul Harremoës, *Water Ethics—A Substitute for Over-Regulation of a Scarce Resource*, Stockholm Water Symposium, Aug. 16, 2001, at 5.

In a sense, ethics are a structured system of principles, codes of conduct, or prime directives that aid humanity in determining appropriate conduct. To some extent, ethics can be both elective and prescriptive in that they direct people's actions toward what they should or ought to do and which values they should or ought to hold. To the extent that civil society can identify fundamental ethical bases related to fresh water, it can then begin constructing laws and policies that best reflect society's collective ideals of right and wrong.

A. Water Ethics in History

Water has been the focus of ethics in every corner of the world for millennia. Irrigation and other water management practices, for example, were the developmental cornerstone of numerous communities in the Americas, Asia, Africa, the Middle East, and elsewhere thousands of years before the Industrial Revolution. *See* Fekri A Hassan, *A Historical Perspective*, *in Water and Ethics* 11–15 (UNESCO 2004) [hereinafter Hassan], *available at* http://unesdoc.unesco.org/images/0013/001363/136341e.pdf. These communities formulated strict rules of behavior governing the use and management of fresh water. *See* Hassan, at 47–49 (discussing principles of distribution, use, upkeep, and overall management dating back to the Code of Hammurabi 3,700 years ago). Cultures in arid parts of the world, such as Muslim communities, are especially noteworthy for developing allocation priorities for limited water resources. *See, e.g.*, Melanne Andromecca Civic, *A Comparative Analysis of the Israeli and Arab Water Law Traditions and Insights for Modern Water Sharing Agreements*, 26 Denv. J. Int'l L. & Pol'y 437 (1998). Considered collectively, water ethics have formed the foundation upon which every aspect of a society's management of fresh water resources has developed.

Water ethics reflect the relative importance water plays in people's lives and provide guidance in decision making related to the use, management, allocation, and protection of fresh water resources. Even the concept and the act of valuation, regardless of methodology, are fundamentally based on notions of good and bad, right and wrong. For example, communities that apportion fresh water based on historical use hold a water ethic that values prexisting uses. In contrast, those that apportion water based on ownership rules value the property aspects of water. But both communities value water in relation to what they define as morally appropriate and correct. Thus, the valuation of water is a function of water ethics in that valuation reflects the evaluator's belief of how water should be managed.

B. Identifying Universal Water Ethics

Ethics generally focus on individual conduct, yet they are profoundly influenced by societal norms and beliefs. Writing about the related notion of a "land ethic," noted philosopher Aldo Leopold explained that "[a]ll ethics rest upon a single premise: that the individual is a member of a community of interdependent parts." Aldo Leopold, *The Land Ethic, in A Sand County Almanac* (Oxford Univ. Press 1949). The extent to which that interdependence is taken lies at the core of whether an ethic can be said to cut across diverse cultural, political, economic, religious, and national beliefs and proclivities. Yet any effort to identify one or more universal water ethics is not an easy task. In fact, recent cases suggest that different societies have distinct viewpoints related to water management. For example, in 1992 the International Conference on Water and the Environment formulated recommendations, including one providing that "[w]ater has an economic value in all its competing uses and should be recognized as an economic good." *The Dublin Statement on Water and Sustainable Development*, International Conference on Water and the Environment (Jan. 1992), *available at* www.wmo.int/pages/prog/hwrp/documents/english/icwedece.html. This portrayal of water as an economic good generated considerable concerns in Islamic countries, which regard water as the source of all life and a gift from God that cannot be bought or sold. *See* Jerome Delli Priscoli et al., *Overview, in Water and Ethics* 8–9 (UNESCO 2004) [hereinafter Priscoli et al.], *available at* http://unesdoc.unesco.org/images/0013/001363/136343e.pdf.

One starting point in seeking universal water ethics may be the fact that all individuals, communities, nations, and societies value water. The specific reasons that different societies treasure water may be particularly significant because if common justification can be identified, it may serve as a basis for articulating shared ethical bases for water valuation. This in turn could evolve into a foundation for cooperation on managing water resources.

1. Life as a Water Ethic

Possibly the simplest and most obvious universal factor in valuing water is the value of water for life. Water is absolutely fundamental to human life. It nourishes people and facilitates health and well-being in ways that no other resource can. The adult human body is composed of up to 60 percent water, while a human brain is more than 70 percent water and human lungs are about 83 percent water. *See* U.S. Geological Survey, *The Water in You, in The USGS Water Science School*, http://ga.water.usgs.gov/edu/propertyyou.html. Accordingly, it is easy to concede that water is universally valued for its life-giving and life-sustaining qualities. Combined with the broadly accepted notion that human life is invaluable and should be protected, a water ethic emerges: All human beings should have water in a quantity and quality that ensures and sustains life. The practical consequence of such an ethic mandates that, regardless of any other objective, water for human life should be ensured and guaranteed in the quantity and quality necessary to maintain that life. *See* Gabriel Eckstein, *Precious, Worthless, or Incalculable: The Value and Ethic of Water*, 38 Tex. Tech L. Rev. 963 (2006), at 969.

This particular water ethic, however, is rudimentary and does not address the mechanisms for its realization. Rather, it is a simple statement designed to capture the fundamental and universal notion that everyone—regardless of cultural, religious, political, economic, or other background—values fresh water for sustaining human life. Whether there exists another identifiable water ethic related to the *provision* of water, however, is a separate matter. Such is the position argued by those who espouse the human right to water. *See* Salman & McInerney-Lankford; Hardberger.

2. Participation as a Water Ethic

Participation in institutions and the decision-making process is one of the fundamental rights upheld in most democracies. Thus, in a democracy and in the context of water management, such a right comprises an ethic to the extent that all stakeholders are afforded the opportunity to become involved in assessing how fresh water resources should be managed and allocated. *See* Priscoli et al., at 16. Accordingly, it is important that the ethic of participation in water-related decisions be substantial and applied at all levels of involvement. Moreover, it especially should be ensured and protected for those who are least able to assert their rights and interests and for whom water is vital to their fulfillment as humans. *See* Priscoli et al., at 16.

3. Equality as a Water Ethic

Equality is at the heart of the American experience and is enshrined in many of its constituent documents, including the Declaration of Independence. It is a notion that appeals to the near primordial sense of fairness and justice and that is intrinsic to our nation's ideals. The antithesis of discrimination, it is a principle intended and designed to apply to all people with regard to rights, opportunities, and the application of law. In this respect, the ethic of equality applies to all aspects of water and suggests that everyone is equally entitled to the water due them. In practical terms, the ethic of equality refers to the actual allocation of water as well as opportunities related to water, such as access to water, decision making affecting fresh water resources, and commercial and other prospects related to water. *See* Priscoli et al., at 16.

4. Stewardship as a Water Ethic

The ethical principle of stewardship reflects a moral responsibility for creation. It both teaches respect for creation and establishes an obligation to use wisely all components of creation. Moreover, it offers a reminder that absent sound stewardship, the ability to achieve the full human potential, now and in the future, will likely be compromised. Without good water management, human potential and human dignity are diminished for all and denied for some. The practical consequence of such an ethic challenges people to consider and respect all interests and perspectives in the efforts to manage fresh water resources. It also binds people to formulate management schemes that ensure and promote the human potential of current generations without compromising those of future generations. *See* Priscoli et al., at 16.

C. Ethical Base for Water Law and Policy

The purpose of the above discussion is to encourage the sound management of fresh water resources by balancing and ensuring adequate water supplies for all stakeholders. Although different peoples, communities, and stakeholders often have disparate objectives for limited water resources, they often possess common ethical beliefs and values related to water on which they can agree. And although the use of ethics is but one method for analyzing how fresh water resources are managed, it is a lens that, unlike other approaches, allows a more direct view of the social, environmental, cultural, and other values that are so important to stakeholder groups and people in general. By pursuing such commonalities, disputes can be replaced by cooperation.

Under this ethical lens, when considering how to pursue a water permit, a wholesale water sales agreement, new water legislation, or a lawsuit challenging or defending a client's water rights, lawyers would endeavor to incorporate considerations of ethics and values into the decision-making process. Examples of questions and issues to consider might include:

- Who will the decision or planned action affect and how? Have those who may be affected been offered a voice in the decision-making process? Do they even know about the pending decision or action?
- What are all of the economic and noneconomic values involved in the decision or planned action? Have they been integrated into the cost-benefit analysis of the deal? Have they been given equal treatment?
- What are the consequences of the decision or planned action for the water resource? Will it leave adequate fresh water resources for other stakeholders and future generations?

The integration of such ethics and values into the decision-making process offers a unique opportunity to seek common ground and to pursue compromise. Moreover, it permits the creation of a foundation on which to construct rules and regulations and business and court decisions that are inclusive and just, as well as principled.

VII. Conclusion

The field of water law is today an established and growing specialization whose importance is well recognized around the country. The reasons are quite clear: Water is critical, not only to human survival but also for other human interests and endeavors, including development, the environment, and recreation. Moreover, there is now a greater appreciation that while our water needs continue to expand, our water resources are finite. Accordingly, the sound management and regulation of all water resources are critical to ensuring both our present and our future. Without water, nothing is possible.

Water law, however, is a complex subject matter and requires a broad understanding of not only the law but also the science of water as well as people's relationship to this critical resource. Accordingly, water law today is an interdisciplinary practice encompassing a broad perspective that incorporates individual and community rights, environmental issues, commerce and economics, and other societal and legal concerns. Moreover, it is interdisciplinary in the sense that it requires a firm understanding of the science of water, including knowledge of the hydrologic cycle, groundwater flow regimes, agricultural practices, ground and surface water interaction, wetlands and dependent ecosystems, and much more.

Ultimately, the application of water law is a means to advance societal values and goals related to terrestrial water resources. It is a tool for bridging the gap between our societal water needs and the actual availability and distribution of the resource. The challenge we face as water lawyers is to practice water law in a manner that will ensure our clients' interests as well as those of society's in this precious and irreplaceable resource.

CHAPTER 2

Meeting Water Supply Needs: Planning, Permitting, and Implementation

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I. Overview of Issues

The climate and hydrology of Texas vary greatly from one area of the state to the next. Because of its sheer size, Texas encompasses multiple ecological and hydrologic zones, with different resources, climates, and demands for water. The varied nature of water resources in Texas is particularly evident when examining the state from east to west. The eastern part of Texas is blessed with abundant rainfall in most years, ranging from 40 to 55 inches per year over large areas of the region, which provides plentiful water resources in many parts of East Texas. *See* Texas Water Development Board, *Water for Texas 2012* 149, fig. 4.4 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.state.tx.us/waterplanning/swp/2012/. West and South Texas are not so blessed, with much of these areas receiving less than 10 to 20 inches of rainfall annually. 2012 State Water Plan, at 149. Not surprisingly, water supply has played a large role in development and population growth throughout the state's history. The Trinity River provides the vast majority of the existing water supplies for the two largest metropolitan areas in the state: the Dallas–Fort Worth metroplex and the Houston metropolitan area. Other rivers and river basins in the state, notably the Sabine and Neches in the east and

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the Brazos, Colorado, and Guadalupe basins to the west are also prolific, resulting from sizable drainage areas, plentiful rainfall in most years, and spring flow contributions. These basins all generate water supplies for cities, industries, and agricultural interests. 2012 State Water Plan, at 160.

The history of water development in Texas begins at the end of the nineteenth century, when the state passed legislation allowing the formal recognition of water rights and the issuance of debt for water supply projects. *See* Irrigation Act of Mar. 19, 1889, 21st Leg., R.S., ch. 88, §§ 1–17, 1889 Tex. Gen. Laws 100, 100–03, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1987*, at 1128–31 (Austin, Gammel Book Co. 1898); Irrigation Act of Mar. 21, 1895, 24th Leg., R.S., ch. 21, § 1, 1895 Tex. Gen. Laws 21–26, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751–56; *see generally* Ronald A. Kaiser, *Texas Water Marketing in the Next Millennium: A Conceptual and Legal Analysis*, 27 Tex. Tech L. Rev. 183, 229–44 (1996) (discussing the history of water rights and surface water law in Texas); Edmond R. McCarthy, Jr., *The Rule of Capture in Texas—Still So Misunderstood After All These Years*, 37 Tex. Tech L. Rev. 1 (2004) (noting the extensive history of the rule of capture and water rights in Texas). See Chapter 3 of this book for a discussion of the history of surface water development. With the passage of the Conservation Amendment to the Texas Constitution in 1917, the legislature enabled the creation of political subdivisions entitled to issue debt to develop water-related infrastructure. Tex. Const. art. XVI, § 59. Since the passage of that amendment, literally thousands of such political subdivisions have been formed—from large river authorities charged with conserving, preserving, protecting, and developing the water resources within their boundaries to geographically small municipal utility districts and other water districts created primarily for supporting land development. *See, e.g.*, Sabine River Authority, Acts of 1949, 51st Leg., R.S., ch. 110; Lower Colorado River Authority, Acts of 1934, 43d Leg., 4th C.S., ch. 7; Brazos River Authority, Acts of 1929, 41st Leg., 2d C.S., ch. 13; Guadalupe River Authority, Acts of 1933, 43d Leg., 1st C.S., ch. 75; Trinity River Authority, Acts of 1955, 54th Leg., R.S., ch. 518. See Chapter 7 of this book for a discussion of the various water-related political subdivisions.

Although supplies remain available for development, much of the state's surface water has already been appropriated, and in some areas of the state groundwater resources are not readily available in significant quantities. 2012 State Water Plan, at 165. The amount of water that can be produced with current permits, current contracts, and existing infrastructure during drought is projected to decrease about 10 percent, from 17.0 million acre-feet in 2010 to about 15.3 million acre-feet in 2060. 2012 State Water Plan, at 157. Alarmingly, the state's population is projected to grow 82 percent between 2010 and 2060, but the amount of water needed is anticipated to grow by only 22 percent (2012 State Water Plan, at 136), and a shortfall of 8.3 million acre-feet of water is projected by 2060 (2012 State Water Plan, at 4). Thus, for the state to successfully respond to future demand, it will have to plan, permit as necessary, and implement water supply projects and strategies over the next several decades. This chapter provides a brief discussion of the state's current water planning protocol, an overview of some of the sources of water supplies and strategies available for meeting projected water supply demands, a brief discussion of state and federal permitting that is generally associated with the development of water supply and delivery systems, and a description of the most common means available to finance the implementation of such projects. An in-depth treatment of many of these topics is included in other chapters of this book, as noted.

II. Regional and State Water Planning

In 1957, a constitutional amendment created the Texas Water Development Board (TWDB) in response to the worst drought in the state's history. Tex. Const. art. III, § 49-c. The drought lasted seven years, and by the end of 1956 more than 96 percent of the counties in the state were considered disaster areas. 2012 State Water Plan, at 1; *see also* 2007 State Water Plan, Vol. II, at 110. The epic drought ended in 1957 with a flood that replenished the aquifers, reservoirs, and surface water flows, but public awareness of the lack of drought protection led to the development of a structured system for water planning and strategy implementation. The TWDB was authorized in 1957 to manage and distribute a $200-million water development fund to aid communities in developing reliable water supplies. The legislature also mandated that the TWDB initiate a planning process to project future water needs and determine appropriate steps to address projected shortfalls. The TWDB has been provided with funding and other resources to assist in water supply development, maintenance, and planning from the agency's inception to the present day. 2012 State Water Plan, at 21.

Over the past fifty years, the TWDB has prepared nine state water plans. Plans were produced in 1961, 1968, 1984, 1990, 1992, 1997, 2002, 2007, and 2012. See Texas Water Development Board, *State Water Planning*, www.twdb.state.tx.us/waterplanning/swp/index.asp. The early plans were created at a time when the primary method of water supply was the large-scale construction of reservoirs. From 1950 to 1970, more than ninety "major reservoirs" (i.e., reservoirs having a capacity of at least 5,000 acre-feet) were constructed in Texas. 2012 State Water Plan, at 278–82. In addition to providing a reliable source of water, these reservoirs controlled flooding, provided cheap electricity, and offered recreational opportunities. Currently, there are 211 major reservoirs in Texas, and 188 are a source of water supply for the state, region, or local community. 2012 State Water Plan, at 278–82; *see also* Texas Water Development Board, *River Basins & Reservoirs*, www.twdb.texas.gov/surfacewater/rivers/index.asp. More than one half of the surface water supply in Texas comes from reservoirs, but the accumulation of sediment in reservoirs will lessen this supply over time. 2012 State Water Plan, at 160; *see also* Texas Water Development Board, *Texas Lakes & Reservoirs*, www.twdb.texas.gov/surfacewater/rivers/reservoirs/index.asp. The focus on reservoirs was reflected in the first two state water plans, but by 1980 reservoir construction had declined precipitously because of a lack of viable sites, increased difficulty in environmental permitting, and costs of construction that had risen faster than inflation. 2012 State Water Plan, at 237.

Because of the challenges associated with reservoir development, the water plans of the 1980s and 1990s instead focused on water management and infrastructure development to best utilize existing water resources. For example, after 1984, the plans became increasingly more open to consider conservation, reuse, desalination, and other water supply proposals to address the growing water supply needs of Texas. The process for developing the state water plan changed over time as well. In 1992, the TWDB increased participation in the development of the water plan by including stakeholders, the Texas Parks and Wildlife Department, and the Texas Natural Resource Conservation Commission, a predecessor agency of the current Texas Commission on Environmental Quality (TCEQ). 2012 State Water Plan, at 22. Even with the increased participation of other entities, the TWDB was still primarily in charge of developing the state water plan and was required to consider the varied needs of the entire state. 2012 State Water Plan, at 218–23.

This top-down system changed, however, after the devastating drought of 1996. The drought reminded the public of the imminent need for efficient water planning and development of dependable supplies throughout the state. The water shortage and extensive crop failures across the state spurred legislative action that has reshaped water planning in Texas. In 1997, the 75th Legislature passed Senate Bill 1, which rewrote many sections of the Texas Water Code and created a bottom-up approach to water planning. S.B. 1 directed the TWDB to divide the state into regional planning areas based on the agency's assessment of relevant criteria, including river basin and aquifer locations, utility development patterns, boundaries of political subdivisions, a public involvement and comment process, and existing planning area boundaries. *See* Act of June 1, 1997, 75th Leg., R.S., ch. 1010. At least once every five years, the TWDB must review the regional planning area boundaries and update them if necessary. *See* Tex. Water Code § 16.0121; 2012 State Water Plan, at 19. In response, the TWDB created sixteen regional water planning groups (RWPGs). Each region is charged with developing its own fifty-year water plan tailored to the unique needs and resources of the area. 2012 State Water Plan, at 19–20. Each RWPG is charged with developing a plan that is consistent with the guiding principles of the state water plan and that conforms to guidelines adopted by the TWDB, and with making recommendations based on data provided by or approved by the TWDB. *See* Tex. Water Code § 16.053. See Chapters 20 and 21 of this book for discussions of state water planning.

Through the regional water planning process, the state water plan is forged out of the grassroots, bottom-up assessments of water needs and supply performed by the RWPGs. The sixteen approved plans are aggregated to form the state water plan. Every five years, the RWPGs are required to prepare revised regional water plans, which again are submitted to the TWDB for approval and inclusion in the revised state water plan. The final state water plan is published by the TWDB and contains a wealth of information and projections of future population, water demand, climate, and alternative water supplies over the next fifty years. *See* 2012 State Water Plan, at 132.

In the 2012 state water plan, RWPGs identified 562 unique water supply projects designed to meet the need for additional water supplies for Texas during severe droughts. 2012 State Water Plan, at 189. This would compensate for the projected shortfall of 8.3 million acre-feet and save $11.9 billion annually if current drought conditions approach the drought of record. 2012 State Water Plan, at 174. This expense may be a bargain because the TWDB projects that if no action is taken, water shortages and droughts may cost the state upwards of $115.7 billion annually by 2060. 2012 State Water Plan, at 174. While many water supply projects or strategies are being considered, permitting and funding lengthen the time before a project can be implemented. Delays in the implementation of projects increase the total estimated capital cost. The 2007 state water plan estimated water project costs at $31 billion, which was substantially higher than the $17.9 billion estimated in the 2002 state water plan. The 1997 state water plan, developed by TWDB prior to regional water planning, estimated $4.7 billion in costs for recommended major water supply and conveyance systems through 2050. 2012 State Water Plan, at 213. The estimated cost of the 2012 plan is $53 billion, but includes all of the strategies recommended by the regional water planning groups. 2012 State Water Plan, at 211.

The state water plan is only a guide and is not binding on any agency, but the TCEQ is required to consider approved state and regional water plans when it makes permit decisions regarding surface water rights. *See* Tex. Water Code § 11.1501. Unless the requirement is affirmatively waived, the TCEQ can grant a permit for the appropriation of surface water only if that appropriation addresses a water supply need that is "consistent with the state or approved regional plan" in the area of appropriation. *See* Tex. Water Code § 11.134(b)(3)(E). Furthermore, the TCEQ may not issue a water right for municipal purposes unless the region has an approved regional water plan, but this requirement may also be waived. *See* Tex. Water Code § 11.134(c). The state water plan, even if not binding on the TCEQ, also has important implications on the funding for water supply projects; large-scale regional water supply projects are not eligible for TWDB funding unless the proposed project is consistent with state and regional water plans. *See* Tex. Water Code § 16.053(j).

III. Sources of Supply

One of the most important steps in the state water planning process is adequately identifying and considering all water supply options. There may be a number of sources, or a combination of sources, that can be used to meet projected water supply demands. Traditionally, water suppliers have focused on surface water and groundwater, but with the decreasing availability of these supplies and the increasing protection afforded such natural resources, more emphasis has been placed on nontraditional sources of supply. This section provides an overview of the potential sources of available water supplies identified in the State Water Plan.

A. Surface Water

Surface water is a readily available and renewable source of supply. Like groundwater, however, fresh surface water is a finite resource. Within the state, twenty-three surface water basins (fifteen major river basins and eight coastal basins) produce fresh surface water. See 2012 State Water Plan, at 158. Regardless of the apparent supply from these basins, existing allocations of surface water will determine whether any particular river basin should be considered a viable source of supply.

For the most part, surface water is considered "state water." There are a few exemptions, such as diffused surface water runoff, but the definition of "state water" is broad and includes all "water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state." Tex. Water Code § 11.021(a). Thus, state water is rainfall and spring flows that have reached a watercourse or other surface water body. State water also includes water imported from outside the boundaries of the state for use in the state. Tex. Water Code § 11.021(b). State water is the property of the state and may be regulated for use by the state. *See, e.g., Texas Water Rights Commission v. Wright*, 464 S.W.2d 642 (Tex. 1971). Although there are certain exemptions from permitting, the authority to use state water must be granted by the TCEQ. *See* Tex. Water Code § 11.121. See also Chapter 9 of this book.

When planning for the use of surface water supplies, one must first evaluate the reliability and availability of the source. The TCEQ may not issue a permit unless it has been shown that sufficient water is available for appropriation. Tex. Water Code § 11.134(b)(2). In this regard, the TCEQ must review and consider an application pursuant to its rules regarding water availability. *See* 30 Tex. Admin. Code § 297.42. Assuming a sufficient supply of surface water exists for appropriation, the TCEQ may grant a permit for the diversion and use of surface water. See Chapter 9 of this book regarding surface water rights permitting.

In addition to securing the right to use surface water supplies from the TCEQ, one must consider other practical issues. The method of taking, storing, or diverting surface water may affect the yield, efficiency, and feasibility of a surface water supply project. For example, it stands to reason that surface water captured during high-flow events and stored in a reservoir will be more reliable than run-of-river or direct diversions because the latter lack a means of storage. Though reservoirs are more reliable, the cost of construction and the environmental impacts will typically be much greater for reservoir development than those associated with a direct diversion. See Chapter 27 of this book regarding reservoirs.

B. Groundwater

Groundwater is the most utilized source of water supply in rural areas of Texas and particularly in the western portion of the state, but unlike surface water, groundwater has not been the subject of statewide regulation. See Chapters 1 and 19 of this book for discussions of the attributes of groundwater. Principles of rights to produce groundwater have been established in a series of cases dating back to the early twentieth century. In a 1904 decision, the Texas Supreme Court opined that groundwater was "secret [and] occult." *See Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (1904); *contra Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75, 77 (Tex. 1999) (citing *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 805–06 (1955) (Wilson, J., dissenting)) (advancing knowledge of geology and hydrology have made groundwater not so secret and occult); *see also City of Altus, Oklahoma v. Carr*, 255 F. Supp. 828, 833 (W.D. Tex.), *aff'd sub nom. Carr v. City of Altus*, 385 U.S. 35 (1966) (holding that "the law of Texas is well settled that the landowner has the right to drill wells and appropriate the water beneath his land"). Through these cases, the English common-law "rule of capture" has been ratified by Texas courts, although in the past fifty to sixty years, the legislature has embraced a system of groundwater management by groundwater conservation districts (GCDs). *See Sipriano*, 1 S.W.3d at 77. The legislature has created a number of GCDs across the state to regulate groundwater withdrawals within those districts' jurisdictional boundaries. Groundwater production in areas outside of GCDs is generally unregulated, and the rule of capture continues to prevail. In areas with GCDs, the type and degree of regulation vary widely. See Chapter 16 of this book for a discussion of groundwater and regulation by GCDs.

When groups plan for the use of groundwater, ample consideration must be given to the method and means of accessing the aquifer where groundwater is stored. Some of the state's most prolific aquifers cover vast geographic areas and may be accessed at various points, which provides an opportunity for many diverse water users to site wells and withdraw groundwater. Other aquifers are confined to smaller geographic areas or located far from those who would put the water to use, and aboveground transmission lines are required to transfer supplies from the well site to the place of use. Groundwater quality is also an important consideration. Waters in some aquifers have a higher quality than others, and accessing pristine groundwater supplies may be impossible or more costly. Furthermore, some aquifers, like the Ogallala Aquifer in the Texas Panhandle, have a limited ability to recharge, while others, like the Edwards Aquifer in Central Texas, are highly dependent on surface water recharge and diffused surface water runoff. When a water supply project will depend on the use of groundwater, these issues should be carefully considered. *See generally* the State Water Plan and Texas Water Development Board Web site, www.twdb.state.tx.us/waterplanning/swp/index.asp.

C. Conjunctive Use

Conjunctive use is the concurrent use of groundwater and surface water supplies to meet demands. Conjunctive use recognizes that an entity can balance its demands by supplementing one source of supply with another. Often, alternative supplies are used to meet peak daily demands. For example, readily available groundwater supplies in rural areas of the state have enabled many utilities to meet their water needs exclusively with groundwater. The population of Texas, however, has grown rapidly over the last fifty years. Many areas that have historically relied on groundwater supplies have seen demand grow to a level requiring that water sources be supplemented with a renewable source of surface water supplies. *See generally* 2012 State Water Plan, ch. 3. See Chapter 5 of this book regarding conjunctive management and use.

As with any project that involves blending distinct sources of supply, conjunctive use requires consideration of water quality as well as quantity. Groundwater resources may have higher levels of total dissolved solids or metals, while surface water supplies may have higher levels of nutrients or bacteria. A utility needs to carefully consider the ramifications of blending these sources. For instance, blending groundwater and surface water sources may produce water with a chemical composition different from that of either individual source. Often, this may change the overall pH of the water, resulting in the precipitation of undesirables into the water source.

Additionally, consideration must be given to meeting drinking water quality requirements (*see, e.g.*, 40 C.F.R. §§ 141.1–.723) when potable water is the end use, as well as the potential impact that return flows resulting from such use may have on stream standards compliance. *See* 33 U.S.C. § 1313 (federal surface water standards); 30 Tex. Admin. Code §§ 307.1–.10 (Texas surface water standards). See also Chapter 30 of this book for a discussion of drinking water standards. Conjunctive use is a proven water supply management strategy that has wide support and, in some instances, has been mandated by state or federal governments. *See* 2012 State Water Plan, at 196.

D. Reuse

Reuse is a water supply strategy that has gained significant interest in Texas during the last ten to twenty years, but the water rights and water quality laws and regulations associated with reuse are complex. Not only are there distinctions in law between direct and indirect reuse, but there are also legal differences between the indirect reuse of surface water–based effluent and groundwater-based effluent. *See generally* Tex. Water Code §§ 11.042, 11.046; *see also* 30 Tex. Admin. Code ch. 210 (TCEQ reclaimed water regulations). See Chapter 24 of this book for a further discussion of reuse.

In plans for a reuse project, there are a number of issues to consider. The first is whether a utility desires to fully control the corpus of the water from creation to the end point of use, or whether the bed and banks of a state watercourse need to be used to convey the water. Second, assuming the utility seeks to use water via indirect reuse, questions related to the use of surface water for drinking water purposes arise, such as *Where will the water be diverted?* If the water will be stored in a reservoir, there may be concerns regarding the ratio of the reuse water to natural runoff in the total volume of the reservoir, as well as concerns about hydraulic detention time. These concerns regarding the end use of reclaimed water, as well as the yield of a project given special conditions that may be imposed on the authorizations and rights to use such water, can greatly influence the viability of a reuse project.

E. Conservation

Like reuse, conservation is also a valuable water supply strategy. This is considered a supply strategy because it serves to reduce the overall demand requirements of a utility. *See* 2012 State Water Plan, at 187–89. See Chapter 23 of this book regarding conservation.

The Texas legislature has recognized the need for conservation. Not only is there a requirement to prepare a water conservation plan before appropriating state water (*see* Tex. Water Code § 11.1271(a)), but the legislature has also created a task force to consider and enhance conservation across the state. *See* Tex. Water Code §§ 10.001–.011 (establishing the Texas Water Conservation Advisory Council). Conservation is the first water supply strategy employed by many utilities because it is much less costly and more certain than permitting and constructing new facilities. However, conservation alone as a water supply strategy can rarely meet long-term projected demands. Utilities should look to the regional water planning process to determine how their own conservation efforts can be improved as well as to ascertain how much of their projected future demands can be met through conservation. *See* 2012 State Water Plan, at 187–89.

Conservation and drought planning are requirements for any utility that serves more than 3,300 connections. *See* 30 Tex. Admin. Code § 288.30(10)(A). Moreover, wholesale contracts are required to include language that imposes conservation planning on end users. *See* 30 Tex. Admin. Code § 288.5(1)(G). See Chapter 31 of this book for a discussion of wholesale contracts.

Annual reporting is required to ensure that tasks are being implemented to achieve water conservation goals. *See* 30 Tex. Admin. Code § 288.30(10)(C). Oversight for water conservation activities is shared between the TCEQ and the TWDB. See Chapters 9 and 23 of this book for discussions of conservation plans.

F. Desalination

Desalination involves the treatment and removal of dissolved solids from brackish groundwater or seawater. As noted above and further discussed in Chapter 4 of this book, groundwater is regulated differently from surface water. Seawater is considered within the definition of state water. *See* Tex. Water Code § 11.021(a). Any desalination project that involves the diversion and use of brackish surface water and seawater is required to have a surface water use permit in order to use this state water, whereas desalination of groundwater may require approval by a GCD. Thus, permitting for desalination projects differs significantly depending on the source of supply and location. See Chapter 25 of this book regarding desalination.

In addition to permitting considerations, planning a desalination project raises other issues such as the type and cost of treatment that must be used to remove dissolved solids. Membrane technology options include ultrafiltration, nanofiltration, microfiltration, and reverse osmosis, each of which involves the use of a progressively less porous membrane to remove dissolved solids. Additional treatment technologies, such as electrodialysis, can also be employed. Often, however, the limiting factor for a desalination project is how to handle the by-product produced from treatment. In arid portions of the state, the by-product is often disposed of via salt drying beds. In other areas of the state it may be possible to deep-well inject the by-product. *See* Tex. Water Code § 27.051; 30 Tex. Admin. Code §§ 331.1–.186. Where neither of these options exists or is practical, a Texas Pollutant Discharge Elimination System (TPDES) permit authorizing discharge of the by-product into a receiving water may be obtained. *See* Tex. Water Code § 26.121; see also Texas Commission on Environmental Quality, *What Is the "Texas Pollutant Discharge Elimination System (TPDES)"?*, www.tceq.texas.gov/permitting/wastewater/pretreatment/tpdes_definition.html.

G. Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) is a means by which entities construct groundwater wells that can inject water into, and subsequently extract water from, a single aquifer. ASR wells are typically used to store surface water that is available during periods of high flow for use during periods of drought. ASR wells can be used to facilitate conjunctive use, and often they assist in offsetting peak pumping demands otherwise dependent on distant or less reliable sources. See Chapter 26 of this book regarding ASR.

ASR wells are regulated under the Texas Water Code (*see, e.g.*, Tex. Water Code § 11.154) and TCEQ rules. Securing the authority to operate an ASR well requires that an application be submitted to the TCEQ that includes the same information necessary to appropriate state water as well as information necessary to demonstrate compliance with TCEQ injection wells regulations. *See* Tex. Water Code § 27.051; *see also* 30 Tex. Admin. Code ch. 331 (Underground Injection Control); *Texas Rivers Protection Ass'n v. Texas Natural Resource Conservation Commission*, 910 S.W.2d 147, 154 (Tex. App.—Austin 1995, writ denied) (holding that water diversion permits providing for storage of water for municipal use via ASR technique was permissible since water injected into an aquifer became groundwater outside state control). If an ASR application is filed within the territory of a GCD, the application must also demonstrate cooperation with the district, and it must include permit conditions referencing any contract by and between the applicant and the district. *See* Tex. Water Code § 11.154(b)(2). When reviewing an application for a permit authorizing an ASR well, the TCEQ must consider any potential impacts on water quality, whether the stored water can be successfully harvested for beneficial use, and whether the applicant can protect the water it is storing such that the water can be put to beneficial use without experiencing unreasonable loss. *See* Tex. Water Code § 11.154(c); *Texas Rivers Protection Ass'n*, 910 S.W.2d at 153 (holding that "beneficial use is the yardstick by which to measure legality of a permit").

ASR wells have certain unique features that differ from single-production or injection wells. Because of this, when ASR is considered, it is recommended that a three-phase approach be taken to assess the viability of any proposed well. *See generally* Edmond McCarthy, Jr., et al., *Aquifer Storage and Recovery: The Texas Perspective, in The Water Report*, Issue #19, Sept. 15, 2005, at 1. The first phase involves a preliminary feasibility study and conceptual design, which includes siting and designing certain monitoring wells. The second phase includes a field testing program to ensure that the aquifer can store the source of supply planned and that it can be secured and subsequently retrieved without excessive loss or adverse impact to the existing aquifer. The third phase involves the permitting of an ASR well(s), which includes securing any necessary surface water permits under Texas Water Code chapter 11 or groundwater permits required by Texas Water Code chapter 36 (for projects located inside a GCD). Additionally, the project must be authorized by injection permits required under chapter 27 of the Texas Water Code.

H. System Operations

To secure the right to divert and use state water for certain uses, an applicant must demonstrate that water is available for appropriation for a sufficient percentage of time. *See* 30 Tex. Admin. Code § 297.42. However, if an entity has additional, alternative supplies and can supplement its diversions with other sources, TCEQ rules allow the agency discretion regarding the necessary availability requirement. *See* 30 Tex. Admin. Code § 297.42(c). This type of supplementation is often available through the use of a "system operation" for water supplies.

A number of issues about the type of system must be considered when contemplating a system operation. One concept that may be considered is the ability to overdraft one reservoir by relying on the permitted yield of another reservoir. Another concept is the ability to operate a series of reservoirs or run-of-river rights as a system, thereby allowing diversions or releases from any one reservoir or diversion location to meet water supply obligations. For large utilities with numerous sources of supply, the concept of networking a system of supplies can lead to enhanced yield as well as redundant reliability. See Chapter 27 of this book for a discussion of system operations.

I. Portfolio Management

When planning and implementing water supply strategies, one must consider all available supplies. Managing a portfolio of supplies is akin to managing a portfolio of monetary investments. The goal is to provide long-term reliable water supplies at the lowest possible cost and risk. A prudent water supplier will evaluate all available water supply options, including the means for more efficient use of existing resources. This may be accomplished through reuse and conservation. A supplier should also consider ways to diversify and limit its exposure to short- and long-term water deficits. Potential causes of failure may include natural disasters such as hurricanes, source water contamination, drought, and catastrophic system collapse. Every catastrophic scenario cannot be addressed, but to ensure long-term success a supplier should consider diversifying its supply portfolio. This may include entering into possible partnerships with other suppliers to gain access to additional or backup supply, as well as planning for regulatory changes. *See generally* Brad B. Castleberry, *Maintaining a Diverse Water Supply*, 33 OpFlow No. 7, July 2007, at 14–17 (discussing portfolio management in depth).

IV. Permitting of Water Supply Projects

Once a project is identified in the state and regional water plans as a recommended strategy to meet a community's water supply needs, a water supplier can begin to work toward the realization of that project. Before construction can commence on a specific project, the water supplier may need to obtain a variety of local, state, and federal permits to gain the legal right to construct a project. Permitting a major long-term water project is time-intensive and costly, particularly when applications are protested. State and federal permitting for a new reservoir, for example, may take five to ten years to complete, and sometimes more if litigation occurs. Depending on the urgency with which a project must be completed, many water suppliers choose to apply for and obtain all necessary permits before acquiring land for the project, obtaining additional financing, or beginning construction because of the uncertainty involved in the permitting process. Others risk this uncertainty by pursuing certain aspects of the project, such as land acquisition, in conjunction with their applications for the necessary permits. This section focuses on how water suppliers obtain the legal right to construct and pursue a water supply project.

A. State and Local Permitting

Surface water supply projects in Texas require authorization from the state because the state holds in trust all surface water (i.e., "state water") within the state. *See* Tex. Water Code § 11.021(a). As mentioned above, state water is defined as all "water of the ordinary flow, underflow, and tides of every flowing natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state." Tex. Water Code § 11.021(a). The TCEQ is the agency charged with regulating surface water use, including the issuance of permits to divert and use such state water and the approval of sales and transfers of water already authorized for diversion. Local entities are not typically involved in permitting surface water projects unless local regulation of real property is involved (e.g., property on which the storage or diversion facilities will be constructed). However, because groundwater is not regulated as state water, depending on the location groundwater projects may involve the oversight and approval of local groundwater conservation districts. Thus, the regulation of a water supply project depends in large part on whether the project is based on surface water or groundwater.

1. Surface Water Projects

Chapter 11 of the Texas Water Code outlines the legal and regulatory requirements to apply for a new surface water right from the TCEQ, to amend an existing surface water right, to transfer an existing surface water right to a third party, to transfer water supplies to another water basin, and to seek reuse of wastewater effluent. In allocating the right to the use of state water, Texas adheres to the doctrine of prior appropriation, where the actual "use" of water is a major element in acquiring and perfecting a water right. Water Code section 11.022 provides that the "right to the use of state water may be acquired by appropriation" and that when such a right of use "is lawfully acquired, [water] may be taken or diverted from its natural channel." Tex. Water Code § 11.022. This provision, along with others in the Water Code, contemplates the "use" of water within an appropriations system and also requires the taking, storage, or diversion of such water. See Chapters 3 and 9 of this book for discussions of the appropriation system and surface water permitting.

New appropriations of state water and amendments to existing authorizations are obtained through an application and permitting process with the TCEQ, which is often subject to public notice and participation requirements. See Chapter 9 of this book for a discussion of this process. When an application is submitted for a new appropriation of state water, the threshold issue that the TCEQ must address is whether unappropriated water is actually available for use at the proposed diversion point. *See* Tex. Water Code § 11.134(b)(2).

After the agency determines that water is available for appropriation, TCEQ staff focuses on other significant issues, such as environmental impacts, whether the proposed diversion will be put to a beneficial use, and whether the proposed diversion will harm the public welfare. *See* Tex. Water Code §§ 11.134, 11.147, 11.150–.152. After performing all necessary reviews, the TCEQ will prepare a draft permit that may limit the diversion allowed, include stream flow restrictions as special conditions of the permit, or include other limitations and special conditions to ensure that the water authorized for diversion will be lawfully utilized in a manner that addresses the requirements for permitting the use of state water in the Texas Water Code. *See* Tex. Water Code § 11.134. See Chapter 9 of this book regarding surface water rights permitting.

The Texas legislature augmented the process to be used for identifying environmental flow requirements in 2007 with its passage of Senate Bill 3. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430. These new provisions require the TCEQ to adopt environmental flow regulations for certain bay and basin areas within the state, following the development of environmental flow recommendations developed by bay and basin expert science teams and bay and basin stakeholder groups. *See* Tex. Water Code §§ 11.0235–.0237. The evaluation of environmental flow issues is key to any surface water supply project in Texas.

Once issued, permits for water rights identify the date on which the permit was declared administratively complete, which is used for the purpose of setting the priority date for the water right and establishing a water right's place in the hierarchy of the prior appropriation system. Water rights also include provisions related to (1) the purpose of use for which water can be appropriated, (2) the annual diversion amount, (3) the instantaneous rate at which water can be diverted, (4) a time frame in which construction of storage and diversion facilities must commence and be completed, and (5) any special conditions the agency deems necessary. *See* Tex. Water Code § 11.135.

Amendments to existing appropriative rights that seek to increase the amount of water diverted or the rate at which water is diverted are assessed by the TCEQ and noticed as any application for a new appropriation. *See* Tex. Water Code § 11.122(a); 30 Tex. Admin. Code § 295.158. Applications that do not request an additional appropriation of water or an increased rate of diversion may not require full notice to other water rights holders in the basin, if the amendment would authorize no greater impact on other water rights or the environment than would full use of the existing right, and in light of the terms and conditions of the existing right. *See* Tex. Water Code § 11.122(b). However, a 2006 decision by the Texas Supreme Court suggests that even minor amendments to water rights may, under certain circumstances, require notice and the opportunity for a contested case hearing. *See City of Marshall v. City of Uncertain*, 206 S.W.3d 97, 110–11 (Tex. 2006) (requiring the TCEQ to consider the impact of several limited public interest criteria when determining whether to issue notice of a water right amendment application, including whether the application is intended for a beneficial use, whether it will harm the public welfare, and any impacts on groundwater). See Chapters 6 and 7 of this book for discussions of the four corners doctrine and the *Marshall* case.

For portions of the state where surface water supplies are limited, many water supply projects focus on delivering water from a neighboring river basin to areas where supplies can be used. Interbasin transfers of surface water are contemplated in the Texas Water Code and are an important tool for water suppliers seeking to move water resources to portions of the state where they are needed. Code section 11.085 provides a permitting framework under which the TCEQ may authorize such transfers of water. See Chapter 9 of this book for a discussion of interbasin transfers.

The reuse of water supplies, usually in the form of discharged treated wastewater, has increasingly been viewed as a viable means for water suppliers to supplement their water resources. There are, however, major legal implications for reuse projects, such as environmental sustainability concerns, water quality issues, and a potential negative impact on downstream water rights holders, some of whose rights may have been granted based on an assumption of continued municipal return flows or are made more reliable as a result of such discharges. Nonetheless, reuse is a key approach for many water suppliers in the state that seek to ensure that future demands can be met. Reused wastewater is considered a drought-proof supply of water, and technology now enables such water to be treated to a high level of quality.

Both legally and practically, the direct and indirect reuse of such water supplies in Texas is treated differently. Under the Texas Water Code, once a water right has been granted, "direct reuse" projects (i.e., the use of effluent directly from a wastewater treatment facility to an end user, also known as "flange-to-flange" reuse) are generally possible without seeking separate water rights authorization from the TCEQ. *See* Tex. Water Code § 11.046(c). Despite this general authority for direct reuse projects, water quality issues surrounding such reuse are subject to TCEQ regulation. *See* 30 Tex. Admin. Code ch. 210 (setting TCEQ rules on the use of reclaimed water). Thus, a water supplier pursuing a direct reuse project must first obtain water quality authorization from the TCEQ, which, generally, regulates the quality of the reused water and the place and manner of use.

"Once water has been diverted under a permit, certified filing, or certificate of adjudication and then returned to a watercourse or stream, however, it is considered surplus water and therefore subject to reservation for instream uses or beneficial inflows or to appropriation by others unless expressly provided otherwise in the permit, certified filing, or certificate of adjudication." Tex. Water Code § 11.046(c). Thus, for a water supplier to obtain "indirect reuse" authorization (i.e., the use of effluent after it has been discharged from a wastewater treatment facility to a state stream), the producer must seek a permit from the TCEQ to divert the water and a bed and banks authorization to transport such water to the point of diversion. See Chapter 24 of this book for a discussion of reuse authorization.

Although most diversions of water from state watercourses require an appropriative right from the state, several exemptions from the permitting process exist in the Texas Water Code that allow the development of certain water supply projects to proceed without permit authority. See Chapter 9 of this book for a discussion of exemptions related to state water permitting.

2. Groundwater Projects

Texas law controlling groundwater production poses many challenges to the development of a groundwater project. First, some areas are locally regulated by GCDs, while others are unregulated. Second, each GCD develops its own plan for managing the groundwater resources within the district and rules to implement the plan. Third, the state established a regional groundwater management planning process where GCDs in a designated groundwater management area develop planning goals known as desired future conditions (DFCs) that have potential to affect all future groundwater projects. In evaluating a groundwater-based project, a developer must consider all of these variables.

Unlike most western states, Texas does not have a uniform, statewide system of groundwater regulation. Historically, the common-law "rule of capture" has been the governing legal principle throughout the state. *See generally Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (1904); *Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75 (Tex. 1999); *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012) (explaining the rule of capture at length and holding that groundwater from a well became state water when it flowed into a Texas lake). Under the rule of capture, a landowner can pump as much groundwater as he can use without concern for any detrimental effects on third parties as long as the pumping does not result in a wanton or wasteful use of water, the pumping landowner does not maliciously intend to harm a third party, and the pumping does not cause subsidence. *Sipriano*, 1 S.W.3d at 76. However, the rule of capture has been limited in recent cases. *See, e.g., Day*, 369 S.W.3d at 831 (regulation of groundwater production is essential for Texas). S.B. 332, passed in 2011 during the 82nd legislative session, recognized that a landowner owns the groundwater below the surface of the landowner's land as "real property," but the right does not bestow upon the landowner the right to capture a specific amount. *See* Act of May 27, 2011, 82d Leg., R.S., ch. 1207. A detailed discussion of the rule of capture is provided in Chapter 4 of this book.

The legislature has expressed its clear preference for groundwater resource management by local GCDs. *See* Tex. Water Code § 36.0015. GCDs are political subdivisions and conservation and reclamation districts formed under the Conservation Amendment (Tex. Const. art. XVI, § 59) and operating pursuant to each GCD's enabling legislation and the general law of chapter 36 of the Water Code. *See* Tex. Water Code ch. 36. Currently, at least 176 counties, making up more than half of the total land area in Texas, are either partially or fully within a GCD. More important, the most current

TWDB data available reflect that roughly 90 percent of groundwater withdrawals and usage occur within the boundaries of a GCD. Texas Water Development Board, *Groundwater Conservation District Facts*, www.twdb.texas.gov/groundwater/conservation_districts/facts.asp. Each legislative session since 1997 (the year in which the legislature indicated its preference for management by GCDs), the legislature has created new GCDs across the state. Now there are a total of 98 GCDs in Texas. Texas Water Development Board, *Groundwater Conservation District Facts*, www.twdb.texas.gov/groundwater/conservation_districts/facts.asp.

See Chapter 16 of this book for a discussion of GCDs. Because most groundwater produced in Texas is located within a GCD, the remainder of this section discusses groundwater projects within GCDs.

GCDs are created "[i]n order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater." Tex. Water Code § 36.0015. These goals are reflected in a groundwater management plan developed by the district and approved by the TWDB. Tex. Water Code §§ 36.1071–.1073. See also Chapters 16 and 21 of this book. One aspect of this process that is particularly important to groundwater projects is the determination of the amount of groundwater that is available for production. See the discussion below regarding groundwater management area joint planning and the calculation of the managed available groundwater.

One of the primary tools a GCD uses to manage groundwater resources, and the tool that is of primary importance to a groundwater project, is well permitting. Texas Water Code chapter 36 gives GCDs the authority to alter the rule of capture by regulating and restricting groundwater production. *See* Tex. Water Code §§ 36.002, 36.101. Also, GCDs may restrict or limit production to protect existing wells as long as the restriction is tied both to the amount and the purpose of the prior use. *See Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910 (Tex. 2008). GCDs often use the permitting process to restrict or limit production from a well. For example:

- A district's rules may limit groundwater production based on tract size or the spacing of wells (*see* Tex. Water Code §§ 36.101(a), 36.116(a)(2)) and may regulate the spacing of wells relative to property lines or adjoining wells. *See* Tex. Water Code § 36.116(a)(1).
- Production limits may preserve historic use. *See* Tex. Water Code § 36.116(b). When issuing a permit for historic or existing use, a district is prohibited from discriminating between land that is irrigated for production and land that is enrolled in a federal conservation program. *See* Tex. Water Code § 36.113(g), (h).
- Production limits may vary within different geographic areas of the district based on differences in the aquifer or in the use of the aquifer. *See* Tex. Water Code § 36.116(d), (e).
- A district may require a production permit that controls the rate and amount of withdrawal. *See* Tex. Water Code §§ 36.1131(b)(8), 36.116(a)(2). Such permits have various names, such as production permit, operating permit, high production permit, and historic use permit.
- A district may base production limits on managed depletion. Tex. Water Code § 36.116(a)(2)(E).
- A district may base production limits on the service needs or service area of a retail water utility. Tex. Water Code § 36.116(c).

In addition to evaluating the method a GCD uses to limit production, the permit term or duration is of significant importance in evaluating a groundwater-based project. GCDs set various term limits, which range from one- to ten-year terms to indefinite, renewable terms. Some GCDs provide options for temporary permits, emergency permits, and other short-term, limited permits. As discussed below, when a project involves production of groundwater inside a GCD for use outside that GCD, different rules may apply. With regard to permit duration, there is some question about how the permit term is set for projects involving the export of groundwater outside a district's boundaries, although very few projects have been implemented that would test those statutory sections. *See* Tex. Water Code § 36.122; see also Chapters 16 and 18 of this book.

A significant issue for GCDs is their authority to regulate the export of groundwater across their boundaries. Concern has increased regarding water shortages. New projects to transport groundwater from one area of the state to another are a popular means for addressing such shortages. *See* Tex. Water Code § 36.122. GCDs are authorized to adopt rules requiring permits for groundwater transports (either increases of previous arrangements or new transfers) out of their boundaries occurring after March 2, 1997. *See* Tex. Water Code § 36.122(b). Districts cannot prohibit the export of groundwater if the purchase was in effect on or before June 1, 1997. In addition to the requirements in an operating or production permit mentioned above, export permits must specify the amount of water that may be transferred out of the district and the period for which the water may be transferred.

When reviewing a proposed transfer, a GCD must consider (1) the availability of water in the district and in the proposed receiving area during the period for which the water supply is requested; (2) the projected effect of the proposed transfer on aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the district; and (3) the approved regional water plan and approved management plan. Tex. Water Code § 36.122(f). A GCD is prohibited from discriminating between in-district users and transporters. A GCD may not deny a permit because the applicant seeks to transfer groundwater outside of the district. However, a GCD may limit a permit if conditions warrant the limitation, as long as it does not impose more restrictive permit conditions on transporters than on existing in-district users. *See* Tex. Water Code § 36.122(g). Groundwater export applications must be considered and processed in the same manner as in-district water use applications. *See* Tex. Water Code § 36.122(d). A GCD may not impose more restrictive permit conditions on transporters than the district imposes on existing in-district users, unless the more restrictive conditions apply to all subsequent in-district and transport permit applications, bear a reasonable relationship to the GCD management plan, and are reasonably necessary to protect existing uses. *See* Tex. Water Code §§ 36.122(c), 36.113(e). Significantly, a GCD may periodically review the amount of water that may be transferred under a permit. Tex. Water Code § 36.122(k). When determining whether to renew an export permit, a district must consider relevant and current data for the conservation of groundwater resources and must consider the permit in the same manner that it would consider any other permit in the district. Tex. Water Code § 36.122(k). See also Chapter 18 of this book.

Another aspect of GCD regulation that often has an impact on a groundwater-based project is the procedure the GCD uses to process, evaluate, and issue the operating, production, and transfer permits discussed above. Chapter 36 of the Texas Water Code sets forth the minimum due-process requirements for notice and hearing for permit and permit amendment actions. *See* Tex. Water Code § 36.114. See also Chapter 16 of this book.

GCDs in each groundwater management area (GMA) participate in joint planning as part of the state's overall water planning process. All the districts within a GMA must meet at least annually for joint planning. *See* Tex. Water Code § 36.108(c). The GCDs within each GMA determine how they want to manage the groundwater resources within the management area by creating a policy statement, known as the "desired future condition" (DFC) of the aquifers in the area. *See* Tex. Water Code § 36.108(d). The GCDs then submitt the desired future condition to the TWDB, which translates it into an estimate of the amount of water that could be withdrawn from the aquifers while maintaining the desired future condition. This water estimate is called the "managed available groundwater" (MAG). *See* Tex. Water Code § 36.108(o); *see also* Tex. Water Code §§ 36.001(25), 36.1071(e)(3)(A). This, effectively, is the new term for groundwater availability. See Chapter 19 of this book regarding groundwater availability modeling.

Development of the DFC and calculation of the MAG are significant for several reasons. A GCD uses the MAG numbers in its groundwater management plan. *See* Tex. Water Code § 36.108(d-2).

MAG numbers are also used in groundwater production permitting decisions. The MAG is critical because "to the extent possible" a district must issue permits "up to the point that total volume of groundwater permitted equals managed available groundwater" if applications for production are submitted. *See* Tex. Water Code § 36.1132. In other words, once the DFC is established and the TWDB calculates the MAG, a district cannot refuse to issue a production permit on the basis that no water is available if there is any amount of the MAG amount that has not been permitted.

On the other hand, the TWDB has opined that the managed available groundwater serves as a de facto cap on permitting. Robert E. Mace et al., *A Streetcar Named Desired Future Conditions: The New Groundwater Availability for Texas*, *in The Changing Face of Water Rights in Texas* 3.1, 6 (State Bar of Texas 2006) (stating that managed available groundwater numbers are a "cap on groundwater production") [hereinafter Mace et al.]. Thus, it is expected that this language will be cited by districts that refuse to issue permits after the total volume of groundwater permitted equals the TWDB-calculated managed available groundwater.

The MAG is also used by regional water planning groups in the state water planning process. Tex. Water Code § 16.053(e)(3)(A). As a result, it affects the ability of political subdivisions to obtain TWDB loans for groundwater projects. *See* Mace et al.; see also Chapter 21 of this book for a detailed discussion of joint planning and Chapter 20 for state and regional water planning.

Additionally, the MAG calculation can seriously influence planning on supply. Total permitted production that exceeds the MAG could result in forcing a reduction in use of an aquifer.

In summary, areas that are locally regulated by GCDs pose particular challenges to groundwater-based projects, even as they can also provide protection for the long-term viability of the project. Each GCD has a unique plan for managing the groundwater resources within the district and rules to implement the plan, thus increasing the complexity in evaluating the project. The regional groundwater management planning has the potential to affect all future groundwater projects. In evaluations of a groundwater-based project, it is essential to consider all these variables.

B. Federal Permitting

Depending on the scope of a particular water supply project, federal permitting under the Clean Water Act (CWA) and assessments related to environmental impacts under the National Environmental Policy Act (NEPA) may be required and, when required, add another layer of challenges and delays to a water supply project. CWA permits and NEPA procedures involve the oversight of or consultation with agencies such as the Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (USACE), and the Fish and Wildlife Service. See Chapter 35 of this book for a discussion of the CWA section 404 Corps of Engineers program; see Chapter 34 for a discussion of the CWA section 401 program; see Chapter 32 for a discussion of the Fish and Wildlife Service and the Endangered Species Act; see Chapter 27 for a discussion of NEPA.

1. Clean Water Act Section 404

The USACE section 404 permit program specifically applies to the discharge of "dredged or fill material" into "waters of the United States." *See* 33 C.F.R. pt. 323. Most large-scale dredge and fill discharges, like those associated with a water supply project, require an individual permit from the USACE. Before it can be issued, however, a section 404 permit requires public notice and hearing, a consideration of alternatives, public interest review, and conformity with EPA guidelines. *See* 33 U.S.C. § 1344(b), (c); *see also* 40 C.F.R. pt. 230 (EPA guidelines developed with the assistance and comments of the USACE). The public interest review associated with a section 404 permit involves an extensive analysis of the effects a discharge will have on the short- and long-term physical, chemical, and biological elements that make up the aquatic ecosystem. *See* 40 C.F.R. § 230.11. A section 404 permit will also be subjected to the procedural requirements of NEPA, but the public interest review in the two statutes overlap significantly. *See* 40 C.F.R. § 230.10(a)(4). The USACE also has the authority to issue general permits on a state, regional, or nationwide basis that exempt certain activities the agency believes have a minimal environmental impact. *See* 33 U.S.C. § 1344(e).

Before seeking individual 404 permit authorization, a water supplier must ensure that it has conducted a thorough alternatives assessment and can demonstrate that the proposed project will have the least environmental impact and is justified economically. Such an assessment should identify the water supply projects as the only practicable alternative, while considering environmental impacts, economics, and the overall project purpose. *See* 40 C.F.R. § 230.10(a)(2) (noting that an alternative is practicable if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes").

A section 404 permit will not be issued if there is a practicable alternative that would have less impact on the aquatic ecosystem. *See* 40 C.F.R. § 230.10(a). Practicable alternatives include restructuring the project so that no discharge into the waters of the United States occurs and discharging at a different location than proposed by the applicant. *See* 40 C.F.R. § 230.10(a)(1); *see also Alliance to Save the Mattaponi v. U.S. Army Corps of Engineers*, 810 F. Supp. 2d 160, 163 (D.D.C. 2011). As long as the dredge and fill operation is water dependent, this stringent consideration of alternatives typically does not require that a dramatically different alternative be used to effectively change the type of project. In contrast, a rebuttable presumption is that practicable nonaquatic alternatives exist when a non-water-dependent activity is the subject of a section 404 permit on a "special aquatic site." *See* 40 C.F.R. § 230.10(a)(3). Still, the USACE has an affirmative duty to consider alternatives within the framework of costs, technology, and logistics in accordance with the overall project purpose. *See* 40 C.F.R. § 230.10(a)(2); *see also Louisiana Wildlife Federation, Inc. v. York*, 761 F.2d 1044, 1048 (5th Cir. 1985); *Gouger v. U.S. Army Corps of Engineers*, 779 F. Supp. 2d 588, 603–04 (S.D. Tex. 2011). For a more detailed discussion of section 404 permitting, see Chapter 35 of this book.

2. Clean Water Act Section 401

Under CWA section 401, any applicant for a federal permit to conduct an activity that may cause a discharge into waters of the United States must obtain certification that the discharge will comply with state water quality standards adopted by the state in which the discharge will originate. *See* 33 U.S.C. § 1341(a). Certification under section 401 ensures that each state is involved in decisions made by the federal government that affect its water quality. With the exception of oil and gas exploration, the TCEQ is the state agency that administers the section 401 certification program. *See* 30 Tex. Admin. Code § 279.1. Certification of projects that propose a discharge resulting from oil and gas exploration is the responsibility of the Railroad Commission of Texas. *See* 16 Tex. Admin. Code § 3.93. For a detailed discussion of Clean Water Act section 401, see Chapter 34 of this book.

The TCEQ has developed a tiered system for evaluating all individual section 404 permit applications based on the project size and the amount of state water affected. Tier I projects are small projects that affect less than three acres of water in the state or less than 1,500 linear feet of streams. The TCEQ has determined that incorporating certain best management practices (BMPs) and other outlined requirements into Tier I projects will sufficiently minimize impacts to water quality. Therefore, applicants that want to utilize Tier I for small projects should include a signed Tier I checklist with their application for an individual section 404 permit to the USACE. *See* Texas Commission on Environmental Quality, *Tier I (Small Projects) Checklist, available at* www.tceq.texas.gov/assets/public/permitting/waterquality/forms/20228.pdf.

Any project that requires a section 404 individual permit and does not qualify for Tier I review or for which the applicant elects not to incorporate Tier I criteria is considered a Tier II project. Tier II projects are subject to an individual certification review by the TCEQ. A Certification Questionnaire and Alternatives Analysis Checklist must be submitted to the TCEQ for section 401 approval. Applicants completing the Certification Questionnaire are required to provide information about the potential impacts the disposal of waste materials from a project may have on the surface water quality in the state. The Alternatives Analysis Checklist generally covers the same requirements used for determining the practicable alternative for section 404 permit purposes. This checklist relates to determining how project needs could be satisfied in a way that does not affect surface water, how the project could be redesigned to fit the site without affecting surface water, how the project could be minimized, what other sites were considered, and possible consequences of not building the project. An applicant is also required to compare different alternatives, to explain why the preferred alternative was selected, and to explain what will be done to minimize adverse effects on surface water. Texas Commission on Environmental Quality, *Tier II 401 Certification Questionnaire and Alternative Analysis Checklist*, TCEQ Form TCEQ-20229 (Apr. 4, 2004), *available at* www.tceq.state.tx.us/assets/public/permitting/waterquality/forms/20229.pdf. Either the USACE district engineer or a section 404 permit applicant may submit a request for section 401 certification to the TCEQ. 30 Tex. Admin. Code § 279.4(b). If the USACE requests certification, the district engineer will provide the TCEQ with a copy of the public notice, a request for certification, and a copy of the complete permit application. 30 Tex. Admin. Code § 279.4(b)(1). If the permit applicant requests certification, the applicant will provide the TCEQ with a copy of the completed permit application and any amendments, a list of the names and addresses of owners of tracts of land adjacent to the site to be permitted, and a request for certification. 30 Tex. Admin. Code § 279.4(b)(2). An opportunity for notice and comment on an application for certification under section 401 is available to interested parties. *See* 30 Tex. Admin. Code §§ 279.5–.8. The executive director of the TCEQ will take final action on the application for certification within sixty days after receiving the certification request. 30 Tex. Admin. Code § 279.11(a). However, the executive director can elect to delay acting on a request for certification until after reviewing a section 404 final permit decision document. 30 Tex. Admin. Code § 279.4(b)(3). The TCEQ will not certify a discharge if (1) there is a practicable alternative to the proposed discharge that would have less adverse impacts on the environment, (2) appropriate steps are not taken to minimize adverse impacts, (3) mitigation is not undertaken for all unavoidable adverse impacts, or (4) the executive director determines that the impacts of the project are so significant that mitigation will not compensate for the damage of the project. *See* 30 Tex. Admin. Code § 279.11.

The TCEQ has certified that the activities authorized by some section 404 nationwide permits do not result in a violation of established Texas water quality standards and therefore do not need individual certification from the TCEQ under section 401. *See* 30 Tex. Admin. Code § 279.12. Other section 404 nationwide permits may be conditionally certified by the TCEQ. *See* 30 Tex. Admin. Code § 279.12.

3. *National Environmental Policy Act*

NEPA is integral to many water supply projects because the issuance of federal permits under section 404 of the CWA is conditioned upon NEPA compliance. The provisions of NEPA direct that "to the fullest extent possible . . . the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter." 42 U.S.C. § 4332. NEPA is a procedural statute that can influence the decision-making process of any federal agency (such as the USACE) by requiring the agency to consider environmental impacts, alternatives, and mitigation strategies for projects pursued by the federal government or projects sanctioned through the issuance of a federal permit.

As a procedural statute, NEPA "prohibits uninformed, not unwise, agency actions." *Stewart v. Potts*, 996 F. Supp. 668, 672 (S.D. Tex. 1998) (citing *Sabine River Authority v. U.S. Department of*

Interior, 951 F.2d 669, 676 (5th Cir. 1992)). The information required by NEPA allows for public accountability when major agency actions have an impact on the human environment and an injunction is appropriate to remedy an agency's failure to comply with NEPA procedures. Despite that remedy, other statutes are required in order for substantive environmental obligations to become binding upon an agency. NEPA procedures are required whenever "a proposal . . . for legislation or other major federal actions significantly [affects] the human environment." 40 C.F.R. § 1508.5. "Major federal actions" include a federal agency's issuance of permits, such as section 404 permits for water projects, the use of federal funds to construct projects, like federal flood control projects, and authorizing activities that occur on federal lands. *See, e.g., Maryland Conservation Council, Inc. v. Gilchrist*, 808 F.2d 1039, 1042 (4th Cir. 1986) (highway project requiring section 404 permit and federal approval is a "federal" action subject to NEPA); *Crutchfield v. U.S. Army Corps of Engineers*, 192 F. Supp. 2d 444, 448 (E.D. Va. 2001) (section 404 permit for wastewater treatment plant triggered NEPA procedural requirement); *Stewart*, 996 F. Supp. at 668 (municipal golf course proposal that included clearing and fragmentation of forested areas and a proposed drainage ditch that would discharge into waters of the United States was subject to USACE factual determinations under section 404).

NEPA requires a consideration of the consequences of the agency action and possible alternatives that are less damaging to the environment. NEPA is not required if the agency action falls within a limited number of categorical exemptions or has been previously determined to have no significant environmental impact. *See* 40 C.F.R. § 1508.4. Agency actions under certain statutes will never require NEPA compliance because it has been determined that these, mostly environmental protection statutes, are the functional equivalent of NEPA. For example, the EPA is exempted from NEPA for most actions the agency takes under the Clean Air Act. *See Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375 (D.C. Cir. 1973) (decision codified at 15 U.S.C. § 793(c)(1)); *but see American Trucking Ass'ns, Inc. v. U.S. Environmental Protection Agency*, 175 F.3d 1027, 1042 (D.C. Cir. 1999), *cert. granted, cause remanded sub nom., American Lung Ass'n v. American Trucking Ass'ns, Inc.*, 532 U.S. 901 (2001) (only section 111 of the Clean Air Act requires the functional equivalent of a NEPA impact statement, and any other EPA action under the CAA would be exempt).

When NEPA does apply, the agency authorizing the major federal action must prepare an environmental assessment (EA). This relatively short document is issued to determine whether an agency needs to prepare an environmental impact statement (EIS) or that lengthy process can be avoided by a finding of no significant impact (FONSI). A FONSI can be issued when a determination is made in the EA that an EIS is not necessary. *See* 40 C.F.R. § 1501.3(b). In order for a FONSI to be valid, the agency must prepare an adequate EA. The EA may be overturned if a court determines it to be superficial or manipulated. This is evidenced by a lack of documentation, internal inconsistencies, uncertainties, and a failure to consider the cumulative impacts of a proposed action. *See* Sheldon M. Novick, *Environmental Practice Series, Law of Environmental Protection* § 8:49 (1987). A qualitative identification of the potential effects of a project on the natural environment can be enough for an adequate EA.

In an EIS, the agency must evaluate alternatives to the proposed action that might be employed to meet the objective. An alternative may be less environmentally damaging, or it may make the proposed action unnecessary. The courts have adopted the standard that only "feasible" and "reasonable" alternatives need to be discussed, but some deference is given to an agency's determination that an alternative need not be considered. *See Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519 (1978). See Chapter 27 of this book for further discussion of NEPA requirements for reservoir projects.

V. Funding Considerations

After a water supply project has secured the necessary permits, it may be brought "on-line" through project implementation. For the most part, large-scale water supply projects require project-specific construction methods and techniques, but, in every project, new water supplies cannot be successfully and reliably obtained without adequate funding to support the completion of the project design, site and equipment acquisition, construction, and operations and maintenance of the project once constructed. Creating a delivery system for large quantities of water also typically requires a significant expenditure of money that exceeds the existing financial capabilities of the project sponsor and the project's end users. Most projects require public funding to allow implementation of a water supply system of an adequate scale to meet present and future demands. While Chapter 37 of this book provides a detailed description of water supply project funding options available in Texas, this section includes a brief overview of some of these funding options.

A. Public Entity Financing Options

Many options are available to structure debt issued by a public entity for project implementation. This discussion is meant to provide only a general overview. The nuances of particular financing options vary depending on the type of entity even under the general discussions noted here. The Conservation Amendment to the Texas Constitution authorizes conservation and reclamation districts created by the state to issue debt to further the purposes of the amendment through new water supply projects and management practices. *See* Tex. Const. art. XVI, § 59. Political subdivisions in Texas are also authorized, with approval from the state, to issue debt to supply funding for public works projects throughout the project's life cycle, including planning, land acquisition, construction, and routine maintenance phases. Tex. Const. art. III, § 49-d-4. A rigorous assessment of the risks and costs involved in each potential financing avenue is necessary to allow for reliable and economically sustainable water supply delivery to end users. *See generally* Michigan Water Works Association, *Water Works News* 22 (Nov. 2002); First Southwest Company, Authorized City Debt Instruments (Oct. 28, 1996).

1. General Obligation Bonds

General obligation bonds (GOBs) are issued by a political subdivision for a specifically approved public-purpose project and are secured by the full faith and credit of the public entity through its power of ad valorem taxation. The requirement that a bond be issued for a "public purpose" means that the project must specifically benefit the entity issuing the debt and its residents. *See* Tex. Loc. Gov't Code § 374.906. Municipalities, counties, towns, and other political corporations are prohibited from lending credit to any entity by the Texas Constitution, so a GOB could not be issued to fund a project that, upon completion, is entirely privately owned. *See* Tex. Const. art. III, § 52. However, a project funded by GOB financing may be jointly owned or funded by another entity, as long as the political subdivision issuing the bond retains a divided or undivided interest in the project being financed.

GOBs require voter approval. The amount of GOBs that can be issued is limited by the tax revenue that can be generated at the maximum ad valorem tax rate, specified by the constitution, less taxes used to pay for other functions, including debt, of the entity. For example, a general law city may tax only up to $1.50 per $100.00 taxable assessed valuation (1.5 percent), and a home rule city may tax up to $2.50 per $100.00 taxable assessed valuation (2.5 percent). *See* Tex. Const. art. XI, §§ 4, 5. Public entities can avoid paying GOB debt through tax revenues if they are able to pay the debt from other sources.

GOBs are generally regarded as the most secure form of debt that a public entity can issue. This type of bond, like other forms of debt issued by public entities, must be reviewed by the attorney general, receive prior approval, and ultimately be submitted to the comptroller for registration in the state records. *See* Tex. Gov't Code § 1202.003(a), (b). After they are approved and registered, GOBs issued by a public entity are binding obligations that are valid and incontestable in a court or other forum. Tex. Gov't Code § 1202.006(a). The only way to overturn this presumption is with a showing of fraud or forgery. *See Leonard v. Abbott*, 171 S.W.3d 451, 460 (Tex. App.—Austin 2005, pet. denied) (bonds are generally incontestable after attorney general approval). Although the interest income earned by purchasers of some GOBs is taxable, the interest income earned by purchasers of most GOBs is tax free, and such bonds typically have the lowest interest rate of any public securities. GOBs are a useful mechanism to finance project implementation, but voter and attorney general approval lengthens the time before funding is made available. Substantial reliance on GOBs requires planning ahead to avoid inefficient or postponed project implementation caused by delays associated with the bureaucratic system of GOB authorization.

2. Revenue Bonds

Revenue bonds are issued on the foundation of a pledge of revenues that will be generated by the project through the sale of services or water generated by the project. This revenue stream may also be created by the imposition of standby fees or groundwater management fees. Debt issued by a revenue bond cannot be repaid with ad valorem taxes, but a tax may be issued to help pay for the operating expenses of the revenue-generating project. Revenue bonds do not require voter authorization, but they are subject to a voter referendum if a certain percentage of voters (usually 5 or 10 percent) petition to force an election.

The amount of financing for a water project available through revenue bonds is limited by the amount that rates for water services can be feasibly increased. Determining practical rate increases to secure a bond involves a technical and economic study that should be performed in coordination with a professional rate consultant trained in analyzing projected population growth, water demand, and other relevant factors. Revenue bonds typically require a higher interest rate than GOBs because of the uncertainties involved in funding the debt. The amount of interest required for a successful bond will depend, in part, on the quality of the project's financial operations and business practices.

3. Certificates of Obligation/Double-Barreled Bonds

A certificate of obligation (COO) (*see generally* Tex. Gov't Code §§ 1371.001–.106) is similar to a GOB and is available for funding projects. Unlike GOBs, COOs do not require voter approval. A COO, however, is subject to the same referendum by voter petition as a revenue bond. If a COO is funded entirely by ad valorem taxation, it may be issued only for limited purposes, such as land acquisition. *See, e.g.*, Tex. Gov't Code § 1509.902.

COOs may be used for any lawful purpose when they are supplemented with a pledge of surplus revenue ($1,000 or more) from the project after it is implemented. A COO may also make up half of a double-barreled bond (DBB). A DBB is primarily secured by a revenue bond, but if revenue generation fails to satisfy the bond obligation over a period of time, the principal and interest payments may be satisfied by tax revenues guaranteed by a COO.

4. Contract Revenue Bonds

A project sponsor may issue a contract revenue bond based on wholesale contracts entered into with third-party users, such as regional river authorities or entities created by a political subdivision for water services. *See generally City of Galveston v. Hill*, 519 S.W.2d 103, 106 (Tex. 1975). The contract may specify that payments are secured by taxes, revenue, or a combination of both. Depending on the terms of the contract, the public entity may or may not retain ownership over all aspects of the project. The interest rate of the contract revenue bond will be based on the strength of the project sponsor's credit.

5. Anticipation Notes

Anticipation notes allow municipalities to fund water supply projects based on an ordinance passed by a city council. These bonds may be secured by a pledge of revenues, projected revenues, ad valorem taxes, or already authorized bonds that the city may issue if necessary to repay the debt. Bond anticipation notes and tax anticipation notes mature within one year of their date. Tex. Water Code § 49.154(a). No voter approval is necessary for anticipation notes, but these securities typically require a fairly high interest rate.

6. Public Property Finance Contractual Obligations

A political subdivision or governmental agency is authorized by statute to purchase equipment or other personal property necessary for implementing a water supply project through a debt obligation contract. *See* Tex. Loc. Gov't Code § 271.005. The contract may be paid over the term of the contract with taxes, revenue from the project, or both.

7. Commercial Paper Program

Commercial paper may be used to obtain funding for capital improvements through a short-term note program. These obligations are secured through a pledge of revenues, similar to a revenue bond, supplemented with a letter of credit from a bank guaranteeing that the purchaser will be repaid on time. These notes are used for immediate funding needs and mature in periods from one day to one year. *See* Tex. Gov't Code §§ 1371.001, 1371.059.

8. Nonprofit Corporations

To avoid the constitutional prohibition against the lending of credit, political subdivisions may create nonprofit corporations to implement, finance, or operate a water supply project. *See* Texas Development Corporation Act of 1979, Tex. Loc. Gov't Code tit. 12, subtit. C1. These corporations are specifically exempt from article III, section 52, of the Texas Constitution and are authorized to issue taxable and tax-exempt bonds. *See* Tex. Loc. Gov't Code §§ 501.055(b), 501.201. Often, nonprofit corporations are created to be used as a conduit for channeling money necessary for project implementation, and they are also used to implement water supply projects operated under a public-private partnership.

B. Texas Water Development Board Funding

1. The American Recovery and Reinvestment Act

On Feb. 17, 2009, the American Recovery and Reinvestment Act (ARRA), commonly referred to as the "stimulus bill," was signed into law. American Recovery and Reinvestment Act of Feb. 17, 2009, Pub. L. No. 111-5, 123 Stat. 115. The ARRA provided funding to twenty-eight federal agencies, including the Environmental Protection Agency (EPA) which, in turn, distributed funds to state agencies. In Texas, the EPA distributed $326 million to the TWBD to fund water and wastewater projects. *See* Texas Water Development Board, *Annual Report—Drinking Water State Revolving Fund* (2013), at B.23, *available at* www.twdb.texas.gov/publications/reports/administrative/doc/FY13_DWSRF_annualreport.pdf. In 2008, the TWDB launched a comprehensive outreach campaign about the stimulus funding available for water projects in the state. Through this campaign, the TWDB identified multiple projects, equating to $6.6 billion, eligible to receive funding based on the deadlines and qualifications set by the ARRA.

The TWDB ARRA funds are dispersed through the state's Drinking Water and Clean Water (Wastewater) programs. Some of the projects are funded by grants, others through loans. Overall, at least fifty percent of funding has gone to disadvantaged communities in need of assistance, and twenty percent of the funded projects are "green" projects that demonstrate water or energy efficiency or environmental innovation.

To ensure that funds are spent accurately, state agencies and local entities receiving funds must file weekly, monthly, and quarterly financial reports regarding their use of the funds. In addition, citizens are encouraged to report suspected fraud, waste, or abuse.

2. Water Infrastructure Fund

In 2007, the 80th Texas Legislature appropriated monies to allow for deferred debt service payments to the TWDB in order to provide reduced-interest loan rates and deferral of annual principal and interest payments for state water plan projects funded through the Water Infrastructure Fund (WIF). *See* Act of May 27, 2007, 80th Leg., R.S., ch. 1428; *see generally* 31 Tex. Admin. Code §§ 363.1201–.1210. The WIF is designed to fund current water project needs and preconstruction studies. In 2009, the legislature amended WIF eligibility; entities eligible for assistance from the WIF now include political subdivisions of the state; nonprofit water supply corporations created and operating under chapter 67 of the Texas Water Code; and certain categories of districts such as freshwater supply districts, special utility districts, and municipal utility districts. *See* Tex. Water Code § 15.971; 31 Tex. Admin. Code § 363.1202.

3. Agricultural Water Conservation Grants

Agricultural Water Conservation Grants are available annually and may be issued to state agencies and political subdivisions to fund research, technical assistance, education, and technologies associated with agricultural water conservation. Funding is also available to a political subdivision for installing metering devices to quantify the impact of a water conservation strategy on irrigation.

4. Agricultural Water Conservation Loans

Agricultural Water Conservation Loans are available for various public entities and individuals (if the money is routed through a bank or farm credit system) to (1) improve the efficiency of water use or delivery, (2) convert irrigated land to dryland farming, (3) improve the efficiency with which dryland farming areas use natural precipitation, (4) install devices that measure irrigation water use, (5) establish brush control activities conducted under chapter 206 of the Agriculture Code, or (6) fund other conservation projects authorized by TWDB rules. *See* 31 Tex. Admin. Code ch. 367.

5. Clean Water State Revolving Fund Program

The Clean Water State Revolving Fund Program is available to political subdivisions for planning, land acquisition, project construction, wastewater treatment, reuse projects, and nonpoint source pollution control. Individuals are also eligible to receive funding, but only for nonpoint source pollution control projects.

6. *Drinking Water State Revolving Fund Program*

Drinking Water State Revolving Fund Program Loans are available to "eligible applicants," including all entities under the federal Safe Drinking Water Act and private individuals. *See* Tex. Water Code § 15.604. Funds may be used for all aspects of the implementation of water-related infrastructure as well as source water protection. Subsidies may be available for economically disadvantaged areas.

7. *Rural Water Assistance Fund Program*

Political subdivisions and nonprofit water supply corporations may apply for loans from the Rural Water Assistance Fund Program to aid in the planning, acquisition, and construction of water supply infrastructure in rural areas.

8. *State Participation in Regional Water and Wastewater Facilities Program*

Under the State Participation in Regional Water and Wastewater Facilities Program, the TWDB provides funding to political subdivisions and public entities for the construction of regional water or wastewater projects. Through this program, the state secures an ownership interest in the project that is transferred to the applicant after the customer base grows enough to allow for repayment.

9. *Water and Wastewater Loan Program*

The Water and Wastewater Loan Program makes loans available to political subdivisions and nonprofit water supply corporations for, among other things, water supply projects, including reservoir construction, water storage, and agricultural water conservation.

10. *Regional Facility Planning Grant Program*

The Regional Facility Planning Grant Program provides funding to political subdivisions authorized to implement regional water supply projects to support research into potential alternatives that could be used to meet present and future regional needs. Nonprofit water supply corporations may also receive funding under this program.

11. *Economically Distressed Area Program*

Grants, loans, or a combination of both may be issued under the Economically Distressed Area Program to finance water or wastewater services for economically distressed areas. In 2007 the 80th Texas Legislature provided funding for debt service payments for the State Participation and Economically Distressed Areas Programs to fund state water plan projects. Public entities, and some private entities, are eligible to receive funding from these and other TWDB programs. *See generally* Texas Water Development Board, *Financial Assistance Programs*, www.twdb.state.tx.us/financial/programs/index.asp.

12. State Water Implementation Fund for Texas

During the 2013 legislative session, House Bill 4 was passed to provide a fund intended to serve as a water infrastructure bank to enhance the financing capabilities of the TWDB under constitutionally created programs and revenue bond programs. The State Water Implementation Fund for Texas (SWIFT) was proposed to provide a source of revenue or security for those programs and a cash flow mechanism under which money used in TWDB programs flows back to the fund to provide protection for the fund's principal (codified at Tex. Water Code § 15.432). On November 5, 2013, voters approved amending the Texas Constitution to create two separate, constitutionally dedicated, revolving loan accounts that will be managed by the TWBD and funded by a $2 billion cash infusion from the "Rainy Day Fund." At least 20 percent of the funds must be used to support water conservation programs, and at least 10 percent will be used to serve water supply infrastructure and development needs in rural Texas. In November 2014, the TWDB adopted rules to implement the SWIFT funding program and began accepting applications for the first round of SWIFT funding.

VI. Conclusion

The 2012 Texas State Water Plan identifies the need to develop 8.8 million acre-feet of additional water supplies in order to meet the state's projected demands in 2060, the planning horizon required by law. *See* 2012 State Water Plan, at 3. Development of these supplies is the subject of significant planning and permitting requirements, and adequate funding is essential to project development. State law provides that water supply projects requiring state water rights permitting or state funding be consistent with approved regional and state water plans. *See* Tex. Water Code §§ 11.134(b)(3)(E), 16.053(j). Depending on the source of supply, permitting the storage and use of water by the state or a GCD may also be required, and federal permits are necessary for permits involving construction activities in federally regulated waters. *See* 33 U.S.C. § 1344. These activities involve compliance with state and federal procedures, which often require years to complete. Finally, adequate funding for planning, permitting, site and right-of-way acquisitions, and construction of projects is necessary for new water supplies to be developed.

CHAPTER 3

Historical Development of Texas Surface Water Law: Background of the Appropriation and Permitting System and Management of Surface Water Resources

Glenn Jarvis[1]

I. Introduction and Overview

Substantial modifications in Texas surface water laws have occurred more frequently than in other aspects of property law. For this reason, the Texas law of surface water rights can best be understood by reviewing its historical evolution. The evolution of surface water law in Texas is unique due substantially to the state's governmental and legal history. Politics always played a significant role motivated by social and historical events and economic considerations, which in turn were often driven by nature. Droughts and water shortages, as well as floods, often have been followed by changes in water law. This chapter traces that history and its effect on surface water law, culminating in the establishment of the prior appropriation and permitting system in effect today.

Texas was initially governed by Spanish law, then by Mexican law from 1821 until Texas achieved its independence from Mexico in 1836. Texas was a republic and sovereign nation from 1836 until it became a state in 1845. The Republic of Texas utilized the general laws of Mexico until 1840. The Fourth Congress of the Republic of Texas introduced the common law of England as of March 16, 1840. It preserved Spanish and Mexican mining law, but notably did not preserve the water law of New Spain. *See* Act approved Jan. 20, 1840, 4th Cong., R.S., §§ 1, 2, 1840 Repub. Tex. Laws 3, 4, *reprinted in* 2 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 177, 178 (Austin, Gammel Book Co. 1898). When it became a state in 1845, Texas reserved the ownership of its public land, water, and other natural resources. *See* Ordinance adopted July 4, 1845, *reprinted in* 2 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1228. Each of these political, legal, and historical events shaped Texas water law.

This evolution continued through the Republic period and as the new state took form. Sixteen years after the adoption of the common law in 1840, the courts adopted a version of the common-law

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riparian rights system. *Haas v. Choussard*, 17 Tex. 588, 589 (1856); *see also* A. Dan Tarlock, *Law of Water Rights and Resources* ch. 3 (Clark Boardman Callaghan & Co. 1988) [hereinafter Tarlock]. The period from 1845 through the 1870s was politically uncertain. Texas seceded from the Union in 1861 and returned to statehood in 1870. Wells H. Hutchins, *Texas Law of Water Rights* 1–3 (1961) [hereinafter Hutchins]. Faced with public pressure to develop the state's water resources during these unstable times, the legislature passed the Irrigation Act of 1852 to encourage local private irrigation projects. *See* Act approved Feb. 10, 1852, 4th Leg., R.S., ch. 74, 1852 Tex. Gen. Laws 80, *reprinted in* 3 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 598. Thus began a divergence of water law principles: the courts followed the common-law water rights riparian system, while the legislature passed statutes regulating the use of water. This created a disconnected and confused legal water rights system. Because the period was marked by political discontent, public focus was on ensuring the stability of government rather than on regulating the state's water resources. Later, when people were free to pursue a better life and economic stability, the need for developing the state's resources gained attention, and the legislature, recognizing these needs, adopted the law of prior appropriation in the Irrigation Act of 1889. *See* Act approved Mar. 19, 1889, 21st Leg., R.S., ch. 88, 1889 Tex. Gen. Laws 100, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1128.

In an effort to improve the 1889 Act, the legislature passed the 1893 Act and then the Irrigation Act of 1895, which extended the scope of the 1889 Act and confirmed the dual system of water rights: common-law riparian rights, as previously recognized by the courts, and statutory prior appropriation rights established by the legislature. *See* Act of Mar. 29, 1895, 23d Leg., R.S., ch. 44, 1893 Tex. Gen. Laws 47; Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, 1895 Tex. Gen. Laws 21, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751. This legislative policy of state control of water resources, while recognizing private property rights, was reinforced by legislation passed in 1913 and 1917–18. The dual system of surface water rights and the dichotomy of the state ownership of surface water and protection of private property rights led to confusion, which was not resolved until the enactment of the Water Rights Adjudication Act in 1967. *See In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 439 (Tex. 1982) (noting that water law in Texas "was in a chaotic state prior to the enactment of the Water Rights Adjudication Act in 1967"). Thus, it took almost 125 years after statehood for Texas to address all water resource rights and provide a means of adjudicating the nature and extent of all surface water claims. Surface water rights were defined and quantified by the 1967 Act, with those rights claimed both under common law and the prior appropriation statutes.

As a result of the adjudication proceedings undertaken under the 1967 Act, the common-law riparian right was converted into an appropriative right. The Act set the stage for better water management and refinement of Texas law on how surface water rights are exercised and managed. This refinement is continuing today as water managers, courts, and state water agencies, in an effort to meet the changing and increasing needs for water in a state that has a growing population and is changing from a predominantly agrarian society to a commercial and industrial society, struggle with issues such as reuse, environmental flows, interbasin transfers, the hydrologic connection between surface water and groundwater, and conjunctive use of surface water and groundwater.

II. The History of Surface Water Rights

A. Spanish and Mexican Law and Its Influence

Before 1836, settlers from Spain and Mexico developed irrigation and municipal water systems in several areas of what is now Texas, particularly in the El Paso, San Antonio, and Laredo areas. The irrigation system in San Antonio is the best Texas example of the practical application of Spanish and Mexican water law.

The San Antonio irrigation system contained several ditches or "acequias." Each acequia served a community of irrigators who operated their ditches within an administrative framework provided by the local government. The settlements were governed by the *alcalde* and *regimentos*, or in modern terms the community authority and the mayor, under authority granted by the king. *See San Juan Ditch Co. v. Cassin*, 141 S.W. 815 (Tex. Civ. App.—San Antonio 1911, writ ref'd). A similar system was created and maintained on the Rio Grande in the El Paso Valley on both sides of the river. These acequias also provided the Catholic missions and civil settlements with water for domestic use. *See* Betty Eakle Dobkins, *The Spanish Element in Texas Water Law* 103–13 (University of Texas Press 1959).

These water supply projects were politically, socially, and economically necessary during the Spanish colonization period and helped to prevent the westward expansion of the French. In these early settlements, acequias were established to serve the missions, the presidio, domestic needs, and the limited irrigation needs of settlers' lands. *See* Hutchins, at 102–03.

Under Spanish and Mexican law, surface water was reserved to the king or the government that governed its use, with the exception that people abutting a stream had the right to use water for basic domestic and livestock needs as a common-to-all use of water in the stream. A surface water right was gained for generally larger uses not abutting a stream—that is, not riparian to a stream—for irrigation, commercial, *and* industrial purposes only by a grant from the sovereign or by legal processes provided by the government. *See* Hans W. Baade, *The Historical Background of Texas Water Law—A Tribute to Jack Pope*, 18 St. Mary's L.J. 1 (1986).

As discussed below, early water law court decisions, such as *Haas v. Choussard*, 17 Tex. 588 (1856), and later *Motl v. Boyd*, 286 S.W. 458 (Tex. 1926), misunderstood these legal concepts and were later reconsidered and overturned. Later courts clarified this historical influence and relied on it to support their decisions. *See, e.g., State v. Valmont Plantations*, 346 S.W.2d 853 (Tex. Civ. App.—San Antonio 1961), *op. adopted*, 355 S.W.2d 502 (Tex. 1962), discussed below.

B. Republic of Texas Period

When the Republic of Texas was established, it continued to be governed by Spanish and Mexican civil law during the period 1836–40. The validity and legal effect of contracts and grants of land were determined according to the civil law in effect at the time of the contract or grant. *Miller v. Letzerich*, 49 S.W.2d 404, 407–08 (Tex. 1932). Therefore, statutes in force during this period were construed in light of Mexican civil law. As noted above, the Republic adopted the English common law in 1840. At that time, embedded in English common law was a riparian right to use surface water. *See* Act approved Jan. 20, 1840, 4th Cong., R.S., §§ 1, 2, 1841 Repub. Tex. Laws 3, 4, *reprinted in* 2 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 177, 178. From 1836 through 1845, except for adoption of the English common law, there is little or no record of attention to water law. This obviously was because of other more pressing matters of the Republic. No water laws of significance were enacted until some years after Texas became a state.

C. Early Statehood Period

The Republic of Texas became a state of the United States in 1845, and unlike other states it retained its public debt and obligations. Because of political pressures of the time and possibly because of the unknown nature of the debt, the state retained its public land and resources and debt. *See* Joint Resolution for Annexing Texas to the United States, 5 Stat. 787, 28th Cong., 2d Sess. (approved Mar.

1, 1845); Ordinance adopted July 4, 1845, *reprinted in* 2 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1228. The result was that the United States did not initially have federal public lands in Texas as it had in other states. This fact significantly influenced the development of water law and water management in Texas in ways unique from other states. Also, the needs of the time dictated the development of a strong agricultural economy to encourage migration and produce food for the state's population growth.

1. Irrigation Act of 1852

The first general law on the subject of water was the Irrigation Act of 1852, which was significant because irrigation enhanced agricultural production vital to the state's economy and growth. The 1852 Act authorized counties to regulate dams and distribute shares of the water. *See* Act approved Feb. 10, 1852, 4th Leg., R.S., ch. 74, 1852 Tex. Gen. Laws 80, *reprinted in* 3 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 598. Consistent with "the principles of the Mexican laws," counties were given authority to regulate the construction, operation, and maintenance of irrigation works, similar to the former regulatory power of the community *alcalde* system of Spanish and Mexican law. *Tolle v. Correth*, 31 Tex. 362, 364–65 (1868). It was observed that the 1852 Act was consistent with "ancient law" that regulated community irrigation. Harbert Davenport, *Development of the Texas Laws of Waters*, 21 Tex. Rev. Civ. Stat. Ann. XIII, XIX (Vernon 1954) [hereinafter Davenport]. The 1852 Act remained the law in Texas until its repeal by the so-called "Water Appropriation Statute of 1913." Hutchins, at 104–05. See discussion below.

2. Riparian Rights

After the adoption of the common law of England in 1840, there was embedded in Texas law an aspect of the English common law that ownership of land riparian to a stream or natural lake includes, by implication, a right to use water from the stream or lake. *See* Tarlock, ch. 3. However, it was not until sixteen years later, after the legislature's first attempt to manage the use of surface water by the Irrigation Act of 1852 discussed above, that the courts applied English common law to Texas water law. In 1856, the Texas Supreme Court held in *Haas v. Choussard* that the "right to the use of water adjacent to one's lots, as it flowed in its natural channel was a right inherent and inseparably connected with the land itself." *Haas*, 17 Tex. at 589; *see generally* Ira P. Hilderbrand, *The Rights of Riparian Owners at Common Law in Texas*, 6 Texas L. Rev. 19 (1927). The recognition of this right was significant, especially for irrigation in the semiarid regions of Texas. *Tolle*, 31 Tex. at 364–65; *Rhodes v. Whitehead*, 27 Tex. 304, 310–11, 315–16 (1863).

In *Fleming v. Davis*, 37 Tex. 173, 201–02 (1872), for example, the applicability of riparian water rights to semiarid areas was contested. The court was urged to judicially adopt the California prior appropriation system. In this case, a downstream riparian user on a stream sued an upstream user for unreasonably using water from springs, which were the headwaters of the stream. The upstream user was using the entire flow for his domestic and irrigation purposes. The court concluded, applying common-law riparian rules, that the upstream user could be enjoined from *unreasonable* detention and use of all the water while it was on his property; that without a contract or an express grant of water, the upstream user had only the right to use water co-equally with the rights of all other riparians to have the benefits of the water. Thus, the reasonable use and correlative rights concept was applied to the common-law riparian right. The court, however, advised the legislature that "the wealth and comfort of our people throughout a large portion of the State might be greatly augmented by wise legislation on this subject."

3. *Special Laws Creating Private Irrigation Companies*

While the courts in the cases discussed above recognized a Texas version of common-law riparian rights, between 1854 and 1879 multiple special laws were passed granting individuals, cities, and corporations authority to construct dams and other works for the purpose of water development through irrigation enterprises. *See* 4 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 151, 400, 580, 823, 1202, 1294; 5 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 536, 789, 793–94, 1318, 1431, 1572, 1584, 1605, 1607; 6 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 712; 7 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 191. During this same period, at least fourteen of these laws granted the right to divert water from various streams for irrigation and other purposes. *See, e.g.*, 4 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1314; 5 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 231, 302, 570, 1284, 1360, 1491, 1627; 6 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 683, 1470, 1621; 7 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 316, 1310; 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 14. In these special acts, the Texas legislature granted private companies the power to construct dams and divert water from a river. The grants made by these legislative acts did not take into account whether the owners owned any riparian land and contemplated use by the owner of water for irrigation purposes without restriction as to the riparian users of the water. A.W. Walker, Jr., *Legal History of the Riparian Right of Irrigation in Texas Since 1836* 41, 47, *in* Proceedings, Water Law Conference, Univ. of Texas (1959). These special acts illustrate the legislature's reliance on the legal concept that the state's land and surface waters were public waters of Texas, subject to state control within basic constitutional restraints.

For example, the Texas legislature authorized the formation of the El Paso Irrigation and Manufacturing Company for the purpose of providing irrigation to the El Paso Valley and granted to the private company the power "to divert from the channel or bed of the Rio Grande one-fourth of all the water forming said river, and apply the same to the purposes or [sic] irrigation." *See* Act approved Nov. 6, 1866, 11th Leg., R.S., ch. 157, § 10, 1866 Tex. Spec. Laws 271, 273, *reprinted in* 5 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1491, 1493.

Water policy at that time recognized that encouraging irrigation development was important and that the state had to play a role in the development of its natural water resources. For example, a law enacted on December 20, 1861, authorized the imposition of a fine on any person who refused to work on a ditch when summoned to do so by proper authority and apparently was intended to supplement the 1852 Act. Act approved Dec. 20, 1861, 9th Leg., R.S., ch. 15, 1861 Tex. Gen. Laws 8, *reprinted in* 5 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 452.

Texas statutes relating to private corporations, however, developed more rapidly than the statutes defining the right to the water itself. This legal development added a layer of complexity to the evolving water law. For example, the Private Corporation Act was passed in 1871, which provided for the organization of canal companies for the purpose of irrigation. Act approved Dec. 2, 1871, 12th Leg., 2d C.S., ch. 74, § 2, 1871 Tex. Gen. Laws 66, 67, *reprinted in* 7 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 68, 69. Section 58 of the Private Corporation Act of April 23, 1874, made ample provision for the organization of "canal companies for the purpose of irrigation" and authorized each such corporation "to construct its canals across, along, or upon any stream of water." Act approved Apr. 23, 1874, 14th Leg., R.S., ch. 97, § 58, 1874 Tex. Gen. Laws 120, 134, *reprinted in* 8 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 122, 136. The following year, the legislature enacted a comprehensive statute to encourage the construction of canals and ditches for navigation and irrigation. It also authorized the granting of public land for each mile of canal constructed, when approved and accepted by the governor, and stated "that any such canal company *shall have the free use of the water* of the rivers and streams of this State; but in no case shall any company flow lands to the detriment of the owners without their consent, or due payment to the parties aggrieved." Act approved Mar. 10, 1875, 14th Leg., 2d C.S., ch. 62, § 7, 1875 Tex. Gen. Laws 77, 79, *reprinted in* 8 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 449, 451 (emphasis added). As discussed below, this language later proved to be insufficient to grant a private property right to actually take water from a stream where there were existing riparian claimants.

These early irrigation laws were not water rights statutes as such but were related to public regulation of commonly owned private irrigation enterprises. These statutes do, however, indicate that the legislature believed that, based on the reservation of ownership of public land and waters by the state, it was authorized to grant rights to surface waters in Texas streams. At the same time, without further constitutional authority, the courts continued to recognize a form of common-law riparian rights.

The competing interest created by this dual system was highlighted in *Mud Creek Irrigation, Agricultural & Manufacturing Co. v. Vivian*, 11 S.W. 1078 (Tex. 1889), in which a private irrigation company attempted to enforce its charter and its statutory rights. The company sought to enjoin Vivian and others from maintaining a dam on Mud Creek in Kinney County above the point where the waters of the creek entered the company's canal. The company alleged that under applicable law and its charter it had exclusive use of the waters of the stream. The court disposed of this contention by holding that "the charter *conferred the right to acquire* water privileges, but it did not confer the privileges themselves." *Mud Creek Irrigation*, 11 S.W. at 1078–79 (emphasis added). The court was logical and resourceful in holding that while the company was vested with the power to *acquire*, as a private corporation, a privilege to take the waters of the creek for the purpose of irrigation, the statute did not expressly grant the right to take and use the waters. The company had to obtain this right to take water from the stream. The case left open the question of how such a company was to obtain this water right.

The court noted that canal company statutes discussed above applied only to streams on public lands, because the legislature had no power to take away or impair the *vested rights of riparian owners* without providing for the constitutional right to just compensation. This case illustrates the dilemma that existed for individuals desiring to develop their water rights. Companies, such as the plaintiff in *Mud Creek Irrigation*, had to invest relatively large amounts of capital to start and operate such enterprises, which the state encouraged by enacting statutes establishing entities to develop water resources. The legislature, however, ignored the need for laws regarding the actual right to take and use water from the state's streams. At the same time, the courts were protecting their version of common-law riparian claims as a private property right. Making the situation even more difficult was the fact that the period from 1855 to 1864 was one of the most sustained droughts ever experienced in the state, causing water shortages lasting until 1888. *See* David W. Stahle & Malcolm K. Cleaveland, *Texas Drought History Reconstructed and Analyzed from 1698 to 1980*, 1 J. Climate 59, 66, 72 (1988) [hereinafter Stahle & Cleaveland]; Douglas Helms, *Great Plains Conservation Program, 1956–1981: A Short Administrative and Legislative History, reprinted from Great Plains Conservation Program: 25 Years of Accomplishment*, U.S. Department of Agriculture, SCS National Bulletin No. 300-2-7 (1981), *available at* www.nrcs.usda.gov/about/history/articles/GreatPlainsConservPrgm.html.

Responding to political and economic pressures, the legislature addressed these problems in the Irrigation Act of 1889.

4. *Texas Legislative Acts Adopting the Prior Appropriation Doctrine*

a. The Irrigation Act of 1889

The purpose of the Irrigation Act of 1889 was "to encourage irrigation, and to provide for the acquisition of the right to the use of water, and for the construction and maintenance of canals, ditches, flumes, reservoirs, and wells for irrigation, and for mining, milling, and stockraising in the arid districts of Texas." Act approved Mar. 19, 1889, 21st Leg., R.S., ch. 88, 1889 Tex. Gen. Laws 100, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1128.

The first four sections of the Act provided:

> Section 1. Be it enacted by the Legislature of the State of Texas: That the unappropriated waters of *every river or natural stream* within *the arid portions of the state of Texas*, in which, by reason of the insufficient rainfall, irrigation is necessary for agricultural purposes, may be diverted from its natural channel for irrigation, domestic, and other beneficial uses: Provided, that said water shall not be diverted so as to deprive any person who claims, owns, or holds a possessory right or title to any land lying along the bank or margin of any river or natural stream of the use of the water thereof for *his own domestic use*.
>
> Section 2. That *the unappropriated waters* of every river or natural stream within the arid portions of the state, as described in the preceding section of this act, are hereby declared to be the property of the public, and may be acquired by appropriation for the uses and purposes as hereinafter provided.
>
> Section 3. The appropriation must be for the purposes named in this act, and when the appropriator, or his successor in interest, ceases to use it for such purpose the right ceases.
>
> Section 4. As between appropriators, the one first in time is the one first in right to such quantity of the water only as is reasonably sufficient and necessary to irrigate the land susceptible of irrigation on either side of ditch or canal.

Act approved Mar. 19, 1889, 21st Leg., R.S., ch. 88, §§ 1–4, 1889 Tex. Gen. Laws 100–101, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1128–29 (emphasis added).

The Act made clear that the unappropriated waters within the *arid portions* of the state were the property of the state and adopted the prior appropriation doctrine of first in time, first in right. The Act clarified the method by which irrigation ditch companies could acquire a right to take water from a stream by filing a declaration of appropriation in the office of the county clerk of the county where the headgate of the proposed canal or ditch was to be located.

The primary goal of this statute was to protect irrigation ditch companies, and its key purpose was to authorize these companies to appropriate water, urging that irrigation canals should be built "at once." Act approved Mar. 19, 1889, 21st Leg., R.S., ch. 88, §§ 1, 2, 5, 17, 1889 Tex. Gen. Laws 100–103, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1128–31. The Act also protected the right of a landowner who owned property adjacent to the stream to use water of the stream "for his own domestic use," thereby statutorily confirming the state's dual system of water rights, to this extent, in the arid portions of the state.

The caption of the legislation included a reference to "wells for irrigation," which expressed an intent to include water wells and groundwater within its scope in the arid portions of the state. However, the statute itself did not address wells. From a historical perspective, it is interesting to note what would have occurred in later years with respect to groundwater law if the legislature and courts had expanded on this intent to include groundwater within the appropriation doctrine. See discussion at section II.C.4.f below and Chapter 4 of this book for a discussion of the development of groundwater laws in Texas.

Only the riparian right aspects of the Act were interpreted by the courts. The Supreme Court of Texas, in *McGhee Irrigating Ditch Co. v. Hudson*, 22 S.W. 967 (Tex. 1893), without referring to section 1 of the Act, which protected only riparian domestic use, held:

> Section 2 of the act cannot operate, and probably was not intended to operate, on the rights of riparian owners existing when the law was passed, but was intended to operate only on such interests as were in the State by reason of its ownership of land bordering on rivers or natural streams; and it may be that there are some other parts of the act that would have to

> be so limited. . . . The word "land" includes not only soil, but everything attached to it, whether attached by course of nature, as trees, herbage, and water, or by the hand of man, as buildings and fences.

McGhee Irrigating Ditch Co., 22 S.W. at 968 (emphasis added).

The court narrowly construed section 2 of the Act, with reference to the protection of riparian rights, but did not consider section 1, which protected only domestic riparian use. The Act was later amended in 1893, addressing the manner of evidencing claims by filing declarations of appropriation in the county records, but made no other significant change and did not refer to riparian water rights claims. Act approved Mar. 29, 1893, 23d Leg., R.S., ch. 44, 1893 Tex. Gen. Laws 47, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 447. The 1889 and 1893 Acts were replaced by a much broader and comprehensive statute in 1895, which gave some deference to the *McGhee* court's protection of riparian claims.

b. The Irrigation Act of 1895

The legislature extended, and clarified to an extent, the prior appropriation doctrine in the Irrigation Act of 1895. Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, 1893 Tex. Gen. Laws 21, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751. This law sought to reserve to the state stormwaters or rainwaters and, in deference to court holdings, protected the rights of riparian owners to the ordinary flow and underflow of a stream. It declared in the first five sections of the Act:

> Section 1. Be it enacted by the Legislature of the State of Texas: That the un-appropriated waters of the ordinary flow or underflow of every running or flowing river or natural stream, and the storm or rain waters of every river or natural stream, canyon, ravine, depression or watershed within those portions of the State of Texas *in which by reason of the insufficient rainfall or by reason of the irregularity of the rainfall*, irrigation is beneficial for agricultural purposes, are hereby declared to be the property of the public, and may be acquired by appropriation for the uses and purposes and in the manner as hereinafter provided.
>
> Section 2. The storm or rain waters, as described in the preceding section, may be held or stored in dams, lakes or reservoirs built and constructed by a person, corporation or association or persons for irrigation, mining, milling, the construction of waterworks for cities and towns, or stockraising, within those portions of Texas described in the foregoing section; and all such waters may be diverted by the person, corporation or association of persons owning or controlling such dam, reservoir or lake for irrigation, mining, milling, the construction of waterworks for cities and towns, and stockraising.
>
> Section 3. The ordinary flow or underflow of the running water of every natural river or stream within those portions of Texas described in section 1 of this act may be diverted from its natural channel for irrigation, mining, milling, the construction of waterworks for cities and towns, or stockraising: *Provided, that such flow or underflow of water shall not be diverted to the prejudice of the rights of the riparian owner without his consent, except after condemnation thereof in the manner as hereinafter provided.*
>
> Section 4. The appropriation of water must be either for irrigation, mining, milling, the construction of waterworks for cities and towns, or stockraising.
>
> Section 5. As between appropriators the first in time is the first in right.

Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, §§ 1–5, 1893 Tex. Gen. Laws 21–22, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751–52 (emphasis added).

The 1895 Act not only encouraged irrigation but also addressed water for mining, milling, and stock-raising uses and waterworks for cities and towns. It established the method by which irrigators and others could develop dams and take water.

By special proviso, the Act protected a riparian owner's right to the ordinary flow or underflow of water in a stream, but it failed to define "ordinary flow" or what rights a riparian owner had with respect to the remaining "unappropriated ordinary flow" in a stream. As later judicially and legislatively confirmed, the Act reserved to the state all of the unappropriated running waters, including ordinary flows, stormwater, and flood water on a statewide basis. This means that public lands granted after July 29, 1895, the Act's effective date, do not carry with them a riparian water right claim unless expressly provided in the grant. Common-law riparian rights were limited to "ordinary flows or underflow" and to land granted or patented before July 29, 1895. These defining dates became even more significant during the statewide adjudication of water rights undertaken under the Water Rights Adjudication Act of 1967. See discussion at section II.E below.

The 1895 Act also limited the ratemaking power of irrigation companies, previewing existing law with respect to regulation of rates charged by some entities for the supply or delivery of potable or nonpotable water. See Chapters 29 and 31 of this book.

In summary, the 1895 Act was primarily directed at irrigation use of water; it required irrigation ditch companies and developers of irrigation to obtain recognition for their projects by a local filing process in local county records, reminiscent of the Spanish and Mexican system of local control subject to the sovereign's control. Similar to the prior appropriation doctrine adopted in the western United States, it provided a process to obtain a legally recognized right to use water. This provided an incentive that encouraged investment in agricultural water projects by providing a process to acquire a recognized legal right to use water from a stream. It also provided the security of recognition of a water right, since the essential element of the appropriation doctrine system, "first in time is the first in right"—that is, the priority system—was made clear, and provided a means of enforcement of water rights. Nonetheless, it left much uncertainty about the nature of the riparian right and how it was to be reconciled with the appropriation doctrine of water rights.

During the period 1895–1913, knowledge of practical irrigation improved steadily, and the development of irrigation pumping converted small gravity flow irrigation systems to much larger pumping and gravity flow irrigation operations. More land was developed into large irrigated areas. *See* Davenport, XXIII. However, water rights claimants still had an incomplete system of water laws to ensure that their claims were honored.

c. The Dual System and Conflicts in the Courts

During this period water rights holders had to rely on the courts to resolve their disputes. This was an awkward process. It required injunction lawsuits, so that a court could exercise its equitable powers in attempting to resolve conflicts. A court could resolve only disputes between individual parties in the litigation; courts could not take into account the impact of such litigation on other water rights holders on a stream or a segment of a stream. The process also placed the courts in the difficult position of dealing with technical hydrologic and water management questions without the aid of relevant hydrologic evidence.

An example of these difficulties is an early water dispute after the 1889 and 1895 Acts but before the 1913 Act. In *Biggs v. Miller*, 147 S.W. 632 (Tex. Civ. App.—El Paso 1912, no writ), users of water from the Pecos River through one irrigation system called the "Barstow System" sought to enjoin other users through an irrigation system called the "Biggs System." Both parties claimed prior appropriation rights and riparian rights to riparian lands. The claimants sought to use an injunction to divide the waters of the stream in accordance with the parties' respective water rights.

Evidence showed that a prior federal court judgment had adjudicated to the Barstow System, whose diversion point was below the Biggs System, the prior and more senior right to use water for irrigation purposes on both its riparian and nonriparian lands. That judgment ruled that the more junior upstream Biggs System was subject to such rights as to irrigating its nonriparian lands but not its riparian lands even though the Biggs System was more senior. In other words, the first in time principal did not apply to the riparian lands.

The *Miller* court was faced with a complex record pertaining to the capacity of canals to handle water; whether rights were restricted to then cultivated land, or could include irrigable land that could later be brought under cultivation; how much water was needed to irrigate the land without waste; the capabilities of the irrigation system's headgates and other facilities; and rights to return flows. The court was also faced with procedural issues about whether all users in each of the systems were necessary parties for the adjudication of the rights as to each system.

Because the suit was for an injunction, an equitable remedy could be applied. The trial court divided the flows in a detailed, practical manner, distinguishing between appropriative rights to nonriparian lands and riparian rights to riparian lands, recognizing and consistent with the dual system of water rights. The court recognized the appropriative rights under the 1895 Act and riparian rights as to riparian lands by declaring: "By our statutes, the waters of such rivers as the Pecos are property of the public. Riparian owners have easements therein, which cannot be divested, save, perhaps, by condemnation. But statutory appropriations, when filed in compliance with law, give to such appropriators the right to take the water to non-riparian lands, there to use it for themselves or to dispose it to water consumers." *Miller*, 147 S.W. at 637. The court disagreed with some of the equitable findings of the trial court, found procedural errors, and reversed the case for further proceedings. No resolution was achieved, and no further judicial history is available on the case.

Pending at the same time before the same court was *Biggs v. Lee*, 147 S.W. 709 (Tex. Civ. App.—El Paso 1912, writ dism'd), which involved a downstream Pecos River riparian water rights claimant's action against an upstream appropriator, seeking to enjoin him from diverting water to be used on nonriparian land. The district court's action enjoining the appropriator claimant from diverting water was reversed and remanded on appeal, without resolving the controversy.

The appellate court, on motion for rehearing, provided guidance to the district court:

> It is certain that under our laws the waters are the property of the public, subject to the easements of riparian owners. The riparian easement is the right to use an amount of water reasonably sufficient for domestic and stock-raising purposes and for irrigating the riparian lands. A statutory appropriation, under our decisions, is effective as against the waters as the property of the public, subject to the easements of the riparian owners which have the prior right.
>
> If the water is sufficient only for riparian owners using it, it must be equitably divided between them. As between the riparian owners and the statutory appropriator, the riparian owners must first have water reasonably sufficient, as indicated; but as against the excess the statutory appropriation is effective. To hold that riparian owners have the right to have all the water flow past their land as against statutory appropriations would be to destroy the appropriation statute in its entirety, for there are riparian owners on every stream, and if each had the right as against the appropriator to have all the water flow past his land, there could never be an effective appropriation system anywhere. We refused to decide in the original opinion whether an appropriation is good against the water until such time as the riparian owner shall make use of it; but, as here illustrated, we very strongly incline to the opinion that this will be found to be the law. Every stream is bordered by riparian lands, even the Mississippi river, the largest stream we have. If every riparian owner had the right

> to have all the water, as against appropriators, flow past his land, no valid appropriation could ever be made. Again, if as we have held the riparian owner's only right is to use sufficient water for his land's purposes, still it would follow, if his right was good against appropriations, before he made use of the water, that on small streams the appropriation statute would be nullified. On the other hand, if the law is that the riparian owner can only use sufficient for his land's purposes, and if the law is that he only has the preferential right when he uses it or when in good faith he is about to use it, then there has been preserved the statutory appropriation, without, it will be noted, injuring the riparian owner; for if the water is sufficient only for the riparian owners using it, there can be no valid appropriation. If there is an excess over what the riparian owners using it need, then as to the excess the appropriation is valid. If there is a stream where none of the riparian owners care to use the water, and which flows only a small quantity, it may nevertheless be used by the appropriator, subject always to the prior right of the riparian owner to the extent of his needs.
>
> We think, however, that the point made by appellee is well taken. The riparian owner in this case is entitled to sufficient water for his land's purposes. This necessarily means sufficient usable water, and it would be proper for a decree, if he show himself entitled to one, to award sufficient water so as to avoid the mineral impregnation; but, having ascertained the amount, as may be done, the judgment should certainly and definitely fix the same so as to make it intelligible and capable of enforcement.

Lee, 147 S.W. at 710–11.

These cases illustrate the many complex issues arising (1) in interpreting and enforcing individual water rights claimants claiming both appropriative and riparian rights; (2) against a number of parties in a single litigation without joinder of all water rights claimants on the stream or segment of a stream; and (3) without the benefit of technical definition of rates of flow, system capacities, and other relevant hydrologic evidence. They also illustrate the frustration exhibited by the courts in reconciling the dual system of law. For later litigation on the Pecos River, see the following cases: *Ward County Water Improvement District No. 2 v. Ward County Irrigation District No. 1*, 214 S.W. 490 (Tex. Civ. App.—El Paso 1919, no writ); *Hoefs v. Short*, 273 S.W. 785 (Tex. 1925); *Ward County Water Improvement District No. 3 v. Ward County Irrigation District No. 1*, 237 S.W. 584 (Tex. Civ. App.—El Paso 1922), *modified*, 295 S.W. 917 (Tex. 1927); and *Wilson v. Reeves County Water Improvement District No. 1*, 256 S.W. 346 (Tex. Civ. App.—El Paso 1923, no writ). The relative rights on the Pecos River were never fully resolved until adjudication under the Water Rights Adjudication Act of 1967 (see section II.E.1 below). *See Borden v. Trespalacios Rice & Irrigation Co.*, 86 S.W. 11 (Tex. 1905); *City of Wichita Falls v. Bruner*, 191 S.W.2d 912 (Tex. Civ. App.—Fort Worth 1945, writ ref'd w.o.m.); Neal King, *Inadequacies of Existing Texas Procedure for Determination of Water Rights on Major Stream Segments* 66–73, *in* Proceedings, Water Law Conference, Univ. of Texas (1956).

Historically, the privately operated and financed irrigation companies that were expected to build irrigation diversion and delivery (canal) systems did not work well. Money was difficult to raise. In many instances, without further incentives other than land grants from the state, irrigation did not develop as expected after the 1895 Act. At the same time, the "filing" system provided in the 1895 Act left much to be desired. As the state grew, increased irrigation needs and population growth, and the resulting need for municipal and industrial use of water, highlighted problems with the early acts. Droughts, floods, and the need to develop agriculture and other uses constituted conditions for change.

The common-law riparian rights were yet to be defined, and the appropriation declarations filed with the county clerks required only that the amount of water to be appropriated and the area to be irrigated be stated generally as to appropriation statutory rights. This left open to conjecture many details of an appropriative statutory water right such as the specific location of use, purpose, rates, and location of diversion points. The system's lack of a manageable definition of riparian rights added to the uncertainty. This process did not create a system by which all water rights could be inventoried and managed. *See* A.P. Rollins, *The Need for a Water Inventory in Texas* 67–68, *in* Proceedings, Water Law Conference, Univ. of Texas (1952).

These circumstances first led to a constitutional amendment in 1904 providing for the establishment of water districts. These political subdivisions would have the means to provide money necessary for the development of operations and facilities through assessments paid by water users and through taxation of the benefited land. The 1904 amendment did not, however, address the means of acquiring the right to take (divert) water from the state's rivers. Following another drought in 1910 and intermittent floods in the 1910–13 period, the legislature made basic changes to surface water law in 1913.

d. The Irrigation Act of 1913

The Irrigation Act of 1913, also known as the Burges-Glasscock Act, created the Board of Water Engineers and centralized the statutory water rights inventory process by providing that waters belonging to the state could be appropriated only pursuant to permits issued by that board through procedures provided in the Act. *See* Act of Apr. 9, 1913, 33d Leg., R.S., ch. 171. While acknowledging common-law riparian rights, it did not address their nature and extent.

The 1913 Act repealed earlier water laws, primarily those applicable to the arid regions of Texas, and adopted a uniform system of statutory water laws. "In essence, the [1913 Act] declared all waters within Texas to be the property of the State, and provided means [and process] by which . . . water could be appropriated for designated purposes, including 'waterworks for cities and towns.' (Secs. 2 and 4)." *Texas Water Rights Commission v. City of Dallas*, 591 S.W.2d 609, 613 (Tex. Civ. App.—Austin 1979, writ ref'd n.r.e.).

The Board of Water Engineers was given authority to grant permits for the statutory appropriation of the state's waters. The Act required that certified copies of all records of previous declarations of prior appropriation of water filed locally under the 1889 and 1895 Acts be filed with the board. The filings included sworn statements as to the extent of work done and the amount of water that had been taken or appropriated from a stream. Some forty years later, these rights were defined as certified filings. *See* Act approved June 8, 1953, 53d Leg., R.S., ch. 352, § 2.

The 1913 Act provided that the "ordinary flow and underflow" of watercourses could not be diverted to the prejudice of the "rights of any riparian owner" without consent, but it did not define the measure or extent of a riparian right. The Act confirmed the intent of the 1895 Act's reservation of "storm waters" for later appropriation. It further cemented the dual system of water law, but in doing so clarified that nothing in the Act was to be "construed as a recognition of any riparian right in the owner of any lands the title to which . . . passed out of the state" after 1895. To this extent, the Act limited a riparian right to grants and patents issued before 1895.

The Act clarified the legislative intent in the 1895 Act with respect to the period by which the undefined riparian right could be claimed, but the extent or measure of the right was yet to be determined. The Act also made clear that the appropriation doctrine applied to the entire state, which allowed a more manageable statewide permitting system compared to the previous filing system with local county clerks. Nevertheless, the Act failed to provide a mechanism for the comprehensive inventory and adjudication of "vested" riparian rights, which would be necessary for rational allocation of the water that remained to be appropriated.

The Act did seek to clarify water rights laws with respect to irrigation use and development as well as municipal and industrial water needs. In this regard, one of the active sponsors of the Act, Rep. D. W. Glasscock, in addressing the house on behalf of the 1913 Act, stated:

> While known as the "Irrigation Bill," it is in fact much more extensive in scope than this term would indicate, and is an effort to form a comprehensive system of statutory "Water Law" for this State. It deals, not only with the important question of irrigation, in which

> millions of capital is now invested in this State and upon which many thousands of people are dependent; but also with every right to the use of water; from the primary use for drinking and domestic purposes, the supply of cities and towns, the natural use for stock raising, the uses for mining, the development power, and other purposes; up to the problem of conservation of this great natural resource, and its control, application and use, to the benefit of all people of this State.

H.J. of Tex., 33d Leg., R.S. 949–50 (1913). *See Texas Water Rights Commission*, 591 S.W.2d at 613.

At the time, 90 percent or more of water was used for irrigation. Rep. Glasscock's words, when considered in light of the alternating droughts and floods and the words of the Act, show a recognition of population growth. They also show an intent to define the riparian right in terms of a natural right for domestic and livestock use, but many believed it gave protection to a riparian right to irrigation. *See* Davenport, at 1. It was not long before these issues were addressed by more legislation and another important constitutional amendment.

e. The Irrigation Act of 1917

A drought in 1917 increased water needs and public pressure to develop the state's water resources, culminating in the repeal of the Irrigation Act of 1913 by the 1917 Irrigation Act. *See* Act of Mar. 19, 1917, 35th Leg., R.S., ch. 88. The 1917 Act included most of the substance of the 1913 Act while clarifying the permitting process. More significantly, the Act added provisions for adjudication of water rights. Some contemporaries of the 1917 Act believed it destroyed the intent of the 1913 Act, which protected riparian rights claimants. *See* Davenport, at 1. The public's mood and the legislature's intent, however, were to give the state more control over the development of water resources. To evidence this, in the same session, a constitutional amendment was proposed to assure legislative authority in this respect. S.J. of Tex., 35th Leg., R.S. 500 (1917).

f. The Conservation Amendment: 1917

On August 21, 1917, the citizens of Texas approved a constitutional amendment, Tex. Const. art. XVI, § 59, referred to as the "Conservation Amendment." The amendment enabled the legislature to create governmental entities whose purpose was to conserve water by developing the water resources. The term "conservation" meant the development of water resources through local and regional water districts, using dams, reservoir projects, and delivery systems. Water was "conserved" through use or storage for later use before it was lost to the Gulf of Mexico. The amendment provided in part:

> Sec. 59(a). The conservation and development of *all* of the natural resources of this State, including the control, storing, preservation and distribution of its storm and flood *waters*, the *water* of its rivers and streams, for irrigation, power and all other useful purposes, the reclamation and irrigation of its arid, semi-arid and other lands needing irrigation, the reclamation and drainage of its overflowed lands, and other lands needing drainage, the conservation and development of its forests, water and hydro-electric power, navigation of its inland and coastal waters, and the *preservation and conservation of all such natural resources* of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto.

Tex. Const. art. XVI, § 59(a) (emphasis added). The Conservation Amendment covers all natural resources, including both groundwater and surface water. The Texas Supreme Court in *Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75 (Tex. 1999), stated that the Conservation

Amendment passed after *Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (1904), the seminal groundwater law case in Texas, "made clear that in Texas, responsibility for the regulation of natural resources, including groundwater, rests in the hands of the Legislature" and are "public rights and duties." 1 S.W.3d at 77. As discussed in Chapter 4 of this book, the legislature has thus far chosen regulation through local groundwater conservation districts with respect to groundwater. With respect to surface water, the governmental entities to be created were conservation and reclamation districts with such powers concerning the subject matter of the amendment as conferred by law. *See* Tex. Const. art. XVI, § 59(b).

The Conservation Amendment is important in many respects. First, it declared that all water resources were public rights and duties. Second, it empowered the legislature to pass such laws "as may be appropriate" in the conservation, development, distribution, and control of its water resources. Third, it vested lawful rights acquired prior to its enactment while granting authority to the legislature to pass laws appropriate to protect the public's rights. This became the legal dividing line in the development of water laws: the legislature was empowered to pass laws subject only to the test of "appropriateness" in the context of the intent expressed in the Conservation Amendment.

This constitutional authority was not self-enacting, requiring action by the legislature. By its very terms, the duty is placed on the legislature to execute the public policy expressed in these provisions. *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798 (1955). The legislature promptly acted to legally confirm the 1917 Act and its provisions.

g. The 1918 Act

In 1918, after passage of the Conservation Amendment, the legislature amended the 1917 Act to confirm and clarify, among other things, the extent of the power of the Board of Water Engineers to issue permits and to adjudicate existing water rights and its authority pertaining to water rates charged by suppliers for the use of water. *See* Act approved Mar. 21, 1918, 35th Leg., 4th C.S., ch. 88. This Act is sometimes called the Canales Act, after its main legislative sponsor.

In 1921, however, the Supreme Court of Texas held that the adjudication provisions in the 1917 Act were unconstitutional because they delegated judicial powers to an administrative agency. *See Board of Water Engineers v. McKnight*, 229 S.W. 301 (Tex. 1921). This was a significant decision for two reasons. On the positive side, it recognized that a vested water right is a property right. On the negative side, it delayed the proper management of surface water for many decades by dismantling the effort to adjudicate and quantify existing water rights. In the words of Chief Justice Pope, that decision "ushered in a half century interregnum during which there was no inventory of available water, and no record of the extent of claims upon the dwindling supply." *In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 441 (Tex. 1982). See discussion of the *McKnight* case at section II.E.1 below.

h. The 1925 Act

In 1925, because of the *McKnight* decision, water legislation was passed that omitted the adjudication provisions of the 1917 and 1918 Acts and thereby repealed those provisions. Act approved Mar. 28, 1925, 39th Leg., R.S., ch. 136 (art. 7500a of the Texas Civil Statues). This legislation also changed the domestic and livestock reservoir exemption and the provisions regarding water districts, which are discussed more fully below.

i. The Dual System and Conflicts in the Courts Continue

In 1926, the Texas Supreme Court, in *Motl v. Boyd*, 286 S.W. 458 (Tex. 1926), analyzed in depth the development of water law in Texas. Simply stated, this case was brought by a riparian claimant to irrigation rights seeking to pump water from a small reservoir built and developed by an appropriator under a filing made under the 1889 Act. The riparian claimant's application for a permit was denied by the Board of Water Engineers, but the riparian continued to pump water from the reservoir. The reservoir owner sued, seeking to enjoin the riparian from diverting water. Although this case was later reversed on other grounds dealing with the nature of the riparian right, it is still an instructive case with respect to the evolution of Texas water laws as construed by a court in 1926.

In this case, the appropriator contended that the riparian right on a natural or statutory navigable stream extended only to domestic stock and household uses, and rights for other uses, including irrigation, had to be obtained by statutory appropriation. The court was urged to declare that riparian rights do not exist on natural or statutory navigable streams. Thus, the continuation of the dual system of water rights under existing statutes was squarely before the court. After an extensive analysis of Mexican laws, laws of the Republic, and later legislative acts, the court concluded that a riparian owner had the right implied in the original grant of land—to use water "not only for his domestic and household use, but for irrigation as well." *Motl*, 286 S.W. at 467 (citing *Watkins Land Co. v. Clements*, 86 S.W. 733 (Tex. 1905); *Board of Water Engineers v. McKnight*, 229 S.W. 301 (Tex. 1921); *Martin v. Burr*, 228 S.W. 543 (Tex. 1921)).

Having held that a riparian right to irrigation existed, the court recognized that a riparian right attached only to the ordinary and normal flow of a stream, not to flood waters. The court felt compelled to legally define the water to which a riparian is entitled. The court's opinion noted:

> [T]hat riparian waters are the waters of the ordinary flow and underflow of the stream, and that the waters of the stream, when they rise above the line of the highest ordinary flow, are to be regarded as flood waters or waters to which riparian rights do not attach. . . . "The line of highest ordinary flow" is the highest line of flow which the stream reached and maintains for a sufficient length of time to become characteristic when its waters are in their ordinary, normal, and usual condition, uninfluenced by recent rainfall or surface run-off.

Motl, 286 S.W. at 468–69. In applying this legal definition of flows, the court affirmed the judgment enjoining the riparian from pumping from a reservoir, *except when water was running over the appropriator's dam*. This ruling had practical results: (1) it allowed the appropriator to take as much water as desired, whether the water was ordinary or flood flow; (2) it allowed the riparian to pump water only when the reservoir was full and overflowing; and (3) regardless of the amount of ordinary flow in the stream available to the riparian at a particular point in time, it could not be taken if the water is needed to fill the reservoir, even if the appropriator is pumping at the same time. Needless to say, confusion was created as courts attempted to apply the holding in other cases.

The court's decision that a riparian right to irrigation exists and the court's perpetuation of the dual system of water rights were the significant aspects of the holding. The court's definition of "ordinary flow and underflow" and "storm flow and flood flow," normally a matter of hydrology and science rather than law, caused much uncertainty. Though considered to be *dicta*, the court's definition was problematic in determining water rights claims and in planning reservoir projects, which were designed to capture stormwaters and flood waters for later use, but as a practical matter also captured ordinary flows and "conserve water."

The *Motl* court made another significant though often overlooked holding. In spite of the earlier similar attack on the adjudication provisions in the 1917 and 1918 Acts in *Board of Water Engineers v. McKnight* involving the separation of powers doctrine, the *Motl* court concluded that the provisions providing for the issuance of permits to appropriate waters (granting a water right) were valid and constitutional even though it was done by an administrative agency (the executive branch) instead of directly by the legislature. *Motl*, 286 S.W. at 474–75.

Another illustrative case is *Humphreys-Mexia Co. v. Arseneaux*, 297 S.W. 225 (Tex. 1927). This suit sought to enjoin the defendants from pumping, drawing off, diverting, selling, or otherwise disposing of water from a certain reservoir made by a dam across the Navasota River constructed by the plaintiff. The defendants owned land riparian to the reservoir and claimed riparian rights to water impounded by the plaintiff's dam. The defendants installed a pump on the river to divert water from impounded water constructed by the plaintiff, and sold it to oil well-drilling companies in the Mexia field. The defendants claimed the rights to divert this water by virtue of their riparian rights to the land adjoining the natural stream. On the other hand, the plaintiff had obtained a permit to impound waters from the river on the dams involved. The plaintiff contended that the defendants did not have the right under their riparian rights to divert water from the impounded water and deliver it to nonriparian land.

The court noted that the plaintiff's permit authorized it to impound only public waters of the state consisting of stormwaters and flood waters of the Navasota River, and expressly prohibited it from impounding any part of the normal flow of the Navasota River. The plaintiff also constructed other dams that backed up water onto the land of other riparian owners. The court, relying on cases recognizing riparian rights, trespass laws, statutory appropriation rights, and a very complicated set of facts, determined that the injunction to prohibit the diversion of waters from the water in the flood pool would be a continuous legal wrong and trespass without just compensation, and therefore denied the injunction. This case illustrates the complicated nature of the construction of dams by an appropriator faced with competing claims of riparian water rights by those owning land adjacent to the reservoir or original natural stream and how a court sitting in equity must determine the appropriate result. The court, in essence, denied the rights of the appropriator while recognizing assertable claims by a riparian. The result did not provide guidance to water rights holders in the state.

These cases illustrate the difficulties encountered in the courts when individual water rights claimants sought court enforcement of their rights against other individual water rights holders without involving all others who may be impacted on the stream or a segment of the stream. These cases were often cited as declaring the existing water law after the 1913–1925 Acts, but frustration and confusion continued among water rights claimants in efforts to enforce and protect their claims in a practical sense. This was the case even though the courts could use their equitable powers to resolve disputes. In the 1950s, the state experienced a drought of record that resulted in litigation on a large stream segment of the Rio Grande and led to clarification and future development of Texas water law.

D. Riparian Rights Revisited and Court Adjudication

1. State v. Valmont Plantations

The *Motl* decision, which recognized the common-law riparian right to irrigation, remained the law until 1962, when the court decided *State v. Valmont Plantations*, 346 S.W.2d 853 (Tex. Civ. App.—San Antonio 1961), *op. adopted*, 355 S.W.2d 502 (Tex. 1962). *Valmont* was a case between appropriators and common-law riparian rights claimants on the Rio Grande, which had been severed as a separate cause arising out of *State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.). This case involved all water rights claimants on the Rio Grande below Falcon Dam, downstream of Laredo, Texas, to the Gulf of Mexico.

The *Motl* decision had been folowed by the courts, and many had relied on the existence of the riparian right to irrigation in making long-range business decisions. As noted by Chief Justice Murray in his *Valmont* dissent, *Motl v. Boyd* had been cited seventy-eight times by Texas courts since 1926, and "there can be no doubt that the bench and bar of this State accepted such law as settled, and followed it up to the present time." *Valmont*, 346 S.W.2d at 883. Nonetheless, the Texas Supreme Court, having squarely before it the issue of the existence of a common-law riparian right to irrigation under Spanish and Mexican law, and having considerably more evidence and information about Spanish and Mexican law than were available to the *Motl* court, determined the law differently.

In a thoroughly considered and exhaustive study of Spanish and Mexican law, the *Valmont* court concluded that—

> (1) rights under titles from Spain, Mexico and Tamaulipas are governed by the law of the sovereign when the grants were made, (2) those sovereigns did not have a system of riparian irrigation rights based upon or similar to the common law right to irrigate, (3) the grants involved in this suit were not made with the implied intent or agreement that the right to irrigate was appurtenant to the lands, and (4) [referring to *Motl v. Boyd*] this issue has never before been presented to a Texas Court for decision and there is no *stare decisis* on the subject.

Valmont, 346 S.W.2d at 881–82. The *Valmont* case clarified the classes of water rights claims in the dual system of water rights as follows: (1) rights asserted under permits and certified filings, (2) common-law riparian rights pertaining to land granted by the Republic of Texas or the state between 1840 and prior to July 9, 1895, and (3) riparian rights to irrigation under Spanish and Mexican land grants where the right of irrigation was expressly granted.

2. State v. Hidalgo County Water Control & Improvement District No. 18

Another important case from which *Valmont* arose is *State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.), often referred to as the *Valley Water* case. The *Valley Water* case emphasized the need for more efficient water rights adjudication. The *Valley Water* case was an injunction case, similar to earlier cases seeking clarification of water rights. This was, however, the first court adjudication among *all* water rights claimants in an independent segment of a stream, that portion of the Lower Rio Grande downstream of Falcon Reservoir. It arose during the drought in the 1950s and took more than thirty years to decide. It involved roughly 3,000 parties, all potentially adverse to one another, and cost an estimated $10 million in court costs and attorney's fees. *Administrative Government in Texas—Current Problems*, 47 Texas L. Rev. 804, 875 (1969).

The background of this case involved parties who were seeking a right to a limited supply of water. It involved years of litigation between individual parties making individual claims to water rights adverse to all other party claimants. *See Hidalgo & Cameron Counties Water Control & Improvement District No. 9 v. Starley*, 373 S.W.2d 731 (Tex. 1964); *Hidalgo County Water Improvement District No. 2 v. Blalock*, 301 S.W.2d 593 (Tex. 1957); *Maverick County Water Control & Improvement District No. 1 v. City of Laredo*, 346 S.W.2d 886 (Tex. Civ. App.—San Antonio 1961, writ ref'd n.r.e.); *Hidalgo County Water Improvement District No. 2 v. Cameron County Water Control & Improvement District No. 5*, 253 S.W.2d 294 (Tex. Civ. App.—San Antonio 1952, writ ref'd n.r.e.). In this case, a streamwide approach was taken by the state's filing an injunction action against all the water rights claimants to adjudicate all water rights in the river segment below and including Falcon Reservoir.

In *Hidalgo*, the trial judge took judicial custody of the water in the river segment including Falcon Reservoir and appointed a watermaster to allocate the available water pursuant to court orders. Recognizing the contradictory and incompatible issues resulting from the dual system of water rights, initially the court severed the riparian water rights claims from the suit and tried them separately in the *Valmont* case discussed above. After *Valmont* was resolved, the trial court in the *Valley Water* case focused on appropriative rights. The trial court ultimately addressed appropriative rights and other claims. Its judgment, as modified and affirmed on appeal, (1) set aside a water reserve for municipal, industrial, and domestic and livestock uses; and (2) recognized two classes of appropriative irrigation rights: first priority for legally established statutory claims under the appropriation system and a second priority framework for equitable claims. The latter category included riparians and others who had been using water in the good-faith mistaken belief that they had riparian rights. The court justified its rejection of time priorities by observing that the existing appropriative rights in the Lower Rio Grande were to divert from a free-flowing stream. However, the Lower Rio Grande had been transformed to a controlled stream by dams built by the federal government.

A significant lesson learned during the course of these proceedings was that without some mechanism to organize the case from an evidentiary perspective, through required maps and identification of parties and land, such an adjudication was impossible. The customary evidentiary presentation by each party on an individual basis was meaningless without evidence of the technical overview of the watershed involved. In this case, the attorney general and the Texas Water Commission brought together the necessary tools by which claims could be evaluated, organized, and ultimately adjudicated. Without this assistance, the adjudication would not have been possible. The lessons learned included the need for a constitutional administrative adjudication process, without which it would be extremely difficult, or almost impossible, to quantify and adjudicate all the water rights on all the streams. *See* Garland F. Smith, *The Valley Water Suit and Its Impact on Texas Water Policy: Some Practical Advice for the Future*, 8 Tex. Tech. L. Rev. 577 (1977); Corwin W. Johnson, *Adjudication of Water Rights*, 42 Texas L. Rev. 121 (1963). This experience, coupled with earlier difficulty in the court cases dealing with disputes between water rights claimants and the need to quantify and define existing water rights, led to the passage of a 1967 Adjudication Act.

E. Water Rights Adjudication Act of 1967

1. Background

To understand the impact of the Adjudication Act, one must consider the history of adjudication of water rights in Texas. The background of the Adjudication Act began with the Irrigation Act of 1917, which contained adjudication provisions that were patterned after the then-existing Wyoming system of adjudication of statutory surface water rights. Implementation of these adjudication provisions, however, was thwarted in 1921 when the Texas Supreme Court held, as discussed above, that this statutory procedure was unconstitutional under constitutional separation-of-powers principles. *Board of Water Engineers v. McKnight*, 229 S.W. 301 (Tex. 1921).

The *McKnight* case arose from a petition filed under the 1917 Act with the Board of Water Engineers by a riparian water rights claimant alleging that he was entitled to receive water from the Pecos River from a canal company that claimed rights by appropriation. The hearing in the case was held while there was a pending suit in federal court seeking to adjudicate water rights on the Pecos River involving the *McKnight* parties and other parties. Also pending at the time was another suit in district court in Reeves County by Ward County District No. 1 against the Farmers Independent Canal Company to determine the relative rights of claimants to waters of the Pecos. *See McKnight v. Pecos & Torah Lake Irrigation Co.*, 207 S.W. 599 (Tex. Civ. App.—El Paso 1918), *aff'd*, 301 S.W. 299 (Tex. 1921).

In *Board of Water Engineers v. McKnight*, the plaintiff sought an injunction, contending that sections 105–32 of the 1917 Act were unconstitutional. The trial court denied the injunction, but on appeal the injunction was granted, then affirmed by the Texas Supreme Court. The court found that the legislature had unconstitutionally undertaken to empower the Board of Water Engineers with judicial power to adjudicate vested water rights, except for domestic and livestock water. This power gave the same effect to the board's determination, when not appealed, as is given to a judgment of a court of competent jurisdiction, thereby violating the constitution's separation-of-powers doctrine.

The *McKnight* court did not mention or discuss the 1917 Conservation Amendment, which, in the meantime, was approved by Texas voters because the underlying adjudication proceeding was commenced before adoption of the amendment. Significantly, this constitutional amendment gave the legislature control over the development and conservation of water resources and the production of oil and gas. Later, in *Corzelius v. Harrell*, 186 S.W.2d 961 (Tex. 1945), the court recognized that the *McKnight* decision construed only the adjudication provisions of the 1917 Act, which were effective June 19, 1917. If the *McKnight* court had considered the Conservation Amendment, which applied to all natural resources of the state and made them "public rights and duties" and directed that "the Legislature shall pass all such laws as may be appropriate thereto," the decision might have been different. In *Corzelius*, the court upheld the Railroad Commission's regulatory power to control drilling of oil and gas wells. In holding that the Conservation Amendment supported the legislative grant of such power to an administrative agency, the court held that the *McKnight* case was not controlling and that the separation-of-powers ruling in *McKnight* to such extent was overruled.

The *McKnight* decision undermined the authority of the Board of Water Engineers and thwarted the orderly development of the state's surface water resources, creating a desert in surface water law for some forty years. From 1921 to 1945 the board ceased to function in the role of quantifying and managing surface water rights. The Texas Supreme Court later observed that water law in Texas before 1967 "was in a chaotic state." *In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 439 (Tex. 1982).

While the *Valley Water* case was in progress (see section D.2 above), a former attorney general and governor of Texas, sitting as a federal district judge, commented:

> The Texas water laws and decisions are in hopeless confusion; . . . their application and administration would be difficult . . . ; said laws confer little, if any, real authority upon the State Board of Engineers; that the Board has granted permits on many streams . . . very few of which have been canceled, in such numbers and for such quantities that if riparian rights are given the full effect for which plaintiffs contend, practically every drop of water, normal flow, or flood, is "bespoken."

Martinez v. Maverick County Water Control & Improvement District No. 1, 219 F.2d 666, 670 (5th Cir. 1955) (quoting Judge James V. Allred's memorandum opinion from the district court). *See generally* A.A. White & Will Wilson, *The Flow and Underflow of Motl v. Boyd—The Problem*, 9 Sw. L.J. 1 (1955); *The Flow and Underflow of Motl v. Boyd—The Conclusion*, 9 Sw. L.J. 377 (1955).

Following the 1950s drought of record, the legislature again tried to delegate to the Board of Water Engineers the power to adjudicate water rights. *See* Stahle & Cleaveland, at 66. In 1953, while the *Valley Water* case was in process, article 7477 of the Texas Civil Statutes was amended. *See* Act approved June 8, 1953, 53d Leg., R.S., ch. 357, §§ 12, 13. Under article 7477, the board's determinations of water rights would not be final. Such findings could be appealed de novo, and the court could modify them. The legislature was trying to circumvent the *McKnight* ruling, which held that under the 1917 Act, because the board's findings on water rights claims were final with no right to appeal, the findings violated the separation-of-powers doctrine.

Article 7477 was, however, subsequently invalidated by the Texas Supreme Court in *Southern Canal Co. v. Texas Board of Water Engineers*, 318 S.W.2d 619 (Tex. 1958). In *Southern Canal*, the court found that the 1953 Act required application of two different but irreconcilable standards of review—that is, the preponderance of evidence standard of review in a trial de novo appeal as opposed to the substantial evidence standard of review, which is applicable to decisions by the board and other agencies of the state on appeal to the courts. Again, the legislature's attempt to quantify and evaluate water rights was frustrated.

In 1964, the Texas Water Commission requested that the Texas Research League conduct a study of the operation of the Board of Water Engineers and recommend changes to more effectively secure development of the state's water resources. Volume II of the League's study was published February

17, 1965, and dealt with water rights and water resource administration in Texas. This report was a scholarly dissertation on the problem and concluded that a water adjudication act was necessary.

A water rights adjudication bill was introduced in 1965 consistent with the Texas Research League study. It followed the Wyoming adjudication model, with appeal from the agency's determination under the substantial evidence rule. It was amended to provide for strict trial de novo appeal, but failed to pass. In 1966, interested water rights groups debated alternatives: (1) a special water court, (2) the Oregon-type approach mentioned in the *McKnight* case, and (3) the Wyoming-type adjudication act. A modified Oregon-type water rights adjudication bill was finally agreed on containing provisions for automatic appeal to court on a trial de novo basis. It was enacted by the 60th Texas Legislature and signed by Governor Connelly on April 13, 1967. *See* Act approved Apr. 13, 1967, 60th Leg., R.S., ch. 45; *see also In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d at 445.

2. The Water Rights Adjudication Act

The Water Rights Adjudication Act, codified at Texas Water Code chapter 11, subchapter G, established a statewide process. All water rights claimants, except domestic and livestock claimants (whether statutory claimants or riparian claimants), were required to file sworn claims by September 1, 1969. *See* Tex. Water Code § 11.303(c). Certain riparian claimants were required to file by July 1, 1971. *See* Tex. Water Code § 11.303(e). Nonstatutory claims were limited to maximum beneficial use between 1963 and 1967. *See* Tex. Water Code § 11.303(b). The Act did not recognize any water rights claim that did not exist before August 28, 1967, and expressly excluded claims for domestic or livestock uses. Tex. Water Code § 11.303(k), (*l*).

The Act addressed the dual system of water rights and was an improvement over previous legislation, which addressed only statutory rights. Under this new process, when a claim was filed, the then Texas Water Commission staff completed an investigative report cataloging and describing all claims previously filed. These claims were mapped by aerial photography of the river segment and surrounding areas, and all claims of water users on the segment were located on the map. When the commission completed its investigation of a stream or segment, there was notice, hearings were held, and a preliminary determination issued. The Act established the procedure for contests and exceptions to the preliminary determination, resulting in a final determination. The Act allowed for a proper initial adjudication and a narrowing of the issues by administrative determination for later court decisions only on those issues, as identified by the parties during the adjudication process. This administrative process eliminated the previous chaotic judicial process of adjudication. The final determination was automatically filed in district court, where it was considered de novo on issues defined during the administrative process and presented to the court. *See* Doug Caroom & Paul Elliott, *Water Rights Adjudication—Texas Style*, 44 Tex. B.J. 1183 (1981).

The first adjudication under the Act concerned the middle segment of the Rio Grande between Falcon Reservoir and Amistad Reservoir immediately upstream from the court-adjudicated rights in the *Valley Water* case. At the beginning, the commissioners heard these adjudication cases themselves, but because of the overwhelming tasks involved, later the cases were assigned to TWC hearing officers. The commission next conducted the Upper Rio Grande adjudication for the segment above Amistad Reservoir and below Fort Quitman, Texas, and continued by adjudicating all Texas rivers. The adjudication process was completed in 2007 with the adjudication of the Upper Rio Grande segment above Fort Quitman, Texas, to the state line. *See In re Adjudication of Water Rights in the Upper Rio Grande Segment of the Rio Grande Basin*, No. 2006–3219 (327th Dist. Ct., El Paso, Tex. Oct. 30, 2006).

Upon completion of each adjudication case, which was marked by court judgment or decree, the commission issued certificates of adjudication to all parties who were adjudicated a water right in the proceedings. The certificate is required to quantify the basic extent of the right and any other findings made in the adjudication case. *See* Tex. Water Code § 11.323. A certificate evidences an existing water right in the stream segment that is adjudicated. Permits issued subsequent to an adjudication on a stream segment are now simply added to the records as a water right and are subject to the same regulation as adjudicated rights. *See* Tex. Water Code § 11.336. See Chapter 9 of this book.

3. Watermasters

A significant component of the Water Rights Adjudication Act was that once rights were adjudicated, they would be enforced by a watermaster. Establishment of the watermaster program was intended to assure those holding adjudicated water rights that their rights would be enforced and protected. The watermaster concept of enforcement derived from the experiences in the *Valley Water* case, where the court initially took judicial custody of the water in the Lower Rio Grande and appointed a watermaster to allocate and manage the distribution of the available water pursuant to court orders subject to final adjudication of the rights. This system made its way into the Adjudication Act at sections 11.325–.333, which empowered the commission, once rights were adjudicated, to appoint a watermaster to oversee water use using the regulatory tools authorized by statute.

The watermaster provisions have not been implemented statewide as provided by the Act. There is a watermaster program on the Rio Grande, implemented initially by the court in the *Valley Water* case and later by the commission in the Middle and Upper Rio Grande adjudications. The South Texas Watermaster Program, implemented in the adjudication process, originally covered the Colorado, Guadalupe, San Antonio, and Nueces Rivers. Later, the Lavaca and Navidad Rivers were added by a commission order based on a petition of water rights holders on those rivers. The program now also covers the Concho Watershed pursuant to petitions filed under Texas Water Code chapter 11, subchapter I, and by legislation in 2005, adding sections 11.551–.560 to the Texas Water Code, which established the Concho River Watermaster Program. *See* Act of May 25, 2005, 79th Leg., R.S., ch. 749; *see also City of San Angelo v. Texas Commission on Environmental Quality*, Cause No. GV4-03796 (53d Dist. Ct., Travis County, Tex. 2005); *City of San Angelo v. Texas Natural Resources Conservation Commission*, 92 S.W.3d 624 (Tex. App.—Austin 2002, no pet.).

The 82nd legislature in 2011 addressed the potential role of watermasters in managing water rights in other river basins in the state and passed legislation amending the Adjudication Act by adding section 11.326(g), (h) to the Water Code. This provision requires, in river basins in which no watermaster has been appointed, that the executive director of the Texas Commission on Environmental Quality evaluate each river basin at least once every five years to determine whether a watermaster should be appointed, and these findings and recommendations shall be included in the commission's biennial report to the legislature. *See* Tex. Water Code § 11.326(g), (h).

The commission has completed these evaluations in several of the river basins without recommending the establishment of a watermaster program. On April 21, 2014, however, the commission issued an order granting a petition for a watermaster in the Lower Brazos River Basin. *See* Order Granting the Petition for the Appointment of a Watermaster in the Brazos River Basin Filed by the Brazos River Coalition, TCEQ Doctet No. 2013-0174-WR; SOAH Docket No. 582-13-3040 (Apr. 21, 2014, *available at* www.tceq.texas.gov/assets/public/compliance/field_ops/wmaster/Brazos/Order_2013-0174-WR.pdf. See Chapter 13 of this book for further discussion of watermasters.

4. Cases Decided in the Adjudication Process

Most adjudication cases were resolved at the district court level and were not appealed. This shows that many complex water rights issues were resolved to the satisfaction of the claimants on a stream or segment of a stream at either the agency or district court level. However, there are a few decisions of note.

a. Extent of Riparian Rights

The first case under the Adjudication Act to reach the appellate courts was *In re Adjudication of Water Rights of Cibolo Creek Watershed of San Antonio River Basin*, 568 S.W.2d 155 (Tex. Civ. App.—San Antonio 1978, no writ). One water rights claimant on the Cibolo Creek, who had been recognized a right based on prescription and equity on one tract of land but denied a right on another tract, challenged the district court's decision. The appellant asserted a riparian right to the land under Spanish and successor land grant and/or equitable rights. He further claimed that the Adjudication Act was unconstitutional. The appellate court, citing the *Valmont* case, held that the claimant did not have a riparian right because his riparian land grant did not specifically grant riparian irrigation rights. This is the first case that applied *Valmont* to a river other than the Rio Grande. The court also held that the claimant did not possess an equitable right under the *Valley Water* case because the unique circumstances applicable in the *Valley Water* case did not exist in this case. Finally, the court held that because the claimant had no vested property right, he did not have standing to raise the constitutionality of the Adjudication Act.

Four years later, the Texas Supreme Court in *In re Adjudication of Water Rights in the Llano River Watershed of the Colorado River Basin*, 642 S.W.2d 446 (Tex. 1982), affirmed that riparian rights to irrigation cannot be claimed on lands granted by the state after July 1, 1895, the effective date of the Irrigation Act of 1895, in which the state reserved the ordinary flow of water in streams. The court noted:

> The Act stated that the ordinary or underflow of a river or stream, as well as the storm or rain waters were the property of the public appropriation for irrigation purposes. The manner of acquiring water rights after that date was by appropriation and not by force of the riparian location of land.

642 S.W.2d at 448. This holding finally confirmed the legislature's intent in the 1895 Act and subsequent statutes to limit riparian claims to grants or patents issued before 1895.

Subsequently, in *In re Adjudication of the Water Rights in the Medina River Watershed of the San Antonio River Basin*, 670 S.W.2d 250 (Tex. 1984), the Texas Supreme Court affirmed the commission's holding that a riparian was restricted to use during the 1963–67 period and the extended period provided in the Act. After an extensive discussion of the *Valmont* case, court decisions since then, and Spanish and Mexican law, the court held that a riparian claimant under an 1833 Mexican grant did not own all of the waters of Medio Creek (tributary to the Medina River) and could be adjudicated only the amount of water shown to have been used during the statutory period.

Later, in *In re Adjudication of Water Rights of Lower Guadalupe River Segment*, 730 S.W.2d 64 (Tex. App.—Corpus Christi 1987, writ ref'd n.r.e.), the issue involved whether the water in a natural lake was public or private water. The court held that the water in the lake was public water based on the definition of the "state's water" contained in the Texas statutes beginning with the 1889 Act and statutes existing at the time the claimant acquired the land.

b. Merger of Riparian and Appropriative Rights

As noted above, the purpose of the Adjudication Act was to unify the previous dual system of surface water law and to inventory and quantify the basic extent and amount of existing water rights. To quantify surface water law, the Act provided that riparian rights, other than for domestic and livestock use, be limited in amount of authorized use to historical beneficial use, and for water rights administration purposes, the commission additionally determined that merger of these riparian rights into appropriative rights was necessary to unify surface water law. Therefore, not long after the decision in the *Cibolo Creek* case, discussed above, the commission declared that the assignment of time priorities to proven riparian rights was essential to a workable scheme of proper state water rights management, and priority dates were assigned to riparian rights proven in the adjudication and included in certificates of adjudication. *See Final Determination before the Texas Water Commission in the matter of the Middle Colorado River segment of the Colorado River Basin* (1981) (approved at the district court level).

c. Adjudication Act Constitutional

In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin, 642 S.W.2d 438 (Tex. 1982), was the pivotal case that confirmed the constitutionality of the Adjudication Act. The court held that the Act did not violate the doctrine of separation of powers because the administrative determination was subject to automatic appeal and trial de novo. It further determined that riparian water rights claimants could be restricted to a defined water right based on use during a test period. Such restriction did not constitute a taking of property without just compensation because the claimants received due-process notice and hearing and there was an automatic appeal of the administrative determination and trial de novo.

d. Equitable and Pueblo Water Rights

The appeal in *In re Contests of the City of Laredo, to the Adjudication of Water Rights in the Middle Rio Grande Basin & Contributing Tributaries*, 675 S.W.2d 257 (Tex. App.—Austin 1984, writ ref'd n.r.e.), considered the commission decision that the equitable water rights concept adopted in the *Valley Water* case extended to rights in the Middle Rio Grande because of the unique circumstances on the Rio Grande. The court recognized that the commission lacked the equitable powers of a court to recognize an equitable right; nevertheless, on review of the commission's finding of equitable water rights on the Rio Grande it affirmed the commission's finding that the right should be recognized elsewhere in this segment of the river. The court reviewed the laws of Spain and Mexico and court decisions in California, and held that the law of New Spain did not expressly create a municipal water right in the nature of a pueblo water right on the Rio Grande.

e. Appropriative Rights Issues

In adjudicating the basic extent and amount of an existing appropriative right, such as a certified filing or permit, the commission in its determination, and the court in considering the determination, did not make findings regarding all of the terms and conditions of a permit or certified filing. In such cases, the commission observed in a final determination that—

> the most significant terms and conditions stated in permits or amended certified filings are specifically included in the findings and/or conclusions for each rights. However, all of the terms and conditions stated in permits or amended certified filings shall continue in full force and effect, except for obsolete, irrelevant or immaterial terms and conditions which will be deleted from certificates of adjudication when they are issued.

Final Determination of all Claims of Water Rights in the Brazos III Segment of the Brazos River Basin 5 (1985) (see also para. II, pg. 11, of the *Final Determination*, regarding merger of riparian rights with appropriative rights). The final determination was affirmed in *In re Adjudication of Water Rights of the Brazos III Segment of the Brazos River Basin*, 746 S.W.2d 207 (Tex. 1988).

In *In re Contests of City of Eagle Pass, to the Adjudication of Water Rights in Middle Rio Grande Basin & Contributing Texas Tributaries*, 680 S.W.2d 853 (Tex. App.—Austin 1984, writ ref'd n.r.e.), the court affirmed the commission's adjudication involving the volume of water to which an appropriative claim is entitled. In this case, the city sought an amount of water equivalent to a water duty requirement per acre, taking into account future use and needs. The commission allowed the amount of water perfected by the city's actual maximum use prior to August 1967. The court applied the rules of the appropriation doctrine, which measures the extent of the right as the maximum amount beneficially used, after reasonable development, pursuant to the appropriative claim prior to 1967. This, the court held, is the measure of a perfected right under the prior appropriation doctrine. The effect of the court's holding restricted the water right to past beneficial use without provision for future growth and needs.

The *City of Eagle Pass* case was the only adjudication case that reached the appellate courts pertaining to basic issues involved in appropriative rights claims. All others dealt with riparian rights issues and the constitutionality of the Act in relation to riparian rights. Other than those in the *City of Eagle Pass* case, all claimants to appropriative rights were satisfied with either the commission's determination or a district court judgment. This shows that a goal of the Adjudication Act was successful: it reached an amicable resolution to many complex issues that earlier courts found difficult to resolve in a judicial setting. The Act served its purpose of establishing a statutory process that met due-process and separation-of-powers requirements to finally adjudicate existing water rights.

5. Goals of the Adjudication Act

The goals of the Adjudication Act were to quantify and inventory all water rights, which were necessary for the management of water resources. Under the Act, the adjudication process assigned an acre-foot limitation and a priority date to all water rights, and identified the ownership, location of diversion on the stream, diversion rate, and other details so that all water rights could be quantified and identified. The Act included both statutory and nonstatutory claims, with certain exceptions. The goals were accomplished by requiring the filing of claims and providing proof of use during the periods of time provided in the Act.

The Act did much more than establish a procedure for adjudication of claims. It also had the effect of limiting riparian rights, which were previously unquantified and traditionally considered not to be dependent on use, to the maximum demonstrated beneficial use during a prescribed period prior to the effective date of the Act. *See* Tex. Water Code § 11.303. Thus, the Act transformed riparian rights from a right to make an unquantified, reasonable use of water into a right to make a beneficial use of a specified quantity of water with a first use priority date. The Act transformed the existing chaotic dual system of water rights to a more manageable single statutory rights system, with some exceptions discussed below and in Chapters 9 and 27 of this book. In this respect, the Act accomplished its goals.

F. The Adjudication Act: Special Issues

The Adjudication Act and the subsequent adjudication were not cure-alls. They resolved many problems caused by the dual system of water rights and paved the way for better water management, but they left some issues unaddressed. This section discusses selected statutory exemptions from the appropriation process, irrigation canal rights, the Wagstaff Act, and termination of water rights. Some of these topics have only historical significance, whereas others continue to be litigated.

1. Domestic and Livestock Use

The Adjudication Act specifically excluded the adjudication of domestic and livestock use claims. Study of the historical background with specific attention to domestic and livestock use is necessary to understand the nature of these claims. As summarized below, the right to use water for domestic and livestock purposes on land that abuts a stream developed separately from the same right for other uses on land that abuts a stream and uses on land that does not abut a stream.

a. Spanish and Mexican Law Influence

Early Spanish and Mexican law generally provided for water use for domestic and livestock purposes in the ditch or acequias systems. Under the laws of Spain, certain common water uses did not require a grant from the sovereign. Waters in the Rio Grande could be used by all for "drinking by men and animals; as a highway, for the navigation of boats and sailing ships; for fishing; and for domestic necessities." *Valmont Plantations*, 346 S.W.2d at 854 n.1. "[T]he waters of navigable rivers" could be used by all "persons in common." 346 S.W.2d at 857. Common uses included navigation, mooring of boats, making repairs on ships or sails, landing merchandise, fishing, and drying of nets. 346 S.W.2d at 857. All waters of public rivers were for public and common use, and anyone could use the water for domestic purposes. 346 S.W.2d at 860–61 (citing with approval the Spanish commentator Lasso de la Vega); *see also In re Adjudication of the Water Rights in the Medina River Watershed of the San Antonio River Basin*, 670 S.W.2d 250, 254 (Tex. 1984) (A grant from the sovereign was not "needed to take water even from a public stream for domestic or personal use," citing Lasso de la Vega, *Reglamento General De Las Medidas de Aguas*, *reprinted in* M. Galvan, *Ordenanzas de Tierras y Aguas* 155–57 (1844).

b. Statutory and Common-Law Background of Domestic and Livestock Use Claims

The Irrigation Act of 1889 did not mention domestic and livestock use except to the extent that an appropriator of water "shall first make available his said land for agricultural or grazing purposes, and shall provide cisterns, wells, or storage reservoirs for water for domestic purposes." *See* Act approved Mar. 19, 1889, 21st Leg., R.S., ch. 88, § 10, 1889 Tex. Gen. Laws 100, 101–02, *reprinted in* 9 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 1128–30. This reference to domestic and livestock use is in the context of the prior appropriation doctrine and meant that the appropriator was to make water available for domestic use within the appropriator's water delivery system. The intent was to provide domestic water incident to the irrigation enterprise, which in the late 1800s and early 1900s most often included water for surrounding towns, villages, and cities.

The Irrigation Act of 1895 went further by protecting domestic drinking and livestock water use from any right acquired by an appropriation of surface water, by providing:

> Whenever any person, corporation or association of persons shall become entitled to the use of any water of any river, stream, canyon, or ravine, or the storm or rain water hereinbefore described, it shall be unlawful for any person, corporation or association of persons to appropriate or divert any such water in any way, *except that the owner whose land abuts on a running stream may use such water therefrom as may be necessary for drinking purposes for himself, family and employes* [sic], *and for drinking purposes for his and their livestock* . . . .

See Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, § 10, 1895 Tex. Gen. Laws 21, 23, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751, 753 (emphasis added). This was the first legislative declaration of the rights of domestic and livestock users to surface water. Interestingly, it is stated in terms of an exception or exemption from the statute's enforcement of a lawful appropriator's rights to take water from the stream. It is a limited exemption; it applies only to those who own land that abuts a stream, the landowner's family and employees, and the landowner's livestock, and it restricts the use of water to these purposes only.

During this early period, development of the law controlling domestic and livestock use was likely influenced by how this right was recognized in arid regions in the western United States. As stated in a well-recognized 1912 water law treatise—

> In all the Western States water may be appropriated for domestic purposes. This use may be defined as a use similar to that which a riparian owner has, under the common law, to take water for himself, his family, or his stock, and the like. (Citing *Crawford v. Hathaway* (Hall), 67 Neb. 325, 93 N.W. Rep. 781, *Montrose Canal Co. v. Loutsen Leizer D. Co.*, 23 Colo. 223, 48 Pac. Rep. 53, where the Nebraska court held that the appropriation by a company of a large portion of the waters of a stream, for the purposes of supplying water to a municipality for general use, including sprinkling the streets, providing power for a light plant, for flushing sewers, is not a domestic use. This is consistent with current Texas water law requiring a municipality to acquire an appropriative right.) The right is based, however, upon the same differences, compared to the right under the common law, as are the other rights which may be acquired to the use of water under the common law and under the Arid Region Doctrine of appropriation. The first is based upon the ownership of the soil through which or adjoining which the stream flows, as an incident thereto, while the second is by virtue of an appropriation for that purpose under the doctrine of appropriation, and without regard to ownership on the stream. Even without statutory regulations, the right to appropriate water for domestic purposes is not without its limitations. The water must be used in a reasonable manner and no more can be appropriated for a purpose, even where it is prior, than will reasonably meet the demands. It is such a use as ordinarily involves but little interference with the water of a stream or its flow, and does not contemplate the diversion of large quantities of water in canals or pipe lines.

Clesson S. Kinney, *The Law of Irrigation and Water Rights* § 692 (2d ed. 1912) [hereinafter Kinney].

In speaking of domestic and livestock use, the law also makes a distinction between natural and artificial use. Natural uses are uses necessary to sustain life, as opposed to artificial uses, which do not depend on necessities but bear on the question of business, profit, pleasure, or comfort. Domestic and livestock use was given preference over artificial uses, whether appropriative or riparian rights. This preference was based on a reasonable use rule, taking into consideration the nature and extent of the use and all the other facts surrounding the particular use involved. *See* Kinney, § 487. Many of these concepts found their way into Texas water law.

The 1925 Act authorized the appropriation of waters of the state "for public parcels, game preserves, recreation and pleasure resorts, power and water supply for industrial purposes and power and water supply for industrial purposes and *for domestic use*." Act approved Mar. 28, 1925, 30th Leg., R.S., ch. 136, § 1 (emphasis added). This provision was derived from the 1913 Act and the 1917 and 1918 Acts, which later became article 7470 of the Texas Civil Statutes. These provisions allow for a permit or certified filing to appropriate water for domestic use on land that does not abut a stream and for artificial uses. These provisions have continued through codification in 1971, when they became section 5.001 and now section 11.001 of the Texas Water Code. The statutes provide for the appropriation of water for domestic use in cases where the use of water for domestic and livestock use is not on land that abuts a stream and give natural uses the first priority in the case of competing applications for a permit.

The Texas Commission on Environmental Quality rules defined domestic and livestock use in various versions both before and after the Adjudication Act. This is notable because domestic and livestock use was excepted from adjudication. The earlier rules defined domestic and livestock use as it was traditionally understood as limited to household use and use by domestic animals, which seemingly applies to the Adjudication Act exclusion. Current rules have divided the definition of domestic use from that of livestock use consistent with statutory changes dealing with statutory permit exemptions. See discussion below. The current rules define domestic use as—

> Use of water by an individual or a household to support domestic activity. Such use may include water for drinking, washing, or culinary purposes; for irrigation of lawns, or of a family garden and/or orchard; for watering of domestic animals; and for water recreation including aquatic and wildlife enjoyment. If the water is diverted, it must be diverted solely through the efforts of the user. Domestic use does not include water used to support activities for which consideration is given or received or for which the product of the activity is sold.

30 Tex. Admin. Code § 297.1(18). Note that the first part of this definition includes the early common-law and statutory traditional definition of the domestic and livestock use, where livestock use is limited to domestic livestock and does not refer to location of use on land that abuts a stream.

The rules currently define livestock use separate from domestic livestock use as—

> The use of water for the open-range watering of livestock, exotic livestock, game animals or fur-bearing animals. For purposes of this definition, the terms livestock and exotic livestock are to be used as defined in § 142.001 of the Agriculture Code, and the terms game animals and fur-bearing animals are to be used as defined in § 63.001 and § 71.001, respectively, of the Parks and Wildlife Code.

30 Tex. Admin. Code § 297.1(28).

Section 297.21(a) of the rules provides that a person who owns land adjacent to a stream may directly divert and use water from the stream for domestic and livestock use without having to obtain a permit. *See* 30 Tex. Admin. Code § 297.21(a). Also, section 304.21(c)(3) allows a watermaster to protect domestic and livestock uses in times of low flows. *See* 30 Tex. Admin. Code § 304.21(c)(3). These provisions deal with domestic and livestock use consistent with prior law. Additionally, permits issued after the 1913 Act are generally made subject to superior rights, and some have equated this to the exempted domestic and livestock rights on property that abuts a stream.

c. Domestic and Livestock Rights: Summary

The common law, state statutory law, and early Spanish and Mexican law recognize a common-to-all right, excluded from the appropriation and permitting system, to take water from a stream that abuts one's property for one's own domestic use and livestock use.

Use of water for domestic and livestock purposes on land that does not abut a stream may be appropriated from the stream pursuant to the appropriation and permitting system unless exempted by statute. See discussion below with respect to domestic and livestock reservoirs. As applied to individual fact situations, there remain questions about the application of the law related to domestic and livestock use that are yet to be determined. See Chapter 34 for additional discussion.

2. Domestic and Livestock Reservoirs

The Adjudication Act does not cover other exempted statutory claims, such as certain reservoirs, including domestic and livestock reservoirs. This section summarizes the development of this statutory exemption.

The first clear recognition of a statutory water right outside the appropriation law requirements was a landowner's right to construct a dam and impound water on the landowner's land for a limited use of the water impounded, whether riparian or not. It was first recognized in the Irrigation Act of 1895 as an exception to the appropriation system:

> [E]xcept that the owner whose land abuts on a running stream may use such water therefrom as may be necessary for drinking purposes for himself, family and employes [sic], and for drinking purposes for his and their livestock, *and* any one whose land may be located within the area of the watershed from which the storm or rain waters are collected may construct on his land such dams, reservoirs or lakes as may be necessary for the storage of water *for drinking purposes for such owner of land, his family and employes* [sic], *and for his and their livestock* . . . .

Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, § 10, 1895 Tex. Gen. Laws 21, 23, *reprinted in* 10 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 751, 753 (emphasis added). This law recognized the common-law domestic and livestock use and exemption discussed above, and further authorized a reservoir with limited use on the landowner's land. The reservoir's use was limited to the landowner's and the landowner's livestock drinking purposes.

This provision was repealed by the 1913 Irrigation Act, but a similar right was established in the Irrigation Act of 1917. Again, the right was authorized by exemptive language. The 1917 Act included a volume of water limitation but no reference to the nature of use of the water:

> [P]rovided, however, that nothing in this Section or in this Act shall affect or restrict the right of any person or persons, owning land in this State to construct on his own property any dam or reservoir which would impound or contain less than *five hundred acre-feet of water*.

Act of Mar. 19, 1917, 35th Leg., R.S., ch. 88, § 16 (article 7496 of the Texas Civil Statutes) (emphasis added). Thus, the initial reservoir exemption in 1895 was for domestic and livestock use. It was repealed in 1913. For four years, the exemptive right did not exist. When reintroduced in 1917, it did *not* mention the purposes of use; instead, the exemption allowed a reservoir capacity of five hundred acre-feet.

In 1925, the exemption became an affirmative authorization but with a smaller volume limitation and limited purposes as follows: "Any one may construct on his own property a dam and reservoir to impound or contain not to exceed two hundred and fifty acre-feet of water for domestic and livestock purposes without the necessity of securing a permit therefor." Act approved Mar. 28, 1925, 39th Leg., R.S., ch. 136, § 5 (article 7500a of the Texas Civil Statues). The attorney general ruled the 1925 Act unconstitutional, so the nature and extent of this exemption were clouded until it was reenacted by the legislature in 1941, using the following language: "Anyone may construct on his own property a dam and reservoir to impound or contain not to exceed fifty (50) acre-feet of water for domestic and livestock purposes without the necessity of securing a permit therefor." Act of Mar. 14, 1941, 47th Leg., R.S., ch. 37, § 1.

In *City of Anson v. Arnett*, 250 S.W.2d 450 (Tex. Civ. App.—Eastland 1952, writ ref'd n.r.e.), the court was faced with interpreting these different statutes pertaining to reservoirs. A landowner constructed a dam on an unnamed watershed in 1934 and 1935 to impound one hundred acre-feet of water. Over time, the dam had fallen into disrepair and periodically could hold only fifty acre-feet. In 1951, the dam was repaired to impound about ninety acre-feet. The city sued to enjoin the landowner from pumping more than fifty acre-feet of water from the reservoir behind the dam for livestock and domestic use. The city argued that the 1925 Act was void, apparently based on the attorney general's opinion, and that any rights of the landowner before passage of the 1941 Act must be governed by article 7496, enacted in 1917.

The court did not rule on the validity of the 1925 Act because, in the court's opinion, the amount of water impounded made such a determination unnecessary. The court summarized the city's argument as follows:

> [U]nder either the 1917 Act, or the Act of 1925, the only right given to a landowner was the right to construct on his land, without a permit, a dam or reservoir of the size indicated by the statute, but that neither of such Acts gave him the right to use the water impounded without a permit.

City of Anson, 250 S.W.2d at 452. The court rejected this argument, saying:

> Although dams may be built without the intent to use the water impounded, such as those constructed for the purpose of flood control, it is our opinion that the usual purpose for which a landowner builds a dam of the type under consideration is to use the water. The costs of the construction of such a dam would be needless expense to the landowner unless he could use the water impounded.

250 S.W.2d at 452–53. Regardless of which statute controlled, article 7496 (enacted in 1917) or article 7500a (enacted in 1925), the capacity of the dam meant that it required no permit to construct. The court found that neither statute placed any restriction or limitation on the use of the water impounded by the dam and that even though neither statute specified that the impounded water could be used without a permit, the court held that such an intention was implied.

Because the size and purpose of use of the dam and reservoir had changed over time and the relevant statutes varied in the size and purpose of use requirements, the court also addressed the issue of which statute applied to the dam and reservoir. The court found that the 1941 Act did not apply, stating:

> The limitation of use imposed by [the 1941] Act plainly applies to dams constructed under the authority of the Act itself and not to dams which had been previously constructed. The rights of appellee Arnett were not affected by the 1941 Act since they were vested under prior laws and statutes. Under such statutes, it is our opinion that Arnett had the right to use water from his reservoir for the purposes and in the manner set out in the facts of his case. He also had the right to repair his dam to accomplish that end.

250 S.W.2d at 453.

Although the applicable statutes and facts are complicated, the court's holding in the *Arnett* case established that a water right to an exempt reservoir arises by virtue of its construction under the existing statute, within the capacity limitations and purposes of use provided by the existing statute, and that the reservoir must be constructed on land owned by the landowner, whether riparian or not.

The legislature continued to modify the reservoir exemption. The acre-feet restriction was increased to two hundred acre-feet in 1953. *See* Act approved May 27, 1953, 53d Leg., R.S., ch. 235, § 1. In 1959, the law was amended to provide: "The owner of any such dam or reservoir wishing to take water from such dam or reservoir for any beneficial purpose or purposes other than domestic or livestock use . . . can seek a permit from the State." Act approved May 8, 1959, 56th Leg., R.S., ch. 151, § 1 (amending article 7500a of the Texas Civil Statutes).

A later case that considered the reservoir exemption is *Garrison v. Bexar-Medina-Atascosa Counties Water Improvement District No. 1*, 404 S.W.2d 376 (Tex. Civ. App.—Austin 1966, writ ref'd n.r.e.). In this case, a permit authorizing a dam and reservoir on the west prong of the Medina River, a navigable stream, was invalidated. The court of appeals held that the state, not the landowner, owns the bed and banks of navigable streams. The Texas Supreme Court approved that portion of the court of appeals' opinion holding that the exemption from permitting (then article 7500a) did not apply to a navigable stream. *Garrison*, 407 S.W.2d 771 (Tex. 1966). The supreme court ruled that any exemption from permitting for a dam and reservoir would be controlled by the statute at the time of construction but that such exemptions do not apply to navigable streams. For an exemption to apply, the dam must be located on the landowner's land; if on a navigable stream, a permit is required. Thus, under the common law established by the court, the statutory exemption from permitting such a reservoir does not apply when the dam and reservoir are on a navigable stream.

The law continued to evolve. In 1971, article 7500a was repealed and recodified as sections 5.140 and 5.141 of the Texas Water Code, which are currently section 11.142. Section 11.142 allows broader uses of the water in such an exempt reservoir, but it is still subject to the earlier court decisions.

The reservoir exemption to the appropriation and permitting system was created by statute. It is considered by the courts to give a landowner who constructs a dam and reservoir on his own property, to collect diffused water, or on a nonnavigable stream the right to impound a limited amount of water. The terms that control such an exemption are those found in the law that was in effect when the dam was constructed. This exemption under common law does not apply to a navigable stream. See Chapter 27 for a discussion of reservoirs, including exempt reservoirs.

3. *Irrigation Canal Rights*

Certain other rights of landowners adjoining an appropriator's irrigation lands or facilities are of historical interest. Such claims were considered in the *Valley Water* case and possibly in adjudication cases that did not reach the appellate courts. Remnants of older statutes relating to this type of claim remain in the current statutes. The duty to provide water under reasonable terms and conditions at reasonable rates originated from these irrigation canal rights.

The early general and special legislative acts dealing with early irrigation companies, the 1889, 1895, 1913, 1917, and 1918 Acts, provided for the creation of private canal corporations to construct water diversion and distribution systems with the emphasis on delivery of water for irrigating land contiguous to the corporation's canal distribution system. *See* Hutchins, at 251. Later statutes governing the creation and operation of private canal corporations were found in article 7552 *et seq.*, *Vernon's Texas Civil Statutes*. The provisions relating to service of contiguous lands are now found in Texas Water Code sections 11.036–.041.

The court decisions that interpret and apply these statutes to claims of water rights are generally fact- and site-specific and involve questions of the relative rights of the canal company and individuals claiming the right to water from the canals. *See Borden v. Trespalacios Rice & Irrigation Co.*, 86 S.W. 11 (Tex. 1905); *Lakeside Irrigation Co. v. Buffington*, 168 S.W. 21 (Tex. Civ. App.—San Antonio 1914, writ ref'd); *American Rio Grande Land & Irrigation Co. v. Mercedes Plantation Co.*, 208 S.W. 904 (Tex. Comm'n App. 1919, judgm't adopted); *Knight v. Oldham*, 210 S.W. 567 (Tex. Civ. App.—El Paso 1919, writ ref'd); *Mudge v. Hughes*, 212 S.W. 819 (Tex. Civ. App.—San Antonio 1919, no writ); *McBride v. United Irrigation Co.*, 211 S.W. 498 (Tex. Civ. App.—San Antonio 1919, writ ref'd); *Edinburg Irrigation Co. v. Paschen*, 223 S.W. 329 (Tex. Civ. App.—San Antonio 1920), *aff'd*, 235 S.W. 1088 (Tex. Comm'n App. 1922); *Ball v. Rio Grande Canal Co.*, 256 S.W. 678 (Tex. Civ. App.—San Antonio 1923, writ ref'd); *Fairbanks v. Hidalgo County Water Improvement District No. 2*, 261 S.W. 542 (Tex. Civ. App.—San Antonio 1923, writ dism'd w.o.j.); *Chapman v. American Rio Grande Land & Irrigation Co.*, 271 S.W. 392 (Tex. Civ. App.—San Antonio 1925, writ ref'd); *Edinburg Irrigation Co. v. Ledbetter*, 206 S.W. 1088 (Tex. Comm'n App. 1926); *Van Horne v. Trousdale*, 10 S.W.2d 147 (Tex. Civ. App.—El Paso 1928, no writ); *Willis v. Neches Canal Co.*, 16 S.W.2d 266 (Tex. Comm'n App. 1929, judgm't adopted). These early cases generally construed the statutes to say that all landowners contiguous to a private canal company's distribution facilities have a right to demand the use of water from the canal company (or a successor water district) and are entitled to water service on reasonable terms and rates. *See* Hutchins, at 251–52, 271–72, 279–80 (and cases cited therein).

The duty of a canal company or irrigation company to provide water on reasonable terms and rates to landowners contiguous to the company's reservoirs and distribution facilities is reflected in Texas Water Code section 11.038. This basic provision had appeared in every irrigation act since 1889 with specific reference to the content of each act. In those statutes, the duty to provide water was tied to the right of the canal or irrigation company to appropriate water and to the company's construction and maintenance of reservoir and distribution facilities as provided in each statute.

Private irrigation companies were the only facilities that were "constructed and maintained" under the statutes before 1918 and passage of the Conservation Amendment except for early irrigation districts established after the 1904 constitutional amendments; see discussion is section III below. The facilities of water improvement districts and water control and improvement districts were constructed and maintained under later statutes after 1918. When a water district took over the facilities of a predecessor private irrigation company, these early statutes would not apply because the facilities were then maintained under post-1918 statutes, even though they may have been constructed by a private irrigation company under the pre-1918 statutes.

These historical canal corporation water service rights would appear to have limited applicability because most private canal companies in Texas have been converted into water districts; however, this is not the case, because the court in *State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.), recognized independent water rights in claimants that owned or held possessory rights to lands "adjoining or contiguous" to canals of a predecessor private irrigation company, even though their land was not later included in the boundaries of a successor water district. 443 S.W.2d at 748, 750–53. These landowners held permanent water supply contracts, recorded in the county records, with the predecessor private irrigation company and continued to receive deliveries of water from the successor water district. *See also Arneson v. Shary*, 32 S.W.2d 907 (Tex. Civ. App.—San Antonio 1930, writ ref'd).

As mentioned above, during codification in 1971, the provisions dealing with private irrigation companies relating to service of contiguous lands were codified into what is now Texas Water Code sections 11.036–.041. This codification should not have changed the substantive meaning of the law it codified. Nevertheless, as codified, it appears to have changed the context and original aspect of these rights, because a court later held that these current Code provisions were not limited to irrigation uses and private irrigation companies but included other uses, including municipal use, and the court extended the provisions and the duty to serve and deliver water at reasonable rates to municipal suppliers. *See Texas Water Rights Commission v. City of Dallas*, 591 S.W.2d 609 (Tex. Civ. App.—Dallas 1979, writ ref'd n.r.e.).

The duty to deliver water and serve at reasonable rates and terms and conditions, which historically arose out of the canal company and irrigation company statutes as discussed above, has also been broadened to include other water suppliers and water usage. In *City of San Antonio v. Texas Water Commission*, 407 S.W.2d 752 (Tex. 1967), the Guadalupe-Blanco River Authority held a permit granting it "authority to appropriate, divert and use certain waters of the State as may be necessary when beneficially used for the purposes of municipal use." The court declared that the authority could not legally refuse to sell municipal water to any particular municipality. It had a duty to serve the public without discrimination and at reasonable rates. *See Allen v. Park Place Water, Light & Power Co.*, 266 S.W. 219 (Tex. Civ. App.—Galveston 1925, writ ref'd).

Thus the duty to provide water under reasonable terms and at reasonable rates found in today's Texas Water Code chapter 11 originated historically in the state's desire to encourage agriculture and irrigation and support the construction and maintenance of irrigation waterworks designed for this purpose. See Chapter 31 of this book for a discussion of wholesale water suppliers.

4. *Wagstaff Act*

Legislation historically referred to as the "Wagstaff Act," Act approved May 18, 1931, 42d Leg., R.S., ch. 128, § 2 (amending article 7472 of the Texas Civil Statutes), was enacted by the legislature in 1931 and later codified as Texas Water Code section 11.028. Its underlying purpose was based on a perception that upstream municipal water suppliers were threatened by major downstream senior appropriation for hydroelectric and irrigation purposes. The Act declared that it was the public policy of the state that, in the allotment and appropriation of water and issuance of permits after 1931, preference and priority were to be given to listed uses in the order provided in the statute. Domestic and municipal uses were listed first, followed by industrial, irrigation, mining, hydroelectric power, navigation, and recreation, in that order. This preferential treatment based on purpose of use was existing law and continues as law today with respect to issuance of permits, but the Act further stated:

> provided, however that all appropriations or allotments of water hereafter made for . . . any other purposes than domestic or municipal purposes, shall be granted subject to the right of any city, town or municipality of this State to make further appropriations of said water thereafter without the necessity of condemnation or paying therefor . . . .

This provision was highly controversial for more than fifty years because it appeared to provide a mechanism for making water available for municipal use on a watercourse (except the Rio Grande) that was otherwise fully appropriated in permits issued after 1931. No Texas court ever addressed this basic issue authoritatively. *But see City of San Antonio v. Texas Water Commission*, 407 S.W.2d 752, 764 (Tex. 1966). The uncertainties created by the Wagstaff Act were removed by the legislature in 1997 in Senate Bill 1, when it repealed Texas Water Code section 11.028, the successor provision.

5. *Forfeiture and Cancellation of Water Rights*

Another aspect of surface water law development that was not involved in the adjudication, but that has historical significance, concerns laws dealing with how water rights may be lost through abandonment or statutory forfeiture and cancellation. Since 1917, the legislature has provided means by which statutory water rights may be forfeited and canceled.

a. Forfeiture

The 1917 Act was the first statute to provide a means by which an appropriative water right could be terminated. *See* Act of Mar. 19, 1917, 35th Leg., R.S., ch. 88. (This provision was codified as article 7544 of the Texas Revised Civil Statutes and then as section 5.030 of the Texas Water Code. The current statute on forfeiture is found at Texas Water Code section 11.030.) Article 7544, *Vernon's Texas Civil Statutes* (1948), provided:

> Any appropriation or use of water heretofore made under any statute of this State, or hereafter made under the provisions of this Chapter, which shall be willfully abandoned during any three successive years, shall be forfeited and the water formerly so used or appropriated shall be again subject to appropriation for the purposes stated in this Act.

Article 7544 was applied as between the water rights holders in *City of Anson v. Arnett*, where the court held that there must be clear and satisfactory evidence of an intention to abandon a water right before it will be declared forfeited. *City of Anson*, 250 S.W.2d at 454. This is consistent with judicial disfavor of forfeiture of rights. According to the court, mere failure to repair a dam or facilities or the nonuse of water is not probative evidence of an intent to abandon a water right. *See also Lower Nueces*

River Water Supply District v. Cartwright, 274 S.W.2d 199 (Tex. Civ. App.—San Antonio 1955, writ ref'd n.r.e.).

An action of forfeiture of a water right under article 7544 applied to actions between water rights holders being heard by a court rather than to cancellation of water rights by an administrative agency. *Fairbanks v. Hidalgo County Water Improvement District No. 2*, 261 S.W. 542 (Tex. Civ. App.—Austin 1923, writ dism'd w.o.j.), held that article 7544 did not give the Board of Water Engineers the power to forfeit rights because to do so would violate article I, section 1, of the state constitution by giving judicial powers to an administrative agency. (This provision was originally enacted as part of the Irrigation Act of 1917 (Act of Mar. 19, 1917, 35th Leg., R.S., ch. 88), codified as article 7544 of the Texas Revised Civil Statutes, then as section 5.030 of the Texas Water Code. The current statute on forfeiture is found at Texas Water Code section 11.030.)

Although the 1917 Act and subsequent statutes did not give the Board of Water Engineers the authority to terminate an appropriative water right, the board did have the right to forfeit a permit, after notice, if the permitted work did not commence within ninety days, or as extended. Similar authority has been carried forward in Texas Water Code section 11.146, which establishes procedures, including a hearing, for forfeiture proceedings.

In the codification process in 1971, the forfeiture provision in article 7544 was repealed, leaving cancellation as the only statutory means through which an appropriative right may be terminated. *See* Act approved Apr. 12, 1971, 62d Leg., R.S., ch. 58, § 2.

b. Cancellation

The 1953 Act, which was enacted during the historic drought of the 1950s, established another means to terminate a water right through cancellation:

> All permits or certified filings for the appropriation and use of public waters granted by the Board of Water Engineers, or filed with said Board, more than ten (10) years prior to the effective date of this Act and under which no part of the water authorized to be withdrawn and appropriated has been put to beneficial use for a period of ten (10) consecutive years next preceding the effective date of this Act are hereby canceled and shall be of no further force and effect.
>
> Provided, however, that the Board shall send notice of such pending cancellation by registered mail, return receipt requested, to the holder of any such permit or certified filing, at the last address shown by the records of the Board of Water Engineers at least ninety (90) days prior to the effective date of such cancellation. The failure of the Board of Water Engineers to cancel a permit or certified filing hereunder shall not be construed as validating any such permit or certified filing not cancelled.

Act approved June 8, 1953, 53d Leg., R.S., ch. 352, § 1.

Cancellation of water rights pursuant to statute was upheld as constitutional in *Texas Water Rights Commission v. Wright*, 464 S.W.2d 642 (Tex. 1971). The court held that the issuance of a permit authorizes the beneficial use of water and that a permittee does not acquire the right of nonuse of water. It is the duty of the appropriator to beneficially use the water. Water permits are grants of usufructuary rights to use the state's water, with the implied condition subsequent that the water is beneficially used. The cancellation statute provides a reasonable remedy for the state's enforcement of this condition subsequent after fair opportunity for notice and hearing. A permittee could reasonably have expected that his rights would be subjected to a remedy enforcing this condition, which inherently attached to the rights granted. The court concluded that the cancellation statute was not invalid even though it has retroactive effects.

III. Legislative Water Management: Water Districts and River Authorities

As early as 1852, the legislature realized the need to manage surface water resources and to develop a system for individuals to acquire surface water rights. This effort began first in the arid portion of the state and was later extended to the entire state. The early efforts to develop water resources through private irrigation companies and privately financed projects proved less successful than was anticipated, and it was apparent that more legislation would be needed. The response was a constitutional amendment adopted on November 8, 1904. *See* Tex. Const. art. III, § 52 interp. cmt.

A. The 1904 Constitutional Amendment and Legislatively Created Irrigation Districts

The 1904 constitutional amendment authorized the legislature to establish political subdivisions and districts that could issue bonds for improvements of watercourses and for the construction and maintenance of works for irrigation, drainage, navigation, and roads. Tex. Const. art. III, § 52.

This amendment, enacted when there was public concern about higher taxes, contained limitations that hampered its effectiveness. For example, it required a two-thirds majority vote of resident property owners to authorize a bond issue, prevented taxation where cities were included within the boundaries of the district, and limited the amount of bonds issued by a district.

Based on the new authority granted in the 1904 constitutional amendment, the legislature passed a statute authorizing the creation of irrigation districts. *See* Act of Apr. 15, 1905, 29th Leg., R.S., ch. 235. The legislature also passed statutes providing for the creation of drainage and levee improvement districts. A few irrigation districts were formed pursuant to these new laws, and the statutes were declared constitutional. *See, e.g., Barstow v. Ward County Irrigation District No. 1*, 177 S.W. 563 (Tex. Civ. App.—El Paso 1915, writ ref'd); *White v. Fahring*, 212 S.W. 193 (Tex. Civ. App.—Galveston 1919, writ ref'd). However, the limitations imposed by the 1904 constitutional amendment restricted the irrigation development that it was intended to encourage. This continued until the legislature responded in the 1913, 1917, and 1918 Acts.

B. The Conservation Amendment

The 1913 Act, in addition to being a comprehensive water statute relating to surface water law, authorized the creation of "irrigation districts." Act approved Apr. 9, 1913, 33d Leg., R.S., ch. 172. Questions were raised about whether the legislature, under the 1904 amendment, had sufficient authority to create water districts with the powers necessary to fully develop the state's water resources. In 1917, the legislature passed the 1917 Act, which provided for the creation of water improvement districts. *See* Act approved Mar. 19, 1917, 35th Leg., R.S., ch. 87. The legislature also passed a joint resolution to submit to the voters of the state another and more liberal constitutional amendment with respect to, among other things, financing the operations and projects of water districts and river authorities.

The 1917 Conservation Amendment, approved by the state's electorate on August 21, 1917, authorized the legislature to establish water districts that have more operational and financial flexibility than those authorized under the earlier amendment. *See* Tex. Const. art. XVI, § 59(b). Specifically, it authorized the creation of conservation and reclamation districts and eliminated the financing restrictions and limitations contained in the 1904 amendment (article III, section 52). See Tex. Const. art. XVI, § 59 interp. cmt.; Hutchins, at 12.

C. Districts and Authorities after the Conservation Amendment

The Conservation Amendment was not self-enacting. By its terms, the legislature had the duty to implement the public policy expressed in the amendment. *See City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 802–03 (Tex. 1955). At a called session of the same 35th Texas Legislature, held in 1918, legislation was passed for the purpose of implementing the Conservation Amendment. *See* Act approved Mar. 21, 1918, 35th Leg., 4th C.S., ch. 25. The 1918 Act, in addition to confirming provisions in the 1913 and 1917 Acts, provided for the creation of conservation and reclamation districts with the powers of water improvement districts. It also authorized existing water improvement districts and earlier irrigation districts to convert to conservation and reclamation districts that have the powers of such districts without having to change the district's name. Although the 1918 Act removed the limitations with regard to taxation, the process for converting to a conservation and reclamation district remained an impediment to development and use of the state's surface water. The process required a petition signed by a relatively large percentage of the owners of land in the district, confirmed by an election held in the district.

In *Trimmier v. Carlton*, 264 S.W. 253 (Tex. Civ. App.—Austin 1924), *aff'd*, 296 S.W. 1070 (Tex. 1927), the court discussed the background of these statutes and stated, without holding, that the 1917 Act dealing with water improvement districts was intended to supersede the 1913 Act because it covered the same general subject, and in many respects the two statutes were identical. However, the two statutes remained within statutory law. *See Trimmier*, 264 S.W. at 258. The court, on motion for rehearing, held that the Conservation Amendment did not supersede the 1904 amendment. To avoid the limitations imposed by the 1918 Act, special enabling legislation would be required to create a conservation and reclamation district. *Trimmier*, 264 S.W. at 262; *see also Arneson v. Shary*, 32 S.W.2d 907 (Tex. Civ. App.—San Antonio 1930, writ ref'd) (addressing the relationship between previous early irrigation canal companies and later created water districts).

Legislation passed in 1925 provided for the organization of water control and improvement districts, which were conservation and reclamation districts without the limitations created by the 1918 Act as noted in *Trimmier*. Act of Feb. 26, 1925, 39th Leg., R.S., ch. 25 (which became Tex. Rev. Civ. Stat. art. 7880-1*et seq.* (1954) and was later codified in Texas Water Code chapter 51). Because of the uncertainty caused by the *Trimmier* decision and the subsequent 1925 Act, numerous special bills were passed to validate existing districts, convert existing districts into conservation and reclamation districts, and create new districts. *See* Tex. Rev. Civ. Stat. art. 8280-2 *et seq.* (1954), Water Auxiliary Laws (Vernon 2004–05). The legislature is in the process of codifying these special enabling statutes. *See generally* Tex. Spec. Dist. Code.

The 1925 legislature authorized the conversion of any existing water improvement district or irrigation district into a water control and improvement district by action of its board of directors. *See* Tex. Water Code §§ 51.040–.044 (relating to water control and improvement districts). The authority to convert to a water control and improvement district was extended in 1929 to levy improvement districts or any other existing conservation and reclamation districts. *See* Tex. Rev. Civ. Stat. arts. 7880-143, 7880-143a (1954) (now included in Tex. Water Code ch. 51). Although the 1925 Act, Act of Feb. 26, 1925, 39th Leg., R.S., ch. 25, § 144, later Tex. Rev. Civ. Stat. art. 7880-144 (1954), appeared to validate that all existing water improvement districts and irrigation districts were operating under the Conservation Amendment, this issue remained uncertain with regard to existing and possible future districts and river authorities in their efforts to manage water sources within their respective jurisdictional boundaries.

The legislature also provided for other special-purpose districts, such as fresh water supply districts, Act approved July 28, 1919, 36th Leg., 2d C.S., ch. 48; municipal utility districts, Act approved Apr. 27, 1971, 62d Leg., R.S., ch. 84; and drainage districts, Act approved Mar. 23, 1907, 30th Leg., R.S., ch. 40; Act approved Mar. 28, 1911, 32d Leg., R.S., ch. 118. Many other types of districts and river authorities were created in specific watersheds—for example, the Brazos River Authority, Act of July 2, 1929, 41st Leg., 2d C.S., ch.13, 1929 Tex. Spec. Laws 22; the Guadalupe-Blanco River Authority, Act approved Oct. 25, 1933, 42d Leg., 1st C.S., ch. 75, 1933 Tex. Spec. Laws 198; and the Lower Colorado River Authority, Act approved Nov. 13, 1934, 43d Leg., 4th C.S., ch. 7, 1934 Tex. Spec. Laws 19. See Chapter 7 of this book for a discussion of water districts and Chapter 8 regarding river authorities and regional water districts.

In 1971, the legislature codified almost all water law and water district statutes. In general, it was intended that the Texas Water Code should include all general water laws of the state as well as amendments made to such laws. However, many of the general water district laws were not codified. *See* Water Auxiliary Laws (Vernon 2004–05). Most of the provisions of the 1917, 1918, and 1925 Acts were codified, including those dealing with water improvement districts, water control and improvement districts, fresh water supply districts, and drainage districts. For example, the 1925 Act providing for water control and improvement districts is now found in Texas Water Code chapter 51, and the statutes dealing with water improvement districts, which govern early irrigation districts under the 1905 statute, are found in chapter 55. See Chapter 7 of this book.

Significantly, in 1971 the question of the status of irrigation districts organized under the early laws pursuant to the 1904 constitutional amendment was resolved with adoption of Texas Water Code section 55.050. Under this provision, those early irrigation districts are governed by the provisions of chapter 55 and are allowed to change their name if they desire. *See* Tex. Water Code §§ 55.050–.051. This is consistent with *dicta* in *Trimmier*. *See Trimmier*, 264 S.W. at 258.

In 1977, the legislature approved legislation establishing a new type of district called an *irrigation district* as a district separate and apart from other existing earlier water districts and irrigation water districts. Act approved June 15, 1977, 65th Leg., R.S., ch. 627. This legislation was added as chapter 58 of the Texas Water Code. A chapter 58 irrigation district is a conservation and reclamation district pursuant to the Conservation Amendment, article XVI, section 59, of the Texas Constitution. The specific purposes of these new irrigation districts are to deliver water for irrigation, provide for drainage, and deliver untreated water to municipal suppliers. They are authorized to perform, in addition to the delivery of irrigation water, other incidental functions and may contract with municipalities, political subdivisions, water supply corporations, or other water users for the delivery of untreated water. *See* Tex. Water Code §§ 58.121–.190. See also Chapter 7 of this book.

As mentioned above, the 1925 Act authorized all existing water districts to convert to water control and improvement districts with the additional powers authorized by the Act. Similarly, chapter 58 authorizes any water improvement district (including an earlier created irrigation district operating as a water improvement district) or water control and improvement district, whose purposes were to furnish water for irrigation and delivery of untreated water, to convert to a chapter 58 irrigation district. *See* Tex. Water Code §§ 58.038–.042.

In 1995, uniform provisions dealing with water districts were enacted in chapter 49 of the Texas Water Code. They apply to all districts, with certain exceptions for "special water authorities." Act approved June 15, 1995, 74th Leg., R.S., ch. 715 (codified at Texas Water Code chapter 49). According to the legislature, this step was needed because of the "lack of procedural uniformity between the different types of local water district[s]" and "inconsistencies [that] lead to confusion among citizens, district board members, and state agency personnel." Bill Analysis, Senate Bill 626, House Natural Resources Committee, 74th Leg. (1995). For a review of some water district organizational and operational issues, see *Ward County Irrigation District No. 1 v. Red Bluff Water Power Control District*, 170 S.W.3d 696 (Tex. App.—El Paso 2005, no pet.).

As discussed in greater detail in Chapters 7 and 8 of this book, with legal issues involving water districts and authorities, it is necessary to consider the noncodified special and general laws authorizing and governing a district or, if codified, the chapter of the Texas Water Code covering the particular district, as well as chapter 49, which applies to all surface water districts.

IV. Conclusion

Surface water law in Texas has evolved from a dual system of common-law riparian rights and appropriation rights granted by the state to a more uniform system based on the appropriation doctrine controlled by the constitution and legislation passed pursuant to the constitution. Within this transformation is the recognition that a perfected water right is a property right to use the state's water, which is protected by the constitution. The legislature has provided for management of its water resources through local and regional water districts and river authorities, watermaster programs, and the regulatory system within the current Texas Commission on Environmental Quality, which governs the enforcement of water rights and the granting of permits and amendments to existing water rights.

The surface water law system, as it has evolved, is not yet a perfect system. There are many legal issues and refinements yet to be considered and dealt with by the legislature, by the judiciary, and when necessary, in amendments to the Texas Constitution. The current surface water law system has matured through this evolution and is one that can be built on to meet the state's future water resource needs.

CHAPTER 4

Groundwater Law and Regulation

Russell S. Johnson[1] and Mary K. Sahs[2]

I. Introduction

This chapter reviews the law of groundwater as established and applied by Texas courts and the regulation of the exercise of those rights under the Conservation Amendment, article XVI, section 59, of the Texas Constitution. Although Texas adopted the common law as a republic in 1840 (*see* Act approved Jan. 20, 1840, 4th Cong., R.S., § 1, 1840 Repub. Tex. Laws 3–6, *reprinted in* 2 H.P.N. Gammel, *The Laws of Texas 1822–1897*, at 177–78 (Austin, Gammel Book Co. 1898)), although not until 1904 did Texas common law expressly address the law of groundwater. In the early 1900s, the need to use large quantities of groundwater and the ability to raise it to the surface with submersible pumps led to conflicts that required resolution by the courts. The Texas Supreme Court in *Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (Tex. 1904), commonly referred to as the "*East* case," adopted the common-law absolute ownership rule. More than one hundred years of jurisprudence have left the law little changed and much criticized. Finally, in 2012, the Texas Supreme Court thoroughly examined the nature of a landowner's ownership right and right to produce groundwater in *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012).

Under the Conservation Amendment, the state has, through the creation of groundwater conservation districts (or similar governmental agencies), authorized the regulation of groundwater. *See* Tex. Const. art. XVI, § 59; Tex. Water Code ch. 36. As summarized below and discussed in greater detail in Chapter 16 of this book, since the late 1990s, groundwater conservation districts have been given increasing authority to regulate the use of groundwater. This increase in authority has created conflict between landowner rights in groundwater and the exercise of the districts' regulatory powers. This chapter reviews the development of the law of groundwater from the adoption of the absolute ownership rule to its most recent affirmance, as well as the relationship of this common-law rule to groundwater regulation by local groundwater districts.

II. What Is Groundwater?

Although the question "What is groundwater?" seems simple, it is the critical beginning of all water law analyses in Texas. Entirely different laws and regulations apply to "groundwater" and "state

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water," which makes this type of categorization extremely important. In determining the legal classification of water found beneath the ground, one must first determine whether it is state water. If not, it is legally groundwater, owned by the landowner, subject to regulation by groundwater conservation districts.

A. Groundwater Is Not State Water

Because "state water" includes underground rivers and streams and the underflow of surface rivers and streams, the fact that water is found underground is not definitive proof of its character as groundwater. *See* Tex. Water Code § 11.021(a) (underflow). See also Chapter 1 of this book for a discussion of the legal distinction between state water, which is generally referred to as surface water, and groundwater.

Chapter 36 of the Texas Water Code, under which most groundwater is regulated, does not clarify the distinction; it defines groundwater as water percolating below the surface of the earth. Tex. Water Code § 36.001(5). The regulations implementing the state's water rights statute, however, add some clarity, defining groundwater as "[w]ater under the surface of the ground other than underflow of a stream and underground streams, whatever may be the geologic structure in which it is standing or moving." 30 Tex. Admin. Code § 297.1(21). Thus, the facts of each situation involving water beneath the ground's surface must be analyzed before it is apparent whether surface water law or groundwater law applies. Several cases illustrate this analysis. *See Texas Co. v. Burkett*, 296 S.W. 273, 278 (Tex. 1927); *East*, 81 S.W. at 280; *Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503, 506 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.) (underground rivers and streams); *Cantwell v. Zinser*, 208 S.W.2d 577, 579 (Tex. Civ. App.—Austin 1948, no writ).

B. Spring Water Is Not Groundwater

As early as 1927, the Texas Supreme Court recognized that spring water, which is neither surface water nor water in a subsurface stream with defined channels, was the exclusive property of the landowner. *See Burkett*, 296 S.W. at 278. The first court decision directly addressing the conflict between landowners who used percolating groundwater emerging at springs and landowners who had historically benefited from and used downstream flows from a spring was *Pecos County*. In that case, the defendant owned large areas of land over groundwater formations that historically provided flow to Comanche Springs. The plaintiff was the owner of state water right permits based on historic spring flows and had used and enjoyed the waters of Comanche Springs for ninety years. During the 1950s drought, the defendant's extensive groundwater use was alleged to have caused the cessation of spring flows from Comanche Springs. The downstream plaintiff, as the owner of the surface water permits, filed suit seeking an injunction and a declaration that their more senior state water appropriative rights had priority.

The district court refused to enjoin the use because it was not wasteful and refused to judicially declare correlative rights in the water at issue. On appeal, the court declined to recognize the state water rights predating the groundwater usage by the defendant as justification for injunctive relief against the groundwater use. The court held that the plaintiff only had rights to the waters of Comanche Springs after they emerged from the springs and refused to extend those rights to the water underground. See *Pecos County*, 271 S.W.2d at 506–07. The court also rejected the plaintiff's claim that, because the water supplying Comanche Springs flowed in well-defined underground channels, it was not groundwater but rather surface water. *Pecos County*, 271 S.W.2d at 506.

This decision was reinforced in *Denis v. Kickapoo Land Co.*, 771 S.W.2d 235 (Tex. App.—Austin 1989, writ denied), in which an upstream landowner drilled a suction well into Kickapoo Springs, which fed Kickapoo Creek, pumped the water to Kickapoo Creek, and diverted it to irrigate his land. Flow of the creek downstream of the diversion was substantially reduced, and downstream users sued, claiming unlawful diversion of state surface water. The trial court granted summary judgment for the defendant well owner, and the court of appeals affirmed, holding that waters tributary to springs were treated the same as all other percolating waters and belonged absolutely to the owner of the land. The landowner could do what he pleased with them, even though abstracting the water dried up the springs. The court said it is immaterial that the springs so supplied with water were the sources of a stream or surface water course on which rights had vested, provided that the water was intercepted while it was still percolating through the soil before it had reached the surface of the ground at the springs. *Denis*, 771 S.W.2d at 238–39.

C. Groundwater Can Become State Water

While the courts early on held that groundwater emerging from springs and entering a watercourse loses its character as groundwater and is properly classified as surface water, only more recently has it been decided that groundwater discharged into a river, stream, or watercourse loses its status as groundwater and becomes state water. *See City of San Marcos v. Texas Commission on Environmental Quality*, 128 S.W.3d 264, 277 (Tex. App.—Austin 2004, pet. denied). A similar holding was made in *Day*, 369 S.W.3d at 823. The court was asked to decide whether an Edwards Aquifer Authority (EAA) permitting decision based on a finding that water from an artesian well that was allowed to flow into a surface impoundment had become surface waters of the state even though the water never left the landowner's property. The EAA found that the water used from the impoundment had become surface waters of the state and that Day was therefore not entitled to a groundwater production permit for water withdrawn from the impoundment and used for irrigation.

The supreme court affirmed the EAA's decision, finding that Day had failed to prove that his use of water was groundwater and not state water. This statement of the law has profound implications for any landowner using groundwater to supplement water in an impoundment on a watercourse. As stated by the court, "We do not suggest that a lake can never be used to store or transport groundwater for use by its owner. We conclude only that the Authority could find from the evidence before it that that was not what had occurred on Day's property." *Day*, 369 S.W.3d at 823.

D. The Same Law May Not Apply to Both Fresh and Salty Groundwater

As greater amounts of saline or brackish water are drawn from beneath the surface of the earth, another legal distinction becomes important: whether the groundwater is fresh or brackish. Currently, the law of groundwater covers all non-state-water found beneath the ground. Recent legislative trends, however, indicate that this may change in the not too distant future. For more information on the legal implications of the salinity of groundwater, see chapter 25 of this book, which discusses desalination.

III. The Rule of Capture: A Common-Law Concept

As discussed below, the common law of groundwater encompasses two primary issues: the ownership of groundwater and liability for its use. Both issues were addressed in the seminal *East* case decided in 1904, which established the rule of capture in Texas. Subsequent cases addressed these issues, but the ensuing jurisprudence did not always distinguish between the property rights and the tort aspects of the rule of capture. Ultimately, however, the Texas Supreme Court opined on the property rights aspects of the common-law rule of capture, shortly after the legislature codified groundwater property rights by amending Texas Water Code chapter 36.

A. The Rule of Capture: Ownership of Groundwater and Liability for Its Use

In the *East* case, the Texas Supreme Court was presented with its first opportunity to address the ownership of groundwater and liability for its use. The case arose as a claim by a landowner for injuries allegedly caused by new, large-volume pumping by an adjacent landowner. The plaintiff had historically used groundwater, but that water became unavailable because the defendant had purchased nearby land, drilled a well, and installed a steam pump to pump groundwater to cool locomotives, which were located some distance from the railroad company's well. The court reversed lower court rulings and found there was no right to recover damages for the loss of use of the plaintiff's wells nor could the plaintiff prevent the railroad's use of the water, even though the railroad company's use clearly deprived the plaintiff of a historically exercised right.

The court refused to adopt a system that would limit the use of groundwater to prevent harm to nearby property owners or sanction a claim for damages. The court rejected the American rule, which limits the use of the water to the reasonable amount for the land from which it is produced, expressing considerable concern about the adverse economic consequences of adopting that rule, particularly in the context of the railroad industry's need for water along its growing network of lines.

Landowners were, in the court's opinion, free to capture and use as much water as could be beneficially used without waste. The court described groundwater ownership as giving the landowner all that lies beneath his surface, including the right to dig therein and apply all that is found to his own purpose even if he drains his neighbor's well, the resulting injury described as *damnum absque injuria*. *East*, 81 S.W. at 280–81. The East court gave two reasons for adopting the absolute ownership rule:

1. Because the existence, origin, movement, and course of such waters and the causes that govern and direct their movements are so secret, occult, and concealed, any attempt to administer a set of legal rules with respect to them would be involved in hopeless uncertainty and would therefore be practically impossible. *East*, 81 S.W. at 281.

2. Any consideration of correlative rights would interfere to the material detriment of the commonwealth with drainage and agriculture, mining, the construction of highways and railroads, sanitary regulations, building, and the general progress of improvement of works of embellishment and utility. *East*, 81 S.W. at 281.

Even though described as an absolute ownership rule, the court recognized the common-law limitations on the exercise of the right. The groundwater must be put to a beneficial use without waste, and the action must be without malice. *East*, 81 S.W. at 281. The court also acknowledged that, by noting its absence in Texas, the rule applies only when there exists no legislation limiting the exercise of the right. *East*, 81 S.W. at 280.

In 1927, the Texas Supreme Court reaffirmed the rule of capture in *Burkett*, 296 S.W. 273. The court expressly held that a landowner had the right to enter into a contract to sell groundwater, even though the water would not be used on the property from which the water would be produced.

Despite extensive criticism concerning the absence of a remedy for a landowner or other interest adversely affected by the exercise of the right to produce groundwater, the absolute ownership rule has remained the common law in Texas. The Texas Supreme Court had the opportunity to repeal the rule in 1999 in *Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75 (Tex. 1999), but declined to do so. The defendant purchased land, constructed wells, and produced groundwater for bottling purposes. Sipriano claimed that the wells he owned were severely depleted by the defendant's alleged nuisance, negligence, gross negligence, and malice. In the lower court, Sipriano argued that his claims fell within recognized exceptions to the rule of capture and, further, that Texas should abandon the rule of capture and replace it with the rule of reasonable use. These arguments were rejected; the defendant obtained a summary judgment denying all of the plaintiff's claims, which was affirmed by the court of appeals. *See Fain v. Great Spring Waters of America, Inc.*, 973 S.W.2d 327 (Tyler 1998). In arguments to the supreme court, Sipriano abandoned the argument that he had stated a claim under a recognized exception to the rule of capture and argued only that the rule of capture should be abandoned.

The supreme court affirmed the lower court judgments applying the rule of capture to groundwater. In doing so, the court reviewed the history of the rule of capture and the cases interpreting the rule, including the common-law exceptions to the rule that a landowner was not liable to his neighbors for injury caused by the use of water as long as the water was not wasted, negligently withdrawn, or maliciously removed.

> For over ninety years, this Court has adhered to the common-law rule of capture in allocating the respective rights and liabilities of neighboring landowners for use of groundwater flowing beneath their property. The rule of capture essentially allows, with some limited exceptions, a landowner to pump as much groundwater as the landowner chooses, without liability to neighbors who claim that the pumping has depleted their wells. We are asked today whether Texas should abandon this rule for the rule of reasonable use.... Because we conclude that the sweeping change to Texas's groundwater law Sipriano urges this Court to make is not appropriate at this time, we affirm the court of appeals' judgment.

Sipriano, 1 S.W.3d at 75.

Although the court's decision upheld the rule of capture, it is instructive to consider the reasoning provided in the majority and concurring opinions. The majority opinion stated that there were compelling reasons for abandoning the rule and replacing it with the reasonable use rule. Furthermore, the court stated that it had the power to make such a change and would not be reluctant to do so in the future if the legislature did not adequately address regulation of groundwater production.

In the majority opinion, the court cited the Conservation Amendment as ample justification for the legislature to authorize regulation of groundwater production and stated that Texas voters had made groundwater regulation "a duty of the legislature." *Sipriano*, 1 S.W.3d at 80. The court noted that the legislature had recently passed Senate Bill 1 (Act of June 1, 1997, 75th Leg., R.S., ch. 1010), which provided a process to create local groundwater conservation districts. *Sipriano*, 1 S.W.3d at 79–80. The court stated, with a major caveat, that changing the common law on which this process was intended to act would be improper.

In deferring to the legislature, the supreme court in the majority opinion specifically referenced amendments by Senate Bill 1 (S.B.1) to the Texas Water Code, mentioning those giving more authority to groundwater conservation districts to regulate and manage groundwater withdrawals and regulate water transferred outside the district. They "save[d] for another day the determination of whether further revising the common law is an appropriate prerequisite to preserve Texas's natural resources and protect property owners' interests." *Sipriano*, 1 S.W.3d at 80.

The concurring opinion by Justice Hecht, joined by Justice O'Neill, presents a slightly different view. While agreeing to defer to the legislature, Justice Hecht makes a persuasive argument for the abandonment of the rule of capture in favor of the "beneficial purpose doctrine" set out in section 858 of the *Restatement (Second) of Torts*. This doctrine would impose liability (1) for withdrawal of groundwater that unreasonably causes harm to neighboring land through lowering the water table or reducing artesian pressure, (2) for water use that exceeds the landowner's reasonable share of the annual supply or total store of groundwater, or (3) for water use that has a direct and substantial effect on a watercourse or lake and unreasonably causes harm to a person entitled to use its water. *Sipriano*, 1 S.W.3d at 83 (citing *Restatement (Second) of Torts* § 858).

B. Exceptions to the Rule of Capture

As is apparent from the cases discussed above, lawsuits in which a claim is made based on the rule of capture alleging that the defendants' production of groundwater in some manner injured the plaintiff traditionally have been analyzed under two major concepts: (1) the extent and nature of a person's ownership right in groundwater beneath his property, and (2) liability attached to the use of that groundwater property when it damages another. In 2015, the issue of whether a third party may be liable for activities that negatively impact a person's groundwater ownership right has been added to the list. Earlier courts established exceptions to the rule of capture's unfettered right to produce groundwater for waste and subsidence. The latest case attaches liability for underground trespass.

1. Waste

Although the waste exception to the rule of capture has been recognized since its adoption in 1904, it was not until *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798 (Tex. 1955), that an appellate decision addressed the extent to which the waste exception limited the rule of capture. A river supply district and the city of Corpus Christi made an agreement under which the district would allow groundwater to flow from the district's artesian wells into a river, which would then transport the water 118 miles to Corpus Christi's reservoirs. Pleasanton's water supply was threatened by these actions, and it sought to enjoin performance of the contract and prevent the "waste" of the groundwater caused by the loss of water during its transit to Corpus Christi. The claim was based on proof that up to 75 percent of the water removed from the ground was lost to evaporation and seepage before it was actually used by the citizens of Corpus Christi. The plaintiff relied on a 1925 statute that defined waste, in relation to artesian wells, as permitting the waters of an artesian well to run into any river unless it was put to lawful use. In reversing the lower courts' decisions enjoining the transporting of water because it constituted waste, the supreme court found that it was not waste to transport water down a natural stream bed with consequent loss of water by evaporation, transpiration, and seepage. Examining the limitations on the rule of capture right, the supreme court noted, "About the only limitations applied by those jurisdictions retaining the 'English' rule [rule of capture] are that the owner may not maliciously take water for the sole purpose of injuring his neighbor, or wantonly and willfully waste it." *City of Corpus Christi*, 276 S.W.2d at 801 (citations omitted)

In examining whether the facts justified a finding that the water had been wasted, the court noted that no common-law limitation of the means of transporting the water to the place of use could be found and that the question of whether the use to which the water is put is lawful or unlawful cannot reasonably turn on whether some of the water put into the system escapes during transportation. The decision noted that the water transported was put to a beneficial use, despite the amount lost in transport. The court concluded that the legislature could prohibit the use of any means of transportation of groundwater that allowed the escape of excessive amounts but that it had not done so. *City of Corpus Christi*, 276 S.W.2d at 803.

Justices Griffin, Wilson, and Culver dissented. All three were troubled by the large percentage of water lost. After lamenting the majority's finding, Justice Wilson wrote on the limitations of the rule of capture and suggested that the rule be abandoned and a correlative rights system be adopted. *City of Corpus Christi*, 276 S.W.2d at 808.

Texas courts have not considered any other cases in which a claim of waste of underground water has been alleged or found. Similarly, there are no Texas cases finding liability for malicious production, despite courts' continued references to this exception to the rule of capture.

2. *Subsidence*

Subsidence caused by unregulated groundwater withdrawals due to explosive growth in the 1940s, 1950s, and 1960s in the Harris-Galveston County area created the next conflict in which the rule of capture was examined. Extensive groundwater pumping in this highly urbanized area was causing subsidence. Once a direct link between increasing groundwater withdrawals and subsidence had been established, the region recognized the need for limits on the hitherto unlimited right to capture and use groundwater. In 1973, Smith-Southwest Industries and other landowners in Harris County brought a class-action lawsuit against Friendswood Development Company alleging that severe subsidence of their lands was caused by Friendswood's past and continuing withdrawals of vast quantities of groundwater. Friendswood filed third-party actions against other landowners withdrawing groundwater in the area. Ultimately, in *Friendswood Development Co. v. Smith-Southwest Industries, Inc.*, 576 S.W.2d 21 (Tex. 1978), the Texas Supreme Court established a prospective new cause of action limiting the future exercise of the right to capture and use groundwater if negligence in producing water from existing wells is established or if new wells are drilled and produced in a negligent manner.

The supreme court found that the plaintiffs' argument that the absolute ownership rule should not insulate defendants from damages due to nuisance or negligence in the manner by which they made use of their property was, in effect, a contention that the reasonable use doctrine should apply to groundwater. *Friendswood Development Co.*, 576 S.W.2d at 24. After a careful examination of the history and background of the rule of capture in other jurisdictions and in Texas, the court concluded that some aspects of the rule are harsh and outmoded and that the rule had been severely criticized since its reaffirmation by the court in the 1955 *City of Corpus Christi* case, but declined to change the law to apply in the case before it. *Friendswood Development Co.*, 576 S.W.2d at 29.

The court made, however, a very significant ruling: the court created a common-law exception to the unlimited right to use groundwater by recognizing a cause of action for "future" subsidence proximately caused by negligence in the manner in which wells are drilled or produced. The court wrote:

> Therefore, if the landowner's manner of withdrawing ground water from his land is negligent, willfully wasteful, or for the purpose of malicious injury, and such conduct is a proximate cause of the subsidence of the land of others, he will be liable for the consequences of his conduct. The addition of negligence as a ground of recovery shall apply only to future subsidence proximately caused by future withdrawals of ground water from wells which are either produced or drilled in a negligent manner after the date this opinion becomes final.

Friendswood Development Co., 576 S.W.2d at 30. The court also called on the legislature to exercise its proper role in regulating and managing groundwater withdrawals in the state of Texas.

In a dissenting opinion, Justice Pope, joined by Justice Johnson, made a strong argument for recognizing a cause of action for damages caused to the land of another by groundwater withdrawals as distinguished from a claim for damages caused by the loss of the use of the water. The dissent preferred to limit the application of the no-injury rule to claims for damages for loss of water but not claims for damage to the land itself, linking it to an actual trespass. *Friendswood Development Co.*, 576 S.W.2d at 34.

Between the time when the *Friendswood* case was filed and when it was ultimately decided by the supreme court, the region sought legislation creating a district with the power to address groundwater use and limit further damage from subsidence. The legislature responded in 1975 by creating the Harris-Galveston Coastal Subsidence District. See Harris-Galveston Coastal Subsidence District Act, 64th Leg., R.S., ch. 284. See also Chapter 16 of this book, which discusses subsidence districts.

3. *Underground Trespass*

In early 2015, the Texas Supreme Court issued an opinion on a claim of deep subsurface trespass. The suit claimed that the operator of an adjacent wastewater disposal facility allowed deep subsurface wastewater to trespass beneath the landowner-plaintiff's property. After a series of appeals, the supreme court ruled that the landowner take nothing, but "decline[d] the invitation to address the remaining question presented in this appeal—namely, whether deep subsurface wastewater migration is actionable as a common law trespass in Texas." *Environmental Processing Systems, L.C. v. FPL Farming Ltd.*, 457 S.W.3d 414, 416 (Tex. 2015). Affirming the trial court's decision, the supreme court agreed that FPL failed to establish lack of consent, which "is a required element of a trespass cause of action that the plaintiff must prove." *Environmental Processing Systems*, 457 S.W.3d at 426. Any error made by the trial court "in submitting the question of trespass for deep subsurface wastewater migration was harmless because the jury found no such liability, which obviates the need to address whether this is a viable cause of action in Texas." *Environmental Processing Systems*, 457 S.W.3d at 426. The court then reversed the court of appeals' judgment and reinstated the trial court's judgment that FPL take nothing. Although the court declined to address the deep underground trespass theory of recovery, its analysis is illustrative on the issue of such potential liability, implicating, as it does, the plaintiff's vested property rights to groundwater in place.

IV. Nature of the Groundwater Ownership Right

Although the rule of capture has been the law of the state of Texas since 1904 and has been consistently described as a property right incident to ownership, the courts have never been called on to define the exact nature of the right. Beginning with the *East* case, the courts have described it as a real property right but did not clearly define when or if the right is vested. This is particularly important in the context of regulation of the exercise of that right discussed later in this chapter, and the resolution of this issue will continue to have a significant impact into the future. This section summarizes the history of the common law addressing the ownership right and its resolution by the Texas Supreme Court in *Edwards Aquifer Authority v. Day*, as well as the codification of groundwater as a vested property right. Finally, the section introduces unanswered questions resulting from these recent statements of groundwater property law.

A. History

As mentioned above, the *East* case described the nature of ownership of groundwater beneath a person's property as a real property right but did not clearly define when or if the right is vested. In *East*, the Texas Supreme Court, citing New York authority, said:

> An owner of soil may divert percolating water, consume or cut it off, with impunity. It is the same as land, and cannot be distinguished in law from land. So the owner of land is the absolute owner of the soil and of percolating water, which is a part of, and not different from, the soil.

East, 81 S.W. at 281 (quoting *Pixley v. Clark*, 35 N.Y. 520 (1866)).

Nearly half a century later, in *Pecos County*, the court stated:

> It seems clear to us that percolating or diffused and percolating waters belong to the landowner, and may be used by him at his will . . . . These cases seem to hold that the landowner

owns the percolating water under his land and that he can make a non-wasteful use thereof, and such is based on a concept of property ownership.

Pecos County, 271 S.W.2d at 505.

The supreme court in *Friendswood Development Co.* refused to abandon the rule, noting that it had become "an established rule of property law in this State, under which many citizens own land and water rights." *Friendswood Development Co.*, 576 S.W.2d at 29.

In spite of these statements that seem to conclude that groundwater is owned by the landowner, until 2012 the courts were reluctant to delineate the nature of the ownership right embraced by the absolute ownership rule. In *Sipriano v. Great Spring Waters of America, Inc.*, the supreme court deftly avoided a discussion of the nature of the ownership right and instead held that it was inappropriate for the court, given the legislature's efforts to expand the powers of groundwater conservation districts, to insert itself into the regulatory mix by substituting the rule of reasonable use for the rule of capture. *Sipriano*, 1 S.W.3d at 80.

In the one case in which the issue was argued to be directly relevant, *Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (Tex. 1996), the supreme court avoided making a definitive decision on the issue. In *Barshop*, the landowner plaintiffs claimed that the Edwards Aquifer Authority Act violated the Texas Constitution by taking their rights to use Edwards Aquifer groundwater governed by the rule of capture. The plaintiffs claimed that the act deprived the landowner of a vested property right in violation of the constitution. The plaintiffs conceded that the state has the right to regulate the use of groundwater, but maintained that they had a vested property right in the water, which the legislation took away. The state countered that the rule of capture, while an ownership right, was not vested until the water was actually reduced to possession, and no taking occurs by virtue of regulation of use. *Barshop*, 925 S.W.2d at 625. The court held that the act was not unconstitutional on its face, ruling that the plaintiffs had failed to establish that, under all circumstances, the act would deprive landowners of their property rights. Therefore the court did not have to definitively resolve the clash between property rights in water and regulation of water—that is, whether the act, as it might be applied, resulted in an unconstitutional taking.

B. Groundwater Rights Are Part of Real Property

The issue of the nature of the groundwater right has been addressed in two recent decisions in which the courts were confronted with questions of law requiring analysis of the ownership interest in groundwater, and in both decisions the courts concluded that the right was a part of the real property ownership.

In *City of Del Rio v. Clayton Sam Colt Hamilton Trust*, 269 S.W.3d 613, 614 (Tex. App.—San Antonio 2008, pet. denied), the issue before the court was whether a seller's reservation in the conveyance of "all water rights associated with said tract" prevented the buyer from drilling a well and producing groundwater.

Litigation was initiated after the buyer, the city of Del Rio, drilled a water well on the purchased tract. The city argued that the trust's reservation of water rights could not be effective, because under the rule of capture, the corpus of groundwater cannot be owned until it is reduced to possession. 269 S.W.3d at 616. The court reviewed supreme court authority holding that percolating water is part of and not different from the soil, that the landowner is the absolute owner of it, and that it is subject to barter and sales like any other species of property. 269 S.W.3d at 617. The court distinguished the absolute ownership rule from the rule of capture, holding that the rule of capture is a tort rule denying a landowner any judicial remedy and was developed as a doctrine of nonliability for damage, not a rule of property. 269 S.W.3d at 617–18. The court concluded that "under the absolute ownership theory, the Trust was entitled to sever the groundwater from the surface estate by reservation when it conveyed the surface estate to the City of Del Rio." 269 S.W.3d at 617.

The court rejected the city's argument that a specific relinquishment of all right to surface access by the seller rendered the reservation ineffective, since the seller owned adjacent property.

In the second case decided, *Edwards Aquifer Authority v. Day*, 274 S.W.3d 742 (Tex. App.—San Antonio 2008, pet. granted), the court reviewed, among other issues, a summary judgment in favor of the Authority on Day and McDaniel's claim that the operation of the Edwards Aquifer Authority legislation and its decision denying Day and McDaniel's permit application constituted a taking under article I, section 17, of the Texas Constitution.

Under the Edwards Aquifer Authority Act, landowners who had historically used Edwards Aquifer groundwater for irrigation purposes were allowed a minimum permit amount of two acre-feet of production per year, per acre irrigated.

Day and McDaniel, who jointly owned a tract of land located within the Edwards Aquifer Authority jurisdiction that had an Edwards Aquifer well that flowed under artesian pressure, sought a permit from the Authority, based on the following facts. Day and McDaniel irrigated a portion of their property directly from the well. A much larger portion of the property was irrigated from an impoundment on a creek to which the artesian flow had been directed by a ditch constructed by the landowners. The Authority granted Day and McDaniel a permit for fourteen acre-feet of groundwater based on irrigation of land directly from the well but denied the rest of the application based on land irrigated from the impoundment. The Authority determined that the water pumped from the impoundment on the property was surface water and therefore owned by the state and did not constitute historical use of groundwater from the Edwards Aquifer. Day and McDaniel appealed the decision to state district court.

Day and McDaniel claimed error by the Authority. In the alternative, they argued that the actions of the Authority constituted a constitutional taking and an inverse condemnation of their groundwater rights, and sought damages. The Authority interpleaded the state as a third-party defendant seeking contribution and indemnity from the state on the takings claims made by Day and McDaniel.

The district court held that Day and McDaniel were entitled to a permit. The court granted the Authority and state's motions for summary judgment on the constitutional takings claims, finding that the plaintiffs had no vested right to groundwater under their property, and granted a take-nothing summary judgment on all of Day and McDaniel's constitutional claims.

Both parties appealed to the fourth court of appeals. The court agreed with the Authority's conclusion that the water used from the lake was state water and not groundwater and reversed the trial court's judgment granting a permit for acres irrigated with water from the impoundment. The court affirmed the Authority's decision granting plaintiffs a permit only for the seven-acre tract that was irrigated with groundwater directly from the well. The court of appeals also reversed the take-nothing judgment granted on summary pleadings on the takings claim and remanded to the trial court for further proceedings on the constitutional claims. The court concluded that landowners have ownership rights in groundwater, that those rights are vested and are therefore constitutionally protected, and reversed the trial court's grant of summary judgment on these issues. The court held that the landowner's "vested right in the groundwater beneath their property is entitled to constitutional protection." *Day*, 274 S.W.3d at 756.

Both the state and the Authority filed petitions for review of the court of appeals' finding that plaintiffs have a vested and constitutionally protected interest in groundwater beneath their property. Day and McDaniel filed a petition for review claiming error by the court of appeals in denying a permit for acres irrigated with water from the impoundment.

C. The Legislature Intervenes on the Property Rights Issue

With the *Day* case still awaiting a decision from the Texas Supreme Court, the 82nd Legislature passed Senate Bill 332, amending section 36.002 of the Texas Water Code to address the nature of the ownership interest in groundwater beneath a landowner's property. *See* Act of May 27, 2011, 82d Leg., R.S., ch. 1207, § 1, eff. Sept. 1, 2011. Section 36.002, as amended, provides that landowners own the groundwater below the surface as real property, which entitles the landowner to drill for and produce the groundwater below the surface, subject to the common-law limitations against waste, malice, or negligent subsidence and the regulatory authority outlined by the legislature in Water Code chapter 36, particularly new section 36.002(d). The statute also clarifies that ownership does not entitle a landowner to a specific amount of groundwater. *See* Tex. Water Code § 36.002.

Subsection (c) provides that nothing in chapter 36 should be construed as granting the authority to deprive or divest a landowner of the ownership and rights described by section 36.002. *See* Tex. Water Code § 36.002(c). Section 36.002 does not, however, prohibit a district from limiting or prohibiting the drilling of a well not in compliance with district rules for spacing or tract size or affect the ability of a district to regulate groundwater production authorized by chapter 36. *See* Tex. Water Code § 36.002(d). Subsection (d)(3) clarifies that districts are not required to allocate to a landowner a proportionate share of available groundwater based on acreage owned, in effect stating that the ownership right is not a correlative right. *See* Tex. Water Code § 36.002(d)(3).

Subsection (e) then provides that the section does not affect the ability to regulate groundwater as authorized by chapter 626, Acts of the 73rd Legislature, Regular Session 1993 (The Edwards Aquifer Authority Act), chapter 8801, Special District Local Laws Code (The Harris-Galveston Subsidence District), or chapter 8834, Special District Local Laws Code (The Fort Bend Subsidence District). *See* Tex. Water Code § 36.002(e).

During the 2015 legislative session, House Bill 4112 was enacted, adding subsection (b-2) to Water Code section 36.002, which recognizes that the landowner is entitled to "have any other right recognized under common law." Act of May 23, 2015, 84th Leg., R.S., ch. 590, § 1, eff. Sept. 1, 2015. The substantive effect of this law is unclear.

D. Supreme Court Decision in Day

On February 24, 2012, the Texas Supreme Court issued a unanimous opinion in *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012), affirming the court of appeals' decision and confronting and answering for the first time the question of whether a landowner's groundwater rights are a vested real property right protected by the Texas and U.S. Constitutions' prohibitions against uncompensated taking. The opinion, written by Justice Hecht, begins with a succinct summary of the issue presented in the decision:

> We decide in this case whether land ownership includes an interest in groundwater in place that cannot be taken for public use without adequate compensation guaranteed by article I, section 17(a) of the Texas Constitution. We hold that it does.

Day, 369 S.W.3d at 817. The opinion reviews the history of the Edwards Aquifer Authority Act and its key provisions and summarizes the facts leading up to the Authority's decision to deny Day a permit for groundwater use from an impoundment on a watercourse. The court then provided a detailed summary of the history of the rule of capture from its adoption in *East* to the decision in *Sipriano*, finally concluding that ownership of groundwater in place had never been decided by the court. The court noted that while it had never addressed the issue with regard to groundwater, it had done so long ago with respect to oil and gas, to which the rule of capture also applies. The court noted that while ownership of gas in place did not entitle the owner to specific molecules of gas that could be diminished through drainage, with proper diligence they could be replenished or obtained. The court stated that while the molecules are in the ground they constitute a property interest. The court, quoting its previous decisions, noted that the right to the oil and gas beneath a landowner's property is an exclusive and private property right inherent in land ownership, which may not be deprived without a taking of private property. *Day*, 369 S.W.3d at 829.

The supreme court concluded that there was no difference between groundwater and oil and gas with regard to common-law ownership of oil and gas in place and that of groundwater. Specifically, the court relied on *Elliff v. Texon Drilling Co.*, 210 S.W.2d 558, 562–63 (Tex. 1949), regarding the ownership of oil and gas in place:

> In our state the landowner is regarded as having absolute title and severalty to the oil and gas in place beneath his land. The only qualification of that rule of ownership is that it must be considered in connection with the law of capture and is subject to police regulations. The oil and gas beneath the soil are considered a part of the realty. Each owner of land owns separately, distinctly and exclusively all the oil and gas under his land and is accorded the usual remedies against trespassers who appropriate the minerals or destroy their market value.

Day, 369 S.W.3d at 831–32 (quoting *Elliff*, 201 S.W.2d at 561) (internal citations omitted). The court then noted, "We now hold that this correctly states the common law regarding the ownership of groundwater in place." *Day*, 369 S.W.3d at 832. The court cited the legislative revisions to Texas Water Code section 36.002 (described above) as demonstrating the legislature's understanding of the interplay between groundwater ownership and groundwater regulation.

E. Issues for Another Day

Once the court decided that a landowner has an ownership of groundwater in place, it analyzed whether Day had stated a viable takings claim. In so doing, the court rejected the argument that the Authority's regulatory action could be considered a per se taking for Fifth Amendment purposes and instead applied the regulatory takings analysis originally adopted by the U.S. Supreme Court in *Penn Central Transportation Co. v. New York City*, 438 U.S. 104 (1978). In *Penn Central*, the Court identified several factors that have particular significance in determining whether the regulation rises to the level of a taking under the Constitution. Primary among those factors are the economic impact of the regulation on the claimant and the extent to which the regulation has interfered with distinct investment-backed expectations. In addition, the character of the governmental action—in essence an analysis of the reasonableness of the regulation in light of the goals to be achieved and the impacts reasonably expected—must be considered. *Day*, 369 S.W.3d at 839–40.

Because this factual inquiry was not developed in the summary judgment proceeding, the Texas Supreme Court agreed with the fourth court of appeals that summary judgment against Day's taking claim should be reversed and the issue remanded to the trial court. *Day*, 369 S.W.3d at 843.

In addition to takings issues raised by the supreme court's decision in the *Day* case, when describing property rights in underlying groundwater, the court used phrases such as "correlative rights" and "fair share." *See, e.g., Day*, 369 S.W.3d at 830. It also showed an inclination to rely on oil and gas legal principles to define groundwater property rights. Oil and gas case law interpreting these ownership principles is extensive and may become the basis, or at least provide guidance, as courts continue to refine groundwater ownership rights, although some commentators believe that such reliance is inapposite. *See* Marty Jones, *Correlative Rights: Meaning and Implications*, and Edmond R. McCarthy, Jr., *Groundwater and Oil and Gas Doctrines*, CLE International Conference on Texas Water Law, Austin (2015). *See also City of Lubbock v. Coyote Lake Ranch, LLC*, 440 S.W.3d 267 (Tex. App.—Amarillo 2014, pet. filed) (oil and gas "accommodation doctrine" inapplicable to groundwater estate).

V. Legislative Regulation of Groundwater

The concept that the legislature has the authority to regulate the exercise of the rule of capture rights of landowners is based on the Conservation Amendment to the Texas Constitution adopted in 1917. Section 59(a) requires the state to engage in the preservation and conservation of all natural resources of the state and specifically authorizes the legislature to pass laws that may be appropriate. *See* Tex. Const. art. XVI, § 59(a). The Conservation Amendment makes water regulation a legislative function, recognizing that preserving and conserving natural resources are public rights and duties. Despite this clear authority, the Texas legislature did not authorize the creation of local districts, groundwater conservation districts, or underground water conservation districts until 1949 (Act of June 2, 1949, 51st Leg., R.S., ch. 306 (codified at Tex. Rev. Civ. Stat. art. 7880-3c), *repealed by* Act of Apr. 12, 1971, 62d Leg., R.S., ch. 58, § 2) and did not actually form a groundwater conservation district until the creation of High Plains Underground Water Conservation District No. 1 in 1951. The original legislation authorized a petition process for creation of a groundwater conservation district subject to a confirmation election.

The state has described groundwater conservation districts as the state's preferred method of regulating production of groundwater. *See* Tex. Water Code § 36.0015. There are currently ninety-seven functional groundwater conservation districts, with three awaiting confirmation. *See* Texas Water Development Board, *Groundwater Conservation Districts of Texas*, *available at* www.twdb.texas.gov/mapping/doc/maps/GCDs_8x11.pdf; see also Plate 2. Two new groundwater conservation districts were created during the 84th legislative session. *See* House Bill 2407, Act of May 26, 2015, 84th Leg., R.S., ch. 656, eff. Sept. 1, 2015 (Comal Trinity Groundwater Conservation District); House Bill 4207, Act of May 26, 2015, 84th Leg., R.S., ch. 671, eff. Sept. 1, 2015 (Aransas County Groundwater Conservation District).

A. Groundwater Conservation Districts

In 1995 the Texas legislature consolidated all groundwater conservation district law into chapter 36 of the Texas Water Code. Chapter 36 provides for creation of groundwater conservation districts (subchapter B), their means of governance (subchapter C), and their powers and duties (subchapter D). In 1995 the Texas legislature consolidated all groundwater conservation district law into chapter 36. Act of May 25, 1995, 74th Leg., R.S., ch. 715. Groundwater conservation districts are to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater and of groundwater reservoirs or their subdivisions and are to control subsidence. Tex. Water Code § 36.0015. *But see* Tex. Spec. Dist. Code §§ 8801.002, 8801.102; Act of June 16, 1989, 71st Leg., R.S., ch. 1045, *as amended by* Act of May 13, 2005, 79th Leg., R.S., ch. 238, codified at Tex. Spec. Dist. Code ch. 8834 (eff. Apr. 1, 2011) (establishing that existing subsidence districts are no longer subject to chapter 36). See Chapter 16 of this book for a discussion of groundwater conservation districts.

1. Groundwater Conservation District Creation

Groundwater conservation districts can be created in one of three ways. First, groundwater conservation districts can and often are established through the action of the legislature. Typical legislation outlines a district's powers, usually including all chapter 36 powers and any additional powers the legislature chooses to describe, and establishes a procedure for confirmation of the district and for board membership. In recent years, many legislatively created districts have excluded (1) the exercise of eminent domain and (2) assessment of ad valorem taxes from the districts' powers. *See* Act of May 19, 2009, 81st Leg., R.S., ch. 248. The vast majority of groundwater conservation districts have been established through the action of the legislature. Second, a groundwater conservation district can be created by landowners through a petition procedure outlined in subchapter B of chapter 36. The landowner petition is filed with the Texas Commission on Environmental Quality (TCEQ), which must find that the boundaries of the proposed groundwater conservation district provide for effective management of the groundwater resources and determine whether the proposed groundwater conservation district can be adequately funded to carry out its purposes. *See* Tex. Water Code § 36.013. Upon certification by the TCEQ, temporary directors are named and an election is held on whether to confirm the district. Tex. Water Code §§ 36.015–.021. Third, a groundwater conservation district can be created by the TCEQ on its own motion. This action is limited to areas within a priority groundwater management area that have failed, through local actions, to create a groundwater conservation district or become part of an existing district within two years after the date of designation. *See* Tex. Water Code § 36.0151. In addition to creating a new groundwater conservation district, landowners in an area can petition a groundwater conservation district individually, as a group, or as an entire county, to be annexed into an existing groundwater conservation district. *See* Tex. Water Code §§ 36.321–.331.

2. *Groundwater Conservation District General Powers*

Groundwater conservation districts typically are empowered to prevent waste and manage the groundwater resources by requiring permits for water wells, developing comprehensive management plans, and adopting rules that regulate production based on the authority contained in chapter 36 and the district's adopted management plan. The groundwater conservation district can require that all wells, with certain exceptions, be registered and permitted. Wells that require permits are subject to groundwater conservation district rules establishing minimum spacing requirements, drilling, equipping, completion and alteration requirements, and production limits. Districts are required to exempt from permitting requirements wells used solely for domestic use or for providing water for livestock, if they are incapable of producing more than 25,000 gallons per day, they are not located in a subdivision requiring platting, and the property is at least ten acres. Districts, however, may require registration of these wells. Wells used solely to supply water for a rig actively engaged in drilling or exploration operations for an oil and gas well permitted by the Railroad Commission are exempt from the permitting requirements of the district but are required to be registered by the district and may be required to comply with the district's production or spacing limits. Water wells necessary for mining activities authorized by a permit issued by the Railroad Commission are exempt from permitting requirements and spacing requirements but must be registered with the district. An extensive discussion of groundwater district powers, procedures, and authorities is found in Chapter 16 of this book.

3. *Evolution of Groundwater Conservation District Authority*

Before 1995, groundwater conservation districts in Texas had permitting authority as well as the authority to limit production by adopting rules setting spacing requirements, although this authority was not well defined. Amendments to chapter 36 enacted in 1995 added authority to regulate by setting production limits on wells and by limiting the amount of water produced based on acreage or tract size. Act of May 29, 1995, 74th Leg., R.S., ch. 933, § 2, sec. 36.116. Groundwater conservation districts were also required by the legislature to adopt a management plan addressing specific management goals outlined by the legislature. Act of May 29, 1995, 74th Leg., R.S., ch. 933, § 2, sec. 36.107. See Chapters 16 and 21 of this book for a discussion of groundwater conservation district management plans. In 1997, S.B. 1 (Act of June 1, 1997, 75th Leg., R.S., ch. 1010) revised these sections and added Texas Water Code section 36.122, authorizing groundwater conservation districts to require permits for transfer of groundwater outside of their district boundaries and granting the specific authority to prohibit such transfers. During the 1999 legislative session, more than twenty-two areas sought formation of groundwater conservation districts in an effort to prevent out-of-area transfers of groundwater. Ultimately, thirteen temporary groundwater conservation districts were created during that session. Act of May 26, 1999, 76th Leg., R.S., ch. 1331.

In recognition of the need to balance the powers of groundwater conservation districts with the needs of the state in the regional water planning efforts authorized in S.B. 1, the legislature enacted S.B. 2 in 2001. Act of May 27, 2001, 77th Leg., R.S., ch. 966. S.B. 2 substantially rewrote Texas Water Code sections 36.113, 36.116, and 36.122, as well as addressed changes related to state water planning efforts and the designation of groundwater management areas. The legislature authorized districts, for the first time, to impose more restrictive permit conditions on applications for new permits and for amendments to increase use authorized by existing permits. Under amended Water Code section 36.113, this was allowed if the limitations applied to all subsequent applications for new permits and amendments and were necessary to protect existing use. *See* Tex. Water Code § 36.113(e). Districts were thus free to set new, more restrictive limitations in the future if they were applied fairly to all new and increased use.

S.B. 2 amended section 36.116 to more clearly delineate the authority of groundwater conservation districts to regulate spacing and production through a variety of mechanisms. *See* Tex. Water Code § 36.116(a). Subsection (b) was added and provided that districts may preserve historic or existing use before the effective date of rules limiting groundwater production to the extent practicable and consistent with the district's comprehensive management plan. *See* Tex. Water Code § 36.116(b). This section provides no guidance or criteria for determining to what extent and how the district may accomplish this preservation. (Some clarification was provided in 2005 with the passage of House Bill 1763, which added the definition of evidence of historic or existing uses, establishing that a district may determine "the relevant time period" for determining eligibility for protection as an existing or historic user. Act of May 30, 2005, 79th Leg., R.S., ch. 970, § 2 (codified at Tex. Water Code § 36.001(29)).) Section 36.116(c) grants districts permissive authority to consider the service area of a retail public utility in setting production limits. *See* Tex. Water Code § 36.116(c).

S.B. 2 amended section 36.122 to eliminate the power of groundwater districts to prohibit transfers outside district boundaries. Indeed, S.B. 2 amendments prohibited a district from preventing transfers or from imposing more restrictive permit conditions on transporters than imposed on in-district users. A groundwater conservation district may still require a permit for the transport of water outside the district and impose an additional fee for exported water. To the extent a groundwater conservation district restricts production for any new application, including for transfer, compliance with section 36.113 imposing those restrictions on all new permit applicants would apply. A more thorough discussion of all provisions of Water Code chapter 36 can be found in Chapter 16 of this book. See also Chapter 18 for further discussion of section 36.122. Other legislation adopted in 2005 attempted to interject science-based determinations of water available for production by outlining a process by which science could be applied aquifer wide. The legislation established a groundwater management area joint planning process to establish desired future conditions and managed available groundwater. *See* Act of May 30, 2005, 79th Leg., R.S., ch. 970. This process has continued to evolve, with substantial changes made in Act of Apr. 14, 2011, 82d Leg., R.S., ch. 18, eff. Sept. 1, 2011, and Act of May 29, 2011, 82d Leg., R.S., ch. 1233, eff. Sept. 1, 2011. Minor changes to the process were made in 2013 and 2015. *See* Act of May 20, 2013, 83d Leg., R.S., ch. 785, eff Sept. 1, 2013. *See* Chapter 21 of this book for a detailed discussion of groundwater management area joint planning.

B. Subsidence Districts

Explosive growth and massive groundwater use in Harris and Galveston counties caused substantial subsidence. Not only did this prompt the Texas Supreme Court in *Friendswood Development Co. v. Smith-Southwest Industries Inc.* (discussed at section III.B.2 above) to adopt an exception to the rule of capture for negligent pumping causing subsidence, but it also prompted the legislature to create the Harris-Galveston Coastal Subsidence District (now the Harris-Galveston Subsidence District). *See* Harris-Galveston Coastal Subsidence District Act, 64th Leg., R.S., ch. 284, §§ 1–49, codified at Tex. Spec. Dist. Code §§ 8801.002, 8801.102. Unlike all previous groundwater conservation districts, the Harris-Galveston Subsidence District's enabling legislation granted the district unique regulatory powers, including the power to assess disincentive user fees for groundwater use, to thereby limit groundwater production and prevent subsidence and consequent potential flooding in the two Gulf Coast counties. The Act did not require a confirmation election, nor did it provide for a property tax. Instead, the district was authorized to require permits for all groundwater well owners (other than exempt wells) and to condition use permits for those wells on meeting certain conditions and on the payment of a fee based on the amount of water to be withdrawn. Regulation was to be accomplished by a combination of limits on the percentage of total water use from groundwater in decreasing increments in the future and the ability to assess regulatory fees. The overall purpose was intended to limit the total amount of groundwater used by water users in the two counties. See also Chapter 16 of this book.

Landowners challenged the Act, complaining that it was unconstitutional, that the district's action in levying a permit fee constituted an impermissible tax, and that the Act violated their equal protection and due-process constitutional rights. *Beckendorff v. Harris-Galveston Coastal Subsidence District*, 558 S.W.2d 75 (Tex. Civ. App.—Houston [14th Dist.] 1977), *writ ref'd n.r.e.*, 563 S.W.2d 239 (Tex. 1978). The court, in affirming the district court's judgment, rejected the landowners' claims that the Conservation Amendment did not authorize the creation of a district for the purpose of controlling subsidence. The court found that the Act's purpose was to control subsidence so as to control flooding and inundation. *Beckendorff*, 558 S.W.2d at 78. Because control of flooding was prominently set out in the Conservation Amendment, the court found express authorization for the Act. *Beckendorff*, 558 S.W.2d at 78.

The landowners also challenged the district's permit fees, arguing that they were not authorized by the Conservation Amendment and were not regulatory measures, but instead were taxes and therefore unconstitutional. The court held that the overall purpose of the Act was undeniably regulatory and that the Act was passed and the district created for the purpose of regulating groundwater withdrawals. *Beckendorff*, 558 S.W.2d at 80. The court found that the district could achieve this regulation by conditioning the issuance of permits on payment of a fee based on the amount of water to be withdrawn during the term of the permit. *Beckendorff*, 558 S.W.2d at 80. The court concluded that the fees were intended to operate as an economic disincentive to groundwater withdrawal and were therefore regulatory in nature and not a tax. *Beckendorff*, 558 S.W.2d at 80.

The court also was not persuaded by equal protection and due-process claims of the landowners, which validated the Act even though areas outside the district contributed to subsidence but were unregulated. The court held: "[W]e see no constitutional requirement that the subsidence district extend beyond Harris and Galveston Counties, even though legitimate objects of regulation exist outside them." *Beckendorff*, 558 S.W.2d at 81.

Although recent legislation made Texas Water Code chapter 36 inapplicable to the subsidence districts (*see, e.g.*, Act of May 13, 2005, 79th Leg., R.S., ch. 238, § 7, sec. 8801.102), the *Beckendorff* decision has broader importance in light of recent amendments to chapter 36. Chapter 36 now authorizes districts to assess user or permit fees as a revenue source in addition to or as an alternative to relying on tax revenue. Chapter 36 also authorizes much higher fees for municipal and industrial users as compared with agricultural users. *See* Tex. Water Code § 36.205. These authorizations seem less designed to be regulatory measures and clearly are intended to generate revenue for operations, thus raising the question of the applicability of the *Beckendorff* decision. See also Chapter 16 of this book.

C. Edwards Aquifer Authority

The Edwards Aquifer in south central Texas became the focal point of groundwater disputes in the late 1980s and early 1990s. Substantial population growth in the region and increased demand from irrigated agriculture had combined to more than double groundwater production from the Edwards Aquifer from 1950s' levels. New Braunfels and San Marcos depended on spring flow from the Edwards Aquifer springs to sustain their cities' economies, and residents on the Guadalupe River downstream of the springs depended on river water, a substantial portion of which originated at the springs. Not only were these residents dependent on these spring flows for their water supply, but endangered species listed under the Federal Endangered Species Act of 1973 (16 U.S.C. §§ 1532–1544) lived in both San Marcos Springs and Comal Springs and their habitat was dependent on spring flows. Knowledge that Comal Springs had ceased flowing for six months during the drought of the 1950s prompted concern that the ever-increasing pumping could have substantial adverse impacts on the springs and spring flow interests. *See City of San Antonio v. Texas Water Commission*, 392 S.W.2d 200, 210 (Tex. Civ. App.—Austin 1965), *aff'd*, 407 S.W.2d 752 (Tex. 1966) (noting that the dependability of the natural flows of the Guadalupe River had been "destroyed" because of increased pumping in the San Antonio region causing decreased spring flows). See also Chapter 17 of this book.

The inability of the region to agree on legislation that would empower the existing Edwards Underground Water Conservation District to implement a drought management plan resulted in litigation in both state and federal court, seeking to impose limits on groundwater usage from the Edwards Aquifer. In 1991, the Sierra Club commenced its first aquifer-related litigation and brought *Sierra Club v. Lujan*, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex. Feb. 1, 1993), *appeal dism'd*, *Sierra Club v. Babbitt*, 995 F.2d 571 (5th Cir. 1993). In 1992, the Texas Water Commission, in an effort to avoid federal court management of the aquifer, adopted rules to declare the aquifer an "underground river" and "state water" subject to state regulation. 17 Tex. Reg. 6601 (Sept. 25, 1992). However, these rules were short lived. In December 1992, a Travis County district judge declared the TCEQ underground river rules void and of no force and effect. *See McFadin v. Texas Water Commission*, No. 92-05214 (331st Dist. Ct., Travis County, Tex. 1992), *appeal dism'd by agreement*.

The Endangered Species Act litigation resulted in a judgment adverse to the U.S. Fish and Wildlife Service, directing the agency to advise the region on the amount of spring flow required from Comal Springs and San Marcos Springs to prevent violations of the federal law. The court also ordered the State of Texas to take legislative action to provide for limitations on groundwater usage from the Edwards Aquifer and to implement appropriate management of the Edwards Aquifer to protect endangered species or risk further orders of the court. *See Sierra Club v. Babbitt*, 995 F.2d 571 (5th Cir. 1993). The Texas legislature responded by passing enabling legislation creating a new Edwards Aquifer Authority with specific statutory authority to regulate and limit groundwater production from the Edwards Aquifer. Act of May 30, 1993, 73d Leg., R.S., ch. 626, *as amended by* Act of May 16, 1995, 74th Leg., R.S., ch. 524; Act of May 29, 1995, 74th Leg., R.S., ch. 261; Act of May 6, 1999, 76th Leg., R.S., ch. 163; Act of May 23, 2001, 77th Leg., R.S., ch. 1192; Act of May 28, 2001, 77th Leg., R.S., ch. 966, §§ 2.60–.62, 6.01–.05; Act of June 1, 2003, 78th Leg., R.S., ch. 1112, § 6.01(4); Act of May 23, 2007, 80th Leg., R.S., ch. 510; Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.01–.12; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.01–.12 (EAA Act). This legislation was challenged as unconstitutional by the Medina County Underground Water Conservation District and initially found unconstitutional by a Medina County state district judge, as discussed below.

The Edwards Aquifer Authority Act established a new Edwards Aquifer Authority and imposed an aquifer-wide limit on total annual permitted withdrawals of 450,000 acre-feet of water per year. EAA Act § 1.14(b), *repealed by* Act of May 28, 2007, 80th Leg., R.S., ch. 1351, § 2.09; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.01–.12. Utilities, industries, irrigation farmers, and other existing users were given the first and (as it turned out) only right to obtain authorization to use the available amount of water. EAA Act § 1.19. Various plaintiffs filed suit to enjoin the Act's implementation, alleging that provisions of the Act limiting groundwater withdrawals violated the Texas Constitution, primarily by "taking" the plaintiff's property rights without compensation. The Texas Supreme Court reversed a trial court judgment declaring the Act unconstitutional and dissolved the trial court's injunction preventing the Act's implementation. *Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (Tex. 1996). As stated by the court:

> This case concerns water rights in Texas. The clash between the property rights of landowners in the water beneath their land and the right of the State to regulate water for the benefit of all is more than a century old. This case presents another chapter in this ongoing battle.

Barshop, 925 S.W.2d at 623. The court noted that the plaintiffs challenging the Act relied on *East* and subsequent holdings recognizing the landowners' significant rights to the water under their land, whereas the state relied on opinions "which have long recognized the necessity of legislation that conserves and preserves our limited water resources." *Barshop*, 925 S.W.2d at 626.

Having presented the conflict, the court then deftly avoided answering fundamental questions concerning the nature and extent of vested property rights in groundwater and instead focused on the nature of the plaintiffs' facial challenge to the constitutionality of the Act:

> While our prior decisions recognize both the property ownership rights of landowners in underground water and the need for legislative regulation of water, we have not previously considered the point at which water regulation unconstitutionally invades the property rights of landowners. The issue of when a particular regulation becomes an invasion of property rights in underground water is complex and multi-faceted. The problem is further complicated in this case because Plaintiffs have brought this challenge to the Act before the Authority has even had an opportunity to begin regulating the aquifer.
>
> Despite these problems and competing interests, this case involves only a facial challenge to the Act. Because Plaintiffs have not established that the Act is unconstitutional on its face, it is not necessary to the disposition of this case to definitively resolve the clash between property rights in water and regulation of water. Instead, our focus will be on the issues which control the resolution of this case.

Barshop, 925 S.W.2d at 626. The court then addressed the narrow issues raised by the plaintiffs' facial challenge to the legislation. After rejecting the plaintiffs' notice and per se takings claims, the court reviewed the provisions of the Act that severely limit or extinguish the rights of landowners that had not made use of Edwards Aquifer water before May 1993. *Barshop*, 925 S.W.2d at 630. The court relied on provisions of the Act that require compensation for any taking caused by the Act to conclude that, since compensation must be provided, no prohibited constitutional taking has occurred.

Finally, the court found no merit in the plaintiffs' equal protection, due-process, and retroactive law claims in upholding the legislation. The court concluded that the public safety and welfare basis for the Act justified the retroactive provisions and that regulations dealing with physical things such as land or natural resources could have incidental effects on contracts if the power was exercised in the interest of the public welfare. *Barshop*, 925 S.W.2d at 634.

Both *Beckendorff* and *Barshop* required the court to examine specific and unique grants of legislative authority to newly created groundwater districts with substantial regulatory powers not found in the general chapter 36 provisions applicable to most groundwater districts in Texas. Although the holdings clearly recognize the power of the legislature to authorize groundwater districts to regulate groundwater use, the two districts are unique. Without aggressive regulation of groundwater withdrawals, the areas faced massive problems from subsidence or from enforcement of the Endangered Species Act. Because such conditions do not exist in most areas of the state and because most groundwater conservation district enabling legislation differs markedly from the legislation creating the subsidence districts and the Edwards Aquifer Authority, these decisions are distinguishable in litigation involving the exercise of power by general chapter 36 districts.

VI. Conclusion

The common-law rule of capture established in the *East* case has been the law for more than a hundred years. Periodically, the courts have reaffirmed the concept, consistently describing it as a property right incident to ownership. Meanwhile, the legislature has increased regulation of the state's groundwater resources, including limits on groundwater withdrawals. The legislature and the Texas Supreme Court have confirmed that the right to groundwater beneath one's property is a vested real property right. One new frontier in groundwater law will be the extent to which statutory groundwater conservation districts can regulate production of groundwater without effecting a compensable governmental taking. A second is expected to be new regulatory concepts to address the heightened interest in developing the state's brackish groundwater resources for desalination. Another evolving groundwater issue is to what extent the common law of oil and gas will be applied to groundwater.

CHAPTER 5

Conjunctive Management and Use of Surface Water and Groundwater Resources

Ronald Kaiser[1]

Texas faces some daunting challenges in the management of its water resources. Population growth, increasing urban and environmental water demands, limited surface supplies, and, in growth corridors, tensions over groundwater transfers contribute to increasing difficulty in managing the state's water resources. Statewide, groundwater provides about 60 percent of the water used on an annual basis, whereas surface water provides about 40 percent. *See* Texas Water Development Board, *Water for Texas 2012* 163 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.state.tx.us/waterplanning/swp/2012/. About 80 percent of the state's annual groundwater usage is for agriculture, while about two-thirds of the state's surface water is used for municipal and industrial purposes. These numbers can be deceiving, as groundwater is also a major water supply for municipal and industrial users in many areas of the state. As Texas continues to grow, the amount of surface water and groundwater used by different sectors of the economy will shift from agricultural irrigation to municipal and industrial purposes. Planners believe that by the middle of this century cities and industry will use more water than agriculture. *See* 2012 State Water Plan, at 178.

To address new and shifting demands, water planning must evolve from a central theme of reservoir development to an expanded list of options. The 2012 State Water Plan still proposes new reservoirs, but it contains an expanded portfolio of options, called strategies, which include desalination, interbasin transfers, water marketing, reusing treated effluent, conservation, aquifer storage and recovery (ASR), brush control, and conjunctive use of surface water and groundwater resources. *See* 2012 State Water Plan, ch. 7, Water Management Stategies, at 187–98. Conjunctive management and use of hydrologically connected surface water and groundwater is an issue that will receive greater attention as a result of population growth and the need for more water to sustain this growth.

The relationship between surface water and groundwater is a central part of the natural hydrologic cycle. Groundwater pumping that lowers the water table can deplete surface streams, while stream diversions can affect groundwater recharge. As outlined in Chapter 1 of this book, streams gain from groundwater discharges and lose from outflows into aquifers. Many streams gain in some reaches and lose in others. For example, the Edwards Aquifer contributes to surface flows in the Comal, Guadalupe, San Antonio, and San Marcos Rivers through numerous springs and seeps. *See* Edwards Aquifer Authority Act § 1.06(a). (See Chapter 17 of this book for discussion of the EAA Act.) Stretches of the Brazos River are also linked to its alluvial aquifer. *See* Ali H. Chowdhury et al., Texas Water Development Board, *Groundwater–Surface Water Interaction in the Brazos River Basin:*

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Evidence from Lake Connection History and Chemical and Isotopic Compositions (2010), *available at* www.twdb.state.tx.us/publications/reports/numbered_reports/doc/R375_BrazosOxbows.pdf. This connectivity has been observed in the Fort Stockton area, where groundwater pumping reduced spring flow, resulting in decreased surface water flows. *See Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.).

Hydrologic and legal concepts often conflict, especially where there is a coexistence of independent surface water and groundwater law doctrines and institutions. Water laws and institutions that do not account for these interactions will result in short- and long-range hydrologic system imbalances. Conjunctive management reflects these realities in planning, appropriations, and dispute resolution rules. Nevertheless, with the exception of the river underflow (Tex. Water Code § 11.021), Texas law is predicated on the notion that surface and groundwater are not connected, resulting in separate regulatory systems. As more fully described in Chapters 3 through 9 of this book, Texas regulates surface water based on prior appropriation and groundwater under the rule of capture and through local groundwater conservation districts.

This chapter describes the principles of conjunctive management and lessons to be gleaned from practices in western states. It reviews Texas water law related to conjunctive management, especially as it relates to the underflow of a river, and concludes with some Texas examples of conjunctive use and portfolio management by water suppliers.

I. Conjunctive Management and Conjunctive Use

Although the terms are used interchangeably, there are important distinctions between conjunctive management and conjunctive use. Conjunctive management refers to the administration of surface water and groundwater resources in an integrated water rights system. This may occur on a statewide, regional, basin, or aquifer level. The ultimate goal of conjunctive management is to improve water availability and reliability. It is also a means to reduce exposure to drought, protect water quality, protect springs and groundwater resources from overexploitation, protect aquatic life and habitat, and reduce reliance on costly dams and reservoirs. In meeting these purposes, conjunctive management can improve administrative and economic efficiency by reducing the costs associated with water allocation. *See generally* U.S. Advisory Commission on Intergovernmental Relations, *Coordinating Water Resources in the Federal System: The Groundwater–Surface Water Connection* (1990); President's Water Resource Policy Commission, *A Water Policy for the American People* (1950).

Conjunctive use is defined as "the combined use of surface and groundwater that optimizes the beneficial characteristics of each source." 2012 State Water Plan, at 247; *see also* Tex. Water Code § 36.001(21). Conjunctive use is not a legal concept per se, but rather a water management tool. An example of conjunctive use is when water providers use surface water as their primary supply and groundwater to meet peak demands or to supplement supply during drought. *See* Texas Water Development Board, 2 *Water for Texas 2007* 270–71 (2007) [hereinafter 2007 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2007/. Conjunctive use may also extend to encouraging recharge by allowing water to percolate into the aquifer through constructed basins or through well injection in ASR systems.

II. Conjunctive Management in Western States

Conjunctive management is not a new idea. As early as the 1920s, Samuel Weil proposed that California unify the state's two sets of legal rules for surface water and groundwater into an integrated regulatory regime. *See* Samuel Wiel, *Need for Unified Law for Surface and Underground Water*, 2 S. Cal. L. Rev. 358 (1929). The California drought of 2014–15 is revealing some of the managerial consequences of having separate surface water and groundwater management systems. Four decades ago, the National Water Commission called for integrated management of surface water and groundwater. *See* National Water Commission, *Water Policies for the Future* 232 (1973). Other commentators have continued with calls for integration. *See generally* Charles Wilkinson, *Western Water Law in Transition*, 56 U. Colo. L. Rev. 317, 321–22 (1985); Frank Trelease, *Conjunctive Use of Groundwater and Surface Water*, 27B Rocky Mtn. Min. L. Inst. 1853 (1982). However, moving from a bifurcated surface water and groundwater management system to conjunctive management is difficult given Texas's legal history of separate systems, reluctance of stakeholders in acceptance of data, models demonstrating the relationship between pumping and stream flows, and political reluctance to change the status quo.

History has demonstrated that, absent a devastating drought or serious demand-supply imbalances, Texas legislators, jurists, planners, and stakeholders are reluctant to change the status quo. The state has generally taken an evolutionary, incremental approach in changing its water laws and institutions. Improving conjunctive management while working with an imperfectly integrated legal and institutional system is both a challenge and an opportunity for Texas. Lessons from western states can inform Texas policymakers when considering incorporating conjunctive planning and management concepts into law and regulation. An analysis of conjunctive management practice indicates that two basic regulatory and management patterns can be found in western states.

A. States with Separate Regulatory Agencies and Legal Regimes

California, Nebraska, and Texas are examples of states with separate regulatory agencies and legal surface water and groundwater regimes. These three states regulate surface water through a state regulatory agency based on prior appropriation principles, but they have established local entities to manage groundwater. These local entities have adopted varying appropriation rules, including reasonable use, correlative rights, preferred uses, historic use, and prior appropriation.

California appropriates and manages surface water at the state level based on prior appropriation and appropriates and manages groundwater at the local level. In 2014, the California legislature reaffirmed local groundwater management by passing the Sustainable Groundwater Management Act, with a central feature that groundwater management is best accomplished locally. For a description of the practical realities of the Act, see California Groundwater, *Sustainable Groundwater Management*, www.water.ca.gov/groundwater/sgm/index.cfm. Local agencies will be required to adopt groundwater management plans tailored to meet the needs of local communities. *See* California Department of Water Resources, *Groundwater Information Center*, www.water.ca.gov/groundwater/groundwater_management/legislation.cfm. For information on groundwater use, *see* California Department of Water Resources, *Bulletin 118* (2003), *available at* www.water.ca.gov/groundwater/bulletin118/index.cfm.

Nebraska bifurcates regulations and agencies by applying prior appropriation to surface water and correlative rights to groundwater. Surface water is regulated by the Nebraska Department of Natural Resources based on prior appropriation (*see* Neb. Rev. Stat. § 46–226), and groundwater by twenty-three Natural Resource Districts based on correlative rights (*see* Neb. Rev. Stat. §§ 46-701 to -752). Under correlative rights, those using groundwater for the same purpose are entitled to share the available supply during shortages. In a case involving groundwater pumping that affected river flow, the Nebraska Supreme Court applied the reasonableness standards of *Restatement (Second) of Torts* § 858 (1979) to resolve the conflict. *See Spear T Ranch, Inc. v. Knaub*, 691 N.W.2d 116 (Neb. 2005). This approach makes the groundwater user liable if the withdrawal has a direct and substantial effect on river flow and unreasonably causes harm to the surface user. *Spear T Ranch*, 691 N.W.2d at 132.

The court emphasized that the *Restatement* test is flexible and that a trial court should consider any of these factors it deems relevant. *Spear T Ranch*, 691 N.W.2d at 132. For a discussion on the importance of *Spear T Ranch* in protecting streamflow from groundwater pumpers, see J. David Aiken, *Hydrologically Connected Groundwater, Section 858, and the* Spear T Ranch *Decision*, 84 Neb. L. Rev. 962 (2006).

Soon after *Spear T Ranch*, a Michigan appellate court also applied *Restatement (Second) of Torts* § 858 to reduce groundwater pumping at a proposed bottling plant to protect surface water flow in the Dead Stream Swamp. *See Michigan Citizens for Water Conservation v. Nestle Waters North America Inc.*, 709 N.W.2d 174 (Mich. App. 2005), *rev'd in part on other grounds*, 737 N.W.2d 447 (Mich. 2007).

B. Conjunctive Management States

Unlike California, Nebraska, and Texas, most western states have an integrated administrative structure and legal doctrine for surface water and groundwater, managing both based on prior appropriation principles. During periods of shortage, or when groundwater pumping affects surface water flows and rights, seniority determines water allocation. Because most surface rights were established long before groundwater withdrawals, surface water rights generally receive priority.

A few states allow for input by local aquifer advisory districts, including Colorado and Kansas. Colo. Rev. Stat. §§ 37-90-118 to -135; Kan. Stat. Ann. §§ 10-82a-1022 to -1040. However, these districts must have their rules approved by their state water agency.

1. Colorado

With few exceptions, Colorado treats its groundwater as tributary to a stream. Except for groundwater located in the Ogallala Aquifer, the Denver Basin, and a few other small aquifers where a different appropriation rule applies (*see* Colo. Rev. Stat. §§ 37-90-101 to -143), a legal presumption exists that all groundwater is tributary. In these exceptional basins different rules apply to the rate of aquifer withdrawal.

Groundwater is presumed to be tributary to a stream subject to prior appropriation adjudication and administration. A party seeking to rebut the presumption bears the burden of proof to establish that the groundwater is not tributary. *See Well Augmentation Subdistrict of Central Colorado Water Conservancy District v. City of Aurora*, 221 P.3d 399, 414 (Colo. 2009); *Safranek v. Town of Limon*, 228 P.2d 975 (Colo. 1951). Accordingly, groundwater withdrawals that interfere with senior surface water rights may be enjoined. *See, e.g., Simpson v. Cotton Creek Circles, LLC*, 181 P.3d 252 (Colo. 2008).

Tributary water is any groundwater connected to the stream that influences the rate of direction of that stream flow. *See* Colo. Rev. Stat. § 37-92-103(11). Tributary groundwater is numerically defined as water the withdrawal of which will, within one hundred years, deplete the flow of a natural stream at a rate greater than 0.1 percent at the annual rate of withdrawal. *See* Colo. Rev. Stat. § 37-90-103(10.7). Thus, a well is treated in the same manner as a surface diversion. Since most of Colorado's surface water was allocated much earlier than groundwater, most wells are junior to surface water rights and need an augmentation or offset plan to be permitted. *See* Colorado Department of Natural Resources, *Guide to Colorado Well Permits, Water Rights, and Water Administration* (2012), *available at* http://water.state.co.us/DWRIPub/Documents/wellpermitguide.pdf.

A novel approach, crafted by landowners in the San Luis Valley of south-central Colorado, protects surface water rights holders from groundwater pumping. Water in the valley is used for irrigation, and surface streams were fully appropriated by the early 1900s. Water well development and pumping began in the late 1940s and increased through the 1960s. In 1972, the state engineer issued a moratorium on new well permits in the valley. Fearing further state pumping restrictions, landowners developed an incentive plan to retire up to 40,000 irrigated acres to protect senior surface water rights holders. This plan was upheld in *San Antonio, Los Pinos & Conejos River Acequia Preservation Ass'n v. Special Improvement District No. 1 of Rio Grande Water Conservation District*, 270 P.3d 927 (Colo. 2011), in which the Colorado Supreme Court concurred with the local plan to protect Rio Grande river surface water rights. The court cautioned that if this local approach does not protect senior water rights holders, the state engineer must curtail groundwater withdrawals to prevent material injury to the senior holders. 270 P.3d at 948.

2. Idaho

Prior appropriation governs the use of both surface water and groundwater in Idaho. *See* Idaho Code §§ 42-103, 42-229. Appropriation requests are filed with the Idaho Department of Water Resources, and rights are assigned through state-issued permits. The department has statewide rules governing the conjunctive management of surface water and groundwater, including enforcement of priority against junior groundwater appropriators. *See* Idaho Admin. Code r. 37.03.11.20.03 (2015).

In the 1980s, Idaho began the adjudication of surface water and groundwater rights on the Snake River. The Snake River Basin Adjudication (SRBA) was a statutorily created lawsuit to inventory all surface water and groundwater rights in the stream system. A special court system was established to manage the case. *See* Snake River Basin Adjudication, *Background Information on the Snake River Basin Adjudication*, http://srba.idaho.gov/doc/broch1.htm#SEC1. In *Clear Springs Foods Inc. v. Spackman*, 252 P.3d 71 (Idaho 2011), the Idaho Supreme Court affirmed a decision by the director of the Department of Water Resources curtailing junior groundwater pumping that affected senior surface water rights. After that case, a final unified decree was issued in 2014 regarding the SBRA. *See* Snake River Basin Adjudication, *Final Unified Decree* (filed Aug. 26, 2014), *available at* http://srba.idaho.gov/Images/2014-08/0039576XX09020.pdf.

Idaho uses the conjunctive management rule to regulate pumping in critical groundwater areas (CWAs) where there is not a reasonably safe supply of groundwater at current rates of withdrawal. In these areas, a groundwater management plan must be prepared providing for the management of hydraulically connected surface water and groundwater. *See* Idaho Code § 42-233a. Protection of spring flows can provide the basis for designating an area as a CWA. A listing of Idaho CWAs may be accessed at the Idaho Department of Water Resources Web site at www.idwr.idaho.gov/WaterInformation/GroundWaterManagement/designated_areas.htm.

Conjunctive planning is also covered in Idaho's 2012 state water plan. Planning actions include (1) quantifying the hydraulic relations between ground and surface water supplies in designated basins, (2) prioritizing basins where additional technical information is needed, (3) developing technical tools and models for use in basin planning, and (4) assessing the rate of future aquifer recharge and withdrawal under climate change. *See* Idaho Water Resource Board, *Idaho State Water Plan* 12 (2012), *available at* www.idwr.idaho.gov/waterboard/WaterPlanning/Statewaterplanning/PDFs/ADOPTED%20State%20Water%20Plan%202012.pdf.

3. New Mexico

In New Mexico, surface water and groundwater are managed by the state engineer based on prior appropriation. *See* N.M. Stat. §§ 72-2-1, 72-2-9. For groundwater management purposes, the state is divided into thirty-three basins. In each of these basins, the state engineer will grant new appropriations only if there is unappropriated water available and the appropriation will not impair existing rights. Accordingly, if a new appropriation has a significant effect on hydrologically connected surface water, the state engineer will deny the application unless the applicant can offset the surface water effect caused by the new groundwater diversion. *See City of Roswell v. Berry*, 452 P.2d 179 (N.M. 1969); *City of Albuquerque v. Reynolds*, 379 P.2d 73 (N.M. 1962). Typically, offsets seek to retire existing surface water rights. On a case-by-case basis, the state engineer can allow a de minimus, hydrologic effect on surface supplies. *See Montgomery v. Lomos Altos, Inc.*, 150 P.3d 971 (N.M. 2006). More recently, the New Mexico legislature granted the state engineer jurisdiction over all uses of aquifers at more than 2,500 feet in depth, except water used in the oil and gas industry. N.M. Stat. § 72-12-25. The implication is that these deep groundwater basins are not hydrologically connected to surface waters.

4. Utah

In Utah, all surface water and groundwater are property of the state and are allocated and regulated by prior appropriation. New rights to use unappropriated state waters are issued by the state engineer. *See* Utah Code § 73-3-1. Surface water and groundwater rights are administered under the same priority system, and curtailment in reverse order of priority occurs when water is limited. *See* Utah Code § 73-3-1(5)(a); *Sanpete Water Conservancy District v. Carbon Water Conservancy District*, 226 F.3d 1170, 1172 (10th Cir. 2000) (granting senior rights holders full allocation before junior rights holders).

In areas where the safe yield of an aquifer is reached, or exceeded, the state engineer may designate the area for special groundwater management plans and requirements for conjunctive management. *See* Utah Code § 73-5-15. Based on hydrologic connectivity and demand data, the plans may require that surface water and groundwater systems be managed as one system. In the Wasatch Front, which is an urban area in north-central Utah where roughly 80 percent of Utah's population resides, the state engineer has designated sixteen areas requiring groundwater management plans and requirements for conjunctive management. A listing of these areas is available at the Utah Division of Water Rights Web site at www.waterrights.utah.gov/groundwater/ManagementReports/ground.asp.

5. Washington

In Washington, the Department of Ecology administers both surface and groundwater rights under separate codes based on prior appropriation. *See* Wash. Rev. Code § 43.21A.064. However, groundwater rights must follow the substantive and procedural dictates of the surface water code. *See* Wash. Rev. Code § 90.44.060. To the extent that any groundwater is part of or tributary to a surface stream, surface water rights are superior to those of groundwater rights. *See* Wash. Rev. Code § 90.44.030.

III. Conjunctive Management in Texas

Texas legislators and jurists have long recognized the interrelationship between surface water and groundwater, but this has not resulted in conjunctive management. With the exception of river underflow, Texas does not practice conjunctive management of its surface water and groundwater. Surface water is allocated and managed by the Texas Commission on Environmental Quality (TCEQ) based on prior appropriation principles; groundwater is allocated by the judicially established rule of capture or by local groundwater conservation districts. See Chapters 3 and 4 of this book. The Texas legislature has expressed a clear preference for this bifurcated approach to water management.

A. Underflow of a River: Recognized Connectivity

The "underflow of a river" provision in the Texas Water Code provides a legal basis for conjunctive management of surface water and groundwater resources. Section 11.021(a) provides that "[t]he water of the ordinary flow, *underflow*, and tides of every flowing river, natural stream or lake . . . is the property of the state." Tex. Water Code § 11.021(a) (emphasis added). The implication of this statement is that groundwater that is river underflow is required to comply with the surface water provisions of the Code. An obvious question is: What is the definition of underflow? The Water Code does not define underflow, nor has any Texas court directly construed its meaning. Although underflow is a legal, not a scientific, term, defining its boundaries turns on resolving factual hydrogeologic questions.

With the exception of Arizona, western-state water law provides little guidance in defining river underflow. Arizona has a bifurcated system like Texas in treating surface water according to prior appropriation principles and groundwater according to reasonable use. Arizona's case law addressing underflow or subflow is instructive for Texas. Subflow is defined as "those waters which slowly find their way through the sand and gravel constituting the bed of the stream, or the lands under or immediately adjacent to the stream, and are themselves a part of the surface stream." *Maricopa County Municipal Water Conservation District No. 1 v. Southwest Cotton Co.*, 4 P.2d 369, 380 (Ariz. 1931). The Arizona Supreme Court clarified how subflow is determined, holding that—

1. a subflow zone is adjacent to and beneath a perennial or intermittent stream and not an ephemeral stream;
2. there must be hydraulic connection to the stream from the saturated "subflow" zone that is part of the floodplain alluvium;
3. that part of the floodplain alluvium that qualifies as a "subflow" zone must be part of the geologic formation where the flow direction, water level elevations, and chemical composition of the water in that particular stretch of the stream are substantially the same as the water level, elevation, and gradient of the stream; and
4. riparian vegetation may be useful in marking the lateral limits of the "subflow" zone.

See In re General Adjudication of All Rights to Use Water in the Gila River System and Source, 9 P.3d 1069, 1076–81 (Ariz. 2000). In Arizona, therefore, river subflow for regulatory purposes is limited to groundwater pumping from the saturated floodplain of the river.

The underflow definition in the Texas Administrative Code is basically congruent with this approach. The TCEQ defines underflow as "[w]ater in sand, soil, and gravel below the bed of the watercourse, together with the water in the lateral extensions of the water-bearing material on each side of the surface channel, such that the surface flows are in contact with the subsurface flows, the latter flows being confined within a space reasonably defined and having a direction corresponding to that of the surface flow." 30 Tex. Admin. Code § 297.1(55). Thus underflow is water in sand, gravel, or soil that is—

1. below the bed of a watercourse; or
2. extending from the channel an unmeasured distance provided that underflow follows the direction of this surface flow.

This definition does not impose time, distance, or volume limitations on the groundwater but only a directional limitation.

A narrow construction of this regulatory definition suggests that the underflow extends only to the floodplain of the river. From a hydrologic connectivity perspective, however, underflow could extend to the alluvium of Texas rivers beyond present-day floodplains. In some instances, older geologic alluvial terraces may extend beyond current floodplains. For example, the saturated part of the Brazos River alluvium in Brazos and Burleson counties is about eight miles wide, and the saturated thickness is as much as fifty feet. *See* Paul D. Ryder, United States Geological Survey, *Groundwater Atlas of the United States: Texas, Oklahoma* (Report HA 730-E 1996), *available at* http://pubs.usgs.gov/ha/ha730/ch_e/E-text1.html. The Colorado River Alluvial Aquifer is much like the Brazos alluvium. It generally extends from just below Austin to the water gap in Wharton and is interactive with changes in river stage and flow. During periods of increasing river flow, there is a corresponding increase in water table elevation and storage in the alluvium. Correspondingly, when the river is falling, the alluvium loses water from bank storage. Geoffrey P. Saunders, *Qualification of the Colorado River Alluvium as a Minor Aquifer in Texas*, 46 Trans. Gulf Coast Ass'n Geo. Soc. 363 (1996).

Jurisdictional conflicts between the state and groundwater districts over the groundwater regulation in alluvial aquifers have not been definitively resolved by Texas courts or the legislature. The two regulatory regimes will probably remain in harmony until a high-capacity well or well field in an alluvium aquifer reduces river flow to the extent that it impacts a downstream surface water rights holder. From a well owner's perspective, an interesting set of questions may arise. First, is the well pumping groundwater from the underflow of a river? If yes, then jurisdiction could rest with the TCEQ; the water would be considered state water subject to all the relevant statutory and regulatory requirements over withdrawals and use of state water. A second question relates to how much of the pumped water is from the underflow. Only that which is underflow would be subject to state regulation.

B. Conjunctive Concepts in Planning

At a planning level, regional planning groups have recommended conjunctive use projects, and groundwater conservation district management plans encourage conjunctive use. The 2007 State Water Plan contains a number of recommended conjunctive use projects in order to optimize the beneficial use of each source. *See* 2007 State Water Plan, Vol. II, at 270–71. In preparing management plans, groundwater conservation districts are required to coordinate with surface water entities in addressing conjunctive surface water management issues. Tex. Water Code § 36.1071(a)(4).

There is recognition of the importance of spring flow and surface water and groundwater interaction as part of the desired future condition aquifer planning process. *See* Tex. Water Code § 36.108(c)(4). In setting desired future aquifer conditions, groundwater conservation districts must consider interactions between surface water and groundwater. This requirement is to be applied prospectively to the next desired future condition iteration. *See* Tex. Water Code § 36.108(d). The statute gives little guidance on how this is to be achieved, and districts have a range of options, from mere acknowledgment of interactions to protecting surface flows as part of a desired future condition. An interesting consequence of this planning process is that groundwater conservation districts may become the preferred agencies for protecting surface water flows in gaining rivers and streams.

IV. Water Management Practices in Texas

A. Conjunctive Use

Except for the complexities of dealing with different regulatory agencies and rules, the legal barriers to conjunctive use are not insurmountable for water suppliers. Where conjunctive use projects contemplate transporting groundwater in natural watercourses to a downstream point of diversion, the Water Code allows for a bed and banks permit to accomplish this purpose. *See* Tex. Water Code § 11.042. See discussion of bed and banks permits in Chapters 9 and 27 of this book.

Conjunctive use of surface water and groundwater is commonplace for many Texas public and private water suppliers, municipalities, and landowners. These practices include blending surface water and groundwater, blending desalinated water with other waters, using groundwater as a backup resource during unusual or emergency conditions, and ASR. The following examples discuss some of these practices.

1. Canadian River Municipal Water Authority

Perhaps the largest conjunctive use project in Texas has been quietly undertaken by the Canadian River Municipal Water Authority (CRMWA). Established in 1953, the authority supplied raw water from Lake Meredith to eleven member cities in the Panhandle and South Plains. These eleven cities have a population of just over one-half million.

Concerns over the future quality and quantity of water in Lake Meredith prompted the development of a groundwater supply. Starting in the mid-1990s, the CRMWA began acquiring groundwater rights, and with the completion of the Mesa Water purchase in 2011 has groundwater rights on some 420,000 acres of land. *See* Canadian River Municipal Water Authority, *History of CRMWA*, http://crmwa.com/history-of-crmwa/.

The John C. Williams Wellfield developed on a portion of these lands consists of forty-five wells that can supply up to 65,000 acre-feet of water annually. When lower-quality water from Lake Meredith is available, it is blended with high-quality groundwater and fed into a 322-mile pipeline-aqueduct system extending from Pampa and Amarillo in the north to Lubbock and Lamesa in the south. Unfortunately, since 2012 Lake Meredith surface water storage has been so low that nearly all the water delivered by the CRMWA has been groundwater. Because Lake Meredith is totally dependent on rainfall, only substantial rain events will fill the lake again. However, even if the lake remains dry, groundwater from CRMWA sources are projected to provide water to its customers for more than one hundred years. *See* Canadian River Municipal Water Authority, *FAQ*, http://www.crmwa.com/faq.

2. *City of Round Rock*

Historically, the city of Round Rock relied on groundwater to furnish water to its municipal customers. In 1981, the city began using water from Lake Georgetown, which also serves as a water supply for the city of Georgetown and the Brushy Creek Municipal Utility District. When needed the City pumps water into Lake Georgetown from Lake Stillhouse Hollow. To ensure future supplies, Round Rock has contracted to purchase Lake Travis water from the Lower Colorado River Authority. In addition to surface water, Round Rock supplements surface supplies with groundwater from wells located in the Edwards Aquifer. *See* Round Rock Texas, *Water Sources*, www.roundrocktexas.gov/departments/utilities-and-environmental-services/water/water-resources/.

3. *City of San Marcos*

The city of San Marcos began conjunctive use of surface water and groundwater with the treatment of Canyon Lake water purchased from the Guadalupe-Blanco River Authority. Two-thirds of the city's water comes from surface water treated at the city's water plant operated by the Authority. San Marcos will continue to pump groundwater from the Edwards Aquifer to maintain its historic rights to aquifer water. *See* City of San Marcos, *Water/Wastewater*, www.ci.san-marcos.tx.us/index.aspx?page=327; *see also* Guadalupe-Blanco River Authority, *San Marcos Water Treatment Plant Division*, www.gbra.org/operations/sanmarcos.aspx. San Marcos is a partner in the Hays Caldwell Public Utility Agency, which is seeking to supplement supplies with groundwater from the Carrizo-Wilcox Aquifer. The agency holds 10,300 acre-feet of annual production and transport permits from Gonzales County Groundwater Conservation District. *See* Hays Caldwell Public Utility Agency, *Frequently Asked Questions*, http://hcpua.org/.

4. City of Kerrville

The city of Kerrville uses surface water from the Guadalupe River, native groundwater from its well fields, and treated surface water stored in its ASR system. The city has a total annual water supply rights amount of about 6,000 acre-feet from the Guadalupe River, 4,100 acre-feet from the Lower Trinity Aquifer, and 2,400 acre-feet from its ASR system. While most of its annual use is from the Guadalupe River, groundwater is important during low river flows. Kerrville water customers are using an average of 1.4 billion gallons per year, with a long-term average yearly growth rate of about 3 percent. *See generally* City of Kerrville, *A Holistic Look at the City of Kerrville Water Systems*, www.kerrvilletx.gov/DocumentCenter/Home/View/6845; City of Kerrville, *Issue #93—Water Supply*, www.kerrville.org/index.aspx?NID=911.

5. City of Midland

The city of Midland uses both surface water and groundwater. Surface water is provided by the Colorado River Municipal Water District from Lakes Thomas, Spence, and Ivie. Unfortunately, drought conditions have reduced surface storage in the three lakes, compelling the city to rely on groundwater sources from the T-Bar Ranch and Clear Water Ranch well fields located in Winkler and Loving Counties. A seventy-mile pipeline, constructed in partnership with the Midland Water Supply District No. 1, has the capacity to bring more than twenty million gallons per day (mgd) to the city. *See generally* City of Midland, *2013 Water Quality Drinking Report*, www.midlandtexas.gov/ArchiveCenter/ViewFile/Item/152; Black & Veatch, *Midland County Fresh Water Supply District No. 1*, http://bv.com/Projects/Midland-tx-fresh-water-supply.

6. City of Victoria

Surface water with groundwater as a backup source is the strategy of the city of Victoria. Average annual consumption is slightly over 11,000 acre-feet. Currently, Victoria has permits for up to 20,000 acre-feet of surface water from the Guadalupe River. The city also has off-channel reservoirs holding 3,000 acre-feet of water that is a mixture of groundwater and Guadalupe River water. These reservoirs store approximately one year's supply of water for Victoria. The city has retained the ability to use ten water wells for extreme emergencies and for peak demand periods. These wells are drilled into the Gulf Coast Aquifer and before 2001 supplied all the water for the city's residents. *See* City of Victoria, *2013 Annual Drinking Water Quality Report*, www.victoriatx.org/home/showdocument?id=3884.

7. City of Tyler

Tyler relies on surface water from Lake Tyler and Lake Palestine as its primary source of water but has twelve deep wells in the Carrizo-Wilcox sands that it uses as a backup source. Tyler entered into a water supply contract with the Upper Neches River Municipal Water Authority for up to 69,000 acre-feet per year (34.7 mgd) from Lake Palestine. *See generally* City of Tyler, *Tyler Water Utilities*, www.cityoftyler.org/Departments/TylerWaterUtilities/WaterQualityandProduction/WaterSources.aspx.

B. Portfolio Managment Practices

Many water suppliers now incorporate conjunctive use as one option in a new practice called portfolio management. This approach, borrowing from financial management practices, involves identifying and diversifying all available water resources to provide sustainable services. A water portfolio approach considers not only traditional surface water and groundwater supplies but also reuse, conservation, rainwater harvesting, desalination, ASR, gray water recycling, and water purchasing.

1. City of El Paso

El Paso Water Utilities (EPWU) supplies 90 percent of all municipal water for more than 750,000 people, or about 100,000 acre-feet annually. Historically, groundwater from the Hueco and Mesilla Bolsons (aquifers) supplied most of the water. Concerns regarding the long-term viability of the Bolsons to supply water compelled the EPWU to expand its portfolio of water management strategies. These strategies included rate increases, conservation, reuse of reclaimed water, desalination, and greater conjunctive use of surface water and groundwater resources from local and imported sources. *See* El Paso Water Utilities, *Water Resources*, www.epwu.org/water/water_resources.html.

Annual water consumption averaged around 130,000 acre-feet from 1995 to 2000 but has declined to just over 100,000 acre-feet since 2004. Groundwater pumping from the Bolsons peaked at about 80,000 acre-feet in 1989 and has declined to about 50,000 acre-feet annually during the last decade. Recently, pumping dropped below 40,000 acre-feet for the first time since the 1960s. Since the 1980s, the EPWU has blended groundwater with increasing amounts of water from the Rio Grande in order to meet the utility's needs. Under full surface water allocation from the Rio Grande, the EPWU has rights to about 70,000 acre-feet per year leased from the El Paso County Water Improvement District No. 1. *See* El Paso Water Utilities, *Water Resources*, www.epwu.org/water/water_resources.html. Additionally, groundwater from the Kay Bailey Hutchison Desalination Plant is provided to the EPWU and to Ft. Bliss. This water is blended by the city with other surface and groundwater for distribution to its customers. *See* El Paso Water Utilities, *Desalination Plant*, www.epwu.org/water/desal_info.html.

2. City of San Antonio

With a service population of 1.3 million, the San Antonio Water System (SAWS) uses about 180,000 acre-feet of water per year. Under nondrought conditions, SAWS's water supply comes from the Edwards Aquifer (59 percent), recycled water (20 percent), ASR (16 percent), other aquifers (3 percent), and surface water from Canyon Lake (2 percent). *See* San Antonio Water System, *2009 Annual Report*, at A10, *available at* www.saws.org/who_we_are/Financial_Reports/Annual_Reports/2009/09SAWS_AR_WEB.pdf.

In 2012, SAWS adopted a water plan to increase its water supply with a diversified portfolio of options including new supply development, conservation, reuse, ASR, and groundwater desalination. *See* San Antonio Water System, *2012 Water Management Plan*, *available at* www.saws.org/Your_Water/WaterResources/2012_WMP/ [hereinafter SAWS Plan]. Under this plan, new conservation will reduce demand by 16,500 acre-feet by 2020, and new supplies will be added from 10,900 acre-feet of new purchases of Edwards Aquifer water rights; 24,420 acre-feet from brackish desalination in 2021; 14,000 acre-feet from expansion of Carrizo water in 2022; and up to 50,000 acre-feet from a water importation project starting in 2018. SAWS Plan, at 6.

3. City of Wichita Falls

Since 2011 the Wichita Falls area has been in a severe drought, compelling a need to diversify its water sources. The city's main water sources of Lakes Arrowhead, Kickapoo, and Kemp have experienced the lowest level of storage since they were constructed. In response to this emergency condition, the city in 2013 initiated a direct potable reuse project. Up to 5 mgd of treated effluent from its wastewater treatment plant is piped directly to its water treatment plant for advanced treatment by reverse osmosis and ultraviolet disinfection. The treated water is then blended with raw water from existing sources and is further filtered and treated by conventional means.

Given the uncertainties created by the current drought, Wichita Falls prepared a long-range water supply plan in January 2015. *See* City of Wichita Falls, *Long-Range Water Supply Plan, available at* www.wichitafallstx.gov/DocumentCenter/View/24251 [hereinafter Wichita Falls Long-Range Plan]. The plan examines a portfolio of short- and long-range options to improve the sustainability of its water supply. Three strategies that could be implemented within two to four years include indirect reuse, enhanced water conservation, and groundwater development. *See* Wichita Falls Long-Range Plan, at 7-2. Long-range options include another reservoir and groundwater importation from adjoining counties. *See* Wichita Falls Long-Range Plan, at 7-2.

V. Conclusion

In spite of recommendations to adopt conjunctive management principles, the bifurcated system for surface water and groundwater in Texas is solidly entrenched and accepted. Issues may arise in the future in the courts or at the TCEQ, when there is an identifiable conflict between a surface water rights holder who can scientifically demonstrate that a groundwater user is depleting the surface water holder's water supply. In such a case, the entrenched and accepted regime might change. It may be that the desired future condition process for aquifers results in groundwater conservation districts protecting surface water flows and rights.

Currently, this dual system of institutions and laws is not a major barrier to the conjunctive use of surface water and groundwater. In acquiring water, users must comply with the surface water appropriative rights system and the rules of a groundwater conservation district for groundwater. Reliability of supply and economic costs are more of a barrier than the law.

CHAPTER 6

State and Federal Governmental Entities with Water Resource Jurisdiction

Shana L. Horton[1] and Constance Courtney Westfall[2]

I. Introduction

This chapter provides an overview of the major state and federal authorities with jurisdiction over water resources. It focuses primarily on the water resource jurisdiction of such governmental entities and does not attempt to summarize the overall jurisdiction, function, and mission, except to provide context to the water resource discussion. The chapter identifies the source of each state or federal governmental entity's authority, delineates the scope of jurisdiction, and describes generally how each functions to accomplish its mission. Details on many of the programs discussed in this chapter are contained in other chapters of this book, as noted. For discussion of local governmental entities with jurisdiction over water resources, see Chapters 7, 8, 16, and 17 of this book.

II. State Governmental Entities with Water Resource Jurisdiction

A. Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ or commission) is the primary environmental agency in the state of Texas. Its mission is to protect the state's public health and natural resources consistent with sustainable economic development. Its goal is clean air, clean water, and the safe management of waste. *See* Texas Commission on Environmental Quality, *About the TCEQ*, www.tceq.texas.gov/about [hereinafter *About the TCEQ*]. The commission is the agency of the state given primary responsibility for implementing the state constitution and laws relating to the conservation of natural resources and the protection of the environment. Tex. Water Code § 5.012.

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2. For over twenty-nine years, Constance Westfall has represented industrial and institutional clients on a wide range of environmental matters. She is a partner with the law firm of Strasburger & Price, LLP. Ms. Westfall is a past chair of the State Bar Environmental and Natural Resources Law Section. She is grateful for the assistance of Scott McDonald, Legal—Water Enforcement Branch Chief, Region 6, U.S. Environmental Protection Agency.

The pursuit of this broad goal in a state the size of Texas requires an agency of similar scope. The TCEQ is one of the largest environmental agencies in the world, with approximately 2,750 employees, a central office in Austin and sixteen regional offices, and a $368 million operating budget for the 2015 fiscal year. *See About the TCEQ*. The TCEQ's water programs include those that maintain the quality and prevent pollution of water in the state, ensure that water for human consumption meets standards designed to protect health, and mete out the supply of state water so that sources of supply are not overdrawn.

Texas has been granted primacy by the federal government to implement the federal Clean Water Act (CWA) within the state. 40 C.F.R. pt. 123. That is, the federal government has delegated its authority to the state to implement and enforce the CWA within the state. To earn and maintain primacy, the state must adopt a regulatory scheme that is at least as stringent as the CWA. 40 C.F.R. § 123.25. The state assumed the authority to administer the National Pollutant Discharge Elimination System (NPDES) program in Texas on September 14, 1998. *See* United States Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES), *Specific State Program Status*, http://water.epa.gov/polwaste/npdes/basics/State-Program-Status.cfm. The NPDES is a federal regulatory program to control discharges of pollutants to surface waters of the United States. The TCEQ's Texas Pollutant Discharge Elimination System (TPDES) program now has federal regulatory authority over discharges of pollutants to Texas surface water, with the exception of discharges associated with oil, gas, and geothermal exploration and development activities, which are regulated by the Railroad Commission of Texas. Texas has also been granted primacy with respect to the Safe Drinking Water Act (SDWA). *See* 40 C.F.R. pt. 123. The grants of primacy to the state for these two bodies of law provide a primary basis for its legal authority in these areas of water regulation.

The TCEQ also has legal authority over regulating the use of water through its water rights permitting program. This authority is derived from the common law and is codified in the Water Code, which provides that state water in Texas is the property of the state, which holds it in trust. "State water" is defined at section 11.021 and essentially includes surface water in a watercourse. *See* Tex. Water Code § 11.021. Because of its ownership of water, the state holds the legal authority over the right to use state water. For further discussion of state water and the state's legal authority over the right to use state water, see Chapters 1, 3, and 9 of this book.

The TCEQ was created by the legislature as an agency of the executive branch of Texas state government. Tex. Water Code § 5.051. The TCEQ was preceded by several agencies with the same functions, including most recently the Texas Natural Resources Conservation Commission (TNRCC). References to these predecessor agencies are found in older case law as well as in statutes and rules that have not been updated to reflect the current agency name. The TCEQ may only exercise authority granted by the legislature. *Cities of Austin, Dallas, Fort Worth & Hereford v. Southwestern Bell Telephone Co.*, 92 S.W.3d 434, 441–42 (Tex. 2002); *Public Utility Commission of Texas v. City Public Service Board of San Antonio*, 53 S.W.3d 310, 315–16 (Tex. 2001); *State v. Public Utility Commission of Texas*, 883 S.W.2d 190, 194 (Tex. 1994); *Martinez v. Texas Employment Commission*, 570 S.W.2d 28, 31 (Tex. 1978). General powers and duties are contained in chapter 5 of the Water Code, which provides that the commission has general jurisdiction over water and water rights including, among other things—

- the issuance of water rights permits, water rights adjudication, cancellation of water rights, and enforcement of water rights (see Chapters, 3, 9, and 13 of this book);
- continuing supervision over districts created under article III, section 52(b)(1) and (2), and article XVI, section 59, of the Texas Constitution (see Chapters 7, 8, and 16);
- the state's water quality program, including issuance of permits, enforcement of water quality rules, standards, orders, and permits, and water quality planning (see Chapters 33 and 34);
- the adoption and enforcement of rules and performance of other acts relating to the safe construction, maintenance, and removal of dams (see Chapters 39 and 27); and

- the administration of the state's limited programs involving underground water and water wells (although the Water Code gives the TCEQ jurisdiction in this area, local groundwater conservation districts are the preferred method for regulating groundwater (*see* Tex. Water Code § 36.0015)).

See Tex. Water Code § 5.013.

Chapter 7 of the Water Code provides the TCEQ with the authority to enforce the provisions of the Code within the commission's jurisdiction under section 5.013 and rules adopted under those provisions. Tex. Water Code § 7.002. The TCEQ, referring to the three-member governing commission, or the executive director of the agency may institute legal proceedings to compel compliance with the relevant provisions of the Water Code and rules, orders, permits, or other decisions of the commission. Tex. Water Code § 7.002. The commission may delegate its enforcement authority to its executive director. Tex. Water Code § 7.002. See Chapter 13 of this book for further discussion of water rights enforcement.

Some of the key chapters of the Water Code related to the TCEQ's jurisdiction over water resources include—

- chapter 5, Texas Commission on Environmental Quality, which provides general authority;
- chapter 7, Enforcement (see Chapter 13 of this book); and
- chapter 11, Water Rights (see Chapters 3, 9, and 11).

The TCEQ also has broad rulemaking authority; that is, the commission can adopt rules to implement the statutes enacted by the legislature. The Water Code provides that the commission shall adopt any rules necessary to carry out its powers and duties under the Code and other laws of this state. Tex. Water Code § 5.103. The commission's rules are contained in title 30 of the Texas Administrative Code. Rule chapters specific to water rights and water supply include—

- chapter 290, Public Drinking Water (see Chapters 29 and 30 of this book);
- chapter 292, Special Requirements for Certain Districts and Authorities (see Chapter 8);
- chapter 293, Water Districts (see Chapters 7, 8, and 16);
- chapters 295 and 297, Water Rights, Procedural and Substantive, respectively (see Chapters 3, 9, and 11); and
- chapter 20, Rulemaking. The commission must adopt its rules in accordance with the rulemaking requirements of Texas Government Code chapter 2001, commonly referred to as the Administrative Procedures Act (APA). Tex. Water Code § 5.103(c); 30 Tex. Admin. Code § 20.3.

1. *Decision-Making Body*

The commission itself is made up of three members, appointed by the governor with the advice and consent of the senate. Tex. Water Code § 5.052. The members of the commission serve on a full-time basis and hold office for staggered terms of six years, with the term of one member expiring every two years, and may not serve for more than two terms. Tex. Water Code §§ 5.056, 5.057. The governor appoints one member of the commission to serve as its chair to preside over meetings. Tex. Water Code § 5.058. The commissioners are charged with establishing overall agency direction and policy and with making final determinations on contested permitting and enforcement matters. *See* Texas Commission on Environmental Quality, *Office of the Commissioners*, www.tceq.state.tx.us/about/organization/commissioner.html [hereinafter TCEQ Commissioners].

The commission is subject to the Open Meetings Act, Texas Government Code chapter 551, which requires its members to have all of their discussions and decisions conducted in a forum open to the public, with some limited exceptions. Tex. Gov't Code § 551.002; *see also* Tex. Gov't Code §§ 551.071–.089. This open meeting is commonly referred to as the "commission agenda" or simply "agenda meeting." It is held relatively regularly, usually every other Wednesday morning, at the TCEQ central offices in North Austin. The law requires that notice be given about the items that will be considered on any agenda. *See* Tex. Gov't Code § 551.041. The commission posts its agenda on the TCEQ's Web site in advance of the meeting. *See* Texas Commission on Environmental Quality, *Agenda Meetings and Work Sessions*, www.tceq.texas.gov/agency/agendas/agenda.html. Links on the site lead to all documents provided to the commissioners for consideration on each agenda item. Additionally, TCEQ agenda meetings are webcast—a live video feed from the meeting is broadcast to the public over the Internet. *See* TexasAdmin.com, www.texasadmin.com/tceqa.shtml.

The Water Code authorizes the commission to delegate to the executive director its authority to act on an application or other request to issue, renew, reopen, transfer, amend, extend, withdraw, revoke, terminate, or modify a permit, license, certificate, registration, or other authorization or approval under the following circumstances:

1. required notice has been given;

2. the applicant agrees in writing to the action to be taken by the executive director; and

3. the application is uncontested.

Tex. Water Code § 5.122.

An application is uncontested if no party protests the application or if all parties have settled and withdrawn their protests to the application. The ability to delegate decisions on uncontested matters to the executive director means that the commission does not have to hear and decide on every permit application and enforcement action. This delegation authority is essential to the efficient execution of the commission's duties. Before taking action on a delegated matter, the executive director posts the proposed action on the executive director's searchable agenda for at least three days. *See* Texas Commission on Environmental Quality, *Executive Director's Agenda and Marked Agenda*, www.tceq.texas.gov/agency/cc/eda.html.

2. Office of Water

The TCEQ is composed of several "Offices," which are further divided into "Divisions" and then "Sections." *See* Texas Commission on Environmental Quality, *TCEQ Organization Map*, www.tceq.state.tx.us/about/organization. The Office of Water contains the Water Quality, Water Quality Planning, Water Supply, and Water Availability divisions. The Water Supply and Water Availability divisions deal most directly with water resources.

The Water Supply division is responsible for programs that "ensure the efficient administration of surface water and groundwater use" and "the production, treatment, delivery and protection of safe and adequate drinking water." *See* Texas Commission on Environmental Quality, *Office of Water*, www.tceq.texas.gov/about/organization/water.html [hereinafter TCEQ Office of Water].

The Water Supply division performs the following functions:

- oversees the production, treatment, quality, and delivery of drinking water for the public by implementation of the SWDA;
- assesses and protects sources of public drinking water;
- offers technical assistance on the design and operation of public water systems;
- guides public water systems on homeland-security preparation, response, and recovery;
- reviews applications for district creation and district bond issues; and

- reviews engineering plans for new or significantly modified public water systems or exceptions to TCEQ rules.

See TCEQ Office of Water. Before the enactment of House Bill 1600 (83rd Legislature, 2013), the Water Supply division was also responsible for ensuring provision of safe and adequate water and sewer utility services at fair rates. H.B. 1600 transferred this duty to the Public Utility Commission beginning September 1, 2014. *See* Act of May 13, 2013, 83d Leg., R.S., ch. 170, § 2.96, eff. Sept. 1, 2013. See section II.B below for further discussion regarding this function.

The Water Availability division manages the diversion and use of surface water and protects groundwater through planning and pollution prevention programs. This is the primary division responsible for responding to drought conditions to ensure adequate water supplies. It is also responsible for the development of water availability models (WAMs), the primary tools used to determine whether and how much of the state's surface water is available for water rights permits. See Chapter 12 of this book for more information regarding WAMs.

The division performs the following functions:

- processes water rights permits and amendments;
- maintains water availability models for all river basins;
- reviews water conservation plans and drought contingency plans;
- performs groundwater quality planning and assessments;
- supports the interagency Texas Groundwater Protection Committee and the Texas Groundwater Protection Strategy;
- manages the state's plan for preventing groundwater pollution from pesticides and the state's program for the identification of priority groundwater management areas;
- ensures compliance, through the watermaster programs, with water rights by monitoring stream flows, reservoir levels, and water use (the TCEQ Office of Compliance and Enforcement is responsible for enforcement of water rights in areas that do not have watermasters; see Chapter 13 of this book for discussion of enforcement of water rights); and
- supports interstate river compacts.

See TCEQ Office of Water.

3. Watermasters

The TCEQ employs watermasters to ensure compliance with water rights rules and permits in certain designated geographic areas. *See, e.g.*, Tex. Water Code § 11.326. The TCEQ's watermasters monitor streamflows, reservoir levels, and water use; coordinate diversions in the basins managed by their programs; and regulate reservoirs as needed to prevent waste of water or the use of water in quantities in excess of a user's water right.

Currently, watermasters operate in four large areas: the Rio Grande Basin (*see* 30 Tex. Admin. Code ch. 303); the South Texas Watermaster Region (*see* Tex. Water Code §§ 11.326–.341; 30 Tex. Admin. Code ch. 304); the Concho River Basin (*see* Tex. Water Code §§ 11.551–.561; 30 Tex. Admin. Code ch. 304); and part of the Brazos River Basin (*see* Tex. Water Code §§ 11.326–.341; 30 Tex. Admin. Code ch. 304). The Brazos watermaster was added in 2014 after a contested case hearing process in which the TCEQ ordered that a watermaster be appointed to help regulate diversions in a portion of the Brazos River basin, including the Possum Kingdom Reservoir and the rest of the basin downstream from it. Watermasters may be appointed for other areas in the future. See Chapter 13 of this book for further discussion of the watermaster program.

4. Attorneys

The TCEQ's attorneys are primarily assigned to three offices: the Office of General Counsel, the Office of Legal Services, and the Office of Public Interest Counsel. The general counsel is the chief advisor to the commissioners about questions of law and ethics. The general counsel and assistant general counsel attorneys provide legal assistance to the commissioners for their review of permits, proposed enforcement actions, rules, and other matters, in addition to managing the administrative affairs of the commissioners' office. *See* TCEQ Commissioners. One of their primary functions is briefing the commissioners on agenda items before each commission meeting.

In addition to its role as advisor to the commission, the Office of General Counsel houses alternative dispute resolution (ADR) staff to assist permit applicants and persons opposed to the applications in resolving their differences informally, to avoid the time and expense of a contested case hearing. *See* TCEQ Commissioners.

While the general counsel's office works for the commissioners, the attorneys in the Office of Legal Services represent the agency's executive director and staff, which includes staff in the Office of Water. This office manages legal services for the agency in environmental law, enforcement litigation, bankruptcy, and general agency operations. The Office of Legal Services is divided into three divisions, two of which provide legal counsel and representation related to water resource issues and program areas: the Environmental Law Division (ELD) and the Litigation Division (LD). Attorneys in the ELD provide legal counsel to the agency in all areas of permitting and rulemaking and represent the executive director in contested permitting matters. The division's functions also include legal support related to federal program delegation, interpretation of environmental statutes and rules, and support for the Office of the Attorney General in state and federal court litigation. Within the ELD, the Water Utilities and Districts Section is composed of attorneys who work with legal issues related to water resources. *See* Texas Commission on Environmental Quality, *Office of Legal Services*, www.tceq.texas.gov/about/organization/ols.html [hereinafter TCEQ Office of Legal Services].

The LD provides legal representation and support to the Enforcement, Field Operations, and Remediation divisions of the Office of Compliance and Enforcement. These are the attorneys who prosecute alleged violations of the commission's rules. The division negotiates agreed enforcement orders, represents the executive director in enforcement actions, advises the agency concerning cleanup standards and recovery of cleanup costs, and coordinates other related programs. Through the Environmental Crimes Section, the LD also investigates and gathers evidence on environmental crimes for prosecution in state and federal courts. *See* TCEQ Office of Legal Services.

The Office of Public Interest Counsel (OPIC) represents the public interest in matters considered by the TCEQ to ensure that the commission is responsive to citizens' concerns regarding environmental quality and consumer protection. The OPIC does not formally represent individuals at TCEQ proceedings; however, it is a statutory party in all contested case hearings. *See* Tex. Water Code § 5.273. Additionally, citizens who have questions about the legal aspects of dealing with the TCEQ, its hearing process, and its rules can obtain help from this office. Assistance is available to anyone who is affected by a particular permit application or other agency authorization. The staff of the OPIC also assists people with questions about enforcement proceedings. *See* Texas Commission on Environmental Quality, *Office of Public Interest Counsel*, www.tceq.texas.gov/agency/public_interest/index.html.

B. The Public Utility Commission

The Public Utility Commission of Texas (PUC) regulates the state's electric, telecommunication, and water and sewer utilities, implements respective legislation, and offers customer assistance in resolving consumer complaints. *See* Public Utility Commission of Texas, *About the PUCT*, *Mission* *and History*, www.puc.texas.gov/agency/about/mission.aspx. The PUC was given jurisdiction over water and sewer utilities on September 1, 2014. *See* Act of May 13, 2013, 83d Leg., R.S., ch. 170, § 2.96(a). The agency is now responsible for the economic regulation of water and sewer service, including the issuance and transfer of certificates of convenience and necessity (CCNs) designating service areas, the determination of water and sewer utility rates, and the administration of hearings and proceedings regarding CCNs and rates. *See* Act of May 13, 2013, 83d Leg., R.S., ch. 170, § 2.96(a).

From its creation by the legislature in 1975 until 1986, the PUC was responsible for the oversight of water and sewer utilities. In 1986, those functions were transferred to the Texas Water Commission, a TCEQ predecessor agency. In 2013, in connection with the Sunset Advisory Commission's review of the PUC, the Texas legislature transferred responsibilities related to the regulation of water and sewer utility service areas and rates from the TCEQ back to the PUC. The Sunset Advisory Commission found that "[w]ith its core mission of utility oversight, PUC's expertise and structure are focused on handling rate-related regulation efficiently and fairly." Sunset Advisory Commission, *Final Supplement to the Sunset Staff Report on the Public Utility Commission of Texas* 4 (July 2011), *available at* www.sunset.texas.gov/public/uploads/files/reports/Public%20Utility%20Commission%20Supplement%202011%2082%20Leg.pdf [hereinafter Sunset Staff Report]. Further, it found that "transferring [ratemaking] duties to PUC offers potential benefits from aligning the State's utility regulation within one agency." Sunset Staff Report, at 5.

Water resource functions taken over by the PUC include—

- administering the state's water and sewer utility rates under chapter 13 of the Water Code (see Chapters 29 and 31 of this book for further discussion of retail and wholesale rates);
- regulating service areas of retail public utilities through the administration of CCNs;
- determining reasonable rates for the furnishing of raw or treated water;
- reviewing applications for utility sales, transfers, and mergers;
- assessing the financial, managerial, and technical capabilities of public water systems; and
- referring failing or abandoned water and sewer utilities to the Office of the Attorney General for the appointment of a receiver.

Key Water Code chapters pertaining to the PUC's water resource jurisdiction include chapters 11, 12, and 13. See also Chapters 29, 30, and 31 of this book (regulation of retail and wholesale water rates and services). The PUC's rules are divided into procedural rules and substantive rules. The PUC's procedural rules, which apply to electric, telecommunications, and water and sewer utilities, are located in 16 Texas Administrative Code chapter 22, Procedural Rules. The PUC's substantive rules applicable to water and sewer utilities are located in 16 Texas Administrative Code chapter 24, Substantive Rules Applicable to Water and Sewer Service Providers.

As of the publication date of this edition, the transfer of jurisdiction from the TCEQ to the PUC is complete. However, the PUC is in the process of amending the substantive rules applicable to water and sewer utilities. The PUC used a two-phase approach to adopting rules to accomplish the transfer of jurisdiction over the economic regulation of water and sewer utilities. The first phase involved moving the TCEQ's rules (formerly 30 Texas Administrative Code chapter 291, Utility Regulations), with minor changes, to 16 Texas Administrative Code chapter 24, Substantive Rules Applicable to Water and Sewer Service Providers. 39 Tex. Reg. 5920 (Aug. 1, 2014). The phase 1 rules became effective September 1, 2014, the same date that jurisdiction transferred to the PUC. On March 20, 2015, the PUC published proposed phase 2 rules with substantive revisions. 40 Tex. Reg. 1607 (Mar. 20, 2015). The proposed phase 2 rules include amendments to implement the legislature's creation of a new classification system for water and sewer utilities into Class A, Class B, and Class C utilities depending on the utility's number of water or sewer taps or connections. In addition to the proposed rule changes, the PUC initiated agency projects to update the rate filing package forms and information that a utility must submit as part of a rate change application.

1. Decision-Making Body

The commission is composed of three commissioners, appointed by the governor with the advice and consent of the senate. Tex. Util. Code § 12.051(a). Commissioners serve staggered six-year terms. Tex. Util. Code § 12.051(c). One commissioner is designated by the governor as the presiding officer. Tex. Util. Code § 12.052(a). The executive director is responsible for the day-to-day operations of the PUC. *See* Tex. Util. Code § 12.103.

2. Office of Public Utility Counsel

The PUC's Office of Public Utility Counsel (OPUC) is an independent state agency created in 1983 that represents the interests of residential and small commercial consumers in PUC proceedings. *See* Tex. Util. Code § 13.001. OPUC is headed by a public counsel appointed by the governor with the advice and consent of the senate. *See* Tex. Util. Code § 13.201. OPUC gained authority to intervene on behalf of water and sewer utility customers on September 1, 2013. *See* Act of May 13, 2013, 83d Leg., R.S., ch. 170, § 296(g).

Under chapter 13 of the Texas Water Code, the OPUC—

1. must assess the effect of utility rate changes and other regulatory actions on residential consumers in Texas;

2. must advocate in the office's own name a position determined by the public counsel to be most advantageous to a substantial number of residential consumers;

3. may appear or intervene, as a party or otherwise, as a matter of right on behalf of residential consumers, as a class, in any proceeding before the PUC, including an alternative dispute resolution proceeding, and small commercial consumers, as a class, in any proceeding in which the public counsel determines that small commercial consumers are in need of representation, including an alternative dispute resolution proceeding;

4. may initiate or intervene as a matter of right or otherwise appear in a judicial proceeding that involves an action taken by an administrative agency in a proceeding, including an alternative dispute resolution proceeding, in which the public counsel is authorized to appear, or in which the public counsel determines that residential consumers or small commercial consumers are in need of representation; and

5. may recommend legislation to the legislature that the office determines would positively affect the interests of residential and small commercial consumers.

See Tex. Water Code § 13.017(b).

Importantly, the appearance of OPUC in a proceeding does not preclude the appearance of other parties on behalf of residential or small commercial consumers. Tex. Water Code § 13.017(d).

C. Texas Water Development Board

Created in 1957 by legislative act and constitutional amendment, the Texas Water Development Board (TWDB) is the state agency primarily responsible for water planning and for administering water financing for the state. Tex. Water Code § 6.011. The board's mission is to provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas. *See* Texas Water Development Board, *About Texas Water Development Board*, www.twdb.state.tx.us/about/index.asp [hereinafter About the TWDB].

The board has general jurisdiction over—

- the development and implementation of a statewide water plan;
- the administration of the state's various water assistance and financing programs, including those created by the constitution;
- the administration of the National Flood Insurance Program; and
- other areas specifically assigned to the board by the Water Code or other law.

Tex. Water Code § 6.012(a).

The key chapters in the Water Code related to the TWDB's jurisdiction include—

- chapter 6, Texas Water Development Board; and
- chapter 16, Provisions Generally Applicable to Water Development.

Like the TCEQ, the TWDB has the authority to adopt rules necessary to carry out its powers and duties. Tex. Water Code § 6.101(a). Its rulemaking process is also governed by the Administrative Procedure Act. Tex. Water Code § 6.101(c). The rules of the TWDB are contained in title 31 of the Texas Administrative Code, chapters 353 through 384.

1. Decision-Making Body

The board is made up of three members, appointed by the governor with the advice and consent of the senate. Tex. Water Code §§ 6.052–.053. The chair of the board is designated by the governor. Tex. Water Code § 6.059. Members serve on a full-time basis. Tex. Water Code § 6.061. The members of the board hold office for staggered terms of six years, with the terms of one member expiring each odd-numbered year. Tex. Water Code § 6.056(a). The executive administrator is the chief executive officer of the TWDB, who oversees the day-to-day functions of the agency.

2. Programs

Although the TWDB is generally not regulatory in nature, the agency nonetheless plays a crucial role in evaluating and prioritizing water-related infrastructure projects for state funding, and whether a project is contained in a regional or state water plan can affect its ability to obtain state financing or permits. *See* Tex. Water Code §§ 11.134(b)(3)(E), 16.053(j)(1). See Chapters 9 and 20 of this book. Moreover, the agency has taken on a greater role in the area of groundwater management in recent years, having responsibility for approval of groundwater conservation districts' groundwater management plans and serving as the key resource to local groundwater districts and groundwater management areas. *See* 31 Tex. Admin. Code ch. 356. See Chapter 21 of this book regarding groundwater management area joint planning.

The TWDB—

- provides loans to local governments for water supply projects; water quality projects including wastewater treatment, municipal solid waste management, and nonpoint source pollution control; flood control projects; agricultural water conservation projects; and groundwater district creation expenses;

- provides grants and loans for the water and wastewater needs of the state's economically distressed areas;
- provides agricultural water conservation funding and water-related research and planning grants;
- supports regions in developing their regional water plans, which are incorporated into a statewide water plan for the development, management, and conservation of the state's water resources;
- collects data and conducts studies concerning the freshwater needs of the state's bays and estuaries;
- administers the Texas Water Bank, which facilitates the transfer, sale, or lease of water and water rights throughout the state, and administers the Texas Water Trust, where water rights are held for environmental flow purposes; and
- maintains a centralized data bank of information on the state's natural resources, called the Texas Natural Resources Information System, and manages the Strategic Mapping Program, a Texas-based, public and private sector cost-sharing program to develop consistent, large-scale computerized base maps describing basic geographic features of Texas.

See About the TWDB.

The TWDB's water planning function involves a continuous process that responds to changing environmental, socioeconomic, and demographic conditions. To address these changes, Texas law requires that the board develop and adopt a new state water plan every five years. Tex. Water Code § 16.051(a). This state water plan must incorporate regional water plans developed every five years by regional water planning groups. Tex. Water Code § 16.051(a). Water plans provide for—

> the orderly development, management, and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the entire state.

Tex. Water Code § 16.051(a). The state water plan also acts as a guide to state water policy, which the TCEQ must take into consideration in matters coming before it. Tex. Water Code § 16.051(b). Thus, the TWDB's role in the water planning process is fourfold: it reviews regional water plans in accordance with agency rules and guidelines and resolves interregional conflicts; approves regional water planning groups' plans; develops the state water plan; and provides funding for implementation. *See* House Committee on Natural Resources, *Interim Report to the 82nd Texas Legislature* 16–17 (Dec. 2010), *available at* www.house.state.tx.us/_media/pdf/committees/reports/82interim/House-Committee-on-Natural-Resources-Interim-Report-2010.pdf [hereinafter 2010 Interim Report]. See also Chapter 20 of this book discussing state water planning and Chapter 37 on financing water projects.

The TWDB also performs functions essential to the development and conservation of groundwater resources. The TWDB develops groundwater availability models (GAMs) for the state's aquifers. Tex. Water Code § 16.012(*l*). These computer models include comprehensive information about the aquifers that is critical to groundwater resource management. Local groundwater conservation districts are required to use GAM information, if available, in the development of their groundwater management plans. The GAMs also serve a key role in TWDB's verification of groundwater availability in the state and regional water planning process. This vital information is used in the groundwater management area joint planning process to determine desired future conditions (DFCs) of groundwater aquifers. Tex. Water Code § 36.108(d). See Chapter 19 of this book for a detailed discussion of development of GAMs and Chapter 21 for a discussion of the joint groundwater planning process. In addition to providing technical and administrative assistance in the adoption of DFCs and developing the GAMs, the board also conducts administrative reviews of DFC submissions, considers DFC petitions, holds public hearings, and assesses reasonableness of the DFCs.

The board conducts studies and is an important repository for data regarding the state's water resources, such as location, quantity, and quality. These studies and data are used to inform water planning and development. For example, at the request of the 84th Legislature in 2015, the board will soon embark on a study of the hydrology and geology of the state's aquifers to determine the quality and quantity of groundwater in the aquifers (specifically regarding salinity), how water moves between aquifers, and the contributions of aquifers to surface water flows. *See* Act of May 18, 2015, 84th Leg., R.S., ch. 159, § 1 (H.B. 1232), eff. May 28, 2015. Much of the data developed and maintained by the board is available on its Web site, www.twdb.texas.gov.

In another of its key functions, the TWDB administers several loan programs for financing the planning, design, construction, improvement, or expansion of water and wastewater facilities. TWDB financial assistance programs are funded through state-backed bonds, a combination of state bond proceeds and federal grant funds, or limited appropriated funds and are often provided at interest rates lower than the current market rate. These programs include—

- the State Water Implementation Fund of Texas,
- the Drinking Water State Revolving Fund,
- the Clean Water State Revolving Fund,
- the Texas Water Development Fund,
- the Water Infrastructure Fund,
- the Rural Water Assistance Fund,
- the Agricultural Water Conservation Grant and Loan Program,
- the Groundwater Conservation District Loan Program,
- the Economically Distressed Areas Program, and
- the State Participation Program.

See generally Texas Water Development Board, *Financial Assistance Programs*, www.twdb.texas.gov/financial/programs/index.asp.

The most recently added financial assistance program is the State Water Implementation Fund of Texas, commonly known as "SWIFT." In 2013, the legislature adopted the legislation creating the SWIFT program as a means to provide an additional funding source for water development projects in the state water plan. *See* Act of May 20, 2013, 83d Leg., R.S., ch. 207, § 2.01 (H.B. 4); Act of May 26, 2013, 83d Leg., R.S., ch. 836, § 33 (H.B. 1025); Tex. S.J. Res. 1, 83d Leg., L.S. (2013); Tex. Water Code ch. 15, subchs. G, H. The bills provide for the use of two million dollars from the state's Economic Stabilization Fund, also known as the "Rainy Day Fund," to support loans for projects contained in the state water plan. Texas voters overwhelmingly approved the constitutional amendment necessary to fund SWIFT in November 2013. The TWDB regulations implementing the SWIFT, which were adopted in November 2014, are found at 31 Texas Administrative Code chapter 353, subchapter M.

See also Chapter 37 of this book on financing water projects.

D. Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) is an executive agency formed in 1963 by merging the State Parks Board and Game and Fish Commission. *See* Tex. Parks & Wild. Code § 11.011. The TPWD's mission is to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing, and outdoor recreation opportunities for the use and enjoyment of present and future generations. Texas Parks and Wildlife Department, *Mission*, www.tpwd.state.tx.us/business/about/mission/.

The TPWD derives its authority over state water resources from various statutes in the Texas Parks & Wildlife Code and the Texas Water Code. The TPWD has primary responsibility for protecting the state's fish and wildlife resources. The agency regulates the taking and conservation of marine life and sand, gravel, and mud shell and protects fish in public waters. *See* Tex. Parks & Wild. Code §§ 1.011(d), 1.012. Resource protection activities include investigating fish kills and seeking restoration of lost resources; providing recommendations for protecting fish and wildlife resources to local, state, and federal agencies; and providing recommendations to the TCEQ on scheduling instream flows and freshwater inflows to Texas estuaries for the management of fish and wildlife resources. *See* Tex. Parks & Wild. Code § 12.0011; *see also* Texas Parks and Wildlife Department, *Statutory Authority*, www.tpwd.texas.gov/landwater/water/conservation/water_resources/legal/. The rules of the TPWD are contained in 31 Texas Administrative Code chapters 51 through 69.

The TPWD's direct regulation of water resources is limited to issuing approval for the removal of sand and gravel from riverbeds (*see* Tex. Parks & Wild. Code ch. 86; 31 Tex. Admin. Code §§ 69.101–.121) and the enforcement of prohibitions against operation of vehicles in riverbeds (*see* Tex. Parks & Wild. Code ch. 90).

The TPWD also has authority to enforce prohibitions against unauthorized discharges of waste into or adjacent to state waters and TCEQ rules, orders, or permits regulating discharges when such violations "affect aquatic life and wildlife." Tex. Water Code § 26.129. In such instances, the TPWD is authorized to bring suit to recover natural resource damages, as described in the statute. Tex. Water Code § 26.129.

The agency's major influence over water resources comes from its role as an advisor to the TCEQ and other state regulators, in the following ways:

- Through its mission of conserving the state's wildlife and wildlife habitats, the TPWD can employ voluntary programs or interagency agreements to attempt to increase water yield. This often occurs through private landowner watershed management programs that are administered by other agencies or river authorities. *See* Texas Parks and Wildlife Department, *Landowner Incentive Program (LIP)*, www.tpwd.state.tx.us/landwater/land/private/lip/.
- TPWD provides input to regional water planning groups and the TWDB during the development of state and regional water plans.
- In conjunction with the TWDB, the TWPWD established and maintains a bay and estuary data collection and evaluation program and conducts studies to determine bay conditions necessary to support a sound ecological environment. *See* Tex. Water Code § 16.058.
- With the TCEQ and the TWDB, the TPWD established and maintains an instream flow data collection and evaluation program. *See* Tex. Water Code § 16.059.

1. Decision-Making Body

The Texas Parks and Wildlife Commission consists of nine members of the public who are appointed by the governor with the advice and consent of the senate, one of whom is appointed to preside over the commission. Tex. Parks & Wild. Code §§ 11.012(a), 11.014(a). The members of the commission hold office for staggered terms of six years, with the terms of three members expiring every two years. Tex. Parks & Wild. Code § 11.013. The commission is required to meet quarterly and have an annual public meeting. Tex. Parks & Wild. Code § 11.015. The chief operating officer of the TPWD is its executive director, who is appointed by the commission. Tex. Parks & Wild. Code § 11.017.

The TPWD is currently organized into eleven divisions: Wildlife, Coastal Fisheries, Inland Fisheries, Law Enforcement, State Parks, Infrastructure, Legal, Administrative Resources, Communications, Human Resources, and Information Technology. *See* Texas Parks and Wildlife Department, *Divisions and Offices*, www.tpwd.state.tx.us/business/about/divisions/.

2. *Influence on Water Resources*

As previously stated, the TPWD regulates the removal of sediment from riverbeds. *See* Tex. Parks & Wild. Code ch. 86; 31 Tex. Admin. Code §§ 69.101–.121. The sediments include marl, sand, mud shell, gravel, or a combination. 31 Tex. Admin. Code § 69.102(9). Before disturbing or taking sediment from state water, a person must obtain a permit from the TPWD. *See* 31 Tex. Admin. Code § 69.104. Projects to restore or maintain the storage capacity of existing public water supplies, maintenance projects carried out by public utilities for noncommercial purposes, and public road projects of the Texas Department of Transportation are exempt from these permitting requirements. 31 Tex. Admin. Code § 69.120. The TPWD may issue general or individual permits. *See* 31 Tex. Admin. Code § 69.104. A general permit may be issued for a project that involves an insignificant disturbance or removal of sedimentary materials from the public waters of the state. 31 Tex. Admin. Code § 69.102(5). Such projects include pipeline construction and maintenance and other activities that necessitate the disturbance or removal of less than 1,000 cubic yards of sedimentary material and are not likely to affect a natural resource. 31 Tex. Admin. Code § 69.115(a). An application for an individual permit is more complex, requiring both a mailed and published notice. *See* 31 Tex. Admin. Code § 69.105(b). The applicant or a person with a "justifiable interest" may request a contested case hearing, which is referred to the State Office of Administrative Hearings. 31 Tex. Admin. Code § 69.107. The TPWD also issues permits for dredging in coastal waters. *See* 31 Tex. Admin. Code §§ 69.201–.209.

In addition to its regulatory function, the TPWD influences state water resource decisions by actively participating in decision-making processes at the TCEQ and providing support to it and other state agencies with water resource jurisdiction. The TPWD also monitors rule-making actions and regularly provides comments and suggestions for TCEQ rules.

a. Water Rights

In regard to water rights permitting, the TCEQ must send the TPWD a copy of all permit applications to store, take, or divert water. The TPWD must make recommendations to the TCEQ to protect fish and wildlife resources. The TPWD may be a full party in any hearing on an application to store, take, or divert water, and the TCEQ must consider information, evidence, and testimony offered by the TPWD. *See* Tex. Parks & Wild. Code § 12.024; Tex. Water Code § 11.147(f).

The TPWD has played a strong role in the arena of water rights through its participation in the development of environmental flow requirements pursuant to Senate Bill 3. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.13. The TPWD provided many of the tools used to determine instream flows and provides valuable technical experience. See Chapter 11 of this book for a discussion of the Senate Bill 3 instream flows requirements.

The Water Code contains several requirements for the TPWD's participation in the environmental flows process. The TPWD, the TWDB, and the TCEQ have joint responsibility for establishing and maintaining an instream flow data collection and evaluation program. The priority studies are to be completed by December 31, 2016. *See* Tex. Water Code § 16.059(d). A Texas Parks and Wildlife Commission member must serve on the Environmental Flows Advisory Group. Tex. Water Code § 11.0236(c)(3). The TPWD, the TWDB, and the TCEQ are required to provide written reports to the Environmental Flows Advisory Group describing agency responses to recommendations of the Science Advisory Committee of the Group. *See* Tex. Water Code § 11.02361(f). The staffs of the TPWD, the TWDB, and the TCEQ are required to provide technical assistance to each basin and bay expert science team and may serve as nonvoting members of the science teams. *See* Tex. Water Code § 11.02362(k).

b. State Water Planning

The TPWD also plays a role in the development of the state water plan and assists regional water planning groups in creating regional water plans. See Chapter 20 of this book for more on the state water planning process. Often, the TPWD can assist regional water planning groups with an accurate description of a natural resource, as required for regional water plans. *See* 31 Tex. Admin. Code § 357.11(e)(2).

c. Estuary Program

The TPWD works with other agencies to ensure the health of the state's bays and estuaries. It is required to participate and provide assistance in estuary programs. *See* Tex. Water Code § 5.605(a)(2). The TPWD and the TCEQ are required to review bay and estuary studies prepared by the TPWD and the TWDB to determine inflow conditions necessary for the bays and estuaries; the TPWD, the TCEQ, and the TWDB are authorized to establish an advisory council for each principal bay and estuary. *See* Tex. Water Code § 11.1491(a). The TPWD and the TWDB have joint responsibility for establishing and maintaining a bay and estuary data collection and evaluation program. Tex. Water Code § 16.058(a).

d. Edwards Aquifer Recovery Implementation Program

Recently, the TPWD has been active in the development of the Edwards Aquifer Recovery Implementation Program (EARIP). In 2007, Senate Bill 3 required the Edwards Aquifer Authority to cooperatively develop a recovery implementation program for threatened or endangered species associated with the aquifer through a facilitated, consensus-based process that involves input from the U.S. Fish and Wildlife Service (FWS), other appropriate federal agencies, and all interested stakeholders, including specifically the TPWD. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 12.06. Senate Bill 3 also mandated that the TPWD be a member of the EARIP Steering Committee and be a required signatory to all implementing agreements for the EARIP process. See Chapter 17 of this book for further discussion of the EARIP and Chapter 32 regarding the Endangered Species Act.

e. Water Quality

The TPWD also influences water resources in the area of water quality. The TPWD has been active in the TCEQ process for developing total maximum daily loads (TMDLs) for state waters. The TCEQ must develop and set water quality standards based on all quality-assured data obtained by the TCEQ, including the local watershed and river basin database, which is to be composed of data obtained from river authorities, wastewater discharge permit holders, state and federal agencies, and other relevant sources. *See* Tex. Water Code §§ 26.023, 26.0135. The TPWD plays a large role in periodic revisions of these standards, including formation of policy and development of rules and guidance. Texas Parks and Wildlife Department, *Statutory Authority*, *TPWD Involvement in Water Quality Issues*, http://tpwd.texas.gov/landwater/water/conservation/water_resources/legal/. (Other agencies' roles in the TMDL process are briefly discussed elsewhere in this chapter.) See Chapter 33 of this book for further discussion of TMDLs. The TPWD also has authority concurrent with the TCEQ to enforce water quality violations when violations may impact fish and wildlife. *See* Tex. Water Code §§ 7.109, 26.129. Additionally, the TPWD has statewide responsibility for the Natural Resource Damage Assessment (NRDA) Program, as a cotrustee of the state's natural resources (the NRDA Program is discussed in more detail later in this chapter). Texas Parks and Wildlife

Department, *Natural Resource Trustee Agencies*, www.tpwd.state.tx.us/landwater/water/environconcerns/damage_assessment/trustees.phtml.

f. State Scientific Areas

As a unique tool for protecting a particular water resource, the TPWD is authorized to create state scientific areas for the purposes of education, scientific research, and preservation of flora and fauna of scientific or educational value. *See* Tex. Parks & Wild. Code § 81.501. Until recently, only one state scientific area had been created, in Redfish Bay, established to protect seagrass. 31 Tex. Admin. Code § 57.921. However, in 2012 the TPWD adopted a rule creating the San Marcos River State Scientific Area, which is designed to protect Texas wild rice during low water flow periods as part of a larger EARIP plan for protection of all the Edwards Aquifer–related endangered species. 31 Tex. Admin. Code § 57.910; *see also* Texas Parks and Wildlife Department, *San Marcos River State Scientific Area Information Sheet*, *available at* www.tpwd.state.tx.us/publications/pwdpubs/media/cs_lf_p4000_1876.pdf.

E. Railroad Commission of Texas

The Railroad Commission of Texas (RRC) was established in 1891, pursuant to a constitutional amendment to regulate the railroads. Railroad Commission of Texas, *About RRC*, www.rrc.state.tx.us/about-us/. Over time, the commission has been given responsibility to oversee the activities of many different industries. Railroad Commission of Texas, *History of the Railroad Commission*, www.rrc.state.tx.us/about-us/history/. The RRC has primary regulatory jurisdiction over the oil and natural gas industry, pipeline transporters, the natural gas and hazardous liquid pipeline industry, natural gas utilities, the liquefied petroleum gas (LP-gas) industry, and coal and uranium surface mining operations. With regard to uranium exploration activities, the RRC, TCEQ, and groundwater conservation districts may all have regulatory jurisdiction. *See* Tex. Nat. Res. Code § 131.354. The primary statutes under which the RRC operates are the Texas Natural Resources Code, the Texas Water Code, the Texas Health and Safety Code, the Texas Utilities Code, and the Uranium and Coal Surface Mining and Reclamation acts contained in chapters 131 and 134 of the Natural Resources Code. The commission also has regulatory and enforcement responsibilities under federal law, including the Surface Coal Mining Control and Reclamation Act, the SDWA, the Pipeline Safety Act, the Resource Conservation Recovery Act, and the CWA. *See* Railroad Commission of Texas, *Railroad Commission Authority and Jurisdiction*, www.rrc.state.tx.us/about-us/resource-center/faqs/railroad-commission-authority-and-jurisdiction-faq/. The RRC's implementing regulations are in title 16, part 1, of the Texas Administrative Code.

The RRC plays an important role in water resources. RRC rules provide that "[n]o person conducting activities subject to regulation by the commission may cause or allow pollution of surface or subsurface water in the state." 16 Tex. Admin. Code § 3.8(b). Generally, under the memorandum of understanding (MOU) between the TCEQ and the RRC, where an activity would otherwise be regulated by the TCEQ, the RRC has jurisdiction if that activity is associated with the exploration, development, or production of oil, gas, or geothermal resources, including transportation of crude oil and natural gas by pipeline, and from solution brine mining activities. *See* 16 Tex. Admin. Code § 3.30(b)(2)(B)(i). For example, a discharge into or adjacent to water in the state is regulated by the RRC, instead of the TCEQ, when it is associated with one of these activities. The discharge cannot cause a violation of TCEQ water quality standards, but the RRC enforces a violation of those standards in this context. *See* 16 Tex. Admin. Code § 3.30(b)(2)(B).

The RRC also has jurisdiction over drilling, construction, operation, and closure of many injection wells, including those used for disposal of oil and gas waste and those used for enhanced recovery of oil or natural gas. The RRC implements and enforces rules related to the proper well spacing, drilling, cementing, casing, and plugging of these wells to protect groundwater resources. *See* 16 Tex. Admin. Code §§ 3.9, 3.13, 3.46, 3.95–.97.

Additionally, the RRC grants uranium exploration permits. *See* Railroad Commission of Texas, *Uranium Exploration Program*, www.rrc.state.tx.us/mining-exploration/programs/uranium-exploration-program. Uranium is found in a soluble form in aquifers in south Texas. The uranium exploration process involves drilling a number of exploration holes or wells into aquifer formations. Permits are required to protect groundwater from contamination during this process. The RRC retains jurisdiction over the exploration holes and wells until they are either plugged, registered with the TCEQ, or included in a TCEQ production area authorization. *See* Tex. Nat. Res. Code § 131.354(a); *see also* Tex. Water Code § 27.0513 (regarding production area authorizations). Statutes and rules under the RRC's uranium exploration program are contained in Natural Resources Code chapter 131, subchapter 1, and 31 Texas Administrative Code chapter 11.

1. Decision-Making Body

There are three commissioners; each is elected statewide for a six-year term, with one commissioner seeking election every two years. When a commissioner is appointed by the governor to fill an unexpired term, the appointee serves until the next general election, at which time the appointee may run for the remainder of the unexpired term. Railroad Commission of Texas, *Railroad Commissioners*, www.rrc.state.tx.us/about-us/commissioners/. The executive director, appointed by the commissioners, serves as the commission's chief administrative officer and is responsible for the overall operation of the commission.

2. Influence on Water Resources

a. Groundwater Production

Importantly, while groundwater conservation districts have wide authority over the production of groundwater within their local jurisdictions, their authority may be limited when the groundwater production is associated with the exploration, development, or production of oil or gas or with mining operations. *See* Tex. Water Code §§ 36.111, 36.117; *see also* Tex. Nat. Res. Code ch. 131 (uranium exploration), § 91.101 (injection water source wells).

b. Uranium Mining

The RRC shares jurisdiction with the TCEQ over uranium mining projects. Uranium is a naturally occurring element that exists in commercially viable quantities in only a few places in the United States; one of those places is south Texas. *In situ* uranium mining, which involves injection of fluid into wells, is primarily regulated by the TCEQ; however, the RRC regulates the initial exploration phase in which the regulated entity drills numerous boreholes into the underground formation to attempt to locate uranium deposits. *See* Tex. Nat. Res. Code ch. 131. As with any drilling into a groundwater-bearing formation, this exploration must be carefully regulated to ensure contaminants are not introduced into freshwater. RRC regulations related to uranium mining projects are designed to protect fresh groundwater from contamination from exploration activities. *See* Tex. Nat. Res. Code ch. 131; 16 Tex. Admin. Code ch. 11.

c. "Frac Water"

Management of water used for fracturing gas wells, or "frac water," has come under scrutiny recently because of a dramatic increase in gas production wells in the Barnett and Eagle Ford shales. A process known as hydraulic fracturing, or "fracking," frees the gas from the dense shale so that it can be produced. Water mixed with sand and small amounts of other chemicals is pumped in large volumes at high pressure into the shale formation, forcing its way into tiny cracks and spaces to extract the trapped gas. This area of regulation is evolving as lawmakers and regulators address concerns related to the volume of water used in the process, the effects of the process on groundwater quality, and reuse or disposal of frac water. For example, during the 2011 legislative session, the Texas Natural Resources Code was amended to require disclosure of the composition of hydraulic fracturing fluids, including reporting the quantity of water used, and it establishes a complex disclosure process. *See* Tex. Nat. Res. Code § 91.851. For additional discussion of hydraulic fracturing, see Chapter 40 of this book.

F. General Land Office

Formed by the Republic of Texas in 1836, the Texas General Land Office (GLO) is the oldest state agency. Part of the GLO's mission is to protect the environmental health of the state's coasts, including beaches, wetlands, and coastal preserves, and it is the lead agency for responding to coastal oil spills. *See* Texas General Land Office, *Environmental Protection*, www.glo.texas.gov/what-we-do/caring-for-the-coast/environmental-protection/.

1. Decision-Making Body

The commissioner of the GLO serves a four-year term and is elected statewide. The day-to-day operation of the agency is managed by the chief clerk. *See* Texas General Land Office, *Agency Administration*, www.glo.texas.gov/GLO/agency-administration/.

2. Influence on Water Resources

The GLO administers and directs all coastal discharge response and cleanup operations resulting from unauthorized discharges of oil pursuant to the Oil Spill Prevention and Response Act of 1991. *See* Tex. Nat. Res. Code. ch. 40. As a cotrustee of the state's natural resources, the GLO also has statewide responsibility for the NRDA Program. *See* Texas General Land Office, *Natural Resources Damage Assessment (NRDA) Trustee Program*, www.glo.texas.gov/what-we-do/caring-for-the-coast/natural-resource-restoration/nrda-trustees.html [hereinafter *NRDA Trustee Program*].

The NRDA Program is the legal and technical process designed to restore the damaged area and ensure that responsible parties pay for restoring the affected area. The GLO NRDA trustees act on behalf of the public to identify the injured natural resources and determine the extent of the impact. They also recover damages from the responsible party to plan and carry out restoration activities. *See NRDA Trustee Program*. The GLO's NRDA rules are located in 31 Texas Administrative Code chapter 20.

The GLO's Nonpoint Source Pollution Control Program is designed to control polluted runoff from activities related to forestry, agriculture, urban areas, marinas, shoreline and stream channel modification, and wetlands and vegetated shorelines, or riparian areas. The GLO works with local communities, the TCEQ, and the Texas State Soil and Water Conservation Board (TSSWCB) to develop, fund, and implement nonpoint source pollution control projects. *See* Texas General Land

Office, *Anti-Pollution Efforts*, www.glo.texas.gov/what-we-do/caring-for-the-coast/environmental-protection/anti-pollution-efforts.html.

The GLO is also responsible for the administration of the Coastal Management Program (CMP). The CMP is based on the Coastal Coordination Act of 1991. *See generally* Tex. Nat. Res. Code ch. 33. The boundaries of the coastal zone are set out in 31 Texas Administrative Code section 503.1. The Texas coastal zone is generally the area seaward of the Texas coastal facility designation line, up to three marine leagues into the Gulf of Mexico. *See* National Oceanic and Atmospheric Administration, *Coastal Zone Management Programs*, http://coast.noaa.gov/czm/mystate/#texas. The National Oceanic and Atmospheric Administration approved Texas's CMP in 1996. The CMP links federal, state, and local activities along the coast pursuant to the federal Coastal Zone Management Program, discussed later in this chapter. *See* Texas General Land Office, *Coastal Management Program*, www.glo.texas.gov/what-we-do/caring-for-the-coast/grants-funding/cmp/. The GLO administers the CMP in conjunction with the Coastal Coordination Advisory Committee, discussed later in this chapter. The GLO acts as the lead agency to coordinate and implement the CMP for the management of uses affecting coastal natural resource areas, in cooperation with other state agencies that have duties relating to coastal matters such as the TCEQ and TPWD. *See* Tex. Nat. Res. Code § 33.052. Originally, another state agency, the Coastal Coordination Council, administered the CMP. As a result of the sunset process, the Texas legislature in 2011 transferred this responsibility to the GLO, abolished the Coastal Coordination Council, and established the Coastal Coordination Advisory Committee, discussed later in this chapter. *See* Texas General Land Office, *Coastal Coordination Advisory Committee*, www.glo.texas.gov/GLO/boards-and-commissions/coastal-coordination-advisory-committee/index.html. In addition to the GLO, the TPWD, and the TCEQ, the following state agencies implement the goals and policies of the CMP through their statutory authorities: the RRC, the Texas Department of Transportation, the Texas Historical Commission, the PUC, the TWSSWCB, and the TWDB. *See* General Land Office, *Texas Coastal Management Program Routine Program Changes from January 1, 1997 through December 31, 2011* 5 (Dec. 2013), *available at* www.glo.texas.gov/what-we-do/caring-for-the-coast/_documents/grants-funding/cmp/2013-texas-coastal-management-change-submission.pdf.

Some of the elements included in the CMP are—

- identification of the boundaries of the coastal zone subject to the CMP;
- a continuous analysis of the potential uses for the land and water within the coastal zone, and recommendations about which configurations of uses maximize the benefits conferred on citizens;
- guidelines on the priority of uses within the coastal zone and a list of the uses of the land and water within the coastal zone that are permissible under state law and that would have a direct and significant impact on the coastal waters; and
- a procedure for determining the consistency of an agency or subdivision action or a federal agency action or activity or outer continental shelf plan with the goals and policies of the CMP.

See, e.g., Tex. Nat. Res. Code § 33.053(1)–(3), (11).

In administering the CMP, the GLO—

- may review an agency action, such as a proposed rule, or a permit for consistency with the CMP, including holding a hearing and making findings necessary to a complete and thorough review:
- must, in coordination with other agencies and subdivisions, prepare an annual report on the effectiveness of the CMP; and
- may award grants to projects that further the goals and policies of CMP.

See Tex. Nat. Res. Code §§ 33.204, 33.205.

If an agency permit or action is determined to be inconsistent with the CMP, the land commissioner must report his findings to the agency. Tex. Nat. Res. Code § 33.206(b). If the agency does not modify or amend the proposed permit or action to be consistent with the goals and policies of the CMP, the commissioner must request an attorney general opinion on the consistency of the proposed permit or action with the CMP. Tex. Nat. Res. Code § 33.206(c). If the attorney general finds that the proposed permit or action is inconsistent and the agency still declines to modify or amend it, the attorney general must file suit against the agency in a Travis County district court. *See* Tex. Nat. Res. Code § 33.208(b).

G. Department of Licensing and Regulation

The Texas Department of Licensing and Regulation (TDLR) is the state's umbrella occupational agency. *See* Tex. Occ. Code § 51.051(a). The TDLR regulates occupations that include water well drillers and water well pump installers. *See* Tex. Occ. Code chs. 1901, 1902. In this regard, the Water Well Drillers and Pump Installers Advisory Council advises the department. *See* Tex. Occ. Code § 1901.109.

1. Decision-Making Body

The TDLR Commission has seven members, appointed by the governor for staggered six-year terms. *See* Tex. Occ. Code §§ 51.052(a), 51.055(a). In turn, the nine members of the Water Well Drillers and Pump Installers Advisory Council are appointed by the presiding officer of the Texas Commission of Licensing and Regulation, with the commission's approval. Tex. Occ. Code § 1901.101(a). A member of the advisory council serves a six-year term, with the term expiring September 15. Tex. Occ. Code § 1901.104. The executive director of the TDLR, in addition to performing any duties assigned by the commission, administers and enforces the department's programs and issues the licenses. Tex. Occ. Code § 51.103(a).

2. Influence on Water Resources

The TDLR helps protect the state's water resources through its jurisdiction over water well drillers and water well pump installers. The purpose of the TDLR's rules is to provide procedural and substantive requirements for the licensing, complaint procedures, continuing education, and technical standards for well drillers and pump installers and to ensure the quality of the state's groundwater for the safety and welfare of the public. 16 Tex. Admin. Code § 76.1. In general, a person may not drill a water well or install a pump without a license from the TDLR. *See* 16 Tex. Admin. Code § 76.20. The TDLR issues water well licenses pursuant to chapters 1901 and 1902 of the Texas Occupations Code and its rules in 16 Texas Administrative Code chapter 76. To obtain a license, an applicant must meet experience requirements and pass an examination. *See* 16 Tex. Admin. Code §§ 76.21, 76.23. Licensees must also complete continuing education requirements in order to renew their licenses. 16 Tex. Admin. Code § 76.25. The TDLR rules are designed to ensure that water well drillers and pump installers will not present a serious risk of pollution to a groundwater source. By ensuring that only qualified persons drill water wells into groundwater-bearing formations or install pumps, the TDLR serves an important role in protecting groundwater quality.

The TDLR's rules also include notification requirements for instances when a driller or pump installer encounters water injurious to vegetation, land, or other water. In such cases, the well must be plugged, repaired, or properly completed to avoid injury or pollution. *See* 16 Tex. Admin. Code §§ 76.71, 76.101, 76.104. This, along with other reporting requirements, helps the agencies with water resource jurisdiction develop information about water wells and groundwater quality. The TDLR has authority to enforce its rules for licensees using administrative penalties. *See* 16 Tex. Admin. Code § 76.90. The TDLR's rules also contain specific technical requirements for drilling, cementing, casing, and capping wells. These rules help protect groundwater from contamination that could be introduced through the well if proper procedures are not followed.

Another function of the TDLR is to assist in the location and remediation of abandoned or deteriorated wells. There are water wells on private property all over the state that were drilled before regulation. Many have not been used or maintained. When such a well is identified, such as by a complaint, the TDLR works with the TCEQ and local groundwater conservation districts to investigate and bring the landowner into compliance. *See* 16 Tex. Admin. Code § 76.111 (MOU between the TDLR, the TCEQ, and groundwater conservation districts).

Rainfall is also a water resource, which, as a part of the water cycle, affects surface water flows and groundwater recharge. The TDLR plays a role in regulating water resources through its jurisdiction over weather modification activities, sometimes referred to as "cloud seeding." The term "weather modification and control" is defined by TDLR rules as "[c]hanging or controlling, or attempting to change or control, by artificial methods the natural development of atmospheric cloud forms or precipitation forms that occur in the troposphere." 16 Tex. Admin. Code § 79.10(7). A person must obtain a license from the TDLR before beginning any weather modification project. 16 Tex. Admin. Code § 79.11(a). Before issuing a permit, the TDLR must find that "the operation proposed in the application will not significantly dissipate the clouds and prevent their natural course of developing rain in the area where the operation is to be conducted to the material detriment of persons or property in that area." 16 Tex. Admin. Code § 79.21(a)(1).

H. Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board (TSSWCB) is the state agency "that administers Texas' soil and water conservation law and coordinates conservation and nonpoint source pollution abatement programs throughout the State." Texas State Soil and Water Conservation Board, *About the TSSWCB*, www.tsswcb.texas.gov/en/aboutus [hereinafter *About the TSSWCB*]. In reaction to the Dust Bowl of the 1930s, the Texas legislature created the TSSWCB in 1939 to organize the state into soil and water conservation districts (SWCDs). *See About the TSSWCB*; *see also* Texas State Soil and Water Conservation Board, *Texas Soil and Water Conservation Districts*, www.tsswcb.texas.gov/en/swcds [hereinafter *Texas Soil and Water Conservation Districts*]. The TSSWCB is the state counterpart to the federal Natural Resources Conservation Service, discussed later in this chapter. The mission of the TSSWCB is "working in conjunction with local soil and water conservation districts, to encourage the wise and productive use of natural resources." *About the TSSWCB*; *see also* Tex. Agric. Code § 201.001(d). The bulk of the TSSWCB's activities "involve making grants of state funds, on a cost-share basis, to landowners to address water quality issues and public safety concerns about flood control structures throughout the state." Sunset Advisory Commission, *Report to the 82nd Legislature* 140 (Feb. 2011), *available at* www.sunset.texas.gov/review-cycles/2010-2011-review-cycle. Rules related to the TSSWCB are contained in 31 Texas Administrative Code chapters 517–529.

1. Decision-Making Body

The TSSWCB is governed by a seven-member board. Five board members are elected by soil and water conservation district directors in the state district they represent. *See About the TSSWCB*; Tex. Agric. Code § 201.011(1). These board members serve two-year staggered terms. Tex. Agric. Code § 201.015(a). Two board members are appointed by the governor. Tex. Agric. Code § 201.011(2). The executive director of the TSSWCB, appointed by the board, oversees the day-to-day functions of the agency. The TSSWCB is headquartered in Temple and has five district offices.

The TSSWCB provides assistance to the state's 216 SWCDs. Each SWCD is an independent political subdivision of the state government, brought into existence by a vote of the landowners within the boundaries of the district. An SWCD is governed by a board of five directors who are elected by rural landowners in the district. The SWCDs are actively involved in soil and water conservation activities, such as operation and maintenance of flood control structures. The SWCDs do not have taxing authority and rely on funds from the TSSWCB. The SWCDs can be contacted through their local U.S. Department of Agriculture (USDA) Natural Resources Conservation Service or USDA Service Center. Texas State Soil and Water Conservation Board, *Soil and Water Conservation Districts*, www.tsswcb.texas.gov/swcds/info.

2. Influence on Water Resources

Water management is an integral part of soil conservation. The SWCDs play a vital role in one of the earliest federal programs, the Watershed Protection and Flood Prevention Program, which is administered by the Natural Resources Conservation Service (NRCS) (discussed later in this chapter). The NRCS, over the course of sixty years, has designed and constructed nearly 2,000 floodwater retarding structures, or dams, in Texas. *See* Texas State Soil and Water Conservation Board, *Flood Control Programs*, www.tsswcb.texas.gov/en/floodcontrol [hereinafter *Flood Control Programs*]. In addition, the NRCS has assisted watershed sponsors in the installation of land treatment practices, channel improvements, and dikes for watershed protection. *See* Natural Resources Conservation Service, *Texas Watershed Protection and Flood Prevention Program*, www.nrcs.usda.gov/wps/portal/nrcs/detail/tx/programs/?cid=nrcs144p2_002884. These structures are built with the understanding that the private property owner provides the land, the federal government provides the technical design expertise and the funding to construct them, and then units of local government (local sponsors) are responsible for maintenance. See the discussion of NRCS dams in Chapter 39 of this book. The SWCDs, along with a "taxing" partner (e.g., county, water control and improvement district), are the local sponsors. The TSSWCB administers the Operation and Maintenance Grant and Structural Repair Grant Programs to assist the SWCDs and certain other cosponsors in meeting their obligations. *See Flood Control Programs*; *see also* 31 Tex. Admin. Code ch. 529.

Another water management program is the Brush Control Program, the premise of which is that selective control of brush species can yield substantial water over significant portions of the state. *See* Tex. Agric. Code ch. 203. The TSSWCB provides funding, on a cost-share basis, to landowners in identified priority watersheds, often in cooperation with the NRCS through its Environmental Quality Incentives Program. Natural Resources Conservation Service, *How EQIP Works in Texas*, www.nrcs.usda.gov/wps/portal/nrcs/detail/tx/newsroom/releases/?cid=nrcs144p2_002784.

The TSSWCB, along with the SWCDs, is instrumental in meeting the environmental mandates in the CWA and the SDWA. The TSSWCB is the lead state agency for planning, implementing, and managing programs and practices for abating agricultural and silvicultural nonpoint source (NPS) pollution. Tex. Agric. Code § 201.026(a), (b). Responsibilities of the TCEQ and TSSWCB related to point and NPS pollution are contained in an MOU at 30 Tex. Admin. Code § 7.102. Correspondingly, the TSSWCB manages the agricultural and silvicultural portions of the Coastal Coordination Advisory Committee, discussed later in this chapter. *See* Texas State Soil and Water Conservation Board, *Coastal Nonpoint Source Pollution Control Program*, www.tsswcb.texas.gov/en/coastalnps.

The CWA requires states to have an NPS management program. *See* 33 U.S.C. § 1329. The Environmental Protection Agency (EPA), through CWA section 319 grants, provides federal funding that is equally split between the TCEQ and the TSSWCB to implement the Texas NPS management program. Texas State Soil and Water Conservation Board, *Texas Nonpoint Source Management Program*, www.tsswcb.texas.gov/en/managementprogram [hereinafter *Texas Nonpoint Source Management Program*].

To address NPS pollution, Texas uses a "watershed" approach. *See Texas Nonpoint Source Management Program*. The TSSWCB focuses its efforts on a subset of the CWA section 303(d) impaired waters where agricultural or silvicultural NPS pollution is contributing to water quality impairment. A list of watersheds is available at the TSSWCB's Web site at www.tsswcb.texas.gov/watersheds. The TSSWCB applies the watershed approach through the Total Maximum Daily Load Program and the Watershed Protection Plan (WPP) Program.

TMDLs are an estimate by the state of the pollutants that an impaired water body can receive. TMDLs are discussed elsewhere in this chapter and also in Chapter 33 of this book. The TSSWCB and the TCEQ share responsibility for developing and implementing TMDLs and have entered into an MOU, which may be found on the TSSWCB's Web site at www.tsswcb.texas.gov/files/contentimages/MOA_20060927.pdf. The agencies, through a public stakeholder process, develop an Implementation Plan (I-Plan) to achieve the goals of the TMDL in the watershed. The I-Plan recommends best management practices (BMPs) for nonpoint sources. Texas State Soil and Water Conservation Board, *Total Maximum Daily Load Program*, www.tsswcb.texas.gov/en/tmdl.

A WPP is "a coordinated framework for implementing prioritized and integrated water quality protection and restoration strategies driven by environmental objectives." Texas State Soil and Water Conservation Board, *Watershed Protection Plan Program*, www.tsswcb.texas.gov/en/wpp [hereinafter WPP Program]. Through this program, the state encourages stakeholders to "holistically address all of the sources and causes of impairments and threats to both surface and groundwater resources within a watershed." WPP Program. The TCEQ and the TSSWCB provide technical and financial assistance to develop the WPPs, which follow EPA guidance. *See* Environmental Protection Agency, *Nonpoint Source Program and Grants Guidelines for States and Territories* (issued Apr. 12, 2013), *available at* http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf. The WPP must coordinate with the development of a TMDL and the I-Plan; however, in some instances, a WPP may be used in lieu of a TMDL. *See* WPP Program.

The main mechanism for implementing these TMDLs and WPPs is Water Quality Management Plans (WQMPs). The TSSWCB, through the local SWCDs, develops, supervises, and monitors individual WQMPs for agricultural and silvicultural lands. Through the WQMPs, which are voluntary and incentive-based, agricultural producers and other rural landowners implement best management practices. *See* Texas State Soil and Water Conservation Board, *Water Quality Management Plan Program*, www.tsswcb.texas.gov/en/wqmp. There are specific requirements for poultry WQMPs. *See* Texas State Soil and Water Conservation Board, *Poultry WQMP Program*, www.tsswcb.texas.gov/en/poultry. The TSSWCB and SWCDs work closely with the federal NRCS on WQMPs, which are certified by the SWCD, local NRCS, and the TSSWCB. *See* Texas State Soil and Water Conservation Board, *Self Evaluation Report for the Texas Sunset Advisory Commission*, at 3 (Sept. 21, 2009), *available at* www.tsswcb.texas.gov/files/docs/admin/Sunset2009/1-FINAL%202009%20TSSWCB%20Sunset%20SER.pdf.

I. Coordination between State Agencies

1. Memoranda of Understanding

Because each of the agencies discussed above exercises jurisdiction over water in the state, their roles and responsibilities often intersect. Where the agencies' jurisdictions abut, it is necessary to draw a fine line delineating authority. To that end, Texas state agencies often adopt memoranda of understanding (MOUs). The MOUs clarify and provide for the respective duties, responsibilities, or functions on any matter under either agency's jurisdiction that is not otherwise expressly assigned. MOUs between the TCEQ and other state agencies are adopted by rule. *See* Tex. Water Code § 5.104(b).

As the primary state-level environmental agency, the TCEQ has MOUs with several other state agencies, including the TWDB, the TPWD, the RRC, the TSSWCB, and the TDLR. These MOUs or references to their location are found in the TCEQ's rules at 30 Texas Administrative Code chapter 7. Reading the appropriate MOU may be beneficial when questions of regulatory jurisdiction arise.

2. Water Conservation Advisory Council

Water conservation is essential to management of scarce water resources. A new emphasis was placed on conservation in 2007 when Senate Bill 3 created the Water Conservation Advisory Council and directed the TWDB to appoint the members. *See* Water Conservation Advisory Council, *About Us*, www.savetexaswater.org/about/index.htm. The council was created to provide to lawmakers, policymakers, and the public a water conservation resource. Tex. Water Code § 10.002. The council is composed of twenty-three members appointed by the TWDB who represent different entities and interest groups, including the TCEQ, the Texas Department of Agriculture, the TPWD, the TSSWCB, the TWDB, regional water planning groups, federal agencies, groundwater conservation districts, river authorities, and environmental groups. *See* Tex. Water Code § 10.003(a).

The council's powers and duties are—

1. monitoring trends in water conservation implementation;
2. monitoring new technologies for possible inclusion in the TWDB's best management practices guide;
3. monitoring the effectiveness of the state and local water conservation public awareness programs;
4. establishing a state water management resource library;
5. establishing a public recognition program for water conservation;
6. monitoring the implementation of regional water plan water conservation strategies; and
7. monitoring water conservation target and goal guidelines to be considered by the TWDB and the TCEQ.

See Tex. Water Code § 10.010.

By December 1 of each even-numbered year, the council submits a report on progress made in water conservation to the governor, lieutenant governor, and speaker of the house of representatives. Tex. Water Code § 10.011. See Chapter 23 of this book for further discussion of water conservation.

3. Coastal Coordination Advisory Committee

The Coastal Coordination Advisory Committee (CCAC), established in 2011 as part of the legislation abolishing the Coastal Coordination Council, advises the GLO on matters related to the Texas CMP. The twelve-member council is composed of one member from each of the seven state natural resource agencies, including the GLO, TCEQ, TWDB, TPWD, RRC, TSSWCB, and the Texas Transportation Commission; four members appointed by the land commissioner who represent specific coastal interests; and one nonvoting member representing the Texas Sea Grant College Program. *See* Tex. Nat. Res. Code § 33.2041.

As discussed above, the GLO is responsible for reviewing agency actions that may adversely affect a coastal natural resource to ensure that they comply with the goals and policies of the CMP. The land commissioner will review an agency action if a member of the CCAC contests the consistency determination for the proposed action in an administrative hearing or if three voting members of the CCAC agree that there is a significant unresolved dispute regarding the proposed action's consistency with the goals and policies of the CMP, and the matter is referred to the land commissioner for review. *See* Tex. Nat. Res. Code § 33.205(c). CCAC members may also be involved in a preliminary review of a permit or proposed action for consistency with the CMP. *See* Tex. Nat. Res. Code § 33.205(f)(1). CCAC members may request additional information from a federal agency or request that the land commissioner review a federal action, activity, or outer continental shelf plan because of concerns about consistency with the CMP. *See* Tex. Nat. Res. Code § 33.206(d), (e).

4. Drought Preparedness Council

The Drought Preparedness Council is composed of representatives from twelve agencies or groups, including the TCEQ, the TWDB, the TPWD, and the TSSWCB. *See* Tex. Water Code § 16.055(b). It is responsible for—

1. assessing and public reporting of drought and water supply conditions;
2. advising the governor on significant drought conditions;
3. making recommendations for the state's response to drought-related disasters for inclusion in the state emergency management plan and the state water plan;
4. advising the regional water planning groups on drought-related issues;
5. ensuring effective coordination among state, local, and federal agencies in drought-response planning; and
6. reporting to the legislature, not later than January 15 of each odd-numbered year, regarding significant drought conditions in the state.

Tex. Water Code § 16.055(e).

The council is required to develop and implement a comprehensive state drought preparedness plan for mitigating the effects of drought and to periodically update the plan. Tex. Water Code § 16.0551(a). The plan is designed to facilitate the flow of information between agencies, define duties and responsibilities of various players in responding to drought conditions, and ensure coordination between the state and federal governments regarding drought policy. *See* Tex. Water Code § 16.0551(b). A copy of the current drought preparedness plan is available at the Texas Department of Public Safety's Web site at www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/droughtPrepPlan.pdf. See Chapter 22 of this book for further discussion of drought planning and response.

J. The Texas Legislature

The Texas legislature meets for 140 days every two years. Each legislative session, hundreds of bills are filed that have the potential to affect the law of water resources. After being filed, these bills may be assigned to certain standing committees for consideration and possible action. Bills related to water resources are generally assigned to certain standing committees in the Senate and certain standing committees in the House, as discussed below. Although these are not state agencies, they are state-level committees that influence the development of the body of law used by the state agencies that regulate water resources.

1. House Committees

In the Texas House of Representatives, water-related bills are primarily referred to the nine-member Environmental Regulation Committee or the eleven-member Natural Resources Committee (or its five-member subcommittee on Special Water Districts). A water-related bill may also be referred to the Special Purpose Districts Committee, Appropriations Committee (if it concerns funding), or the State Affairs Committee (if it involves matter of state policy, the administration of state government, or other high-profile or big-picture issues). Each session the House adopts a resolution setting out its rules, including the jurisdiction of each of its standing committees. *See, e.g.*, Tex. H.R. 4, 83d Leg., R.S. (2015).

Among other issues, the House Environmental Regulation Committee has jurisdiction over water pollution, including the environmental regulation of industrial development, environmental matters that are regulated by the TCEQ, and oversight of the TCEQ as it relates to environmental regulation.

Also, the House Natural Resources Committee and its subcommittee on Special Water Districts have jurisdiction over all matters pertaining to—

- natural resources conservation;
- appropriation, allocation, and development of land and water resources;
- water districts and authorities;
- the TCEQ's regulation of water resources; and
- river compacts, the Multi-State Water Resources Planning Commission, and the TWDB.

2. *Senate Committees*

At the beginning of each session, the Senate adopts a resolution laying out its rules. This resolution includes a list of the standing committees and the number of members on each. *See, e.g.*, Tex. S.R. 4, 83d Leg., R.S. (Tex. 2013). Through the 83rd legislative session in 2013, bills related to water resources were referred primarily to the eleven-member Senate Natural Resources Committee. However, with the 84th legislative session in 2015, a new Senate Committee on Agriculture, Water, and Rural Affairs was created, and the Senate Natural Resources Committee was renamed the Senate Natural Resources and Economic Development Committee. The new Agriculture, Water, and Rural Affairs committee is now hearing most water-related bills. Some water-related bills are heard by the Senate Natural Resources and Economic Development Committee. For example, items related to the economic regulation of water and sewer service and the use of groundwater for power generation and mining, as well as bills related to environmental permitting procedures, were referred to the Senate Natural Resources and Economic Development Committee during the 2015 legislative session. Unlike the House committees, there is no written delineation of the jurisdiction of each Senate committee.

III. Federal Regulatory Authorities with Jurisdiction over Water Resources

The interplay between the state and federal government is an important consideration in the water resource arena. Texas avoids the tussles over ownership of lake- and streambeds that occur between the federal government and the western states because Texas retained its public lands when it entered the Union. The federal government controls so few lands within the state that its role is limited in water supply and water rights matters. *See* Anthony S. Corbett, *The Players—Who's Who in Water Rights* 1, *in Water Rights Boot Camp* (State Bar of Texas 2006). See also Chapter 3 of this book. This is not to say, however, that the federal government is without influence over Texas's water resources. The federal government has the authority to apportion interstate waters and sets national standards for a variety of water-related environmental programs. Federal agencies also affect water conservation, storage, development, control, and supply. *See* Corbett, at 1. This section provides a brief summary of a variety of the main federal regulatory authorities with jurisdiction over water resource issues.

A. The United States Environmental Protection Agency

Established in 1970, the EPA conducts federal research, monitoring, standard-setting, and enforcement activities to ensure environmental protection. The mission of the EPA includes the protection of the nation's waters, and it carries out both regulatory and voluntary programs to fulfill this mission. *See* Environmental Protection Agency, *About EPA*, *EPA History*, www2.epa.gov/aboutepa/epa-history. After the attacks on September 11, 2001, the EPA's mission expanded beyond safeguarding these natural resources from traditional sources of pollution or calamity to include protecting the nation's drinking water and wastewater infrastructure from terrorist attacks. *See* Environmental Protection Agency, *Basic Information About Water Security*, http://water.epa.gov/infrastructure/watersecurity/basicinformation.cfm.

1. Organizational Structure

The EPA is an independent agency of the Executive Branch, headed by an administrator who is appointed by the President with the advice and consent of the Senate. In addition to the Office of the Administrator, there are twelve headquarters offices and ten regional offices. The headquarters' Office of Water is responsible for the agency's water quality activities. The Office of Water—

> is responsible for implementing the Clean Water Act and Safe Drinking Water Act, and portions of the Coastal Zone Act Reauthorization Amendments of 1990, Resource Conservation and Recovery Act, Ocean Dumping Ban Act, Marine Protection, Research and Sanctuaries Act, Shore Protection Act, Marine Plastics Pollution Research and Control Act, London Dumping Convention, the International Convention for the Prevention of Pollution from Ships and several other statutes.

Environmental Protection Agency, *About the Office of Water*, www2.epa.gov/aboutepa/about-office-water. Within the Office of Water are the Office of Ground Water and Drinking Water, the Office of Science and Technology, the Office of Wastewater Management, and the Office of Wetlands, Oceans and Watersheds.

Texas is part of the EPA's Region 6, which is headquartered in Dallas and also encompasses Arkansas, Louisiana, New Mexico, and Oklahoma. Region 6 is headed by a regional administrator who is appointed by the President. Within EPA Region 6, the Water Quality Protection Division and the Water Enforcement Branch (part of the Compliance Assurance and Enforcement Division) deal the most directly with water issues. The Water Quality Division provides oversight of the water programs. *See* Environmental Protection Agency, *Water Programs*, www.epa.gov/region6/water/index.htm. The Water Enforcement Branch "assures compliance and takes appropriate enforcement action against facilities for violations of the Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) within EPA Region 6." Environmental Protection Agency, *Region 6 South Central Water Enforcement*, www.epa.gov/region6/6en/w/index.html. Other areas within EPA Region 6, such as the Superfund Division, which includes the spill response program, also address the quality of water resources. Attorneys in the Office of Regional Counsel assist on the legal aspects of the water programs.

The jurisdiction of the EPA is derived from statute. *See National Pork Producers Council v. United States Environmental Protection Agency*, 635 F.3d 738 (5th Cir. 2011) (EPA regulations found to exceed statutory authority). The EPA's rules are contained in title 40 of the Code of Federal Regulations.

2. Influence on Water Resources

As mentioned in the discussion of the EPA's Office of Water above, the EPA has a role under a number of statutes and treaties. A full discussion of the EPA's programs is beyond the scope of this chapter; however, a few of the more significant programs are briefly summarized. In the area of water resources, the EPA's responsibilities include the regulation of discharges of pollutants into waters of the United States, addressing nonpoint sources, setting drinking water standards, and regulation and protection of wetlands. The EPA obtains its authority for these duties under the CWA, 33 U.S.C. §§ 1251–1387 (see Chapters 2, 33, 34, and 35 of this book) and the SWDA, 42 U.S.C. §§ 300f–300j-26 (see Chapter 30 of this book). A number of duties established by the CWA and the SWDA may be delegated to a state, and in such instances the EPA plays a lesser role. See discussion above regarding delegation of authority.

a. Clean Water Act

Key to the EPA's jurisdiction under the CWA is whether the water body is considered "waters of the United States." This determination can be hotly contested. The EPA and U.S. Army Corps of Engineers (Corps) jointly issued proposed rules to clarify the definition of "waters of the United States." *See* Environmental Protection Agency and U.S. Army Corps of Engineers, *Definition of "Waters of the United States" Under the Clean Water Act*, 76 Fed. Reg. 22,188 (Apr. 21, 2014); *see also* Environmental Protection Agency, *Clean Water Rule*, www2.epa.gov/cleanwaterrule. (The Corps' role is discussed below.) See Chapter 35 of this book for further discussion of "waters of the U.S."

The CWA was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). There are three CWA permitting programs that regulate point sources that discharge pollutants into the waters of the United States: the section 402 National Pollutant Discharge Elimination System (NPDES) permits program, the section 404 dredge and fill permits, and the section 401 state certification program. *See* 33 U.S.C. §§ 1341, 1342(a), 1344; *see also* 33 U.S.C. § 1311(a) (prohibiting unauthorized discharge of oil or hazardous substances).

i. National Pollutant Discharge Elimination System Program

Section 402 of the CWA authorizes the EPA to issue NPDES permits to control water pollution by regulating point sources that discharge pollutants into the waters of the United States. *See* 33 U.S.C. § 1342. The EPA may delegate the NPDES program to the states to administer. *See* 33 U.S.C. § 1342(b). This authority has been delegated to the TCEQ along with the state pretreatment program, the general permits program, and the biosolids program. *See* Environmental Protection Agency, *Specific State Program Status*, http://water.epa.gov/polwaste/npdes/basics/State-Program-Status.cfm. The EPA retains oversight of the program and has the authority, in certain circumstances, to object to the NPDES permit. *See* 33 U.S.C. § 1342(c),(d).

The NPDES program is the key means by which the EPA implements the CWA's two fundamental approaches to control water pollution: technology-based regulations and water quality standards. *See* 33 U.S.C. §§ 1311, 1313, 1316, 1317. Technology-based regulations (effluent limitations) seek to reduce pollution by requiring a discharger to effectuate equipment or process changes, without reference to the effect on the receiving water; state-adopted water quality standards fix the permissible level of pollution in a specific body of water regardless of the source of pollution. *See* 33 U.S.C. §§ 1311, 1313, 1316, 1317.

There are a number of technology standards, including the best practicable control technology currently available (BPT), applicable to discharges of conventional pollutants to surface water by existing sources (and the baseline for control applicable in all circumstances); best available technology economically achievable (BAT), applicable to toxic and nonconventional pollutants by existing sources; and new source performance standards (NSPS), applicable to new sources discharging into surface waters. See Environmental Protection Agency, Frequent Questions, http://water.epa.gov/scitech/wastetech/guide/questions_index.cfm. The EPA promulgates the technology effluent limitations on an industry-by-industry basis. *See* 40 C.F.R. pts. 401–610. For a discussion of the TCEQ's use of these standards, see Chapter 34 of this book.

As for the water quality component, the CWA provides for the states to establish the water quality standards that consist of (1) the designated use(s) of a water body, (2) the water quality criteria necessary to protect the use(s), and (3) an antidegradation policy. *See* 33 U.S.C. §§ 1311(b)(1)(C), 1313. See Chapter 33 of this book. The designated use(s) (e.g., public water supply, recreation, agriculture) should allow for "the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water" (fishable/swimmable standard). 40 C.F.R. § 131.2. If the designated use(s) does not include the fishable/swimmable standard, the state must submit a use attainability analysis to demonstrate that obtaining that standard is not feasible. *See* 40 C.F.R. § 131.10(g), (j); Environmental Protection Agency, *Use Attainability Analyses (UAAs)*, http://water.epa.gov/scitech/swguidance/standards/uses/uaa/index.cfm. The designated use(s) and the use attainability analysis are subject to the EPA's review and approval, as discussed below. For the specifics on use designations in Texas, see Chapter 33 of this book.

The water quality criteria, either numeric or narrative, are then derived by the state from the designated use(s)—the maximum concentrations of pollutants that could occur without jeopardizing the use. *See* 33 U.S.C. §1313(c). For narrative statements, states must develop a mechanism for translating or interpreting them into numeric limits. *See* 40 C.F.R. § 122.44(d)(1)(vi). The EPA, under CWA section 304, periodically publishes documents "reflecting the latest scientific knowledge" to assist the states in selecting appropriate criteria. *See* 33 U.S.C. § 1314(a)(1). These water quality-based effluent limitations (WQBELs) are required when the technology-based effluent limits (TBELs) will not assure compliance with applicable water quality standards for the particular receiving stream. *See* 33 U.S.C. § 1312; 40 C.F.R. § 122.44(d). See Chapters 33 and 34 of this book for details on the Texas water quality standards.

As for the antidegradation component, the state must ensure that the existing water quality is protected, even though water quality criteria and uses are met and maintained. 40 C.F.R. § 131.12; *see* Lauren Kalisek, *The Principle of Antidegradation and Its Place in Texas Water Quality Permitting*, 41 Texas Envtl. L.J. 1, 3 (2010) ("Antidegradation can easily be described as the next frontier in setting permit discharge limits."). Different types of waters have different levels of antidegradation protection. Tier 1 applies to all waters—existing uses criteria must be maintained. Tier 2 applies to high-quality waters that exceed fishable/swimmable criteria—degradation will be allowed only on a showing that it is necessary to accommodate important social or economic development in the region. Tier 3 applies to outstanding national resource waters (e.g., national parks and wildlife refuges)—degradation is strictly prohibited. *See* Kalisek, at 9.

A state may adopt variances to its water quality standards through policies "generally affecting their application and implementation, such as mixing zones, low flows, and variances." 40 C.F.R. § 131.13. These policies are subject to EPA review and approval, as discussed immediately below. 40 C.F.R. § 131.13. See Chapter 21 of this book for a discussion of the specifics of the Texas program.

The states submit their water quality standards to the EPA for its review. *See* 33 U.S.C. § 1313(c); 40 C.F.R. § 131.5. If the agency disapproves a state water quality standard, and the state does not make appropriate changes, the EPA must propose and promulgate revised standards. *See* 33 U.S.C. § 1313(c)(3), (4), 40 C.F.R. §§ 131.5, 131.21. The water quality standards are effective only when they have been approved by the EPA (or, if the standards were disapproved, the EPA adopts federal standards). *See* 40 C.F.R. § 131.21. The EPA approval of a new or revised water quality standard is considered a federal action, which may be subject to the section 7 consultation requirements of the Endangered Species Act. Consultation with the FWS and National Marine Fisheries Service is part of the EPA's water quality standards approval process. *See* Environmental Protection Agency, *Water Quality Standards Review and Revision*, http://water.epa.gov/scitech/swguidance/standards/rev.cfm.

Once the water quality standards have been finalized, they are used in determining NPDES permit limits, impairment status, TMDL endpoints, and the issuance of section 404 permit applications and section 402 certifications. *See* 40 C.F.R. § 131.21(d). A critical element of the water quality standards is periodically assessing the waters to determine the degree to which these standards are being met. *See* 40 C.F.R. § 130.4. To that end, on a biennial basis a state submits to the EPA a list (the 303(d) list) of water bodies, with a priority ranking, for which TBELs are (or are threatened to be) insufficient to achieve the water quality standards. *See* 33 U.S.C. §§ 1315(b)(1), 1313(d); *see also* 33 U.S.C. § 1313(c) (triennial state water quality standard review). As discussed earlier in this chapter, the state also must estimate the TMDL that the impaired water body can receive and still attain its use designation. *See* 33 U.S.C. § 1313(d). A TMDL is composed of a wasteload allocation (for existing and future point sources) and a load allocation (for existing and future nonpoint sources), "with seasonal variations and margins of safety." 33 U.S.C. § 1313(d)(1)(C). States must develop an implementation plan for the TMDL. (As discussed earlier in this chapter, the TCEQ and the TSSWCB share this responsibility.) See also discussion in Chapter 33 of this book. The EPA must approve the 303(d) list and the TMDLs or propose its own. *See* 33 U.S.C. § 1313(d)(2). In practice, the EPA rarely prepares an entirely new list but partially disapproves a list because of an omission and then adds to the list. *See* Office of Water, Environmental Protection Agency, *Fact Sheet: Introduction to Clean Water Act (CWA) Section 303(d) Impaired Waters List (2009), available at* www.epa.gov/owow/tmdl/results/pdf/aug_7_introduction_to_clean.pdf. The EPA does not approve the implementation plans. *See* Environmental Protection Agency, *Guidelines for Reviewing TMDLs Under Existing Regulations Issued in 1992*, http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/final52002.cfm.

ii. Nonpoint Source Management

Nonpoint source pollution (NPS) is pollution that "does not result from a discharge at a specific, single location (such as single pipe), but generally results from land runoff, precipitation, atmospheric deposition, or percolation." Office of Water Regulations and Standards, Environmental Protection Agency, *Nonpoint Source Guidance* (1987). The CWA requires states to submit an NPS management program to the EPA. *See* 33 U.S.C. § 1329(d); *see also* 33 U.S.C. § 1288(b). An integral element of an approvable program is its identification of best management practices (BMPs) to reduce nonpoint runoff. 33 U.S.C. § 1329(b)(2)(a); *see also* 33 U.S.C. § 1342(p) (use of BMPs in NPDES stormwater permits).

Once approved, the state is eligible for section 319 grants to assist in the implementation of the program, such as lake protection and restoration activities. *See* 33 U.S.C. § 1329(h); Environmental Protection Agency, *Nonpoint Source Program and Grants Guidelines for States and Territories* (issued Apr. 12, 2013), *available at* http://water.epa.gov/polwaste/nps/upload/319-guidelines-fy14.pdf. (As mentioned earlier, the TCEQ and TSSWCB equally split these monies in Texas.) Other agencies may supplement these funds, such as the NRCS through its EQIP program.

The reauthorization of the Coastal Zone Management Act also focused on NPS by requiring coastal states to submit a Coastal Nonpoint Program to the EPA and the National Oceanic and Atmospheric Agency (NOAA) for approval. *See* 16 U.S.C. § 1455b(a); National Oceanic and Atmospheric Administration, *Coastal Nonpoint Pollution Control Program*, http://coast.noaa.gov/czm/pollutioncontrol#Texas. The state must identify land uses that contribute to degradation of coastal areas, identify critical coastal areas, and implement management measures to achieve the CWA water quality standards. *See* 16 U.S.C. § 1455b(b). The Texas CMP is discussed earlier in this chapter.

iii. Section 401 Certification

Section 401 of the CWA requires an applicant for a federal permit or license for any activity that may result in any discharge to waters of the United States to obtain a certification from the state. *See* 33 U.S.C. § 1341; Environmental Protection Agency, *Clean Water Act Section 401 Water Quality Certification: A Water Quality Protection Tool For States and Tribes* 5 (2010), *available at* http://water.epa.gov/lawsregs/guidance/cwa/upload/CWA-401-Handbook-2010-Interim.pdf [hereinafter CWA Section 401 Certification Handbook]. Examples of federal licenses and permits subject to section 401 certification include CWA section 404 permits, Federal Energy Regulatory Commission (FERC) hydropower licenses, and Rivers and Harbors Act section 9 and section 10 permits. CWA Section 401 Certification Handbook, at 5–6. The state reviews and certifies that the federal permit/license will comply with the CWA effluent and water quality standards, or else the federal authority cannot issue the permit/license. *See* 33 U.S.C. § 1341. The Texas 401 certification program is discussed in Chapter 34 of this book. Most certifications are issued in connection with section 404 dredge and fill permits.

iv. Section 404

The CWA is also the source for the EPA's authority to regulate and protect wetlands. Section 404 of the CWA establishes a permitting program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. For example, a person who wishes to build a dam or levee may need to get a section 404 permit under this program. The EPA and the Corps each administer specific aspects of this program, with the Corps in charge of the day-to-day program implementation, including permit decisions and enforcement. As mentioned above, the EPA determines the scope of geographical jurisdiction ("waters of the United States"). Environmental Protection Agency, *Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning the Determination of the Section 404 Program and the Application of the Exemptions Under Section 404(F) of the Clean Water Act*, http://water.epa.gov/lawsregs/guidance/wetlands/404f.cfm. Additionally, the EPA identifies activities that are exempt from permitting, develops and interprets environmental criteria used in evaluating permit applications, reviews/comments on individual permit applications, enforces section 404 provisions, and has authority to veto the Corps' permit decisions. *See* Environmental Protection Agency, *Wetland Regulatory Authority, available at* http://water.epa.gov/type/wetlands/outreach/upload/reg_authority.pdf [hereinafter *Wetland Regulatory Authority*]; 33 U.S.C. § 1344(b), (c); *Mingo Logan Coal Co. v. U.S. Environmental Protection Agency*, 714 F.3d 608 (D.C. Cir. 2013) (EPA veto of section 404 permit). See also Chapter 35 of this book.

b. Safe Drinking Water Act

The SWDA, codified at 42 U.S.C. §§ 300f–300j-26, is the main federal law that ensures the quality of drinking water, and it applies to every public water system. See discussion in Chapter 36 of this book. Texas has received "primacy" to implement and enforce the SDWA drinking water quality standards. Environmental Protection Agency, *About the Drinking Water Program*, www.epa.gov/region6/water/swp/drinkingwater/index.htm. The standards to ensure healthy, safe water for human consumption are set at the federal level by the EPA. *See* 42 U.S.C. § 300f(3). Texas's standards must be at least as restrictive as the federal standards for the state to maintain primacy over this program. *See* 40 C.F.R. § 142.10. A state is allowed to make its rules more restrictive (i.e., a lower allowable level of a certain constituent), but not less. For example, in 2007, the EPA adopted revisions to its drinking water standards for lead and copper. 72 Fed. Reg. 57,782 (Oct. 10, 2007). To maintain primacy of its drinking water program, Texas was then required to adopt equally restrictive standards. As a primacy state, Texas has two years to adopt its rules, which can be extended for an additional two years if approved by the EPA. *See* 40 C.F.R. § 142.12. These rules are reviewed by the EPA for conformity with the federal rules, specifically to determine whether the state rules are no less stringent than the federal rules. In this instance, the TCEQ adopted the amended lead-copper rules in 2011. 30 Tex. Admin. Code § 290.117.

B. The United States Army Corps of Engineers

The Corps is a federal agency and a combat arms branch of the U.S. Army that traces its roots back to the American Revolution. U.S. Army Corps of Engineers, *The U.S. Army Corps of Engineers: A Brief History*, www.usace.army.mil/About/History/BriefHistoryoftheCorps.aspx. The mission of the

Corps is to provide vital public engineering services in peace and war to strengthen the "Nation's security, energize the economy, and reduce risks from disasters." U.S. Army Corps of Engineers, *Mission & Vision*, www.usace.army.mil/about/missionandvision.aspx. The Corps employs approximately 37,000 civilians and soldiers who provide engineering services within the United States and in foreign countries. U.S. Army Corps of Engineers, *About Us*, www.usace.army.mil/About.aspx.

1. Organizational Structure

The Corps is led by the commanding general and chief of engineers. It is organized geographically into nine divisions. Far west Texas is in the South Pacific Division, while the rest of Texas is in the Southwestern Division. Within the Southwestern Division, there is a Fort Worth District, Galveston District, Tulsa District, and Little Rock District. The Southwestern Division is headquartered in Dallas. U.S. Army Corps of Engineers, *Locations*, www.usace.army.mil/Locations.aspx.

2. Influence on Water Resources

The Corps engages in a wide spectrum of activities supporting its civilian and military mission. This section will generally discuss the Corps' water resource-related activities. The Corps' duties include keeping channels open for navigation; protecting against floods; safeguarding the environment; generating clean, reliable hydropower; providing water to communities; managing recreation areas; and responding to disasters. *See* U.S. Army Corps of Engineers, *Civil Works*, www.usace.army.mil/Missions/CivilWorks.aspx. The Corps builds and maintains infrastructure projects, including dredging waterways and the construction, operation, and maintenance of multipurpose reservoirs. The Corps operates approximately twenty-five surface water supply reservoirs within the state of Texas. *See* U.S. Army Corps of Engineers, Institute for Water Resources, *2011 M&I Water Supply Database* 6 (Apr. 2012), *available at* www.iwr.usace.army.mil/Portals/70/docs/iwrreports/2012-R-02.pdf. As a result, a person who wishes to divert or use water from one of these reservoirs will often be required to obtain a permit or contract rights from the Corps for use of the water supply. *See* Corbett, at 2. See Chapters 2, 35, and 27 of this book. The Corps' water supply contracts do not guarantee quantity or quality of the water—only the storage space.

The Corps runs the regulatory programs, under the Rivers and Harbors Act and the CWA section 404, requiring permits for most activities that occur in the federal waters and wetlands, including construction or renovation of dams, dikes, piers, and jetties; dredging; discharges of dredged or fill material; and commercial and residential development. U.S. Army Corps of Engineers, *Regulatory Permits*, www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx. The Corps is also responsible for permitting ocean disposal of dredged material under the Marine Protection, Research, and Sanctuaries Act, also known as the Ocean Dumping Act. *See* 33 U.S.C. § 1413. Similar to the Section 404 program, the Corps uses the EPA's environmental criteria, and permit issuance is subject to EPA concurrence. *See* 33 U.S.C. § 1413. The Corps' rules are contained in title 33 of the Code of Federal Regulations parts 203–385.

As discussed earlier in this chapter, the Corps' jurisdiction under section 404 is limited to "waters of the United States." The scope of the Corps' authority under the Rivers and Harbors Act is narrower—truly "navigable waters"—which is defined as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past or may be susceptible to use to transport interstate or foreign commerce." 33 C.F.R. § 329.4; *see also* 33 U.S.C. §§ 401, 403.

Under section 404, the Corps has the authority to designate disposal areas and issue specific disposal permits for dredged or fill material. 33 U.S.C. § 1344(a); J. Gordon Arbuckle, *Environmental Law Handbook* 198 (12th ed. 1993). Additionally, the Corps shares enforcement powers of the CWA with the EPA. Arbuckle, at 199. The Corps has the power to issue cease and desist orders, levy administrative penalties, and resolve violations through the use of permits to authorize illegal fill activities that have already occurred. Arbuckle, at 199–200. The Corps primarily issues three types of section 404 permits: standard, general, and letters of permission. See Chapter 35 of this book, which discusses permits under section 404 of the CWA. The premise of the section 404 permitting program is that "no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded." Wetland Regulatory Authority; *see also* 40 C.F.R. § 230.10. If a discharge is unavoidable, the Corps must include compensatory mitigation—creating, restoring, or enhancing a wetland—as a condition of the section 404 permit. *See Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency—The Determination of Mitigation Under the Clean Water Act 404(b)(1) Guidelines*, http://water.epa.gov/lawsregs/guidance/wetlands/mitigate.cfm; *see also* 40 C.F.R. §§ 230.91–.98. See discussions in Chapters 2, 35, and 27 of this book regarding wetlands mitigation.

C. Department of the Interior

The Department of the Interior (DOI), a cabinet-level agency, was created in 1849 to handle federal domestic matters. U.S. Department of the Interior, *History of Interior*, www.doi.gov/whoweare/history.cfm. The DOI is charged with managing and protecting America's natural and cultural resources. Employing 70,000 people, the DOI has nine technical bureaus:

- Bureau of Ocean Energy Management
- Bureau of Reclamation
- Bureau of Land Management
- Bureau of Indian Affairs
- U.S. Geological Survey
- Fish and Wildlife Service
- National Park Service
- Office of Surface Mining, Reclamation and Enforcement
- Bureau of Safety and Environmental Enforcement

U.S. Department of the Interior, *Who We Are*, www.doi.gov/whoweare/index.cfm.

As discussed earlier in this chapter, Texas has few federal lands and so the DOI's involvement within Texas is more limited than it is in some other states. The bureaus and offices with potential to affect Texas water resources are the FWS, the Bureau of Reclamation, the U.S. Geological Survey, the Bureau of Ocean Energy Management, and the Bureau of Safety and Environmental Enforcement, which are discussed briefly below. In addition, the DOI's Office of Environmental Policy and Compliance plays a coordinating role. *See* U.S. Department of the Interior, *Office of Environmental Policy & Compliance*, www.doi.gov/pmb/oepc/index.cfm.

1. The United States Fish and Wildlife Service

The FWS was created from the Bureau of Fisheries and the Bureau of Biological Survey in 1940. The FWS cites as its mission "working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people." U.S. Fish and Wildlife Service, *FWS Fundamentals*, www.fws.gov/info/pocketguide/fundamentals.html.

a. Organizational Structure

The director is head of the FWS and is appointed by the President with the advice and consent of the Senate. The FWS has more than 8,700 employees located at facilities across the country, including a headquarters office in Arlington, Virginia, eight regional offices, and nearly seven hundred field offices. *See* U.S. Fish and Wildlife Service, *Agency Overview* (Nov. 2008), *available at* www.fws.gov/pdfs/AgencyOverviewTransition2009.pdf. Texas is part of the FWS's Southwest Region (Region 2), which also includes Arizona, New Mexico, and Oklahoma, and which has its regional office in Albuquerque, New Mexico. *See* U.S. Fish and Wildlife Service, *Southwest Region (2) Overview* (Nov. 2008), *available at* www.fws.gov/pdfs/SW%20Region%202%20Transition%202009.pdf.

b. Influence on Water Resources

The FWS is responsible for implementing and enforcing federal wildlife laws such as the Endangered Species Act (ESA), 16 U.S.C. §§ 1531–1544; Migratory Bird Treaty Act, 16 U.S.C. §§ 703–712; Marine Mammal Protection Act, 16 U.S.C. §§ 1361–1412h; and Lacey Act, 16 U.S.C. §§ 3371–3378. The FWS also manages the National Wildlife Refuge System and the National Fish Hatchery System. Texas has eighteen National Wildlife Refuges, the oldest of which is located near Muleshoe (established in 1935). *See* U.S. Fish and Wildlife Service, *Texas*, www.fws.gov/refuges/profiles/ByState.cfm?state=TX. There are three National Fish Hatcheries in Texas, located near Burnett, San Marcos, and Uvalde. *See* U.S. Fish and Wildlife Service, *National Fish Hatchery System*, www.fws.gov/fisheries/nfhs/facilities/texas.html.

This section will briefly discuss some of the FWS authorities that affect Texas water resources. One of the significant responsibilities of the FWS, which continues to have far-reaching effects on Texas water resources, is the administration of the ESA with respect to terrestrial and freshwater organisms. *See* U.S. Fish and Wildlife Service, *Endangered Species Act—Overview*, www.fws.gov/endangered/laws-policies/index.html. The FWS decides which species are listed as endangered or threatened.

The ESA makes it unlawful for a person to take a listed animal without a permit. *See* 16 U.S.C. § 1538(a)(1)(B). "Take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." 16 U.S.C. § 1532(19). The term *harm* is defined by regulation as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." 50 C.F.R. § 17.3. The FWS issues permits for the "incidental taking" of a listed animal if the take is mitigated with a conservation plan. *See* 16 U.S.C. § 1539(a)(1)(B), (a)(2). The FWS also has the power to issue civil and criminal penalties for violations of the ESA. *See* 16 U.S.C. § 1540. The ESA and its impact on water resources in Texas is discussed in Chapters 4, 14, 20, and 34 of this book.

The FWS also plays an important role in permitting. The Fish and Wildlife Coordination Act (FWCA), which predates the National Environmental Policy Act (NEPA) and the ESA, provides the basic authority for the FWS's involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. *See* 16 U.S.C. §§ 661–667e. The FWCA requires that fish and wildlife resources "receive equal consideration and be coordinated with other features of water-resource development projects." 16 U.S.C. § 661. Federal agencies that construct, license, or permit water resource development projects, such as the Corps, the Bureau of Reclamation, the NRCS, or FERC, must first consult with the FWS (and the National Marine Fisheries Service in some instances) and state fish and wildlife agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. *See* 16 U.S.C. § 662. The FWCA, NEPA, ESA, CWA, and, in FERC projects, the Federal Power Act, work together to ensure that fish and wildlife values are fully and equally considered in water resource development planning but have different legislative requirements. *See* U.S. Fish and Wildlife Service, *Water Resources Development Under the Fish and Wildlife Coordination Act* III–5 (2004), *available at* www.fws.gov/habitatconservation/fwca.pdf. The FWS provides comments on section 404 permit applications, as discussed in Chapter 35 of this book. In the FERC licensing process, as discussed below, FERC is required to impose conditions to protect fish and wildlife, which are based on recommendations from the FWS. See Chapter 27 of this book.

Additionally, the FWS implements the North American Wetlands Conservation Act, 16 U.S.C. §§ 4401–4414 (matching grants for wetlands conservation projects benefiting migratory birds), and assists in other voluntary habitat conservation and restoration programs such as Partners for Fish and Wildlife, often working with other federal agencies such as the NRCS. U.S. Fish and Wildlife Service, *Partners for Fish & Wildlife*, www.fws.gov/midwest/partners/; *see also* U.S. Fish and Wildlife Service, *Gulf Restoration: The North American Wetlands Conservation Act*, www.fws.gov/gulfrestoration/nawca.html (noting that as part of its plea agreement stemming from the *Deepwater Horizon* oil spill, British Petroleum agreed to pay a total of $100,000,000 to the North American Wetlands Conservation Fund "for purpose of wetlands restoration and conservation located in states bordering the Gulf of Mexico or otherwise designed to benefit migratory bird species and other wildlife affected by the Macondo oil spill"). The FWS's duties include maintaining the National Wetlands Inventory, a series of topical maps that show wetlands and deepwater habitats. U.S. Fish and Wildlife Service, *National Wetlands Inventory*, www.fws.gov/wetlands/. The FWS is also the repository for Coastal Barriers Resources Act maps and advises federal agencies, landowners, and Congress regarding whether properties are in or out of the Coastal Barrier Resources System (CBRS) and what kind of federal expenditures (e.g., flood insurance) are allowed in the CBRS. *See* 16 U.S.C. §§ 3501–3510; U.S. Fish and Wildlife Service, *John H. Chafee Coastal Barriers Resources System*, www.fws.gov/cbra/Act/index.html#CBRS.

2. Bureau of Reclamation

The Bureau of Reclamation was established to construct dams and aqueducts in the West pursuant to the Reclamation Act of 1902. As discussed in Chapter 14 of this book, Congress made the Reclamation Act applicable to Texas in 1906. The Bureau of Reclamation's most famous project is Hoover Dam. The bureau is the largest wholesaler of water in the country, bringing water to more than 31 million people. With fifty-three power plants, the bureau is also the second largest producer of hydroelectric power in the western United States. *See* Bureau of Reclamation, *Bureau of Reclamation—About Us*, www.usbr.gov/main/about/. The bureau's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Bureau of Reclamation, *Mission Statement*, www.usbr.gov/main/about/mission.html.

a. Organizational Structure

The head of the Bureau of Reclamation is the commissioner, who is appointed by the President with the advice and consent of the Senate. There are six regional offices; far west Texas is included within the Upper Colorado Region. Bureau of Reclamation, *Upper Colorado Region*, www.usbr.gov/uc/. The remainder of Texas is in the Great Plains Region. *See* Bureau of Reclamation, *Great Plains Region*, www.usbr.gov/gp/about_us/.

b. Influence on Water Resources

The bureau's role in developing, organizing, and orchestrating the creation of dams and reservoirs in Texas, such as the Rio Grande Project, is discussed in Chapter 14 of this book. *See* Bureau of Reclamation, *Rio Grande Project*, www.usbr.gov/projects/Project.jsp ?proj_Name=Rio%20Grande%20Project.

The bureau and the Corps have entered into a partnership agreement to "promote . . . collaborative efforts to improve the management of water and related land resources." U.S. Army Corps of Engineers, *Partnership Agreement Between the Bureau of Reclamation and the U.S. Department of the Army* 1 (Feb. 11 2005), *available at* www.iwr.usace.army.mil/Portals/70/docs/ partners/BURREC-USACE_Partnership_20Feb05.pdf [hereinafter Partnership Agreement]. Specifically, the partnership provides that the bureau and Corps will work jointly on water resources management (including sustainable development, flood control, and ecological concerns), hydropower, and dam safety. *See* Partnership Agreement, at 4–5.

3. *U.S. Geological Survey*

The U.S. Geological Survey (USGS) was created in 1879 to survey the geological structures and economic resources in the Territories of the United States. Mary C. Rabbitt, U.S. Geological Survey, *The United States Geological Survey: 1879–1989* (Circular 1050, 1989), http://pubs.usgs.gov/circ/ c1050/intro.htm. Today, the USGS is the nation's largest water, earth, and biological science and civilian mapping agency, employing more than 9,000 people. *See* U.S. Geological Survey, *About USGS*, www.usgs.gov/aboutusgs/.

a. Organizational Structure

The USGS is headed by a director who is appointed by the President with the advice and consent of the Senate. There are three USGS offices in Texas, two in Austin and one in Lubbock (Texas Cooperative Fish and Wildlife Research Unit). *See* U.S. Geological Survey, *Contact USGS Offices In Your State*, www.usgs.gov/contact_us/.

b. Influence on Water Resources

To delineate and map waterways, the USGS obtains real-time stream stage and streamflow, water quality, and groundwater levels for more than 650 sites in Texas. This real-time information is used to "monitor floods and droughts, inform water supply and agricultural water-use management decisions, and monitor and track restoration efforts in the basin." U.S. Geological Survey, *Texas Water Science Center*, http://tx.usgs.gov/. USGS maps have been used in determining whether the EPA has jurisdiction under the CWA. *See United States v. Chevron Pipe Line Co.*, 437 F. Supp. 2d 605 (N.D. Tex 2006).

4. *Bureau of Ocean Energy Management (formerly Bureau of Ocean Energy Management, Regulation, and Enforcement, and Minerals Management Service)*

The Minerals Management Service was established in 1982 to facilitate mineral revenue collection and manage the outer continental shelf offshore lands. The agency was renamed in 2010 to the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE). U.S.

Department of the Interior, *History of Interior*, www.doi.gov/whoweare/history.cfm. In response to the *Deepwater Horizon* explosion and resulting oil spill in the Gulf of Mexico, the agency underwent regulatory reforms. Bureau of Ocean Energy Management, *Regulatory Reform*, www.boem.gov/About-BOEM/Reforms/Reforms.aspx. Effective October 1, 2011, the duties of BOEMRE were split between the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement. Bureau of Ocean Energy Management, Regulation and Enforcement, *Reorganization of the Bureau of Ocean Energy Management, Regulation and Enforcement*, www.boemre.gov/. The Bureau of Safety and Environmental Enforcement is discussed below.

The Bureau of Ocean Energy Management (BOEM) is responsible for developing the Five Year Outer Continental Shelf Oil and Natural Gas Leasing Program, conducting oil and gas lease sales, along with marine minerals negotiated agreements and official maps and geographic information system data, and conducting environmental reviews, including NEPA analyses and compliance documents for each major stage of energy development planning. Additionally, the BOEM manages offshore renewable energy leasing and permitting of offshore wind, current, and hydrokinetic energy projects. Bureau of Ocean Energy Management, *About BOEM*, www.boem.gov/About-BOEM/index.aspx.

a. Organizational Structure

The BOEM is led by a director appointed by the DOI secretary. Three regional directors are responsible for management and program implementation. Bureau of Ocean Energy Management, *BOEM Leadership*, www.boem.gov/Leadership/. Texas is in the Gulf of Mexico Region. Bureau of Ocean Energy Management, *BOEM Regions*, www.boem.gov/About-BOEM/BOEM-Regions/Index.aspx.

b. Influence on Water Resources

The BOEM's influence on water resources is indirect through its regulation of drilling activities in the Gulf of Mexico. According to the DOI's Web site, the Gulf Coast is home to one of the most ecologically complex regions in the country and the site of a number of National Wildlife Refuges, National Parks, and National Seashores, including Padre Islands National Seashore. *See* U.S. Department of the Interior, *Interior Fact Sheet—BP Deepwater Horizon Response*, www.doi.gov/deepwaterhorizon/Interior-Fact-Sheet-BP-Deepwater-Horizon-Response.cfm.

5. Bureau of Safety and Environmental Enforcement

As discussed previously in this chapter, the Bureau of Safety and Environmental Enforcement (BSEE) was created in 2011 in the wake of the *Deepwater Horizon* spill. The BSEE's mission is to "promote safety, protect the environment, and conserve resources offshore through vigorous regulatory oversight and enforcement." Bureau of Safety and Environmental Enforcement, *BSEE FY 2012-2015 Strategic Goals at a Glance*, www.bsee.gov/WorkArea/DownloadAsset.aspx?id=85899347070.

a. Organizational Structure

The BSEE is led by a director appointed by the DOI secretary. Bureau of Safety and Environmental Enforcement, *BSEE Leadership*, www.bsee.gov/About-BSEE/BSEE-Leadership/Index/. BSEE is supported by three regional offices: New Orleans, Louisiana (Gulf of Mexico Region), Camarillo, California (Pacific Region), and Anchorage, Alaska (Alaska Region). Bureau of

Safety and Environmental Enforcement, *BSEE Regions*, www.bsee.gov/About-BSEE/BSEE-Regions/BSEE-Regions/. Texas is in the Gulf of Mexico Region.

b. Influence on Water Resources

Like the BOEM, the BSEE's influence on water resources is through its regulation of drilling activities in the Gulf of Mexico. The BSEE is to protect the environment and promote conservation and safety of offshore resources through its regulatory oversight and enforcement of outer continental shelf oil and gas drilling, production, and inspection operations. The BSSE also is responsible for oil spill response, including developing standards and guidelines for offshore operators. Bureau of Safety and Environmental Enforcement, *About BSEE*, www.bsee.gov/About-BSEE/index/.

The BSEE operates the National Offshore Training and Learning Center to secure proper training and up-to-date knowledge for its offshore inspectors. Bureau of Safety and Environmental Enforcement, *National Offshore Training Program*, www.bsee.gov/About-BSEE/National-Offshore-Training-Program/National-Offshore-Training-Program/.

6. *Office of Environmental Policy and Compliance*

The DOI's Office of Environmental Policy and Compliance (OEPC) coordinates and develops environmental policy and program evaluations. It provides "for a coordinated and unified approach and response to environmental issues that affect multiple bureaus in order to ensure that the Department of the Interior speaks as one entity with respect to those issues." Office of Environmental Policy and Compliance, *Director's Office*, www.doi.gov/oepc/director.html. Within the OEPC, there are interdepartmental teams such as the Natural Resources Management Team (NEPA compliance), the Environmental Management Integration Team (sustainability), Resource Protection, the Preparedness and Response Team (natural resource damages), and the Environmental Cleanup and Liability Management Team (Superfund liability). *See* Office of Environmental Policy and Compliance, *Office of Environmental Policy & Compliance*, www.doi.gov/pmb/oepc/index.cfm.

D. National Oceanic and Atmospheric Administration

NOAA was formed in 1970, consolidating some of the oldest federal agencies at that time: the United States Coast and Geodetic Survey (whose roots date back to the Jefferson administration), the Weather Bureau, and the Bureau of Commercial Fisheries. *See* National Oceanic and Atmospheric Administration, *NOAA Legacy*, www.history.noaa.gov/noaa.html. Today, NOAA is composed of five offices: the National Marine Fisheries Service (NMFS); the National Ocean Service (NOS); the National Environmental Satellite, Data, and Information Service; the Office of Oceanic and Atmospheric Research; and the National Weather Service. *See* National Oceanic and Atmospheric Administration, *NOAA Corps and the Coast & Geodetic Survey*, www.history.noaa.gov/legacy/corps.html. The mission of NOAA is "to predict environmental changes on a wide range of time and space scales in order to protect life and property, and provide industry and government decision-makers with a reliable base of scientific information." National Oceanic and Atmospheric Administration, *A History of NOAA*, www.history.noaa.gov/legacy/noaahistory_2.html#introduction.

1. *Organizational Structure*

NOAA is an agency of the U.S. Department of Commerce. The Under Secretary of Commerce for Oceans and Atmosphere serves as the administrator of NOAA. There are two deputy administrators: the Assistant Secretary for Conservation and Management and the Assistant Secretary for Environmental Observation and Prediction. The Chief Scientist advises the administrator and the deputies. All of these are appointed by the President with the advice and consent of the Senate. *See* United States Department of Commerce, *Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration* (Directive No. DOO 10–15, 2011), www.osec.doc.gov/opog/dmp/doos/doo10_15.html.

2. Influence on Water Resources

NOAA is instrumental in providing data regarding Texas water resources through, for instance, the National Weather Service, the National Environmental Satellite Data and Information Service (NESDIS), and the NOS. NOAA is the lead federal agency for the National Integrated Drought Information System. *See* National Oceanic and Atmospheric Administration, *Drought: History of the U.S. Monitoring System*, www.ncdc.noaa.gov/news/drought-history-and-function-monitoring-system-united-states. See Chapter 22 of this book. NOAA monitors river, lake, and tidal levels and models hydrologic flow. The NOS, by way of example, operates seven long-term continuously operating tide stations in Texas. *See* National Oceanic and Atmospheric Administration, *NOAA In Your State and Territory*, www.legislative.noaa.gov/ NIYS/.

Besides its scientific support, NOAA also serves as the natural resource damage trustee for natural resources managed or controlled by the Department of Commerce and for natural resources managed or controlled by other federal agencies, if those resources are in "or using water navigable by deep draft vessels, tidally influenced waters, or waters of the contiguous zone, the exclusive economic zone, and the outer continental shelf." 40 C.F.R. § 300.600(b)(1). Within NOAA's NOS is the Office of Response and Restoration (OR&R). The OR&R has an Emergency Response Division (ERD) and an Assessment and Restoration Division (ARD). The ERD provides scientific support to those responding to oil and chemical spills and assesses environmental injury; the ARD works with the EPA and with state environmental agencies to help protect and restore NOAA's trust resources. *See* Office of Response and Restoration, *About*, http://response.restoration.noaa.gov/about. Texas water resources, such as Lavaca Bay, have been subject to NOAA's Damage Assessment, Remediation, and Restoration Program. *See* Damage Assessment, Remediation, and Restoration Program, *Southeast Region*, www.darrp.noaa.gov/southeast/index.html. This program's most high profile project is now the *Deepwater Horizon*/BP oil spill. *See* National Oceanic and Atmospheric Administration, *Gulf Spill Restoration*, www.gulfspillrestoration.noaa.gov/about-us/.

Another office of the NOS is the Office for Coastal Management, which administers the Coastal Zone Management Act (CZMA). *See* Office of Coastal Management, *Coastal Zone Management Act*, http://coast.noaa.gov/czm/act/ [hereinafter About the CZMA]. Formerly, the Office of Ocean and Coastal Resource Management administered the CZMA, but in 2014 it was combined with another NOAA office, the Coastal Services Center, to form the Office of Coastal Management. *See* Office of Coastal Management, *About the Office of Coastal Management*, http://coast.noaa.gov/about/.

The CZMA outlines three national programs: the National Coastal Zone Management Program, the National Estuarine Research Reserve System, and the Coastal and Estuarine Land Conservation Program (CELCP). CELCP provides matching funds to state and local governments to purchase threatened coastal and estuarine lands or obtain conservation easements. Office for Coastal Management, *The Coastal and Estuarine Land Conservation Program*, http://coast.noaa.gov/czm/landconservation/. Under the Coastal Zone Management Program, the states develop and implement coastal zone management plans in accordance with guidance developed by NOAA. *See* 16 U.S.C. § 1455. To be eligible for NOAA approval, each state's plan was required to define boundaries of the coastal zone, to identify uses of the area to be regulated by the state, the mechanism (criteria, standards, or regulations) for controlling such uses, and broad guidelines for priorities of uses within the coastal zone. *See* 15 CF.R. § 923.1(c). Once a state's program is approved, the state is eligible for grants to implement the program. *See* 16 U.S.C. § 1455. The Texas Coastal Program was approved in 1996 and is administered by the Texas General Land Office in conjunction with the Coastal Coordination Advisory Committee, which are discussed earlier in this chapter. *See* Office of Coastal Management, *Coastal Zone Management Programs: Texas*, http://coast.noaa.gov/czm/mystate/#texas. Each state participating in this program is to evaluate its coastal management program (also known as section 309 assessment) in nine coastal zone enhancement areas every five years. *See* 16 U.S.C. § 1456b. The nine enhancement areas are aquaculture, coastal hazards, cumulative and secondary impacts, energy and government facility siting, marine debris, ocean resources, public access, special area management plans, and wetlands. *See* 16 U.S.C. § 1456b(a). Furthermore, the CZMA provides that federal actions (e.g., permits, licenses, and financial assistance) must be conducted in a manner consistent with the federally approved plans. *See* 16 U.S.C. § 1456.

As for the CZMA's National Estuarine Research Reserve System, the reserves "serve as field laboratories that provide a greater understanding of estuaries and how humans impact them." About the CZMA. Texas has one reserve, the Mission-Aransas Estuary, and the University of Texas is the lead state agency for the reserve. *See* Mission-Aransas National Estuarine Research Reserve, *About Mission-Aransas National Estuarine Research Reserve*, www.missionaransas.org/about.html. The National Marine Protected Areas Center, located within NOAA's Office of National Marine Sanctuaries, also is developing a system of Marine Protected Areas (MPAs). *See* National Oceanic and Atmospheric Administration, *National Marine Protected Areas Center*, http://marineprotectedareas.noaa.gov/aboutmpas/mpacenter/. Texas has a number of MPAs, and information on them may be accessed at the NOAA Web site at http://marineprotectedareas.noaa.gov/nationalsystem/nationalsystemlist/.

Another designation for certain marine areas is through the National Marine Sanctuaries Act. *See* 16 U.S.C. §§ 1431–1447f. The Office of National Marine Sanctuaries, mentioned above, makes designations to comprehensively protect discrete designated areas of the marine environment. *See* 16 U.S.C. §§ 1431–1447f. Texas has one national marine sanctuary, the Flower Garden Banks National Marine Sanctuary, which is located roughly 105 miles (170 km) south of Sabine Pass. *See* National Marine Sanctuaries, *Flower Garden Banks*, http://flowergarden.noaa.gov/welcome.html.

In addition to protecting marine sanctuaries, NOAA, through its NMFS, has other enforcement authorities. While also providing scientific support, the NMFS is responsible for the management and enforcement of fishery resources in the two-hundred-mile-wide U.S. Fishery Conservation Zone and the protection and conservation of threatened and endangered marine mammals. *See* National Oceanic and Atmospheric Administration, *About National Marine Fisheries Service*, www.nmfs.noaa.gov/aboutus.htm. The NMFS plays a complementary role to the FWS under the ESA. The FWS deals with terrestrial and freshwater species, and the NMFS administers the program for marine and anadromous species. See Chapters 17, 32, and 27 of this book for more information regarding the specifics of the ESA and its impact on water resources. The NMFS shares enforcement authority with the FWS under the Marine Mammal Protection Act, with responsibility for dolphins, porpoises, whales, and seals. *See* 16 U.S.C. §§ 1361–1423h. Also, as discussed in Chapter 35 of this book, the NMFS has the opportunity to comment on all individual and some general 404 permits. Additionally, the NMFS plays an important role in the FERC licensing process. See Chapter 27 of this book. The NMFS has six regional offices; Texas is in the Southeast region, which has its headquarters in St. Petersburg, Florida. National Oceanic and Atmospheric Administration, *NOAA Fisheries: Southeast Regional Office*, http://sero.nmfs.noaa.gov/about_us/what_we_do/index.html. The NMFS also maintains a laboratory in Galveston, Texas. National Oceanic and Atmospheric Administration, *NOAA Southeast Fisheries Science Center*, www.sefsc.noaa.gov/.

E. Federal Energy Regulatory Commission

FERC's origins date to 1920 when, under the joint administration of the secretaries of War, Interior, and Agriculture, its mandate was to coordinate the hydroelectric projects under federal control. *See* Federal Energy Regulatory Commission, *History of FERC*, www.ferc.gov/students/ferc/history.asp. FERC regulates the interstate transmission of electricity, natural gas, and oil. It reviews proposals to build liquefied natural gas terminals and interstate natural gas pipelines as well as licenses hydropower projects. Federal Energy Regulatory Commission, *What FERC Does*, www.ferc.gov/about/ferc-does.asp. The statutes under which FERC derives its authority include the Federal Power Act, 16 U.S.C. §§ 791a–828c; Natural Gas Act, 15 U.S.C. §§ 717–717z; Public Utility Regulatory Policies Act of 1978, 16 U.S.C. §§ 2601–2645; and the Energy Policy Act of 2005, 42 U.S.C. §§ 13201–13574.

1. Organizational Structure

FERC is composed of up to five commissioners who are appointed by the President with the advice and consent of the Senate. Commissioners serve five-year terms and have an equal vote on regulatory matters. Federal Energy Regulatory Commission, *Commission Members*, www.ferc.gov/about/com-mem.asp. FERC has regional offices in New York, Atlanta, Chicago, Portland, and San Francisco, which deal primarily with hydropower projects. Texas is served by the Atlanta office. *See* Federal Energy Regulatory Commission, *Regional Office Hydropower Contacts*, www.ferc.gov/contact-us/tel-num/regional.asp.

2. Influence on Water Resources

As discussed in Chapters 2 and 27 of this book, FERC may have jurisdiction over the construction of a dam if it includes hydroelectric facilities. FERC is required to impose conditions on hydroelectric facilities to protect fish and wildlife. *See* 16 U.S.C. § 803(j). These conditions may be based on recommendations from the FWS and the NMFS. FERC and the FWS have entered into an MOU regarding protection of migratory birds. *See* Federal Energy Regulatory Commission, *Memorandum of Understanding Between the Federal Energy Regulatory Commission and the U.S. Department of the Interior United States Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds"* (Mar. 2011), *available at* www.ferc.gov/legal/mou/mou-fws.pdf.

F. United States Department of Agriculture

The USDA, originally established in 1862 by President Lincoln, was elevated to a cabinet-level agency in 1889. *See* 7 U.S.C. § 2201; Act of Feb. 9, 1889, 25 Stat. 659. The mission of the USDA is to "provide leadership on food, agriculture, natural resources, and related issues based on sound public policy, the best available science, and efficient management." U.S. Department of Agriculture, *Mission Statement*, www.usda.gov/wps/portal/usda/usdahome?navid=MISSION_STATEMENT. The involvement of the USDA in Texas water resources is mostly indirect. For instance, as discussed in Chapter 32 of this book, the USDA has been required under the ESA to adopt or develop conservation programs regarding the Edwards Aquifer. This section will focus on the USDA's Farm Service Agency (FSA) and Rural Development, both of which provide water-related loans (see Chapters 22 and 29, respectively), and the Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service, which administers the "Swampbuster" program (see Chapter 35).

1. *Organizational Structure*

The head of the USDA is the Secretary of Agriculture. The day-to-day activities are handled by the Deputy Secretary. U.S. Department of Agriculture, *About USDA*, www.usda.gov/wps/portal/usda/usdahome?navid=ABOUT_USDA. There are seven Under Secretaries, including the Under Secretary for Rural Development, the Under Secretary for Natural Resources and Environment, and the Under Secretary for Farm and Foreign Agricultural Services. U.S. Department of Agriculture, *USDA Organization Chart*, www.usda.gov/wps/portal/usda/usdahome?navid=USDA_ORG_CHART. All these positions are appointed by the President with the advice and consent of the Senate.

a. Rural Development

The Under Secretary for Rural Development is assisted by two Deputy Under Secretaries who are appointed by the Secretary of Agriculture. *See* U.S. Department of Agriculture, *Rural Development Leadership*, www.rd.usda.gov/about-rd/leadership. Four administrators answer to the Rural Development leadership: the Administrator for Housing and Community Facilities Programs, the Administrator for Business and Cooperative Service, the Administrator for Rural Utilities Service, and the Administrator for Rural Development Operations and Management. *See* U.S. Department of Agriculture, *Rural Development Administrators*, www.rd.usda.gov/about-rd/leadership/administrators. The Rural Utility Service programs are discussed in Chapter 29 of this book.

b. Farm Service Agency

The FSA is led by the administrator who reports to the Under Secretary for Farm and Foreign Agricultural Services. Five deputies report to the administrator, including the Deputy Administrator for Field Operations, who oversees more than 2,346 state and county offices. *See* Farm Service Agency, *About FSA—Structure & Organization*, www.apfo.usda.gov/FSA/webapp?area=about&subject=landing&topic=sao.

c. Natural Resources Conservation Service

The Under Secretary for Natural Resources and the Environment oversees the Natural Resources Conservation Service (as well as the Forest Service). The Chief provides overall leadership for the activities of the NRCS. *See* Natural Resources Conservation Service, *NRCS Leadership*, www.nrcs.usda.gov/wps/portal/nrcs/main/national/about/leadership/.

2. *Influence on Water Resources*

a. United States Department of Agriculture—Rural Development

The role of the United States Department of Agriculture–Rural Development (USDA–RD) "is to increase rural residents' economic opportunities and improve their quality of life." United States Department of Agriculture, *Rural Development (RD) Overview*, http://usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=RD_Agency_Splash.xml. The USDA–RD is primarily a grant and loan agency for rural housing and development projects. Corbett, at 2. It serves as a critical source of financing of utility infrastructure that would not otherwise be available in rural communities. Corbett, at 2. For example, USDA–RD administers Resource Conservation and Development loans and Watershed loans. *See* 7 C.F.R. pt. 1781. These loans can be used for many water development and conservation programs, including—

1. water development, storage, treatment, and conveyance for agricultural irrigation;
2. drainage systems and facilities to sustain agricultural production or protect farmers and rural residents from water damage. These can include soil conservation and water control facilities such as dikes, terraces, detention reservoirs, stream channels, ditches, and other special land treatment and stabilization measures; and
3. management and control of vegetation along waterways and in drainage basins to stabilize streamflow, recharge groundwater, and conserve water supplies.

See 7 C.F.R. § 1781.6(a)

USDA–RD also administers Emergency Community Water Assistance Grants to assist certain residents of rural areas to obtain or maintain adequate quantities of water that meet the standards set by the SDWA. *See* 7 C.F.R. § 1778.3. See Chapter 29 of this book, which discusses rural utilities and USDA–RD financial assistance. Regulations regarding the USDA–RD's Utilities Program may be accessed at the USDA's Web site at www.rd.usda.gov/publications/regulations-guidelines/utilities-0.

b. Farm Service Agency

The mission of the FSA is to "deliver timely, effective programs and services to America's farmers and ranchers to support them in sustaining our Nation's vibrant agricultural economy, as well as provide first-rate support for domestic and international food aid efforts." Farm Service Agency, *Mission Statement*, www.fsa.usda.gov/Internet/FSA_File/fsa_mission_values.pdf. The FSA implements agricultural policy, administers credit and loan programs, and manages conservation, commodity, disaster, and farm marketing programs through a national network of offices. *See* U.S. Department of Agriculture, *USDA Agencies and Offices*, www.usda.gov/wps/portal/usda/usdahome?navtype=MA&navid=AGENCIES_OFFICES_C.

In addition to providing low-interest loans for drought disaster relief (see Chapter 22 of this book), the FSA implements the Farmable Wetlands Program to restore wetlands in order to reduce downstream flood damage, improve surface water and groundwater quality, and recharge groundwater supplies. *See* Farm Service Agency, *Conservation Programs—Farmable Wetlands Program*, www.fsa.usda.gov/programs-and-services/conservation-programs/farmable-wetlands/index. Another FSA program, a Source Water Protection Program, is "designed to help prevent pollution of surface and ground water used as the primary source of drinking water by rural residents." *See* Farm Service Agency, *Conservation Programs—Source Water Protection Program*, www.fsa.usda.gov/programs-and-services/conservation-programs/source-water-protection/index.

c. Natural Resources Conservation Service

The NRCS, which traces its origin from efforts to combat the Dust Bowl of the 1930s, "helps America's farmers, ranchers, and forest landowners conserve the nation's soil, water, air, and other natural resources." Natural Resources Conservation Service, *About NRCS*, www.nrcs.usda.gov/wps/portal/nrcs/main/national/about/. Like the FSA and USDA–RD, the NRCS works at the local level, in field offices at USDA service centers in nearly every county in the United States. *See* Natural Resources Conservation Service, *Local Service Centers Directory*, www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/local/.

As discussed in Chapter 35 of this book, the NRCS administers the Swampbuster program. Generally, this program removes "certain incentives to produce agricultural commodities on converted wetlands or highly erodible land, unless the highly erodible land is protected from excessive soil erosion." Natural Resources Conservation Service, *Wetland Conservation Provisions (Swampbuster)*, www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/alphabetical/camr/?cid=stelprdb1043554%20. The NRCS is responsible for making wetlands determinations, and these determinations are depicted on FSA maps. There is an MOU regarding the delineation of wetlands among the USDA, the DOI, the EPA, and the U.S. Department of the Army. *See Memorandum of Agreement Among the Department of Agriculture, the Environmental Protection Agency, the Department of the Interior, and the Department of the Army Concerning the Delineation of Wetlands for Purposes of Section 404 of the Clean Water Act and Subtitle B of the Food Security Act* (Jan. 1994), *available at* www.lb5.uscourts.gov/ArchivedURLs/Files/06-30917(2).pdf. The NRCS maintains a list of hydric soils occurring in U.S. wetlands, which assists in determining wetlands status. *See* Natural Resources Conservation Service, *Hydric Soils*, www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric.

The NRCS administers the Watershed Protection and Flood Prevention Program, which provides local government sponsors (such as the soil and water conservation districts discussed earlier in this chapter) with technical and financial support to implement conservation practices and improvements, including floodwater-retarding dams and reservoirs. *See* 16 U.S.C. §§ 1001–1012. This program is detailed in Chapter 39 of this book, and as noted therein, the focus is generally on small projects in upstream tributary watersheds.

As discussed earlier in this chapter, the NRCS provides assistance regarding WQMPs. Funding is provided for water resource-related projects through such programs as the Environmental Quality Incentives Program and the Wetlands Reserve Program. *See* Natural Resources Conservation Service, *Environmental Quality Incentives Program*, www.nrcs.usda.gov/wps/portal/nrcs/main/tx/programs/financial/eqip/.

G. United States Coast Guard

The United States Coast Guard (USCG) is a branch of the United States Armed Forces. The mission of the USCG is maritime safety, security, and stewardship. Nearly 42,000 men and women are on active duty in the USCG to safeguard the "Nation's maritime interests in the heartland, in the ports, at sea, and around the globe." United States Coast Guard, *Missions—Ready today . . . Preparing for Tomorrow*, www.uscg.mil/top/missions/.

1. Organizational Structure

The head of the Coast Guard is the Commandant. United States Coast Guard, *Senior Coast Guard Leadership*, www.uscg.mil/seniorleadership/. There are nine USCG districts, divided between the Atlantic Area and the Pacific Area. United States Coast Guard, *Units*, www.uscg.mil/top/units/. Texas is in the Eighth Coast Guard District, which is headquartered in New Orleans. United States Coast Guard, *U.S. Coast Guard Eighth District*, www.uscg.mil/d8/.

2. Influence on Water Resources

The USCG is the federal counterpart to the General Land Office in responding to coastal spills. EPA Region 6 and the USCG have entered into an MOU to delineate roles in pollution response. *See Memorandum of Understanding Between the U.S. Environmental Protection Agency Region 6, Dallas, Texas, and the Eighth Coast Guard District Concerning Response Boundaries for Oil and Hazardous Substances Pollution Incidents* (Sept. 1986), *available at* www.rrt6.org/Uploads/Files/epa_uscg_response_boundary_september_1986.pdf. Similarly, the EPA, the USCG, the FWS, the

NMFS, the NOS, and the DOI's Office of Environmental Policy and Compliance signed an interagency memorandum of agreement. *See Interagency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act* (renewed July 2014), *available at* www.nmfs.noaa.gov/op/pds/documents/02/110/02-110-17.pdf.

The USCG's mission also includes enforcement of fisheries laws at sea and regulation to prevent the introduction of invasive species into the maritime environment and unauthorized ocean dumping. *See* 6 U.S.C. § 468; United States Coast Guard, *Missions—Marine Environmental Protection,* www.uscg.mil/top/missions/marineenvironmentalprotection.asp.

H. Council on Environmental Quality

As discussed in Chapters 2 and 27 of this book, water projects may trigger the applicability of NEPA. Generally, NEPA procedures involve the oversight of or consultation with the federal agencies. The Council on Environmental Quality (CEQ) coordinates these federal environmental efforts and "works closely with agencies and other White House offices in the development of environmental policies and initiatives." *See* The White House, *The Council on Environmental Quality—About,* www.whitehouse.gov/administration/eop/ceq/about [hereinafter About the CEQ].

1. Organizational Structure

The CEQ was established within the Executive Office of the President by Congress as part of NEPA in 1969. About the CEQ. The chair of the CEQ is appointed by the President with the advice and consent of the Senate.

2. Influence on Water Resources

Under NEPA, the CEQ works to balance environmental, economic, and social objectives in pursuit of NEPA's goal of "productive harmony" between humans and the natural environment. 42 U.S.C. § 4331(a). Under NEPA, the CEQ is tasked with ensuring that federal agencies meet their obligations under the Act. The CEQ has issued guidance to assist the federal agencies in their review. *See* Office of NEPA Policy and Compliance, *Counsel on Environmental Quality,* http://energy.gov/nepa/council-environmental-quality; *see also NEPA and NHPA: A Handbook for Integrating NEPA and Section 106* (Mar. 2013), *available at* http://energy.gov/sites/prod/files/G-CEQ-NEPA_NHPA_Section_106_Handbook_Mar2013.pdf; Memorandum from Nancy H. Sutley, Chair, Council on Environmental Quality, to Heads of Federal Departments and Agencies (Jan. 14, 2011), *available at* http://energy.gov/sites/prod/files/NEPA-CEQ_Mitigation_and_Monitoring_Guidance_14Jan2011.pdf. NEPA review adds complexity and often delay to water resource projects. See Chapters 2 and 27 of this book.

I. Interstate Compacts

As discussed in more detail in Chapter 14 of this book, interstate stream compacts, such as the Red River Compact, the Pecos River Compact, and the Rio Grande Compact, are administered by a commission. Generally, there is a representative from each state, plus a nonvoting federal commissioner. *See, e.g.*, Red River Compact Commission, www.owrb.ok.gov/rrccommission/rrccommission.html. The federal agencies that support these compacts are the Corps, the Bureau of Reclamation, the USGS, and the NRCS.

J. Congressional Committees

Various congressional standing committees exercise jurisdiction over water or water-related entities. For example, the Senate has standing committees for Energy and Natural Resources and the Environment and Public Works. The Subcommittee on Water and Power, a subcommittee of the Committee on Energy and Natural Resources, oversees and has legislative responsibilities for irrigation; reclamation projects, including related flood control purposes; power marketing administrations; energy development impacts on water resources; groundwater resources and management; hydroelectric power; low head hydro; and energy-related aspects of deepwater ports. U.S. Senate Committee on Energy and Natural Resources, *Subcommittee on Water and Power*, www.energy.senate.gov/public/index.cfm/subcommittees?p=water-and-power.

The Senate Committee on the Environment and Public Works includes oversight of regulations from drinking water to wastewater systems to public infrastructure. The Fisheries, Water, and Wildlife Subcommittee has jurisdiction over the CWA, including wetlands; SDWA; CZMA; invasive species; fisheries and wildlife, ESA, and national wildlife refuges; and outer continental shelf lands. U.S. Senate Committee on Environment and Public Works, *Subcommittees—Fisheries, Water, and Wildlife*, www.epw.senate.gov/public/index.cfm?FuseAction=Subcommittees.Subcommittee &Subcommittee_id=a8a0c57a-7f57-4a4b-8528-f6a9eb20d8ca. Moreover, the Senate Committee on Commerce, Science and Transportation, including the Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, is responsible for legislation that impacts oceans, coasts, and climates. U.S. Senate Committee on Commerce, Science, and Transportation, *Subcommittees—Oceans, Atmosphere, Fisheries, and Coast Guard*, www.commerce.senate.gov/public/ index.cfm?p=OceansAtmosphereFisheriesandCoastGuard.

The House has similar, but not identical, committees asserting jurisdiction over water. The Natural Resources Committee has jurisdiction over, inter alia, interstate compacts relating to apportionment of waters for irrigation purposes; irrigation and reclamation, including water supply for reclamation projects and easements of public lands for irrigation projects; and marine affairs, including coastal zone management. *See* U.S. House Natural Resources Committee, *Committee Jurisdiction*, http://naturalresources.house.gov/about/jurisdiction.htm. Likewise, the Transportation and Infrastructure Committee has jurisdiction over infrastructure issues, such as clean water and wastewater management, and includes the Water Resources and Environment Subcommittee, which deals with matters relating to water resources development, conservation and management, water pollution control and water infrastructure, and hazardous waste cleanup. U.S. House Transportation and Infrastructure Committee, *Subcommittees—Water Resources and Environment*, http:// transport.house.gov/subcommittees/subcommittee/?ID=107422. The House Energy and Commerce Committee and, more specifically, the Subcommittee on Environment and the Economy also exercises jurisdiction over all matters relating to water contamination. U.S. House Energy and Commerce Committee, *Subcommittees—Environment and the Economy*, http://energycommerce.house.gov/ subcommittees/environment-and-economy.

IV. Conclusion

It takes all these agencies, working together, to protect and sustain our vital water resources. The TCEQ acts as the primary regulatory authority with water resource jurisdiction in Texas. The TWDB is responsible for water planning and for administering water financing, while the PUC governs the economic regulation of water and sewer service. Although the RRC is not a water resource agency, due to the nature of the activities it regulates its jurisdiction often overlaps with the TCEQ. There are many more state agencies with jurisdiction over water resource matters, whether in a regulatory, research and advisory, or funding role. The federal government's authority over Texas's state waters is more limited, but the EPA, FWS, and others at the federal level also play their part in regulating water resources.

CHAPTER 7

Water Districts

Angela Stepherson[1]

I. Introduction

A water district is a local government entity that has specified powers and encompasses a specified geographic area. Water districts have existed in Texas in various forms since the early 1900s. Current Texas law provides for more than a dozen different types of districts. This chapter will address the constitutional basis for water districts, the general powers and duties applicable to them by statute, and the creation process and powers of the most common types of districts.

II. Constitutional Provisions

Two provisions in the Texas Constitution provide the authority under which water districts, both general law and special law, are created. See Chapter 3 of this book for a discussion of the history of these provisions.

A. Article III, Section 52

Article III, section 52, of the Texas Constitution provides that the Texas legislature may authorize a political subdivision or a "defined district" to issue debt in an amount "not to exceed one-fourth of the assessed valuation of the real property of such district" for the following purposes:

1. the improvement of rivers, creeks, and streams to prevent overflows and to permit navigation or irrigation thereof or in aid of such purposes;
2. the construction and maintenance of pools, lakes, reservoirs, dams, canals, and waterways for the purposes of irrigation, drainage, or navigation or in aid thereof; and
3. the construction, maintenance, and operation of macadamized, graveled, or paved roads and turnpikes or in aid thereof.

See Tex. Const. art. III, § 52(b). The issuance of debt payable from taxes must be approved at an election by a two-thirds majority of those voting.

In the Texas Supreme Court's decision in *Deason v. Orange County Water Control & Improvement District No. One*, 244 S.W.2d 981 (Tex. 1952), the court held that neither article III, section 52,

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nor article XVI, section 59, as then worded, authorized the legislature to grant a water control and improvement district the power to finance and operate firefighting equipment. *Deason*, 244 S.W.2d at 984; *see also* Tex. Att'y Gen. Op. Nos. H-28 (1973), M-76 (1967). That case was addressed by a 1978 amendment to article III, section 52, and by a similar amendment to article XVI, section 59. Both sections now explicitly allow districts to provide firefighting services and to issue debt for the purpose. *See* Tex. Const. art. III, §§ 52(d), 59(f).

B. Article XVI, Section 59

Article XVI, section 59, of the Texas Constitution provides that conservation and reclamation districts may be created and may be authorized by the legislature to issue debt and levy a maintenance and operations tax for various purposes related to "[t]he conservation and development of all the natural resources of this State." *See* Tex. Const. art. XVI, § 59(a), (b). Debt payable from taxes must be approved at an election by a simple majority of those voting. *See* Tex. Const. art. XVI, § 59(c). As noted above, this section of the constitution was amended in 1978 to allow districts to provide firefighting services and to issue debt for that purpose. *See* Tex. Const. art. XVI, § 59(f).

Article XVI, section 59, was also amended in 2003 to include the development of parks and recreational facilities as an explicit constitutional purpose and to allow the legislature to authorize districts in certain counties (Bexar, Bastrop, Waller, Travis, Williamson, Harris, Galveston, Brazoria, Fort Bend, and Montgomery) and the Tarrant Regional Water District to issue debt payable from taxes (upon voter authorization) and to levy an operations and maintenance tax for the purpose of developing parks and recreational facilities. *See* Tex. Const. art. XVI, § 59(a), (c-1). This amendment was the culmination of a series of court cases, attorney general opinions, and statutory enactments that addressed the authority of districts to provide such facilities and the means by which they could be financed. *See, e.g., Harris County Water Control & Improvement District No. 110 v. Texas Water Rights Commission*, 593 S.W.2d 852 (Tex. Civ. App.—Austin 1980, no writ); Tex. Att'y Gen. Op. Nos. DM-420 (1996), JM-1259 (1990), JM-1173 (1990), MW-313 (1981), H-491 (1975). The currently applicable statutory provisions are found in chapter 49, subchapter N, of the Texas Water Code; those provisions are discussed in detail in section III.J.7 below.

Subsections (d) and (e) of article XVI, section 59, set out the procedural requirements for passage of special law district legislation. Those requirements are discussed in section XI.B below.

III. Texas Water Code Chapter 49: General Provisions

A. Applicability

Enacted through the passage of Senate Bill 626 in 1995, chapter 49 of the Texas Water Code establishes uniform administrative provisions applicable to all types of districts defined in section 49.001 and discussed in this chapter, generally referred to as water districts. Before the passage of Senate Bill 626, chapter 50 of the Texas Water Code had contained some administrative provisions generally applicable to all such districts, but for the most part each chapter of the Water Code included sometimes varying administrative provisions applicable only to the particular type of district covered by that chapter, such as municipal utility districts under chapter 54; most of these provisions were repealed by Senate Bill 626.

The provisions in chapter 49 generally apply to a "district," which is defined by section 49.001(a)(1) to be—

> any district or authority created by authority of either Sections 52(b)(1) and (2), Article III, or Section 59, Article XVI, Texas Constitution, regardless of how created. The term "district" shall not include any navigation district or port authority created under general or special law, any conservation and reclamation district created pursuant to Chapter 62, Acts of the 52nd Legislature, 1951 (Article 8280-141, Vernon's Texas Civil Statutes), or any conservation and reclamation district governed by Chapter 36 unless a special law creating the district or amending the law creating the district states that this chapter applies to that district.

Tex. Water Code § 49.001(a)(1).

Under this definition, chapter 49 does not apply to navigation districts, port authorities, or groundwater conservation districts. As discussed below, specific sections in chapter 49 may also provide that they apply or do not apply to districts that meet particular criteria.

One issue that has arisen but that has not been resolved is whether the legislature intended chapter 49 to apply to districts in the exercise of road powers. Those powers are afforded to districts under article III, section 52(b)(3), of the Texas Constitution; that subsection is specifically excluded from the definition of "district" in section 49.001(a)(1). Some have argued that this exclusion indicates that the legislature did not intend chapter 49 to apply to any exercise of road powers, whereas others contend that the legislature intended only to exclude districts that exercise road powers alone, such as county road districts created and operating under chapter 257 of the Texas Transportation Code. In other words, under this school of thought, chapter 49 should apply to districts that have road powers in addition to other powers that derive from article III, section 52(b)(1) and (2), and article XVI, section 59, of the constitution.

The definition of "district" in section 49.001(a)(1) includes districts "regardless of how created." Section 49.002(a) provides that—

> [chapter 49] applies to all general and special law districts to the extent that the provisions of this chapter do not directly conflict with a provision in any other chapter of this code or any Act creating or affecting a special law district. In the event of such conflict, the specific provisions in such other chapter or Act shall control.

Tex. Water Code § 49.002(a).

A "general law district" is one created by the county or by the Texas Commission on Environmental Quality (TCEQ) under the general procedures set out in the chapter of the Water Code applicable to that type of district. The procedures for creating the different types of general law districts are described below. A "special law district" is one created through the passage of particular local legislation; that process is discussed in section XI below. For a special law district, the specific language of the creation legislation and any amendments that conflict with any provisions in chapter 49 of the Texas Water Code, control over chapter 49.

Section 49.002(b) reiterates that chapter 49 generally does *not* apply to groundwater conservation districts governed by chapter 36 of the Texas Water Code, "unless a special law creating the district or amending the law creating the district states that this chapter applies to that district." Tex. Water Code § 49.002(b). Water Code chapter 36 sets out the administrative provisions applicable to groundwater conservation districts; see Chapter 16 of this book for detailed information regarding those districts.

Water districts are subject to many of the same statutes in the Texas Government Code and the Texas Local Government Code that apply to other types of local government entities, such as cities and counties. For example, districts must comply with the Open Meetings Act, the Public Information Act, and the Local Government Records Act. *See* Tex. Gov't Code §§ 551.001(3)(H), 552.003(1)(A)(viii); Tex. Loc. Gov't Code § 201.003(7). In addition, districts may be subject to certain federal laws such as the Safe Drinking Water Act or federal regulations governing municipal bonds.

B. Directors

The chapter of the Texas Water Code applicable to a type of district establishes the specific qualifications a person must meet to serve on the board of directors for each particular type of district. Chapter 49, however, contains administrative provisions that generally apply to directors for all types of districts. In addition to the provisions discussed in detail below, chapter 49 addresses the election of board officers, the oath of office and bond required for directors, and the fees of office paid to directors. *See* Tex. Water Code §§ 49.054, 49.055, 49.060. Of particular note, a majority of a district board is the quorum required to hold a board meeting, and a majority of the total number on the board is needed to approve an action item, rather than only a majority of those present. *See* Tex. Water Code § 49.053. In other words, if a district's board is made up of five members, three members are needed for a quorum to hold a board meeting. If only three members are present, all three must vote in favor of an item for it to pass.

1. Disqualification

Section 49.052 of the Texas Water Code sets out the circumstances under which a person is prohibited from serving on the board of directors. This section applies to any district "that includes less than all the territory in at least one county and which, if located within the corporate area of a city or cities, includes within its boundaries less than 75 percent of the incorporated area of the city or cities." Tex. Water Code § 49.052(a). Section 49.052(f) provides that the section does not apply to special water authorities, as that term is defined in section 49.001(a)(8); certain districts that are not required to obtain TCEQ approval of their bonds under section 49.181(h)(4); or districts whose main function is to provide irrigation for agricultural purposes or to provide nonpotable water. *See* Tex. Water Code § 49.052(f).

A person is disqualified from serving or continuing to serve on a board if that person is related within the third degree of affinity or consanguinity to or employed by a developer of property in the district, another board member, or a person who provides professional services to the district. *See* Tex. Water Code § 49.052(a)(1), (2); *see also* Tex. Gov't Code ch. 573, subch. B (computing degrees of relationship by affinity and consanguinity). A person is also disqualified if that person is a developer of property in the district, as defined by section 49.052(d); is providing professional services to the district; is a party to a contract with the district, except for services provided by the district to the general public; or is a party to a contract with a developer of property in the district, except for the purpose of acquiring property to establish a residence or a business in the district or to qualify to serve as a director. *See* Tex. Water Code § 49.052(a)(3)–(5).

If the board determines that a director is disqualified, it must replace that director within sixty days. *See* Tex. Water Code § 49.052(b). Willfully continuing to serve as a board member when disqualified is a misdemeanor. *See* Tex. Water Code § 49.052(c). The presence of a disqualified member on a board, however, does not affect any rights obtained by a third party through board action as long as the third party was unaware of the disqualification. *See* Tex. Water Code § 49.052(e).

In addition to disqualification, section 49.052(g) provides that a board, by unanimous vote of the other members, may remove a director who has missed at least half of the regularly scheduled meetings during the preceding twelve-month period. *See* Tex. Water Code § 49.052(g). A director removed under this section may appeal the removal to the TCEQ, which may reinstate the director for good cause. *See* 30 Tex. Admin. Code § 293.35 (reinstatement of board member).

Finally, a person may be prohibited from holding more than one governmental office under the "dual office holding" provisions of the Texas Constitution or under the common-law doctrine of incompatibility. An examination of those topics is beyond the scope of this chapter.

2. *Election of Directors and Terms of Office*

Under section 49.103 of the Texas Water Code, directors serve four-year terms, and director elections are held on the uniform election date in May of even-numbered years. Tex. Water Code § 49.103(a), (b); *see also* Tex. Elec. Code § 41.001 (uniform election dates). In contrast to section 49.002, section 49.103(e) specifically provides that these requirements "take precedence over all prior statutory enactments." Tex. Water Code § 49.103(e). Section 49.103 as a whole, however, does not apply to special law districts that do not have elected directors or to special utility districts operating under chapter 65 of the Texas Water Code. *See* Tex. Water Code § 49.103(f); *see also* Tex. Water Code § 65.103 (election and terms of office of special utility district directors).

Directors are required to serve staggered terms. When a district is first organized under section 49.102 (discussed below), the permanent directors must agree or draw lots to determine which directors will come up for election first. *See* Tex. Water Code § 49.102(h). A district may determine that directors will be elected by position number, at large, or from single-member districts. *See* Tex. Water Code § 49.103(c), (d). Most districts, however, elect directors at large. Districts must generally comply with the Texas Election Code unless otherwise provided. Tex. Water Code § 49.101. Director candidates often run unopposed, and in that case, chapter 2, subchapter C, of the Election Code allows a district to cancel an election if each candidate is unopposed and no propositions appear on the ballot.

3. *Vacancies*

Generally, a board must appoint a new director to fill a vacancy no later than sixty days after the position becomes vacant. Tex. Water Code § 49.105(a). If the board does not fill a vacancy within that time frame, 10 percent of the registered voters in the district may petition the board to fill the vacancy. Tex. Water Code § 49.105(b). If the board has multiple vacancies and cannot act because it no longer has a quorum as required by section 49.053, or if a position is vacant for more than ninety days, regardless of whether a voter petition has been presented, then the vacancy may be filled by either the TCEQ or the county commissioners court. *See* Tex. Water Code § 49.105(c). The commissioners court fills the vacancy if the district was created by the county—for example, a fresh water supply district. Otherwise, the TCEQ fills the vacancy if the district is required to obtain TCEQ approval of its bonds under section 49.181. *See* 30 Tex. Admin. Code §§ 293.31–.34.

4. *Conflicts of Interest*

District directors must comply with chapter 171 of the Local Government Code, which generally regulates conflicts of interest of local public officials. Tex. Water Code § 49.058; *see also* Tex. Loc. Gov't Code § 171.001(1) (defining "local public official"). Chapter 171 requires officials to disclose certain interests in matters that come before them for a vote and to abstain from voting under certain conditions. *See* Tex. Loc. Gov't Code §§ 171.002 (types of interests covered), 171.004 (disclosure and abstention), 171.005 (voting on budget). Failure to comply with these requirements is a misdemeanor. *See* Tex. Loc. Gov't Code § 171.003. A violation, however, does not affect the action taken unless it would not have passed without the vote of the person who had the conflict. *See* Tex. Loc. Gov't Code § 171.006.

Enacted in 2005, chapter 176 of the Local Government Code also applies to district directors. *See* Tex. Loc. Gov't Code § 176.001(3) (defining "local government entity"), (4) (defining "local government officer"). This chapter requires only that a local government officer disclose certain relationships with persons who enter into or seek to enter into contracts with the local government entity. Failure to file the disclosure statement with the local government entity is a misdemeanor. *See* Tex. Loc. Gov't

Code § 176.003. Unlike chapter 171, chapter 176 does not require any abstention from voting. Depending on the circumstances, however, abstention may be required under chapter 171.

C. Confirmation Elections

Section 49.102 generally requires an election to confirm the creation of a district and to elect permanent directors. A confirmation election is not required for a special law district if it is not required by the creation legislation. *See* Tex. Water Code § 49.102(j). The vast majority of special law districts are required to have a confirmation election. *See, e.g.*, Tex. Spec. Dist. Code §§ 8138.023, 8203.023. The board's order canvassing the results of the election must include the district's boundaries and must be filed with the TCEQ and recorded in the deed records. Tex. Water Code § 49.102(f). In most districts, an election to authorize the future issuance of bonds and the levy of a maintenance tax is held at the same time as the confirmation election. An election to approve a plan to provide firefighting services may also be held simultaneously with the confirmation election. *See* Tex. Water Code § 49.102(i); see also section III.J.6 below.

D. Bond Elections

As discussed in section II.A above, the Texas Constitution requires that the voters of a district authorize the issuance of bonds payable from taxes. A bond election may be held at the same time as any other election held by the district. Tex. Water Code § 49.106(c); *but see* Tex. Water Code § 53.172 (requiring bond election for a fresh water supply district to be held separately from other elections). As previously noted, most districts hold their bond election at the same time as their confirmation election. Before a bond election may be held, the district must obtain and make available to the public an engineer's report describing the type and cost of the facilities and other items to be financed by the bonds. *See* Tex. Water Code § 49.106(a). The amount to be authorized covers the full amount of the bonds that are estimated to be needed over the life of the district. Where a district is created over vacant land, the actual issuance of bonds generally occurs in phases as the district develops.

E. Management of a District

The board of directors is responsible for the management of the district but may hire employees or consultants as necessary to conduct the business of the district. *See* Tex. Water Code § 49.057(a). The employees or consultants needed will vary depending on the level of activity in the district. Officers, employees, or consultants who routinely handle district funds must provide a bond or insurance to protect against theft of funds. *See* Tex. Water Code § 49.057(e), (i). The district may provide health, retirement, and other benefits to its employees. *See* Tex. Water Code § 49.069. When hiring professional consultants such as attorneys, engineers, accountants, or financial advisors, a district must comply with the Professional Services Procurement Act, found in chapter 2254, subchapter A, of the Texas Government Code. Tex. Water Code § 49.057(d). That act provides that professional consultants may not be hired based on competitive bids; they must be hired based on "demonstrated competence and qualifications" and "for a fair and reasonable price." Tex. Gov't Code § 2254.003(a).

The board may also "purchase all materials, supplies, equipment, vehicles, and machinery needed by the district." Tex. Water Code § 49.057(h). Certain purchases must follow the competitive bidding requirements in chapter 49, subchapter I (discussed below).

The board of a district must establish a fiscal year for the district and adopt an annual budget. Tex. Water Code §§ 49.057(b), 49.158. The board may change the fiscal year, but not more than once in any two-year period. Tex. Water Code § 49.158. The board must designate one or more banks to serve as the depository for district funds; any funds that are not insured by the Federal Deposit Insurance Corporation must be secured as provided by the Public Funds Collateral Act, found in chapter 2257 of the Government Code. Tex. Water Code § 49.156(a), (b). Investment of district funds must comply with the Public Funds Investment Act, Government Code chapter 2256. Tex. Water Code § 49.157(a).

F. General Financing Mechanisms

1. Operation and Maintenance Tax

If authorized by the voters, a district may levy an ad valorem tax to cover expenses associated with administration of the district and operation and maintenance of its facilities. *See* Tex. Water Code § 49.107(a), (b). The election to authorize an operation and maintenance tax may be held at the same time as any election held by the district and is generally held at the same time as the confirmation election. *See* Tex. Water Code § 49.107(c). The election may authorize a tax "for a specific maximum rate or for an unlimited rate." Tex. Water Code § 49.107(d). A district located in one of the counties listed in article XVI, section 59(c-1), of the Texas Constitution may levy a maintenance tax for parks and recreational facilities. If the district is located in Harris County or an adjoining county, a maintenance tax levied for that purpose may not exceed ten cents per $100 assessed valuation. *See* Tex. Water Code § 49.107(h).

Unlike the taxes levied by other types of local government entities, operation and maintenance taxes and debt service taxes levied by districts are generally not subject to the "truth in taxation" provisions in the Texas Tax Code. *See* Tex. Water Code § 49.107(g). Rather, districts must comply with section 49.236 of the Texas Water Code, which requires the board to publish notice and hold a public hearing before establishing the district's total tax rate. If a board approves a tax rate increase that exceeds certain limits, the voters may petition the district to hold an election to roll back a portion of the increase. *See* Tex. Water Code § 49.236(d). Only the operation and maintenance tax portion of the total tax rate may be decreased; a rollback election does not affect taxes required to pay the debt service on bonds or to pay contractual obligations. *See* Tex. Water Code § 49.236(d).

2. Contract Tax

A district may enter into a contract that requires the district to make payments from any income of the district, including bond or note proceeds or taxes. Tex. Water Code § 49.108(a). A contract that requires a district to make payments from taxes must be approved by the district's voters, although the contract may authorize the board to later amend the contract without further voter approval. *See* Tex. Water Code § 49.108(b). With certain exceptions, if a district is required to obtain the TCEQ's approval of its bonds under section 49.181, then the district must also obtain the approval of the TCEQ's executive director before entering into a contract tax obligation that is longer than three years. *See* Tex. Water Code § 49.108(e); *see also* 30 Tex. Admin. Code § 293.89 (requirements for approval of contract tax). The TCEQ's rules are designed to ensure that a district has the financial means to fulfill a contract tax obligation. As with other types of district taxes, a district board must follow the procedures in section 49.236 before setting a contract tax rate. *See* Tex. Water Code § 49.236.

3. Revenue Notes

Unlike debt payable from taxes, a district may issue notes payable from system revenues without first holding an election. *See* Tex. Water Code § 49.153(a). Such notes may not place a lien on district property or taxes. *See* Tex. Water Code § 49.153(b). With certain exceptions, a district must obtain the

TCEQ's approval before issuing a revenue note with a term of more than three years. *See* Tex. Water Code § 49.153(c), (d) (providing that section 49.153 does not apply to special water authorities), (e) (listing exceptions to the requirement to obtain TCEQ approval); *see also* 30 Tex. Admin. Code § 293.80 (detailing TCEQ rules for the approval of revenue notes).

4. Bond Anticipation and Tax Anticipation Notes

A district may issue bond anticipation notes and tax anticipation notes with a term of not more than one year in anticipation of receiving bond proceeds or tax revenues. *See* Tex. Water Code § 49.154. If a district is required to obtain TCEQ approval of its bonds, it must have a bond application on file with the agency before issuing a bond anticipation note. Tex. Water Code § 49.154(d); *see also* 30 Tex. Admin. Code § 293.54 (requirements for approval of bond anticipation notes; limitation on use of proceeds).

5. Rates and Fees

Under section 49.212, districts have broad authority to establish and enforce fees and charges for district facilities and services. To enforce the payment of fees and charges as well as taxes that have been unpaid for more than six months, a district may discontinue any facility or service. Tex. Water Code § 49.212(c); *see also* Tex. Water Code §§ 49.351(j) (allowing a district to discontinue any service to enforce payment of fire services fee), 49.464(c) (providing that a district may not refuse the use of any facility or service other than recreational facilities to enforce payment of fees for recreational facilities). The customers of a district that provides water or sewer service to household users may appeal a board decision affecting water, sewer, or drainage rates to the TCEQ. *See* Tex. Water Code § 13.043(b)(4), (c)–(e).

Like cities, districts may levy impact fees as provided by chapter 395 of the Local Government Code. *See* Tex. Water Code § 49.212(d). An impact fee is a charge "against new development in order to generate revenue for funding or recouping the costs of capital improvements or facility expansions necessitated by and attributable to the new development." Tex. Loc. Gov't Code § 395.001(4). In lieu of following the procedural requirements in chapter 395 for adopting impact fees, a district may obtain the TCEQ's approval. *See* Tex. Loc. Gov't Code § 395.080; *see also* 30 Tex. Admin. Code ch. 293, subch. N (approval of impact fees).

Districts that propose to or actually do provide retail water or sewer or drainage services may charge standby fees as provided by section 49.231 of the Texas Water Code. A standby fee is "a charge, other than a tax, imposed on undeveloped property for the availability of potable water, sanitary sewer, or drainage facilities and services." Tex. Water Code § 49.231(a)(1). A standby fee may be charged to recoup debt service or operation and maintenance costs for facilities made available to but not used by undeveloped property. *See* Tex. Water Code § 49.230(b). A district must obtain TCEQ approval to impose standby fees. Tex. Water Code § 49.230(c); *see also* 30 Tex. Admin. Code ch. 293, subch. M (approval of standby fees); *McMillan v. Texas Natural Resources Conservation Commission*, 983 S.W.2d 359 (Tex. App.—Austin 1998, pet. denied) (interpreting the standby fee statute and rules).

Certain property owned by electric and gas utilities, carbon dioxide pipelines, and telecommunications and cable providers is exempt from district impact fees and standby fees. *See* Tex. Water Code § 49.212(f)–(i).

G. Issuance of Bonds

With certain exceptions, districts are required to obtain the TCEQ's approval to issue bonds. *See* Tex. Water Code §§ 49.181–.182; *see also* Tex. Water Code § 49.181(a) (TCEQ approval is not required for refunding bonds or bonds issued to and approved by certain entities), (h) (listing districts not required to obtain TCEQ approval of bonds). Under current law, TCEQ approval is not required for bonds issued for road purposes. In 2006, the TCEQ proposed new rules that would have required agency approval of bonds issued for road purposes; the agency initially asserted that it had the authority to require its approval of road bonds if it had the authority to approve a district's utility bonds. *See* 31 Tex. Reg. 3201 (Apr. 14, 2006). The TCEQ subsequently withdrew those rules, however, and they have not been proposed again in any form. *See* 31 Tex. Reg. 8669 (Oct. 20, 2006) (withdrawal of proposed rules). Consequently, TCEQ approval is currently required only for bonds issued for the purpose of providing water, wastewater, and drainage facilities and services as well as parks and recreational facilities. The TCEQ has developed detailed rules designed to ensure that district bonds are financially feasible and are used only to finance district projects. *See* 30 Tex. Admin. Code ch. 293, subchs. E–G.

Except for refunding bonds or bonds sold to certain entities, a district must sell its bonds through competitive sealed bids; notice of the sale must be published in a newspaper of general circulation in the county where the district is located and also in a financial publication. *See* Tex. Water Code § 49.183(a), (b).

Even if TCEQ approval is not required, all district bonds must be approved by the Texas attorney general. *See* Tex. Water Code § 49.184; Tex. Gov't Code § 1202.003 (requiring attorney general review and approval of all public securities); *see also* 1 Tex. Admin. Code ch. 53, subch. F (rules for attorney general approval of district bonds). Over the years, the attorney general has issued a number of "All Bond Counsel Letters," reflecting the attorney general's position on bond-related issues, *available at* www.oag.state.tx.us/opin/abc_letters/abc_index_pdf.shtml. After bonds are approved by the attorney general, they are registered by the comptroller and are "incontestable in any court or other forum, for any reason." *See* Tex. Water Code § 49.184(d); *see also* Tex. Gov't Code § 1202.006.

H. Financial Oversight

Unless its financial activity falls below certain thresholds, a district is required to have an independent annual audit of its finances. *See* Tex. Water Code § 49.191; *see also* Tex. Water Code §§ 49.198 (listing criteria under which a district may prepare an annual financial report instead of an audit), 49.197 (giving exemptions for financially dormant districts); 30 Tex. Admin. Code § 293.94 (describing TCEQ rules regarding annual financial reporting requirements); Texas Commission on Environmental Quality, *Water District Financial Management Guide* (RG-080) (Mar. 2004), *available at* www.tceq.texas.gov/publications/rg/rg-080/rg-080.html. For most districts, the audit must be completed within 120 days after the district's fiscal year ends and must be submitted to the TCEQ executive director within 135 days after the district's fiscal year ends. *See* Tex. Water Code §§ 49.191(d), 49.194(a), 49.194(h) (requiring special water authority to submit audit within 160 days after fiscal year ends).

If a district meets the criteria to prepare a financial report instead of an audit, it must file the financial report with the TCEQ executive director within forty-five days after the district's fiscal year ends. *See* Tex. Water Code § 49.198(c). If a district meets the criteria for financial dormancy, it must file a financial dormancy affidavit with the TCEQ executive director by January 31 of each year as long as the district is financially dormant. *See* Tex. Water Code § 49.197(d). A district must make all of its fiscal records available to the public. *See* Tex. Water Code § 49.196(b).

I. Notice Provisions

Under section 49.455 of the Texas Water Code, certain districts that meet the criteria set out in section 49.452 are required to file in the county deed records and with the TCEQ information concerning the district in a prescribed form. *See* Tex. Water Code § 49.455(a), (j). The information that must be filed includes the name of the district, a map and boundary description of the district, the district's tax rate, the amount of bonds authorized and issued, the amount of any standby fee imposed by the district, the date of the district's confirmation election, the functions of the district, and a notice to purchasers in the form required by section 49.452. *See* Tex. Water Code § 49.455(b). The district is also required to make the notice to purchasers available in its office. *See* Tex. Water Code § 49.453. Under section 49.452, anyone who proposes to sell property in a district subject to that section must first give the notice obtained from the district to the purchaser. *See* Tex. Water Code § 49.452. The purpose of these sections is to ensure that buyers are aware that they are purchasing property in a district and the potential impact of the district on their property.

J. General Powers

In addition to those discussed below, chapter 49 of the Texas Water Code grants districts a number of general powers. *See, e.g.*, Tex. Water Code §§ 49.004 (authority to establish civil penalties for breach of district rules), 49.211(b) (purchase of land, facilities, and equipment), 49.213 (contracting authority), 49.218 (acquisition of property), 49.220 (use of rights-of-way), 49.225 (leases), 49.226 (sale or exchange or property), 49.234 (authority to prohibit septic tanks).

1. *Solid Waste*

Section 49.213(c)(6) of the Texas Water Code authorizes districts to contract for municipal solid waste services. *See* Tex. Water Code § 49.213(c)(6); *see also* Tex. Water Code § 54.203 (authority of municipal utility districts to provide solid waste services). Some districts contract for trash collection and bill customers for this service along with other district services.

2. *Peace Officers*

Under section 49.216 of the Texas Water Code, districts may contract for or hire their own peace officers, who have the authority to make arrests for offenses related to district property or any offense under state law. *See* Tex. Water Code § 49.216(a). Some districts contract with the county or a nearby city to provide extra patrol services in the district.

3. *Eminent Domain*

A district may condemn land or easements within or outside its boundaries "necessary for water, sanitary sewer, storm drainage, or flood drainage or control purposes or for any other of its projects or purposes, and may elect to condemn either the fee simple title or a lesser property interest." Tex. Water Code § 49.222(a); *but see* Tex. Water Code § 54.209 (limiting authority of municipal utility districts to condemn outside their boundaries). The procedures in chapter 21 of the Texas Property Code generally apply to district condemnations. *See* Tex. Water Code § 49.222(b). A district may not condemn land to obtain "rights to underground water or of water or water rights." Tex. Water Code § 49.222(c).

If a district, through the exercise of eminent domain or other powers, makes necessary the relocation of roads, railroads, electric or telephone lines, or pipelines, section 49.223 of the Water Code requires that the relocation be done at the sole expense of the district. *See Southwestern Bell Telephone, L.P. v. Emmett*, 459 S.W.3d 578 (Tex. 2015) (interpreting when a district's action "makes necessary" a relocation).

4. Water Rights

Although a district may not acquire water rights by condemnation, section 49.2261(1) of the Texas Water Code gives districts broad authority to "purchase, acquire, sell, transfer, lease, or otherwise exchange water or water rights under an agreement between the district and a person or entity that contains terms that are considered advantageous to the district." Tex. Water Code § 49.2261(1).

5. Annexation and Exclusion of Land

Districts may annex land into or exclude land from their boundaries as provided in chapter 49, subchapter J, of the Texas Water Code. Other chapters of the Water Code authorize particular types of districts to annex or exclude land under certain conditions. *See, e.g.*, Tex. Water Code § 54.739 (municipal utility districts). Unlike home-rule cities, districts do not have the power to unilaterally annex land; they may annex only upon petition by the landowner. *See* Tex. Water Code §§ 49.301, 49.302. If the land proposed for annexation by the district is located in the extraterritorial jurisdiction of a city, the city must consent to its being annexed into the district. *See* Tex. Loc. Gov't Code § 42.0425; *see also* Tex. Water Code § 54.016(d) (annexation by municipal utility district).

A district board may call a hearing on the exclusion of land either on its own motion or if petitioned by a landowner. *See* Tex. Water Code §§ 49.303(b), (c), 49.306 (grounds for exclusion); *see also* Tex. Water Code § 49.3075 (exclusion of certain land not served by district upon petition of landowner). To prevent impairing the security of district bonds, a district generally may exclude land only if it does not have any bonds payable from taxes outstanding. Tex. Water Code §§ 49.303(a), 49.3075(a); *but see* Tex. Water Code §§ 49.3076, 49.3077 (excluding land from certain districts), 49.309, 49.314 (excluding nonirrigated land).

6. Fire Departments

Section 49.351 allows a district that provides potable water or sewer services to household customers to provide firefighting services upon TCEQ and voter approval. The term "fire-fighting services" is defined as "all of the customary and usual services of a fire department, including fire suppression, fire prevention, training, safety education, maintenance, communications, medical emergency services, photography, and administration." Tex. Water Code § 49.351(k). A district may provide its own fire department, may contract with other districts to operate a joint fire department, or may contract with an existing department to provide firefighting services in the district. *See* Tex. Water Code § 49.351(a), (d), (e). Most districts that provide firefighting services do so through a contract. A district may levy taxes, issue bonds, or charge residents a fee to fund firefighting services. *See* Tex. Water Code § 49.351(a). A district may discontinue water or sewer or any district service to enforce payment of fees for firefighting services. *See* Tex. Water Code § 49.351(j).

Before a district may provide firefighting services, it must have a detailed plan prepared and approved by its board of directors, obtain the TCEQ's approval of the plan, and then hold an election to allow voters in the district to approve or disapprove the plan. *See* Tex. Water Code § 49.351(g)–(i); *see also* 30 Tex. Admin. Code ch. 293, subch. K (TCEQ approval of fire plans and bonds). For districts created by the TCEQ, a fire plan may also be submitted for approval as part of a creation application. *See* Tex. Water Code § 49.351(g); *see, e.g.*, 30 Tex. Admin. Code § 293.11(c)(8) (creation requirements for water control and improvement district), (d)(10) (municipal utility district), (e)(6) (water improvement district), (h)(12) (special utility district).

7. Recreational Facilities

In addition to other services, districts may finance, develop, and maintain recreational facilities, defined as—

> parks, landscaping, parkways, greenbelts, sidewalks, trails, public right-of-way beautification projects, and recreational equipment and facilities. The term includes associated street and security lighting.

Tex. Water Code § 49.462(1). A district may develop recreational facilities on a site also used for utility facilities. Tex. Water Code § 49.463. A district may charge fees to pay for recreational facilities but may not discontinue any other district services or facilities to enforce payment of such fees. *See* Tex. Water Code § 49.464(b), (c). Districts in most counties are prohibited from using tax funds to finance recreational facilities, although they may issue revenue bonds. *See* Tex. Water Code § 49.464(d).

Pursuant to the 2003 constitutional change discussed in section II.B above, districts in certain counties (Bexar, Bastrop, Waller, Travis, Williamson, Harris, Galveston, Brazoria, Fort Bend, and Montgomery) may, upon voter approval, issue bonds payable from taxes or levy an operation and maintenance tax to finance recreational facilities. Section 49.4645 of the Texas Water Code limits the amount and uses of such bonds. *See* Tex. Water Code § 49.4645; *see also* 30 Tex. Admin. Code § 293.41(e).

K. Contracts and Competitive Bidding

Texas Water Code chapter 49, subchapter I, establishes requirements and procedures for district construction contracts. In particular, competitive bidding requirements apply to contracts "for construction and repair and renovation of district facilities and for the purchase of equipment, materials, machinery, and all things that constitute or will constitute the plant, works, facilities, or improvements of the district." Tex. Water Code § 49.273(a). For contracts greater than $75,000, the district must advertise for bids. Contracts for more than $25,000 up to $75,000 must be let on the basis of at least three solicited written bids. Bids are not required for contracts up to $25,000. *See* Tex. Water Code § 49.273(d)–(f). Certain types of contracts are also excepted from the bidding requirements. *See* Tex. Water Code §§ 49.273(j) (exception for certain repair work), 49.274 (emergency projects), 49.278. District contractors must provide performance and payment bonds as required by chapter 2253 of the Government Code. *See* Tex. Water Code § 49.275. The TCEQ has also adopted rules regarding district contracts. *See* 30 Tex. Admin. Code §§ 293.63, 293.64.

L. Dissolution

Under Texas Water Code chapter 49, subchapter K, the TCEQ may dissolve a district that has been inactive for five years and has no bonds outstanding. The TCEQ must give notice and hold a hearing regarding a proposed dissolution. *See* Tex. Water Code §§ 49.322, 49.324; *see also* 30 Tex. Admin. Code ch. 293, subch. L (commission procedure for dissolution of district). Upon dissolution of a district, its assets escheat to the state and are disposed of by the comptroller as provided in chapter 74 of the Texas Property Code. Tex. Water Code § 49.327. Usually, districts that are proposed for dissolution do not have any assets. Other chapters of the Water Code may allow for the dissolution of particular types of districts under certain circumstances. *See, e.g.*, Tex. Water Code § 54.734 (municipal utility districts).

M. Specific Types of Districts

Although chapter 49 of the Texas Water Code sets out administrative provisions applicable to most types of districts, to understand fully the workings of a particular district it is always necessary to review the history of that district, the specific chapter of the Water Code under which the district operates, and, if the district is a special law district, the creation legislation and any amendments. In addition, legislation may be enacted that alters the powers and duties of a previously created general law district. Finally, if a district has been converted to a different type of district under one of the provisions discussed below, its name may not reflect its actual powers. Basic information regarding existing districts is available through the TCEQ's Water District Database, *available at* www.tceq.texas.gov/waterdistricts/iwdd.html.

IV. Water Control and Improvement Districts (Texas Water Code Chapter 51)

A. Specific Powers

A water control and improvement district (WCID) has the basic powers provided in section 51.121. *See* Tex. Water Code § 51.121. Those powers vary somewhat depending on which provision of the Texas Constitution the district was created under but in essence encompass water and irrigation services. A WCID may also obtain the power to provide sewer and drainage services through application to the TCEQ. *See* Tex. Water Code §§ 51.331–.334; 30 Tex. Admin. Code § 293.15.

B. Creation Process

A WCID may be created either by the applicable county commissioners court or by the TCEQ.

1. County

After notice and a hearing, the county commissioners court may create a WCID located in that county only. *See* Tex. Water Code §§ 51.016–.021. The creation process is initiated by a petition filed by a majority of the persons owning land that represents more than a majority in value of the land in the proposed district. If there are more than fifty landowners in the proposed district, the petition may be signed by fifty landowners. *See* Tex. Water Code § 51.013(a). Section 51.014 sets out the required contents of the petition, which include the provision of the Texas Constitution under which the district is proposed to be created. *See* Tex. Water Code § 51.014; *see also* Tex. Water Code § 51.011 (WCID may be created under either article III, section 52, or article XVI, section 59). Under section 42.042 of the Local Government Code, city consent to the creation must be obtained if some or all of the proposed district is located in a city's extraterritorial jurisdiction. *See* Tex. Loc. Gov't Code § 42.042. If the commissioners court approves the creation, it must appoint five temporary directors who will serve until the election required under section 49.102 of the Texas Water Code. *See* Tex. Water Code § 51.026; *see also* section III.C above.

2. Texas Commission on Environmental Quality

The TCEQ has exclusive jurisdiction to create WCIDs that are located in two or more counties. *See* Tex. Water Code § 51.027. The petition requirements are the same as for a WCID created by the county. The TCEQ is required to give notice of an application to create a WCID, but it is required to hold a hearing only if it determines to do so under section 49.011 of the Texas Water Code. *See* Tex. Water Code § 51.028; *see also* 30 Tex. Admin. Code §§ 293.11(c) (TCEQ requirements for application to create WCID), 293.12 (notice procedures); 30 Tex. Admin. Code ch. 55, subch. G (TCEQ procedures for consideration of hearing requests on certain applications).

The TCEQ also has jurisdiction under section 51.333 to create a WCID that will be located in one county if it is proposed to have the power to provide sewer and drainage services. It is rare for a district creation application filed with the TCEQ to go completely through the contested case hearing process. Following a contested case hearing before the State Office of Administrative Hearings (SOAH), however, in 2009 the TCEQ denied the application filed to create Maypearl Water Control and Improvement District No. 1 of Ellis County. That district was proposed to provide water, sewer, and drainage services to development on land in a rural portion of Ellis County. The TCEQ denied the application on the basis that the applicant had not shown a market for the proposed development; therefore, the district was not economically feasible, and no public necessity or need for the district had been shown, both criteria provided in section 51.021(a) of the Water Code. *See* Order Denying the Application of Galilee Partners, L.P., for creation of Maypearl Water Control and Improvement District No. 1 of Ellis County, Texas, TCEQ Docket No. 2005-1686-DIS, SOAH Docket No. 582-07-2163 (Apr. 27, 2009), *available at* http://www14.tceq.texas.gov/epic/CIO/index.cfm?fuseaction=search.download&AGY_DKT_NUM_TXT=2005-1686-DIS&agenda_item_id=983565482014137&agenda_dt=04/22/2009. In another case that went all the way through the hearing process, in 2011 the TCEQ granted the application to create Collin County Water Control and Improvement District No. 3 over the objection of a city in whose extraterritorial jurisdiction the district was partially located. *See* Order Granting the Petition of Lavon 593 Land Investment Partners, L.P. for Creation of Collin County Water Control and Improvement District No. 3 in Collin County, Texas, TCEQ Docket No. 2009-1573-DIS; SOAH Docket No. 582-10-2631 (Mar. 15, 2011), *available at* http://www14.tceq.texas.gov/epic/CIO/index.cfm?fuseaction=search.download&AGY_DKT_NUM_TXT=2009-1573-DIS&agenda_item_id=594583922014137&agenda_dt=03/09/2011.

C. Conversion

Upon notice and a hearing, another type of district may be converted to a WCID through action of the district's board of directors. *See* Tex. Water Code §§ 51.040–.044.

D. Division

Through an election, a WCID that does not have any outstanding debt may be divided one time into two or more separate districts. *See* Tex. Water Code §§ 51.748–.753. The resulting districts have the same powers as any other WCID. *See* Tex. Water Code § 51.752. Chapter 51A of the Texas Water Code applies to a specific subset of WCIDs, those that contain at least 10,000 acres. Chapter 51A provides for the creation and exclusion of subdistricts from such WCIDs.

E. Governing Body

A WCID is governed by a five-member board of directors. Tex. Water Code § 51.071. In order to serve on the board, a person must be a Texas resident, "own land subject to taxation in the district or be a qualified voter in the district," and be eighteen or older. Tex. Water Code § 51.072.

V. Fresh Water Supply Districts (Texas Water Code Chapter 53)

A. Specific Powers

A fresh water supply district (FWSD) may be created to conserve, transport, and distribute fresh water from any sources for domestic and commercial purposes. Tex. Water Code § 53.101. Through an election, a FWSD may obtain the power to provide sewer service. *See* Tex. Water Code § 53.121. A FWSD located in one of the counties described in section V.C below may hold an election to assume the powers of a county road district operating under chapter 257 of the Texas Transportation Code. *See* Tex. Water Code § 53.029(c)–(e). A number of FWSDs in the Dallas area have assumed these powers and provide roads to serve development in the district. Under chapter 53, FWSDs have no means to obtain the power to provide general drainage services, but the attorney general has allowed FWSDs that assume road district powers to provide drainage facilities necessary to serve the roads.

B. Creation Process

A FWSD may be created only by the applicable county commissioners court. *See* Tex. Water Code § 53.061. The creation process begins with the presentation of a petition. *See* Tex. Water Code § 53.013. The petition must include the information described in section 53.014 and, pursuant to 2007 legislation, must be signed by a majority of the persons owning land that represents more than a majority in value of the land in the proposed district. *See* Tex. Water Code § 53.014. As with other types of districts, city consent is required under section 42.042 of the Local Government Code if a FWSD is proposed to be created in the extraterritorial jurisdiction of a city. On receipt of the petition, the commissioners court must set a hearing to be held between fifteen and thirty days after submission of the petition. *See* Tex. Water Code § 53.016. Notice of the hearing must be posted at least ten days before. *See* Tex. Water Code §§ 53.017, 53.018. If the commissioners court approves the creation, it must appoint five temporary supervisors to serve on the district's board until a confirmation election is held under section 49.102. *See* Tex. Water Code § 53.020(a).

C. Division

A FWSD that has no outstanding bonds, is not levying taxes, and is located in a county that meets certain population criteria, upon election, may be divided into two separate districts. *See* Tex. Water Code § 53.029(b); *see also* Tex. Water Code §§ 53.030–.043 (division procedures). Currently, this provision applies to districts located in Bexar, Dallas, or Harris counties or counties adjacent to them. Unlike a water control and improvement district, which may be divided only once, a FWSD that results from a division may itself be divided again by following the same procedures.

D. Governing Body

A FWSD is governed by a five-member board of elected supervisors. Tex. Water Code § 53.062. Except for FWSDs located in Denton County, a person must be a Texas resident, either own property subject to taxation in the district or be a registered voter of the district, and be eighteen or older to serve on a FWSD board. Tex. Water Code § 53.063(a). To be a supervisor for a FWSD located in whole or in part in Denton County, a person must be registered to vote in the district. Tex. Water Code § 53.063(b).

VI. Municipal Utility Districts (Texas Water Code Chapter 54)

A. Specific Powers

Municipal utility districts (MUDs) are the most common type of district in Texas, and the Water Code grants them a wide variety of powers. Under section 54.201, MUDs may provide water, sewer, drainage, and irrigation services and facilities. *See* Tex. Water Code § 54.201. Through application to the TCEQ, either as part of a creation application or later, a MUD may acquire the power to finance certain thoroughfare, arterial, or collector roads to be conveyed to a city, a county, or the state. *See* Tex. Water Code § 54.234; 30 Tex. Admin. Code ch. 293, subch. P. A MUD may also provide street or security lighting within the district, although it may not issue bonds payable from taxes for that purpose. *See* Tex. Water Code § 54.236. A MUD that has been in existence for at least ten years may repair and maintain streets in the district and may issue bonds for that purpose, if authorized by the voters. *See* Tex. Water Code §§ 54.242, 54.522.

B. Creation Process

A MUD may be created only by the TCEQ. Creation of a MUD is initiated by a petition that must be signed by the majority in value of landowners in the proposed district as required by section 54.014 of the Texas Water Code and that includes the information listed in section 54.015. *See* Tex. Water Code § 54.015; *see also* 30 Tex. Admin. Code § 293.11(d) (TCEQ requirements for MUD creation application). If the district is proposed to be located within the corporate limits or extraterritorial jurisdiction of a city, the city must consent to the creation. *See* Tex. Water Code § 54.016. If the district is proposed to be located outside the corporate limits of a city, the county commissioners court may review the proposed creation and submit information to the TCEQ, which the TCEQ must consider. *See* Tex. Water Code § 54.0161. As with the creation of a water control and improvement district, the TCEQ must give notice of a proposed MUD creation and may hold a hearing as provided by section 49.011. *See* Tex. Water Code §§ 54.018, 54.020; *see also* 30 Tex. Admin. Code § 293.12 (notice procedures), 30 Tex. Admin. Code ch. 55, subch. G (TCEQ procedures for consideration of hearing requests on certain applications). If the TCEQ approves the creation under the criteria in section 54.021, it must appoint five temporary directors to serve on the board until the confirmation election is held under section 49.102. *See* Tex. Water Code § 54.022.

Following a contested case hearing, in 2013 the TCEQ denied the application for creation of South Port Alto Municipal Utility District over the objection of the agency's executive director. The application was filed by landowners to address sewer issues in the area proposed to be included in the district but was opposed by other landowners who contended that septic tanks were adequate to serve the area and that the district's proposed facilities would be too costly. The TCEQ found that creation of the proposed district was not feasible and practicable, would not benefit the land in the district because water and sewer service was already available, and was not necessary. *See* Order Denying Application for the Creation of the Municipal Utility District of South Port Alto in Calhoun County Texas, TCEQ Docket No. 2011-1786-DIS; SOAH Docket No. 582-12-5103 (Mar. 1, 2013), *available at* http://www14.tceq.texas.gov/epic/CIO/index.cfm?fuseaction=search.download&AGY_DKT_NUM_TXT=2011-1786-DIS&agenda_item_id=424593502014137&agenda_dt=02/27/2013.

C. Conversion

Any district created pursuant to article XVI, section 59, of the Texas Constitution may be converted to a MUD through application to the TCEQ. *See* Tex. Water Code §§ 54.030–.036; 30 Tex. Admin. Code § 293.15 (TCEQ application requirements for conversion). The TCEQ must give notice and hold a hearing before approving the conversion of a district to a MUD.

D. Governing Body

A MUD is governed by a five-member board of directors. To serve as a director, a person must be a Texas resident, be at least eighteen years old, and either own taxable land in the district or be a qualified voter in the district. *See* Tex. Water Code §§ 54.101, 54.102; *see also* Tex. Water Code § 54.103 (prohibiting certain persons from being appointed to fill vacancies on a MUD board).

VII. Drainage Districts (Texas Water Code Chapter 56)

A. Specific Powers

A drainage district may construct and maintain "canals, drains, ditches and levees, and other improvements of the district" and may make changes and additions to the system as needed. *See* Tex. Water Code §§ 56.111, 56.126.

B. Creation Process

A drainage district may be created by the county commissioners court. *See* Tex. Water Code § 56.082. The process is initiated under Texas Water Code section 56.014 by a petition that must contain the listed information and be signed by at least twenty-five resident freehold taxpayers in the proposed district or by at least one-third of those taxpayers if there are fewer than seventy-five of them. *See* Tex. Water Code § 56.014. The commissioners court must schedule a hearing between thirty and sixty days after receipt of a petition and must give notice of the hearing; at the hearing, the court must make the findings required by section 56.019. *See* Tex. Water Code §§ 56.016–.019. If the findings favor creation of the district, the commissioners court must appoint an engineer to prepare and present to the court a report concerning the drainage needs of the land in the district. *See* Tex. Water Code §§ 56.020–.026. The commissioners court must also appoint temporary directors to serve until the creation of the district is confirmed. *See* Tex. Water Code § 56.061(b).

As an alternative, a drainage district may be created through the election process set out in section 56.033. *See* Tex. Water Code § 56.033.

C. Governing Body

A drainage district is generally governed by a three-member board of directors. Tex. Water Code § 56.061(a). To serve on the board, a person must meet the eligibility requirements for public office set out in section 141.001(a) of the Texas Election Code. Tex. Water Code § 56.062. Under the procedures set out in section 56.069, the board's powers and functions may be transferred to the county commissioners court. Tex. Water Code § 56.069.

VIII. Levee Improvement Districts (Texas Water Code Chapter 57)

A. Specific Powers

Under section 57.092 of the Texas Water Code, a levee improvement district (LID) may provide all works and facilities necessary to serve the following purposes:

1. to construct and maintain levees and other improvements on, along, and contiguous to rivers, creeks, and streams;
2. to reclaim lands from overflow from these streams;
3. to control and distribute the waters of rivers and streams by straightening and otherwise improving them; and
4. to provide for the proper drainage and other improvement of the reclaimed land.

Tex. Water Code §§ 57.091–.092.

B. Creation Process

A LID is created by the county commissioners court. *See* Tex. Water Code § 57.017(a). The process is initiated by a petition containing the information listed in section 57.012 of the Texas Water Code and signed by the landowners of a majority of the acreage in the proposed district. *See* Tex. Water Code § 57.012. The commissioners court must set a hearing between fifteen and thirty days after receiving the petition. In addition to posting notice of the hearing, notice must be provided to the TCEQ executive director, who must file a report with the court concerning the proposed district and also attend the hearing. *See* Tex. Water Code §§ 57.014–.017. If the court makes the findings set out in section 57.019, the LID is created. *See* Tex. Water Code § 57.019.

C. Governing Body

After creating a LID, the county commissioners court must appoint three directors to serve on the board of directors. Generally, the court appoints directors to fill vacancies on the board, and it may remove directors. *See* Tex. Water Code §§ 57.051, 57.053. Alternatively, voters in the district may petition the board to hold an election to determine whether directors should be elected rather than appointed. *See* Tex. Water Code §§ 57.057, 57.060, 57.061. If directors are elected, the board consists of five members who must be "qualified property taxpaying electors." *See* Tex. Water Code §§ 57.058–.059.

IX. Irrigation Districts (Texas Water Code Chapter 58)

A. Specific Powers

Irrigation districts serve the limited purpose of providing untreated water for irrigation and drainage services. Irrigation districts are specifically prohibited from providing treated water, sewer services, or "other similar municipal services." *See* Tex. Water Code § 58.121.

B. Creation Process

An irrigation district may be created either by the applicable county commissioners court or by the TCEQ. In either case, the creation process begins with a petition signed by a majority of the persons owning land that represents more than a majority of the property by value in the proposed district (or fifty landowners if there are more than fifty), as required by section 58.013; the petition must contain the information described in section 58.014. *See* Tex. Water Code §§ 57.013–.014. If the proposed district is in the extraterritorial jurisdiction of a city, consent is required under section 42.042 of the Local Government Code.

1. County

After notice and a hearing, the county commissioners court has the authority to create an irrigation district located in one county. *See* Tex. Water Code §§ 58.017–.021. If the commissioners court approves the creation, it must appoint temporary directors to serve on the board. *See* Tex. Water Code § 58.026(a).

2. Texas Commission on Environmental Quality

The TCEQ has the authority under section 58.027 of the Texas Water Code to create an irrigation district located in two or more counties. *See* Tex. Water Code § 58.027. The creation process is similar to the one for other types of districts created by the TCEQ. *See* Tex. Water Code §§ 58.028, 58.030; 30 Tex. Admin. Code §§ 293.11(f), 293.12.

C. Governing Body

Section 58.071 of the Texas Water Code provides that an irrigation district is governed by a five-member board of directors. *See* Tex. Water Code § 58.071. To serve as a director, a person must be a Texas resident, be at least eighteen years old, own land in the district, and not owe any taxes or assessments to the district. *See* Tex. Water Code § 58.072. The disqualification provisions in section 49.052, discussed in section III.B.1 above, do not apply to irrigation district directors.

X. Other Types of General Law Districts

A. Groundwater Conservation Districts

Groundwater conservation districts are created and operate under chapter 36 of the Texas Water Code. See Chapter 16 of this book for a discussion of these districts.

B. Water Improvement Districts

Under chapter 55 of the Texas Water Code, a water improvement district may be created by the county if located in one county or by the TCEQ if located in two or more counties. A water improvement district may provide irrigation and water services. *See* Tex. Water Code §§ 55.161, 55.163.

C. Regional Districts

The TCEQ may create regional districts over land located in Harris County or an adjacent county. *See* Tex. Water Code §§ 59.001, 59.003. The creation process may be initiated by existing districts that will be included in the regional district, a landowner of at least two thousand contiguous acres, one or more county commissioners courts, or a city. *See* Tex. Water Code § 59.003(a). The general purposes of a regional district are to provide water, sewer, and drainage facilities and services, including on a wholesale basis. *See* Tex. Water Code § 59.004.

D. Navigation Districts

Counties may create various types of navigation districts. These districts are governed by chapters 60–63 of the Texas Water Code. Further discussion is beyond the scope of this book.

E. Special Utility Districts

The TCEQ creates special utility districts under chapter 65 of the Texas Water Code by converting nonprofit water supply corporations created and operating under chapter 67 of the Texas Water Code. *See* 30 Tex. Admin. Code § 293.11(h) (application requirements for creation of special utility district). These districts are authorized to provide water, sewer, and drainage services under section 65.201, but the majority provide water service only. *See* Tex. Water Code § 65.201. Unlike other types of districts, special utility districts may not levy taxes. *See* Tex. Water Code §§ 65.235 (stating that a special utility district may not levy maintenance tax), 65.503 (authorizing issuance of only revenue bonds).

F. Stormwater Control Districts

The TCEQ creates stormwater control districts under chapter 66 of the Texas Water Code. *See* 30 Tex. Admin. Code § 293.11(i) (requirements for stormwater district creation application). As the name implies, the purpose of these districts is to provide facilities for the control of stormwater. *See* Tex. Water Code § 66.201.

XI. Special Law Districts

A. Introduction

The Texas legislature has latitude to create districts to serve any of the purposes provided by the Texas Constitution. In recent legislative sessions, an increasing number of districts have been created through legislation. If the legislature is in session (which occurs only in odd-numbered years), a creation through this process may be faster and less expensive than the TCEQ process and may provide a more desirable combination of powers for the district. As with any type of legislation, these creation bills must sometimes run a political gantlet to be passed, and sometimes they do not pass at all.

B. Process

Legislation to create or amend the powers of a water district is a type of local or special law in that it does not have general applicability. Under article XVI, section 59(d), of the Texas Constitution, notice of the intent to introduce legislation creating a district or altering the powers or boundaries of an existing district must be published at least thirty days and not more than ninety days before the legislation is filed. Notice and a copy of the legislation must also be sent to the governor, who must in turn submit it to the TCEQ for preparation of a report on the legislation to the governor, the lieutenant governor, and the speaker of the house. A copy of proposed creation legislation must also be provided to the county and to any city with jurisdiction; city consent requirements under general law apply to the creation of special law districts. *See* Tex. Const. art. XVI, § 59(e). Once filed, special district legislation proceeds through the legislative process in the same manner as other legislation. Special district legislation is now being codified in the Texas Special District Local Laws Code. *See* Tex. Spec. Dist. Code § 1.001.

C. Powers

As previously noted, districts created by the legislature are not subject to the constraints of general law; they may have any purpose allowed by the constitution and often have a set of powers customized to fit their particular circumstances. In recent legislative sessions, numerous districts have been created that combine the powers of a traditional type of district—for example, a municipal utility district—with other powers, such as the ability to finance roads. *See, e.g.*, Tex. Spec. Dist. Code §§ 8204.101–.102. Also, legislation is commonly pursued to give existing districts additional powers. *See, e.g.*, Tex. Spec. Dist. Code § 8193.052.

River authorities, such as the Lower Colorado River Authority, and districts that function as regional service providers, such as the Upper Trinity Regional Water District and the North Texas Municipal Water District, are generally created through legislation. These entities usually encompass a larger geographic area and have powers tailored to the particular purposes they are intended to serve. The Texas Water Development Board has produced a map showing the location of river authorities and major special law districts. See Plate 5, River Authorities and Special Law Districts of Texas, *available at* www.twdb.texas.gov/mapping/doc/maps/RA_SLD_8x11.pdf. The enabling legislation for many of these authorities has not yet been codified, so it is necessary to check the session laws or *Vernon's Water Auxiliary Pamphlet* to locate the creation legislation and any amendments. See Chapter 8 of this book regarding river authorities and regional water districts.

River authorities are perhaps the best-known special law districts. Although the general public may view "river authorities" as having extraordinary power and authority, in fact "[t]here is no general purpose definition of a 'river authority.'" David B. Brooks, *County and Special District Law* § 46.29 (West's Texas Practice Series, Vol. 35). Although the Texas Water Code defines river authorities for specific statutory purposes not relevant to this discussion, it contains no general purpose definition. *See, e.g.*, Tex. Water Code §§ 26.0135, 30.003(4), 49.001. River authorities "are authorized under the same constitutional provision which authorizes the various types of water conservation districts." Brooks, at § 46.29.

According to Brooks:

> Each of the river authorities is established and operates pursuant to its own statute. . . . There are no general law provisions for the creation of "river[] authorities." The term carries no special meaning and reflects the history of the state's interest in river basins and watersheds, the dividing ridges of which have often been used for political boundaries such as county lines. River authorities, per se, are not expressly provided for in the state Constitution, which makes only oblique references to them.

Brooks, at § 46.29.

The two existing subsidence districts, the Harris-Galveston Subsidence District and the Fort Bend Subsidence District, are also legislatively created and have been designated as "conservation and reclamation" districts under article XVI, section 59, of the Texas Constitution, effective September 1, 2005. *See* Tex. Spec. Dist. Code §§ 8801.002, 8834.002. Although these districts have some powers similar to groundwater conservation districts, they are no longer subject to chapter 36 of the Texas Water Code, and the general law provisions in chapter 49 of the Texas Water Code discussed above also do not apply to the subsidence districts. *See* Tex. Spec. Dist. Code §§ 8801.102, 8834.006. The primary purpose of the subsidence districts is to prevent subsidence. *See* Tex. Spec. Dist. Code §§ 8801.003, 8834.003. See also Chapter 16 of this book for a discussion of subsidence districts.

XII. Conclusion

For a century, water districts have been created in Texas to provide various types of services to the public. Some districts serve only the area within their boundaries, while others provide wholesale and other services to large areas. Different types of districts may be created through different processes and have different powers and duties, although they generally have in common the administrative provisions in chapter 49 of the Texas Water Code. Whatever the type, districts occupy a unique position in the landscape of Texas government.

CHAPTER 8

River Authorities and Regional Water Districts

Lyn Clancy,[1] Howard Slobodin,[2] and Stacie Dowell[3]

I. Introduction

The legislature has long recognized that regional water problems are often best addressed by regional entities rather than by more localized districts. *See* Water Districts and River Authority Study Committee, 1 *Report to the 70th Texas Legislature* 3–4 (1986) [hereinafter 70th Committee Report], *available at* www.lrl.state.tx.us/scanned/interim/69/w291r_1.pdf. River authorities and other regional water districts have long played a vital role in water resources management across the state. They regularly take the lead in water planning, financing and construction of water projects needed to meet the long-term needs of Texas for water supply, wastewater treatment, and flood control. They also perform many other needed functions such as water quality monitoring, septic tank regulation, operation of parks and recreation facilities, and policing water bodies to ensure public safety.

Regional water districts and river authorities are created by the legislature pursuant to the same constitutional provisions authorizing creation of other water districts. *See* Tex. Const. art. III, § 52; art. XVI, § 59. See Chapter 7 of this book for a discussion of water districts. The regional entities' unique importance to the state water supply is recognized primarily because their boundaries and service areas generally cover extended multicounty areas, often encompassing an entire river basin. The specific powers and duties established by their enabling acts can vary significantly, depending on their history and purpose. In other words, as creatures of statute, there is no "one-size-fits-all" definition or

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description of a "regional water district" or "river authority." River authorities are perhaps the best-known special law districts. Although the general public may view "river authorities" as having extraordinary power and authority, in fact "[t]here is no general purpose definition of a 'river authority.'" David B. Brooks, *County and Special District Law* § 46.29 (West's Texas Practice Series, Vol. 35). Although the Texas Water Code defines river authorities for specific statutory purposes, it contains no general-purpose definition. *See, e.g.*, Tex. Water Code §§ 26.0135, 30.003(4), 49.001.

As summarized in section II below, the continuing study, analysis, and discussion of special law water districts with regional scope reflect the state's continued interest in regional management of surface water resources and oversight by the legislature and state agencies. The term *river authorities* has come to include most special law districts whose names include the term, as well as other types of regional water districts. This chapter focuses on the "certain districts and authorities" covered by 30 Texas Administrative Code chapter 292 and listed in section 292.1. With one addition, Titus County Fresh Water Supply District No. 1, the list is based on Senate Bill 2. See discussion below. This chapter also provides citations to the enabling legislation of fourteen additional special law districts that have been deemed important in one or another of the various agency and legislative studies. See also Plate 5, the Texas Water Development Board (TWDB) map of River Authorities and Special Law Districts of Texas.

II. Oversight of Regional Water Districts and River Authorities

Similar to all water districts, as discussed in Chapter 5 of this book, regional water districts and river authorities as political subdivisions of the state are subject to Texas open government laws related to open meetings and public records, Tex. Gov't Code §§ 551.001(3)(H), 552.003(1)(A)(viii), and financial accountability requirements, Tex. Water Code §§ 49.191–49.200. Many are subject to continuing supervision and rate review by the Texas Commission on Environmental Quality (TCEQ). *See, e.g.*, Tex. Water Code §§ 11.036–.041, 12.013, 12.081, 13.043(b), 49.002; 30 Tex. Admin. Code ch. 291. These regional entities continue to be subject to periodic scrutiny by the Texas legislature in its efforts to ensure proper management of the state's water resources, particularly surface water.

A. Legislative Oversight

The lack of uniformity among river authorities and regional water districts and a lack of formal legislative oversight have given rise to a series of legislative initiatives to study and, in some cases, more directly regulate authorities and districts.

In 1985, legislation was enacted that required nineteen specifically named river authorities to be reviewed by the Sunset Advisory Committee under the Sunset Act. Act of May 26, 1985, 69th Leg., R.S., ch. 238, §§ 3–4. Those entities were scheduled for review in 1991. Act of May 26, 1985, 69th Leg., R.S., ch. 238, § 4. That law provided that unless the board directors of a river authority were continued in office, their membership would expire and the governor would appoint a new board. Act of May 26, 1985, 69th Leg., R.S., ch. 238, § 4. Another bill required the state auditor to annually audit twenty-three specifically named "river authorities and certain districts." Act of May 26, 1985, 69th Leg., R.S., ch. 795, § 2.008. The bill also created a study committee "to study water districts and river authorities . . . to determine if their powers and duties are appropriate for management of the state's water resources." Act of May 26, 1985, 69th Leg., R.S., ch. 795, § 2.001.

In December 1986, the Water Districts and River Authority Study Committee issued its two-volume report to the 70th Legislature. *See* 70th Committee Report, *available at* www.lrl.state.tx.us/scanned/interim/69/w291r_1.pdf (Vol. I); www.lrl.state.tx.us/scanned/interim/69/w291r_2.pdf (Vol.

II). Declaring that the "era of water development" had ended in Texas, the committee recommended a focus on water management, with a significant expansion of state regulatory authority. 70th Committee Report, Vol. I, at 9. The committee found that the existing water resource management structure should be changed to establish a "Texas Water Resources Management Oversight Committee" with supervisory authority over all districts and authorities. 70th Committee Report, Vol. 1, at 19. The report recommended repeal of the state audit and sunset requirements passed in 1985. 70th Committee Report, Vol. 1, at 20–22. That report also addressed many other issues still being debated today, such as water conservation, water planning, and groundwater management.

In 1989, the 1985 audit and sunset requirements for river authorities and districts were repealed. The bill also amended Texas Water Code section 12.081(a), under which the TCEQ had the continuing right of supervision over districts and authorities created under Texas Constitution article III, section 52, and article XVI, section 59. The amendment made clear that the provisions regarding districts also applied to river authorities, unless otherwise stated. *See* Act of May 10, 1989, 71st Leg., R.S., ch. 196.

Another evaluation of river authorities and selected districts occurred in 2000, this time by the Senate Interim Committee on Natural Resources. That committee was charged with reviewing "the missions and roles of all Texas river authorities, including their powers and duties, financing, fee structures, service areas, board composition, relationships with other river authorities, competition with private sector service providers, communities they serve, and roles in and contributions to the state's water plan." Senate Interim Committee on Natural Resources, *Report to the 77th Legislature, Missions and Roles of Texas River Authorities* 9 (2000), *available at* www.lrl.state.tx.us/scanned/interim/76/n219r.pdf. Noting that the term *river authority* has no statutory definition, the committee studied the twenty river authorities that were covered by 30 Texas Administrative Code chapter 292 as well as an additional twenty select special law districts. The report to the Texas legislature identified a number of mechanisms for increased oversight but did not make any specific recommendations.

In 2001, as part of Senate Bill 2, the legislature created the Texas Water Advisory Council to, among other things, provide additional oversight of river authorities. Act of May 27, 2001, 77th Leg., R.S., ch. 966, art. 1 (adding Tex. Water Code ch. 9 (since repealed)). This council consisted of legislators, other state officials, and public members. Act of May 27, 2001, 77th Leg., R.S., ch. 966, § 1. The duties of the council included a periodic review of thirty districts and authorities named in the bill and required the entities to provide a variety of information, including a self-assessment and the results of a management audit. Act of May 27, 2001, 77th Leg., R.S., ch. 966, § 1. Over the next two years, the council received written reports and heard testimony from entities scheduled for review. Testimony was also encouraged from others, such as customers of the entities under review. The legislature repealed the review process in 2003 (Act of May 30, 2003, 78th Leg., R.S., ch. 1057, § 1), and the council was abolished in 2007 (Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 2.36).

The issue of river authority oversight was revisited again in 2007 as part of an interim study by the Senate Natural Resources Committee. The committee studied nineteen river authorities and select districts listed by the TCEQ during testimony. Senate Committee on Natural Resources, *Interim Report to the 81st Legislature, Texas River Authorities* (2009) [hereinafter 81st Interim Report], *available at* www.senate.state.tx.us/75r/senate/commit/c580/c580.RiverAuthorityReport80.pdf. The committee was charged with reviewing all state-created river authorities, "including the powers exercised by each authority and the advisability of subjecting these authorities to legislative review." 81st Interim Report, at 1. The committee was also charged with considering "options for ensuring adequate protection of public assets, improving transparency of operations, enhancing appropriate access to financial and management records, and authorizing audits by the State Auditor's office." 81st Interim Report, at 1. That committee concluded that no major reforms to the structure of river authorities were necessary at that time but recommended continued efforts of river authorities to improve their operations and activities. 81st Interim Report, at 5. During the 81st legislative session, bills were introduced that once again would have placed certain river authorities under sunset review and a higher level of scrutiny by the state auditor; however, these bills did not pass. *E.g.*, Tex. S.B. 725, 81st Leg., R.S. (2009); Tex. S.B. 795, 81st Leg., R.S. (2009).

The 83rd regular legislative session again saw river authorities and districts subject to proposed additional oversight. With the addition of Texas Water Code section 49.1991 and Texas Government Code section 322.0171, river authorities are now subject to periodic efficiency review by the Legislative Budget Board (LBB). *See* Act of May 23, 2013, 83d Leg., R.S., ch. 1293, § 1 (H.B. 2362). The LBB is charged with review of the effectiveness and efficiency of the policies, management, fiscal affairs, and operations of river authorities. *See* Tex. Water Code § 49.1991; Tex. Gov't Code § 322.0171(a). Several additional bills failed that would have mandated periodic self-evaluation by river authorities and districts. *E.g.*, Tex. H.B. 14, 83d Leg., R.S. (2013); Tex. H.B. 3397, 83d Leg., R.S. (2013); Tex. S.B. 14, 83d Leg., R.S. (2013); Tex. S.B. 867, 83d Leg., R.S. (2013).

In 2015, "sunset review," without the threat of abolition that usually accompanies review by the Sunset Commission, became a reality for fifteen river authorities. Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 1 (S.B. 523) (adding Tex. Gov't Code § 325.025). These include the following river authorities, listed by the date such review is to be complete:

September 1, 2017

- Central Colorado River Authority
- Palo Duro River Authority of Texas
- Sulphur Basin River Authority
- Upper Colorado River Authority

September 1, 2019

- Guadalupe-Blanco River Authority
- Lower Colorado River Authority
- Nueces River Authority
- Red River Authority of Texas

September 1, 2021

- Brazos River Authority
- Lower Neches River Authority
- Sabine River Authority
- San Jacinto River Authority
- Upper Guadalupe River Authority

September 1, 2023

- Angelina and Neches River Authority
- Bandera County River Authority and Groundwater District
- Lavaca-Navidad River Authority
- San Antonio River Authority
- Trinity River Authority

Each listed river authority will undergo a review of the entity's governance, management, operating structure, and compliance with legislative requirements, and the expense of the review will be paid by the river authority. Tex. Gov't Code § 325.025(c), (d). An entity that is reviewed pursuant to this section is not required to conduct a management audit under the TCEQ's rules. Tex. Gov't Code § 325.025(e).

B. TCEQ Oversight

The TCEQ has a continuing right of supervision over districts and authorities created under article III, section 52, and article XVI, section 59, of the Texas Constitution and has an obligation to report all findings to the governor, lieutenant governor, and speaker of the house. *See* Tex. Water Code § 12.081. Except for matters relating to an authority's or a district's electric utility operations, supervision may include (1) inquiry into the competence, fitness, and reputation of the officers and directors of any district or authority; (2) requiring audits or other financial information, inspections, evaluations, and engineering reports; (3) issuance of witness subpoenas to carry out its authority; (4) investigations and hearings using commission-appointed examiners; and (5) issuance of rules necessary to supervise the districts and authorities (except for water quality ordinances adopted by any river authority that meet or exceed minimum requirements established by the commission). Tex. Water Code § 12.081(a)(1)–(6).

Moreover, if a district provides wholesale potable water and wastewater services, it must adopt a program that provides customers an opportunity to review and comment on the district's annual budget before that budget is adopted by the board. Tex. Water Code § 49.200.

The TCEQ has adopted rules that apply to thirty-one specific water districts and river authorities identified by name. *See* 30 Tex. Admin. Code ch. 292, § 292.1(a). (Although section 292.1 refers to the source of the list as being Texas Water Code section 9.010, section 9.010 was repealed in 2003 and did not include Titus County Fresh Water Supply District No.1). In addition to the administrative policies required by Water Code sections 49.199 and 49.200, these specific entities are required to adopt standards for conduct and activities that meet the minimum requirements set forth in the rules. 30 Tex. Admin. Code §§ 292.11(a), 292.13. Any district or authority subject to chapter 292 may adopt policies that address other administrative matters or that are more specific as to the interpretation and implementation of the minimum requirements. 30 Tex. Admin. Code § 292.11(b). All administrative policies and amendments must be submitted to the TCEQ executive director. 30 Tex. Admin. Code § 292.12(a). These policies are on file at the TCEQ and available to the public for review. 30 Tex. Admin. Code § 292.12(b). To determine whether a covered district or authority is in compliance with its adopted administrative policies, the executive director may request additional documents from the entity or inspect records at the entity's office. 30 Tex. Admin. Code § 292.12(c). In addition to the TCEQ oversight of these entities authorized by chapters 292 and 293, the activities of most are controlled by water rights and other regulatory authorizations, such as wastewater discharge permits, issued and administered by the TCEQ.

The "certain districts and authorities" subject to these requirements are—

- Angelina and Neches River Authority
- Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1
- Brazos River Authority
- Canadian River Municipal Water Authority
- Central Colorado River Authority
- Colorado River Municipal Water District
- Dallas County Utility and Reclamation District
- Guadalupe-Blanco River Authority
- Gulf Coast Water Authority
- Lavaca-Navidad River Authority
- Lower Colorado River Authority
- Lower Neches Valley Authority
- Mackenzie Municipal Water Authority
- North Central Texas Municipal Water Authority
- North Harris County Regional Water Authority
- North Texas Municipal Water District
- Northeast Texas Municipal Water District
- Nueces River Authority
- Red River Authority of Texas
- Sabine River Authority
- San Antonio River Authority
- San Jacinto River Authority
- Sulphur River Basin Authority
- Sulphur River Municipal Water District
- Tarrant Regional Water District
- Titus County Fresh Water Supply District No. 1
- Trinity River Authority
- Upper Colorado River Authority
- Upper Guadalupe River Authority
- Upper Neches River Municipal Water Authority
- West Central Texas Municipal Water District

C. General Powers and Duties of Regional Water Districts and River Authorities

A regional water district or river authority has only those powers expressly granted by statute or implied as an incident to express powers. *Franklin County Water District v. Majors*, 476 S.W.2d 371, 373 (Tex. Civ. App.—Texarkana 1972, writ ref'd n.r.e.); *Harris County Water Control & Improvement District No. 58 v. City of Houston*, 357 S.W.2d 789, 795 (Tex. Civ. App.—Houston 1962, writ ref'd n.r.e.). Language in an enabling act that provides "[e]xcept as expressly limited by this Act, the District shall have and is hereby authorized to exercise all powers, rights, privileges and functions conferred by General Law upon any District or Districts created pursuant to Section 59a, of Article 16, of the Constitution of the State of Texas" constitutes a general grant of power to exercise any powers conferred by general law on any district created pursuant to article 16, section 59(a). *See City of San Antonio v. Texas Water Commission*, 392 S.W.2d 213 (Tex. Civ. App.—Austin 1965), *aff'd*, 407 S.W.2d 752 (Tex. 1966). This type of language is found in many enabling acts, and, today, many of the powers conferred by general law on water districts are embodied in chapter 49 of the Texas Water Code. Unless excluded by the enabling statute of a particular entity, chapter 49 provides regional water suppliers, including river authorities, the authority to—

- acquire property through eminent domain, within and outside the district
- construct, operate, and maintain works necessary to accomplish the purposes assigned by general or special law
- contract for or employ peace officers
- coordinate and contract with governments and entities
- install and maintain parks
- issue contract bonds, property tax bonds, and revenue bonds
- levy an operation and maintenance tax
- regulate irrigation

Further, chapter 49 allows an entity with raw water pipelines conveying any water through more than ten counties to own or operate electric generation or transmission facilities and to sell electricity within the district. Tex. Water Code § 49.233. An entity that operates wastewater collection systems may also regulate private sewage and on-site sewage facilities, Tex. Water Code § 49.234, and entities that provide potable water or sewer service are also authorized to provide firefighting services, Tex. Water Code § 49.351.

In many instances, an entity's enabling act will provide statutory authority to sell water and condemn land outside its limits. However, courts have held that this seemingly broad grant of authority does not separately empower an entity to operate an autonomous water system wholly outside its boundaries. *See Harris County Water Control & Improvement District No. 58*, 357 S.W.2d 789. Unless express authority is granted to provide service outside the district boundaries, the "overriding purpose is service within the district," and thus statutes authorizing acquisition of properties outside the district must be relied on primarily in developing the area within the district. 357 S.W.2d at 796; *see also* Tex. Att'y Gen. Op. No. H-1195 (1978) (concluding that the Upper Colorado River Authority's enabling act, which allowed the authority "to acquire by . . . lease . . . and to maintain, use and operate any and all property . . . within or without the boundaries of the District, necessary or convenient to the exercise of the powers, rights, privileges, and functions conferred upon it by this Act [Act of May 29, 1935, 44th Leg., ch. 126, § 2(f), 1935 Tex. Gen. Laws 336, 338]" was sufficient to authorize use of the Stacy Reservoir for impoundment of purchased water prior to distribution to users within the district, even though the reservoir was located outside the district).

D. Specific River Authority Information

1. *Angelina & Neches River Authority*

a. History

The Sabine-Neches River Conservation District was created by the Texas legislature in 1933. Angelina & Neches River Authority, *ANRA History*, www.anra.org/about/history.html [hereinafter *ANRA History*]. In 1947 the legislature divided the Sabine-Neches River Conservation District into the Sabine River Authority of Texas and the Neches River Conservation District, and in 1977 the Neches River Conservation District's name was changed to the Angelina & Neches River Authority (ANRA). *ANRA History*. The ANRA's territorial jurisdiction was defined as lying wholly or in part of seventeen East Texas counties encompassing approximately 8,500 square miles of the Neches River watershed, with the major functions of water quality management, water resource development, and conservation of water resources. E-mail from Kelley Holcomb, Gen. Mgr., Angelina & Neches River Authority, to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (Nov. 22, 2010, 16:45 CST) (on file with author) [hereinafter Holcomb e-mail].

In the early 1970s, the ANRA began to provide water and wastewater utility operational assistance to cities, industries, school districts, and other governmental agencies in the region by providing analytical services for regulatory compliance. In 1974, the ANRA was assigned responsibility for private wastewater facility regulation around Sam Rayburn Reservoir, and the authority continues to manage this regulatory program today. *See ANRA History*.

Currently, the ANRA administers several water quality–related environmental programs including the Texas Clean Rivers Program, Upper Neches Basin Surface Water Quality Monitoring Programs, Permit Compliance Monitoring Program, and the Water/Wastewater Sample Collection Program. The ANRA also owns and operates a regional wastewater facility and a regional compost facility and is engaged in obtaining the federal permit that would authorize the impoundment of Lake Columbia. Holcomb e-mail.

b. Structure

The ANRA is governed by a nine-member board of directors appointed by the governor to staggered six-year terms. Tex. Spec. Dist. Code § 8501.102. The directors are residents of the Neches River basin, and one-third of the board is appointed every two years. Tex. Spec. Dist. Code § 8501.101.

c. Powers and Duties

- Bonding authority: revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Hydroelectric generation facilities
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply; irrigation, municipal, retail, and wholesale

d. Citations to Special Law or Codes

Tex. Spec. Dist. Code §§ 8501.001–.901
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 2

2. *Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1*

a. History

The Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1 (BMA) was created in 1993, though its roots can be traced back to the early 1900s, when some of its system canals were initially constructed. The BMA's service area covers portions of three counties west of San Antonio, serving a primarily rural population and seven communities: Castroville, Devine, La Coste, Lytle, Natalia, Pearson, and Rio Medina. The BMA must follow specific procedures to exclude land within its service area. *See* Tex. Spec. Dist. Code ch. 9007. The BMA supplies water via gravity flow through releases from Medina Lake through Diversion Lake into more than 250 miles of irrigation canals. Over the last twenty years, the BMA has focused considerable effort on improvements to its delivery system to reduce system loss. *See* Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1, *Natural Resource Plan—Conveyance System Efficiency, Water Quality, and Municipal Water Demand* 1 (1995), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/95483071.pdf.

b. Structure

The BMA is governed by a seven-member board of directors elected to staggered four-year terms. Five of the directors are elected from single-member precincts in which they must reside, and two are elected at-large. *See* Tex. Spec. Dist. Code § 9001.051.

c. Powers and Duties

Chapter 49 duties.

d. Citations to Special Law or Codes

Tex. Spec. Dist. Code ch. 9007
H.B. 2460, Act of May 19, 1993, 73d Leg., R.S., ch. 370
S.B. 1647, Act of May 24, 1995, 74th Leg., R.S., ch. 544

3. *Brazos River Authority*

a. History

The Brazos River Authority (BRA) began as the Brazos River Conservation and Reclamation District, created by act of the Texas legislature in 1929. Brazos River Authority, *The Brazos River Authority Mission*, www.brazos.org/ourMission.asp [hereinafter Brazos River Authority Mission]. In 1953, its name was changed to the Brazos River Authority. *The Handbook of Texas Online, Brazos River Authority*, http://tshaonline.org/handbook/online/articles/mwb01 [hereinafter Brazos River

Authority Online]. It is the first and the oldest river authority in the United States and has the duty to develop, conserve, and make available for beneficial use the surface waters of the entire Brazos River basin. Brazos River Authority Mission. As part of this duty, it built the Lake Possum Kingdom Reservoir in 1941. Brazos River Authority Online. The Lake Granbury Reservoir followed in 1968, and the Lake Limestone Reservoir in 1978. Brazos River Authority Online. At the same time, the BRA began working closely with the U.S. Army Corps of Engineers for water supply and flood control purposes. As a result, the following federal reservoirs were integrated into the BRA's water storage system: lakes Aquilla, Belton, Georgetown, Granger, Proctor, Somerville, Stillhouse Hollow, Waco, and Whitney. Brazos River Authority Online. Subsequently, the BRA's interests in Lake Waco have been transferred to the city of Waco. In 1967, the BRA acquired two canal systems along the Gulf coast, providing water to Brazoria, Fort Bend, and Galveston counties for rice irrigation and industrial and municipal uses. Brazos River Authority Online. The canal system was sold to the Gulf Coast Water Authority in 1988. Brazos River Authority Online.

Today, the BRA covers approximately 42,000 square miles and all or part of seventy Texas counties, reaching from the New Mexico border to Freeport on the Gulf coast. In addition to its reservoirs, it manages 42 potable-water treatment facilities and 8 sewerage treatment facilities, 18 recreational parks, and more than 100 water quality test sites. Memorandum from the BRA to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (Dec. 22, 2010) (on file with author).

In 2013, the 83rd Legislature enacted H.B. 2362, which required the BRA and the Lower Colorado River Authority to undergo an efficiency review by the Legislative Budget Board (LBB) before the LBB conducts a review of any other river authority. *See* Act of May 23, 2013, 83d Leg., R.S., ch. 1293, §§ 1, 3 (H.B. 2362). The LBB assessed the BRA's financial affairs and operations and reported its findings to the governor and the legislature. Legislative Budget Board, Brazos River Authority Management and Performance Review (Feb. 2015), *available at* www.lbb.state.tx.us/Documents/Publications/Other/1860_BrazozRiverAuthority.pdf.

b. Structure

The BRA is governed by a board of twenty-one directors appointed by the governor and confirmed by the Texas senate. The directors serve staggered six-year terms in which seven seats come open every February 1 of each odd-numbered year. The presiding officer is also appointed by the governor. *See* Tex. Spec. Dist. Code § 8502.009(a)–(b), (e).

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds with election, and revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Hydroelectric generation facilities
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Wastewater
- Water quality
- Water supply: industrial, irrigation, mining, municipal, steam-electric generation, and wholesale

d. Citations to Special Law or Codes

Tex. Spec. Dist. Code §§ 8502.001–.901
H.B. 2362, Act of May 23, 2013, 83d Leg., R.S., ch. 1293, § 3
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 14

4. Canadian River Municipal Water Authority

a. History

The Canadian River Municipal Water Authority (CRMWA) is a conservation and reclamation district created by special act of the Texas legislature in 1953, pursuant to section 59 of article XVI of the Texas Constitution. The territory of the district consists of the cities of Amarillo, Borger, Brownfield, Lamesa, Levelland, Lubbock, O'Donnell, Pampa, Plainview, Slaton, and Tahoka, as well as any territory annexed to any of the cities. Act of Apr. 22, 1953, 53d Leg., R.S., ch. 243, § 2; *see* www.crmwa.com/resources/CRMWA-Enabling-Act-RVSD-2009.pdf.

In addition to the powers and duties outlined in section D.4.c below, the CRMWA is best known for operating the Sanford Dam and Lake Meredith. Although the U.S. Congress had authorized construction of the Canadian River Project in 1949, it was not until 1962 that construction actually started. 43 U.S.C. § 600b. Canadian River Municipal Water Authority, *History of CRMWA*, www.crmwa.com/history-of-crmwa [hereinafter CRMWA History]. Congress required the states of Texas, New Mexico, and Colorado to enact the Canadian River Compact before the project could be constructed. The compact was ratified by the Texas legislature in 1951. Tex. Water Code § 43.001. See Chapter 14 of this book regarding multi-jurisdictional compacts. By 1965, Sanford Dam was completed, creating the new Lake Meredith. CRMWA History. Starting in 1968, a 322-mile aqueduct carried Lake Meredith's waters to the member cities. CRMWA History. Because of the high salinity of Lake Meredith, the CRMWA, the state of Texas, and the federal Bureau of Reclamation joined to create the Lake Meredith Salinity Control Project near Logan, New Mexico. Canadian River Municipal Water Authority, *Lake Meredith Salinity Control Project*, www.crmwa.com/lake-meredith-salinity-control-project. In 2001, the CRMWA began blending groundwater and surface water in order to increase supplies and improve water quality. E-mail from John Williams, Special Advisor, CRMWA, to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (Nov. 30, 2010, 01:53 CST) (on file with author). However, Lake Meredith has been unusable since 2011 due to lack of inflow, and the CRMWA is currently supplying only groundwater to its customers. E-mail from John Williams, Special Advisor, CRMWA, to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (May 14, 2013, 14:06 CST) (on file with author) [hereinafter Williams 2013 e-mail]. From 2005 through 2011, the CRMWA's groundwater resources underwent major expansions by bringing its total holding of groundwater rights to over 400,000 acres providing 70,000 acre-feet of water per year. Williams 2013 e-mail.

Today, in addition to operating Lake Meredith, the Sanford Dam, and the associated aqueduct, the CRMWA also pays for operation of the Lake Meredith Salinity Control Project and the Conjunctive Use Groundwater Supply Project. Canadian River Municipal Water Authority, *John C. Williams Aqueduct & Wellfield—Phase I & II*, www.crmwa.com/john-c-williams-wellfield-phase-i-ii. Studies are underway on expansion of groundwater delivery infrastructure since aqueducts to transport the groundwater are of limited capacity.

No taxes are levied. All revenue is derived from sale of water to the member cities.

b. Structure

The CRMWA is currently governed by a seventeen-member board of directors, each of which serves a two-year term. The number of board members can change over time based on population. Two directors are elected by the governing body of each member city with a population of more than ten thousand. Smaller cities can elect only a single director. The board meets once every quarter and for special meetings as needed. Each director must be a qualified voter and property-owning taxpayer in the city from which elected and cannot be an employee or member of the governing body of the city. Act of Apr. 22, 1953, 53d Leg., R.S., ch. 243, § 3.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Parks
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Taxes: operation and maintenance expenses
- Water quality
- Water supply: municipal, wholesale, and out-of-district

d. Citations to Special Law or Codes

S.B. 126, Act of Apr. 22, 1953, 53d Leg., R.S., ch. 243
S.B. 339, Act of Apr. 29, 1955, 54th Leg., R.S., ch. 196
H.B. 914, Act of May 8, 1957, 55th Leg., R.S., ch. 204
H.B. 56, Act of Mar. 30, 1961, 57th Leg., R.S., ch. 67
H.B. 134, Act of Mar. 27, 1969, 61st Leg., R.S., ch. 63
S.B. 201, Act of Apr. 6, 1981, 67th Leg., R.S., ch. 42
H.B. 2131, Act of May 14, 1987, 70th Leg., R.S., ch. 251
H.B. 1285, Act of May 29, 1989, 71st Leg., R.S., ch. 1248, § 81
H.B. 2642, Act of May 10, 1995, 74th Leg., R.S., ch. 220
S.B. 1833, Act of May 26, 2007, 80th Leg., R.S., ch. 1339
S.B. 1040, Act of Apr. 30, 2009, 81st Leg., R.S., ch. 24

5. *Central Colorado River Authority*

a. History

The Central Colorado River Authority (CCRA) was created in 1935 and is limited in jurisdiction to Coleman County. Act of May 9, 1935, 44th Leg., R.S., ch. 338, § 4(a). The CCRA is charged with controlling, storing, preserving, and distributing water from the Central Colorado River and its tributaries for domestic, municipal flood control, irrigation, power, and other useful purposes. In its early years, the authority received from the Texas legislature 50 percent of the state ad valorem taxes collected for general revenue purposes from Coleman County for a ten-year period. Act of May 11, 1939, 46th Leg., R.S., p. 1045, ch. 1; *see also* Comer Clay, *The Handbook of Texas Online*, *Central Colorado River Authority*, http://tshaonline.org/handbook/online/articles/mwc02 [hereinafter Clay].

Its major function is water conservation and supply, with a particular focus on construction of local farm and ranch tanks within its service area. *See* Clay. The CCRA also provides services related to flood damage prevention and soil conservation, often partnering with the U.S. Department of Agriculture to help fund and construct terraces, spreader dams, and diversion channels for the farmers of the county. *See* Clay. In addition, the authority is responsible for constructing a number of local lakes, including those at Gouldbusk, Novice, Talpa, and Santa Anna. The lake southeast of Gouldbusk was the first project of the CCRA, begun about 1936 and completed in 1937; it was built by Works Progess Administration labor. *See* Emma N. Downey & Mary L. Griffin, *Gouldbusk*, http://freepages.genealogy.rootsweb.ancestry.com/~jrterry/colemancounty/communities/gouldbusk/history-gouldbusk.html. The authority also sponsored the construction of Hords Creek Lake, which was completed in 1948. During the 1960s, the CCRA also constructed Coleman Lake.

b. Structure

The CCRA is governed by a board of directors appointed by the governor to serve staggered six-year terms. Tex. Spec. Dist. Code § 8505.052. In 2009, the act was amended to reduce the number of board members from nine to five. *See* Tex. Spec. Dist. Code § 8505.051(a); Act of May 26, 2009, 81st Leg., R.S., ch. 493. Board members must be property taxpayers in the state of Texas and residents within the authority's boundaries. Tex. Spec. Dist. Code § 8505.051(b).

c. Powers and Duties

- Bonding authority: revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply: irrigation, municipal, retail, and wholesale

d. Citations to Special Law or Codes

Tex. Spec. Dist. Code ch. 8505
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 4

6. *Colorado River Municipal Water District*

a. History

The Colorado River Municipal Water District (CRMWD) is a conservation district created in 1949 pursuant to article XVI, section 59, of the Texas Constitution to satisfy the growing water supply needs of the Midland-Odessa area. Act of May 31, 1949, 51st Leg., R.S., ch. 340; Colorado River Municipal Water District, *CRMWD District History*, www.crmwd.org/crmwd_district_history.htm [hereinafter CRMWD History]. The work truly began in 1951 with the construction of the Colorado River Dam and the creation of the surface reservoir Lake J. B. Thomas. Soon after, the Martin Field Wells were created to provide groundwater to a growing population. As the need for water increased, the CRMWD completed the E. V. Spence Reservoir in 1969. Unfortunately, drought conditions brought increasing difficulty to the region and rendered the reservoir unusable. By 1971, the CRMWD had been forced to dramatically expand its groundwater pumping. CRMWD History.

Although a third lake, the O. H. Ivie Reservoir, was constructed in 1990, it has not been full to capacity since June 1992. The twenty-five-year drought in the region has insured that the O. H. Ivie reservoir is never more than 55 percent full, and no other CRMWD reservoirs have been able to reach more than one-third of their capacity. To better address customers' water needs during drought, the CRMWD dramatically expanded its diversion system in the 1980s and 1990s. Today, it can impound more than 100,000 acre-feet of water in its diversion system. CRMWD History. In 2010, the CRMWD further expanded its water supply efforts by acquiring additional groundwater, and moved forward on construction of a water reclamation project. Press Release, Colorado River Municipal Water District, *CRMWD Takes Steps to Provide Additional Water for the Region* (June 3, 2010), *available at* www.crmwd.org/jun2010.pdf. The reclamation project, which began operations in May 2013, is the first direct potable reuse system in the country. Laura Martin, *Texas Leads the Way with First Direct Potable Reuse Facilities in U.S.*, Water-Online.com (Sept. 16, 2014), www.wateronline.com/doc/texas-leads-the-way-with-first-direct-potable-reuse-facilities-in-u-s-0001.

Protection of water quality is also an active concern of the district. In 1961, the legislature amended the CRMWD's enabling act to provide the district with the power and authority to study, correct, prevent, control, regulate, and eliminate artificial and natural pollution, including oil field brine pollution of the Colorado River and its tributaries upstream from the north boundary line of Coke County, Texas. In addition, the district was granted the authority to acquire sources of saltwater by any means and to sell saltwater and freshwater for mining, oil field flooding and repressuring, industrial, manufacturing, or other purposes. Act of Aug. 3, 1961, 57th Leg., 1st C.S., ch. 4.

b. Structure

The CRMWD is governed by a twelve-member board of directors to which the city councils of each member city appoint four directors to serve staggered two-year terms. Act of May 31, 1949, 51st Leg., R.S., ch. 340.

c. Powers and Duties

- Air quality control
- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Wastewater
- Water quality
- Water supply: municipal and wholesale

d. Citations to Special Law or Codes

H.B. 757, Act of May 31, 1949, 51st Leg., R.S., ch. 340
S.B. 31, Act of Aug. 3, 1961, 57th Leg., 1st C.S., ch. 4
H.B. 1801, Act of May 22, 1981, 67th Leg., R.S., ch. 621

7. *Dallas County Utility and Reclamation District*

a. History

The Dallas County Utility and Reclamation District (DCURD) was created by a 1983 special act of the Texas legislature that became effective on February 1, 1984. Act of May 23, 1983, 68th Leg., R.S., ch. 628. The DCURD is the successor to Dallas County Municipal Utility District No. 1, which was created in 1972 by the Texas Water Commission. The DCURD was created to construct and operate certain infrastructure and amenity elements within the Las Colinas development in Irving, Texas. Major projects of the DCURD reach well beyond water resources and include reclamation projects, raw water and flood control systems, and mass transit and road construction projects. DCURD activities support the City of Irving Tax Increment Finance District No. 1, created to accelerate economic development in Las Colinas through various means, including advance infrastructure construction, of which the DCURD is a beneficiary. *See* Dallas County Utility and Reclamation District, www.dcurd.org/.

b. Structure

DCURD is governed by a board of five directors appointed by the Irving, Texas, city council. A board member serves a four-year term, unless removed for cause.

c. Powers and Duties

- Bonding authority: property tax bonds and revenue bonds
- Chapter 49 duties
- Chapter 54 district powers and duties, including street lighting, roads (inside and outside district), electricity, navigation, parks, and raw and treated water supply
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Taxes: operation and maintenance expenses
- Wastewater
- Water quality
- Water supply: irrigation, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

S.B. 963, Act of May 23, 1983, 68th Leg., R.S., ch. 628
H.B. 2421, Act of June 11, 1985, 69th Leg., R.S., ch. 475

8. *Guadalupe-Blanco River Authority*

a. History

The Guadalupe River Authority was created in 1933 as a water conservation and reclamation district. In 1935, it was reauthorized as the Guadalupe-Blanco River Authority (GBRA). The GBRA's statutory district includes ten counties: Caldwell, Calhoun, Comal, DeWitt, Gonzales, Guadalupe, Hays, Kendall, Refugio, and Victoria. *See* Guadalupe-Blanco River Authority, *About GBRA*, www.gbra.org/about/default.aspx; *see also* Judy Gardner, *The Handbook of Texas Online*, *Guadalupe-Blanco River Authority*, http://tshaonline.org/handbook/online/articles/mwg01.

The GBRA consists primarily of its General Division, the Guadalupe Valley Hydroelectric Division, the Rural Utilities Division, the Water Resource Division, the Port Lavaca Water Treatment Plant Division, the Calhoun County Rural Water Supply Division, the Coleto Creek Division, the Luling Water Treatment Plant Division, the Canyon Hydroelectric Division, and the Lockhart Division.

Groundwater has always been of great importance to the GBRA because approximately a third of the water in the Guadalupe basin derives from the Edwards Aquifer. Guadalupe-Blanco River Authority, *Edwards Aquifer and the Guadalupe River*, www.gbra.org/drought/edwardsaquifer.aspx. It is for this reason the GBRA acted to safeguard its water sources and joined as a plaintiff in the 1991 *Sierra Club v. Babbitt* case, which ultimately mandated a minimum discharge below which the Edwards Aquifer could not go. Since that time, the GBRA participated in the development of the Edwards Aquifer Recovery Implementation Program (EARIP), which is designed to protect endangered species and their habitats in Comal Springs and San Marcos Springs, which emanate from the Edwards Aquifer. *See* LaMarriol Smith, *Building a Habitat Conservation Plan*, GBRA River Run 8 (Winter/Spring 2012), *available at* www.gbra.org/documents/publications/riverrun/2012/winterspring.pdf.

More recently, the GBRA has explored expanding its groundwater resources through the Mid-Basin Water Supply Project, which could use groundwater resources in Gonzales County conjunctively with surface water. The GBRA also is evaluating ocean water desalination as a regional water supply with the option of co-located power generation facilities—more commonly referred to as an Integrated Water Power Project (IWPP). *See, e.g.*, Press Release, Guadalupe-Blanco River Authority, *Bureau of Reclamation Funding to Boost Progress on GBRA's Proposed Integrated Water Power Project* (June 27, 2014), *available at* www.gbra.org/news/2014/062701.pdf.

b. Structure

The GBRA is governed by a nine-member board of directors. Each director must be a property taxpayer in Texas and reside in a county within the authority's boundaries. Only one director may come from any one county. All directors are appointed by the governor to six-year terms. Act of May 27, 1969, 61st Leg., R.S., ch. 432, § 4.

c. Powers and Duties

- Bonding authority: revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry
- General powers and duties of any district created by Tex. Const. art. XVI, § 59
- Groundwater management
- Navigation
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Wastewater
- Water supply: irrigation, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

S.B. 97, Act of Oct. 12, 1933, 43d Leg., 1st C.S., ch. 75

H.B. 138, Act of Oct. 11, 1935, 44th Leg., 1st C.S., ch. 410
H.B. 294, Act of Mar. 28, 1963, 58th Leg., R.S., ch. 45
H.B. 1416, Act of May 27, 1969, 61st Leg., R.S., ch. 432
S.B. 1028, Act of May 22, 1975, 64th Leg., R.S., ch. 433
S.B. 1477, Act of May 30, 1993, 73d Leg., R.S., ch. 626
S.B. 361, Act of May 17, 1995, 74th Leg., R.S., ch. 524
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 5

9. Gulf Coast Water Authority

a. History

Before World War II, areas with large industrial and petrochemical development, including Baytown and Texas City, experienced significant localized subsidence. This trend continued during and after the war, when rapid industrial and municipal growth began to create broad regional patterns of subsidence, raising serious concerns over flooding. The Industrial Water Company, founded in 1946, used surface water from the Brazos River as a substitute for the groundwater supply for industries in Texas City. In 1965, the Texas legislature created the Galveston County Water Authority (GCWA) to provide an adequate water supply for municipal, domestic, manufacturing, irrigation, and other useful purposes for the inhabitants and water users of Galveston County. Act of May 26, 1965, 59th Leg., R.S., ch. 712. The GCWA purchased the assets of the Industrial Water Company in 1971. Also in 1971, the cities of Galveston and League City contracted with the GCWA to deliver up to 30 million gallons per day (MGD) of potable water purchased from the City of Houston. The acquisition of a surface water supply by the GCWA for these cities further reduced reliance on groundwater. In 1981, the GCWA purchased an 18 MGD surface-water treatment plant from Texas City. In 1987, the GCWA purchased a 25 percent interest in the new City of Houston Southeast Water Purification Plant for the cities of Galveston and League City. In 1988, the GCWA purchased the Brazos River Authority Canal Division, which included three pump stations and 150 miles of canals across Brazoria, Fort Bend, and Galveston counties. The purchase included 225,000 acre-feet of water rights in the Brazos River. In 1991, the name was changed to the Gulf Coast Water Authority to reflect its service to a broader area. Act of May 23, 1991, 72d Leg., R.S., ch. 818. In 1999, the surface-water treatment plant was expanded to 50 MGD. In 2006, the GCWA purchased the assets of Chocolate Bayou Water Company, which included two pump stations, several reservoirs, and an extensive canal system. This purchase included an additional 175,000 acre-feet of water rights in the Brazos River.

The GCWA is the major provider of surface water to the Texas City Industrial Complex and the cities and water districts in Galveston County; of surface water to the southern Brazoria County Industrial Complex and 18,000 acres of agricultural land in Brazoria and Galveston counties; and of surface water to the cities of Missouri City, Pearland, and Sugarland and water districts serving Pecan Grove and Stafford. In 2015, the 84th Legislature granted express authority to the GCWA, in connection with the acquisition of water or the treatment, storage, or transportation of water, to enter into retail service agreements within the boundaries of the Electric Reliability Council of Texas (ERCOT), which covers much of Texas, for sale of electricity under certain limited circumstances. *See* Act of May 27, 2015, 84th Leg., R.S., ch. 943, § 1 (H.B. 4168), eff. Sept. 1, 2015.

Measurements by the Harris-Galveston Subsidence District in Galveston County indicate that conversion from groundwater to surface water has completely arrested subsidence in that county. *See* Gulf Coast Water Authority, *History*, www.gulfcoastwaterauthority.com/history/.

b. Structure

The GCWA is governed by a ten-member board of directors, each of which serves a two-year staggered term, representing municipal, industrial, agricultural, and general interests. Five members are appointed by the Galveston County Commissioners Court, two by the Fort Bend County Commissioners Court, and three by the Brazoria County Commissioners Court.

c. Powers and Duties

- Bonding authority: revenue bonds
- Chapter 49 duties (no taxes)
- Chapter 54 district powers and duties, including drainage and flood control, irrigation, navigation, solid waste disposal, and wastewater treatment
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Electricity sales (limited)
- Oil and gas leases
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply: irrigation, municipal, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 1127, Act of May 26, 1965, 59th Leg., R.S., ch. 712
H.B. 1383, Act of May 19, 1969, 61st Leg., R.S., ch. 399
H.B. 165, Act of May 27, 1979, 66th Leg., R.S., ch. 708
H.B. 2343, Act of May 23, 1983, 68th Leg., R.S., ch. 1049
H.B. 2837, Act of May 23, 1991, 72d Leg., R.S., ch. 818
H.B. 2177, Act of May 27, 1993, 73d Leg., R.S., ch. 683
S.B. 683, Act of May 18, 2011, 82d Leg., R.S., ch. 1259
H.B. 4168, Act of May 27, 2015, 84th Leg., R.S., ch. 943

10. Lavaca-Navidad River Authority

a. History

The Jackson County Flood Control District was created by the Texas legislature in August 1941 to store, preserve, and distribute the surface and flood waters of Jackson County, Texas. The district's name was changed to the Lavaca-Navidad River Authority (LNRA) in 1969. *See* Christopher Long, *The Handbook of Texas Online*, *Lavaca-Navidad River Authority*, http://tshaonline.org/handbook/online/articles/mwlhk [hereinafter About LNRA].

Once created, the Flood Control District quickly provided local sponsorship for the Bureau of Reclamation's Palmetto Bend Reclamation Project (also known as Lake Texana), but the work was not finally authorized by Congress until 1968. In 1978, the Bureau of Reclamation and the authority executed a lease agreement by which the authority assumed greater control of operations and maintenance for the project. Although the Palmetto Bend Dam was completed in 1979, creating Lake Texana, the LNRA did not assume full responsibility for operations and maintenance until 1985, when the project finally neared substantial completion. *The Handbook of Texas Online*, *Lake Texana*, http://tshaonline.org/handbook/online/articles/rolan; About LNRA.

With a completed reservoir, the LNRA spent much of the 1990s expanding its customer base, executing substantial water supply contracts with the Formosa Plastics Corporation, Interplast

Corporation, the cities of Corpus Christi and Point Comfort, the Calhoun County Navigation District, and the Central Power and Light Company. About LNRA.

Also in the early 1990s, the LNRA, along with the TWDB, began efforts to obtain fee title to the federal interest in the Palmetto Bend Project. On November 13, 2000, the Palmetto Bend Conveyance Act, Pub. L. No. 106-512, 114 Stat. 2378, was approved, conveying title from the United States to the state of Texas acting through the TWDB or the LNRA or both. In May 2001, approximately six months after the initial transaction, the LNRA secured the necessary financing and assumed the TWDB's remaining interest in the project and became sole proprietor of Lake Texana and the associated properties.

In 2003, in an effort to assist newly formed groundwater conservation districts (GCDs) in the Lavaca basin, the LNRA was granted express authority to discover, develop, and produce groundwater for local use within Lavaca River basin and to coordinate and contract with GCDs to engage in conjunctive use of groundwater and surface water management. *See* Act of May 30, 2003, 78th Leg., R.S., ch. 1224. The legislation also gave the LNRA authority for desalination projects and ancillary facilities, including an electric power generation facility, and augmented the types of facilities the LNRA may own, construct, operate, and maintain and the purposes for which it is created.

Today, the authority operates and maintains two raw water delivery systems consisting of nearly 150 miles of large-diameter pipeline and multiple pump stations, three public campgrounds, an event complex, eight public boat ramps, and three fishing areas in and around the Lake Texana Reservoir. Of the nearly 8,000 acres surrounding Lake Texana, approximately 5,000 acres are managed as wildlife habitat, and the balance is leased and managed for hay production. Although the Texas Water Commission authorized a Stage II expansion to the Palmetto Bend Project along the Lavaca River in 1972, the authority is only now entering into more serious study of this project and potential alternatives. *See* About LNRA.

b. Structure

The LNRA is governed by a nine-member board of directors appointed by the governor to staggered six-year terms. The directors must reside within the LNRA's jurisdiction and be property taxpayers as well as legal voters of the state of Texas.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 49 duties
- Conservation of water
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry
- Navigation
- Other: all powers and duties conferred by general or special law on any other district not contravened by enabling legislation
- Parks
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Taxes: operation and maintenance expenses; special taxes for pollution control and district master plan
- Wastewater
- Water quality
- Water supply: irrigation, municipal, out-of-district, and wholesale

d. Citations to Special Law or Codes

H.B. 362, Act of May 14, 1941, 47th Leg., R.S., ch. 361, art. II
H.B. 836, Act of May 14, 1953, 53d Leg., R.S., ch. 383
H.B. 676, Act of May 10, 1955, 54th Leg., R.S., ch. 313
S.B. 11, Act of Aug. 6, 1959, 56th Leg., 3d C.S., ch. 22
S.B. 62, Act of Feb. 28, 1963, 58th Leg., R.S., ch. 14
H.B. 2305, Act of May 23, 1983, 68th Leg., R.S., ch. 1035
H.B. 228, Act of May 17, 1989, 71st Leg., R.S., ch. 956
S.B. 1276, Act of May 30, 2003, 78th Leg., R.S., ch. 1224
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 6

11. Lower Colorado River Authority

a. History

The Lower Colorado River Authority (LCRA) was created in 1934 as a conservation and reclamation district with a statutory authority covering ten counties encompassing the lower Colorado River, including Bastrop, Blanco, Burnet, Colorado, Fayette, Llano, Matagorda, San Saba, Travis, and Wharton counties. *See* S.B. 2, Act of Nov. 10, 1934, 43d Leg., 4th C.S., ch. 7; Tex. Spec. Dist. Code § 8503.003. Between 1935 and 1951 the LCRA built six dams along the Colorado River above Austin, including Tom Miller Dam, which is owned by the city of Austin. Lower Colorado River Authority, *LCRA Historical Timeline*, www.lcra.org/about/overview/history/Documents/timeline.html; John Williams & William McCann, *The Handbook of Texas Online*, *Lower Colorado River Authority*, www.tshaonline.org/handbook/online/articles/mwl03 [hereinafter Williams & McCann]; *see also* John A. Adams, Jr., *Damming the Colorado: The Rise of the Lower Colorado River Authority, 1933–1939* (Texas A&M University Press 1990); James H. Banks & John E. Babcock, *Corralling the Colorado: The First Fifty Years of the Lower Colorado River Authority* (Eakin Press 1988).

These dams help control the river in floods and provide a reliable supply of water by forming the chain called the Highland Lakes. *See* Lower Colorado River Authority, *LCRA Dams Form the Highland Lakes*, www.lcra.org/water/dams-and-lakes/pages/default.aspx [hereinafter LCRA Dams]. Hydroelectric facilities at the six dams make the LCRA the largest supplier of renewable energy in the state. LCRA Dams. Two of the Highland Lakes, Buchanan and Travis, provide water supplies that serve more than 500,000 people as well as businesses, power plants, and agriculture. *See* Lower Colorado River Authority, *Water Supply*, www.lcra.org/water/water-supply/Pages/default.aspx. The LCRA also supplies water for the rice industry in Colorado, Matagorda, and Wharton counties; however, an exceptional drought has caused the LCRA to cut off most water supplies for irrigated agriculture in recent years. See Texas Commission on Environmental Quality, LCRA Emergency Orders, www.tceq.state.tx.us/agency/lcra/lcra-emergency-order. In the mid-1990s, the LCRA began operating several potable water and wastewater systems; however, it has divested itself of these facilities. *See generally* Lower Colorado River Authority, *Water and Wastewater Utility Divestiture*, www.lcra.org/water/utilities/Pages/divestiture.aspx. The LCRA is now focused on expanding its water supply, with the Board's adoption of a goal to develop an additional 100,000 acre-feet of water by 2017 and specific projects to develop groundwater on LCRA property in Bastrop County and an off-channel reservoir in Wharton County. *See* Lower Colorado River Authority, *LCRA Pursuing New Water Supply*, www.lcra.org/water/water-supply/Pages/new-water.aspx.

In addition to its water-related responsibilities, the LCRA also supplies wholesale electricity throughout central Texas to several electric cooperatives and cities. The LCRA operates fossil-fueled power plants in Bastrop, Fayette, and Llano counties, in addition to its six hydroelectric facilities on the Colorado River. *See* Lower Colorado River Authority, *Powering Texas*, www.lcra.org/energy/electric-power/pages/default.aspx [hereinafter *Powering Texas*]; *see also* Tex. Spec. Dist. Code § 8503.004(t); Act of Apr. 22, 1965, 59th Leg., R.S., ch. 124. The LCRA also owns and maintains several thousand miles of power lines and electric substations. *Powering Texas*. To diversify its energy sources, the LCRA became a partner in the first commercial-sized windpower project in the state in early 1994. Lower Colorado River Authority, *Renewable Energy Leader in Texas*, www.lcra.org/energy/electric-power/renewable-energy/pages/default.aspx; *see also* Tex. Spec. Dist. Code § 8503.004(c).

Amendments to the LCRA's enabling act have added to the LCRA's responsibilities and authority. The legislature provided the LCRA authority over pollution control of ground and surface waters and water quality monitoring in 1971. *See* Tex. Spec. Dist. Code § 8503.004(q). Since 1988, the LCRA has sponsored the Colorado River Watch Network, a volunteer-based environmental-education and data collection program along the Colorado River and its tributaries. *See* Lower Colorado River Authority, *Colorado River Watch Network*, www.lcra.org/water/quality/colorado-river-watch-network/Pages/default.aspx [hereinafter Colorado River Watch]. More than five hundred volunteers take part in the program. Under the Clean Rivers Act of 1991, the LCRA conducts a comprehensive assessment of the region's water quality. Colorado River Watch; *see also* Act of May 31, 1971, 62d Leg., R.S., ch. 820.

The LCRA also operates more than twenty-five parks and recreational facilities along the Colorado River, at the Highland Lakes, and at downstream lakes with power plants. *See* Lower Colorado River Authority, *Park News and Updates*, www.lcra.org/parks/Pages/default.aspx. The LCRA also works with local communities to bring new businesses and to help existing businesses expand. Between 1990 and 1995 the LCRA helped add more than $23 million in capital investment in and around Central Texas. *See* Williams & McCann. Like many other river authorities, the LCRA receives no state tax money and cannot levy taxes. The LCRA operates on revenues from wholesale electricity and water sales and other services.

H.B. 2362, enacted by the 83rd Legislature, specifically requires the LCRA and Brazos River Authority to undergo an efficiency review by the Legislative Budget Board (LBB) before the LBB conducts a review of any other river authority. The LBB completed its review of the Brazos River Authority in 2015 but has not yet begun its assessment of the LCRA. It will assess the LCRA's financial affairs and operations and report its findings to the governor and the legislature. *See* Act of May 23, 2013, 83d Leg., R.S., ch. 1293, §§ 1, 3 (H.B. 2362). In 2015, the 84th Legislature amended the LCRA's enabling act to provide the state auditor with the authority to audit the LCRA, which is to be completed by December 1, 2016. *See* Act of May 31, 2015, 84th Leg., R.S., ch. 1148, §§ 7, 8 (S.B. 523). While the same legislation excluded from sunset review the LCRA's management of generation or transmission of electricity through the LCRA or its nonprofit affiliates, the state auditor may make recommendations regarding such review in the future. *See* Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 7.

b. Structure

The LCRA board has fifteen directors appointed by the governor for staggered six-year terms. See Tex. Spec. Dist. Code § 8503.006(a), (c). The chair of the board is also appointed by the governor. Tex. Spec. Dist. Code § 8503.007. Twelve of the LCRA's fifteen directors represent the LCRA's ten-county statutory district. Each county has one director, except for Travis, which has two. The remaining director's seat is an at-large position that rotates among the remaining nine counties. Three directors represent LCRA's electric service area outside the statutory district. These are at-large positions that rotate among the counties in LCRA's electric service area. Tex. Spec. Dist. Code § 8503.006(a), (b).

c. Powers and Duties

- Air quality control
- Bonding authority: revenue bonds
- Chapters 49, 51, and 152 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry
- Hydroelectric generation facilities
- Oil and gas leases
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Wastewater
- Water quality
- Water supply: industrial, irrigation, mining, municipal (and other beneficial uses), out-of-district (limited), retail, and wholesale

d. Citations to Special Law or Codes

Tex. Spec. Dist. Code ch. 8503
S.B. 2, Act of Nov. 10, 1934, 43d Leg., 4th C.S., ch. 7
H.B. 2362, Act of May 23, 2013, 83d Leg., R.S., ch. 1293, § 3
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, §§ 7, 8
H.B. 910, Act of May 29, 2015, 84th Leg., R.S., ch. 437, § 38
H.B. 2000, Act of May 22, 2015, 84th Leg., R.S., ch. 547

12. Lower Neches Valley Authority

a. History

The Lower Neches Valley Authority (LNVA) was created in 1933 as the second river authority in the state, pursuant to article III, section 52, and article XVI, section 59, of the Texas Constitution. Act of Oct. 23, 1933, 43d Leg., 1st C.S., ch. 63. The authority's primary boundaries encompass all of Hardin, Jefferson, and Tyler counties and eastern Chambers and Liberty counties, but the LNVA has power to act inside or outside the boundaries of the authority within the Neches River basin or the adjacent Neches-Trinity coastal basin. *See* Tex. Spec. Dist. Code §§ 8504.003, 8504.103. A primary purpose of the LNVA is to supply water to municipalities, industry, and agriculture and to protect the freshwater intakes of cities, industries, and farms along the lower Neches River that were threatened by saltwater intrusion from the Gulf of Mexico. *See* Lower Neches Valley Authority, *Mission Statement*, www.lnva.dst.tx.us. Originally, most of the LNVA's customers were rice farmers; however, industrial growth has surpassed that historical use. The lower part of the Neches River has been deepened and straightened to provide access for large ocean-going vessels serving the oil refining industry within Jefferson County, thus the need for saltwater protection. To accomplish this, the LNVA owns and operates a saltwater barrier and navigation lock near the mouth of Pine Island Bayou. *See* Lower Neches Valley Authority, *History and Development*, www.lnva.dst.tx.us [hereinafter LNVA History].

Initially, the LNVA planned construction of a large reservoir on the Neches River near Rockland and a regulated dam near Town Bluff for the purpose of storing water and regulating the flow of the river. However, the U.S. Army Corps of Engineers' planned construction of two major reservoirs, one at Rockland on the Neches and the other at McGee Bend on the Angelina River, superseded the LNVA's plans. The LNVA was named the local sponsor of the Neches River basin reservoirs and furnished $5,000,000 of the construction costs of McGee Bend Reservoir (now Sam Rayburn Reservoir, completed in 1965), as well as Town Bluff Dam and B. A. Steinhagen Reservoir, completed in 1951. *See* LNVA History.

The Sam Rayburn and Steinhagen reservoirs are owned by the U.S. government and operated by the U.S. Army Corps of Engineers, Fort Worth District. The LNVA provides local financial sponsorship. The LNVA has state-approved water rights to use essentially the entire dependable freshwater yield of the Sam Rayburn Reservoir, approximately 820,000 acre-feet (or 267 trillion gallons) a year. Water releases through Rayburn's and Steinhagen's powerhouses generate electrical power for use in homes and industries within the area. *See* Lower Neches Valley Authority, *System*, www.lnva.dst.tx.us [hereinafter LNVA System].

The LNVA delivers fresh surface water to its customers using a pumping and distribution system comprising twenty-one pumps capable of pumping more than 1 billion gallons of water a day. The LNVA supplies water to nine cities and water districts, twenty-six industries, and over one hundred irrigated farms. The water is lifted into a canal system and then delivered by gravity flow throughout most of the six-hundred-mile canal system that covers an area of approximately seven hundred square miles, principally in Jefferson, Liberty, and Chambers counties. *See* LNVA System.

In 1997, the LNVA's enabling legislation was amended to expand its economic development program throughout the basin to include (1) education, (2) transportation, (3) public safety, (4) recreation, (5) health care, (6) water and wastewater treatment, and (7) rural water and sewer development. Act of May 26, 1997, 75th Leg., R.S., ch. 1263; Tex. Spec. Dist. Code § 8504.201(5). The LNVA's Economic Development Assistance Program consists of low-interest loans or local matching grants for water/wastewater infrastructure improvements and private enterprise projects that improve water availability, water quality, and water management or that enhance economic growth both within and without the LNVA's service area. As an economic development project, the LNVA supplies the Bolivar Peninsula in Galveston County up to five million gallons per day of treated freshwater from its West Treatment Plant in Winnie, Chambers County, built in 2004.

Since 2008, the LNVA has operated and now owns the Devers Canal System in Chambers and Liberty counties. Additionally, the LNVA operates the North Regional Treatment plant that treats the industrial effluent from five refineries and chemical plants south of Beaumont, Texas.

The LNVA has no power to levy taxes.

b. Structure

The LNVA is governed by a board of nine directors, two of whom reside in Tyler County, two from Hardin County, and five from Jefferson County. They are appointed to six-year terms by the governor.

c. Powers and Duties

- Bonding authority: revenue bonds
- Chapter 49 duties (no taxes)
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry

- Industrial development corporation
- Navigation
- Oil and gas leases
- Other: all powers and duties conferred by general or special law on any other district, not contravened by enabling legislation
- Parks
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Wastewater
- Water quality
- Water supply: industrial, irrigation, mining, municipal, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

S.B. 38, Act of Oct. 23, 1933, 43d Leg., 1st C.S., ch. 63
H.B. 2919, Act of May 26, 1997, 75th Leg., R.S., ch. 1263
Tex. Spec. Dist. Code ch. 8504
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 9

13. Mackenzie Municipal Water Authority

a. History

The Mackenzie Municipal Water Authority (MMWA) was created in 1965. Act of May 13, 1965, 59th Leg., R.S., ch. 277. The MMWA's boundaries encompass the city of Tulia in Swisher County, the city of Silverton in Briscoe County, and the cities of Floydada and Lockney in Floyd County. The primary purpose of the MMWA is to furnish water to these municipalities. Water is supplied via pipeline from Lake Mackenzie, an 896-acre lake holding up to 45,500 acre-feet, that was completed in 1974 and opened to the public in 1976. All facilities, including the land, dam, water treatment plant, pipelines, and pump stations were financed by the four cities and the taxpayers. *See* Lake Mackenzie, *General Lake Information*, www.lakemackenzie.com/geninfo.htm.

b. Structure

The MMWA is governed by an eight-member board of directors. The governing body of each of the four customer cities appoints two board members each, who serve two-year staggered terms. Board members must reside in the cities from which they are appointed. Act of May 13, 1965, 59th Leg., R.S., ch. 277.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 49 duties
- Conservation of water
- Dams and reservoirs
- Groundwater development and use (limited)
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply: out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 622, Act of May 13, 1965, 59th Leg., R.S., ch. 277

14. North Central Texas Municipal Water Authority

a. History

The North Central Texas Municipal Water Authority (NCTMWA) was created in 1957 as a conservation and reclamation district comprising the territory contained within the cities of Goree, Haskell, Knox City, Munday, Rule, Rochester, and Seymour (in Baylor, Haskell, and Knox counties). The district was created to provide, process, and transport water for municipal, domestic, industrial, and mining uses. Act of April 9, 1957, 55th Leg., R.S., ch. 86. Today, the NCTMWA provides treated water to the cities of Aspermont, Benjamin, Goree, Haskell, Knox City, Munday, O'Brien, Rochester, and Rule and to the Paint Creek and Rhineland Water Supply Corporations.

b. Structure

The NCTMWA is governed by a board composed of two directors appointed by the head of governing bodies of the cities of Goree, Haskell, Knox City, and Munday. Each board member must reside in and own taxable property within the city from which he is appointed. Directors serve two-year staggered terms. Act of April 10, 1969, 61st Leg., R.S., ch. 77.

c. Powers and Duties

- Bonding authority: property tax bonds and revenue bonds
- Coordinate/contract with governments/entities
- Dams and reservoirs (in Baylor, Haskell, Knox, and Throckmorton counties)
- Groundwater development (expressly prohibited)
- Parks
- Police and security services
- Property acquisition through eminent domain within Baylor, Haskell, Knox, and Throckmorton counties and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply: municipal, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 494, Act of Apr. 9, 1957, 55th Leg., R.S., ch. 86
S.B. 257, Act of Apr. 10, 1969, 61st Leg., R.S., ch. 77
S.B. 1027, Act of May 31, 1971, 62d Leg., R.S., ch. 849

15. North Harris County Regional Water Authority

a. History

On June 18, 1999, the bill that created the North Harris County Regional Water Authority (NHCRWA) was signed into law, and a special election was called for January 15, 2000, at which voters confirmed the creation of the new authority and elected directors to lead it. The boundaries of the authority are essentially US Highway 290 on the west, the Harris County line on the north (Spring Creek), FM Road 1960 and Bammel-North Houston on the south, and the western shores of Lake Houston on the east. The NHCRWA comprises 335 square miles and includes approximately 460,000 residents. *See* Act of May 20, 1999, 76th Leg., R.S., ch. 1029; *see also* North Harris County Regional Water Authority, *About Us*, www.nhcrwa.org/about/ [hereinafter About NHCRWA].

Following the January 2000 election, the NHCRWA became the single entity empowered to negotiate for a secure, long-term, reliable, quality supply of wholesale drinking water for all the independent neighborhoods, municipal utility districts, small municipalities, and permitted well owners within its boundaries. A primary charge of the NHCRWA is to develop and implement a strategy for complying with the Harris-Galveston Subsidence District's Regulatory Plan that requires a reduction in groundwater usage to no more than 20 percent of total water demand by the year 2030. *See* About NHCRWA. See Chapter 16 of this book for a discussion of subsidence districts.

Since the authority is not a taxing entity, funding for future water supply and the infrastructure through which to deliver it is accomplished through the sale of revenue bonds paid for by groundwater pumpage fees. *See* About NHCRWA.

b. Structure

The NHCRWA is governed by a five-member board of directors. One director is elected from each of the five single-member voting districts by the qualified voters of the district. The directors serve staggered four-year terms and must be qualified voters in the voting district they represent. *See* Act of May 20, 1999, 76th Leg., R.S., ch. 1029.

c. Powers and Duties

- Bonding authority: revenue bonds
- Chapter 49 (does not apply)
- Conservation of water
- Coordinate/contract with governments/entities
- Groundwater (regulation of pumping)
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water quality
- Water supply: municipal, out-of-district, and wholesale

d. Citations to Special Law or Codes

H.B. 2965, Act of May 20, 1999, 76th Leg., R.S., ch. 1029
S.B. 270, Act of May 9, 2001, 77th Leg., R.S., ch. 232
H.B. 1110, Act of May 17, 2001, 77th Leg., R.S., ch. 1296
S.B. 1444, Act of May 26, 2001, 77th Leg., R.S., ch. 1423
S.B. 2, Act of May 28, 2001, 77th Leg., R.S., ch. 966
S.B. 1725, Act of May 30, 2003, 78th Leg., R.S., ch. 381
H.B. 1208, Act of May 26, 2005, 79th Leg., R.S., ch. 271
S.B. 331, Act of May 28, 2005, 79th Leg., R.S., ch. 1343

16. North Texas Municipal Water District

a. History

The North Texas Municipal Water District (NTMWD) is a conservation and reclamation district created in 1951. The creation was prompted by local interests who saw a need to finance, construct, and operate facilities to meet the water needs of the North Texas and Dallas areas. Act of Apr. 4, 1951, 52d Leg., R.S., ch. 62; *see* North Texas Municipal Water District, *History*, http://ntmwd.com/history.html [hereinafter NTMWD History]. In 1956, the NTMWD delivered treated water to approximately 32,000 citizens. Today, the NTMWD meets the daily water needs of more than 1.6 million people in Collin, Rockwall, and portions of Dallas, Denton, and Hunt counties. NTMWD History. In addition, the NTMWD provides wastewater treatment and solid waste disposal services. All services are provided through contracts in which municipalities pledge payments from water, sewer, and solid waste customer revenues. NTMWD History. The NTMWD's three systems are completely separate financially; systems may neither subsidize nor draw revenue from each other. Personal Communication from Jim Parks, NTMWD, to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (Apr. 15, 2011) (on file with author) [hereinafter Parks Personal Communication].

Lake Lavon serves as the NTMWD's main raw water supply. The NTMWD holds water rights in the reservoir. The reservoir also holds additional supplies that are transferred into Lake Lavon to augment supplies. Parks Personal Communication; *see also Handbook of Texas Online*, *Lavon Lake*, http://tshaonline.org/handbook/online/articles/rol88. The NTMWD holds water rights for raw water supplies from the East Fork Raw Water Supply Project (Wetland), Jim Chapman Lake, Lake Bonham, Lake Lavon, and Lake Texoma. Additional supplies are available through a contract with the Sabine River Authority (SRA) providing for water transfer to Lake Lavon from Lake Tawakoni and from a contract with Greater Texoma Utility Authority for additional supplies from Lake Texoma. *See* North Texas Municipal Water District, *About Our Water System*, http://ntmwd.com/watersystem.html [hereinafter Waste Water]. The NTMWD has recognized its role in developing future water supplies that are needed to meet the water demands of a population expected to exceed 3.8 million by 2060. Through the state planning process, the NTMWD had identified numerous water management strategies, including conservation, reuse, and additional reservoirs. *See* Texas Water Development Board, Region C Water Planning Group, 1 2011 Region C Water Plan 3.23 (Oct. 2010), *available at* www.twdb.texas.gov/waterplanning/rwp/plans/2011/C/Region_C_2011?RWPV1.pdf.

As mentioned, the NTMWD provides wastewater treatment services to cities and communities within its service area. *See* Waste Water. Additionally, the NTMWD provides municipal solid waste services for five member cities and residents of Collin County. The NTMWD owns and operates the 121 Regional Disposal Facility (121 RDF) in Melissa, which is expected to meet the needs of its customers for the next forty years. The NTMWD also operates three solid waste transfer stations. *See* Parks Personal Communication.

b. Structure

The NTMWD is governed by a twenty-five-member board of directors appointed to two-year staggered terms by the city councils of the NTMWD member cities of Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royse City, and Wylie. The size of the board can change as population increases; member cities with a population of five thousand or more appoint two directors; cities with a population of less than five thousand appoint only one director. Each director must reside and own taxable property in the city that he represents. *See* Act of Apr. 4, 1951, 52d Leg., R.S., ch. 62.

c. Powers and Duties

- Air quality control
- Bonding authority: contract bonds and revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Wastewater
- Water quality
- Water supply: irrigation, municipal, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

S.B. 141, Act of Apr. 4, 1951, 52d Leg., R.S., ch. 62
H.B. 654, Act of Apr. 28, 1969, 61st Leg., R.S., ch. 122
S.B. 640, Act of Apr. 23, 1975, 64th Leg., R.S., ch. 90
S.B. 715, Act of Apr. 29, 2009, 81st Leg., R.S., ch. 20

17. Northeast Texas Municipal Water District

a. History

The Northeast Texas Municipal Water District (NETMWD) was formed in 1953 to be the local sponsor of Lake O' the Pines in the Cypress basin. Wright Patman and Lyndon B. Johnson were instrumental in arranging for federal participation in creating Lake O' the Pines, which is the primary source of the NETMWD's water and was constructed to reduce flooding of the city of Jefferson. The district territory covers portions of fifty-nine east Texas counties. *See* Northeast Texas Municipal Water District, *About Us*, www.netmwd.com/aboutus.html [hereinafter *About Us*].

In 1957, the NETMWD obtained the right to divert and consume 203,800 acre-feet annually from the lake. The NETMWD had no financial resources and was dependent on contributions from a local property tax from member cities and sales of raw water. The NETMWD was able to discontinue assessing taxes by 1977 due to the growth of raw water sales. *See About Us.*

The NETMWD constructed its first water treatment plant in 1984. In 1995, a contract was signed with the city of Longview to provide a long-term water supply from Lake O' the Pines. In 1998, the NETMWD acquired its second water treatment plant, which provides treated water to the city of Pittsburg. The NETMWD's facilities have a combined water treatment capacity of 9.2 million gallons per day and serve the communities of Avinger, Daingerfield, Diana, Harleton, Hughes Springs, Jefferson, Lone Star, Mims, Ore City, Pittsburg, and Tryon Road. In addition, the NETMWD provides water for key industrial facilities in its service area. *See About Us.*

The NETMWD's mission is to protect the water quality in the Cypress basin and to provide a sufficient supply of water to Northeast Texas. *See* Northeast Texas Municipal Water District, *Our Mission*, www.netmwd.com/home.html.

b. Structure

The NTMWD is governed by a seven-member board of directors selected by the city councils of the seven member cities of Lone Star, Jefferson, Avinger, Pittsburg, Daingerfield, Ore City, and Hughes Springs. Northeast Texas Municipal Water District, *NETMWD—Past, Present, & Future*, www.netmwd.com/pastpresentfuture.html. The directors are elected for a two-year term and must be residents of the city from which they are elected. Act of Apr. 23, 1953, 53d Leg. R.S., ch. 78.

c. Powers and Duties

- Bonding authority: tax bonds and revenue bonds
- Conservation of water
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Parks
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Taxes: operation and maintenance expenses
- Wastewater
- Water quality
- Water supply: irrigation, municipal, and wholesale

d. Citations to Special Law or Codes

S.B. 130, Act of Apr. 23, 1953, 53d Leg., R.S., ch. 78
S.B. 395, Act of May 4, 1959, 56th Leg., R.S., ch. 375
S.B. 36, Act of July 14, 1959, 56th Leg., 2d C.S., ch. 28
S.B. 63, Act of Aug. 2, 1961, 57th Leg., 1st C.S., ch. 16
H.B. 1598, Act of May 8, 1975, 64th Leg., R.S., ch. 193

18. Nueces River Authority

a. History

The Nueces River Authority (NRA) was created in 1935 to conserve and develop water resources in the Nueces River basin. Act of Oct. 14, 1935, 44th Leg., 1st C.S., ch. 427. The NRA's service area covers more than 17,000 square miles in South Texas, including all or part of twenty-two counties, from Rocksprings to the Gulf of Mexico. *See* Act of May 21, 1985, 69th Leg. R.S., ch. 665, § 1; *see also* Nueces River Authority, *Water for the Future—Developing and Protecting Water Resources in South Texas Since 1935*, *available at* www.nueces-ra.org/NRA/pdfs/brochure.pdf [hereinafter NRA Brochure]. The Nueces River basin is about 235 miles long and 115 miles wide and is divided into three segments.

For its first thirty-five years, the NRA functioned solely through its board of directors, having no staff and only those funds it could realize from contributions. E-mail from Con Mims, Gen. Mgr., to Lyn Clancy, Managing Assoc. Gen. Counsel, Lower Colorado River Authority (Nov. 12, 2010) [hereinafter Mims e-mail]. For several years, NRA directors promoted reservoir development projects, but none were affordable. The small rural communities in the Nueces basin had adequate groundwater supplies for municipal purposes; industrial water use was practically nonexistent except in the lower basin, and projects strictly for agricultural use were cost-prohibitive. The board hired its first employee—a part-time executive director—in 1970. Mims e-mail. In 1973, the NRA secured a contract with the Texas Water Quality Board (now the TCEQ) to study municipal wastewater treatment needs in the Nueces basin. With this contract, the NRA was able to hire its first secretary and a full-time employee, in addition to its part-time executive director.

In 1974, the NRA began to issue tax-exempt revenue bonds to finance construction of air and water pollution control equipment for various industries. Mims e-mail. During the 1970s and early 1980s, the NRA and the city of Corpus Christi cosponsored development of Choke Canyon Reservoir, which was constructed by the U.S. Bureau of Reclamation on the lower Frio River, to serve as a municipal and industrial water supply for the Coastal Bend region. Although the NRA owns 20 percent of the water rights associated with the Choke Canyon Reservoir, Corpus Christi retains all operation and maintenance responsibilities and all rights to sell the water supply because it is solely responsible for all project costs and liabilities. *See* NRA Brochure.

The NRA responded to record-breaking drought conditions in 1996 by financing and constructing the Mary Rhodes pipeline for the city of Corpus Christi, which transports 41,840 acre-feet of the city's water from Lake Texana in Jackson County to the city's treatment facilities in Nueces County. The Lavaca-Navidad River Authority, owner of Lake Texana, issued bonds and constructed the primary pump station at the lake. *See* NRA Brochure; Mims e-mail.

The NRA is an active participant in the regional water planning effort, serving as the administrator for the Coastal Bend Regional Water Planning Group (Region N) and providing two voting members to that group. *See* NRA Brochure; Mims e-mail. The NRA also has a voting member in the South Central Texas Regional Water Planning Group (Region L—San Antonio region). *See* NRA Brochure; Mims e-mail. The NRA has focused on protection of limited water resources, contracting for the last twenty years with the TCEQ to carry out the state's Clean Rivers Program in the Nueces and its adjoining coastal basins, and supporting the establishment of a watermaster to enforce water rights permits in the Nueces, San Antonio, and Guadalupe River basins. The NRA also serves as an active member of the Nueces Estuary Advisory Council. *See* NRA Brochure; Mims e-mail. Most recently, the NRA successfully advocated for a legislative ban on off-road vehicles in state-owned riverbeds. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 800.

The NRA levies no taxes and receives no state or federal appropriations.

b. Structure

The NRA is governed by a board of twenty-one directors who serve six-year staggered terms, all appointed by the governor with the advice and consent of the senate. Board members must be residents and property taxpayers within the district. Nueces County must have four members, with Jim Wells and San Patricio counties each having two representatives. Act of May 26, 1971, 62d Leg., R.S., ch. 695.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Navigation

- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Taxes: operation and maintenance expenses; special taxes for pollution control
- Wastewater
- Water quality
- Water supply: irrigation, municipal, out-of-district (surplus), retail, and wholesale

d. Citations to Special Law or Codes

H.B. 141, Act of Oct. 14, 1935, 44th Leg., 1st C.S., ch. 42
H.B. 358, Act of Feb. 24, 1937, 45th Leg., R.S., ch. 21
H.B. 38, Act of Oct. 25, 1937, 45th Leg., 2d C.S., ch. 20
S.B. 329, Act of Apr. 13, 1939, 46th Leg., R.S., Spec. L., ch. 7
S.B. 320, Act of June 15, 1939, 46th Leg., R.S., ch.27
H.B. 83, Act of Apr. 9, 1941, 47th Leg., R.S., ch. 144
H.B. 560, Act of May 7, 1943, 48th Leg., R.S., ch. 390
H.B. 813, Act of May 16, 1945, 49th Leg., R.S., ch. 305
H.B. 1832, Act of May 26, 1971, 62d Leg., R.S., ch. 695
S.B. 437, Act of May 21, 1975, 64th Leg., R.S., ch. 699
H.B. 467, Act of May 20, 1977, 65th Leg., R.S., ch. 565
H.B. 1006, Act of Apr. 26, 1979, 66th Leg., R.S., ch. 138
S.B. 1254, Act of May 17, 1985, 69th Leg., R.S., ch. 844
S.B. 1245, Act of May 21, 1985, 69th Leg., R.S., ch. 665
H.B. 1820, Act of May 29, 2005, 79th Leg., R.S., ch. 977
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 10

19. Red River Authority of Texas

a. History

The Red River Authority (RRA) was created in 1959. Act of May 8, 1959, 56th Leg., R.S., ch. 279. The RRA's territorial jurisdiction encompasses all Texas counties lying wholly or partly within the watershed of the Red River and its tributaries upstream from the northeast corner of Bowie County as well as Hatley, Hutchinson, and Lipscomb counties. Act of May 8, 1959, 56th Leg., R.S., ch. 279; Act of May 26, 1977, 65th Leg., R.S., ch. 529; Act of May 15, 1975, 64th Leg., R.S., ch. 217. In 1981, the legislature added Lamar and Red River counties, and Bowie County for limited purposes, and divided the authority's territorial jurisdiction into three geographical regions. Act of May 25, 1981, 67th Leg., R.S., ch. 870.

The RRA provides public services in the areas of research, planning, design, permit acquisition, development, treatment and distribution of surface water and groundwater, treatment and disposal of municipal and industrial wastewater, and environmental protection through pollution abatement and control. The authority has issued more than $489 million of its tax-exempt contract revenue bonds to provide financial assistance to public entities throughout the Red River basin. The RRA currently provides expert assistance and services related to water resource management to more than sixty-five towns, communities, and cities throughout the basin. *See* Red River Authority of Texas, *Scope of*

Services, www.rra.texas.gov/scope_of_services.htm. See also Chapter 14 of this book regarding multi-jurisdictional issues.

b. Structure

The RRA's governing body is composed of a nine-member board of directors, all of whom are appointed by the governor and confirmed by the senate. A board member must be a legal voter, a property taxpayer, and a resident within the RRA's jurisdiction. Three directors come from each of the three geographic regions. Each director serves a six-year staggered term. One director is appointed from each of the three geographical regions to serve with the board-elected president on an executive committee. The executive committee functions as a policy and administrative oversight committee for all agency-related functions. Act of May 27, 1969, 61st Leg., R.S., ch. 856; Act of May 25, 1981, 67th Leg., R.S., ch. 870; *see* also Red River Authority of Texas, *Governing Body*, www.rra.texas.gov/governing_body.htm.

c. Powers and Duties

- Air quality control
- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 49 duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Drainage and flood control
- Electric generation and transmission facilities
- Navigation
- Other: any powers conveyed to navigation districts by general law and all powers and rights conferred by general law on any district created by Tex. Const. art. XVI, § 59
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Wastewater
- Water quality
- Water supply: irrigation, retail, and wholesale

d. Citations to Special Law or Codes

S.B. 419, Act of May 8, 1959, 56th Leg., R.S., ch. 279
H.B. 800, Act of May 24, 1961, 57th Leg., R.S., ch. 504
S.B. 296, Act of May 25, 1967, 60th Leg., R.S., ch. 570
S.B. 710, Act of May 15, 1969, 61st Leg., R.S., ch. 715
H.B. 1399, Act of May 27, 1969, 61st Leg., R.S., ch. 856
H.B. 2165, Act of May 15, 1975, 64th Leg., R.S., ch. 217
S.B. 1282, Act of May 26, 1977, 65th Leg., R.S., ch. 529
S.B. 490, Act of Apr. 16, 1981, 67th Leg., R.S., ch. 86
H.B. 1549, Act of May 25, 1981, 67th Leg., R.S., ch. 870
S.B. 1348, Act of May 27, 1983, 68th Leg., R.S., ch. 696
H.B. 1285, Act of May 29, 1989, 71st Leg., R.S., ch. 1248, § 83
S.B. 281, Act of May 25, 2013, 83d Leg., R.S., ch. 1156
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 12

20. Sabine River Authority

a. History

The Sabine River Authority (SRA) was created by the Texas legislature in 1949 as a conservation and reclamation district with broad powers to control, store, preserve, and distribute the waters of the Sabine River and its tributaries for useful purposes. The service area of the SRA includes all or parts of twenty-one counties, including Collin, Rockwall, Kaufman, Hunt, Hopkins, Rains, Van Zandt, Franklin, Wood, Smith, Upshur, Gregg, Rusk, Harrison, Panola, Shelby, Sabine, San Augustine, Newton, Jasper, and Orange. Act of Apr. 27, 1949, 51st Leg., R.S., ch. 110, 1949 Tex. Gen. Laws 193; *see* Sabine River Authority of Texas, *History of the Sabine River Authority of Texas*, www.sratx.org/aboutsra/history.asp [hereinafter SRA History]. The SRA is headquartered in Orange, Texas, and has five operational divisions located throughout the Sabine River basin and environmental services located in the upper and lower basin.

The primary activities of the SRA include municipal, industrial, and agricultural raw water supply; hydroelectric power generation; water quality and pollution control activities; management of three major reservoirs (Lake Tawakoni, Lake Fork, and joint ownership of Toledo Bend Reservoir) and the John Simmons Gulf Coast Canal System (serving primarily Orange County customers); recreation facilities; and an economic development initiative to enhance economic growth in the Sabine River basin. The SRA also provides an extensive water quality monitoring program throughout the basin. *See* SRA History.

The SRA purchased the Orange County Water Company in 1954. The newly acquired canal system, now known as the John Simmons Gulf Coast Canal System, provided the catalyst for the operations of the SRA. Lake Tawakoni, a 927,440 acre-foot water supply reservoir about eighty miles east of Dallas, was permitted in 1955 and completed in 1960. The project was funded through a water supply agreement with the city of Dallas to provide water for municipal and industrial purposes. Toledo Bend Reservoir, which forms a portion of the Texas-Louisiana border, was initiated in 1995 and constructed by the SRA and the Sabine River Authority of Louisiana, primarily for the purposes of water supply, hydroelectric power generation, and recreation. The reservoir, one the nation's largest at sixty-five miles long, inundating 185,000 surface acres, and impounding 4,477,000 acre-feet of water, was completed in 1966. Hydroelectric revenues and expenses are shared equally between Texas and Louisiana. The Lake Fork Reservoir, the most recent project undertaken by the SRA, is a 27,690 surface-acre reserve, begun in 1972 and completed in 1980. Lake Fork impounds 675,819 acre-feet and has a firm yield of 188,660 acre-feet per year. *See* Christopher Long, *The Handbook of Texas Online*, *Sabine River Authority*, http://tshaonline.org/handbook/online/articles/mws01 [hereinafter Long]. See Chapter 14 of this book regarding multi-jurisdictional issues.

The SRA does not receive funds from local, state, or federal governments and does not have the authority to levy taxes. As a matter of policy, the SRA has limited its activities to major projects beyond the financial means of local interests. *See* Long. Operating revenues are primarily derived from the sale of raw water, hydroelectric power, water quality services, and recreational and land use permit fees. The SRA provides tax-exempt bond financing to industries and municipalities for water supply, wastewater, and air quality programs. The SRA has also issued pollution control bonds; these are the liability of the firms for whom they were issued. *See* Long.

b. Structure

The SRA is governed by a nine-member board of directors appointed by the governor with the consent of the senate for staggered six-year terms. Board representation consists of four members who reside in the upper basin, four members who reside in the lower basin, and one at-large member. At the close of fiscal year 2013, the SRA had 103 full-time employees throughout the basin. *See* Act of May 27, 1999, 76th Leg., R.S. ch. 1496.

c. Powers and Duties

- Bonding authority: contract bonds and revenue bonds
- Chapters 49, 51, and 54 powers and duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Hydroelectric generation facilities
- Navigation
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Toll bridges and ferries: contract for and regulate
- Wastewater
- Water quality
- Water supply: irrigation, municipal, wholesale

d. Citations to Special Law or Codes

H.B. 467, Act of Apr. 27, 1949, 51st Leg., R.S., ch. 110
H.B. 145, Act of Apr. 6, 1955, 54th Leg., R.S., ch. 101
H.B. 551, Act of Apr. 7, 1955, 54th Leg., R.S., ch. 93
S.B. 298, Act of May 22, 1973, 63d Leg., R.S., ch. 238
H.B. 1285, Act of May 29, 1989, 71st Leg., R.S., ch. 1248, § 79
S.B. 1120, Act of May 2, 1991, 72d Leg., R.S., ch. 100
H.B. 3846, Act of May 27, 1999, 76th Leg., R.S., ch. 1496
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 13
S.B. 1162, Act of May 27, 2015, 84th Leg., R.S., ch. 855, § 1.06 (adding Tex. Spec. Dist. Code ch. 9063)

21. San Antonio River Authority

a. History

The San Antonio River Authority (SARA), created in 1937 as the San Antonio River Canal and Conservancy District, is charged with preserving, protecting, and managing the resources and environment of the San Antonio River and its tributaries over a 3,658-square-mile service area within Bexar, Goliad, Karnes, and Wilson counties. Act of May 12, 1961, 57th Leg., R.S., ch. 233, 1961 Tex. Gen. Laws 466; *see also* San Antonio River Authority, *About SARA*, www.sara-tx.org/. The San Antonio River Improvements Project (SARIP) is one of SARA's biggest projects; it is a $358.3 million joint investment by Bexar County, the city of San Antonio, the U.S. Army Corps of Engineers, SARA, and the San Antonio River Foundation in flood control, amenities, ecosystem restoration, and recreational improvements to the San Antonio River. San Antonio River Improvements Project, *San Antonio River Improvements Project Fact Sheet*, www.sanantonioriver.org/proj_facts/facts.php [hereinafter SARIP Facts]. SARA serves as project manager for all sections of SARIP and as local sponsor with the Corps of Engineers for one reach of the project (the Mission Reach). Portions of the SARIP include the restored portions of the original San Antonio River Walk. SARIP Facts.

SARA has worked on a variety of flood control projects and studies and serves as local sponsor for the construction and maintenance of twenty-seven flood dams in Bexar County and thirteen in Karnes County. San Antonio River Authority, *Flood Management*, www.sara-tx.org/public_services/flood_management/. SARA also administers the Federal Emergency Management Agency (FEMA) buy-out programs throughout the San Antonio River Basin. Additionally, during FEMA's Map Modernization Program, SARA decided to not only digitize flood risk maps but also update them with the most up-to-date and accurate flood models and terrain mapping. The result is a more accurate depiction of flood risk throughout SARA's jurisdiction. San Antonio River Authority, *SARA General Fact Sheet*, *available at* www.sara-tx.org/public_resources/library/documents/SARA-fact_sheets/SARA%20General%20Fact%20Sheet%20NEW.pdf [hereinafter SARA Fact Sheet]. SARA operates an accredited Environmental Sciences Department Laboratory and conducts weekly tests of drinking water and/or wastewater for cities within its service area. *See* San Antonio River Authority, *Laboratory Services*, www.sara-tx.org/public_services/laboratory_services/. As with many other river authorities, SARA provides significant support to the state's Clean Rivers Program and supports additional water quality sampling in the San Antonio River and its tributaries through the SARA Water Monitoring Data Program. *See* San Antonio River Authority, *Clean Rivers Program*, www.sara-tx.org/major_initiatives/water_monitoring/clean_rivers_program/index.php/.

Located within an area that has a history of water conflicts and endangered species issues, SARA has been an active participant in the Region L water planning group and has been active in the development of the Edwards Aquifer Recovery Implementation Plan (EARIP). SARA Fact Sheet. SARA is the administrator of the Regional Water Resources Development Group (RWRDG), which is a coalition of Edwards Aquifer communities and water systems that have come together to jointly acquire withdrawal permits, as well as administrator of the Regional Water Alliance, a group of Region L water purveyors and regional water entities working together to seek and implement solutions to meet the region's water needs. SARA Fact Sheet.

SARA also operates and maintains three wastewater treatment plants and collection systems in northeast Bexar County and a wastewater system at the Randolph Air Force Base and contracts to provide wastewater services to the cities of La Vernia and Somerset. SARA owns and operates three water systems in Wilson County and contracts to provide operation and maintenance services for water systems in Goliad County communities of Berclair and Fannin. In addition to water/wastewater services, SARA actively supports parks and recreation, often in partnership with communities within its service area. *See* SARA Fact Sheet.

b. Structure

A twelve-member elected board of directors governs SARA; six directors are elected from Bexar County, two are at-large, and four are from single-member districts that are coterminous with Bexar County commissioner precincts. Two directors are elected from each of the three downstream counties. Each member serves a staggered six-year term. Policies established by the board are executed by the management organization under the direction of a general manager appointed by the board. *See* Act of May 12, 1961, 57th Leg., R.S., ch. 233; Act of May 27, 1987, 70th Leg., R.S., ch. 701.

c. Powers and Duties

- Bonding authority: contract bonds and revenue bonds
- Conservation of water and soil
- Coordinate/contract with government and entities
- Dams and reservoirs
- Drainage and flood control
- Navigation
- Oil and gas leases
- Parks

- Pollution control districts (establish)
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Sewage treatment
- Solid waste disposal
- Taxes: limited rights to levy ad valorem taxes for planning operation and maintenance expenses
- Wastewater
- Water quality
- Water supply: irrigation, municipal, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 726, Act of May 3, 1937, 45th Leg., R.S., ch. 228
H.B. 542, Act of Mar. 24, 1939, 46th Leg., R.S., ch. 9
H.B. 64, Act of Mar. 30, 1953, 53d Leg., R.S., ch. 60
H.B. 317, Act of May 16, 1957, 55th Leg., R.S., ch. 504
S.B. 55, Act of Mar. 18, 1959, 56th Leg., R.S., ch. 37
H.B. 83, Act of May 12, 1961, 57th Leg., R.S., ch. 233
S.B. 704, Act of May 19, 1969, 61st Leg., R.S. ch. 836
S.B. 452, Act of May 17, 1975, 64th Leg., R.S. ch. 301
H.B. 1643, Act of May 30, 1975, 64th Leg., R.S., ch. 604
S.B. 741, Act of Apr. 18, 1981, 67th Leg., R.S., ch. 60
S.B. 1437, Act of May 27, 1987, 70th Leg., R.S., ch. 701
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 15

22. San Jacinto River Authority

a. History

The San Jacinto River Authority (SJRA) was part of the larger group of regional water providers created by special act of the legislature in the 1930s. In 1937, the San Jacinto River Conservation and Reclamation District (whose name was changed in 1951 to the San Jacinto River Authority) was charged with developing, conserving, and protecting the water resources of the San Jacinto River basin. The SJRA boundaries include the entire watershed of the San Jacinto River and its tributaries, excluding Harris County. This includes all of Montgomery County and parts of Grimes, Liberty, San Jacinto, Walker, and Waller counties. Act of May 12, 1937, 45th Leg., R.S., ch. 426; Act of May 14, 1951, 52d Leg., R.S., ch. 366. The SJRA serves many customers in the Houston area and is authorized to operate in East Harris County through an agreement with the city of Houston, which gives the SJRA the exclusive right to sell water east of the San Jacinto River. San Jacinto River Authority, *What Is the San Jacinto River Authority*, www.sanjacintoriverauthority.com/about/index.html [hereinafter What is the SJRA].

The SJRA is responsible for municipal and industrial raw water supply, wholesale treated water supply, water quality management, wastewater treatment, and water and soil conservation. To provide these services, the SJRA uses income primarily derived from the sale and distribution of water and treatment of wastewater, as it has no taxing authority. This revenue covers the cost of operation and maintenance as well as retirement of outstanding debt. Revenue bonds are sold to finance projects. *See* What is the SJRA. In its early years, from 1939 to 1949, the SJRA received a portion of state ad valorem taxes from Montgomery, Walker, San Jacinto, and part of Liberty counties. Act of June 13, 1939, 46th Leg., R.S., ch. 10.

The SJRA is organized into four operational divisions: the Lake Conroe Division, Woodlands Division, Highlands Division, and GRP Division. *See* San Jacinto River Authority, *Divisions*, www.sanjacintoriverauthority.com/index.html. The SJRA operates and maintains the dam, spillway structure, and service outlet at Lake Conroe, which was completed by the SJRA in 1973 as a water supply reservoir through a joint venture with the city of Houston, which owns two-thirds of the water rights in the reservoir. *See* San Jacinto River Authority, *Lake Conroe Division*, www.sanjacintoriverauthority.com/lakeconroe/index.html. Within the Woodlands Division, the SJRA provides wholesale water supply (from forty groundwater wells) and operates three regional wastewater systems within The Woodlands Township. *See* San Jacinto River Authority, *Woodlands Division*, www.sanjacintoriverauthority.com/about/woodlands.html. Within the Highlands Division, the SJRA delivers water from Lake Houston through canals to a number of large industrial, municipal, and agricultural customers in East Harris County. *See* San Jacinto River Authority, *Highlands Division*, www.sanjacintoriverauthority.com/about/highlands.html.

Finally, the SJRA has been closely involved in efforts to reduce reliance on groundwater within the region to address issues of subsidence. Through its Groundwater Reduction Plan (GRP) Division, the SJRA is responsible for implementing a countywide surface water program that will meet the groundwater reduction requirements of the Lone Star Groundwater Conservation District and ensure reliable long-term water supplies for all of Montgomery County. *See* San Jacinto River Authority, *GRP Division*, www.sanjacintoriverauthority.com/grp/ [hereinafter *GRP Division*]. The GRP Division will design, construct, operate, maintain, and administer a water treatment plant and transmission lines that will withdraw raw surface water from Lake Conroe, treat it to meet or exceed drinking water standards, and then transmit it to customer cities and utilities within Montgomery County. *See GRP Division*; *see also* Lone Star Groundwater Conservation District *District Rules*, as amended, eff. May 11, 2010, *available at* www.lonestargcd.org/wp-content/uploads/2012/10/DistrictRulesApproved05.11.10.pdf; News Release, Lone Star Groundwater Conservation District, *LSGCD Adopts Plan to Reduce Groundwater Pumping for Montgomery County* (Nov. 13, 2009), www.lonestargcd.org/lsgcd-adopts-plan-to-reduce-groundwater-pumping-for-montgomery-county/; *see also* Carolyn Ahrens & Jace A. Houston, *Groundwater Reduction Plans: A Case Study from the Lone Star GCD*, *in The Changing Face of Water Rights in Texas* (State Bar of Texas 2011).

b. Structure

The SJRA is governed by a seven-member board of directors appointed by the governor to six-year staggered terms. Four of the directors must be residents of a county wholly within the SJRA's territory. Act of May 23, 2003, 78th Leg., R.S., ch. 847.

c. Powers and Duties

- Air quality control
- Bonding authority: revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Hydroelectric generation facilities
- Navigation
- Oil and gas leases
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Wastewater

- Water quality
- Water supply: irrigation, municipal, and wholesale

d. Citations to Special Law or Codes

H.B. 832, Act of May 12, 1937, 45th Leg., R.S., ch. 426
H.B. 941, Act of May 1, 1939, 46th Leg., R.S., ch. 10
H.B. 1079, Act of June 13, 1939, 46th Leg., R.S., ch. 10
H.B. 828, Act of June 3, 1941, 47th Leg., R.S., ch. 480
H.B.1094, Act of July 2, 1941, 47th Leg., R.S., ch. 613
H.B. 696, Act of May 10, 1943, 48th Leg., R.S., ch. 371
S.B. 224, Act of May 14, 1951, 52d Leg., R.S., ch. 366
H.B. 1282, Act of May 25, 1967, 60th Leg., R.S., ch. 547
H.B. 1683, Act of May 21, 1991, 72d Leg., R.S., ch. 698
S.B. 526, Act of May 23, 2003, 78th Leg., R.S., ch. 847
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 16

23. Sulphur River Basin Authority

a. History

The Sulphur River Basin Authority (SRBA) was created in 1985. *See* Act of May 29, 1985, 69th Leg., 1st C.S., ch. 3. The SRBA helps protect the water quality of the Sulphur River basin by serving as the coordinator for the Texas Clean Rivers Program within the basin. *See* Sulphur River Basin Authority, *Sulphur River Basin Clean Rivers Program Highlights Report, FYs 2009–2010, available at* www.sulphurr.org/Reports/DataFY2010/BHR2009-10(05112010)Final.pdf.

The Sulphur River basin is in the northeast corner of Texas and includes all or part of Bowie, Cass, Delta, Fannin, Franklin, Hopkins, Hunt, Lamar, Morris, Red River, and Titus counties. The headwater streams are the North and South Sulphur Rivers, which originate in Fannin County. The Middle Sulphur converges with the South Sulphur at Cooper Lake. These rivers all converge and flow eastward into Wright Patman Lake and exit Texas south of the city of Texarkana. The Sulphur River basin drainage area is approximately 3,558 square miles. *See* Sulphur River Basin Authority, *Welcome to the Sulphur River Basin Authority*, www.sulphurr.org.

Four of the sixteen unique reservoir sites designated by the 2007 State Water Plan are located within the Sulphur River basin, including various stages of the Marvin Nichols Reservoir. *See* Texas Water Development Board, 2 *Water for Texas 2007* 265–68, *available at* www.twdb.texas.gov/waterplanning/swp/2007/index.asp. The reservoir is also included in the 2012 State Water Plan. *See* Texas Water Development Board, *Water for Texas 2012* 193, *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. See also Chapter 27 of this book regarding reservoirs. After a lengthy legal challenge brought by the Region D water planning group, the Texas Water Development Board decided in early 2015 to retain the Marvin Nichols Reservoir within the Region C plan. News Release, Texas Water Development Board, TWDB votes on the Interregional Conflict between Region C and Region D (Jan. 8, 2015), www.twdb.texas.gov/newsmedia/press_releases/2015/01/regionc_regiond.asp; *see also Texas Water Development Board v. Ward Timber, Ltd.*, 411 S.W.3d 554 (Tex. App.—Eastland 2013, no pet.).

In 2013, the 83rd Legislature passed House Bill 1675, subjecting the SRBA to sunset review with the potential for abolition. *See* Act of May 26, 2013, 83d Leg., R.S., ch. 1279, § 2.03, eff. June 14, 2013. However, in 2015 the 84th Legislature repealed and replaced this law with sunset review without abolition when it enacted sunset review for several river authorities. *See* Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 17 (S.B. 523); Act of May 31, 2015, 84th Leg., R.S., ch. 938, § 4.01 (H.B. 3123).

b. Structure

The SRBA is governed by a six-member board of directors, serving staggered six-year terms, appointed by the governor. Two members of the board must be appointed from each of three regions specifically identified in the enabling legislation. *See* Act of May 29, 1985, 69th Leg., 1st C.S., ch. 3. The board meets monthly.

c. Powers and Duties

- Air quality control
- Bonding authority: revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Hydroelectric generation facilities
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Taxes: no taxing authority or debt payable by taxes

d. Citations to Special Law or Codes

S.B. 5, Act of May 29, 1985, 69th Leg., 1st C.S., ch. 3
H.B. 1675, Act of May 26, 2013, 83d Leg., R.S., ch. 1279, § 2.03
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 17
H.B. 3123, Act of May 31, 2015, 84th Leg., R.S., ch. 938, § 4.01

24. Sulphur River Municipal Water District

a. History

The Sulphur River Municipal Water District (SRMWD) was created in 1955 and initially comprised the territory within the cities of Cooper, Commerce, and Sulphur Springs. It primarily provides water for domestic, municipal, and industrial purposes from its primary source of supply, Jim Chapman Lake, but may also provide water for irrigation when supplies are plentiful. Act of Apr. 28, 1955, 54th Leg., R.S., ch. 212. The district owns rights to divert 38,520 acre-feet per year from the lake. *See* Certificate of Adjudication No. 03-4797. It has contracted much of this supply to the Upper Trinity Regional Water District and the North Texas Municipal Water District. *See* Certificate of Adjudication Nos. 03-4797A, 03-4797B. The remaining SRMWD supply is divided between the city of Cooper (1,072 acre-feet per year) and the city of Sulphur Springs (18,128 acre-feet per year). *See also* Texas Water Development Board, Region C Water Planning Group, *1 2011 Region C Water Plan* 1.53, tbl. 3.8, *available at* www.twdb.texas.gov/waterplanning/rwp/plans/2011/C/Region_C_2011_RWPV1.pdf. Jim Chapman Lake (also known as Cooper Lake), a U.S. Army Corps of Engineers–constructed facility, also provides water supply for the North Texas Municipal Water District and the city of Irving. *See* U.S. Army Corps of Engineers, *Jim Chapman Lake/Cooper Dam*, www.swf-wc.usace.army.mil/cooper/. Other territory within Delta, Franklin, Hopkins, and Hunt counties can be annexed into the district. Act of Apr. 28, 1955, 54th Leg., R.S., ch. 212.

b. Structure

The SRMWD is governed by a board of directors, each of whom is appointed by a majority vote of the governing body of each city within the district for staggered two-year terms. A director must reside and own taxable property in the city from which appointed. No city employee or member of the city governing body may serve as a director. Any annexed city with a population of 5,000 or more may appoint a board member. Act of April 28, 1955, 54th Leg., R.S., ch. 212.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Conservation of water
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Fishing, hunting, and boating regulation
- Groundwater purchase
- Property acquisition through eminent domain (limited), within Delta, Franklin, Hopkins, and Hunt counties
- Purchase/construct works to carry out district purposes
- Taxes: operation and maintenance expenses
- Wastewater
- Water quality
- Water supply: irrigation (surplus), municipal, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 713, Act of Apr. 28, 1955, 54th Leg., R.S., ch. 212

25. Tarrant Regional Water District

a. History

In 1922, a massive flood along the Trinity River killed ten people and resulted in more than $1 million in damages. Tarrant Regional Water District, *History of TRWD*, www.trwd.com/history [hereinafter TRWD History]. As a result, in 1924 the Tarrant Regional Water District was established originally as the Tarrant County Water Improvement District No. 1. *See* E-mail from Chad Lorance, Tarrant Regional Water District, to Lyn Clancy, LCRA Managing Assoc. Gen. Counsel (Dec. 9, 2010) (on file with author) [hereinafter Lorance e-mail]. The name was changed to the Tarrant County Water Control and Improvement District in 1928 when the district was charged with providing adequate water supply to the citizens of Tarrant County, and again in 1996 to the Tarrant Regional Water District (TRWD). *See* TRWD History; Lorance e-mail.

The TRWD completed construction of the Lake Bridgeport and Eagle Mountain Lake dams in 1931 and 1932, respectively. After another disastrous flood damaged large portions of Fort Worth in 1949, the TRWD worked in conjunction with the U.S. Army Corp of Engineers to implement extensive improvements to the city's levee system. *See* TRWD History. The TRWD completed the construction of the Cedar Creek Reservoir dam in 1964 and the Richland-Chambers dam in 1987.

Water transport pipelines were completed from the Cedar Creek and Richland-Chambers reservoirs in 1973 and 1988, respectively, to bring water to Tarrant County. Construction was completed on the $62 million Benbrook Lake pipeline in 1998. *See* TRWD History.

The TRWD currently owns and operates four major reservoirs in Texas—Cedar Creek, Eagle Mountain Lake, Lake Bridgeport, and Richland-Chambers—that are used for water supply purposes. The District also delivers water via a pipeline to Lakes Arlington and Benbrook, which serve as terminal storage reservoirs for the district. Tarrant Regional Water District, *Overview*, www.trwd.com/aboutus [hereinafter TRWD Overview]. The TRWD is one of the largest raw water suppliers in Texas, providing water to more than 1.8 million people in the North Central Texas area and serving more than thirty wholesale customers, including the cities of Arlington, Fort Worth, and Mansfield as well as the Trinity River Authority. TRWD Overview.

TRWD operations span an eleven-county area reaching from Jack County to Freestone County and include maintenance of dams at the four reservoirs and more than 150 miles of pipeline used for water transport. The TRWD also manages an extensive flood control system in Tarrant County featuring more than 27 miles of floodway levees, which provides vital flood protection to area residents along the West and Clear Forks of the Trinity River. TRWD Overview.

b. Structure

TRWD is governed by a five-member publicly elected board. Members serve staggered four-year terms and must own land subject to taxation within the district, which includes much of the city of Fort Worth and areas surrounding Eagle Mountain Lake. Board meetings are generally held monthly. *See* Tarrant Regional Water District, *Board of Directors*, www.trwd.com/bod.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapters 49, 50, and 51 duties
- Conservation of water
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Oil and gas leases
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities adjacent to reservoirs via TCEQ order
- Taxes: operation and maintenance expenses (flood control only)
- Wastewater
- Water quality
- Water supply: irrigation, municipal, and wholesale (raw surface water only)

d. Citations to Special Law or Codes

H.B. 921, Act of May 9, 1957, 55th Leg., R.S., ch. 268
H.B. 1071, Act of May 24, 1961, 57th Leg., R.S., ch. 352
S.B. 294, Act of May 27, 1961, 57th Leg., R.S., ch. 414
H.B. 807, Act of May 20, 1965, 59th Leg., R.S., ch. 601
S.B. 1674, Act of May 24, 1995, 74th Leg., R.S., ch. 592
H.B. 3636, Act of May 15, 2001, 77th Leg., R.S., ch. 433

H.B. 2639, Act of May 28, 2005, 79th Leg., R.S., ch. 1363

26. Titus County Fresh Water Supply District No. 1

a. History

The Titus County Fresh Water Supply District No. 1 was created by an election of Titus County voters in 1966 and validated by an act of the legislature in 1967. Act of May 4, 1967, 60th Leg., R.S., ch. 221. By countywide election in August 1966, Titus County voters authorized the issuance of over $2 million in tax and revenue bonds to be used for the construction of what is now known as Lake Bob Sandlin, on the Cypress River. The district was converted into a municipal utility district by the Texas Water Rights Commission (now the TCEQ) in 1974. The TWDB was a co-owner in the lake, furnishing approximately 60 percent of the finances. The city of Mt. Pleasant and the Industrial Generating Company (now Luminant) contracted for the purchase of water from the lake, and certainly these contracts were a big factor in getting the lake built. The city of Pittsburg may take water from the lake under an agreement between the district and Northeast Texas Municipal Water District. Titus County Fresh Water Supply District No. 1, *Brief History of the District*, http://tcfreshwater.com/information/history.

b. Structure

The Titus County Fresh Water Supply District No. 1 is governed by a five-member elected board of supervisors. Board members serve staggered two-year terms. Act of May 4, 1967, 60th Leg., R.S., ch. 221.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapters 53 and 54 powers
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Taxes: special taxes for pollution control
- Water quality
- Water supply: municipal, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 601, Act of May 4, 1967, 60th Leg., R.S., ch. 221

27. Trinity River Authority

a. History

The Trinity River Authority (TRA) was created in 1955 and charged with maintaining a master plan for basinwide development, serving as local sponsor for federal water projects, and providing services authorized by the Texas legislature within the TRA's territory. *See* Act of June 6, 1955, 54th Leg., R.S., ch. 518.

The TRA provides water and wastewater treatment, along with recreation and reservoir facilities, for municipalities within the 17,000-square-mile Trinity River basin. The TRA also serves as a conduit for tax-exempt financing for municipal water and wastewater facilities and industrial air- and water-pollution control facilities. The TRA receives no state appropriations, and although its enabling act authorizes the imposition of a tax, it has never exercised this authority. Personal Communication from Howard Slobodin, TRA Attorney, and Michelle Clark, TRA's Public Information Mgr., to Lyn Clancy, LCRA Managing Assoc. Gen. Counsel (Nov. 16, 2010) (on file with author) [hereinafter Slobodin & Clark].

The TRA operates five wastewater treatment facilities and one regional treated water system in the Dallas–Fort Worth Metroplex. It operates three treated water systems in the vicinity of Lake Livingston, which it also owns and operates for its benefit and for the benefit of the City of Houston. The TRA pioneered the concept of regional systems with its Central Regional Wastewater System, established in 1957, which now serves all or part of twenty-one contracting parties and approximately 1.2 million people in the Metroplex. Trinity River Authority, *Central Regional Wastewater System*, www.trinityra.org/facilties-wastewater-centralregionalwastewatersystem. The TRA serves as local sponsor for several federal water projects. Most are multipurpose U.S. Army Corps of Engineers projects that provide water supply and recreational opportunities. TRA-sponsored projects include the following: Bardwell Lake, Joe Pool Lake, Navarro Mills Lake, and the Wallisville Saltwater Barrier. The TRA operates recreational facilities at Lake Livingston. *See* Trinity River Authority, *Water Storage*, www.trinityra.org/water-storage; Trinity River Authority, *Wolf Creek Park*, www.trinityra.org/wolf-creek-park.htm.

The TRA is an active participant in regional water planning, with the majority (81 percent) of the Trinity River basin falling within the Region C regional planning group (which includes Dallas–Fort Worth) and the remainder falling within the Region H regional planning group (which includes the Houston metropolitan area). *See* Trinity River Authority, *Basin Planning*, www.trinityra.org/basin-planning.htm. In addition, the TRA actively participated in the development of environmental flow standards for watersheds draining to Galveston Bay as part of the Senate Bill 3 process. See Chapter 11 of this book for a more detailed discussion of environmental flows.

b. Structure

The TRA is governed by a twenty-five-member board of directors, who are appointed for staggered six-year terms by the governor. The TRA's statute specifies that three of the board members be appointed from within Tarrant County, four from Dallas County, one from each of the remaining fifteen counties within its geographical jurisdiction, and the remaining three at-large. Board members must reside and own taxable property in the area from which they are appointed. Act of June 6, 1955, 54th Leg., R.S., ch. 518.

c. Powers and Duties

- Bonding authority: contract bonds, property tax bonds, and revenue bonds
- Chapter 51 powers and duties
- Conservation of water and soil
- Coordinate/contract with governments/utilities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Forestry
- General powers and duties of any district created by Tex. Const. art. XVI, § 59
- Groundwater management
- Hydroelectric generation facilities
- Industrial development corporation
- Navigation
- Oil and gas leases
- Other: all powers and duties conferred by general or special law on any other district, not contravened by enabling legislation
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Taxes: special taxes for pollution control
- Wastewater
- Water quality
- Water supply: industrial, irrigation, municipal, and wholesale

d. Citations to Special Law or Codes

H.B. 20, Act of June 6, 1955, 54th Leg., R.S., ch. 518
S.B. 463, Act of May 15, 1957, 55th Leg. R.S., ch. 256
S.B. 22, Act of Nov. 11, 1957, 55th Leg., 1st C.S., ch. 22
S.B. 45, Act of July 14, 1959, 56th Leg., 2d C.S., ch. 29
S.B. 360, Act of Apr. 29, 1965, 59th Leg., R.S., ch. 173
S.B. 579, Act of May 15, 1967, 60th Leg., R.S., ch. 273
S.B. 333, Act of Apr. 24, 1969, 61st Leg., R.S., ch. 155
S.B. 334, Act of Apr. 24, 1969, 61st Leg., R.S., ch. 156
S.B. 332, Act of May 8, 1969, 61st Leg., R.S., ch. 193
S.B. 542, Act of May 8, 1969, 61st Leg., R.S., ch. 198
S.B. 708, Act of May 15, 1969, 61st Leg., R.S., ch. 364
S.B. 993, Act of Apr. 12, 1979, 66th Leg., R.S., ch. 87
S.B. 994, Act of May 26, 1979, 66th Leg., R.S., ch. 674
S.B. 1543, Act of May 26, 1991, 72d Leg., R.S., ch. 858
S.B. 792, Act of Apr. 28, 1995, 74th Leg., R.S., ch. 74
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 18

28. Upper Colorado River Authority

a. History

The Upper Colorado River Authority (UCRA) was chartered in 1935 to protect the watersheds of Coke, Tom Green, and contiguous counties. *See* Act of May 1, 1935, 44th Leg., R.S., ch. 126. The UCRA received initial funding through a grant of ad valorem taxes from Coke and Tom Green counties. *See* Act of Oct. 23, 1936, 44th Leg., 3d C.S., ch. 505; Act of June 21, 1939, 46th Leg., R.S., ch. 4; Act of Apr. 23, 1941, 47th Leg., R.S., ch. 174; Act of Apr. 21, 1943, 48th Leg., R.S., ch. 170. Although the UCRA's enabling act provides it with fairly broad powers related to water sales, it does not directly manage or operate any dams. Instead, up through the 1990s, it provided funding to local communities for water supply improvements. Since that time, its efforts have focused on water quality protection (Clean Rivers Program and nonpoint source abatement), brush control for water conservation, public education and outreach, and urban storm water management. *See* Upper Colorado River Authority, *About Us*, http://ucratx.org/aboutus_ucra.html [hereinafter *About Us*].

b. Structure

The UCRA is governed by a nine-member board of directors, each appointed by the governor for staggered six-year terms. Three board members must reside in Coke County, three in Tom Green County, and the remaining three must be residents of counties contiguous to the district. *See* Act of May 1, 1935, 44th Leg., R.S., ch. 126; Act of May 24, 1995, 74th Leg., R.S., ch. 516. The chair of the board, selected by fellow board members, has also served as the chief executive officer of the UCRA. As of 2015, the UCRA had a limited staff of three full-time employees and one management consultant. *See About Us*.

c. Powers and Duties

- Bonding authority: revenue bonds
- Conservation of water
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Forestry
- Hydroelectric generation facilities (subordinate to irrigation and municipal use)
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Water and soil quality
- Water supply: irrigation, municipal, out-of-district, retail, and wholesale

d. Citations to Special Law or Codes

H.B. 77, Act of May 1, 1935, 44th Leg., R.S., ch.126
S.B. 21, Act of Oct. 23, 1936, 44th Leg., 3d C.S., ch. 505
S.B. 493, Act of June 21, 1939, 46th Leg., R.S., ch. 4
S.B. 65, Act of Apr. 23, 1941, 47th Leg., R.S., ch. 174
S.B. 93, Act of Apr. 21, 1943, 48th Leg., R.S., ch. 170
H.B. 511, Act of Apr. 9, 1947, 50th Leg., R.S., ch. 484
H.B. 858, Act of May 19, 1973, 63d Leg., R.S., ch. 268
S.B. 194, Act of May 30, 1983, 68th Leg., R.S., ch. 484, art. IV
H.B. 3053, Act of May 24, 1995, 74th Leg., R.S., ch. 516
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 19
S.B. 1162, Act of May 27, 2015, 84th Leg., R.S., ch. 855, § 1.05 (adding Tex. Spec. Dist. Code ch. 8506)

29. Upper Guadalupe River Authority

a. History

The Upper Guadalupe River Authority (UGRA) was created as a conservation and reclamation district in 1939. Act of Apr. 19, 1939, 46th Leg., R.S., ch. 5; *see also* Act of May 26, 1965, 59th Leg., R.S., ch. 632. The UGRA's territory comprises Kerr County. The mission of the UGRA is to conserve and reclaim surface water through the preservation and distribution of water resources for future growth in order to maintain and enhance the quality of life for all Kerr County citizens. *See* Upper Guadalupe River Authority, *Overview*, www.ugra.org/overview.html. In 1971, the legislature broadened the UGRA's authority to allow it to control waters outside of Kerr County for the benefit of its district and to provide wastewater services to municipalities and others. Act of May 13, 1971, 62d Leg., R.S., ch. 430.

In fulfilling the role of steward of the Upper Guadalupe River and its tributaries for Kerr County, the UGRA has initiated programs that focus on stewardship, public awareness, and planning.

The UGRA's extensive water quality monitoring program includes routine sample collection at over forty sites and is supported by the UGRA Environmental Laboratory, which is nationally accredited by the NELAC Institute. The UGRA also offers several programs for citizens to be involved in protecting water quality through volunteer monitoring and river cleanups.

A portion of the Guadalupe River in Kerrville was designated as impaired due to *Escherichia coli (E. coli)* bacteria levels that did not meet state surface water quality standards. In 2011, the UGRA was selected by the TCEQ to receive grant funding to put bacteria reduction strategies in place with the assistance of the City of Kerrville, the Texas Department of Transportation, and Kerr County. Over the next three years, the UGRA and the other local partners implemented strategies to reduce the primary sources of bacteria pollution that were identified in the Guadalupe River in Kerrville. In December 2014, for the first time in twelve years, the TCEQ listed the portion of the Guadalupe River in Kerrville flowing through the city of Kerrville as fully supporting recreational use. *See* Guadalupe-Blanco River Authority, 2015 Clean Rivers Program Basin Highlights Report: *Guadalupe River and Lavaca-Guadalupe Coastal Basins*, *available at* www.gbra.org/crp/default.aspx. See Chapter 33 of this book for a discussion of water quality standards.

The UGRA's outreach and education programs focus on engaging the public in demonstrations, activities, and presentations on water quality, pollution, conservation, riparian management, and water supply planning. Each year, dozens of programs are presented to school groups, civic groups, and other organizations.

The UGRA has adopted an incremental approach to water supply enhancement, which includes a rebate for rainwater catchment systems, participation in federal and state programs to assist landowners with brush management, and the construction of water and sediment control basins. The UGRA is an active member in the Plateau Water Planning Group and other initiatives to manage future water supplies. In addition, the UGRA is a partner in the Guadalupe–Blanco River Trust, which encourages the voluntary conservation, stewardship, and enjoyment of the land and water resources of the Upper Guadalupe River watershed. *See* Guadalupe–Blanco River Trust, http://gbrtrust.org/.

b. Structure

The UGRA is governed by a nine-member board of directors appointed by the governor to serve staggered six-year terms, all of whom must be residents and property owners within Kerr County and over the age of twenty-one. Act of May 26, 1965, 59th Leg., R.S., ch. 632.

c. Powers and Duties

- Bonding authority: tax bonds (limited) and revenue bonds
- Chapters 51 and 54 powers and duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Forestry
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Solid waste disposal
- Taxes: operation and maintenance expenses
- Wastewater
- Water quality
- Water regulation and control within Upper Guadalupe River and outside Kerr County
- Water supply: irrigation and wholesale

d. Citations to Special Law or Codes

S.B. 303, Act of Apr. 19, 1939, 46th Leg., R.S., ch. 5
H.B. 428, Act of Apr. 9, 1957, 55th Leg., R.S., ch. 83
H.B. 865, Act of Apr. 29, 1965, 59th Leg., R.S., ch. 193
H.B. 1058, Act of May 26, 1965, 59th Leg., R.S., ch. 632
H.B. 989, Act of May 13, 1971, 62d Leg., R.S., ch. 430
H.B. 2368, Act of May 26, 1983, 68th Leg., R.S., ch. 1059
S.B. 194, Act of May 30, 1983, 68th Leg., R.S., ch. 484, art. IV
S.B. 1793, Act of May 22, 1997, 75th Leg., R.S., ch. 830
S.B. 1171, Act of May 28, 1999, 76th Leg., R.S., ch. 1544
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 20

30. Upper Neches River Municipal Water Authority

a. History

Created in 1953, the Upper Neches River Municipal Water Authority (UNRMWA) is charged with controlling, storing, conserving, protecting, distributing, and utilizing storm and floodwaters and unappropriated flows of the Neches River and its tributaries in Anderson, Cherokee, Henderson, and Smith counties, for domestic, municipal, industrial, irrigation, and other useful purposes. Act of May 13, 1953, 53d Leg., R.S., ch. 412; *see also Owens v. Upper Neches Municipal Water Authority*, 514 S.W.2d 58, 60 (Tex. Civ. App.—Tyler 1974, writ ref'd n.r.e.). The UNRMWA is a wholesale water provider to the cities of Palestine and Tyler and to lakeside domestic and irrigation systems. It is also contracted to provide water to the city of Dallas. *See* Texas Water Development Board, East Texas

Regional Water Planning Area—2011 Update of the Regional Water Plan, Final Plan (Sept. 1, 2010), *available at* www.twdb.texas.gov/waterplanning/rwp/plans/2011/I/Region_I_2011_RWP.pdf.

The UNRMWA owns and operates Lake Palestine, outside Tyler. This 25,600-acre lake on the Neches River provides one of the major recreational opportunities in the region and is well known for its largemouth bass fishing. The lake also serves as a water supply for industrial and municipal purposes. Construction of the original dam was started in 1960, completed in 1962, and enlarged in 1972. The drainage area above the dam is about 839 square miles. *See* LakePalestine.com, *Lake Palestine Information*, www.lakepalestine.com/information.

b. Structure

The UNRMWA is governed by a three-member board of directors, who are appointed by the governor. The board members serve six-year terms and must be residents of the city of Palestine. Act of July 6, 1959, 56th Leg., 2d C.S., ch. 9.

c. Powers and Duties

- Bonding authority: contract bonds and revenue bonds
- Chapters 51 and 55 powers and duties
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Drainage and flood control
- Hydroelectric generation facilities
- Oil and gas leases
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Taxes: operation and maintenance expenses, special taxes for pollution control
- Water quality
- Water supply: irrigation, municipal, and wholesale

d. Citations to Special Law or Codes

H.B. 579, Act of May 13, 1953, 53d Leg., R.S., ch. 412
H.B. 405, Act of Apr. 26, 1955, 54th Leg., R.S., ch. 193
S.B. 14, Act of Nov. 11, 1957, 55th Leg., 2d C.S., ch. 31
S.B. 23, Act of July 6, 1959, 56th Leg., 2d C.S., ch. 9
S.B. 8, Act of Aug. 5, 1959, 56th Leg., 3d C.S., ch. 3
S.B. 194, Act of May 30, 1983, 68th Leg., R.S., ch. 484
H.B. 1285, Act of May 29, 1989, 71st Leg., R.S., ch. 1248, § 82

31. West Central Texas Municipal Water District

a. History

Formation of the West Central Texas Municipal Water District (WCTMWD) was the result of a cooperative effort by the district's four member cities—Abilene, Albany, Anson, and Breckenridge—in response to prolonged drought conditions in West Central Texas during the 1950s. West Central Texas Municipal Water District, Response to Tex. Sen. Comm. Nat. Resource Committee

Questionnaire (Nov. 1999) (on file with author) [hereinafter Questionnaire]. The WCTMWD was created to provide a source of water supply for municipal, domestic, industrial, and mining uses. Act of Mar. 30, 1955, 54th Leg., R.S., ch. 66. The WCTMWD constructed, operates, manages, and maintains the Hubbard Creek Reservoir, which has a capacity of 324,000 acre-feet. *See* Questionnaire. The WCTMWD also constructed and maintains one hundred miles of raw water pipelines and pump stations. *See* Questionnaire.

The WCTMWD's enabling legislation was substantially amended in 1985 to provide the district with increased water-related powers. Act of May 9, 1985, 69th Leg., R.S., ch. 167. As a result of the amendment, an additional pipeline from Hubbard Creek Reservoir to Abilene was constructed and the WCTMWD also contracted for access to water in the O. H. Ivie Reservoir. *See* Questionnaire.

b. Structure

The WCTMWD is governed by a board of directors currently composed of twelve members who are appointed by the city council or commission of each member city. The number of board members for each city is determined by the city's population, but each city is guaranteed at least two directors. Act of Mar. 30, 1955, 54th Leg., R.S., ch. 66. The board meets at least three times a year and schedules additional meetings as necessary. *See* Questionnaire.

c. Powers and Duties

- Air quality and water pollution control facilities (acquire, construct, and finance)
- Bonding authority: contract bonds and revenue bonds
- Conservation of water and soil
- Coordinate/contract with governments/entities
- Dams and reservoirs
- Drainage and flood control
- Electric generation and transmission facilities
- Groundwater regulation (pumping/well spacing)
- Parks
- Police and security services
- Property acquisition through eminent domain, within and outside district
- Purchase/construct works to carry out district purposes
- Regulate private sewage, on-site sewage facilities
- Solid waste disposal
- Wastewater
- Water quality
- Water supply: industrial, irrigation, municipal, and wholesale

d. Citations to Special Law or Codes

H.B. 407, Act of Mar. 30, 1955, 54th Leg., R.S., ch. 66
H.B. 911, Act of May 10, 1955, 54th Leg., R.S., ch. 349
S.B. 9, Act of Nov. 11, 1957, 55th Leg., R.S., ch. 13
S.B. 16, Act of Feb. 25, 1959, 56th Leg., R.S., ch. 14
S.B. 144, Act of Mar. 14, 1961, 57th Leg., R.S., ch. 32
S.B. 308, Act of May 11, 1961, 57th Leg., R.S., ch. 194
H.B. 685, Act of Apr. 18, 1963, 58th Leg., R.S., ch. 100
S.B. 315, Act of May 9, 1985, 69th Leg., R.S., ch. 167

Appendix

Authority and special district enabling legislation and its amendments for many years were published by West Publishing Company in a "Water Auxiliary Laws" pamphlet as part of its Vernon's Texas Civil Statutes publication. Some law libraries still maintain the pamphlet, but it has not been updated for many years. Without a publication like this, it is extremely difficult to find and track such legislation. A Special District Local Laws Code was created for purposes of codifying these acts into one readily accessible place, Act of May 20, 2003, 78th Leg., R.S., ch. 1277, but only a handful of the acts have been added to date.

As discussed in the introduction to this chapter, different legislative studies and legislation have focused on a variety of special law water districts and authorities thought to merit particular scrutiny because of their perceived importance in the management of the state's water resources. In addition to the water districts and authorities summarized in the main body of this chapter, this Appendix lists the additional districts and authorities that are included in the TWDB map of regional water providers and special water districts and provides citations to their enabling legislation. See Plate 5, River Authorities and Special Law Districts of Texas, *available at* www.twdb.texas.gov/mapping/doc/maps/RA_SLD_8x11.pdf.

Bandera County River Authority and Groundwater District

Citations to Special Law or Codes

H.B. 988, Act of May 31, 1971, 62d Leg., R.S., ch. 629
S.B. 1636, Act of May 27, 1989, 71st Leg., R.S., ch. 654
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 3
S.B. 363, Act of May 19, 2015, 84th Leg., R.S., ch. 302

Bistone Municipal Water Supply District

Citations to Special Law or Codes

H.B. 899, Act of May 14, 1957, 55th Leg., R.S., ch. 368
H.B. 685, Act of May 8, 1959, 56th Leg., R.S., ch. 258
H.B. 975, Act of May 24, 1961, 57th Leg., R.S., ch. 258
S.B. 862, Act of May 18, 1981, 67th Leg., R.S., ch. 234
H.B. 3166, Act of May 15, 2007, 80th Leg., R.S., ch. 920 (nonsubstantive revisions)

Cibolo Creek Municipal Authority

Citations to Special Law or Codes

H.B. 1399, Act of May 13, 1971, 62d Leg., R.S. ch. 347
S.B. 137, Act of Mar. 28, 1977, 65th Leg., R.S., ch. 44
S.B. 452, Act of Mar. 30, 1983, 68th Leg., R.S., ch. 31
H.B. 2906, Act of May 26, 2009, 76th Leg., R.S., ch. 715

Franklin County Water Improvement District

Citations to Special Law or Codes

H.B. 1161, Act of May 26, 1965, 59th Leg., R.S., ch. 719
H.B. 1256, Act of May 17, 1967, 60th Leg., R.S., ch. 308
H.B. 2469, Act of May 26, 1985, 69th Leg., R.S., ch. 412
H.B. 717, Act of Apr. 18, 1991, 72d Leg., R.S., ch. 59
H.B. 338, Act of Apr. 2, 1997, 75th Leg., R.S., ch. 3

Greater Texoma Utility Authority

Citations to Special Law or Codes

Tex. Spec. Dist. Code ch. 8283
H.B. 976, Act of Apr. 19, 1979, 66th Leg., R.S., ch. 97
S.B. 1270, Act of June 17, 1983, 68th Leg., R.S., ch. 398
H.B. 1120, Act of June 20, 2003, 78th Leg., R.S., ch. 509

Gulf Coast Waste Disposal Authority

Citations to Special Law or Codes

S.B. 225, Act of May 23, 1969, 61st Leg., R.S., ch. 409
H.B. 1035, Act of May 6, 1971, 62d Leg., R.S., ch. 202
S.B. 722, Act of May 21, 1973, 63d Leg., R.S., ch. 258
H.B. 705, Act of May 26, 1973, 63d Leg., R.S., ch. 466
S.B. 1054, Act of May 30, 1975, 64th Leg., R.S., ch. 443
S.B. 621, Act of May 27, 1979, 66th Leg., R.S., ch. 841
S.B. 666, Act of May 28, 1979, 66th Leg., R.S., ch. 630
H.B. 1697, Act of May 13, 1985, 69th Leg., R.S., ch. 202
S.B. 561, Act of May 19, 1987, 70th Leg., R.S., ch. 209
S.B. 34, Act of June 6, 1990, 71st Leg., 6th C.S., ch. 24
H.B. 2049, Act of Apr. 10, 1995, 74th Leg., R.S., ch. 47
H.B. 2050, Act of Apr. 25, 1995, 74th Leg., R.S., ch. 48

Lubbock County Water Control and Improvement District No. 1

Citations to Special Law or Codes

S.B. 1715, Act of May 29, 1989, 71st Leg., R.S., ch. 1149

Palo Duro River Authority

Citations to Special Law or Codes

H.B. 1531, Act of May 24, 1973, 63d Leg., R.S., ch. 438
H.B. 985, Act of Apr. 17, 1975, 64th Leg., R.S., ch. 115
S.B. 132, Act of Mar. 30, 1983, 68th Leg., R.S., ch. 17
H.B. 2537, Act of May 28, 1987, 70th Leg., R.S., ch. 651
S.B. 523, Act of May 31, 2015, 84th Leg., R.S., ch. 1148, § 11

Palo Pinto County Water Control and Improvement District No. 1

Citations to Special Law or Codes

S.B. 303, Act of May 23, 1961, 57th Leg., R.S., ch. 416
S.B. 706, Act of May 22, 1969, 61st Leg., R.S., ch. 837
H.B. 1630, Act of May 20, 1971, 63d Leg., R.S., ch. 450

Riverbend Water Resources District

Citations to Special Law or Codes

Tex. Spec. Dist. Code §§ 9601.001–.217

Sulphur Springs Water District

Citations to Special Law or Codes

H.B. 1379, Act of May 15, 1969, 61st Leg., R.S., ch. 310

Upper Trinity Regional Water District

Citations to Special Law or Codes

H.B. 3112, Act of May 20, 1989, 71st Leg., R.S., ch. 1053
S.B. 1657, Act of May 24, 1995, 74th Leg., R.S., ch. 494
S.B. 835, Act of Apr. 20, 2001, 77th Leg., R.S., ch. 346

White River Municipal Water District

Citations to Special Law or Codes

H.B. 468, Act of Apr. 26, 1957, 55th Leg., R.S., ch. 221
S.B. 42, Act of Aug. 2, 1961, 57th Leg., 1st C.S., ch. 34
S.B. 43, Act of Aug. 2, 1961, 57th Leg., 1st C.S., ch. 35
H.B. 3096, Act of May 17, 2001, 77th Leg., ch. 1506, art. 2

CHAPTER 9

Surface Water Rights Permitting

Douglas G. Caroom[1] and Susan M. Maxwell[2]

I. Overview

A. Statutory Framework

As discussed more fully in Chapter 3 of this book, surface water is owned by the state and available for use pursuant to the statutory appropriation process. The statute defines "state water" as follows:

> The water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state.

Tex. Water Code § 11.021(a).

Appropriative surface water rights in Texas are usufructuary—that is, a right to use the water, not ownership of the corpus. The appropriative system provides for precisely defined water rights, authorizing the use of water in a specific amount, by diversion at a definite location, for a particular purpose, and for use at a particular location. It is unlawful to willfully take, divert, or appropriate any state water for any purpose without first complying with all applicable requirements of chapter 11 of the Texas Water Code. Tex. Water Code § 11.081. Violators are also subject to civil and administrative penalties. *See* Tex. Water Code §§ 11.082, 11.0842–.0843. Once put to beneficial use according to its terms, a water rights permit is "perfected" and becomes a vested property right. Tex. Water Code §§ 11.025–.026. Under certain circumstances, however, a vested water right may be abandoned or totally or partially canceled for nonuse.

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The authors would like to acknowledge the indirect contribution to this chapter in the fourth edition of some excerpted content authored by Robin Smith in a different chapter of the prior edition, particularly on the topics of cancellation and interbasin transfers.

Under the doctrine of seniority or "first in time, first in right," each water right is assigned a specific priority date. During times of shortage, this system determines the allocation of water among appropriators from the same source of supply. A senior right holder is entitled to fully exercise his or her right before junior right holders receive any water. *See* Tex. Water Code § 11.027; 30 Tex. Admin. Code § 297.44; *see also* Tex. Water Code § 11.053 (TCEQ authority to temporarily suspend or adjust water rights in times of drought or other emergency shortage, in accordance with priority system); *Texas Commission on Environmental Quality v. Texas Farm Bureau*, 460 S.W.3d 264 (Tex. App.—Corpus Christi 2015, pet. filed) (affirming declaratory judgment that invalidated TCEQ's drought rules for violating prior appropriation doctrine).

Different uses of water are ranked preferentially by statute. The preferences apply for purposes of permit issuance, as between competing applications to appropriate water, and rank uses in the following order: domestic and municipal, agricultural and industrial, mining, hydroelectric power, navigation, recreation, and "other beneficial uses." Tex. Water Code § 11.024. However, once a water right has been granted, the statutory preferences play no role. Instead, the priority or seniority of the water rights governs.

A person who desires to permanently appropriate water must obtain a permit from the Texas Commission on Environmental Quality (TCEQ or commission). *See* Tex. Water Code § 11.121. The permit may be granted in whole or in part only if, after filing a proper application, paying the required fees, and having notice and a hearing, the applicant shows that—

1. unappropriated water is available in the source of supply;
2. the proposed appropriation—
   a. is intended for a beneficial use,
   b. does not impair existing water rights or vested riparian rights,
   c. is not detrimental to the public welfare,
   d. considers the applicable environmental and water quality assessments required by statute, and
   e. addresses a water supply need in a manner consistent with the state water plan and the relevant approved regional plan(s); and
3. reasonable diligence will be used to avoid waste and achieve water conservation.

Tex. Water Code § 11.134(b); *see* 30 Tex. Admin. Code §§ 297.41–.50, 297.53–.56. Other standards apply to the various types of temporary or limited permits discussed in section IV below.

B. Administrative Process

The TCEQ is subject to the requirements of the Administrative Procedure Act. *See generally* Tex. Gov't Code §§ 2001.001–.902. Thus, notice by mail (by the TCEQ) and publication (by the applicant) are required for applications to appropriate water and for amendments and other applications that may affect other existing water rights. This notice begins a thirty-day period during which a hearing may be requested. For any application seeking a new appropriation of water, individual notice is mailed to all water rights holders located in the river basin involved. *See* Tex. Water Code § 11.132; 30 Tex. Admin. Code §§ 295.151–.153, 295.157. In 2009, the TCEQ changed its previous practice of issuing notice of an application following its determination of administrative completeness. Under the current rules, notice is mailed after TCEQ staff have completed their technical review of the application and prepared a draft permit. *See* 30 Tex. Admin. Code § 295.151(a). Under this procedure, water rights holders (and their attorneys) are better positioned to evaluate whether a protest of the application is warranted, rather than filing a protest based only on the application notice in order to preserve the future ability to challenge the application. For permit applications subject to contested case hearings, the executive director is required to provide written notice to the state senator and representative from the local area of the permitted facilities at least thirty days before issuance of the draft permit. *See* Act of May 13, 2015, 84th Leg., R.S., ch. 116, § 4 (adding Tex. Water Code § 5.5553). Special notice rules apply to other types of water rights described in section IV below. *See* 30 Tex. Admin. Code §§ 295.154 (temporary permit), 295.156 (emergency permit). Section III below further addresses notice and hearing requirements applicable to permit amendments.

The commission will hold a public hearing on the application on the motion of a commissioner or on the request of the executive director or any "affected person." *See* Tex. Water Code §§ 11.132(a), 11.133; 30 Tex. Admin. Code §§ 295.171, 295.173. If the thirty-day notice period passes without receipt of a timely hearing request, the TCEQ may act on the application without referring it for a contested case hearing by the State Office of Administrative Hearings (SOAH). *See* Tex. Water Code § 11.132(d). In several recent cases, the appellate courts have affirmed that, where the statutory notice is adequate, the would-be protestant fails to exhaust administrative remedies by not requesting a hearing within this thirty-day time frame. *See Chocolate Bayou Water Co. & Sand Supply v. Texas Natural Resource Conservation Commission*, 124 S.W.3d 844, 853–54 (Tex. App.—Austin 2003, pet. denied); *Friends of Canyon Lake, Inc. v. Guadalupe-Blanco River Authority*, 96 S.W.3d 519, 525 (Tex. App.—Austin 2002, pet. denied).

To qualify as an affected person to obtain a contested case hearing, a person must have a "personal justiciable interest" in the application that is different from that of the public generally. *See* 30 Tex. Admin. Code §§ 55.3, 55.256(a). The TCEQ shall adopt rules for consideration of affected persons to address new statutory requirements governing most cases referred for contested case hearings, including a requirement that the hearing requestor had also timely submitted comments on the permit application. *See* Act of May 13, 2015, 84th Leg., R.S., ch. 116, § 2 (adding Tex. Water Code § 5.115(a-1)). Generally, holders of other water rights and water right claimants in the same source of supply qualify as affected persons, as do environmental and recreational users of the water and often nearby property owners. Governmental entities with state law authority over "issues contemplated by the application" may also be affected persons. *See* 30 Tex. Admin. Code § 55.256(b). A state agency (not including a river authority) receiving notice of an application may submit comments to the TCEQ regarding the notice but may not contest issuance of the permit. *See* Tex. Water Code § 5.115(b). The TCEQ's executive director is a statutory party to a water right permit contested case hearing and participates in order to provide information to complete the administrative record and to support the executive director's position developed in the underlying proceeding, unless the executive director has revised or reversed that position. *See* Act of May 13, 2015, 84th Leg., R.S., ch. 116, § 3 (amending Tex. Water Code § 5.228(c)).

A contested case hearing before a SOAH administrative law judge is in many ways comparable to a nonjury trial to the court. A limited motions practice is possible, prehearing discovery is available, and rules of evidence are generally applied. *See* 30 Tex. Admin. Code §§ 80.1–.155; *see generally* 30 Tex. Admin. Code ch. 80 (TCEQ contested case rules). The product of the contested case hearing, however, is normally a proposal for decision that is presented to the TCEQ commissioners for consideration and action. *See* 30 Tex. Admin. Code §§ 80.251–.252, 80.255–.267. Following action by the commission, including action on a properly filed motion for rehearing, an appeal for judicial review is possible. *See* Tex. Water Code § 5.351(a); 30 Tex. Admin. Code §§ 80.271–.275. Recent amendments to various SOAH-related Government Code provisions and to various Water Code provisions appear to impose additional controls on TCEQ-referred contested cases, including limitations on issues referred, timelines within which a proposal for decision must be developed, and the burden of proof in relation to information prepared by TCEQ's executive director. *See* Act of May 13, 2015, 84th Leg., R.S., ch. 116, § 1 (adding Tex. Gov't Code §§ 2003.047(e-1), (e-2), (e-3), (i-1), (i-2), and (i-3)).

C. Types of Water Rights

This chapter deals primarily with the acquisition and amendment of permanent surface water rights. However, several other types of water rights may be obtained from the TCEQ to address specific situations. These rights include term permits, temporary permits, seasonal permits, emergency permits, interbasin transfer permits, and bed and banks permits, each of which is discussed in sections II.C, II.D, and IV below.

II. Permanent Water Right Appropriation

A. Application and Administrative Completeness

Texas Water Code section 11.124 sets out requirements for an application to appropriate state water. Application forms are available from the TCEQ and online at www.tceq.texas.gov/permitting/water_rights/wr-permitting/wr_applications.html#applications. TCEQ staff involved in the water rights permitting process is helpful and well informed, and it is generally advisable for a permit applicant to confer with staff before filing an appropriation or amendment application. Subchapter A of the TCEQ's Procedural Water Rights rules establishes the requirements for completing the application. Division 1 of subchapter A sets out the general requirements (*see* 30 Tex. Admin. Code §§ 295.1–.17), and subsequent divisions of subchapter A set out requirements applicable to various particular types of applications (*see* 30 Tex. Admin. Code §§ 295.21–.126). There are also specific requirements for maps, plats, and drawings to accompany the application (*see* 30 Tex. Admin. Code §§ 295.121–.123), and various types of filing fees and other fees applicable to water use applications (*see* 30 Tex. Admin. Code §§ 295.131–.136).

Guidelines for application processing are provided by 30 Texas Administrative Code sections 281.1–.4, 281.17–.20, and 281.22–.24. TCEQ staff reviews applications within ten days following receipt to determine whether appropriate fees have been paid and all the information required to process the application has been provided. If so, the TCEQ declares the application "administratively complete" and initiates technical review of the application; if not, the agency staff sends a letter to the applicant requesting additional information. The applicant is required to submit "any other information the executive director . . . may reasonably require." 30 Tex. Admin. Code § 281.4(7). As a practical matter, additional information is virtually always requested, under this provision or others.

Upon receipt of the executive director's letter requesting additional information, the applicant has thirty days to supply the requested information or else the application may be returned. 30 Tex. Admin. Code § 281.18(a). When all the information requested has been supplied, TCEQ staff will declare the application to be administratively complete, which triggers initiation of the technical review period. This date of administrative completeness also becomes the permit's priority date.

TCEQ rules call for completion of the technical review within seventy-five working days following the declaration of administrative completeness, plus any extensions of time needed for the applicant to respond to requests for additional information. *See* 30 Tex. Admin. Code § 281.19(a). However, based on the staff's determination, the executive director may approve an extension of this time period for technical review. *See* 30 Tex. Admin. Code § 281.20.

B. Technical Review

TCEQ staff performs its technical review by preparing three memoranda evaluating the criteria: a hydrology memorandum, an environmental memorandum, and a conservation memorandum. (For applications that involve storage rights, the TCEQ's dam safety team prepares a fourth memorandum on storage facility issues.) The hydrology memorandum evaluates the availability of unappropriated water and the impact of the proposed appropriation on existing water rights. The staff incorporates recommended special conditions for compliance with adopted environmental flow standards, if applicable, and may also recommend other requirements as part of the water availability analysis, based on the staff's environmental review. The hydrology analysis may also recommend special conditions for the protection of existing water rights.

The environmental memorandum evaluates the impacts of the proposed appropriation on instream uses, recreational uses, aquatic and riparian habitat, water quality, and bay and estuary fresh water inflows. If necessary, the staff will recommend stream flow limitations or other conditions to avoid or mitigate unacceptable environmental impacts. However, for applications for a new appropriation in a basin for which the TCEQ has adopted environmental flow standards through the Senate Bill 3 (S.B. 3) process, TCEQ staff evaluates the environmental and water quality parameters of the application in terms of its compliance with those adopted standards. The TCEQ is now in the process of developing guidelines for the implementation of its S.B. 3 rules. See Chapter 11 of this book for further discussion of environmental flows and water rights permitting.

The conservation team evaluates the applicant's water conservation plan and drought contingency plan, if appropriate. If necessary, the team recommends permit conditions to assure compliance with applicable requirements. The conservation memorandum also evaluates the consistency of the application with the most recently adopted state and regional water plans.

1. Hydrology Review

The availability of the "unappropriated water" requirement has been, and continues to be, a key source of controversy in contested permit applications. *See* Tex. Water Code § 11.134(b)(2). One aspect of the controversy has centered around the legal definition of "unappropriated water"—that is, what standard is used to measure it. The Texas Supreme Court addressed the question of what constitutes unappropriated water in the *Stacy Dam* decision, *Lower Colorado River Authority v. Texas Department of Water Resources*, 689 S.W.2d 873 (Tex. 1984). The lower courts held that the Texas Water Commission could find unappropriated water based on the fact that the existing water rights were not being fully used and were unlikely to be fully used, even though full use of existing permits would show the water to be completely appropriated. The supreme court reversed and expressly held that unappropriated water means the amount of water that remains after taking into account complete satisfaction of all existing uncanceled permits and filings valued at their recorded levels. *Stacy Dam*, 689 S.W.2d at 874. Even if historical use data indicate that the maximum amount claimed under senior water rights has never actually been used, the commission's analysis must account for all existing senior rights at face value. This is known as the "four corners doctrine" and is discussed further below.

The availability of unappropriated water is determined by TCEQ staff using water availability models (WAMs), which have been developed for each river basin in the state pursuant to Senate Bill 1 (S.B. 1). The nature and use of these WAMs are discussed in more detail in Chapter 12 of this book. The version of the WAM (Run 3) used to determine the availability of unappropriated water operates generally as follows: (1) historic stream flow records are "naturalized" or adjusted to remove the impact of diversions, return flows, and major reservoirs; (2) existing water rights in the basin are satisfied to the full extent authorized in order of seniority, taking into account various losses and gains in each river segment and honoring stream flow restrictions and other conditions in each water right; (3) full consumptive use of the authorized diversion of each water right is assumed, unless the water right contains express requirements regarding return flows; (4) any instream flow requirement associated with any particular water right and any instream flow requirements for downstream senior rights must be satisfied; and (5) water remaining in the model following this process is considered to be available for appropriation. The appropriation requested by the application is then inserted into the WAM as the most junior priority right in the model. The model is run, and it produces output reflecting how frequently and to what extent water is available to satisfy the requested right if all existing rights are fully exercised.

The model nearly always indicates that some amount of water is available for appropriation. During periods of flooding or high flows, virtually every river basin will have some unappropriated water at some locations. The question is whether that water is available with sufficient reliability to support the issuance of a new water right. For example, if an application was made for 1,000 acre-feet of water annually, and the WAM showed that 250 acre-feet per year were available on a reliable basis (100 percent of the time), but 1,000 acre-feet were available only 10 percent of the time, it would not generally make sense to grant the 1,000 acre-feet water right as requested. That would simply be setting up potential enforcement problems, with an authorized diversion but water not legally available at times and in sufficient quantities to satisfy the demand. This is when the TCEQ water availability rule (30 Tex. Admin. Code § 297.42) comes into play.

With the exception of term permits, the rule states that "an application for a new or increased appropriation will be denied unless there is a sufficient amount of unappropriated water available for a sufficient amount of the time to make the proposed project viable and ensure the beneficial use of water without waste." 30 Tex. Admin. Code § 297.42(a). Differing uses and types of water rights are analyzed under different standards. Under subsection (f), the TCEQ may require construction of sufficient storage to yield the requested annual diversion at all times under conditions no more severe than the worst drought of record. *See* 30 Tex. Admin. Code § 297.42(f). Under subsection (c), the TCEQ's "75% Rule" applicable to direct diversions for irrigation, a less demanding standard, is applied: 75 percent of the water requested must be available 75 percent of the time to authorize a new appropriation. *See* 30 Tex. Admin. Code § 297.42(c). Regarding appropriations for municipal use, 100 percent reliability is typically required.

Subsection (e) states that an appropriation for a reservoir for municipal use will normally be limited to its "firm yield," which is the supply that a reservoir could have produced annually if it had been in place during the worst drought of historical record. *See* 30 Tex. Admin. Code §§ 297.1(20) (definition of "firm yield"), 297.42(e). Additionally the rule contains several exceptions for situations when otherwise required reliability is not necessary—for example, a groundwater recharge project, an aquifer storage and recovery project, a conjunctive surface water/groundwater project, a project that "scalps" flood flows, or a system operation in conjunction with other water rights. *See* 30 Tex. Admin. Code § 297.42(d). In such instances the TCEQ determines the reliability required for authorization of the requested appropriation on a case-by-case basis, based on whether the proposed project will be viable for its intended purpose and water will be put to beneficial use without waste. See Chapter 27 of this book regarding reservoirs.

Use of water in excess of the firm yield or firm supply is considered "overdrafting." The TCEQ's water availability rule allows approval of water rights that may involve overdrafting if the applicant has a drought management plan or reliable alternative sources of supply sufficient to meet demands during drought periods. *See* 30 Tex. Admin. Code § 297.42(e).

The TCEQ's predecessor agencies have not always used the availability standard reflected by 30 Texas Administrative Code section 297.42. Many of the older reservoirs in Texas are authorized to use the entire storage capacity of the reservoir annually. Additionally, water rights quantified through the water rights adjudication process are not based on a determination of water availability. *See* Tex. Water Code §§ 11.301–.341.

Closely parallel to the determination of availability of unappropriated water is the requirement that the TCEQ must grant a water right application only if the proposed appropriation does not impair existing water rights or vested riparian rights. *See* Tex. Water Code § 11.134(b)(3)(B). Although the WAM prevents impairment of existing water rights in determining the availability of unappropriated water, TCEQ staff frequently imposes operational constraints to provide real-world protection for downstream water rights. A typical provision of this nature is a "stream flow restriction," which restricts diversion or impoundment under the new appropriation when the flow of the stream at an identified reference point (often the diversion point) is less than a specified number of cubic feet per second, thus ensuring that a known amount of water will pass to downstream users. Such stream flow restrictions or "instream flow requirements" are most commonly imposed to ensure that water remains available for environmental purposes. The TCEQ may also require various forms of "special condition" as part of the permit—for example, in the form of accounting or return flow requirements. *See generally* 30 Tex. Admin. Code §§ 297.45(e), 297.59(a). Provisions designed to protect other water rights may also be included—for example, by reducing the amount of water permitted or assigning a junior priority date to the new appropriation.

After the executive director issues the final draft permit, the appropriation is incorporated into the WAM so that it will be protected in future water availability determinations. In so doing, the stream flow requirements, whether for the protection of senior water rights or environmental flows, are incorporated as part of the right to be protected.

2. Environmental Review

The Texas Water Code requires the TCEQ to consider various types of environmental impacts of any application to store, take, or divert surface water. These other requirements include the following:

- The TCEQ must assess the effects, if any, of the issuance of the permit on the bays and estuaries of Texas, paying particular attention to appropriations within two hundred river miles of the coast. *See* Tex. Water Code § 11.147(b); 30 Tex. Admin. Code § 297.55. Additionally, 5 percent of the annual firm yield of any reservoir project within two hundred river miles of the coast constructed with state participation funds is dedicated to the Texas Parks and Wildlife Department (TPWD) for environmental purposes. *See* Tex. Water Code § 16.1331(a); 30 Tex. Admin. Code § 297.55(c).
- To the extent practicable in light of all public interests, the commission must include permit conditions that it considers necessary to maintain existing instream uses, fish and wildlife habitats, and the water quality of the river or stream. Tex. Water Code § 11.147(d), (e); *see also* Tex. Water Code § 11.150 (required assessment of effects on water quality in the state); 30 Tex. Admin. Code §§ 297.54, 297.56. See Chapter 33 of this book for a detailed discussion of water quality issues.
- For a proposed water right in excess of five thousand acre-feet per year, the TCEQ may require the applicant to take reasonable actions to mitigate adverse impacts on fish and wildlife habitat. *See* Tex. Water Code § 11.152; 30 Tex. Admin. Code § 297.53.
- The commission must consider the effects, if any, on groundwater or groundwater recharge. Tex. Water Code § 11.151. If the commission determines that granting an appropriation could significantly impair existing groundwater uses, groundwater quality, or spring flow, it may deny or place restrictions on the water right to prevent or mitigate such impacts. 30 Tex. Admin. Code § 297.47(b).

As part of S.B. 3 and H.B. 3, in 2007 the legislature amended various provisions in chapter 11 of the Texas Water Code to set out the state's policy regarding "environmental flows" to maintain the biological soundness of the state's rivers, lakes, bays, and estuaries. *See* Tex. Water Code § 11.0235. For now, although the TCEQ may not issue new permits for instream flows dedicated to environmental needs or bay and estuary inflows, it may approve an application to amend an existing water right to change the use or add such a use. *See* Tex. Water Code § 11.0237. Prospectively, any new or amended water right that increases the amount of water authorized must include a provision allowing the TCEQ to adjust conditions in the water right to provide for the protection of instream flows or fresh water flows in compliance with applicable flow standards. *See* Tex. Water Code §§ 11.147(e-1)–(e-3), 11.1471(d); see also Chapter 11 of this book.

The TCEQ has developed rules for adopting environmental flow standards (a schedule of flow quantities) for most of the river basin and bay systems in Texas, as the basis for determining the amount of unappropriated water to be set aside (with an assigned priority date) to satisfy downstream instream flow needs or fresh water inflow needs for affected bays and estuaries (essentially, a "floor" below which water should not be appropriated). *See* Tex. Water Code § 11.1471. These adopted basin-specific standards are often referred to as the "S.B. 3 rules." Thereafter, the TCEQ must consider the applicable environmental flow standards in its water rights permitting and include any necessary protective conditions. *See* Tex. Water Code §§ 11.134(b)(3)(D), 11.023(a) (qualifying the provision on purposes of appropriation of state water), 11.147(b)–(e). For basins with adopted S.B. 3 rules, TCEQ staff have taken the approach that compliance with these rules is the relevant environmental and water quality analysis for an application seeking a new appropriation, and thus review under the various other statutes described above is not also necessary. See Chapter 11 of this book for further discussion of environmental flows permitting requirements.

The TPWD has significant authority relating to certain environmental aspects of water rights applications. The TCEQ must provide a copy of every application for a permit to store, take, or divert water to the TPWD, which is entitled to comment and to participate in hearings on such applications but may not contest permit issuance. The TCEQ, in making a final decision on a water rights application, must consider all information and evidence that the TPWD may present. *See* Tex. Water Code § 11.147(f).

3. *Conservation Review*

The third form of technical review performed by TCEQ staff addresses a variety of conservation-oriented issues, including the applicant's intended use of the water, the applicant's planning for water conservation and drought contingency, and the relationship of the application to the state's larger scale water planning.

See also Chapter 23 of this book regarding conservation and Chapter 20 regarding state and regional water planning.

a. Beneficial Use

The Texas Water Code recognizes various purposes for which state water may be appropriated, stored, or diverted: domestic and municipal, agricultural and industrial, mining, hydroelectric power, navigation, recreation, public parks, game preserves, and "any other beneficial use." Tex. Water Code § 11.023(a), (b); *see also* Tex. Water Code § 11.024 (public policy on appropriation preferences). The TCEQ can grant a water rights application only if the proposed appropriation is "intended for a beneficial use." Tex. Water Code § 11.134(b)(3)(A). An irrigator, industrial user, or municipality that has definite plans to put the water to use after obtaining the permit normally meets this standard. In such cases, the commission may also inquire whether the volume of water requested is excessive in light of the use intended.

For water supply projects constructed in advance of current need, particularly reservoirs, this issue can be somewhat more complex. Commitments from future water supply customers would certainly satisfy the requirement. The Senate Bill 1 water planning process also identifies projected water needs and water supply strategies that have been approved in order to meet those needs. Such evidence will normally satisfy the "intended for beneficial use" requirement. In most instances this will be a fact issue that is not seriously contested.

The commission has not yet ruled on whether a speculative appropriation application by a public entity satisfies the statutory requirement. Certainly a private party seeking to appropriate water for subsequent sale *intends* to see that the water is put to beneficial use. Other western states, however, have sometimes applied a higher standard when the private entity is not the end user and has no contract in hand to assure the water's beneficial use. *See, e.g.*, Colo. Rev. Stat. § 37-92-103(3)(a); *Jaeger v. Colorado Ground Water Commission*, 746 P.2d 515 (Colo. 1987) (en banc).

b. Conservation and Drought Contingency

As defined in the Texas Water Code, "conservation" means the development of water resources and those practices, techniques, and technologies that reduce consumption, reduce loss or waste, improve efficiency in use, increase recycling and reuse, or prevent pollution of water so that supplies are available for future or alternative uses. Tex. Water Code § 11.002(8); *see also* 30 Tex. Admin. Code § 297.1(13). The TCEQ may grant a water right application only if the applicant has provided evidence that reasonable diligence will be used to avoid waste and achieve water conservation under the latter part of that definition. *See* Tex. Water Code § 11.134(b)(4); *see also* 30 Tex. Admin. Code §§ 297.48 (waste prevention), 297.50 (water conservation plan requirement).

All applicants for new or amended water rights must now develop and submit a water conservation plan and adopt reasonable conservation measures, with different TCEQ rules governing plans for different types of water users. *See* Tex. Water Code § 11.1271(a); 30 Tex. Admin. Code §§ 288.1–.7, 288.30, 295.9. An application to appropriate water submitted without a conservation plan is administratively incomplete, and the TCEQ is prohibited from considering the application until the plan is submitted. 30 Tex. Admin. Code § 295.9. Only the following types of applications are exempt from the conservation plan requirement: (1) applications to impound water solely for in-place use, (2) applications for emergency use, and (3) applications for temporary use. 30 Tex. Admin. Code § 295.9(5).

Depending on the specified type of use and volume of water appropriated, a holder of *existing* appropriative rights also must develop, submit, and implement a water conservation plan that is consistent with the appropriate approved regional water plan and that adopts reasonable water conservation measures. This requirement for a water conservation plan does not result in the need for amending existing water rights. *See* Tex. Water Code § 11.1271(b); 30 Tex. Admin. Code § 288.30. An entity required to submit a water conservation plan to the TCEQ is now also required to submit a copy of its plan to the Texas Water Development Board (TWDB) and to report annually to the TWDB on its progress in implementing the plan. *See* Tex. Water Code §§ 16.402–.404, 11.1271(g).

An applicant for appropriation of new or additional state water has the burden of showing that the proposed appropriation is necessary and reasonable for the proposed use and must include information that supports the proposed use and evaluates conservation and other feasible alternatives to new water development. 30 Tex. Admin. Code § 297.50(b). Based on its review of the conservation plan, the commission may prescribe in the permit the implementation of reasonable water conservation measures. *See* 30 Tex. Admin. Code § 297.50(c).

In addition to conservation plans, wholesale and retail public water suppliers and irrigation districts applying for or holding an existing water right must develop and submit drought contingency plans consistent with the appropriate approved regional water plan, to be implemented during periods of water shortages and drought. Tex. Water Code § 11.1272(a). As with conservation plans, an application submitted without a required drought contingency plan is administratively incomplete, and the TCEQ is prohibited from considering the application until the plan is submitted. *See* 30 Tex. Admin. Code § 295.9. The commission has promulgated separate rules describing the requirements of drought contingency plans for municipal uses by public water suppliers, for irrigation use, and for wholesale water suppliers. *See* 30 Tex. Admin. Code §§ 288.20–.22. See Chapter 22 of this book for further discussion of drought contingency planning.

c. Consistency with State and Regional Water Plans

The legislature's emphasis on effective water planning is reflected in the requirement that the TCEQ may grant a water rights application only if the proposed appropriation addresses a water supply need in a manner consistent with the state water plan and any relevant approved regional water plans, unless the commission waives this consistency requirement. *See* Tex. Water Code § 11.134(b)(3)(E). The commission must consider these plans in its review of any application to store, take, or divert surface water or for a permit amendment. Tex. Water Code § 11.1501.

In theory this consistency requirement could be problematic for many small and private water use projects because they are not specifically addressed in or contemplated by the state water plan or regional water plans. In practice, however, TCEQ staff considers the statutory consistency requirement satisfied if the application is "not inconsistent" with the relevant plans. Thus, many smaller applications are considered "not inconsistent" because one would not anticipate that the regional plan would address water rights that do not have a significant impact on the regional planning effort. For major projects, the consistency requirement is applied more rigorously, and the project's inclusion in the regional and state plans is desirable. See Chapter 20 of this book for further discussion of Texas water planning at the state and regional levels.

4. Dam Safety

If a water rights application proposes construction of a dam higher than six feet, for either storage or diversion of water, the application must provide additional information showing the location, profile (height, length, etc.), cross sections, layout of the dam and appurtenant structures, such as spillways, and the basis for hydraulic design. Tex. Water Code § 11.126(c); *see also* 30 Tex. Admin. Code § 295.124. Plans for reservoir projects, as well as plats and reports associated with the application, must be prepared by a professional engineer. *See* 30 Tex. Admin. Code §§ 295.41, 295.121(1), 299.4; *but see* 30 Tex. Admin. Code § 299.5 (authority of executive director to approve exceptions to certain requirements). However, recent statutory changes exempt from safety requirements dams located on private property, with a maximum impoundment capacity of less than five hundred acre-feet, classified as low or significant hazard, and located in a less-populated county and outside municipal limits. *See* Tex. Water Code § 12.052(e-1).

Plans submitted at the application stage are preliminary in nature. After the permit is issued, detailed construction plans must be filed with, and approved by, the TCEQ's executive director before construction begins. 30 Tex. Admin. Code § 299.22; *see also* 30 Tex. Admin. Code § 299.16. The commission's dam safety rules address many aspects of the hydrologic and structural adequacy of the dam as well as the dam's downstream hazard potential. The TCEQ has published a document entitled *Guidelines for Operation and Maintenance of Dams in Texas* (TCEQ Pub. No. GI-357, Nov. 2006, available at the TCEQ Web site at www.tceq.state.tx.us/publications/gi/gi_357/gi-357.html/at_download/file) that contains more detailed information about dam safety requirements. TCEQ supervision continues through the construction of the dam and after construction pursuant to the agency's dam safety authority. *See* Tex. Water Code § 12.052; 30 Tex. Admin. Code §§ 299.3, 299.16–.17, 299.25–.30, 299.51, 299.61, 299.71–.72. See Chapter 39 of this book regarding regulation of dams.

5. Public Welfare

The commission may grant a water right only if it finds that it will not be "detrimental to the public welfare." Tex. Water Code § 11.134(b)(3)(C). This provision allows the TCEQ to balance other impacts of the water project against the benefits of the project. Considerations specifically identified by TCEQ rules include the social, economic, and environmental impacts of the proposed appropriation. *See* 30 Tex. Admin. Code § 297.46. There is no definition of "public welfare" or "detrimental to the public welfare" in chapter 11 of the Water Code or in TCEQ rules. A recent decision by the Texas Supreme Court, however, provides some guidance on "public interest" requirements. *See Railroad Commission of Texas v. Texas Citizens for a Safe Future & Clean Water*, 336 S.W.3d 619 (Tex. 2011) (the "*Popp* case") (holding, with respect to a Water Code provision regarding "public interest" findings to be made by the Texas Railroad Commission on applications for commercial injection wells, that the agency's construction of "public interest" was reasonable and entitled to deference). Under the *Popp* case analysis, the TCEQ need only consider public welfare factors that are related to its own regulatory authority in water rights permitting. As a practical matter, this has generally meant that TCEQ staff have concluded that the section 11.134(b)(3)(C) requirement is satisfied if the applicant has met the other applicable statutory criteria under chapter 11 and there are no other facts raising an issue of detriment, within the scope of the TCEQ's regulatory authority.

Although extremely broad, the public welfare issue normally is not the basis for denial of an application. Several factors contribute to this conclusion: (1) use and development of the state's natural resources is constitutionally determined to be in the public interest by the "Conservation Amendment" (Tex. Const. art. XVI, § 59); (2) the statute requires an affirmative finding of detriment; and (3) the most frequently raised issues relating to public welfare, such as environmental impacts, are addressed by more specific statutory requirements. Nonetheless, in *City of Marshall v. City of Uncertain*, 206 S.W.3d 97 (Tex. 2006), the supreme court made a point of emphasizing that the legislature's intent in enacting Texas Water Code section 11.122(b) and other portions of S.B. 1 was to "make the amendment process less cumbersome" but "also to protect the public welfare by otherwise ensuring protection of this valuable resource." *City of Marshall*, 206 S.W.3d at 107. An applicant for a water right appropriation or amendment must take care to satisfy this criterion and be aware that it has implications for determining whether notice of the application is required.

C. Interbasin Transfers

Section 11.085 of the Texas Water Code requires special TCEQ authorization for permits to take or divert water from one river basin to another. At least conceptually, such transfers provide a means for water-scarce areas of the state to obtain water from areas with more water resources. The applicant must obtain a permit or amendment from the TCEQ to authorize any such interbasin transfer. *See* Tex. Water Code § 11.085(a); 30 Tex. Admin. Code §§ 295.13, 297.18. Because this water is permanently taken out of the basin of origin, procedures considerably more burdensome than those involved for the appropriation of water are imposed in order to ensure full notice to, and protection of, basin-of-origin interests.

Besides publication requirements, notice of an application for interbasin transfer must be mailed to each mayor, county judge, groundwater conservation district, and legislator in the basin of origin and to legislators in the receiving basin. Tex. Water Code § 11.085(f)–(h). The TCEQ, before taking any action on an application for an interbasin transfer, must hold at least one public meeting in the basin of origin as well as in the recipient basin.

In weighing the effects of a proposed transfer, the TCEQ must consider several factors, including (1) the fifty-year needs of both basins and guidance from any relevant regional water plan(s) regarding feasible and practicable alternative supplies, (2) the amount and purposes of use, (3) water conservation and drought contingency measures, (4) the economic impact on both basins, (5) impacts on environmental concerns, (6) compensation or mitigation to the basin of origin, and (7) the information submitted by the applicant. *See* Tex. Water Code § 11.085(k); *see also City of San Antonio v. Texas Water Commission*, 407 S.W.2d 752, 758–59 (Tex. 1966) (requiring the commission to balance future benefits and detriments of the two competing basins before authorizing an interbasin transfer). The

TCEQ may grant the application, in whole or in part, only to the extent that the detriments to the basin of origin during the proposed transfer period are less than the benefits to the receiving basin during that period, and only if the applicant has prepared a drought contingency plan and has developed and implemented water conservation measures that will result in the "highest practicable levels" of conservation and efficiency achievable within the applicant's jurisdiction. Tex. Water Code § 11.085(*l*).

Newly authorized interbasin transfers become junior in priority to all other water rights in that basin granted before the transfer application was filed. *See* Tex. Water Code § 11.085(s). Although this provision may not prevent outright new interbasin transfer projects, it can severely limit the feasibility of an interbasin transfer from an existing senior water right, at least in river basins that are fully appropriated, because it could significantly affect the reliability of the water right during times of drought.

Although an interbasin transfer permit is required, the remaining requirements of Texas Water Code section 11.085 do not apply to a limited group of exempt interbasin transfers. The exempt interbasin transfers include transfers of three thousand acre-feet or less; emergency transfers; transfers to adjoining coastal basins; transfers from the part of the geographic area of a county, city, or retail public utility's retail service area that is within the basin of origin for use in that part of the county, city, or utility's retail service area not within the basin of origin; and transfers imported from a source located wholly outside the boundaries of Texas, except water that is imported from a source located in the United Mexican States, for use in Texas, and transported by using the bed and banks of any flowing natural stream located in Texas. Tex. Water Code § 11.085(v). Most interbasin transfers authorized to date fall within one of these statutory exemptions.

D. Bed and Banks Permits

Use of the "bed and banks" of state watercourses, pursuant to procedures approved by the TCEQ and its predecessors, to convey stored or conserved water for downstream use has long been authorized. *See* Tex. Water Code § 11.042(a). This authorization includes the reuse of return flows derived from either privately owned groundwater or previously appropriated state water. *See* Tex. Water Code § 11.042(b). Such authorization is obtained pursuant to the provisions of 30 Texas Administrative Code section 297.16. *See also* 30 Tex. Admin. Code § 295.161 (notice requirements for bed and banks applications). The point of discharge and the point of diversion are identified, as well as the authorized quantity of water to be discharged and diverted. Such authorization is limited to the amount of water discharged less transmission losses. Special conditions, possibly including an accounting plan, may be imposed to protect existing water rights as well as environmental needs for instream flows and the bays and estuaries. *See* Tex. Water Code § 11.042(c). See Chapter 27 of this book for additional discussion of bed and banks authorizations in the context of the reuse of surface water.

III. Amendments to Surface Water Rights

A. General Considerations

Alteration of an existing surface water right, in virtually any respect other than a simple change of ownership, must be authorized by the TCEQ as an amendment. The executive director also may initiate amendment of water rights to correct errors, protect senior water rights, require reporting, or assist with enforcement of the terms and conditions of the water right. *See* 30 Tex. Admin. Code § 297.61. Otherwise, amendments are normally initiated by the owners of the water right. A water right must be amended to authorize a change in the place of use, purpose of use, point of diversion, rate of diversion, acreage to be irrigated, or any other alteration in the water right. *See* Tex. Water Code § 11.122(a).

TCEQ staff review of an amendment application is similar to that provided for a permit application. If the application involves a request for an additional appropriation, the full review described in section II above is required. If a new appropriation is not involved, the analysis focuses on whether the requested changes affect other water right holders or the environment. Most other requirements are applicable to amendments, although many would have already been considered in authorization of the initial appropriation.

The TCEQ's standard of review is reflected in the "no injury" rule, which states that amendments—

1. to increase the appropriative amount,
2. to change the point of diversion or return flow,
3. to increase the consumptive use of water,
4. to increase the rate of diversion, or
5. to change from direct diversion to on-channel storage

will not be authorized unless it is determined that the change has no adverse impact on other appropriators. *See* 30 Tex. Admin. Code § 297.45(a). The adverse impact can take the form of making less water available than would have been available with full exercise of the right before amendment, increasing another appropriator's obligation to pass water for other senior water rights, or substantially affecting stream flow conditions as they would have existed before amendment of the water right. *See* 30 Tex. Admin. Code § 297.45(a).

The applicant has the burden of showing that there are no adverse impacts on other water right holders or the environment. 30 Tex. Admin. Code § 297.45(d). The TCEQ may impose conditions such as stream flow restrictions or return flow requirements and may require subordination of the amended water right in order to avoid adverse impacts on other rights or the environment. *See* 30 Tex. Admin. Code §§ 297.45(c) (subordination of a water right based on a change in diversion point), 297.45(e) (other types of conditions or restrictions designed to protect senior water rights).

B. Four Corners

Under Texas Water Code section 11.122(b), often referred to as the "four corners rule," TCEQ staff determines, from the terms of the existing water right (within the "four corners" of the document) and the nature of the requested amendments, whether there is any potential for adverse impacts and thus whether notice is required. Section 11.122(b) provides:

> Subject to meeting all other applicable requirements of this chapter [Texas Water Code chapter 11] for the approval of an application, an amendment, except an amendment to a water right that increases the amount of water authorized to be diverted or the authorized rate of diversion, shall be authorized if the requested change will not cause adverse impact on other water right holders or the environment on the stream of greater magnitude than under circumstances in which the permit, certified filing, or certificate of adjudication that is sought to be amended was fully exercised according to its terms and conditions as they existed before the requested amendment.

Tex. Water Code § 11.122(b). In essence, this is the converse of the commission's "no injury" rule; instead of directing that an amendment not be authorized unless it can be shown that there is no adverse effect on other water rights or the environment, it directs that the amendment be granted if it is shown that the adverse effects do not occur. *See also* 30 Tex. Admin. Code § 297.45(b). The four corners rule codified in section 11.122(b) is itself an application of the *Stacy Dam* decision, with the commission considering the full appropriation amount of the water right in determining whether an amendment to the water right could cause harm. See *City of Marshall*, 206 S.W.3d at 105–06; *Stacy Dam*, 689 S.W.2d at 873–74, 880–82.

The precise parameters of section 11.122(b), particularly in those instances in which an amendment can be granted without notice and the opportunity for a contested case hearing, were litigated in *City of Marshall*, 206 S.W.3d 97. Generally, the court had ruled that the provision does not preclude contested hearings on amendments, but it significantly narrowed the issues that could be raised. In some cases, a hearing might be necessary to assess the impact of the amendment on other water rights and environmental flow requirements, as well as other public interest issues such as adequacy of water conservation plans, consistency with state and regional water plans, and effects on groundwater. However, the court stated that the TCEQ, under the full-use assumption, might be able to make the necessary determinations from the face of the application; in those cases, notice and hearing would not be required. *City of Marshall*, 206 S.W.3d at 111.

Even after the supreme court's decision, the TCEQ's application of the section 11.122(b) requirements to new amendment applications is still evolving. Permit amendment applicants are routinely required to address TCEQ staff's "*City of Marshall* checklist"—a series of questions designed to assist staff in assessing the potential impacts under limited public interest criteria and notice requirements for each application, discussed further below. Generally, TCEQ staff and the commission have decided that no notice is required for applications to amend only the type or place of use. As of the publication date of this edition, there have been no further court decisions on this issue since *City of Marshall*.

C. Notice Requirements

Water rights amendment applications are generally subject to the same notice requirements applicable to water use permit applications. *See* 30 Tex. Admin. Code § 295.158(b). Whether notice is required for an amendment application depends on the sort of amendment being requested. Amendments that, in the judgment of the executive director, have no possibility of harming existing water rights or the public interest are processed without providing notice to other water right holders or the public. *See* 30 Tex. Admin. Code § 295.158(c)(1). Such amendments may include a clarification of existing terms of the water right, a reduction in the diversion rate, a change in the location of use, a change in diversion point or addition of diversion point when there are no water rights in the intervening distance between the old and new diversion points, or an increase in the rate of diversion from storage. *See* 30 Tex. Admin. Code § 295.158(c)(2).

Notice (both mailed and published) is typically required for amendments to (1) increase the appropriation or rate/period of diversion; (2) change the place of use that may affect other water right holders; (3) change the purpose of use that would materially change the period of time that water could be diverted, or increase the authorized consumptive use of water; (4) change the diversion point that could affect other water right holders; or (5) relocate or enlarge an existing reservoir. *See* 30 Tex. Admin. Code § 295.158(b).

As with notice for an application for a new water right, notice of the amendment application is issued following TCEQ staff's completion of its technical review and preparation of the draft amended permit. *See* 30 Tex. Admin. Code §§ 295.151(a), 295.158(b).

The executive director's evaluation of these factors and decision whether to require publication of notice will undoubtedly be influenced by the *City of Marshall* decision, discussed in section III.B above.

IV. Cancellation of Water Rights

A. General Provisions

Texas Water Code chapter 11, subchapter E, establishes the state's water rights cancellation process. Under these provisions, water rights (permits or certificates of adjudication) may be totally or partially canceled based on ten consecutive years of nonuse. Tex. Water Code § 11.172. The original statute enacted in 1957 was held constitutional by the Texas Supreme Court. *Texas Water Rights Commission v. Wright*, 464 S.W.2d 642 (Tex. 1971) (ruling that this vested property right nonetheless has an implied condition subsequent of continued beneficial use).

After satisfaction of all notice and hearing requirements, the TCEQ may cancel in whole or in part a water right if it has not been put to beneficial use at any time for a ten-year period immediately before the cancellation proceeding. Tex. Water Code § 11.173(a). The executive director may initiate a proceeding for cancellation of a water right, pursuant to Water Code section 11.174, with direct mail notice before the hearing to the water right holder and other water right holders in the same watershed and published notice in a newspaper in each county in which water from the source of supply was authorized for diversion and use. *See* Tex. Water Code §§ 11.174, 11.175.

The statute expressly exempts from cancellation water rights dedicated to certain conservation programs and water use consistent with long-term water planning. If the nonuse results from (1) the implementation of water conservation measures under the water right holder's submitted water conservation plan, (2) some restriction on use of the water under an order issued by the executive director, or (3) an inability to obtain water authorized because of drought conditions, the water right is exempt from cancellation. *See* Tex. Water Code § 11.173(b). Under Water Code section 11.183, the TCEQ may allow a water right holder with reservoir storage to retain the impoundment to the extent of the reservoir's conservation storage capacity for domestic, livestock, or recreational purposes. Tex. Water Code § 11.183. Section 11.184 prohibits the cancellation of water rights authorizing the use of water for municipal purposes if water has been put to use for such purpose at any time during the relevant ten-year period. *See* Tex. Water Code § 11.184.

There are two exceptions to the mandatory requirement of a hearing before cancellation. The first exception applies when the right to a hearing is expressly waived by the affected water right holder. The second exception relates to water rights granted for a term. Because these "term permits" do not vest any water rights in the permit holder for longer than the stated term, they automatically expire and are canceled in accordance with their terms without further need for notice or hearing. *See* Tex. Water Code § 11.176(b), (c). In making its required findings regarding "reasonable diligence" and "justified nonuse," the commission must consider, among other factors, certain conservation measures by the water right holder and whether the water right is being made available for private marketing or is reserved for environmental use. *See* Tex. Water Code § 11.177(b). Once a cancellation proceeding has been brought against a water right holder, no further such proceedings may be brought during the five years following the hearing. Tex. Water Code § 11.186.

Although available for many years as a potential mechanism to address the problem of overappropriated watercourses, the cancellation provisions have rarely been used.

B. Abandonment and Forfeiture

Water rights can also be lost through abandonment and forfeiture. If a lawful appropriation of state water is willfully abandoned during any three successive years, the right to use the water is forfeited and the water is subject to appropriation by another. Tex. Water Code § 11.030. The water right holder must have the intent to knowingly relinquish the water right. If TCEQ records indicate that the water is not being used, the executive director may contact the water right holder regarding intent to cancel the water right. If the water right holder does not so intend, the commission uses the same procedure for an abandonment case as it does for a cancellation. See 30 Tex. Admin. Code § 297.75.

If a permit contemplates construction of a storage reservoir or construction of diversion facilities, construction must begin within the time fixed by the commission but no more than two years after the date the permit is issued. The permittee must work diligently and continuously to complete the work. *See* Tex. Water Code § 11.145(a); *see also* 30 Tex. Admin. Code § 297.74(a). If the permittee fails to begin or complete construction within the time limits in the permit, the water right is subject to cancellation in whole or part, after notice and an opportunity for hearing. *See* Tex. Water Code § 11.146(b), (d). Forfeiture under section 11.146 does not apply to construction of a reservoir designed for the storage of more than 50,000 acre-feet of water. Tex. Water Code § 11.146(g).

A temporary or term permit may be revoked or suspended upon written or verbal notice by the executive director or watermaster without hearing, if necessary to protect senior or vested water rights or instream uses and fresh water inflow needs for bays and estuaries. 30 Tex. Admin. Code § 297.74(b).

V. Exceptions from Permitting and Limited Permits

Certain types of surface water use are exempt from permitting by the TCEQ. Also, in addition to the regular appropriation permit issued under section 11.121 of the Texas Water Code, the TCEQ issues several types of more restrictive permits authorized by the Code.

A. Exemptions

The use of water for domestic and livestock purposes is generally exempt from state water rights administration. Without obtaining a permit, a person (but not a commercial operation) may construct on his or her own property a dam or reservoir up to two hundred acre-feet in capacity for domestic and livestock purposes. Tex. Water Code § 11.142(a); 30 Tex. Admin. Code § 297.21. Similarly, a person, other than a commercial enterprise, may construct a reservoir of this size without a permit for fish and wildlife purposes. Tex. Water Code § 11.142(b). Statutory law expressly exempts *storage* of water for domestic and livestock uses, but not the use itself, from the state water rights appropriation process. As a practical matter, however, this exemption for domestic and livestock *use* is the established existing law and practice. *Cf. City of Anson v. Arnett*, 250 S.W.2d 450 (Tex. Civ. App.—Eastland 1952, writ ref'd n.r.e.) (discussing the statute as a limitation on the type of water use allowable without a permit).

The Texas Water Code also authorizes the conversion of an exempt domestic and livestock or fish and wildlife reservoir to other beneficial uses, through a permit issued by the TCEQ. *See* Tex. Water Code § 11.143; 30 Tex. Admin. Code § 297.15. See Chapter 27 of this book for further discussion of these exempt and nonexempt distinctions and other issues relating to reservoirs.

B. Term Permits and Temporary Permits

The TCEQ may issue a permit for a term of years based on the availability of water that has been appropriated to others but is not yet being used. *See* Tex. Water Code § 11.1381(a); 30 Tex. Admin. Code § 297.19(a). For example, water appropriated to a reservoir that is constructed to meet future water needs might be available for term permits until the future need develops. Term permits automatically expire and are canceled in accordance with their terms without further need for notice or hearing. *See* Tex. Water Code § 11.176(b), (c).

The commission may also issue a temporary permit for a duration of up to three years. Notice and hearing are not required for temporary permits authorizing the use of ten acre-feet or less for a duration of less than one year. Temporary permits are junior to all other appropriations in the watercourse and are designed for activities such as highway construction or oil and gas well drilling projects. *See* Tex. Water Code § 11.138; 30 Tex. Admin. Code § 297.13. In recent years, the TCEQ has granted some temporary permits to allow water right holders to mitigate drought impacts, such as by allowing movement of authorized diversion points.

C. Emergency Permits

The TCEQ has substantial authority to address emergency conditions by authorizations to appropriate or use state water on an emergency basis or to use water appropriated to another, if emergency conditions present an imminent threat to public health and safety and there are no feasible, practicable alternatives. *See* Tex. Water Code § 11.139; 30 Tex. Admin. Code § 297.17. Such authorizations are for a limited duration (an initial period of not more than 120 days) and, if granted without notice and hearing, must be followed by a hearing as soon as practicable. In drought conditions, the TCEQ can mandate without notice or hearing the temporary transfer and use of surface water from a permittee holding a water right for a nonmunicipal use to a city or supplier of water for domestic or municipal use, for public health and safety purposes. *See* Tex. Water Code § 11.139(h); 30 Tex. Admin. Code § 297.17(g). Relatedly, drought conditions may sometimes also be the basis for the TCEQ to approve emergency amendments to a permittee's water management plan.

D. Seasonal Permits

The TCEQ may grant seasonal permits, which are typically used for irrigation only to fill an off-channel reservoir during the wet season. *See* Tex. Water Code § 11.137; 30 Tex Admin. Code § 297.12.

E. Contractual Permits

The TCEQ has also issued contractual permits (these are no longer issued) or contractual amendments to authorize use, pursuant to a contract, by a third party not expressly authorized under the base permit. The owner of the base permit obtains a "contractual amendment" to the permit, authorizing use by the third party. 30 Tex. Admin. Code §§ 297.14 (contractual permit), 297.101–.108 (water supply contracts and amendments).

Contractual permits or amendments are not usually necessary if the diversion and use are authorized under the supplier's water right or if the new use involves only an addition of a diversion point or a change in the location of use of a water right that authorizes storage. In such instances, a water supply contract that meets the TCEQ's requirements may be filed with the executive director. 30 Tex. Admin. Code §§ 295.101, 295.183, 297.101–.108. However, the TCEQ requires an amendment if the added diversion point is not part of a bed and banks authorization, and for new places of use, if the seller's water right does not contain those authorizations. See Chapter 31 of this book for further discussion of wholesale water suppliers.

F. Marine Seawater Permits

Under a statute passed during the 2015 legislative session, the TCEQ has new authority to issue permits for certain diversions of state water from the Gulf of Mexico (or a bay or arm of the Gulf) for desalination and industrial purposes. For these permits, the commission is not required to make a finding of water availability and shall adopt rules for expedited processing of such applications. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 829, § 4 (adding Tex. Water Code § 11.1405). Other 2015 legislation exempts from permitting requirements the diversion and use of marine seawater that has a total dissolved solids concentration of less than 20,000 milligrams per liter, and provides for bed and banks authorization for such sufficiently treated marine seawater. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 756, § 10 (adding Tex. Water Code ch. 18).

VI. Conclusion

This chapter provides an overview of the permitting and amendment of surface water rights. The process is largely dictated by the statutes of chapter 11 of the Texas Water Code and implemented under chapters 295 and 297 of the TCEQ's rules. Several evolving and controversial issues involved in surface water rights permitting and amendments are addressed in more detail in other chapters of this book.

CHAPTER 11

Environmental Flows

Hope Wells[1] and Colette Barron Bradsby [2]

I. Introduction: Using Water Rights to Protect Environmental Flows

The consideration and protection of instream flows—that is, water within rivers, streams, and lakes—and of fresh water inflows into bays and estuaries are critical components of water development and planning. The term "environmental flows" encompasses both instream flows and fresh water inflows and refers to the amount of water necessary to sustain a broad range of biological needs. Simply put, river and bay systems need flowing water to maintain their functions, uses, and benefits to people, fish, and wildlife. Assessing and addressing the impacts of water projects on the needs of these natural systems are increasingly complex undertakings. International Union for Conservation of Nature and Natural Resources, *Flow: The Essentials of Environmental Flows* 1 (Megan Dyson et al. eds., 2003), *available at* https://cmsdata.iucn.org/downloads/flow___the_essentials_of_environmental_flow___dyson_et_al.pdf.

People value rivers and bays for a variety of uses, including drinking water supplies, industrial and manufacturing use, wastewater treatment and dilution, recreation and pleasure, and navigation. Tom Annear et al., *Instream Flows for Riverine Resource Stewardship* 2 (Instream Flow Council 2002). Rivers moderate floods and droughts, renew soil fertility, help recharge certain aquifers, and provide habitat and breeding sites for fish and wildlife. Sandra Postel & Brian Richter, *Rivers for Life: Managing Water for People and Nature* 2 (Island Press 2003). Wetlands and flowing streams act as natural filters, absorbing pollutants, decomposing waste, and churning out fresh water. Postel & Richter, at 3. Healthy flowing waters are a primary means of protecting water quality and limiting the costs of treating municipal and industrial wastewaters. Natural water purification is often far less expensive than engineered or technological treatment methods. Postel & Richter, at 174–76.

Encompassing fifteen major rivers and numerous smaller waterways, Texas boasts almost 200,000 miles of streams and rivers. Larry McKinney, *Texas: The State of Rivers*, *Texas Parks & Wildlife* 23 (July 2004), *available at* www.tpwmagazine.com/archive/2004/jul/ed_2/. Within its many recognized and distinctive ecological regions, the state displays remarkable biodiversity. McKinney, at 23. This diversity is supported by the network of rivers and streams that act like "a moveable feast, bringing nutrients to one area and removing waste from another." McKinney, at 23. Fresh water from

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rivers meets and mixes with seawater in estuaries, dynamic systems that in Texas create diverse wetlands that support the production of 100 million pounds of seafood annually and sustain a birding paradise. *McKinney*, at 23. The stream flows and fresh water inflows into the seven major and five minor estuaries along the Texas coast support the best inland and coastal fisheries in the United States. Larry McKinney, *Water for the Future*, *Texas Parks & Wildlife* 25 (July 2002), *available at* www.tpwmagazine.com/archive/2002/jul/ed_1/. For details about the size and average annual flow of Texas River basins, see www.twdb.texas.gov/surfacewater/rivers/river_basins/index.asp.) A map of Texas river basins appears in Figure1 below.

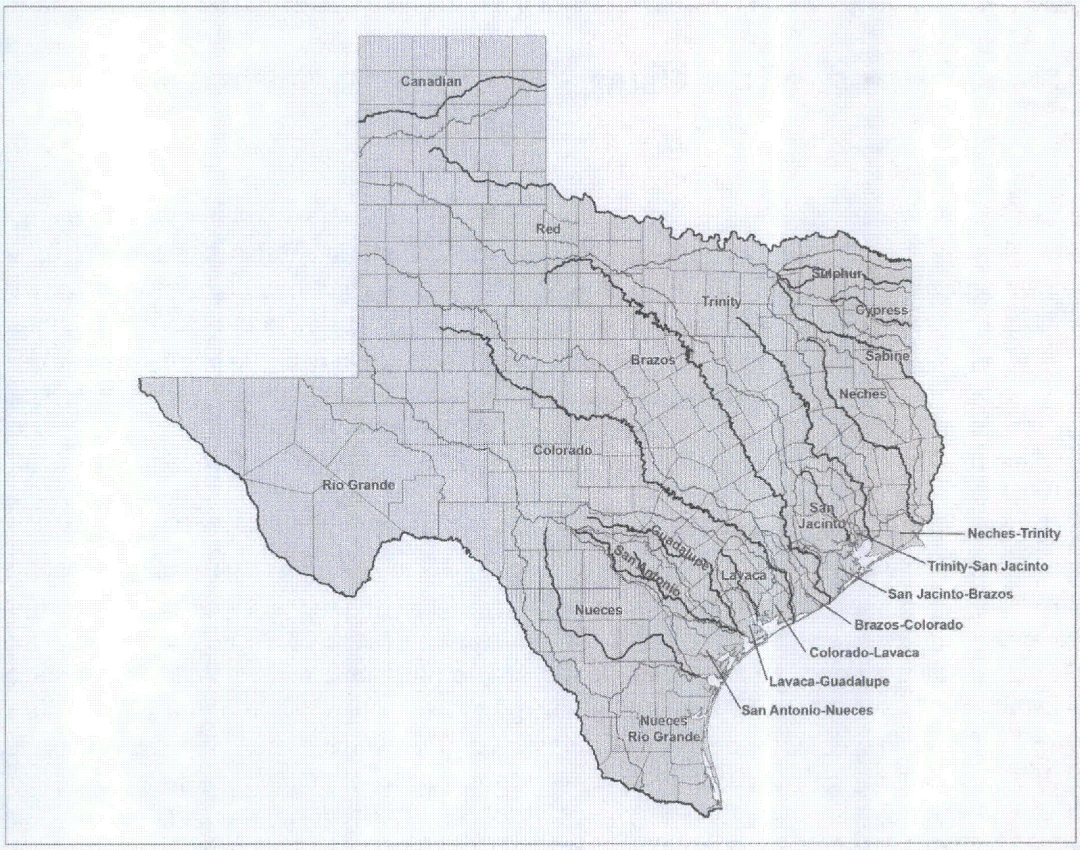

Figure 1. Texas River Basins. Texas Water Development Board, River Basins, www.twdb.texas.gov/surfacewater/rivers/river_basins/index.asp.

Instream flows and fresh water inflows relate to distinct and different natural systems and require different technical assessments when considering the impacts to those flows. As the state has moved toward consideration of whole river and bay systems and away from the historical focus on single river segments or bays, instream flows and fresh water inflows are now commonly coupled together under the term *environmental flows*. This chapter explores the changing legal framework for the protection of environmental flows in water rights administration. Although other regulatory actions such as Federal Energy Regulatory Commission hydropower licensing and Clean Water Act water quality certification and dredge and fill permitting may consider and affect environmental flows (see Chapters 6 and 34 of this book), water rights is the primary body of law that specifically addresses environmental flow needs. With the 2007 enactment of a new statutory scheme for providing water for environmental flows, practitioners must grapple with complying with current requirements while also looking to the consequences of full implementation of the new regulatory system. This chapter provides context for how environmental flow issues have been and will be addressed in the state's quest to balance the needs of a growing population with the recognition that water resources and the communities that depend on those resources must be protected to sustain both the economy and the quality of life in Texas.

Protection of environmental flows through the water rights permitting process is in a transition period. In 2007, Senate Bill 3 established a new regulatory scheme, which is discussed later in this chapter. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.13. It replaced the historical (and in some smaller river basins, the current) permit-by-permit consideration of environmental needs with a system of environmental flow standards and set-asides crafted for individual complete river and bay systems and implemented by Texas Commission on Environmental Quality (TCEQ or commission) rulemaking. Whether a new or amended water right application will be processed under the S.B. 3 scheme depends on whether standards have been adopted for the river basin where the water project is located. Environmental flow standards have been adopted for all the major Texas river basins, but minor basins such as the Cypress, Red, and Canadian basins lack standards. *See* 30 Tex. Admin. Code ch. 298. However, all water rights issued after August 31, 2007, must contain a condition allowing later adjustments to environmental flow protection permit provisions to comply with the eventual adopted environmental flow standards. *See* Tex. Water Code § 11.147(e-1). S.B. 3 also addressed the appropriation of water specifically for instream uses by prohibiting the issuance of new appropriative rights solely for instream uses but allowing for the amendment of existing water rights to change or add instream uses as a purpose for the beneficial use of water. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.13. This section first addresses special permit conditions: the history of the commission's use of special permit conditions to address environmental flow protection; the current process for determining such conditions; under which circumstances the process is applied to water right amendments; under which circumstances the conditions can be suspended; limitations on the effectiveness of environmental flow special conditions; and briefly, changes to this process under S.B. 3. The section then addresses the general appropriation of water for instream uses: permits amended to add instream use, the Texas Water Trust, and new appropriations for instream use. Finally, it discusses three little-used laws allowing for the reservation or other use of water for instream uses.

A. Special Permit Conditions and Environmental Flows

1. History of the Use of Special Permit Conditions to Address Protection of Environmental Flows

The Texas Constitution provides that the preservation and conservation of all natural resources of the state, including the waters of its rivers and streams, are public rights and duties and that the legislature shall pass such laws as may be appropriate to effect such preservation and conservation. *See* Tex. Const. art. XVI, § 59; *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 803 (Tex. 1955) (noting that it is legislature's duty to protect and preserve natural resources). Constitutional authority to preserve water resources has been in place since 1917, but during most of Texas history its law did not require the consideration of environmental flows in water rights; civil-law water rights, riparian rights, certified filings, and permits were established with no reference to instream flows or fresh water inflows to bays and estuaries. In its passage of the sweeping Water Rights Adjudication Act of 1967, intended to quantify and provide uniform administration of existing water rights, the Texas legislature was silent regarding the impacts of these water rights on the needs of river and bay systems. *See* Water Rights Adjudication Act, 60th Leg., R.S., ch. 45, § 1 (current version at Tex. Water Code §§ 11.301–.341); see Chapter 3 of this book regarding the historical development of Texas surface water law.

The first appearance of statutory environmental flow consideration in water rights permitting came in 1975 in the Act of June 2, 1975, 64th Leg., R.S., ch. 344, § 2, as the health of the state's bays and estuaries were given legislative attention. Under these amendments to the Texas Water Code, the commission must assess the effects, if any, of the issuance of a water right permit on the bays and estuaries of Texas. Tex. Water Code § 11.147(b). The amendments reflect the public policy of conserving and developing the state's natural resources, including "the maintenance of a proper ecological environment of the bays and estuaries of Texas and the health of related living marine resources." Tex. Water Code § 1.003(6). Additionally, the Texas Parks and Wildlife Department and the Texas Water Development Board must establish and maintain a bay and estuary data collection and evaluation program and conduct studies to determine bay conditions necessary to support a sound ecological environment. *See* Tex. Water Code § 16.058.

Environmental flow protection progressed from a concept to regulatory action with a suite of provisions added to the Texas Water Code in 1985. See Act of May 26, 1985, 69th Leg., R.S., ch. 795, §§ 1.047–10.012. With only minor changes, these provisions continue to form the body of environmental flow laws governing water right applications. Water Code section 11.147 was expanded to require the commission to consider the effect, if any, of the issuance of a water right permit on the existing instream uses and water quality of the stream or river to which the application applied. *See* Tex. Water Code § 11.147(d). The commission must consider the effect of the issuance of the permit on fish and wildlife habitats (Tex. Water Code § 11.147(e)) and must assess the impacts of permit issuance on the state's water quality. Tex. Water Code § 11.150. Reasonable actions to mitigate adverse impacts on fish and wildlife habitats are required for permits in excess of 5,000 acre-feet. Tex. Water Code § 11.152.

The commission employs special permit conditions to implement the Water Code provisions requiring consideration of instream uses, fresh water inflows, water quality, and fish and wildlife habitat. Between 1985 and 2003, to support this practice, the commission relied on section 11.147(b), which directs the commission to address in a permit "considerations necessary to maintain beneficial inflows to any bay and estuary system." *See* Tex. Water Code § 11.147(b). In 2003, broad authority for this practice was added to section 11.147, which requires permits to include, to the extent practicable when considering all public interests, conditions to maintain existing instream uses and water quality as well as fish and wildlife habitats. *See* Tex. Water Code § 11.147(d), (e).

2. Pre-S.B. 3 Process for Environmental Flow Protection Permit Conditions

Historically, and currently in river basins lacking adopted environmental flow standards, the commission's review of an application for a permit to store, take, or divert water rrequires a project-specific technical review to assess environmental impacts. The technical analysis may rely on existing data and literature, or the commission may require site-specific studies. Where applicable and available, fresh water inflow studies, instream flow studies, and water quality assessments must be considered during this technical review. *See* Tex. Water Code § 11.147(b), (d). Based on this review, a typical special permit condition limits diversion of water by requiring that a certain amount of flow be required to pass before the permittee may divert. This is called a stream flow restriction. Texas Natural Resource Conservation Commission, RG-141, *A Regulatory Guidance Document for Applications to Divert, Store or Use State Water* 41–42 (June 1995) [hereinafter Regulatory Guidance Document]. Factors that might lead to a stream flow restriction include the perennial nature of the stream, aquatic life uses and biological integrity, water quality, threatened or endangered species, and existing recreational use. Regulatory Guidance Document, at 40. *See also* 30 Tex. Admin. Code § 297.56.

Because applications supported by site-specific studies are rare, the majority of environmental flow protection permit conditions are derived through the use of desktop methodologies. The desktop methodology most commonly employed is the "Lyons method," which determines instream flow values based on 40–60 percent of the monthly median flow. Regulatory Guidance Document, at 40; *see also* Robert L. Bounds & Barry Lyons, Texas Parks and Wildlife Department, *Existing Reservoir and Stream Management Recommendations Statewide Minimum Streamflow Recommendation* (Oct.

16, 1979). The Lyons method provides a schedule of minimum monthly flows that must be maintained before diversion is allowed. Special permit conditions are tailored to the specific impacts of the water project. Beyond diversion restrictions, conditions may include a requirement for protective intake screens to limit fish injuries, a mitigation plan for habitat or species loss, removal of exotic species, and seasonal limits on diversion rates. Permit conditions may be crafted to specifically protect water quality. The assessment of water quality impacts must consider the maintenance of applicable Texas surface water quality standards and the need for all existing instream flows to be passed up to that amount necessary to maintain the water quality standards for the affected stream. 30 Tex. Admin. Code § 297.54; *see also* 30 Tex. Admin. Code §§ 307.1–.10. See Chapter 33 of this book for a general discussion of Texas surface water quality standards.

3. *Permit Amendments Subject to Special Conditions*

Certain water rights amendments trigger an assessment of environmental impacts and the possible imposition of environmental flows special permit conditions. The Texas Water Code provides that a water right application can be approved only if it does not impair existing water rights, and thus the TCEQ analyzes an amendment application for its impacts on existing water rights, both senior and junior to the water right being amended. *See* Tex. Water Code §§ 11.122, 11.134(b)(3)(B); 30 Tex. Admin. Code § 297.45; *see also* Regulatory Guidance Document, at 27–28, and Chapter 9 of this book. The statute does not clearly establish when to consider the environmental impacts of water right amendments or how to make that evaluation.

Commission rules require that for an application for a new or amended water right, the commission must consider the effects of the granting of the application on existing instream uses of the stream or river to which the application applies. 30 Tex. Admin. Code § 297.56(a). However, that requirement is also limited by Water Code section 11.122(b). 30 Tex. Admin. Code § 297.56(b). Water Code section 11.122(b) provides:

> (b) Subject to meeting all other applicable requirements of this chapter for the approval of an application, an amendment, except an amendment to a water right that increases the amount of water authorized to be diverted or the authorized rate of diversion, shall be authorized if the requested change will not cause adverse impact on other water right holders or the environment on the stream of greater magnitude than under circumstances in which the permit, certified filing, or certificate of adjudication that is sought to be amended was fully exercised according to its terms and conditions as they existed before the requested amendment.

Tex. Water Code § 11.122(b).

It appears that under Water Code section 11.122(b) (often called the "four corners" doctrine), amendments that increase the amount of water authorized to be diverted or increase the diversion should be assessed differently from other types of amendments and should be subject to the same assessment as new permit applications. For other amendment applications, the commission is directed to issue the amendments after finding that the proposed amendment will not cause adverse impacts to other water right holders or the environment of a greater magnitude than those impacts that would be experienced under the full exercise of the original right. *See* Tex. Water Code § 11.122(b). What level of consideration of these applications is required if the amendment would not increase the appropriated amount or diversion rate was the subject of *City of Marshall v. City of Uncertain*, 206 S.W.3d 97 (Tex. 2006).

In the *Marshall* case, the Texas Supreme Court considered whether the commission correctly interpreted section 11.122(b). The City of Marshall's amendment application requested permission to add industrial purposes to its municipal water use permit and to use the water in the Sabine River Basin as well as continuing use in the Cypress Creek Basin. The commission, relying on section 11.122(b), issued the amendment without performing an environmental analysis and without providing notice to the public or an opportunity for a hearing. The City of Uncertain, the Caddo Lake Institute, the Caddo Lake Area Chamber of Commerce and Tourism, and several other affected parties appealed the TCEQ decision.

The Texas Supreme Court remanded the city's application back to the commission. The court found that section 11.122(b) required the commission to consider the effects of the proposed amendment on other water rights and the environment and to make a factual determination about whether notice and the opportunity for a contested case hearing are required on those bases. The *Marshall* record was devoid of any TCEQ factual inquiry regarding environmental impacts or other water right holders. *City of Marshall*, 206 S.W.3d at 109–11. The court made other findings as well, which are discussed in greater detail in Chapter 9 of this book. Under the *Marshall* decision, the TCEQ is left to determine how to conduct an environmental impact review under the rubric of section 11.122(b), whether to add special permit conditions to provide some type of environmental protection, and whether affected persons must receive notice and an opportunity for hearing. City of *Marshall*, 206 S.W.3d at 111–12.

4. Suspension of Permit Conditions

Permit conditions relating to fresh water inflows and instream uses may be suspended if the commission determines an emergency exists that cannot practically be resolved in other ways. Tex. Water Code § 11.148(a). In these circumstances, the Texas Parks and Wildlife Department must be provided notice and an opportunity to comment. *See* Tex. Water Code § 11.148(b). Although the Texas Parks and Wildlife Department is the only party entitled to notice of the initial emergency suspension, all affected persons are notified by publication immediately after the suspension, and a hearing to determine whether the suspension should be continued must be held within fifteen days of the order to suspend. Tex. Water Code § 11.148(c).

Addressing environmental flow issues in special permit conditions has been common practice by the commission, but, as discussed below, in some instances these issues are addressed by including instream use as one of the beneficial uses authorized by the water right.

5. Limitations on the Effectiveness of Permit Conditions in Protecting Environmental Flows

Although the use of permit conditions has proven to be a positive tool for protecting environmental flows, it is generally agreed that the permit-by-permit method provides only piecemeal protection. As summarized in this section, the limitations on the effectiveness of permit conditions in protecting environmental flows served as one catalyst for the enactment of S.B. 3 in 2007. Environmental protection gained through permit restrictions depends on a third party's decision to file a water right application; environmental needs are not addressed by stream segment or river basin but only to the extent that a particular water project's diversion affects a defined reach of the affected stream. *See generally* Joint Committee on the Study Commission on Water for Environmental Flows, *Interim Report to the 79th Legislature* 11–17 (Dec. 2004) [hereinafter Interim Report to the 79th Legislature].

Another shortcoming of relying on permit conditions is that not until 1985 was the commission required to consider the protection of environmental flows when it issued a water right. See Figure 2. Almost a hundred years of water right authorizations by the state preceded the consideration of any environmental flow needs. Full appropriation of water occurred in some basins such as the Rio Grande without any consideration or reservation of water for the protection of instream uses and fresh water inflows to bays and estuaries. Regulatory Guidance Document, at 74. Fewer than 20 percent of all issued water rights were subject to any regulatory environmental impacts consideration. Even fewer water right permits contain actual environmental protection special conditions. Of an estimated 8,000 water rights, fewer than 16 percent incude environmental permit conditions. For example, of the 1,087 active water rights in the Brazos River Basin, only 6 contain special conditions for instream purposes. Todd Chenoweth, Texas Commission on Envionmental Quality, *Water Availability Memorandum* (July 25, 2003).

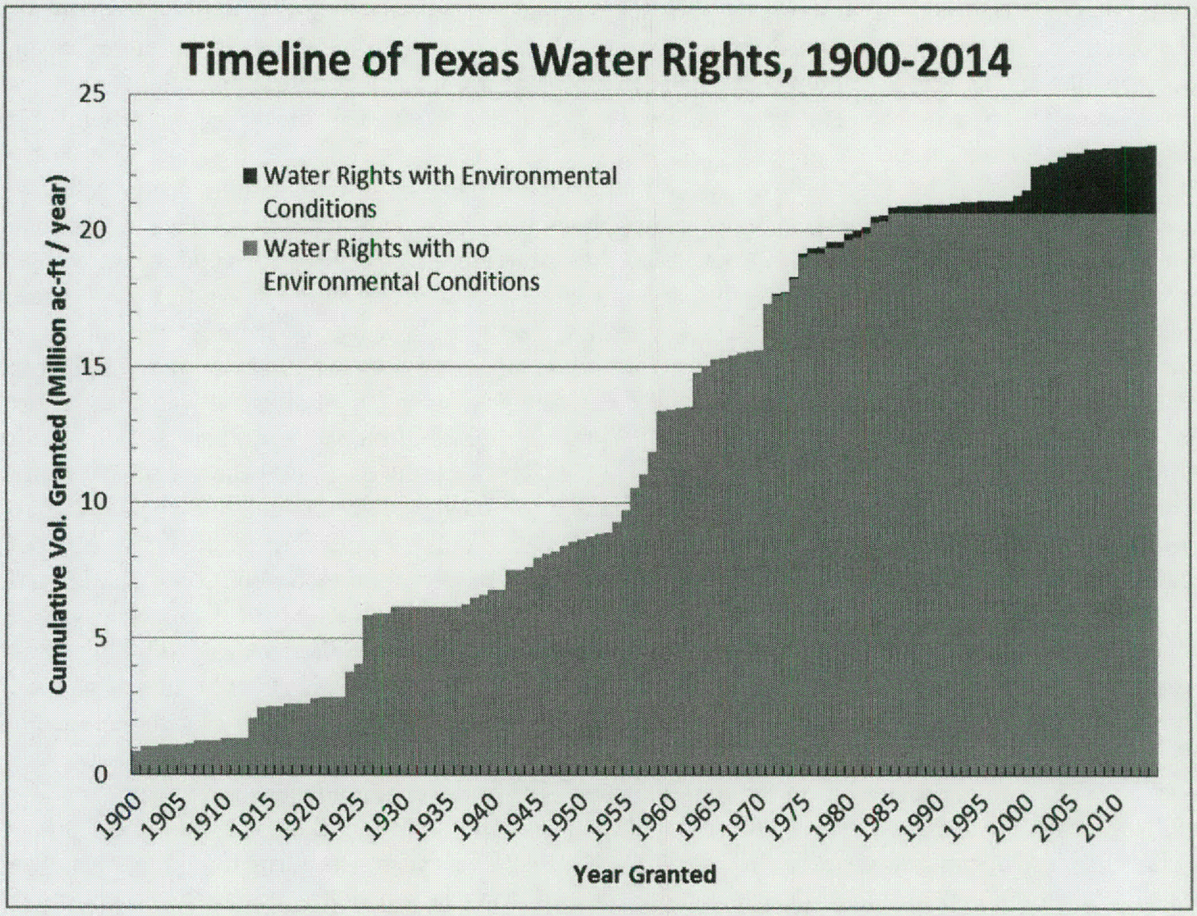

Figure 2. Timeline of Texas Water Rights, 1900–2014. Source: National Wildlife Federation analysis of data provided by the Texas Commission on Envinronmental Quality. Data available at www.tceq.texas.gov/permitting/water_rights/wr_databases.html. National Wildlife Federation, Austin, Texas, 2015.

Indeed, for many streams, the full exercise of pre-1985 water rights would exceed the amount of water expected to be present in dry years. *See* Myron Hess, *An Environmental Take on Environmental Flow Protection*, 34 St. B. Tex. Envtl. L.J. 265 (2004). A common lament of environmental flow protection proponents is that the state's consideration of environmental needs in water right permits was "too little, too late, and did not adequately protect the environment." Martin C. Rochelle, *Competing for Limited Resources*, 67 Tex. B.J. 202, 203 (2004); *see also* Ronald Kaiser, *A Problem in Search of a Solution*, 67 Tex. B.J. 188, 191 (2004).

Although special permit conditions provide some environmental protection, instream uses have a passive support system in the form of water passed to meet downstream senior rights, unused water rights, and return flows. Unused water rights make up a significant portion of the water currently available to meet environmental needs. In the 2012 State Water Plan, the Texas Water Development Board reported that of the estimated 20 million acre-feet of surface water appropriated, approximately

6.44 million acre-feet were used in 2008. Texas Water Development Board, *Water for Texas 2012* 159 (2012), [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. Not all appropriated water is available for use each year, and some permitted water is not yet developed or does not have the necessary physical infrastructure to allow its use. Existing available surface supplies in 2010 were estimated at approximately 13.54 million acre-feet. 2012 State Water Plan, at 161. In fully appropriated streams, the only remaining sources of water available to meet environmental needs are unused appropriated water left in the stream and return flows, those flows that are returned to the stream after an original diversion and use. Regulatory Guidance Document, at 74; *see also* 30 Tex. Admin. Code § 297.1(43). As the state's population increases and water demands rise, less permitted water will remain instream, thus creating the potential for adverse environmental impacts in areas that previously had not experienced such impacts. Regulatory Guidance Document, at 74.

The availability of return flows to continue contributing to environmental needs is highly questionable. Not only are the sources of return flows (the water appropriated for the original use) potentially subject to increased use in the future, but there are also a number of pending water right applications that seek authorization to reuse or appropriate historical and future return flows. *See* Texas Commission on Environmental Quality, *Pending Water Rights Applications*, *available at* www.tceq.state.tx.us/permitting/water_rights. The reuse of water may be direct or indirect. Direct reuse is the use for a permitted purpose of water that remains unconsumed after the water is used for the original purpose of use and before it is either disposed of or discharged or otherwise allowed to flow into a water course. *See* 30 Tex. Admin. Code § 297.1(44). Indirect reuse is the use of water after it has been used for an original permitted purpose and after it has been discharged into a water course; in essence, return flows are diverted from a water course for reuse. Depending on the circumstances, the reuse of return flows may or may not provide some environmental protection; in some cases it may replace the need to develop additional sources, but it may have the potential to disrupt ecosystems dependent on return flows. The TCEQ does not have a fully developed policy on how to treat indirect reuse applications; as the agency continues to refine its policy, its efforts will necessitate the consideration of environmental impacts. *See generally* Interim Report to the 79th Legislature, at 11–17. See Chapter 24 of this book for a discussion of reuse. A contested water right application, pending as of July 2015, may provide an opportunity for the TCEQ to develop guidance on reuse projects. An application by the Brazos River Authority seeks, in part, the appropriation of existing and future surface water and groundwater return flows in the Brazos River basin. One disputed issue is whether the TCEQ should consider the use of the subject return flows as a new appropriation or as a stand-alone bed and banks authorization. *See* Water Use Permit Application No. 5851, TCEQ Docket No. 2005-1490-WR; SOAH Docket No. 582-10-4184.

As competition for water increases, amendments and transfers of water rights may provide the state a small window of opportunity to bring a portion of the pre-1985 rights into the environmental protection fold. One idea is for the legislature to authorize the addition of environmental flow conditions to the unperfected (previously unused) portion of the underlying right when that right is amended or transferred. Hess, at 272. To date, the legislature has not looked to existing water rights for additional opportunities to protect environmental flows.

6. Potential Use of Endangered Species Act to Protect Environmental Flows and Alter Surface Water Rights

While Texas has a history of litigation regarding the Endangered Species Act (ESA) and groundwater rights, a March 2010 lawsuit filed in federal district court tested the viability of the ESA to affect the regulation of surface water rights, both permitted and unpermitted. *See Aransas Project v. Shaw*, No. C-10-75 (S.D. Tex. Mar. 3, 2010). The Aransas Project (TAP) asserted that TCEQ actions and failure to act to manage freshwater inflows had harmed and harassed the endangered whooping cranes and caused a take of the species. The last remaining wild breeding flock of whooping cranes migrates annually from Canada to winter in the warmth of the Texas Gulf Coast at the Aransas National Wildlife Refuge where it consumes food sources dependent on adequate freshwater inflows, such as blue crabs and wolfberries. *See* U.S. Fish & Wildlife Service, *Aransas National Wildlife Refuge Complex, Whooping Cranes*, *available at* www.fws.gov/refuge/Aransas/wildlife/whooping_cranes.html. TAP alleged that the TCEQ, in its administration of surface water rights, had authorized diversions of water that reduced the freshwater inflows needed to support the whooping crane and its habitat. Also alleged was that the TCEQ overallocated and mismanaged the water resources of the San Antonio and Guadalupe Rivers. Relief sought included the creation of a Habitat Conservation Plan pursuant to ESA section 10 and identification of a process to reduce freshwater withdrawals during times of drought and low flow to maintain estuary inflows sufficient to prevent harm to the cranes.

In March 2013, the district court ruled in favor of TAP and held the TCEQ liable for the unauthorized take of the whooping crane in violation of the ESA. *See Aransas Project v. Shaw*, 930 F. Supp. 2d 716 (S.D. Tex. 2013). However, on appeal, the Fifth Circuit reversed judgment, finding that the trial court applied an erroneous proximate-cause analysis. *Aransas Project v. Shaw*, 775 F.3d 641 (5th Cir. 2014), *cert. denied*, 135 S. Ct. 2859 (2015). The court asserted that proximate cause and foreseeability are required to affix liability for ESA violations, and "the district court either misunderstood the relevant liability test or misapplied proximate cause" when it held the TCEQ responsible for "remote, attenuated, and fortuitous events" following issuance of water right permits. *Aransas Project v. Shaw*, 775 F.3d at 656. In a footnote, the court was clear to state that the opinion does not reach the issue of whether water permitting can never constitute a take or cause a take to be committed. 775 F.3d at 656 n.9. This case and other ESA litigation is discussed in more detail in Chapter 32 of this book.

7. S.B. 3 and the Use of Permit Conditions to Address Environmental Flow Needs

As mentioned above and discussed in further detail below, the process of crafting special permit conditions to protect environmental flows on a case-by-case basis is changing as S.B. 3 is implemented. River basin and bay system environmental flow standards adopted by the commission will be implemented through water right permit conditions. Under Texas Water Code section 11.1471(c), the flow standards should consist of a schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location in a river basin and bay system. Tex. Water Code § 11.1471(c). The TCEQ must adjust its technical review process to ensure that permits protect, to the extent practicable, the required range of variable flow distribution needs in specific locations within an affected water body. On April 20, 2011, TCEQ commissioners directed TCEQ staff to develop an implementation guidance document explaining how environmental flow standards will be applied in permits. On June 1, 2015, the TCEQ posted on its Web site a document entitled *DRAFT SB 3 Permitting Guidelines*, a set of proposed guidelines explaining how the TCEQ executive director intends to formulate recommendations for flow restriction special conditions for permits or amendments that request new appropriations and for adjustment of permit conditions. The TCEQ requested public input on those guidelines through a June 25, 2015, stakeholder meeting in Austin and through written comments received by the agency by July 31, 2015. The draft proposed guidelines are available at www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/rulemaking.

B. General Appropriation of Water for Instream Uses

As opposed to adding special conditions to an underlying permit to protect environmental flows, the state has, in limited circumstances, allowed for water to be appropriated for instream uses by amending an existing water right to add such uses. Water deposited in the Texas Water Trust likewise may be designated for instream uses. In the early 2000s, a number of applicants sought new appropriations of water for environmental flows purposes. These applications triggered years of litigation and culminated with the legislature taking action to prohibit new appropriations for instream uses while simultaneously enacting new regulatory consideration of environmental flow needs and clarifying that existing water rights may be amended to include environmental flows as an authorized use of water.

C. Appropriation of Water for Instream Uses

1. Permits Amended to Include Instream Uses

Before 2002, three water rights were granted authorizing instream use purposes to meet instream flow needs and fresh water inflows to bays and estuaries. The Lower Colorado River Authority's water rights for Lake Travis and Lake Buchanan authorize the use of appropriated water for the needs of both the Colorado River and Matagorda Bay. *See* Certificates of Adjudication No. 14-5478A and No. 14-5482A (1989). The Texas Parks and Wildlife Department holds a right with an instream uses purpose to protect Sheldon Lake. *See* Certificate of Adjudication No. 10-3995A (2001). The common element to these instream use permits is that the instream uses portion was not part of the original appropriation; existing water rights were amended to add instream uses.

Under Texas Water Code section 11.134, all appropriated water must be intended for a beneficial use. Tex. Water Code § 11.134(b)(3)(A). "Beneficial use" is defined as "that amount of water which is economically necessary for a purpose authorized by [chapter 11], when reasonable intelligence and reasonable diligence are used in applying the water to that purpose and shall include conserved water." Tex. Water Code § 11.002(4); *see also* 30 Tex. Admin. Code § 297.1(8). Water Code Section 11.023 lists the categories of uses for which state water may be appropriated. The list identifies eight specific uses and one broad category of "any other beneficial use." *See* Tex. Water Code § 11.023(a), (b). Instream use is not an enumerated use.

In 1993, the TCEQ amended 30 Texas Administrative Code chapter 297 by adding a definition for "instream use":

> The beneficial use of instream flows for such purposes including, but not limited to, navigation, recreation, hydropower, fisheries, game preserves, stock raising, park purposes, aesthetics, water quality protection, aquatic and riparian wildlife habitat, freshwater inflows for bays and estuaries, and any other instream use recognized by law. An instream use is a beneficial use of water. Water necessary to protect instream uses for water quality, aquatic and riparian wildlife habitat, recreation, navigation, bays and estuaries, and other public purposes may be reserved from appropriation by the commission.

30 Tex. Admin. Code § 297.1(25). The rules were further amended in 1999 by including instream use in the list of purposes for which state water may be appropriated. *See* 30 Tex. Admin. Code § 297.43(a)(10). This rule reflected the commission's finding that instream uses are authorized under the broad "other" beneficial uses as described in Water Code section 11.023(b). *See* 23 Tex. Reg. 10,312 (1999). Thus, in practice and through its rulemaking, the commission considers instream use to be a beneficial use for which state water may be appropriated.

Under the broad category of "other beneficial uses," the TCEQ has issued permits for purposes that appear to provide water for environmental needs such as wetland enhancement, waterfowl management, wildlife propagation and preservation, and stream quality control. *See, e.g.*, Permit No. 5736, City of Corpus Christi (2001); Certificate of Adjudication No. 7-4493, Texas Parks & Wildlife Department (1986); Certificate of Adjudication No. 22-4539, U.S. Department of Interior (1986); Certificate of Adjudication No. 22-4543, Thomas H. Sweeney Jr., et al. (1986); Certificate of Adjudication No. 7-4296, U.S. Anahuac Wildlife Refuge (1986); Certificate of Adjudication No. 12-5328, Contract No. 1895-9, Dow Chemical Company (1994).

The practice of amending water rights to change the use or to add a use of instream flows dedicated to environmental needs or bay and estuary inflows was confirmed by S.B. 3, as discussed below. *See* Tex. Water Code § 11.0237(a).

2. *The Texas Water Trust*

Water rights on deposit in the Texas Water Trust have been amended to add instream use as a purpose of use. The trust was established within the Texas Water Bank to hold water rights dedicated to environmental needs, including instream flows, water quality, fish and wildlife habitat, and bay and estuary inflows. Water rights may be held in trust for a term specified by contract or in perpetuity. *See* Tex. Water Code § 15.7031. S.B. 3 provided additional authority to the Texas Parks and Wildlife Department to protect and enforce Texas Water Trust deposits. Under Texas Water Code section 11.0841(c), the department has "the rights of a holder of a water right" held in the trust, including the right to file suit to prevent the unlawful use of the right. Tex. Water Code § 11.0841(c)(1).

The trust currently contains three water rights in perpetuity. Two are Rio Grande rights totaling approximately 1,200 acre-feet. These are senior irrigation rights donated to the Texas Parks and Wildlife Department with the express requirement that they be deposited in the trust. *See* Certificate of Adjudication No. 23-914 (2003); Water Use Permit No. 3041 (2003). Texas State University provided the third trust deposit in the form of 33,108 acre-feet of former hydroelectric rights. *See* Certificate of Adjudication No. 18-3865D (2006). One water right of 175 acre-feet on Upper Keechi Creek in the Trinity River Basin has been deposited in the trust for a ten-year term. *See* Certificate of Adjudication No. 08-5085 (2010). Each deposited right has been amended to expressly authorize a change in use to allow the affected water right or portion of water right to be used to provide water for instream uses. For details of existing water rights, *see* www.tceq.state.tx.us/permitting/water_rights/wr_databases.html.

The statute's use of the phrase "water rights dedicated to" environmental needs has been interpreted as an acknowledgment that water rights may be converted to instream use purposes. *See* Tex. Water Code § 15.7031(a). The TCEQ, when authorizing deposits into the trust, has required that the water right to be deposited be amended to include instream use as a purpose of use. This recording of the purpose of use is necessary for enforcement of the paper right. Tex. Water Code § 11.136.

Private water trusts also exist in the state and may become a more common tool to provide water for environmental flows through water rights management, habitat restoration, or watershed protection. Active trusts include the Trans Pecos Water & Land Trust on the Rio Grande and the Guadalupe–Blanco River Trust. For more information on the Trans Pecos Water & Land Trust, see http://tpwlt.org/; additional information on the Guadalupe–Blanco River Trust is available at www.gbrtrust.org/. Many land trust activities also benefit both the water quality and quantity of Texas rivers, streams, bays, and estuaries. For more information on land trusts, see www.texaslandtrustcouncil.org/.

3. New Appropriations for Instream Uses

Beginning in 2000, several applications were filed seeking new appropriations of water to protect instream uses. Although issuing new permits for "instream flows dedicated to environmental needs or bay and estuary inflows" is prohibited by Texas Water Code section 11.0237(a), enacted by Senate Bill 3 in 2007, the history of these instream flows applications is instructive because the applications served as an additional catalyst for new legislation to protect environmental flows.

In 2000 the San Marcos River Foundation (SMRF), a conservation nonprofit organization, filed an application seeking a new appropriation of approximately 1.3 million acre-feet of water to protect the instream uses of the San Marcos and Guadalupe rivers and the San Antonio Bay and Estuary. *See* Application of the San Marcos River Foundation for Permit No. 5724, filed with the Texas Natural Resource Conservation Commission on July 10, 2000. The permit application stated that, once granted, the SMRF intended to transfer the right to the Texas Parks and Wildlife Department and deposit the right into the Texas Water Trust. In 2002, the commission's executive director, after finding the SMRF application administratively and technically complete and finding that the TCEQ had the authority to grant such a permit, issued a draft permit allocating 1.167 million acre-feet of water for instream uses.

The filing of the SMRF application and the issuance of a draft permit prompted water rights players from all sides of water development and environmental protection to debate how the state should address environmental flow protection. The TCEQ invited amicus briefing on the SMRF application because of the great and diverse interests at stake. *See* TCEQ Docket No. 2003-0027-WR, Mar. 20, 2003.

In arguing over whether new appropriation of water for instream uses was authorized, proponents focused on the Texas Water Code's recognition of the benefits and requirements of protecting instream uses, the statutory definition of beneficial use, the commission's authority to issue a water right for any beneficial use, and the commission's definition of instream use as a beneficial use of water. *See, e.g.*, Application of the San Marcos River Foundation, TCEQ Docket No. 2003-0027-WR, Briefs of Coastal Conservation Association; National Wildlife Foundation and Environmental Defense; Texas Parks and Wildlife Department; Matagorda Bay Foundation; Galveston Bay Conservation and Preservation Association; D. M. O'Connor Ranches (on file with the TCEQ) [hereinafter Briefs of Proponents]. Proponents also noted the existence of amended permits that authorize instream use as a purpose of use, and they argued that only a legal fiction would recognize a distinction between uses authorized under an original appropriation or an amended water right. *See* Briefs of Proponents.

Opponents argued that the legislature had not expressly authorized and enumerated instream uses as a beneficial use and that numerous Water Code provisions contemplated actual diversion, storage, or other physical alteration or control of water necessary for water to be put to an intended beneficial use. *See, e.g.*, Application of the San Marcos River Foundation, TCEQ Docket No. 2003-0027-WR, Briefs of the City of Dallas; Brazos River Authority; Texas Water Conservation Association; the Lieutenant Governor of Texas, Texas Municipal League; Guadalupe-Blanco River Authority; San Antonio River Authority; San Antonio Water System (on file with the TCEQ) [hereinafter Briefs of Opponents]; *see* Edmond R. McCarthy, Jr., *Environmental Flows: Water Development Perspective Protection*, 34 St. B. Tex. Envtl. L.J. 248, 250 (2004); *see, e.g.*, Tex. Water Code §§ 11.002 (giving the right to impound, divert, or use state water), 11.022 (stating that water may be taken or diverted from its natural channel), 11.121 (requiring a permit before commencement of construction work designed for the storage, taking, or diversion of water), 11.124(a) (requiring an application to appropriate state water to provide the location and describe proposed facilities and construction timeline), 11.132(c) (requiring the notice of application to include the place where water will be stored, taken, or diverted). Opponents also warned of the public policy implications of entrusting a private party with managing the environmental needs of a river basin and bay. *See* Briefs of Opponents.

Parties against the appropriation of water for instream uses equated leaving water instream to benefit water quality, fish and wildlife, and habitats with "nonuse." *See* Briefs of Opponents. Some relied on a 1971 Texas Supreme Court case concerning the cancellation of water rights in which the court noted that water right permittees do not acquire the right of "nonuse" of water and that such water that is not used by the permittee "will run unused into the sea." *See* Briefs of Opponents; Briefs of Texas Water Conservation Association, the Lieutenant Governor of Texas; *Texas Water Rights Commission v. Wright*, 464 S.W.2d 642, 647 (Tex. 1971); *see also* McCarthy, at 250. However, it should be noted that the *Wright* case preceded the legislative recognitions of the benefits of fresh water inflows reaching the sea and the statutory requirements for the commission to protect inflows and other instream uses in water rights permitting through permit conditions and appropriation to the Texas Parks and Wildlife Department.

On March 19, 2003, the TCEQ considered the SMRF application and pending contested case hearing requests. Finding that it had no express authority to issue a new appropriation solely for instream uses, the commission dismissed the SMRF application. *See* Order denying the application, TCEQ Docket No. 2003-0027-WR, Mar. 20, 2003.

At the time of the SMRF decision, five additional applications for new appropriation of water for instream uses were pending at the TCEQ. The TCEQ dismissed the applications by the Caddo Lake Institute, the Lower Colorado River Authority, the Matagorda Bay Foundation, the Galveston Bay Conservation and Preservation Association (with the Galveston Bay Foundation), and the Lavaca Navidad River Authority on November 19, 2003, finding that it lacked authority to issue a new water right "for purely instream uses which does not involve diversion or storage of state water." *See* Orders denying the applications, TCEQ Docket No. 2003-0719-WR, No. 2003-0731-WR, No. 2003-0732-WR, No. 2003-0733-WR, No. 2003-0734-WR, Dec. 19, 2003. S.B. 1639, passed by the 78th Legislature in 2003, added Texas Water Code section 11.0235, which, in part, contained a policy statement that the legislature had not "expressly authorized granting water rights exclusively" for instream flows or freshwater inflows or "other similar beneficial uses." *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2. Though not applicable to the pending applications (as they preceded the effective date of the new law), the TCEQ relied on S.B. 1639 for guidance. S.B. 1639 also added Water Code section 11.0237, which contained an express prohibition of the issuance of any new water rights for instream uses but allowed for the commission to amend existing water rights to change the use to or add a use for the instream flows dedicated to environmental needs. Section II below provides an extended discussion of S.B. 1639 and later legislative actions.

All conservation organization applicants appealed the TCEQ decisions to state district court. *See San Marcos River Foundation v. TCEQ*, No. GN3-01251; *Caddo Lake Institute, Inc. v. TCEQ*, No. GN4-00132; *Galveston Bay Conservation & Preservation Ass'n, Galveston Bay Foundation & Matagorda Bay Foundation v. TCEQ*, No. GN4-00160. After reviewing the same arguments presented earlier to the TCEQ, the court found that the TCEQ erred in dismissing the applications of SMRF, the Caddo Lake Institute, the Matagorda Bay Foundation, and the Galveston Bay Conservation and Preservation Association. Finding that the TCEQ did have jurisdiction to hear the plaintiffs' applications, the court remanded the applications to the commission (order granting motions for partial summary judgment, 200th Judicial Dist. Ct. of Travis County, Texas, Feb. 7, 2006).

The order includes little detail, but the court's transmittal letter notes that the ruling that the commission has jurisdiction "necessarily includes a finding that Texas law does contemplate appropriation of water rights for instream uses and to protect inflows into bays and estuaries." The court also noted that it was unable to harmonize section 11.0235 with the statutory scheme set out in the Water Code except by applying it "only during the moratorium period which expired September 1, 2005." *See* Letter from Judge Covington to counsel, Feb. 7, 2006; *San Marcos River Foundation v. TCEQ*, No. GN3-01251; *Caddo Lake Institute, Inc. v. TCEQ*, No. GN4-00132; *Galveston Bay Conservation & Preservation Ass'n, Galveston Bay Foundation & Matagorda Bay Foundation v.*

TCEQ, No. GN4-00160 (order granting motions for partial summary judgment, 200th Judicial Dist. Ct. of Travis County, Texas, Feb. 7, 2006).

The TCEQ appealed the district court decisions shortly before the passage of S.B. 3, the omnibus bill that introduced a new regulatory scheme for determining and protecting environmental flow needs. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.13. S.B. 3 enacted new Water Code section 11.027(a), which provides that "the commission may not issue a new permit for instream flows dedicated to environmental needs or bay and estuary inflows." Tex. Water Code § 11.027(a). The Corpus Christi court of appeals found that new Water Code section 11.027(a) made the applications of SMRF and the Galveston and Matagorda Bay Foundations moot and that the trial court's judgment would have no legal effect given the statutory parameters that the legislature enacted. *Texas Commission on Environmental Quality v. Galveston Bay Conservation & Preservation Ass'n*, 267 S.W.3d 361, 366 (Tex. App.—Corpus Christi 2008, no pet.); *Texas Commission on Environmental Quality v. San Marcos River Foundation*, 267 S.W.3d 356, 360 (Tex. App.—Corpus Christi 2008, pet. denied). The SMRF opinion did not address the issue of whether SMRF's priority date vested any rights or distinguished the application from the other instream flow permit applications. The Caddo Lake Institute case was ultimately nonsuited based on an agreement with the TCEQ.

D. Little-Used Laws Authorizing the Reservation or Use of Water for Instream Uses

1. *Provisions Specific to the Texas Parks and Wildlife Department*

The concept of reservation and appropriation of water for environmental needs was introduced in 1985 through Texas Water Code sections 15.3041 and 16.1331. Act of May 8, 1985, 69th Leg., R.S., ch. 133, §§ 4.03, 4.04. Entitled "Reservation and Appropriation for Bays and Estuaries and Instream Uses," the sections provide in part:

> (a) Five percent of the annual firm yield of water in any reservoir and associated works constructed with state financial participation under this chapter within 200 river miles from the coast, to commence from the mouth of the river thence inland, is appropriated to the Parks and Wildlife Department for use to make releases to bays and estuaries and for instream uses, and the commission shall issue permits for this water to the Parks and Wildlife Department under procedures adopted by the commission.

Tex. Water Code §§ 15.3041(a), 16.1331(a). As of the publication date of this edition, no permit application has triggered the requirements of sections 15.3041 and 16.1331. However, a 2009 application by the Guadalupe-Blanco River Authority to divert and use up to 75,000 acre-feet of water from a new off-channel reservoir in Gonzales County would be subject to the requirement should there be financial participation by the state in the construction of the reservoir and associated works. *See* Application documents for TCEQ Docket No. 2014-1658-WR, *available at* www14.tceq.texas.gov/epic/eFiling/index.cfm?fuseaction=search.home.

2. *Reservation of "Surplus" Water*

Texas Water Code section 11.046(c) contains a somewhat hidden reference to the reservation of water to meet environmental flow needs. This section addresses the return of surplus water, providing that once water diverted under a permit or certificate has been returned to a watercourse, "it is considered surplus water and therefore subject to reservation for instream uses or beneficial inflows or to appropriation by others" unless prohibited by specific language in the underlying water right. Tex. Water Code § 11.046(c).

3. *Interruption or Reduction of Exempt Mariculture Appropriations*

One other potential to provide appropriated water to protect fresh water inflows comes in the form of a TCEQ order reducing or interrupting an appropriation of water for certain mariculture activities. Texas Water Code section 11.1421 provides an exemption from obtaining a water use permit for mariculture operations on land. *See* Tex. Water Code § 11.1421. Persons engaged in such activity may take state water from the Gulf of Mexico and adjacent bays and arms of the Gulf in an amount appropriate to support the mariculture operations. *See* Tex. Water Code § 11.1421(b). The exemption requires notice to the commission of the appropriation and a continuing duty to report annual water use. *See* Tex. Water Code § 11.1421(b), (c). After notice and hearing, if the commission determines that the appropriation for mariculture activities, as a result of low fresh water inflows, would interfere with the natural productivity of bays and estuaries, the commission shall issue an order requiring interruption or reduction of the appropriation. *See* Tex. Water Code § 11.1421(d).

II. Senate Bill 3: A New Paradigm for Environmental Flow Protection

The section above provides an in-depth exploration of the statutory basis for protecting environmental flows, including a brief discussion of the framework established in S.B. 3 in 2007. As environmental flow protection in Texas transitions to a system of environmental flow standards and these standards are applied to permits, it is important that the practitioner understand the details of the system as well as the history behind it.

Enacted by the 80th Legislature in 2007, S.B. 3 includes provisions relating to environmental flows, water conservation, and water management and development. House Bill 3 includes almost identical environmental flow provisions. *See* Act of June 15, 2007, 80th Leg., R.S., ch. 1351. The bill established a framework for protecting instream flows and fresh water inflows to bays and estuaries that differs significantly from the case-by-case consideration of individual permits that had historically been done. Under this framework, through a stakeholder-driven process, the commission must adopt, by rule, environmental flow standards, and if appropriate, water set-asides, for each river basin and bay in the state. Through local stakeholder groups, the commission receives input and guidance before adopting any standards or set-asides. Local science teams composed of scientists with expertise regarding the particular basin consider all reasonably available science and provide environmental flow regime recommendations to the stakeholder groups. The Environmental Flows Advisory Group oversees the process, and a statewide science committee coordinates and ensures consistency in environmental flow activities throughout the state.

H.B. 3 and S.B. 3 established a priority order for consideration of certain groups of river basin and bay systems and a time frame for each group. Permit-by-permit consideration of flow conditions in the particular river basin continues to govern the permitting process until standards are in place. Beginning September 1, 2007 (effective date of the legislation), however, any permit or permit amendment that increases the amount of water authorized to be stored, taken, or diverted is subject to a limited re-opener to adjust any flow conditions in the permit based on the eventual adoption of flow standards. As discussed above, environmental flow standards have been adopted for all Texas river basins and associated bay and estuary systems prioritized in H.B. 3 and S.B. 3. *See* 30 Tex. Admin. Code ch. 298. Specifically, rules for environmental flow standards have been adopted for the following: the Sabine and Neches Rivers and Sabine Lake Bay; the Trinity and San Jacinto Rivers and Galveston Bay; the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays; the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays; the

Nueces River and Corpus Christi and Baffin Bays; the Brazos River and its associated bay and estuary system; and the Rio Grande, the Rio Grande estuary, and the Lower Laguna Madre. There is no statutory deadline for adoption of environmental flow standards for the state's minor basins and no indication of when such standards will be adopted.

A. A History of Previous Legislative Efforts

Although this new environmental flows framework was enacted in 2007, the passage of H.B. 3 and S.B. 3 actually represents a multisession effort by legislators, state and local agencies, and various stakeholders to address the issue of environmental flow protection. As discussed above, in 2003 the commission denied applications for instream flow permits by the San Marcos River Foundation (SMRF) and other groups concerned that growing consumptive water demand put at risk instream and fresh water inflow needs. The commission recognized the importance of protecting instream uses and the consideration given environmental needs in the permitting process, but it dismissed the applications because the agency did not have express statutory authority to consider permits exclusively for instream flows as a means of providing for those needs. *See* Order denying the application, TCEQ Docket No. 2003-0027-WR, Mar. 20, 2003. With the 78th legislative session then in progress, the commission's decision brought to the forefront the debate surrounding state policy on environmental flow protection and the potential for statutory changes. Unsuccessful at the commission, proponents of the SMRF and other instream use applications posed the question: If not by a new appropriation of water, then by what mechanism will environmental flows be better protected?

1. S.B. 1639 (78th Legislature)

In response to the issues raised by the commission's decision in the SMRF and other instream use applications, and the need for a more comprehensive approach to environmental considerations in the permitting process, S.B. 1639 was enacted by the 78th Legislature in June 2003. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, §§ 2–3. The legislation adopted a state policy regarding the importance of environmental flow protection and amended certain water right permitting requirements relating to existing instream water uses, water quality, and fish and wildlife habitats, as discussed above. Chiefly, the bill provided a mechanism for further study of the issue through the creation of the Study Commission on Water for Environmental Flows (study commission), which was required to report back to the legislature with recommendations before the start of the 79th session in 2005. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2.

With regard to state policy, S.B. 1639 established that the waters of the state are held in trust for the public; the right to use state water may be appropriated only as expressly authorized by law; and maintaining the biological soundness of the state's rivers, lakes, bays, and estuaries is of great importance to the public's economic health and general well-being. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0235. S.B. 1639 also stated that the commission had no authority to grant water rights exclusively for instream flows dedicated to environmental needs or inflows to the state's bays and estuary systems, but that with the pressures and demands being placed on the water resources of the state, it was of "paramount importance to reexamine the process" for ensuring that environmental flow protections are "effectively addressed in clear delegations of authority to the commission." Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0235. S.B. 1639 also amended section 11.147 of the Texas Water Code relating to the effect of surface water permits on bays and estuaries and instream uses. The bill required the commission to include in a permit, "to the extent practicable when considering all public interests," those conditions considered by the commission necessary to maintain existing instream uses, water quality, and fish and wildlife habitats. Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 3, sec. 11.147. Under previous law, the commission was required only to consider the effect of the issuance of a permit on those environmental factors. *See* Tex. Water Code § 11.147(d), (e); see also the discussion above.

Finally, S.B. 1639 contained several temporary provisions. The section establishing the study commission expired, and the study commission was abolished on September 1, 2005. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0236. New section 11.0237, prohibiting the commission from issuing new permits for instream flows dedicated to environmental needs or bay and estuary inflows, also expired on September 1, 2005. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0237.

2. The Study Commission on Water for Environmental Flows and S.B. 3 (79th Legislature)

In S.B. 1639, the study commission was charged with conducting public hearings and studying policy implications for "balancing the demands on the water resources of the state resulting from a growing population with the requirements of the riverine, bay, and estuary systems." *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0236. The study commission was required to "address ways that the ecological soundness of [the environment and bays and estuaries] will be ensured in the water allocation process." *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0236. The study commission was to appoint a Science Advisory Committee (science committee) that would serve as impartial advisors and reviewers for the study commission. *See* Act of June 20, 2003, 78th Leg., R.S., ch. 1242, § 2, sec. 11.0236.

During the study commission hearings—

> [p]ublic testimony focused on the need for action by the legislature and state resource agencies to address the issue of protecting and providing for environmental flows. Witnesses suggested immediate action should be taken since there were several major water right permit applications pending and there was a need to ensure environmental flow considerations were a part of the assessment process.

Interim Report to the 79th Legislature, at 1. The science committee provided a report to the study commission that made numerous observations and recommendations for scientific improvements, including a recognition that—

> [t]he current climatologic, hydrologic, and aquatic environments vary drastically across the state . . . . This fact must be acknowledged and considered with respect to scientific study, water management strategy implementation, and regulatory permitting. In the future as in the past, basin and subbasin scientific studies must be devised and then implemented.

Science Advisory Committee Report on Water for Environmental Flows, Final Report, Executive Summary viii (Oct. 26, 2004) [hereinafter Science Advisory Committee Report], *available at* www.senate.state.tx.us/75r/senate/commit/c890/downloads/rpt_c890_oct2004.pdf. The science committee report also advised that "[p]articipation by stakeholders and water interests in the environmental flow program and rigorous scientific review are of paramount importance to achieving acceptable environmental flows." Science Advisory Committee Report, at viii. Based on the science committee report and testimony by stakeholders, many of whom described the same limitations of permit conditions discussed earlier in this chapter (see section I.A.2 above), the study commission concluded that with respect to environmental flow protection, continuation of case-by-case consideration of individual water permits in each basin did not provide the certainty necessary for both the environment and water planners and suppliers across the state. Rather, a consistent long-term, science-based adaptive management approach was recommended, based not on special conditions devised in response to individual permits but on comprehensive standards developed for each river basin and bay system in the state. *See generally* Interim Report to the 79th Legislature, at 11–17. In addition to better developed basin-specific science, the concept outlined in the report was designed to allow "local issues to be considered and local solutions for environmental flow requirements to be developed." Interim Report to the 79th Legislature, at 15. The specific process outlined in the study commission report was based on a consensus proposal developed by a stakeholders working group made up of environmental interests and water suppliers and developers, including members of the study commission. Interim Report to the 79th Legislature, at 11. The recommendations in the December 2004 report formed the basis of article 1 of S.B. 3 filed in the 79th legislative session in 2005.

S.B. 3, an omnibus water bill with various provisions relating to the development and management of water resources, was considered during the 2005 session but did not pass. Based on the study commission proposal, article 1 of S.B. 3 called for the creation of a basin-wide stakeholders process including a technical evaluation by a local science committee. Based on recommendations from the local stakeholders groups and science teams, the commission would determine a set-aside for each individual basin, if sufficient unappropriated water is available, and standards for environmental flows to be applied to the water rights permitting process. Tex. S.B. 3, 79th Leg., R.S. (2005).

3. *Environmental Flows Advisory Committee*

Although S.B. 3 was not enacted during the 79th legislative session and the study commission expired by operation of law on September 1, 2005, the framework laid out in the bill was still considered viable by many in the water community. With a solid consensus of affected stakeholders still willing to move forward, on October 28, 2005, Governor Rick Perry issued Executive Order RP50 relating to the creation of an environmental flows advisory committee to address requirements for instream flows for Texas rivers and streams and requirements for fresh water inflows into Texas bay and estuary systems. Specifically, the governor's order stated: "[T]he Study Commission on Water for Environmental Flows . . . laid important groundwork for establishing a method to integrate the vital issues of economic development and the protection of instream flows and freshwater inflows to bays and estuaries with specific recommendations . . . ." Tex. Gov. Exec. Order No. RP50, 30 Tex. Reg. 7798 (2005) [hereinafter Executive Order No. RP50]. In order to continue the work of the study commission, the executive order created the Environmental Flows Advisory Committee (EFAC). The EFAC was charged with developing and recommending a process that would achieve a consensus-based regional approach to integrate environmental flow protection into the water allocation process while assuring that human water needs are satisfied. Executive Order No. RP50. The EFAC was to examine the relevant issues and make recommendations for commission action and legislation, using the December 2004 report of the study commission as a starting point. Executive Order No. RP50.

Following extensive testimony, the EFAC decided to "focus on providing recommendations to reinforce or improve the provisions in [S.B. 3, 79th Legislature]," rather than work toward some new model or concept. Environmental Flows Advisory Committee, Final Report 4 (Dec. 2006) [hereinafter EFAC Final Report]. The EFAC heard testimony from various interest groups and stakeholders, including testimony from a new science advisory committee appointed to provide technical support. In December 2006 the EFAC issued a report recommending proposed revisions to and refinements of the language contained in S.B. 3 (79th Legislature), such as making express the need for fair and equitable representation of interests on local stakeholders groups set out in the original legislation and the addition of a provision allowing extension for cause of certain deadlines contained in the bill. EFAC Final Report, at 11.

B. S.B. 3 (80th Legislature)

In the 80th legislative session, S.B. 3 was filed. S.B. 3, like its predecessor from the 79th Session, was an omnibus water bill that included provisions relating to environmental flow protection. With the continued support of a diverse group of water interests, article 1 of S.B. 3 provided essentially the same framework for environmental flow protection as first proposed by the study commission before the start of the 79th Legislature in 2005. In addition, H.B. 3, including the environmental flow provisions, was filed. Both H.B. 3 and S.B. 3 were ultimately enacted by the 80th Legislature in May 2007, and the language of the bills is for the most part identical. *See* Act of June 15, 2007, 80th Leg., R.S., ch. 1351, *available at* http://www.lrl.state.tx.us/scanned/sessionLaws/80-0/HB_3_CH_1351.pdf; and Act of May 28, 2007, 80th Leg., R.S., ch. 1430, *available at* http://www.lrl.state.tx.us/scanned/sessionLaws/80-0/SB_3_CH_1430.pdf. For ease of reference, all further citations in this chapter will be to S.B. 3. As briefly laid out above, the provisions of S.B. 3 establish a basin-by-basin process for developing recommendations to meet flow needs. With input from all stakeholders, including conservation and environmental groups and municipal, agricultural, industrial, and other water supply interests, the commission will adopt environmental flow standards for all basin and bay systems in the state.

1. Policy Statements

S.B. 3 amended section 11.0235 to provide encouragement for voluntary water and land stewardship to benefit the water in the state. *See* Tex. Water Code § 11.0235(b). Amended section 11.0235(c) requires the commission to consider and "to the extent practicable" provide for fresh water inflows and instream flows necessary to maintain the viability of the state's streams, rivers, and bay and estuary systems in the commission's regular granting of permits for the use of state waters. Tex. Water Code § 11.0235(c). It also states that, as an essential part of the state's environmental flow policy, all permit conditions relating to fresh water inflows to bays and estuaries and instream flow needs must be subject to temporary suspension if necessary for water to be applied to essential beneficial uses during emergencies. Tex. Water Code § 11.0235(c); *see* 30 Tex. Admin. Code ch. 35 (rules related to emergency suspension of environmental flow set-asides). Numerous policy directives were added, including a statement of the need for specific time frames and prompt action to protect environmental flows, enforcement and more effective water rights administration, improved science and adaptive management, and a consensus-based regional approach throughout the state. *See* Tex. Water Code § 11.0235(d-1), (d-2), (d-4)–(d-6), (f). In addition, section 11.0235(e) was amended to note the importance of detailing how environmental flow standards are to be developed and how those standards will be integrated into the regional water planning and water permitting process. Tex. Water Code § 11.0235(e). Finally, section 11.0235(d-3) states that in those basins in which water is available for appropriation, the commission should establish set-asides below which water will not be available for appropriation. In those basins in which unappropriated water is not sufficient to meet environmental flow standards established by the commission, "a variety of market approaches, both public and private, for filling the gap must be explored and pursued." Tex. Water Code § 11.0235(d-3).

These last policy directions highlight the critical recognition that, although environmental flow standards may set out desired conditions for instream flows and fresh water inflows, they are not a mechanism to actually provide water to meet those conditions. Whether water is unappropriated or otherwise available to meet environmental flow needs is a separate undertaking that will have to consider not only competing needs for water but also the effects of dry periods and droughts on water availability.

2. *Environmental Flows Advisory Group and Environmental Flows Science Advisory Committee*

To oversee the process of developing flow standards, S.B. 3 established an Environmental Flows Advisory Group (advisory group) composed of nine members; three are members of the Texas House of Representatives appointed by the speaker; three are members of the Texas Senate appointed by the lieutenant governor; and three are appointed by the governor. *See* Texas Commission on Environmental Quality, *Environmental Flows Advisory Group*, www.tceq.texas.gov/permitting/water_rights/eflows/group.html. Of the members appointed by the governor, one must come from the Parks and Wildlife Commission, one from the Texas Water Development Board (board), and one from the commission. Tex. Water Code § 11.0236(b), (c). The advisory group must conduct hearings and study public policy implications for balancing the demands on the water resources of the state resulting from consumptive needs with the requirements of the state's rivers and bay systems. *See* Tex. Water Code § 11.0236(i). The advisory group must also address ways to ensure the ecological soundness of rivers, bays, and estuaries in the water rights administration, enforcement, and water allocation process, and appropriate methods of encouraging voluntary conversions of existing water rights for environmental flow protection. *See* Tex. Water Code § 11.0236(i). The advisory group was required to submit a report to the governor and legislature not later than December 1, 2008, and every two years thereafter, summarizing hearings and studies, legislative recommendations, and progress on the development of flow recommendations. *See* Tex. Water Code § 11.0236(*l*). The legislation also established a statewide environmental flows science committee (science committee) composed of between five and nine members. The science committee must provide the advisory group with scientific expertise and make recommendations for environmental flow protection. *See* Tex. Water Code § 11.02361; see also Texas Commission on Environmental Quality, *Texas Environmental Flows Science Advisory Committee*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/txenvironmentalflowssac.html.

3. *Priority of Systems and the Development of Environmental Flow Regime Recommendations*

S.B. 3 established a priority order for the development of environmental flow regime recommendations and adoption of environmental flow standards by the commission. In descending order, the priority is as follows:

Group 1: The river basins and bay systems of the Trinity and San Jacinto Rivers and Galveston Bay, and the Sabine and Neches Rivers and Sabine Lake Bay.

Group 2: The river basins and bay systems of the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays, and the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays.

Group 3: The river basins and bay systems of the Nueces River and Corpus Christi and Baffin Bays; the Rio Grande, the Rio Grande estuary, and the Lower Laguna Madre; and the Brazos River and its associated bay and estuary system.

Tex. Water Code § 11.02362(b).

With respect to each river basin and bay system in the priority groups, the advisory group is required to appoint a basin and bay area stakeholders committee (stakeholders committee) that in turn must establish a basin and bay expert science team (science team) within six months. *See* Tex. Water Code § 11.02362(f), (i). Each stakeholders committee consists of at least seventeen members and must reflect a fair and equitable balance of interest groups concerned with each particular river basin and bay system. The group must be representative of appropriate stakeholders, including certain interest groups enumerated in the legislation. *See* Tex. Water Code § 11.02362(f); *see also* Texas Commission on Environmental Quality, *Environmental Flows*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows (committee membership and information).

Each science team must include technical experts who have special expertise regarding the river basin and bay system or the development of environmental flow conditions. *See* Tex. Water Code § 11.02362(i); *see also* Texas Commission on Environmental Quality, *Environmental Flows*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows (committee membership and information). Each science team is required to develop environmental flow analyses, defined in the legislation as "the application of a scientifically derived process for predicting the response of an ecosystem to changes in instream flows or freshwater inflows." Tex. Water Code § 11.002(15). Each science team must recommend an environmental flow regime for the river basin and bay system for which the team is established. Tex. Water Code § 11.02362(m). Environmental flow regimes are defined as—

> a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment and to maintain the productivity, extent, and persistence of key aquatic habitats in and along the affected water bodies.

Tex. Water Code § 11.002(16). "In developing the analyses and recommendations, the science team must consider all reasonably available science, without regard to the need for water for other uses, and the science team's recommendations must be based solely on the best science available." Tex. Water Code § 11.02362(m).

Each science team is required to submit its analyses and flow regime recommendations to the stakeholders committee, the advisory group, and the commission. The stakeholders committee and the advisory group are prohibited from changing the analyses or recommendations of the science team. Tex. Water Code § 11.02362(n). The stakeholders committee, however, must review the analyses and recommendations, considering them with other factors such as present and future water needs, and submit recommendations to the commission and advisory group. Tex. Water Code § 11.02362(o). The advisory group, if appropriate, will also submit comments on the science teams' analyses and recommendations to the commission within six months of receipt. *See* Tex. Water Code § 11.02362(q).

S.B. 3 provided that in the event that the commission, by permit or order, has established an estuary advisory council with specific duties related to implementing permit conditions for environmental flows, the council may continue and must act as the stakeholders committee, subject to the same operational and membership requirements as other stakeholders committees. *See* Tex. Water Code § 11.02362(r). The Nueces Estuary Advisory Council is the only estuary advisory council in existence in Texas and was created by an Agreed Order issued by the Texas Water Commission (predecessor agency to the TCEQ) in 1992. The council is charged with assessing the effectiveness of water management strategies, including fresh water inflow requirements relating to Choke Canyon Reservoir, Lake Corpus Christi, and associated estuary systems. In accordance with S.B. 3, the Nueces River and Corpus Christi and Baffin Bays Stakeholder Committee is composed of members of the Nueces Estuary Advisory Council along with additional stakeholders meeting the membership requirements.

With regard to the Rio Grande Basin and bay system, in developing flow regime recommendations, the applicable science team must exclude any uses attributable to Mexican water flows for the Rio Grande below Fort Quitman and may not recommend any flow regime that would result in violation of a treaty or court decision. *See* Tex. Water Code § 11.02362(n), (o). In developing its recommendations, the Rio Grande stakeholder committee must also consider the water accounting requirements of any international water sharing treaty, minutes and agreements applicable to the Rio Grande, and the effects of allocation of water on the Rio Grande watermaster in the middle and lower

Rio Grande. Tex. Water Code § 11.02362(o). See Chapter 14 of this book regarding multi-jurisdictional water rights to the Rio Grande.

4. *Time Frames for Development of Recommendations and Adoption of Environmental Flow Standards*

Generally, the time frame provided that once a stakeholders committee established a science team, the science team was given one year to submit its analyses and flow regime recommendations. The stakeholders committee was then given six months to submit its recommendations on the work of the science team. Once the commission received recommendations from both the science team and stakeholders committee, the commission had one year to adopt flow standards for the particular basin and bay system.

Under S.B. 3, the advisory group must also establish a schedule for the development of environmental flow regime recommendations and the adoption of flow standards for river basins and bay systems not listed in the priority groups described above. *See* Tex. Water Code § 11.02362(e). Requiring the advisory group to establish a schedule for all other basins in the state in no way prohibits "an effort to develop information on environmental flow needs and ways in which those needs can be met by a voluntary consensus-building process" in those basins. *See* Tex. Water Code § 11.02362(e). For example, the Caddo Lake Institute, a nonprofit scientific and educational corporation, in partnership with the Nature Conservancy, has been working with multiple agencies, universities, and other interested stakeholders to assess and develop the flow needs of Caddo Lake in the Cypress Basin.

5. *Adoption of Environmental Flow Standards and Set-Asides by the Commission*

S.B. 3 requires the commission, by rule, to adopt environmental flow standards for each river basin and bay system in this state "that are adequate to support a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors." Tex. Water Code § 11.1471(a)(1). Section 11.1471 requires the commission to establish an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards "to the maximum extent reasonable when considering human water needs." Tex. Water Code § 11.1471(a)(2). The commission is also required to create procedures for implementing adjustments of permit conditions established before the adoption of standards or set-asides. *See* Tex. Water Code § 11.1471(a)(3).

In adopting flow standards, the commission must consider the following: the geographical extent of the river basins and bay systems as adopted by the advisory group and by the board, schedules established by the advisory group, environmental flow analyses and recommended flow regimes developed by the science teams, stakeholders committee recommendations regarding the suggested flow regime, comments submitted by the advisory group, specific characteristics of the system, economic factors, human and other competing water needs, all reasonably available science, and any other appropriate information. *See* Tex. Water Code § 11.1471(b). Environmental flow standards adopted by the commission must consist of "a schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location in a river basin and bay system." *See* Tex. Water Code § 11.1471(c). As mentioned above, the commission has, by rule, adopted flow standards for each of the priority basins after consideration of recommendations made by the various stakeholders committees and science teams established by S.B. 3.

6. *Effect of New Environmental Flow Standards and Set-Asides on the Permitting Process*

S.B. 3 amended various permitting provisions of the Texas Water Code to integrate requirements relating to environmental flow standards and set-asides. Specifically, the legislation amended section 11.023 of the Water Code to provide that state water may be appropriated for certain enumerated purposes, *only* to the extent that such water has not been set aside by the commission to meet environmental flow needs (emphasis added). *See* Tex. Water Code § 11.023(a). Amended section 11.134, relating to conditions for the issuance of a permit by the commission, adds consideration of any applicable environmental flow standards. *See* Tex. Water Code § 11.134(b)(3)(D). Section 11.147 was amended (relating to the effect of a permit on bays and estuaries and instream uses) to require the commission to apply any applicable environmental flow standards, including any set asides, for the purpose of determining the environmental flow conditions necessary to maintain fresh water inflows, existing instream uses and water quality, or fish and aquatic wildlife in the permitting process. *See* Tex. Water Code § 11.147(e-3). The commission is also prohibited from issuing a permit for a new appropriation or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted, if the permit or amendment would impair any flow set-aside established by the commission. Permits or amendments to existing water rights that increase the amount of water authorized to be stored, taken, or diverted issued after adoption of flow set-asides must contain provisions to ensure protection of the set-aside. *See* Tex. Water Code § 11.1471(d).

With respect to an environmental flow set-aside (for a river basin other than the middle and lower Rio Grande), the priority date assigned to a set-aside is the date that the commission receives environmental flow regime recommendations from the applicable science team. *See* Tex. Water Code § 11.1471(e). The set-aside must also be included in the appropriate water availability models in connection with permits for a new appropriation or amendments to existing water rights that increase the amount of water authorized to be stored, taken, or diverted. *See* Tex. Water Code § 11.1471(e). See Chapter 12 of this book relating to the commission's use of water availability models in the evaluation of water rights.

7. *TCEQ Rulemaking for the Trinity and San Jacinto Rivers and Galveston Bay and the Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Systems; the S.B. 3 Inaugural Rule Package*

On April 20, 2011, the TCEQ adopted environmental flow standards for the river basin and bay systems of the Trinity and San Jacinto Rivers and Galveston Bay, and the Sabine and Neches Rivers and Sabine Lake Bay. *See* 30 Tex. Admin. Code ch. 298; *see also* Texas Commission on Environmental Quality, *Environmental Flows*, www.tceq.state.tx.us/permitting/water_rights/wr_technical-resources/eflows. Serving somewhat as guinea pigs, the scientists, stakeholders, and other interested parties worked their way through the maze of S.B. 3–mandated meetings and decisions. Volumes of technical guidance documents were developed by the Texas Environmental Flows Science Advisory Committee to support the development of environmental flow regimes. *See* Texas Commission on Environmental Quality, *Environmental Flows Science Advisory Committee*, www.tceq.state.tx.us/permitting/water_rights/wr_technical-resources/eflows/txenvironmentalflowssac.html.

A new desktop methodology, the Hydrology Based Environmental Flow Regime (HEFR) method, was created to assist in examining historical hydrology and how that relates to environmental flow needs. *See* Texas Commission on Environmental Quality, *Environmental Flows Science Advisory Committee*, http://www.tceq.state.tx.us/permitting/water_rights/wr_technical-resources/eflows/txenvironmentalflowssac.html.

Relying on existing data, studies, tools, and best professional judgment, extensive reports were generated by the basin and bay expert science teams in compressed time frames. The diverse stakeholders had to not only understand the complex technical findings and supporting science, they also had to impose policy considerations for the whole basin and bay system on top of the expert science teams' recommendations. *See* Texas Commission on Environmental Quality, *Sabine and Neches Rivers and Sabine Lake Bay Basin and Bay Area Stakeholder Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/sabineneches sabinelakebay.html; Texas Commission on Environmental Quality, *Trinity and San Jacinto Rivers and Galveston Bay Stakeholder Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/trinsanjacgalbaystake.html.

It would be fair to characterize the first round of environmental flow standards development as challenging. In the Sabine-Neches basins, the science team reached consensus but failed to produce a specific fresh water inflow recommendation for Sabine Lake; the stakeholders committee made no environmental flow regime recommendations and asked the TCEQ to not adopt any standards. In the Trinity-San Jacinto basins, the expert science team could not develop a consensus environmental flow regime recommendation and instead provided two separate recommendations; the stakeholders committee also did not reach consensus and instead provided two separate recommendations.

The proposed TCEQ rules drew 2,400 comment letters, with a vast majority of them expressing concern, particularly with respect to the commission's decision not to establish any environmental flow set-asides in the basins. Other major concerns expressed in the comment letters related to the number of measuring points in each basin, whether all components of a flow regime were addressed, the specific flow levels selected for protection (some of which were lower than any protective conditions imposed historically by TCEQ), how the standards may affect future availability, and whether the TCEQ would review site-specific studies or data in water right applications. Ultimately, TCEQ staff made few changes in response to the comments, and the flow standards were adopted without achieving the consensus envisioned by S.B. 3. A discussion of the comments and TCEQ responses, as well as the final adopted rule, are available at www.tceq.texas.gov/assets/public/legal/rules/hist_rules/Complete.07s/07049298/07049298_ado_clean.pdf. Sensing, however, the need for additional clarification and for collaboration with interested parties, the TCEQ commissioners directed agency staff to develop an implementation guidance document explaining how the new rules will be applied. TCEQ staff began the process of gathering input in June 2011. As discussed above, on June 1, 2015, the TCEQ posted on its Web site a set of proposed guidelines with a request for stakeholder input, but no date has been given for adoption of a final document. One takeaway message from the commissioners' deliberation at the April 20, 2011, TCEQ hearing was that the agency's task would be much easier if it was presented with consensus recommendations from the S.B. 3 participants.

8. TCEQ Rulemaking for the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays and the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Systems

On August 8, 2012, the TCEQ adopted environmental flow standards for the second priority group of basins outlined in S.B. 3, the river basin and bay systems of the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays and the Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays. *See* 30 Tex. Admin. Code ch. 298.

As with the first round of environmental flow standards development, the members of each science team and stakeholders committee worked through large amounts of data, reports, and presentations, participated in rigorous discussion and debate, and developed their recommendations, all within the required time frame. *See* Texas Commission on Environmental Quality, *Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Basin and Bay Area Stakeholder Committee and*

Expert Science Team, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/colorado-lavaca-bbsc; Texas Commission on Environmental Quality, *Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Area Stakeholder Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/guadalupe-sanantonio-bbsc. While the second round of standards development was no less challenging than the first, there was progress in terms of producing consensus recommendations. The Colorado-Lavaca basins science team, as well as its stakeholders committee, reached consensus recommendations. In the Guadalupe-San Antonio basins, the science team reached consensus. While the stakeholders committees' recommendations did not achieve unanimous support, the recommendations were supported by a supermajority of the members.

As with the first round of rulemaking, the proposed TCEQ rules drew a large volume of comment letters, many of which expressed concern that the draft rules did not include all of the stakeholders committee recommendations, even with the consensus efforts. A discussion of the comments and TCEQ responses, as well as the final adopted rule, are available at www.tceq.texas.gov/assets/public/legal/rules/hist_rules/Complete.11s/11059298/11059298_ado_clean.pdf. Ultimately, the commissioners adopted a version of the draft rules that addressed some of the issues raised in public comments. In their responses to comments, the TCEQ did note that S.B. 3 provides that the commission, adopt the final standards after their own analysis that includes *consideration* of the stakeholders' recommendations. Various commentors, however, urged that, going forward, the TCEQ remain mindful of the valuable participation of individuals in the S.B. 3 process and consider increased dialogue and transparency between the agency and the stakeholders committees during the development of recommendations.

9. TCEQ Rulemaking for the Nueces River and Corpus Christi and Baffin Bays, the Rio Grande, the Rio Grande Estuary, the Lower Laguna Madre, and the Brazos River and Its Associated Bay and Estuary System

On February 12, 2013, the TCEQ adopted environmental flow standards for the third priority group of basins outlined in S.B. 3, the river basin and bay systems of the Nueces River and Corpus Christi and Baffin Bays, the Rio Grande, the Rio Grande estuary, and the Lower Laguna Madre, and the Brazos River and its associated bay and estuary system. *See* 30 Tex. Admin. Code ch. 298. As in the other priority basins, science team and stakeholders committees for the basin and bay systems produced recommendations to the commission, with the exception of the Rio Grande. The Rio Grande science team split into two subgroups and developed separate science team reports for the Upper Rio Grande and Lower Rio Grande. The Rio Grande stakeholders committee, however, did not produce a report. *See* Texas Commission on Environmental Quality, *Nueces River and Corpus Christi and Baffin Bays Basin and Bay Area Stakeholders Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/nueces-river-and-corpus-christi-and-baffin-bays-stakeholder-committee-and-expert-science-team; Texas Commission on Environmental Quality, *Brazos River and Associated Bay and Estuary System Stakeholders Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/brazos-river-and-associated-bay-and-estuary-system-stakeholder-committee-and-expert-science-team; Texas Commission on Environmental Quality, *Rio Grande, Rio Grande Estuary, and Lower Laguna Madre Basin and Bay Area Stakeholders Committee and Expert Science Team*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows/rio-grande-rio-grande-estuary-and-lower-laguna-madre.

As with the previous rounds of rulemaking, the proposed TCEQ rules drew a large volume of comments, many citing various concerns or suggestions for revision to the proposed rules in areas where the proposed rules deviated from the recommendations of the applicable stakeholders committees or science teams. A discussion of the comments and TCEQ responses, as well as the final adopted rule, are available at www.tceq.texas.gov/assets/public/legal/rules/hist_rules/Complete.13s/13009298/13009298_ado_clean.pdf.

One item of note is that, after the adoption of the third set of rules relating to the priority basins, the commission has not established any set-asides as part of the environmental flows rules adopted thus far. For example, with respect to the Nueces, Brazos, and Rio Grande bay basin areas, the commission, in response to comments critical of the decision, stated that set-asides were not reasonable because of limited water availability. The commission did note, however, that after gaining further experience with implementation of environmental flow standards, as part of the adaptive management process, the commission would be willing to revisit the issue. However, even with water available to meet part of the adopted flow standards in other river basins, the commission chose not to establish set-asides, instead stating that the commission was of the opinion that the environmental flow standards may be adequately protected by special conditions in water right permits or amendments for new appropriations of water. *See, e.g.*, Texas Commission on Environmental Quality, *Chapter 298—Environmental Flow Standards for Water Rule Project No. 2007-049-298-OW* 47, *available at* www.tceq.texas.gov/assets/public/legal/rules/hist_rules/Complete.07s/07049298/07049298_ado_clean.pdf (discussing the Sabine and Neches Rivers and Sabine Lake Bay rule adoption).

10. Prohibition on New Appropriations for Instream Uses

As discussed above, S.B. 1639, enacted during the 78th legislative session, included a prohibition on the issuance of instream use permits; however, that provision expired on September 1, 2005. S.B. 3 includes a provision, without expiration, that expressly prohibits the commission from issuing a new permit for instream flows dedicated to environmental needs or bay and estuary inflows. The commission is authorized, however, to approve an application to amend an existing permit or certificate of adjudication to change the use or to add a use for instream flows dedicated to environmental needs or bay and estuary inflows. Tex. Water Code § 11.0237.

11. Re-Opener Provisions

S.B. 3 requires any permit for a new appropriation or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted to include a provision allowing the commission to adjust the conditions included in the permit or amended water right to provide for protection of instream flows or fresh water inflows if needed to achieve compliance with applicable environmental flow standards. Tex. Water Code § 11.147(e-1). With respect to an amended water right, the commission may adjust only conditions that relate to the increase in the amount of water to be stored, taken, or diverted. *See* Tex. Water Code § 11.147(e-1).

Permits in existence before the effective date of S.B. 3 would not be affected. *See* Tex. Water Code § 11.147(e-1). With respect to permits issued beginning September 1, 2007, the commission must determine whether adjustment is appropriate through an expedited public comment period. Such adjustment must (1) not increase the amount of the pass-through or release requirement for the protection of instream flows or fresh water inflows by more than 12.5 percent of the annualized total of the requirement, (2) be based on consideration of priority dates and diversion points of other water rights in the basin subject to adjustment, and (3) be based on consideration of any contributions to the Texas Water Trust or voluntary amendments to existing water rights for environmental flows that contribute to meeting the applicable flow standards. *See* Tex. Water Code § 11.147(e-1)(1)–(3). Any water right holder who makes a contribution or amends a water right for environmental flows is entitled to credit for the benefits of the contribution or amendment against any required permit adjustment. Tex. Water Code § 11.147(e-2). The TCEQ's draft guidelines, discussed above, include a proposed technical procedure for making adjustments pursuant to the re-opener provisions of S.B. 3.

12. Continued Periodic Review of Flow Standards and Abolishment of Advisory Group and Local Committees

In recognition of the importance of adaptive management, S.B. 3 provides for ongoing review and potential refinement of flow standards. Each stakeholders committee, in consultation with its science team, must prepare and submit for approval by the advisory group a work plan. *See* Tex. Water Code § 11.02362(p). The work plan, prepared after recommendations for environmental flow standards have been completed and submitted to the commission, must establish a periodic review of environmental flow analyses, regime recommendations, and flow standards to occur at least once every ten years; recommend specific monitoring and studies; and establish a schedule for validation and refinement of flow standards and strategies to achieve those standards. *See* Tex. Water Code § 11.02362(p)(1)–(3). Work plans for each of the priority basins have been prepared by the applicable stakeholders committees with the exception of the Rio Grande stakeholders committee. *See* Texas Commission on Environmental Quality, *Environmental Flows*, www.tceq.texas.gov/permitting/water_rights/wr_technical-resources/eflows (links to individual stakeholders committee work plans).

The commission is allowed to alter an environmental flow standard or set-aside in a rulemaking process undertaken in accordance with a schedule established by the commission and involving stakeholder participants from the particular basin. In establishing a schedule, the commission is required to consider the work plan submitted by the applicable stakeholders committee. The rulemaking process may not occur more frequently than once every ten years, unless the stakeholders work plan provides for periodic review to occur more frequently. In that case, if the commission finds the schedule appropriate, the review and rulemaking may be undertaken together. *See* Tex. Water Code § 11.1471(f).

At the conclusion of the adoption of flow standards by the commission for all the river basin and bay systems in the state, the advisory group, science advisory committee, and all stakeholders committees and science teams are abolished. See Tex. Water Code §§ 11.0236(m), 11.02361(g), 11.02362(s). The abolishment date is unknown at this time, since the advisory group has not adopted a schedule for developing environmental flow standards for the nonpriority river basin and bay systems in the state. In addition, as of the publication date of this edition, the advisory group has not yet conducted hearings relating to balancing consumptive and environmental needs or encouraging voluntary conversions of existing rights for environmental flow protections, as discussed in section II.A above.

13. Emergency Suspension

Before the passage of S.B. 3, section 11.148 of the Texas Water Code provided that permit conditions relating to fresh water inflows and instream uses could be suspended by the commission if the commission finds that an emergency exists and cannot practically be resolved in other ways. *See* Tex. Water Code § 11.148(a). S.B. 3 likewise makes clear that a set-aside could temporarily be made available for other beneficial uses in emergency situations. *See* Tex. Water Code §§ 5.506(a–1), 11.148(a–1). A suspension of a set-aside is subject to the same process provided for the suspension of permit conditions. *See* Tex. Water Code § 11.148(b), (c); see also section I.A.4 above relating to procedures for the suspension of special permit conditions.

III. Conclusion

Maintaining the fishery and aquatic wildlife resources and the ecological processes of riverine and bay systems is an increasingly important and complex task as the demands on finite water sources rise with the needs of a fast-growing state. With the transition from permit-by-permit protection of environmental flows to the imposition of environmental flow standards for complete river and bay systems continues, the practitioner must carefully navigate the Texas Water Code to determine how a water project will be evaluated in water rights permitting. While environmental flow standards have been adopted for many river basins and bay systems in the state, there are few permits to which the standards have been applied that can serve as guidance for implementation of the rules. In addition, environmental flow standards for nonpriority basins have yet to be adopted. Thus, today's practitioner must remain aware of both pre– and post–S.B. 3 procedure as well as the history behind the legislation.

CHAPTER 12

Determining Surface Water Availability

Kathy Alexander Martin[1]

I. Introduction

When the Texas Commission on Environmental Quality (TCEQ) considers an application for a new appropriation of surface water, it must consider, among other factors, whether the permit will impair either existing water rights or vested riparian rights, and whether "unappropriated water is available in the source of supply." *See* Tex. Water Code § 11.134(b)(2); see also Chapter 9 of this book for a discussion of water rights applications. This chapter will describe the water availability models (WAMs) and the hydrologic analysis that the TCEQ uses to support these required findings. Before examining a description of the computer models, it will be instructive to take a brief look at what Texas courts have said on the subject.

II. Water Availability in the Courts

In *Lower Colorado River Authority v. Texas Department of Water Resources*, 689 S.W.2d 873 (Tex. 1984), referred to as the *Stacy Dam* or *Stacy* case, the Texas Supreme Court reviewed a challenge to a finding of water availability made by the Texas Department of Water Resources, a predecessor agency to the TCEQ. In *Stacy*, the Colorado River Municipal Water District (CRMWD) applied for a permit to appropriate water from the Colorado River. Under state law, the department was barred from issuing a permit for a new appropriation of water unless water remained available in the source of supply after considering senior water rights at their maximum authorized amounts. 689 S.W.2d at 875. The issue was how to determine the amount of water appropriated to senior water rights for purposes of comparison with physical stream flow. 689 S.W.2d at 875–76. The CRMWD urged the agency to subtract from the physical stream flow only that amount of water that had been historically used by senior appropriators and argued that water not yet beneficially used by a senior appropriator could not be considered to be appropriated. 689 S.W.2d at 875–76. Many water rights holders owned more rights on the stream than they actually needed at the time the appropriation was made; for example, municipalities were allowed to appropriate for future needs. Thus, according to the CRMWD, the estimated amount of permitted but unused water, when subtracted from the maximum authorized

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amounts, yielded sufficient "unappropriated water" to support the permit request. On this basis, the CRMWD argued that the unused water should be deemed available for appropriation by someone else who would put it to actual beneficial use. 689 S.W.2d at 874–75. The court held: "[T]he term 'unappropriated water' means the amount of water remaining after taking into account all existing uncancelled permits and filings *valued at their recorded levels*." 689 S.W.2d at 874 (emphasis added).

In the *Stacy* decision, the court quoted from its opinion in *Motl v. Boyd*, 286 S.W. 458 (Tex. 1926), on how to calculate water availability. Contrary to the CRMWD's arguments, in the court's view, the calculation was a simple matter of taking the amount of state water that the agency had previously determined the stream furnished and subtracting from that the amount of state water already appropriated to others. Any amount of water left over is water available for appropriation. *Stacy*, 689 S.W.2d at 880. The court also held that, in this calculation, "the amount of state water already appropriated to others" is the full paper amount of issued water rights, not just the amount of water historically diverted or forecast to be diverted in the future. 689 S.W.2d at 880.

Taken together, the *Stacy* and *Motl* decisions are the foundation of the TCEQ's water availability analysis. In practice, the calculation is more complex than the court's language suggests. At the heart of the complexity are the hydrologic facts that both the amount of state water that a stream furnishes and the amount of that water needed to satisfy all existing water rights vary depending on the specific location in the river basin under consideration. Adding to the complexity is that the amount of state water that a stream furnishes, which TCEQ staff refers to as the *naturalized flow*, cannot be directly measured. Naturalized flow has to be calculated from a number of different sources of data. Other complexities of the availability analysis are discussed in the description of the WAM below.

III. Development of the Texas Water Availability Modeling System

During the 1970s and 1980s, the TCEQ's predecessor agencies developed models for eight of the twenty-three river basins in Texas. *See* Texas Natural Resource Conservation Commission (TNRCC), Documentation for Legacy Water Availability Models Used for Water Rights Permitting (June 25, 1998), on file with the author [hereinafter Documentation for Legacy Models]. By the mid-1990s, the models were outdated and many of the underlying calculations used to support the modeling assumptions were not available. *See* TNRCC, Draft Technical Paper #2, Evaluation of Existing Water Availability Models (1997), on file with the author [hereinafter Technical Paper #2]. In 1997, the Texas legislature authorized funding for the development of modern modeling capability for twenty-two of the twenty-three river basins. Act of June 1, 1997, 75th Leg., R.S., ch. 1010, § 2.08; Act of May 25, 1999, 76th Leg., R.S., ch. 518. The legislation provided funding for the construction of the models and included requirements that the agency provide information to all water rights holders. The models developed as a result of this legislation provide an updated and uniform suite of modeling tools for both planning and water rights permitting.

The purpose of the modeling tools used by the TCEQ and its predecessor agencies was to "allow the staff to obtain a reasonably accurate scientific estimate whether there was 'unappropriated' water at points along the river." *Stacy*, 689 S.W.2d at 875. Because of the complexity associated with accurate calculations of physical stream flow and increasingly complex water management strategies and associated permits, the initial development phase of the Texas WAMs began with a series of technical meetings among agency staff of the TNRCC (now the TCEQ), the Texas Water Development Board (TWDB), the Texas Parks and Wildlife Department, and outside consultants. These technical meetings resolved issues related to choice of the model and attendant technical issues related to model construction and assumptions. Development of the Texas WAM System consisted of five phases, the first two related to the development of naturalized flows for each river system. *See* Technical Paper #2.

IV. Naturalized Flows

Naturalized stream flow represents the flow in a river that would have occurred without human impacts, such as reservoir construction, diversions, and return flows. Naturalized stream flow is the baseline condition for water availability accounting. It is the amount of water that the stream furnishes. *See Stacy*, 689 S.W.2d at 880. For most Texas river systems, the naturalized flow encompasses at least a fifty-year period of record that includes the drought of the 1950s, recognized as an extremely severe drought throughout much of the state. The period of record also includes major floods and less severe droughts, thereby representing an approximation of historic hydrologic variability.

Naturalized stream flows are calculated by first identifying all U.S. Geological Survey (USGS) gauges in a river basin and then selecting a subset of those gauges that meet the requirements for having a sufficient period of record and having no known major issues with the gauge flow data. Development of the naturalized flows consists of two parts: adjusting the gauged flows to approximate predevelopment conditions and filling in or extending the period of record for a gauging station. Gauged flows are adjusted using the following equation:

$$NF = GF + \Sigma D - \Sigma RF + \Sigma E + \Sigma \Delta S$$

where NF is the naturalized flow, GF is the gauged flow, D is all diversions upstream of the gauge, RF is all return flows upstream of the gauge, E is the net reservoir evaporation for all reservoirs upstream of the gauge, and S is the change in content for all reservoirs upstream of the gauge. *See* TNRCC, Draft Technical Paper #1, Evaluation of Naturalized Streamflow Methodologies (1997), on file with the author [hereinafter Technical Paper #1]. Note that this procedure may vary. Some coastal basins have few or no USGS gauges. For example, in the Nueces–Rio Grande Coastal Basin, a rainfall-runoff model was used to estimate stream flow.

A Geographical Information System (GIS) is used to identify water rights locations, reservoirs, and return flow locations. These locations are then grouped within an incremental watershed. An incremental watershed is the area between a downstream gauge and the upstream gauges that contribute flow to that gauge. For gauges at the top of watersheds, the incremental area is simply the watershed area that contributes runoff to that gauge. The naturalized flow adjustments are performed for incremental watersheds. The incremental flow, or the difference between the flows at the downstream gauge and the upstream gauge, is added to the flow at the upstream gauge, and the simulation uses this total flow to determine water availability for water rights.

Data availability determines the level of detail for the adjustments described above. In general, data on the end-of-month content for reservoirs, evaporation rates, and storage/volume/surface area relationships are available for most large reservoirs in Texas. These data are generally unavailable for smaller reservoirs, so they are usually not included in the adjustments. Excluding smaller permitted reservoirs from the flow naturalization process has little effect on the estimates of naturalized flow. *See* Technical Paper #1. Domestic and livestock uses are also not considered in the adjustments. There are no reporting requirements for these users, so quantification of domestic and livestock use is not practical. *See* David Klein & Robin Smith, *Exploring the Scope of Landowner Water Rights for Domestic and Livestock Purposes*, 7 Tex. Tech Admin. L.J. 119, 141 (2007). See also Chapter 3 of this book.

Other issues related to data availability include the accuracy and availability of diversion and return flow data for permitted water rights. For example, the Texas Water Code allows the cancellation of water rights for nonuse. *See* Tex. Water Code § 11.173. Therefore, some water rights owners may tend to overestimate self-reported water use to avoid cancellation for nonuse. For municipal rights with missing data, diversions are estimated using a statistical correlation with population. For water rights with questionable self-reported use for irrigation purposes, the diversions are estimated based on available information or are assumed to be zero. This avoids overestimating the naturalized flow and subsequent water availability. The TCEQ uses this conservative approach to determine the amount of water the stream furnishes to prevent "double permitting" or the stacking of permits or grants of a new appropriation that overlays existing permits. *See Stacy*, 689 S.W.2d at 876.

Specific basins may require other adjustments to account for channel losses and spring flows. Channel losses represent the amount of water available at an upstream point that may not reach the downstream point due to seepage, evapotranspiration, infiltration, or unaccounted-for diversions. The naturalized flow, computed as described above, should already include natural losses. In basins where this is applicable, however, because a portion of the water diverted at an upstream point would not reach the downstream point, channel loss adjustments are included in the flow naturalization process. In some basins, such as the Guadalupe, San Antonio, Colorado, and Rio Grande, the effects of groundwater pumpage and variable spring flows are calculated and removed from the gauged flows so that the gauged flows represent only watershed runoff. Adjustments are performed and the spring flows are added back to the naturalized flow during the simulation.

V. Other Hydrologic and Spatial Data

In addition to the naturalized flow, water availability simulations require evaporation rates for each basin. The U.S. Army Corps of Engineers (USACE) maintains precipitation and evaporation data for major reservoirs. *See* U.S. Army Corps of Engineers, *Query Hydrologic Data on Ft Worth District Lakes*, www.swf-wc.usace.army.mil/cgi-bin/rcshtml.pl?page=Hydrologic. Both the stream flow naturalization process and the water availability simulation use this reservoir-specific information. For all other reservoirs, in particular those that impound less than five-thousand acre-feet of water, if specific information is unknown, the TWDB data sets of precipitation and monthly gross evaporation rates for the entire state for each one-degree quadrangle of latitude and longitude are used. *See* Texas Water Development Board, *Precipitation & Lake Evaporation*, www.twdb.texas.gov/surfacewater/conditions/evaporation/index.asp. Net evaporation rates are derived by subtracting precipitation from evaporation, and they are then used in the simulation for small reservoirs.

Individual water rights are represented spatially at a specific location, known as a *control point*. The simulation requires information including the drainage area of the control point, the relationship between the control point and other control points, and the relationship between the control point and the next upstream and downstream gauge control points. Drainage area information and control point connectivity are derived from the TCEQ's GIS database for each basin. This information is used during the simulation to distribute flows from gauged to ungauged control points so that the model can then calculate the amount of flow available to each water right. Additional information for water rights includes the amount of water authorized for storage and diversion, the associated priority dates, the pattern of monthly water use, and any instream flow requirements or other special conditions that affect water availability.

VI. WRAP and Prior Appropriation Accounting

During the development phase of the Texas WAM System, the Water Rights Analysis Package (WRAP) was selected to model prior appropriation accounting. *See* Technical Paper #2. "Prior appropriation accounting" means that water rights are processed in the order of their priority dates, with senior water rights being fully satisfied before junior rights can divert. *See* Tex. Water Code § 11.027. See also Chapter 3 of this book. WRAP includes three component models: the simulation model SIM, a postprocessing application TAB, and a program to facilitate development of naturalized flows HYD. *See* Ralph A. Wurbs, *Water Rights Analysis Package (WRAP) Modeling System*, (updated Aug. 30, 2013). http://ceprofs.civil.tamu.edu/rwurbs/wrap.htm.

The simulation model SIM is used to determine water availability. SIM reads the water rights, ranks the rights in priority order, and then reads the parameter information for each control point in preparation for flow distribution. SIM executes an annual loop in which naturalized stream flow and evaporation for each month of the year are read. SIM distributes naturalized flow from gauged control points to ungauged control points using a drainage area ratio between the ungauged and gauged control points. SIM then executes a monthly loop. This loop is the basis for calculating the amount of water that each water right can store and divert, the remaining amount available to other rights, and the amount of water available for appropriation to new permits.

In the monthly loop, during each month of the period of record, SIM processes water rights in priority order, with senior water rights processed first. The amount of water needed by an individual water right in any month, the target stream flow depletion, is determined from the authorized diversion amount, the end-of-month reservoir storage from the preceding month, and is limited by any instream flow requirements or other special conditions. The end-of-month content is used to calculate reservoir drawdown and determine the amount of water a reservoir would need to fill completely. SIM assumes that a senior reservoir may fill completely before any water is available to downstream rights. *See* TNRCC, WAM Resolved Technical Issues, Conservation Storage Protection (1999), on file with the author [hereinafter Conservation Storage Protection].

After computing the target stream flow depletion, SIM determines the amount of stream flow available to meet the target. Upstream junior rights do not have access to water needed to meet the depletion needs of downstream senior rights because WRAP incorporates a strict interpretation of the prior appropriation doctrine. In other words, in the water availability simulation, junior rights do not have access to all of the flow at their control point. Any water necessary to meet the demands of a senior right is passed downstream. This includes any water needed to satisfy fully the storage rights of downstream senior reservoirs. *See* Conservation Storage Protection.

As each water right is processed in turn, SIM performs a water balance to determine the stream flow depletion, reservoir evaporation, end-of-month storage, diversion and diversion shortage, instream flow requirement, and instream flow shortage. SIM attempts to meet all or any portion of the water right's depletion demand and then adjusts the stream flow availability at the control point of the water right and all downstream control points. This is accomplished by subtracting stream flow depletions, adding return flows, and adjusting for channel losses, if any. The result is the amount of water remaining to satisfy the needs of junior water rights; any water left over would be available for appropriation to others.

When all basin water rights are processed, SIM computes the regulated, available, and unappropriated flows. The regulated flow is the stream flow at a control point after accounting for all water rights. This is the "actual" physical stream flow and includes water flowing past a point that would be needed by downstream senior water rights. Thus, not all of the regulated flow at a control point may be available to water rights at that point. The available flow is the amount of water a water right can use to meet its target stream flow depletion. The unappropriated flow is the amount of stream flow that is not needed by existing basin water rights and may be available for appropriation to others.

VII. Water Availability Analysis

The TCEQ uses the WAMs to process applications that request new appropriations of state water, to analyze the effects of amendment applications on existing water rights, to process requests for term water (diversion permits for a limited duration or "term"), and to analyze reuse applications. See Chapter 9 of this book for a discussion of these applications. The TCEQ maintains two different versions of the input data sets for each river basin. The full authorization simulation (Run 3) is used to evaluate requests for new appropriations of water and amendments that could potentially affect senior water rights. *See* TNRCC, WAM Resolved Technical Issues, Run 3 and Run 8 of the New WAMs Relating to the Review of New Perpetual Water Right Applications and Term Water Right Applications (2000), on file with the author. The full authorization data set for each river basin assumes that all water rights holders divert their entire authorized amount and that reservoirs are included at their as-built capacity. *See* TNRCC, WAM Resolved Technical Issues, Model Runs (1999), on file with author. This ensures that the actual recorded values of all water rights are deducted from the physical stream flow.

Term water rights are not included in this data set. Term water rights are based on appropriated but unused water and are subordinate to senior appropriative rights. *See* Tex. Water Code § 11.1381(a), (d). See also Chapter 9 of this book. Return flows are also not included in the full authorization data set because these flows are potentially interruptible. *See* 30 Tex. Admin. Code § 297.42(g). Earlier agency models did include return flows. *See* Documentation for Legacy Models. Therefore, some or all of the return flows in the river may have been appropriated to others in past agency permitting actions. Excluding return flows from current permitting decisions for perpetual water rights lessens uncertainty in permitting actions by ensuring that actual physical stream flows do not include flows that could be removed from the stream at any time.

For applications requesting a new appropriation of water, TCEQ staff first compiles parameter information for the diversion point for the new application—that is, the drainage area and location of the point with respect to gauges and other water rights. This information is then inserted into the full authorization data set, along with the priority date of the application and the pattern of use supplied by the applicant. Any instream flow requirements are also included, modeled at the priority date of the application. *See* TNRCC, WAM Resolved Technical Issues, Streamflow Reservations Associated with Permits (1999), on file with the author. Since instream flow requirements are modeled using a priority date, they are treated like any other water right. This means that a downstream senior instream flow requirement could limit diversions and impoundment by an upstream junior water right. Instream flow requirements are usually based on the regulated flow computed at priority date of the underlying water right, unless the model user specifies otherwise.

After the new application is inserted into the WAM, SIM is executed and an output file is generated. The output file contains the diversion amount and shortage, monthly reservoir storage and evaporation, and instream flow information. Additionally, regulated flow, available flow, unappropriated flow, and naturalized flow are written into the output files. The post-processing application, TAB, is used to generate statistical information for the period of record. For water rights diversions, TAB computes the reliability of the diversion. Volume reliability is the percentage of the diversion demand that is actually satisfied, computed for the entire period of record. Period reliability is the percentage of months during the period of record that either the diversion demand is fully met or a specified percentage of the demand is equaled or exceeded.

For applications requesting water for municipal use, the TCEQ does not recommend that an application be granted unless the water requested for appropriation is available 100 percent of the time. *See* 30 Tex. Admin. Code § 297.42(e). That is, the volume reliability and period reliability must both equal 100 percent. For applications requesting a direct diversion from a stream for irrigation use, 75 percent of the requested demand must be available 75 percent of the time. *See* 30 Tex. Admin. Code

§ 297.42(c). The period reliability is used to determine whether the "75/75" criterion is met. If the applicant indicates that an alternative source of water is available, the TCEQ can grant a request that does not meet the "75/75" criterion. The TCEQ evaluates the availability of the alternative source, in particular its availability during drought times when unappropriated water may be unavailable, the reliability of the source, and its quantity and quality to ensure that any water rights granted will be beneficially used without waste. *See* 30 Tex. Admin. Code § 297.42(c). For certain applications, such as system operations or scalping (diversions during times of high streamflows), availability is determined on a case-by-case basis. *See* 30 Tex. Admin. Code § 297.42(d). For these types of applications, the maximum amount of water that could be granted is the maximum amount of unappropriated water available in any given year as determined by the simulation. The TCEQ cannot grant an application for more water than the agency determines the stream furnishes.

If water is unavailable to meet the requested demand, TCEQ staff executes iterative simulations with reduced demands to determine whether any amount of water is available to the applicant. For applications requesting storage of state water, staff performs a simulation to determine whether there is sufficient unappropriated water to refill the reservoir if there are extended periods of time during which the reservoir is empty because there is no available unappropriated water. If so, staff recommends granting the application. An underlying assumption of a water availability simulation is that reservoirs are assumed full at the start of the simulation. This is because the period of record for most basins begins in 1940, generally a wet year in most parts of the state. (Note that WRAP allows the user to specify the storage capacity at the beginning of the simulation as a specified percentage of total reservoir capacity.) If a reservoir cannot refill during the period of record, the assumption is that insufficient water is available for appropriation. In addition, if the reservoir is not full a percentage of the time, inflows of state water appropriated to other water rights could not pass downstream and those water rights could be affected by the application. If the reservoir does not refill, TCEQ staff recommends denial of the application unless the applicant can demonstrate that an alternative source is available that meets the criteria specified in 30 Texas Administrative Code section 297.42(c).

For amendments to existing water rights, TCEQ staff must evaluate whether the proposed change harms other basin water rights. *See* Tex. Water Code § 11.122. The evaluation is conducted by running two simulations using the full authorization data set. The first simulation does not include the new application and represents a baseline condition. The application information is then added to the input data set and a second simulation is performed. TAB is used to calculate volume reliabilities for both simulations, and the results are compared. Volume reliability is used because most water rights authorize an annual amount of water. If the analysis demonstrates effects on the reliabilities of basin rights senior to the amendment application, the TCEQ may recommend that the authorization include special conditions to mitigate these effects. *See* 30 Tex. Admin. Code § 297.45(c), (e). In certain cases, TCEQ staff may also evaluate changes in reservoir storage for downstream reservoirs to ensure that senior storage rights are not impaired by the amendment application. *See* 30 Tex. Admin. Code § 297.42(a).

The current conditions data set for each river basin assumes (1) reported actual diversions for each water right, (2) current capacity for reservoirs, (3) recent return flows, and (4) term water rights. The TCEQ uses the highest annual self-reported use for each water right for a ten-year period to determine the diversion target for each water right in the current conditions data set. This allows the TCEQ to determine whether water that is permitted but unused is available for appropriation for a term of years. *See* Tex. Water Code § 11.1381(a). Requests for term water are processed in a similar manner as those for a new appropriation. The only difference is that the current conditions data sets are used in the simulation. In addition to processing requests for term water, when no water is available for appropriation in the full authorization simulation, the current conditions simulation is used to determine whether term water may be available. In other words, an application for a perpetual water right may be denied and the applicant may instead be allowed to use water for a specified period of time, usually ten years.

Return flows are included in the current conditions simulation; therefore, applications for indirect reuse of treated effluent are also represented in this simulation. See Chapter 24 of this book for a discussion of reuse. The amount of return flows included in the WAM is the minimum reported monthly discharge for each month. The target diversion for a reuse water right is developed based on the actual volume of the return flows that are represented in the WAM. Including reuse diversion in the WAM ensures that water available to a water right, based on an authorization to divert discharged return flows, is not appropriated to more junior water rights. This prevents harm to existing reuse water rights in future agency permitting actions.

VIII. Administrative Findings on the WAM

There are no known court decisions in which the TCEQ's use of the WRAP model, or the modeling assumptions incorporated in that model, have been at issue. However, applications of the WRAP model and WAM datasets, and underlying modeling assumptions, have been issues in administrative proceedings. Issues in these cases have ranged from the accuracy of data inputs to the methods used to determine water availability and injury to other water rights. While such administrative decisions have no precedential value, they can be of persuasive value in later cases.

In the first case to address issues related to the water availability models, protestants to a water rights application asserted that the TCEQ's model did not properly account for channel losses and that the model was not used correctly. *See* Application of Southerland Properties, Inc. for Permit No. 5647 to Appropriate Water, TNRCC Docket No. 2000-1230-WR; SOAH Docket No. 582-01-1272 (final order issued May 16, 2002). The administrative law judge (ALJ) found that although the model might be considered a "black box" with respect to the complex nature of the input data, TCEQ staff experience with the model proved compelling and the ALJ agreed with the TCEQ that the WRAP was useful in the determination of water availability. *See* Proposal for Decision, SOAH Docket No. 582-01-1272, at 24–25, *available at* www.soah.state.tx.us/pfdsearch/pfds/582/01/582-01-1272-pfd.pdf.

In a second case, the TCEQ's use of the WAM to determine injury to other water rights as a result of an amendment was addressed. The City of San Angelo applied to amend its water right to add a downstream diversion point. An issue in this case was whether the move of a diversion point could affect other water rights. The executive director performed an analysis using the WAM and determined that other water rights would not be affected. *See* Application No. 1298B by the City of San Angelo for Amendment to Certificate of Adjudication 14-1298, TCEQ Docket No. 2009-0815-WR; SOAH Docket No. 582-10-0292 (final order issued Mar. 24, 2011). In this case the ALJ found that the WAM is the best hydrologic model available to the TCEQ to assess potential impacts from water rights amendments. *See* Findings of Fact and Conclusions of Law, SOAH Docket No. 582-10-0292, at 6, *available at* www.soah.state.tx.us/pfdsearch/pfds/582/10/582-10-0292-pol.pdf.

Use of the WAMs to determine water availability for term permits was addressed in the application of Bradley B. Ware for an extension of his term permit. *See* Application of Bradley B. Ware to Amend Water Use Permit No. 5594, TCEQ Docket No. 2008-0181-WR, SOAH Docket No. 582-08-1698. Ware filed an application to extend or delete the term on his existing term water use permit. The executive director determined, based on the WAM, that no water was available for a either a term permit or a perpetual permit. The ALJ found that the WAM is designed to be the most accurate method available to determine water availability without regard to the amount of water requested by an application but that the TCEQ is not required by law to use the WAM in this determination. The ALJ recommended that the application be denied. *See* Findings of Fact and Conclusions of Law, SOAH Docket No. 502-08-1698, at 4, 11, *available at* www.soah.state.tx.us/pfdsearch/pfds/582/08/582-08-1698-pol.pdf. The TCEQ commissioners voted to adopt the ALJ's proposal for decision and deny the application. Mr. Ware filed suit in district court appealing the TCEQ's denial of his application and asking the court to reverse the commission's decision or remand the case to the agency for further proceedings. *See Bradley B. Ware v. TCEQ*, Cause No. D-1-GN-10-002342 in Travis County, Texas. The district court ruled in favor of the TCEQ, and Mr. Ware is appealing that decision.

Finally, how water availability should be determined for return flows, a new appropriation, and system operation of existing reservoirs are issues in a pending case concerning the Brazos River Authority's Application for Permit No. 5851, TCEQ Docket No. 2005-1490-WR; SOAH Docket No. 582-10-4184.

IX. Other Uses of the WAMs

As discussed above, the TCEQ uses WRAP and the TCEQ WAM data sets in permitting decisions. The model and data sets have also been used to evaluate environmental flow standards developed in response to the requirements of Senate Bill 3 of the 80th legislative session (2007). *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430. See Chapter 11 of this book regarding environmental flows. Use of the TCEQ WAM for environmental analysis can be limited by the fact that the TCEQ WAM is a monthly accounting model, whereas flows for aquatic habitat protection are measured on a daily or instantaneous basis. The Texas Environmental Flows Science Advisory Committee reviewed various methods for evaluating daily environmental flows standards and their impact on future water supply projects and noted that the monthly WAM "is recognized as the superior method with regard to effectively representing both water availability, consistent with the way TCEQ would evaluate a permit application, and e-flow requirements in the same analysis." *See* Texas Environmental Flows Science Advisory Committee, *Consideration of Methods for Evaluating Interrelationships Between Recommended SB-3 Environmental Flow Regimes and Proposed Water Supply Projects*, Report # SAC-2010-04 (Nov. 12, 2010), *available at* www.tceq.state.tx.us/assets/public/permitting/watersupply/water_rights/eflows/20101112wam_applications.pdf.

The TWDB uses modified versions of the TCEQ WAMs in regional water planning. See Chapter 20 of this book regarding state water planning. The need for flexibility was recognized during the developmental phase of the WAMs. *See* Conservation Storage Protection. For example, in TCEQ permitting decisions, a strict application of prior appropriation is required. For planning purposes, water management strategies that equitably distribute available water within a planning region may modify the prior appropriation doctrine such that an upstream junior reservoir could impound water appropriated to a downstream senior user. A planning model might also include return flows in the full authorization data set to assess the full impacts of all planning strategies. The differing assumptions used in permitting and planning have the potential to generate conflicts in the future; however, this issue has not yet arisen in the courts.

X. Conclusion

The TCEQ uses the water availability models to evaluate applications for the appropriation of state water, amendments to existing water rights, term permits, and reuse authorizations. Depending on the application, the analysis helps determine whether unappropriated water is available and whether the proposed authorization will impair existing water rights. Other potential uses of the models include evaluations conducted as part of the Senate Bill 3 process and support for the state's regional water planning process. As explained in this chapter, although the models are based on scientific principles, the underlying assumptions and application of the models on a case-by-case basis are influenced by legal requirements, both common law and statutory.

CHAPTER 13

Water Rights Enforcement

Robert Martinez[1] and Robin Smith[2]

If water rights are to be protected, water right statutes and rules must be enforced. Water rights permits and laws can be enforced both on the administrative level and in the courts, and violations can be both civil and criminal. Such violations include taking water from a river without a permit as well as violations of permits, rules of the Texas Commission on Environmental Quality (commission or TCEQ), and state statutes. Chapter 11 of the Texas Water Code sets up a system for water rights enforcement by the watermaster in areas where a watermaster has been appointed. In other parts of the state (generally referred to as "non-watermaster areas"), the TCEQ regional staff investigates water rights violations. Persons can also file civil suits alleging water rights violations to attain common-law remedies. *See* Tex. Water Code § 11.0841.

I. Texas Water Code Violations

Several provisions of the Texas Water Code pertain to enforcement of water rights laws and permits. Statutory violations include unlawful use of water, obstruction of waterways and diversion of surface water flow, waste of water, and dam safety and levee construction violations.

A. Unlawful Use of State Water

Several types of unlawful use of state water are prohibited by the Texas Water Code. Subchapter C of chapter 11 of the Code begins with the statement that "no person may willfully take, divert, or appropriate any state water for any purpose without first complying with all applicable requirements" of chapter 11. Tex. Water Code § 11.081. "State water" is defined as follows:

> [t]he water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state.

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Tex. Water Code § 11.021(a). Although this definition is broad, it must be read in connection with case law that distinguishes between surface water runoff and water in a watercourse. *See Dietrich v. Goodman*, 123 S.W.3d 413, 418 (Tex. App.—Houston [14th Dist.] 2003, no pet.). In general, state water is water in a watercourse or bay of the state. Also, section 11.021(b) provides that state water is water imported from any source outside the state for use in the state and transported through the bed and banks of a navigable stream in the state or by using any facilities owned or operated by the state. Tex. Water Code § 11.021(b). See Chapter 14 of this book for a discussion of interstate compacts and treaties.

Section 11.081 makes it unlawful to "take, divert, or appropriate" state water without authorization. "Appropriate" is not specifically defined in the Code. Section 11.002(6) defines "appropriator" as a person who has made beneficial use of any water in a lawful manner under the 1913 Act (Burgess-Glasscock Act, 33d Leg., R.S., ch. 171 (which required a person claiming water to file a record of his appropriation)) or has made beneficial use within the limitations of a permit lawfully issued by the commission or one of its predecessors. Tex. Water Code § 11.002(6).

It is unlawful for a person to willfully open, close, change, or interfere with any headgate or water box without lawful authority or to willfully use water or conduct water through the person's ditch or upon his land unless he is entitled to do so. Tex. Water Code § 11.083. No person may sell or offer to sell a permanent water right unless he has obtained a water right from the commission or a predecessor agency. Tex. Water Code § 11.084. Additionally, no one may willfully cut, dig, break down, destroy, injure, or open a gate, bank, embankment, or side of any ditch, canal, reservoir, flume, tunnel or feeder, pump or machinery, building, structure, or other works that is the property of another or in which another owns an interest or possesses, and that is used for milling, mining, manufacturing, the development of power, domestic purposes, agricultural uses, or stock raising, with the intent to injure, gain personal advantage, or take or steal the water. Tex. Water Code § 11.088.

Other prohibited acts include owning, leasing, or operating a ditch, canal, or reservoir, or cultivating land that abuts a reservoir, ditch, flume, canal, waterway, or lateral, and permitting Johnson grass or Russian thistle to go to seed on the waterway within ten feet of the high-water line if the waterway crosses or lies on the owned or controlled land. This prohibition does not apply in Tom Green, Sterling, Irion, Schleicher, McCullough, Brewster, Menard, Maverick, Kinney, Val Verde, and San Saba counties. Tex. Water Code § 11.089. Also, no one may deposit the carcass of any dead animal, tin cans, discarded buckets or pails, garbage, ashes, bailing or barbed wire, earth, offal, refuse of any character, or any other article that might pollute the water or obstruct the flow of a canal or similar structure into any canal, lateral, reservoir, or lake used for a lawful purpose listed in chapter 11. Tex. Water Code § 11.090.

B. Obstruction of Waterways, Diversion of Surface Water Flow, and Interference with Water Deliveries

In addition to the prohibited unlawful use of state water, the Water Code establishes that obstructing a navigable stream, impounding or diverting surface water runoff, and interfering with deliveries of water are violations of chapter 11. No person may obstruct the navigation of any stream that is navigable in fact by cutting and felling trees or by building on or across the stream any dike, milldam, bridge, or other obstruction. Tex. Water Code § 11.096. A stream is "navigable in fact" if, "in its natural and ordinary state, it can be used for travel or commerce." Black's Law Dictionary 1056–57 (8th ed. 1999). The TCEQ will investigate a reported natural obstruction on a navigable stream caused by the accumulation of limbs, logs, leaves, other tree parts, or other debris, on its own motion or on written request from a commissioners' court. Tex. Water Code § 11.097(a). The commission will initiate action to remove the obstruction if it determines that the obstruction is creating a hazard or is having other detrimental effects on the stream. Tex. Water Code § 11.097(b).

Likewise, diverting or impounding the natural flow of surface waters, or allowing such diversion to continue, in a manner that damages the property of another by the overflow of the diverted or impounded water is prohibited. Tex. Water Code § 11.086(a). A person whose property is injured by an overflow of water caused by an unlawful diversion or impounding has "remedies at law and in equity and may recover damages occasioned by the overflow." Tex. Water Code § 11.086(b). See Chapter 39 of this book for further discussion.

The construction and maintenance of levees for flood control or the construction of canals for water conveyances for authorized purposes are not prohibited or affected by section 11.086. Canals, lateral canals, or ditches may not be constructed if they obstruct a river, gully, slough, ditch, or other well-defined natural drainage. Tex. Water Code § 11.086(c). If gullies or sloughs have cut away or intersected the banks of a river so that floodwaters from the river overflow the land nearby, the owner of the flooded land may fill the mouth of the gullies or sloughs up the height of the banks of the river without liability to other property owners. Tex. Water Code § 11.086(d).

Water released from a dam or reservoir on an international stream, when such water is designated for storage downstream by a specified user legally entitled to receive, it may not be stored, diverted, appropriated, or used by anyone else, and no one else may interfere with its passage downstream. Tex. Water Code § 11.087. The commission has implemented this statute in 30 Texas Administrative Code chapter 303, rules concerning the watermaster operations in the Middle and Lower Rio Grande. *See* 30 Tex. Admin. Code §§ 303.34(a)(1), 303.35. The temporary diversion of water in an international stream may be authorized by the watermaster for use by holders of water rights for water that spills from dams and reservoirs and would otherwise flow into the Gulf of Mexico without being used. *See* Tex. Water Code § 11.0871. Under commission rule, persons may obtain an excess flow permit for irrigation use of the Texas share of water in the Rio Grande below the International Boundary and Water Commission gauging station near Brownsville, Texas, that is not being beneficially used. *See* 30 Tex. Admin. Code § 303.61. See also Chapter 14 of this book.

Interference with the delivery of conserved or stored water under Water Code section 11.042, the bed and banks statute, is prohibited. Tex. Water Code § 11.091.

C. Waste of Water

The waste of water, like the actions described above, also violates Water Code chapter 11. A person who owns or has a possessory right to land contiguous to a canal or irrigation system and who acquires the right by contract to use the water from it commits waste if he allows wasteful use of the water or allows the water to be applied to anything but beneficial use. Tex. Water Code § 11.092. The commission shall declare this wasteful use to be a public nuisance and act to abate the nuisance by directing the water supplier to close the water gates of the person wasting the water and keep them closed until the commission has determined that the wasteful use has been corrected. Tex. Water Code § 11.093(b). No person may operate or attempt to operate any waterworks or irrigation system, or use water from such a system, if it has been declared a public nuisance. Tex. Water Code § 11.094. A person who permits an unreasonable loss of water through faulty design or negligent operation of any waterworks that use water for a purpose listed in chapter 11 commits waste, and the commission may declare the use a public nuisance. Tex. Water Code § 11.093(a). The commission may act to abate the waste, and any person injured by the waste may sue in district court to have the operation of the works abated as a public nuisance. Tex. Water Code § 11.093(a).

D. Water Use Reports

All water right holders that "divert, impound, or otherwise use" state water must file a water use report by March 1 of every year. Tex. Water Code § 11.031(a). Water right holders must also maintain monthly water use records and produce them to the TCEQ on request. Tex. Water Code § 11.031(d). The penalty for not filing this report or not providing the TCEQ with monthly data on request ranges from $100 per day if the amount authorized in the water right is 5,000 acre-feet or less per year to $500 per day if the amount authorized in the water right is more than 5,000 acre-feet. Tex. Water Code § 11.031(b). The fee may be waived in watermaster areas, which have their own reporting requirements in the TCEQ rules.

E. Dams and Levees

In addition to the violations involving the use of state water and the obstruction of waterways, the Water Code addresses dam safety and levee construction enforcement. *See* Tex. Water Code §§ 12.052 (dam safety), 16.236 (levee construction). Section 12.052(a) provides that the TCEQ shall make and enforce rules for dam safety. The TCEQ has enacted these rules in 30 Texas Administrative Code chapter 299. Dam owners that do not comply with the rules and orders of the TCEQ can be penalized. *See* Tex. Water Code § 12.052(c). For a full discussion of dam safety regulations, see chapter 39 of this book.

Section 16.236 of the Code requires the TCEQ to regulate levee construction in areas that are not in the National Floodplain Insurance Program. The statute provides:

> No person may construct, attempt to construct, cause to be constructed, maintain, or cause to be maintained any levee or other such improvement on, along, or near any stream of this state that is subject to floods, freshets, or overflows so as to control, regulate, or otherwise change the floodwater of the stream without first obtaining approval of the plans by the commission.

Tex. Water Code § 16.236(a). However, under section 16.236(h), subsection (a) does not apply to several types of structures, including a dam or levee within the corporate limits of a city or town, and "a levee or other improvement within the boundaries of any political subdivision which has qualified for the National Flood Insurance Program as authorized by the National Flood Insurance Act of 1968." Tex. Water Code § 16.236(h)(4). The TCEQ's regulatory requirements for levee construction are stated in 30 Texas Administrative Code chapter 301. See Chapter 39 of this book for further discussion of floodplain management, including the National Flood Insurance Program.

II. TCEQ Penalties and Other Remedies

The TCEQ has enforcement power to issue administrative penalties, order certain actions, or go to court to enforce violations of the Texas Water Code, TCEQ rules, and water rights authorizations. Civil and criminal penalties may also be obtained in court for certain water rights violations.

A. Administrative Penalties

Chapter 11 of the Water Code provides for administrative penalties for violations. *See* Tex. Water Code § 11.0842. It also provides for field citations that may be issued by a watermaster or a watermaster's deputy for certain violations. Tex. Water Code § 11.0843. As discussed above, the penalties for not filing a water use report are under section 11.031. See section III.C below for a discussion of the watermaster program. Administrative penalties may be issued against a person who violates chapter 11, a rule or order adopted under chapter 11 or Water Code section 16.236 (concerning approval for levees), or a permit, certified filing, or certificate of adjudication issued under chapter 11. *See* Tex. Water Code § 11.0842(a). Penalties may be assessed in an amount up to $5,000 per day for violation of chapter 11, a rule adopted under chapter 11, or a permit or certificate of adjudication. *See* Tex. Water Code § 11.0842(b). Penalties may be assessed in an amount up to $1,000 per day for a violation of Water Code section 16.236. Tex. Water Code § 11.0842(b).

The commission shall consider several factors in determining the amount of the penalty: the nature, circumstances, extent, duration, and gravity of the prohibited acts, with special emphasis on a violation of a water right or a hazard or potential hazard to the health, safety, or welfare of the public; the impact of the violation on instream uses, water quality, fish and wildlife habitat, or fresh water inflows to bays and estuaries; the alleged violator's compliance history, degree of culpability, and demonstrated good faith, including action to rectify the violation and compensate affected persons; the economic benefit gained through the violation; the amount necessary to deter future violations; and any other matters that justice may require. Tex. Water Code § 11.0842(c). The alleged violator has a right to a contested case hearing and a right to judicial review under the substantial evidence rule. *See* Tex. Water Code § 11.0842(f), (h), (n). The procedures for filing enforcement actions, notice, hearing, and resolution of the enforcement action are set out in subsections 11.0842(d)–(q). *See* Tex. Water Code § 11.0842(d)–(q).

Field citations may be issued by watermasters and their deputies for violations of chapter 11 or an order or a water right issued under chapter 11. *See* Tex. Water Code § 11.0843. These citations provide that the alleged violator may pay the administrative penalty and take remedial action without admitting to or denying the violation or requesting a hearing on the violations. *See* Tex. Water Code § 11.0843(a); 30 Tex. Admin. Code § 303.35(b). Under 30 Texas Administrative Code section 303.35, the Rio Grande watermaster may issue field citations for the following violations of chapter 303: diversion without approval from the watermaster, failure to provide a measuring device, not passing water that the water right holder is not entitled to hold, and late pump operation reports. The South Texas and Concho watermaster, under 30 Texas Administrative Code section 304.34, may issue a field citation for the same actions except that, instead of late pump reports, citations can be issued for late report of diversion, transport, release, or impoundment.

Chapter 7 of the Texas Water Code contains general provisions for enforcement by the TCEQ. Because chapter 11 contains its own enforcement provisions specifically for water rights violations, these more specific provisions would govern over the chapter 7 provisions. Some provisions of chapter 7 that do not conflict with chapter 11 would still apply. For example, the commission may initiate an enforcement action based on information it receives from a private individual if that information is of sufficient value and credibility to warrant initiation of enforcement. Tex. Water Code § 7.0025. Also, the commission is not required to make findings of fact or conclusions of law in enforcement cases if there is an agreed order compromising or settling an alleged violation of a statute or rule under the commission's jurisdiction. The commission can state that the order is not an admission of a violation of a statute or rule within the commission's jurisdiction. *See* Tex. Water Code § 7.070.

In enforcing dam safety laws, the TCEQ shall make and enforce rules and orders and shall perform all other acts necessary to provide for the safe construction, maintenance, repair, and removal of dams located in the state. Tex. Water Code § 12.052(a). Under section 12.052(d), if the commission determines that the condition of a dam is creating or will cause extensive or severe property damage or economic loss to others or is posing an immediate and serious threat to human life or health, the commission may issue an emergency order directing the owner to repair, modify, maintain, dewater, or remove the dam. Tex. Water Code § 12.052(d). This emergency order may be issued without notice to the dam owner, but if the order is issued without notice, there must be a hearing before the commission as soon as practicable to affirm, modify, or set aside the order. Tex. Water Code § 12.052(e). When the executive director finds that a dam poses a level of danger to the public that is unacceptable under commission rules, he may go directly to the attorney general for injunctive relief or seek an order from the commission to direct the owner to take appropriate action. The penalty for refusing to take appropriate action is $5,000 per day. *See* 30 Tex. Admin. Code § 299.71(b).

Concerning levee construction, the penalty for violations of a rule or order adopted under section 16.236 may be up to $1,000 per day. *See* Tex. Water Code § 11.0842(b). The TCEQ has requirements for obtaining approval for levee projects in 30 Texas Administrative Code chapter 301.

B. Remedies in Court

In addition to its administrative enforcement powers, the TCEQ has civil enforcement remedies under chapter 7 of the Texas Water Code, which provides civil penalties and injunctive relief for violations of TCEQ statutes and rules. *See* Tex. Water Code §§ 7.101–.102. The executive director of the commission may initiate a suit in district court for injunctive relief to restrain a violation or threat of a violation under the TCEQ's jurisdiction. *See* Tex. Water Code § 7.032.

With regard to dam safety, the chapter 7 powers are supplemented by chapter 12. If the commission orders the owner of a dam to reconstruct, repair, or remove a dam to comply with TCEQ statutes and rules, and the owner fails to comply within thirty days of the order, the owner is liable for a penalty of not more than $5,000 per day. Suit to enforce this provision must be brought in a district court of Travis County. *See* Tex. Water Code § 12.052(c).

Under subchapter E of chapter 7, the following water rights violations of chapter 11 can be criminal offenses:

- Section 11.081 (taking, diverting, or appropriating state water without complying with chapter 11);
- Section 11.083 (unlawful taking by interfering with a headgate or waterbox, or conducting water the person is not entitled to through his ditch);
- Section 11.084 (selling a permanent water right without a permit);
- Section 11.087 (diverting water on an international stream);
- Section 11.088 (destroying waterworks);
- Section 11.089 (permitting Johnson grass or Russian thistle to go to seed in certain waterways);
- Section 11.090 (depositing certain pollutants in a water body);
- Section 11.091 (interfering with delivery of water under contract);
- Section 11.092 (wasting water);
- Section 11.093 (permitting works to be a public nuisance due to waste);
- Section 11.094 (using works declared to be a public nuisance);
- Section 11.096 (obstructing a navigable stream);
- Section 11.203 (failing to keep accurate records for artesian wells); and
- Section 11.205 (wasting water from an artesian well).

See Tex. Water Code § 7.142.

Thus the TCEQ has broad power to ensure compliance with water rights authorizations and TCEQ rules and state law concerning water rights, including administrative and civil remedies, and seeking criminal convictions.

III. TCEQ Enforcement Procedures

The TCEQ enforces water rights in both watermaster areas and non-watermaster areas. Watermaster areas also have their own rules for enforcement. A watermaster is a TCEQ employee designated by the executive director to enforce water rights in a water division or river basin or segment of a river basin. *See* Tex. Water Code §§ 11.326, 11.453.

A. Enforcement in Non-Watermaster Areas

Because there are only four watermaster areas, most commission regional offices enforce water rights and water rights statutes and rules. As section 11.0842(a) provides, the commission can assess a penalty for a violation of chapter 11, a rule or order adopted under chapter 11, or a water right, whether in a watermaster area or not.

Regional offices have inspectors assigned to water rights violations. Common complaints and violations include taking water without a permit or other water right and violating a provision of a water right. Many complaints concern whether impoundments are exempt under Texas Water Code section 11.142(a) because they are an average of two hundred acre-feet or less and only for domestic and livestock use. Because it may be difficult to tell how water is used and because, under TCEQ rules, water meters and gauges are not required for most water rights outside of watermaster areas, it may be difficult to determine whether a violation has occurred. *See* 30 Tex. Admin. Code chs. 295, 297, 303, 304. Therefore, the inspector may need to see the violation occur or have a witness who has seen the violation occur and is willing to testify in a hearing.

Title 30 Texas Administrative Code chapter 70 and Texas Water Code section 11.0842 provide the requirements for an enforcement action. At the commission region level, enforcement may be initiated by a complaint. In general, water rights violations are class B violations. Alleged violators for class B violations are given time frames to come into compliance with the relevant rules and statutes. *See* Texas Commission on Environmental Quality, *Enforcement Initiation Criteria* (Rev. No. 14, eff. Dec. 1, 2012.) at 27, 28, and 40 [hereinafter EIC], *available at* www.tceq.texas.gov/assets/public/agency/eic-rev-14-120112.pdf. The only class A water rights violations, which require automatic initiation of formal enforcement when discovered, are reported or documented use of state water in excess of authorized amounts during times of extreme or exceptional water shortage; breaking, tampering with, or mutilating any seal or other device used to enforce orders of the commission, executive director, a court, or a watermaster; and impounding state water without a permit when no water is available for appropriation. *See* EIC, at 24.

Once a notice is given of a violation that does not allow time for compliance, because it is either a class A violation or a class B violation that was not corrected, the violation is sent to the commission's central office in Austin. *See* EIC, at 6, 17. Under section 11.0842(d), if the executive director concludes that a violation has occurred, the executive director shall issue a preliminary report recommending an administrative penalty and recommending the amount of the penalty. The executive director shall use the factors in section 11.0842(c) to determine the recommended amount of the penalty.

The executive director must give notice of the violation to the alleged violator within ten days of issuance of the report. The report is considered issued when it is filed with the chief clerk of the State Office of Administrative Hearings. 30 Tex. Admin. Code § 70.104(a). The notice must summarize the charges, state the amount of penalty, and tell the alleged violator of the right to a hearing on the occurrence of the violation, the amount of the penalty, or both. Tex. Water Code § 11.0842(e). Not later than twenty days after receiving the notice, the person charged may consent to or request a hearing. If the person does not timely respond to the notice, the commission may either assess the penalty or order a hearing on the executive director's report. Tex. Water Code § 11.0842(f), (g). Under 30 Texas

Administrative Code section 70.106, the executive director may request a default order. Any hearing requested must be conducted under the Administrative Procedure Act, Texas Government Code chapter 2001, and Texas Water Code section 11.0842(h). Hearings may be referred to the State Office of Administrative Hearings. 30 Tex. Admin. Code § 70.108.

Additionally, the commission must give notice of its decision and the person's right to judicial review of the commission's order. Tex. Water Code § 11.0842(i). Within thirty days of the commission's order, the person must pay the penalty in full or appeal to court. Tex. Water Code § 11.0842(j). The person may stay enforcement of the penalty by paying the amount of the penalty to the court for placement in an escrow account or giving the court a supersedeas bond. Tex. Water Code § 11.0842(k). Judicial review is under the substantial evidence rule and must be heard in a district court in Travis County. Tex. Water Code § 11.0842(n).

B. Suspension and Adjustment Orders

The TCEQ may also suspend or adjust water rights in non-watermaster areas under Water Code section 11.053, which was added by the 82nd Legislature in 2011. Section 11.053 provides that the executive director of the TCEQ may temporarily suspend a water right and temporarily adjust the diversions of water by a water right holder during periods of drought or other emergency shortage of water, in accordance with the priority of water rights established by section 11.027. Tex. Water Code § 11.053(a). Section 11.053 includes several factors that the executive director must ensure are met when issuing these orders and provides that the commission must adopt rules to implement the section, including rules that define "drought" or "other emergency shortage of water," and the conditions for and terms of an order. Further, the commission must adopt rules concerning notice of an opportunity for hearing on and the appeal to the commission of one of these orders.

The executive director must ensure that an order—

1. maximizes beneficial use of water;
2. minimizes the impact on water right holders;
3. prevents waste of water;
4. takes into consideration the efforts of the affected water rights holders to develop and implement water conservation and drought contingency plans;
5. "[t]o the great extent practicable, conforms to the order of preferences established by Section 11.024 [of the Texas Water Code]"; and
6. does not require the release of lawfully stored water.

Tex. Water Code § 11.053(b).

The commission adopted rules in 30 Texas Administrative Code chapter 36 in 2012 and has issued several curtailment and adjustment orders, mostly in the Brazos River Basin. In general, those orders do not completely curtail water rights for municipal and power generation. The Texas Farm Bureau sued the TCEQ in 2012 after the TCEQ issued an order curtailing water rights in the Brazos River Basin. The plaintiffs argued that the TCEQ rules were invalid and exceeded its authority under section 11.053 of the Water Code and contended that the TCEQ improperly gave itself the authority to modify the prior appropriation doctrine, a fundamental part of each surface water right in Texas, when it did not suspend the municipal and power generation water rights.

The district court issued an order on June 6, 2013, striking the chapter 36 rules and holding that the commission had exceeded its statutory authority by exempting municipal and power generation water rights from curtailment, and that the exemption of these water rights was not authorized by the

TCEQ's police powers to protect public health and welfare. The TCEQ appealed, and the Corpus Christi court of appeals sitting in Austin heard argument from the parties on April 24, 2014. The court of appeals affirmed the district court on April 2, 2015, and the TCEQ appealed the decision to the Texas Supreme Court. *See Texas Commission on Environmental Quality v. Texas Farm Bureau*, 460 S.W.3d 264 (Tex. App.—Corpus Christi 2015, pet. filed).

C. Watermaster Areas and Enforcement

As mentioned above, the enforcement powers and procedures of the TCEQ differ in watermaster and non-watermaster areas. The state has four active watermaster areas and two active watermasters. The watermaster areas are the Rio Grande area, the South Texas area, and the Concho River area. The watermaster for the South Texas area is also the watermaster for the Concho River area. A petition for a watermaster for the Brazos River was filed by more than twenty-five water right holders on January 10, 2013. That proceeding is discussed below.

1. Creation of a Watermaster

The commission's 2011 Sunset Bill, H.B. 2694, amended section 11.326(g) of the Water Code by adding subsection (g). *See* Act of May 28, 2011, 82d Leg., R.S., ch. 1021, § 5.05, eff. Sept. 1, 2011. Section 11.326 addresses the appointment of a watermaster in a "water division" by the executive director of the commission, as discussed below. Section 11.326(g) requires that for water basins for which a watermaster is not appointed, the executive director shall evaluate the water basin at least once every five years to determine whether a watermaster should be appointed and report the findings and make recommendations to the commission. *See* Tex. Water Code § 11.326(g). In 2012, the executive director evaluated the need for a watermaster in the Brazos and Colorado River basins and made a report to the commission. No watermaster was recommended at that time. Several river basins have been evaluated since the Colorado and Brazos River basins, but the commission has not decided that a watermaster should be designated.

A watermaster may be appointed by the executive director for an area if that area has been designated as a water division. The commission shall divide the state into water divisions for the purpose of administering adjudicated water rights and as the necessity arises. Tex. Water Code § 11.325. The executive director may appoint one watermaster for each water division. Tex. Water Code § 11.326(a). Both existing watermasters were appointed by this method. The South Texas Watermaster was also appointed by statute as the watermaster for the Concho River Watermaster Program. *See* Tex. Water Code §§ 11.551–.561.

Another way to create a watermaster, under certain circumstances, is for a district court to appoint a watermaster when a suit has been filed in which the state is a party, the purpose of the suit is to determine the rights of the parties to divert or use water of a surface stream, and rights are asserted to use water in, or divert water to, not more than four counties. *See* Tex. Water Code § 11.401. Although it was done before section 11.401 was enacted, a district court appointed the first Rio Grande watermaster. *See Hidalgo County Water Control & Improvement District No. 1 v. Boysen*, 354 S.W.2d 420 (Tex. Civ. App.—San Antonio 1962, writ ref'd).

Finally, a watermaster may be appointed by the TCEQ through a water right holder petition process. In this procedure, a petition of twenty-five or more water right holders of a river basin or segment of a river basin must be submitted to the commission. The commission initially created the Concho River watermaster program through this method. *See* TCEQ Order Appointing a Watermaster for the Concho River Segment, TCEQ Docket No. 2000-0344-WR, Aug. 17, 2004, *available at* www14.tceq.texas.gov/epic/CIO/index.cfm?fuseaction=search.download&AGY_DKT_NUM_TXT=2000-0344-WR&agenda_item_id=956549562014137&agenda_dt=08/11/2004. The legislature later created the program by statute and appointed the South Texas watermaster to be the Concho River watermaster. *See* Tex. Water Code §§ 11.551–.561. For a further discussion of that petition and program, as well as the watermaster programs in general, *see* Comment, *Texas Watermasters: A Legal History and Analysis of Surface Water Rights Enforcement*, 7 Tex. Tech Admin. L.J. 143 (2006).

A petition for a watermaster for the Brazos River Basin under Texas Water Code chapter 11, subchapter I, was filed by more than twenty-five water right holders on January 10, 2013. After a contested case hearing, the commission created the watermaster area in the Brazos River Basin from Lake Possum Kingdom to the Gulf of Mexico. *See* TCEQ Order Granting the Petition for the Appointment of a Watermaster in the Brazos River Basin, TCEQ Docket No. 2013-0174-WR, Apr. 21, 2014, *available at* www.tceq.texas.gov/assets/public/compliance/field_ops/wmaster/Brazos/Order_2013-0174-WR.pdf. A watermaster for the Brazos River Basin was hired and this area began operating as a watermaster area on June 1, 2015.

2. Enforcement in a Watermaster Area

Watermasters have the same authority as regional inspectors, but they also have broader authority for water rights enforcement under the Water Code and require more from water right holders in the watermaster area. Watermaster and staff are devoted exclusively to enforcing water rights.

Three separate statutes relate to the authority of a watermaster. For watermasters appointed by the executive director, the duties are set out in section 11.327. Under this statute, the watermaster shall—

1. divide the water of the streams or other sources of supply in the watermaster's division in accordance with adjudicated water rights;

2. regulate or cause to be regulated the controlling works of reservoirs and diversion works in times of water shortage, as necessary to prevent waste or unlawful diversion, or to protect the existing rights in the division;

3. regulate the distribution of water from any system of works that serves users whose rights have been separately determined; and

4. perform activities that relate to other programs of the commission only in situations of imminent threat to public health and safety or the environment.

See Tex. Water Code § 11.327.

Water Code provisions relating solely to the Rio Grande Watermaster are contained in section 11.3271. *See* Tex. Water Code § 11.3271. Under section 11.3271(e), the Rio Grande Watermaster's duties include activities that relate to situations of imminent threat to public health and safety or the environment. As required, the commission has adopted rules defining situations of imminent threat under this section and addressing the watermaster's duties in response to terrorism. *See* 30 Tex. Admin. Code § 303.18. The remainder of section 11.3271 provides procedures for the watermaster to authorize the storage of groundwater in a reservoir to release and transport down the bed and banks of the Rio Grande for later diversion and use. *See* Tex. Water Code § 11.3271(f)–(k).

For watermasters appointed by the commission under subchapter I of chapter 11, section 11.327 applies to the duties and authority of the watermaster in the same manner as that section applies to the duties and authority of a watermaster appointed for a water division under chapter 11, subchapter G. *See* Tex. Water Code § 11.454.

Under the Concho River Watermaster Program, Texas Water Code chapter 11, subchapter K, the watermaster has the same duties and authority as the watermaster has under the South Texas

Watermaster Program, which are the authority and duties in section 11.327. *See* Tex. Water Code § 11.555.

The water right holders in a watermaster area pay the expenses and compensation for the watermaster program. *See* Tex. Water Code § 11.329(a). A watermaster advisory committee is appointed for each watermaster area to provide recommendations to the executive director on activities of benefit to the water right holders in the administration and distribution of water, to review and comment to the executive director on the annual budget for watermaster operations, and to perform other duties as may be required by the executive director or as requested by water right holders. *See* Tex. Water Code § 11.3261. Chapter 11 also specifically requires headgates or gates on outlets for the diversion or storage of water in a watermaster area and allows the watermaster to require measuring devices on water right diversion or storage at a place that the watermaster can assess. *See* Tex. Water Code §§ 11.330, 11.331.

All four watermaster programs have rules setting out the actions that the watermasters may take. Title 30 Texas Administrative Code chapter 303 governs the Rio Grande Watermaster program, and chapter 304 governs the South Texas and Concho programs. Specific authority under those rules that differs from the authority of the commission's regional offices includes—

1. requiring meters for all water rights (*see* 30 Tex. Admin. Code §§ 303.11(e), 304.13(a));

2. requiring that water right holders pay fees for the watermaster program (*see* 30 Tex. Admin. Code §§ 303.71–.73, 304.61–.63);

3. requiring that a declaration of intent be approved by the watermaster prior to the diversion, transport, or release of water (*see* 30 Tex. Admin. Code §§ 303.11, 304.15); and

4. requiring records of diversion, transport, and release of water (*see* 30 Tex. Admin. Code §§ 304.16, 303.11(f), (h)).

The South Texas and Concho River watermaster must allocate water based on seniority "in such a way as to maximize the beneficial utilization of state water, minimize the potential of impairment to senior water rights by the diversions of junior water right holders, and to prevent waste or use in excess of quantities to which the holders of water rights are lawfully entitled." 30 Tex. Admin. Code § 304.21(a). The watermaster can protect senior water rights when flows are low by denying diversions by junior water right holders and requiring reservoir owners to pass through inflows for senior water rights and domestic and livestock users. *See* 30 Tex. Admin. Code § 304.21(c).

The Rio Grande watermaster has the same allocation rules in the Upper Rio Grande portion of the Rio Grande program (above Lake Amistad) as exist in chapter 304. *See* 30 Tex. Admin. Code § 303.23. Below Lake Amistad, however, the watermaster must operate on a different priority system, one established by the court in *State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.). The majority of water rights below Lake Amistad and Lake Falcon receive their water from these two lakes, and the priority of the water rights in this area is based on type of use. These allocation rules are set out in 30 Texas Administrative Code sections 303.21–.23. See discussion of the Rio Grande in Chapter 14 of this book.

3. *Litigation Concerning Agency Water Rights Enforcement*

There is no case law discussing the TCEQ's or predecessor agencies' enforcement of water rights laws. There have been several enforcement actions concerning water rights at the agency, however. For a discussion of some of those cases, *see* David Klein & Robin Smith, *Exploring the Scope of*

Landowner Water Rights for Domestic and Livestock Purposes, 7 Tex. Tech Admin. L.J. 119, 138–40 (2006).

IV. Private Enforcement

Although the TCEQ has significant authority to enforce water rights, as discussed above, private corporations, individuals, and political subdivisions with a justiciable interest may pursue civil remedies for such violations as well. Such suits seek any available common-law remedy to enforce a right, to seek redress or compensation for violations of a right, or otherwise to redress an injury. The prevailing party in a suit for injunctive relief to redress an unauthorized diversion, impoundment, or use of surface water in violation of chapter 11 or a rule adopted under chapter 11 may be awarded court costs and reasonable attorney's and expert fees. *See* Tex. Water Code § 11.0841(a), (b).

Section 11.086 of the Texas Water Code, which prohibits a person from diverting or impounding the natural flow of surface waters in the state, authorizes a private cause of action. *See* Tex. Water Code § 11.086. Under section 11.086(b) a person whose property is damaged may sue in law and equity for damages caused by the overflow. Courts have interpreted section 11.086 to apply to surface water runoff rather than state water or water in a watercourse. *See, e.g., Hopkins v. State*, No. 03-03-00499-CV, 2006 WL 1126224, at *12 (Tex. App.—Austin Apr. 27, 2006, pet. denied) (mem. op.); *Dietrich v. Goodman*, 123 S.W.3d 413, 418 (Tex. App.—Houston [14th Dist.] 2003, no pet.). Generally, the commission would not be involved in these cases, absent water quality concerns, because the agency's jurisdiction is over "waters of the state." *See* Tex. Water Code §§ 5.5013(a)(1), 11.002(5), 11.023(a). Also, the commission does not have the authority to provide remedies at law or equity and may not award damages for injuries. *Texas Department of Human Resources v. ARA Living Centers of Texas, Inc.*, 833 S.W.2d 689, 694 (Tex. App.—Austin 1992, writ denied) (state agencies have only the authority expressly granted to them by the legislature or implied to perform the express duties). See Chapter 39 of this book for a more detailed discussion of section 11.086.

V. Conclusion

Water right authorizations and related statutes and regulations can be enforced by the TCEQ both on the administrative level and in the courts. Enforcement may include injunctions, penalties, and criminal convictions. Private citizens also have the right to seek redress for certain water rights–related activities or violations by filing a civil action in district court. Thus the Texas Water Code provides many avenues by which Texas's water resources may be protected and its system of water allocation ensured.

CHAPTER 14

Multi-Jurisdictional Water Rights

Priscilla M. Hubenak[1] and Jane E. Atwood[2]

I. Five Unique Texas Streams

Texas shares the waters of five rivers with other states or with Mexico. These rivers are the Rio Grande, the Pecos, the Canadian, the Red, and the Sabine. The waters in each of these rivers are subject to interstate compacts between Texas and other states. In the case of the Rio Grande, two treaties provide for the division of water with Mexico.

This chapter explores interstate river compacts, with special attention to the compacts to which Texas is a party, the international treaties that apportion water in the Rio Grande, and the unique characteristics of water rights in the Lower and Middle Rio Grande of Texas.

II. Laws That Affect Apportionment of Interstate Streams

The waters of the major Texas streams that Texas shares with neighboring states have been apportioned by interstate compacts. An understanding of the legal framework of apportionment and interstate compacts is important to enforcing each state's rights, to making any needed amendments, and to making additional apportionments of surface water or groundwater that may be necessary in the future.

The authority of the federal government to apportion waters of an interstate stream comes from the government's paramount authority to control navigation and interstate commerce under the U.S. Constitution. A state can regulate the waters of streams within its borders, but this authority is subject

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to the power of Congress to control commerce and navigation under the Constitution. *United States v. Appalachian Electric Power Co.*, 311 U.S. 377, 404–05 (1940), *superseded on other grounds by statute*, *Rapanos v. United States*, 547 U.S. 715 (2006); *United States v. Rio Grande Dam & Irrigation Co.*, 174 U.S. 690, 703 (1899); *see also* U.S. Const. art. I § 8, cl. 3 (the Commerce Clause). The authority of Congress over navigable waters extends not only to portions of a stream that are currently navigable but also to non-navigable and formerly navigable portions that contribute to the navigation of other reaches of the stream. *State of Oklahoma ex rel. Phillips v. Guy F. Atkinson Co.*, 313 U.S. 508, 522–23 (1941). Congress, acting within its power to control navigation, may appropriate water, change the course of streams, or even build dams on portions of streams that are navigable, or even on portions that are not navigable but are found to contribute to navigation in other parts of the stream. *Guy F. Atkinson Co.*, 313 U.S. at 522–23.

Under federal law, there are three means by which the waters of interstate streams may be apportioned: (1) through an equitable apportionment lawsuit in the U.S. Supreme Court, (2) through an act of Congress, and (3) through an interstate compact. The following sections will discuss each method.

A. Equitable Apportionment by the Supreme Court

The U.S. Supreme Court can, under its equity jurisdiction, apportion water between two or more states under the doctrine of equitable apportionment. *Nebraska v. Wyoming*, 325 U.S. 589, 618 (1945); *Kansas v. Colorado*, 206 U.S. 46, 98 (1907). The doctrine of equitable apportionment is a principle of federal common law. *Colorado v. New Mexico*, 459 U.S. 176, 182–83 (1982).

1. Jurisdiction over Equitable Apportionment Cases

Title 28 United States Code section 1251(a) provides: "The Supreme Court shall have original and exclusive jurisdiction of all controversies between two or more States." The Supreme Court has held that its jurisdiction extends to controversies between two states in a properly framed suit to apportion the water of an interstate stream between states through which it flows. *Texas v. New Mexico*, 462 U.S. 554, 567 (1983).

Lower courts, by concluding that no real controversy existed between two or more states, have rejected motions to dismiss based on the arguments that the Supreme Court had exclusive jurisdiction over interstate disputes. These cases give insight into the types of cases that might not qualify as "properly framed" suits to apportion water of interstate streams. For example, South Dakota sought to enjoin the U.S. Army Corps of Engineers from releasing water from a dam on the Missouri River that would then flow out of South Dakota into Nebraska in *South Dakota v. Ubbelohde*, 330 F.3d 1014, 1025–26 (8th Cir. 2003), *cert. denied*, 541 U.S. 987 (2004). Because the action was really directed at the Corps of Engineers, the court of appeals held that intervention by the state of Nebraska would not strip the federal district court of jurisdiction despite the fact that the lawsuit was filed by the State of South Dakota. *Ubbelohde*, 330 F.3d at 1025–26.

Likewise, a lawsuit involving the states of Georgia, Alabama, Florida, and others was held not to be a state-versus-state controversy that would consign the case to the exclusive jurisdiction of the Supreme Court. *Alabama v. U.S. Army Corps of Engineers*, 424 F.3d 1117, 1130 (11th Cir. 2005), *cert. denied*, 547 U.S. 1192 (2006). The State of Georgia and other Georgia plaintiffs had sought to compel the Corps of Engineers to increase the amount of water allocated for use in Georgia out of Lake Lanier, on a stream system shared by the three states.

2. *Discretionary Nature of the Supreme Court's Original Jurisdiction*

The fact that the U.S. Supreme Court has jurisdiction over an equitable apportionment case does not mean that the Court must—or that it will—exercise its jurisdiction over a case. The rules of the Supreme Court require a petitioner in an original action before the Court to file a motion for leave to file a complaint before proceeding, and the party against whom the petitioner seeks to file an action is allotted time to respond. Sup. Ct. R. 17. At this initial stage, the Supreme Court can dismiss an action on jurisdictional grounds. *See* Vincent L. McKusick, *Discretionary Gatekeeping: The Supreme Court's Management of Its Original Jurisdiction Docket Since* 1961, 45 Me. L. Rev. 185 (1993). This article suggests that the Court has used three additional criteria to determine whether an original action before the Court is warranted: "(i) the parties to the suit; (ii) the subject matter of the suit and its 'seriousness and dignity,' . . . that is, its importance; and (iii) the existence or not of an alternative forum for the cause of action or for at least the controlling issue." McKusick, at 197.

The Supreme Court has said it views Congress's grant of exclusive original jurisdiction under 28 United States Code section 1251(a) as providing the Court with "substantial discretion to make case-by-case judgments as to the practical necessity of an original forum in [the Supreme] Court for particular disputes" within its original jurisdiction. *Texas v. New Mexico*, 462 U.S. 554, 570 (1983). The Court exercises that discretion "with an eye to promoting the most effective functioning of this Court within the overall federal system." 462 U.S. at 570. The Court has also said that, before it intervenes in a case, the case should be "of serious magnitude, clearly and fully proved, and the principle to be applied should be one which the court is prepared deliberately to maintain against all considerations on the other side." *State ex rel. Dyer v. Sims*, 341 U.S. 22, 27 (1951) (quoting *Missouri v. Illinois*, 200 U.S. 496, 521 (1906)); *see also New York v. New Jersey*, 256 U.S. 296, 309 (1921).

3. *Equitable Apportionment: Criteria and Issues*

Once the Supreme Court has granted leave to file a petition, the Court typically appoints a special master to address any grounds for dismissal and conduct any trial on the merits. The recommendations of the special master will be presented in one or more special master's reports that are ultimately considered by the Court. "Equitable apportionment," as its name suggests, weighs a variety of factors. Some enumerated by the Court are "physical and climatic conditions, the consumptive use of water in the several sections of the river, the character and rate of return flows, the extent of established uses, the availability of storage water, the practical effect of wasteful uses on downstream areas, [and] the damage to upstream areas as compared to the benefits to downstream areas if a limitation is imposed on the former." *Colorado v. New Mexico*, 459 U.S. 176, 183 (1982) (quoting *Nebraska v. Wyoming*, 325 U.S. 589, 618 (1945)). The seniority—that is, priority—of water rights in an interstate stream can become a guiding principle in equitable apportionment when the states involved recognize the doctrine of prior appropriation, but the laws of the contending states are not controlling. 459 U.S. at 183 (citing *Nebraska v. Wyoming*, 325 U.S. at 618, and *Connecticut v. Massachusetts*, 282 U.S. 660, 670–71 (1931)). The Court has also held that the source of a stream—that is, the amount that the watershed in each state contributes to the flow of the stream—"should be essentially irrelevant" to the adjudicating of competing state claims. *Colorado v. New Mexico*, 467 U.S. 310, 324 (1984).

The Supreme Court has indicated that it may weigh the amount of harm a certain apportionment scheme causes in one state against the amount of benefit it yields in another. *See Colorado v. New Mexico*, 459 U.S. at 183–88; *see also Idaho ex rel. Evans v. Oregon*, 462 U.S. 1017, 1036 (1983) (suit to apportion harvestable fish populations in the Columbia–Snake River system). In some instances, the fact that a complaining state has never made use of a stream will not bar the state from seeking or obtaining an apportionment. *Colorado v. New Mexico*, 459 U.S. at 182 n.9. Although evidence supporting the protection of existing economies created by existing water use is viewed by the

Supreme Court as compelling, the Court has also said it would consider whether the state where existing uses are occurring can offset the impact of apportionment by greater efficiency in use. 459 U.S. at 188. In a suit by Nebraska to amend or seek further relief under a prior equitable apportionment decree, the Supreme Court held that Nebraska could present evidence that proposed new developments in Wyoming would affect wildlife and wildlife habitat. *Nebraska v. Wyoming*, 515 U.S. 1, 11–13 (1995).

Clear and convincing evidence must be offered to support equitable apportionment. A state seeking to prevent or enjoin a diversion bears the burden to prove that the diversion will cause "real or substantial injury or damage." *Colorado v. New Mexico*, 459 U.S. at 188 (citing *Connecticut v. Massachusetts*, 282 U.S. at 672); *see also Colorado v. Kansas*, 320 U.S. 383, 389–90, 400 (1943). The Court denied Colorado's request to apportion waters of the Vermejo River in part because Colorado did not prove that future diversions in Colorado could be offset by increased efficiencies in New Mexico through the use of economically practical and feasible means. *Colorado v. New Mexico*, 467 U.S. at 319–20.

When a state petitions the Supreme Court for equitable apportionment, the Court has shown a reluctance at the initial stage to intervene too quickly and a preference for negotiated settlements under the Compact Clause of the U.S. Constitution, even after the Court granted leave to file a petition. The long-standing dispute between Kansas and Colorado over the Arkansas River may best illustrate the Supreme Court's historical position. Before the states entered into the Arkansas River Compact, Kansas and Colorado had been before the Court twice with disputes over the waters of the Arkansas. In the first suit, the Court denied Kansas's request to enjoin diversions of the Arkansas River by Colorado because the depletions alleged by Kansas were insufficient to warrant injunctive relief. *See Kansas v. Colorado*, 206 U.S. 46 (1907). About forty years later, in a second lawsuit before the Supreme Court, Colorado sought to enjoin lower court litigation brought against Colorado water users, while Kansas sought an equitable apportionment of the Arkansas River. *See Colorado v. Kansas*, 320 U.S. 383 (1943). The Court granted Colorado an injunction, but concluded that it should not apportion the waters of the Arkansas River by equitable decree. Instead, the Court suggested that the states resolve their differences by negotiation and agreement, pursuant to the Compact Clause of the Constitution. 320 U.S. at 393. The Court noted that judicial apportionment would cause Colorado hardship and that Kansas had not proven that Colorado's actions had caused "a serious detriment to the substantial interests of Kansas." 320 U.S. at 400. In 1949, Kansas and Colorado ratified and Congress approved an Arkansas River Compact. The Supreme Court recounts a history of this case in *Kansas v. Colorado*, 514 U.S. 673, 678 (1995).

Perhaps the salient point from the perspective of the state's attorney or private practitioner concerned with equitable apportionment issues is that the outcome in an equitable apportionment is never certain. Although litigation seeking equitable apportionment is part of the legal arsenal, the other apportionment options—which involve deliberation or negotiation—may present the best solution to interstate water controversies.

B. Apportionment by Act of Congress

Congress has the authority to apportion water in interstate streams by congressional act. One example is the Boulder Canyon Project Act, now codified at 43 United States Code sections 617–617t. This apportionment is discussed in *Arizona v. California*, 373 U.S. 546 (1963) (certain dicta were disavowed on other grounds by *California v. United States*, 438 U.S. 645, 673–75 (1978)). In *Arizona v. California*, petitioners asked the Supreme Court to apportion the waters of the lower Colorado River among the states that had rivers flowing into the Colorado Basin. The Court noted that the Colorado River Compact did not make such an apportionment. The Court also noted that it had divided the waters of interstate streams before under the doctrine of equitable apportionment. *Arizona v.*

California, 373 U.S. at 565–66. The Court refused to make the requested apportionment, however, because Congress had already made an apportionment of the waters in the main stem of the lower Colorado River among California, Arizona, and Nevada by enacting certain provisions in the Boulder Canyon Project Act. The Court held that in cases in which Congress had apportioned water by statute, the Court could not substitute its own notion of "equitable apportionment" for the apportionment chosen by Congress. 373 U.S. at 565–66. Another example of apportionment by congressional act is the Truckee and Carson Rivers and Lake Tahoe between California and Nevada in 1990. Truckee-Carson-Pyramid Lake Water Rights Settlement Act of Jan. 23, 1990, Pub. L. No. 101–618, 104 Stat. 3298, 3294.

C. Apportionment by Interstate Stream Compact

The third method of apportioning interstate streams is by interstate compact. Those streams Texas shares with other states, that have been apportioned, have been apportioned solely by this method. Although the use of a carefully negotiated compact is undoubtedly the preferred method of apportioning the water of interstate streams, it is also a complicated and often lengthy process that can be punctuated by conflicts. A comprehensive review of the many different considerations involved in interstate stream compact negotiations can be found in Jerome C. Muys, George William Sherk & Marilyn C. O'Leary, *Utton Transboundary Resources Center Model Interstate Water Compact*, 47 Nat. Resources J. 17–115 (Winter 2007). The amount of time that can be spent reaching agreement and the examples of potential conflicts along the way are illustrated in the Supreme Court's description of the history of the Pecos River Compact in *Texas v. New Mexico*, 462 U.S. 554, 557–59 (1983), and in Douglas Littlefield's history of the Rio Grande Compact. Douglas Robert Littlefield, Interstate Water Conflicts, Compromises, and Compacts: The Rio Grande, 1880–1938 (1987) (Ph.D. dissertation, University of California, Los Angeles) (copy available through ProQuest Communications, www.proquest.com).

1. The Nature of Interstate Compacts

Certain types of agreements between states—including agreements to divide waters in an interstate stream, such as the Pecos River Compact between Texas and New Mexico—must be approved by Congress in order to be concluded. *Texas v. New Mexico*, 462 U.S. 554, 564 (1983); *see also* U.S. Const. art. I, § 10, cl. 3 (the Compact Clause). When these agreements are approved by Congress, they take on a twofold nature: they are federal law, but they are also contracts between the states that must be construed in accordance with their terms. *Texas v. New Mexico*, 482 U.S. 124, 128 (1987) (citing *West Virginia ex rel. Dyer v. Sims*, 341 U.S. 22, 28 (1951), and *Petty v. Tennessee-Missouri Bridge Commission*, 359 U.S. 275, 285 (1959)).

A "compact" under the meaning of the Compact Clause is limited to a class of agreements that are "directed to the formation of any combination tending to the increase of political power in the states, which may encroach upon or interfere with the just supremacy of the United States." *U.S. Steel Corp. v. Multistate Tax Commission*, 434 U.S. 452, 471 (1978) (quoting *Virginia v. Tennessee*, 148 U.S. 503, 519 (1893)). In *Virginia v. Tennessee*, the Supreme Court held that certain actions leading up to an agreement on boundaries did not require congressional approval, while others did. The Court discussed at length the actions taken by the two states, including an agreement to have surveys conducted, the actions by state legislatures acknowledging the surveyed line as the correct boundary, and the adoption by both states of the report of the survey commissioners. The Court concluded that the acts leading up to a mutual understanding, even if they could be used to bind one state against the claims of the other, did not constitute a compact. On the other hand, a mutual action acknowledging the boundaries likely would be a compact requiring congressional approval. *Virginia v. Tennessee*, 148 U.S. at 517–21.

There is some flexibility about whether certain agreements are compacts that require congressional approval. For example, in *New Hampshire v. Maine*, 426 U.S. 363 (1976), the two states reached a settlement over the meaning of certain key terms in a 1740 court decree setting certain boundaries between New Hampshire Colony and what was then the Maine portion of Massachusetts Colony. Despite the settlement, New Hampshire argued that the Supreme Court would have to make an independent determination of the meaning of the terms, or else the consent decree would require congressional approval under the Compact Clause. The Supreme Court concluded that the settlement agreement was not a compact under the *Virginia v. Tennessee* test because the two states had merely resolved their differences over the meaning of term; they had not adjusted their boundary. *New Hampshire v. Maine*, 426 U.S. at 369–70.

2. What Constitutes Congressional Approval and When It Must Be Given

The Constitution does not prescribe whether the consent of Congress must be express or may be implied. The Supreme Court has held that it may be either. *Virginia v. Tennessee*, 148 U.S. 503, 521–22 (1893). The Court has also held that the consent of Congress to an agreement between states need not be given as an express and formal statement of every proposition of the agreement, and of its consent thereto. *Virginia v. West Virginia*, 78 U.S. (11 Wall) 39, 59–60 (1870).

Likewise, the Constitution does not specify when congressional consent must be given—that is, whether before or after the states enter into the agreement. *Waterfront Commission of New York Harbor v. Construction & Marine Equipment Co., Inc.*, 928 F. Supp. 1388, 1402 (D.N.J. 1996), *aff'd*, 103 F.3d 115 (3d Cir. 1996). In *Cuyler v. Adams*, 449 U.S. 433 (1981), congressional consent was given in advance. At issue in *Cuyler v. Adams* was an interstate agreement relating to "detainers" or notifications to a correctional institution in one state that a prisoner was wanted to face criminal charges in another state. The agreement was originally drafted in 1956 and was adopted by a number of state legislatures. The Court determined that Congress had given advance consent to the agreement by enacting the Crime Control Consent Act of June 6, 1934, ch. 406, 48 Stat. 909. *See Cuyler v. Adams*, 449 U.S. at 441–42. On the other hand, advance consent may not always be necessary or appropriate. As the Court noted in *Virginia v. Tennessee*, 148 U.S. at 519, the Compact Clause of the U.S. Constitution is "directed to the formation of any combination tending to the increase of political power in the states, which may encroach upon or interfere with the just supremacy of the United States." Based on this rationale, the Court noted that it may not be clear whether an agreement between states requires congressional approval under the Compact Clause until after the terms of the agreement are known. Seeking congressional approval, therefore, may not be appropriate until after the agreement is negotiated. 148 U.S. at 521–23.

The Constitution gives Congress substantial flexibility in approving compacts, which is helpful in the event that fundamental questions about the need for or the timing of approval are not addressed when negotiations begin. However, the sensible approach would be to keep these questions in mind at the earliest stage of negotiations. The process of concluding far-reaching interstate water agreements is far too complex and involved to leave fundamental questions of state and federal authorization to be litigated later.

3. Parties Bound by Interstate Stream Compacts

Once ratified by the signatory states and approved by Congress, a compact binds various governmental entities at all levels of government and various private parties. Because a compact is federal law, it preempts conflicting state law dealing with the same subject. *State of Nebraska ex rel. Nelson v. Central Interstate Low-Level Radioactive Waste Commission*, 902 F. Supp. 1046, 1049 (D. Neb. 1995); *see also* U.S. Const. art VI, § 2 (the Supremacy Clause). The contractual aspects of a compact also make it binding on signatory states. In *Green v. Biddle*, 21 U.S. (8 Wheat) 1 (1823), laws enacted by Kentucky were challenged as violating the terms of a 1789 compact with Virginia. The Supreme Court held that a state is prohibited from enacting a law that is inconsistent with an interstate compact on the grounds that such a law would violate article I, section 10, clause 1, of the U.S. Constitution, prohibiting any state from impairing the obligations of contracts, even a state's own contracts.

Likewise, a compact that apportions the waters of an interstate stream is binding on the citizens of each signatory state and all claimants to water under the laws of those states. This is true even if a signatory state had granted an affected water right before the state entered into the compact and this right had vested under state law. *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92, 106–08 (1938). In *Hinderlider*, holders of vested Colorado water rights sued the Colorado state engineer for curtailing their water use in the La Plata River. The state engineer argued that he was acting pursuant to the terms of an interstate compact with New Mexico. Although the compact was entered into after the Colorado water rights were granted, the Supreme Court reasoned that the water rights Colorado had to grant to its citizens could never be more than Colorado's equitable share of the La Plata River, nor could people claiming water rights under Colorado law claim more than Colorado's equitable share of the river. The states in their sovereign capacity were the entities that adjusted these equities by compact. *Hinderlider*, 304 U.S. at 104–109; *see also Nebraska v. Wyoming*, 325 U.S. 589, 627 (1945).

The question of whether Congress is bound by compacts is somewhat different from the question of whether states are bound by them. Some courts have held that Congress itself cannot unilaterally reserve the right to amend or repeal an interstate compact. *See Riverside Irrigation District v. Andrews*, 568 F. Supp. 583, 589 (D. Colo. 1983), *aff'd*, 758 F.2d 508 (10th Cir. 1985); *Tobin v. United States*, 306 F.2d 270, 273 (D.C. Cir.), *cert. denied*, 371 U.S. 902 (1962). However, the approval of a compact does not prevent Congress from exercising its constitutional authority to control commerce and navigation. *Pennsylvania v. Wheeling & Belmont Bridge Co.*, 59 U.S. (18 How.) 421 (1855). In *Riverside Irrigation District*, a district engineer for the U.S. Army Corps of Engineers (the Corps) decided that petitioners did not qualify under a nationwide permit to discharge sand and gravel in connection with petitioners' construction of a dam on the South Platte River in Colorado. His successor later required petitioners to seek an individual permit from the Corps for the activity. The district engineers based their decisions on the Corps' authority under section 404 of the federal Clean Water Act, and on consultations with the U.S. Fish and Wildlife Service under the federal Endangered Species Act regarding protection of the endangered whooping crane. The evidence indicated that the Corps' concern lay more with the impacts that the reservoir would eventually have on habitat and water quality than with the impact that dredge and fill material would have during construction. Petitioners, including the State of Colorado and various local entities involved in water management, argued that the district engineers lacked the statutory authority to make their decision based on the impacts of reservoir operation. However, they also argued that the actions of the government under the federal Clean Water Act could not be used to affect state water rights under the South Platte River Compact, approved by Act of Mar. 8, 1926, ch. 46, 44 Stat. 195. The court held that Congress does not limit its authority to enact subsequent laws of nationwide applicability, even though they conflict with the terms of a compact. *Riverside Irrigation District*, 568 F. Supp. at 589–90.

Finally, compacts place limitations on the courts. Unless a compact to which Congress has consented is somehow unconstitutional, no court may order relief inconsistent with its express terms. *Texas v. New Mexico*, 462 U.S. 554, 564 (1983).

D. Enforcement of Interstate Stream Compacts

1. Enforcement by the States in the U.S. Supreme Court

Historically, enforcement of Texas compacts has been by the signatory states in the U.S. Supreme Court. *See, e.g., Oklahoma v. New Mexico*, 484 U.S. 808 (1987); *Texas v. New Mexico*, 421 U.S. 927 (1975); *Texas v. Colorado*, 389 U.S. 1000 (1967); *Texas v. New Mexico*, 343 U.S. 932 (1952); *Texas v. New Mexico*, 296 U.S. 547 (1935). Federal law provides that the Supreme Court has "original and exclusive jurisdiction of all controversies between two or more States." 28 U.S.C. § 1251(a). However, the U.S. Constitution does not confine state-versus-state controversies to the exclusive jurisdiction of the Supreme Court. *See Ames v. Kansas*, 111 U.S. 449, 469 (1884); *see also* U.S. Const. art. III, § 2, cl. 2. Congress can create lower courts and vest them with jurisdiction that is concurrent with that of the Supreme Court. *See* U.S. Const. art. III, §§ 1, 2, cl. 2. The Red River Compact contains language stating that U.S. district courts have concurrent original jurisdiction over suits "involving the application or construction" of the compact. *See* Tex. Water Code § 46.013, art. XIII, § 13.03. Therefore, it is important to determine whether there is a federal law other than 28 United States Code section 1251(a) that addresses jurisdiction.

2. Enforcement of Compact Terms in Other Actions

States are the principal enforcers of their compacts, but lawsuits involving compact issues are not always state-versus-state actions. And this third-party litigation is usually not consigned to the Supreme Court's original jurisdiction. One example is *Hinderlider v. La Plata River & Cherry Creek Ditch Co.*, 304 U.S. 92 (1938). In *Hinderlider*, a Colorado irrigation company sued the state engineer of Colorado in the Colorado state courts for having "so administered the water of the river as to deprive the plaintiff of water which it claims the right to divert." *Hinderlider*, 304 U.S. at 95. The state engineer argued that any curtailment of water deliveries to the plaintiff was made in order to comply with water delivery obligations Colorado had to New Mexico under the La Plata River Compact. *Hinderlider*, 304 U.S. at 95. The case was decided on the meaning and applicability of the compact, but it reached the U.S. Supreme Court by way of appeal from the Colorado Supreme Court.

Compact requirements were also raised as issues by non-state parties in *League to Save Lake Tahoe v. Tahoe Regional Planning Commission*, 507 F.2d 517 (9th Cir. 1974), *cert. denied*, 420 U.S. 974 (1975), *appeal after remand*, 558 F.2d 914 (9th Cir. 1977). In *League to Save Lake Tahoe*, a local association, the Sierra Club, and two individuals sued a regional planning commission. The commission was created under an interstate compact between California and Nevada intended to control development around Lake Tahoe to protect natural resources in the area. The plaintiffs sought an injunction, *inter alia*, to compel the planning commission to adopt ordinances that it was required to adopt under the compact. Standing, discussed below, was not at issue in either the *Hinderlider* or the *League to Save Lake Tahoe* case.

In contrast to the two situations above, not every litigant who invokes a compact claim in federal court succeeds in maintaining an action on the claim. In *United States v. City of Las Cruces*, 289 F.3d 1170 (10th Cir. 2002), the U.S. Bureau of Reclamation sought to quiet title to its claim of water rights in the Rio Grande Project, serving the region around Las Cruces, New Mexico, and El Paso, Texas. The New Mexico state engineer and other New Mexico parties cited various abstention doctrines and moved for dismissal. They argued that a water rights adjudication was pending in New Mexico state court that would resolve the bureau's claims. The bureau and two Texas parties contended that federal law questions arising under the Rio Grande Compact and a 1906 treaty with Mexico needed to be resolved by the federal courts and that the case should proceed. The Tenth Circuit Court of Appeals rejected the bureau's federal question arguments, saying in part, "The Treaty and the Compact only require water deliveries to the states or Mexico, not the named defendants. Because the federal quiet title action only involves the competing claims of the United States and the named defendants, the water rights given to the states or Mexico are irrelevant." *City of Las Cruces*, 289 F.3d at 1185.

3. *Standing and Intervention—Enforcement of Interstate Compacts by State and Local Governments*

A threshold issue in compact enforcement is standing. States may usually assert standing in federal court in one of three capacities: (1) a proprietary capacity, in which the state claims to suffer a direct, tangible injury; (2) a sovereign capacity, as when a state seeks relief in a boundary dispute or a water rights dispute; and (3) as *parens patriae*, to protect "quasi-sovereign" interests. *See Alfred L. Snapp & Son, Inc. v. Puerto Rico ex rel. Barez*, 458 U.S. 592, 601–03 (1982); *see also Connecticut v. Cahill*, 217 F.3d 93, 97 (2d Cir. 2000).

The question of whether a political subdivision of a state may intervene in a compact enforcement action before the Supreme Court is another issue. Although there is little authority precisely on the point, lower courts have held that municipalities or local governments cannot base standing on the *parens patriae* doctrine. *Colorado River Indian Tribes v. Town of Parker*, 776 F.2d 846, 848 (9th Cir. 1985); *In re Multidistrict Vehicle Air Pollution M.D.L. No 31*, 481 F.2d 122, 131 (9th Cir.), *cert. denied sub nom. Morgan v. Automobile Manufacturers Ass'n, Inc.*, 414 U.S. 1045 (1973). On the other hand, lack of standing to prosecute a claim under the *parens patriae* doctrine does not preclude a local government from asserting that it has standing based on some specific proprietary or individual interest that would permit intervention generally under rule 24 of the Federal Rules of Civil Procedure. *See In re Multidistrict Vehicle Air Pollution M.D.L. No 31*, 481 F.2d at 131.

In the event that the political subdivision's state is already a party to the proceeding, however, another standing-related issue arises. Under the *parens patriae* doctrine, the state is presumed to represent its citizens—private, corporate, and governmental. A political subdivision seeking to overcome that presumption and obtain standing in an original action before the Supreme Court must show "some compelling interest in [its] own right, apart from [its] interest in a class with all other citizens and creatures of the state, which interest is not properly represented by the state." *New Jersey v. New York*, 345 U.S. 369, 373–74 (1953) (citing *Commonwealth of Kentucky v. State of Indiana*, 281 U.S. 163, 173–74 (1930)). The standard was reaffirmed in 2010 by the Supreme Court in *South Carolina v. North Carolina*, 55 U.S. 256, 268–69 (2010), in which the Court allowed a nonstate party to intervene but required it to demonstrate a "compelling interest that is unlike the interests of other citizens of the States."

In *New Jersey v. New York*, New Jersey filed a suit against the State of New York relating to the use of the waters of the Delaware River. The City of New York was also joined as defendant. When the State of Pennsylvania and the City of Philadelphia sought to intervene, the Supreme Court determined that Pennsylvania could intervene but Philadelphia could not because it was represented by Pennsylvania. The Court distinguished the inclusion of New York City as a party to the litigation on the basis that New York City was "forcibly joined as a defendant to the original action since [it] was the authorized agent for the execution of the sovereign policy which threatened injury to the citizens of New Jersey." *New Jersey v. New York*, 345 U.S. at 374–75. The holding in *New Jersey v. New York* was cited and discussed again in 1995 in *Nebraska v. Wyoming*, 515 U.S. 1, 21–22 (1995).

There has been at least one situation in which the commissioners of a regional agency within a state *were* deemed to be acting for its state and were thus appropriate parties in an original action. The Supreme Court allowed the State of New York to maintain an original action against the Passaic Valley Sewage Commissioners (a New Jersey governmental agency) as well as the State of New Jersey, seeking an injunction against proposed sewage discharges from New Jersey into New York Bay. The Court said, "[T]he defendant sewerage commissioners constitute such a statutory, corporate agency of the state [of New Jersey] that their action, actual or intended, must be treated as that of the state itself, and we shall so regard it." *New York v. New Jersey*, 256 U.S. 296, 302 (1921).

Despite the cases that apply stringent standards for intervention by political subdivisions in original actions, as a practical matter there have been many incidences of political subdivisions being allowed to participate as parties in interstate water litigation without objection by the other litigants. Among that number are cases where irrigation districts in Texas or New Mexico have been parties to litigation involving the Pecos River and the Rio Grande.

If compact issues are raised in cases originating in the lower courts, the rules on intervention by political subdivisions may be different. Some federal appellate courts have recognized a distinction between intervention by political subdivisions in the lower courts and intervention in a Supreme Court original action. In *Environmental Defense Fund, Inc. v. Higginson*, 631 F.2d 738 (D.C. Cir. 1979), the court of appeals held that the "compelling state interest" criterion used in *New Jersey v. New York* applied in cases that were under the Supreme Court's original jurisdiction but not in cases that originated in the federal district courts. The court of appeals attributed the Supreme Court's more stringent standard to the high court's need to limit original actions. *Higginson*, 631 F.2d at 739–40. However, the would-be intervenor would still have to demonstrate that its interests were not adequately represented by the state. 631 F.2d at 739–40.

4. Express and Implied Rights of Action

Closely related to standing is the question of whether a compact affords an aggrieved state any type of remedy—whether express or implied. Lack of an express remedy in a compact does not necessarily prevent a state from enforcing a compact in the courts. In *Texas v. New Mexico*, 462 U.S. 554, 567 (1983), the State of New Mexico noted that the Pecos River Compact provided no express remedies for violations of its provisions and argued that the lack of an express remedy precluded an original action to enforce the compact in the Supreme Court. Therefore, New Mexico argued, the only remedy available to Texas was the Pecos River Commission, where Texas had one vote, New Mexico had one vote, and there was no provision for resolving a deadlock. The Supreme Court rejected New Mexico's argument, saying, "In the absence of an explicit provision or other clear indications that a bargain to that effect was made, we shall not construe a compact to preclude a State from seeking judicial relief when the compact does not provide an equivalent method of vindicating the State's rights." 462 U.S. at 569–70.

As with standing, nonstate parties such as political subdivisions seeking to intervene in compact enforcement cases under an implied right of action may be subject to different or greater scrutiny. There is little case law on the subject, and the case law that does exist is not published. However, at least one case follows the Supreme Court's general rules regarding private rights of action under federal statutes. In *Three Forks Ranch Corp. v. City of Cheyenne, Wyoming*, 96 Fed. App'x. 567 (10th Cir. 2004), a Wyoming corporation sued the City of Cheyenne, the Wyoming state engineer, and various local water management entities for damages based on alleged violations of the Upper Colorado River Basin Compact. The Tenth Circuit Court of Appeals employed the four-pronged analysis prescribed by the Supreme Court in *Cort v. Ash*, 422 U.S. 66, 78 (1975), for determining whether a federal statute created an implied private right of action. It should be noted that *Cort v. Ash* has not been expressly overruled, but in more recent cases, the Supreme Court has reduced the number of factors essentially to one—namely, whether Congress clearly manifested an unambiguous intent to confer individual rights. *See Gonzaga University v. Doe*, 536 U.S. 273 (2002). There must be a demonstration of intent on the part of Congress to create both a private right and a private remedy. *Alexander v. Sandoval*, 532 U.S. 275, 286–87 (2001).

Again, as is the case with standing, there are practical considerations. Political subdivisions or private concerns that have a stake in water rights affected by multistate stream litigation may well be included as parties without objection. The fact that they are directly affected may bolster their chances of being made parties because, among other reasons, they may be best situated to gather information important to the lawsuit.

5. *Parol Evidence in Compact Enforcement Actions*

The Supreme Court has held that the record of the negotiations may be used to ascertain the meaning intended by the parties when the interpretation of a compact is at issue and the relevant language of the compact is determined to be ambiguous. *Oklahoma v. New Mexico*, 501 U.S. 221, 234–35 (1991); *Texas v. New Mexico*, 462 U.S. 554, 568 n.14 (1983); *Arizona v. California*, 292 U.S. 341, 359–60 (1934). As is the case with the interpretation of any statute or contract, the courts and special masters have a substantial amount of latitude in determining whether an ambiguity exists, but this determination may also be subject to dispute on review. One example of this is seen in *Oklahoma v. New Mexico*, in which New Mexico questioned the special master's use of extrinsic evidence to construe certain provisions of the Canadian River Compact, but the Supreme Court upheld the master's decision. *See Oklahoma*, 501 U.S. at 235 n.5.

The signatory states' course of performance under a compact can also be a significant factor, as it was in interpreting North Carolina's obligations under an interstate waste disposal compact. *Alabama v. North Carolina*, 560 U.S. 330, 343–52 (2010); *see also Oklahoma v. New Mexico*, 501 U.S. at 235 n.5, and *Texas v. New Mexico*, 462 U.S. 554, 565 (1983). The Supreme Court also considered whether there had been any history of cross-border water diversions under the Red River Compact when evaluating Tarrant Regional Water District's request for relief in *Tarrant Regional Water District v. Herrmann*, 133 S. Ct. 2120, 2133–35 (2013).

6. *Relief: Injunction*

The courts can compel a state to comply with the terms of an interstate compact. *Texas v. New Mexico*, 462 U.S. 554, 567 (1983). The relief granted may be remedial to address past violations, but it also may be prospective to prevent future violations. *See Texas v. New Mexico*, 482 U.S. 124, 128 (1987). In doing so, the Court has enforcement authority necessary to prevent abuse. *See Kansas v. Nebraska*, 135 S. Ct. 1042, 1052 (2015). However, as previously noted, because a compact is federal law, the courts are bound by its terms and cannot order relief that is inconsistent with a compact's express terms. *Kansas v. Nebraska*, 135 S. Ct. at 1052–53; *see also Texas v. New Mexico*, 462 U.S. at 571–75. In the Pecos River litigation, the Supreme Court refused to reform the Pecos River Compact to break an impasse on the Pecos River Commission that led in part to the litigation. *Texas v. New Mexico*, 462 U.S. at 564–66. The Court also refused to accept a drastically different method for water accounting than had been contemplated by the framers of the Pecos River Compact, but it did accept that a new methodology for water accounting, that it viewed as consistent with the framers' intent, could be substituted for the original (and unworkable) method of determining New Mexico's water delivery obligations. *Texas v. New Mexico*, 462 U.S. at 571–75.

7. *Relief: Monetary Damages*

The Supreme Court can award monetary damages in an original action between states. *See Texas v. New Mexico*, 482 U.S. 124, 130–31 (1987) (holding that monetary damages could be awarded to Texas for New Mexico's violation of the Pecos River Compact in lieu of specific performance); *see also Virginia v. West Virginia*, 246 U.S. 565 (1918) (mandamus action by Virginia to compel collections of taxes by West Virginia to pay a judgment). The Eleventh Amendment is not implicated when a state seeks monetary damages against another state, even if the complaining state's claim is based in part on the losses of individuals in the petitioner state. *Kansas v. Colorado*, 533 U.S. 1, 7 (1991). However, the state's claim ultimately must be based on its own interest, and the state may not sue as a nominal party on behalf of one or a small group of its citizens. 533 U.S. at 8–9. Prejudgment interest may also be awarded. 533 U.S. at 9–12.

III. The Five Interstate River Compacts in Texas

As noted in the beginning of this chapter, Texas is a party to five interstate river compacts with its neighbors. These compacts are:

1. The Rio Grande Compact, approved by Act of May 1, 1939, ch. 155, 53 Stat. 785; codified in Texas Water Code chapter 41.

2. The Pecos River Compact, approved by Act of June 9, 1949, ch. 184, 63 Stat. 159; codified in Texas Water Code chapter 42.

3. The Canadian River Compact, approved by Act of May 17, 1952, ch. 306, 66 Stat. 74; codified in Texas Water Code chapter 43.

4. The Red River Compact, approved by Act of Dec. 22, 1980, Pub. L. No. 96-564, 94 Stat. 3305; codified in Texas Water Code chapter 46.

5. The Sabine River Compact, approved by Act of Aug. 10, 1954, ch. 668, 68 Stat. 690; codified in Texas Water Code chapter 44.

There was a sixth compact that addressed the management of Caddo Lake, in northeast Texas. Caddo Lake is on a tributary of the Red River, and it is transected by the Texas-Louisiana state line between Marshall, Texas, and Shreveport, Louisiana. The Caddo Lake Compact was ratified by Texas and codified in chapter 47 of the Texas Water Code in 1979. However, the Caddo Lake Compact failed to receive approval by Congress. *See* Paul Elliott, *Texas' Interstate Water Compacts*, 17 St. Mary's L.J. 1241, 1271 n.263 (1986). Louisiana repealed its ratification of the agreement in 1982.

The sections that follow provide a general overview of each of the five active interstate stream compacts Texas has with its neighboring states.

IV. The Two Rio Grandes: An Overview

A discussion of the Rio Grande Compact must begin with a discussion of the broader organization of water management on the Rio Grande. Two treaties between the United States and Mexico have, legally speaking, created two "Rio Grandes" in Texas. A discussion of the two treaties is found in *State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728, 733–37 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.).

The first "Rio Grande" encompasses the river from its source in Colorado to a point about eighty river miles below El Paso near Fort Quitman, an abandoned cavalry outpost in Hudspeth County. This Rio Grande—the Rio Grande above Fort Quitman—is governed by a 1906 treaty with Mexico commonly known as the "1906 Convention." *See* Convention for the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes, U.S.–Mexico, May 21, 1906, 34 Stat. 2953, *available at* www.ibwc.state.gov/Files/1906Conv.pdf. This is the portion of the Rio Grande that is also governed by the Rio Grande Compact (discussed below). The second "Rio Grande" encompasses the river from Fort Quitman to the Gulf of Mexico. This Rio Grande is governed by a treaty with Mexico, also called the "1944 Treaty" or the "1945 Treaty" because it was signed in 1944 and ratified by Congress in 1945. *See* Treaty Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.–Mexico, Feb. 3, 1944, 59 Stat. 1219, *available at* www.ibwc.state.gov/Files/1944Treaty.pdf.

The 1945 Treaty divides the waters below Fort Quitman, including the waters of the Rio Grande stored in Falcon and Amistad reservoirs and waters in tributaries that enter the Rio Grande downstream of Fort Quitman, between the United States and Mexico. This second Rio Grande is not governed by an interstate compact, but the 1945 Treaty and the adjudication of water rights in the Lower and Middle Rio Grande of Texas have given rise to a system of water rights that is distinct from all other parts of Texas. This unique system will be discussed below.

V. The Rio Grande above Fort Quitman: Its Compact and Its Treaties

A. The River and Its Course

The Rio Grande has its headwaters at the Continental Divide in the San Juan Mountains of Colorado, northeast of Durango, Colorado. *See* Leon C. Metz, *The Handbook of Texas Online*, *Rio Grande*, www.tshaonline.org/handbook/online/articles/rnr05. The river flows eastward to Alamosa, Colorado, where it begins a southern descent to New Mexico northwest of Taos, New Mexico. It then flows south roughly through the center of New Mexico, arriving in Texas just west of El Paso. From El Paso, it proceeds to mark the boundary between Texas and Mexico until the river flows into the Gulf of Mexico at the far southern tip of Texas. A map of the Rio Grande is included in Figure 1.

The portion of the Rio Grande, and all its tributaries, in Colorado, New Mexico, and Texas above Fort Quitman (about eighty miles southeast of El Paso in Hudspeth County) are subject to the Rio Grande Compact. *See* Tex. Water Code § 41.009, art. I(c). Additionally, the 1906 Convention governs use of the water above Fort Quitman by the United States and Mexico.

B. The Rio Grande Compact

1. *History of the Rio Grande Compact*

The Rio Grande Project was built by the U.S. Reclamation Service, predecessor to the U.S. Bureau of Reclamation, in accordance with the Reclamation Act of 1902. Act of June 17, 1902, ch. 1093, 32 Stat. 388 (codified at 43 U.S.C. §§ 371–390). Congress made the Reclamation Act applicable to projects in Texas and approved the Rio Grande Project in 1906. *See* Act of June 12, 1906, ch. 3288, 34 Stat. 259 (codified at 43 U.S.C. § 391). Elephant Butte Reservoir was completed around 1915, and most of the additional project works were added by the late 1930s.

In the 1920s and 1930s, use of water for irrigation in the Rio Grande above Elephant Butte increased greatly. New irrigation projects were designed and built between Elephant Butte and Albuquerque and in the mountain valleys near Alamosa, Colorado. This caused Texas (supported by interests in southern New Mexico) to file suit against the States of New Mexico and Colorado. *See* *Texas v. New Mexico*, 308 U.S. 510 (1939) (dismissing Texas's complaint). The Final Report of the Special Master explained that the controversies raised in Texas's lawsuit were resolved by the

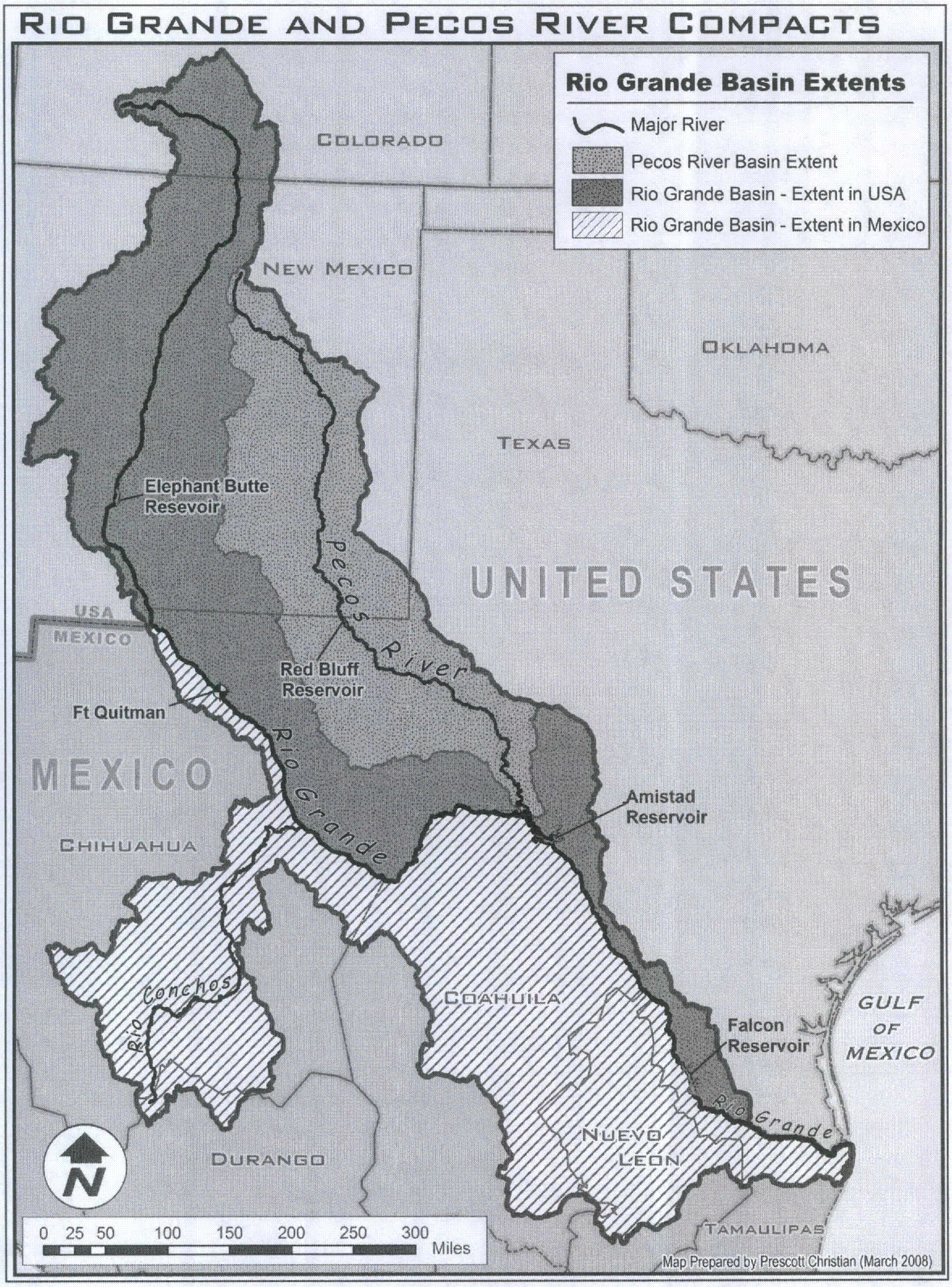

Figure 1. The Rio Grande and Pecos River Compacts. Courtesy Prescott Christian, Texas Commission on Environmental Quality.

ratification of the Rio Grande Compact in 1938. The compact was approved by Congress in 1939. See Act of May 31, 1939, ch. 155, 53 Stat. 785; *see generally* Elliott, at 1241.

2. Language of the Rio Grande Compact

Colorado, New Mexico, and Texas are the signatories to the Rio Grande Compact. Tex. Water Code § 41.001. The compact is administered by the Rio Grande Compact Commission, which is made up of one representative from each state. Tex. Water Code § 41.009, art. XII. The governor of Texas appoints the Texas Rio Grande Compact Commissioner, and the state engineers of Colorado and New Mexico are the representatives for their respective states. Tex. Water Code § 41.009, art. XII. By unanimous action, the three commissioners may adopt rules and regulations to govern their proceedings. Tex. Water Code § 41.009, art. XII. A chair is appointed by the president of the United States, but this person does not have a vote on any matter before the commission. Tex. Water Code § 41.009, art. XII.

The preamble of the Rio Grande Compact states the intentions of the three states, in entering into the compact, to be "effecting an equitable apportionment" of the waters of the river. Tex. Water Code § 41.009. The Rio Grande Compact specifically obligates the upstream states of Colorado and New Mexico to make quantifiable deliveries to their respective downstream state. Colorado delivers its water obligation to New Mexico at the Colorado–New Mexico state line. Tex. Water Code § 41.009, art. III. New Mexico delivers its water obligation into Elephant Butte Reservoir, about one hundred miles upstream of El Paso in New Mexico. Tex. Water Code § 41.009, art. IV; Resolution Adopted by Rio Grande Compact Commission at the Annual Meeting Held at El Paso, Texas, February 22–24, 1948, Changing Gaging Stations and Measurements of Deliveries by New Mexico, *available at* http://wrri.nmsu.edu/wrdis/compacts/Rio-Grande-Compact.pdf [hereinafter Resolution]. The amount of water to be delivered is calculated on a sliding scale based on the river flow past certain gauges identified in the compact. *See* Tex. Water Code § 41.009, arts. III, IV.

Although the compact purports to divide the waters of the Rio Grande from its source in Colorado to Fort Quitman, the compact does not contain an express ratio for dividing the waters between western Texas and southern New Mexico after New Mexico has met its delivery obligation at Elephant Butte Reservoir. Initially, the Bureau of Reclamation made a determination about how many irrigable acres lay in the water district in New Mexico (the Elephant Butte Irrigation District) and how many acres lay in the water district in Texas (El Paso County Water Improvement District No. 1). Water is delivered under contract to each district based on the total "irrigable acres" the bureau recognized in each district. The irrigable acres are split 57 percent to New Mexico and 43 percent to Texas. Only one formal reference to this allocation is found in writing, and that is in a 1938 bureau contract with the districts. *See* Contract between the Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1 Dated Feb. 16, 1938, Providing for a 3 percent cushion on the Irrigable Area of the Rio Grande Reclamation Project as allocated to the Districts (copy on file in the offices of the Texas Attorney General).

Under the compact, credits and debits for Colorado and New Mexico are computed annually. Tex. Water Code § 41.009, art. VI. Colorado may not accrue a debit greater than 100,000 acre-feet; New Mexico may not be in debt to Texas in excess of 200,000 acre-feet. Tex. Water Code § 41.009, art. VI. Credits and debits can be canceled by an actual spill of usable water or under conditions that would have resulted in a spill, called a "hypothetical spill." *See* Tex. Water Code § 41.009, art. I (definitions), art. VI. When less than 400,000 acre-feet of usable water are in project storage, which is a time of drought, neither Colorado nor New Mexico can store water in any reservoir built after 1929. Tex. Water Code § 41.009, art. VII.

3. *Operations under the Rio Grande Compact*

Practically, the Rio Grande's operations under the compact generally are worked out between the states. Over the years, adoption of a resolution or a change in rules by the Compact Commission, or even a letter agreement between states, can address a specific need of one or more states on the Rio Grande. This is preferred to any attempt to change the terms of the compact, because that could be seen as submitting all issues in the compact to reconsideration, much like opening a can of worms.

For instance, the compact literally provides that New Mexico's delivery obligation is to be made at San Marcial. *See* Tex. Water Code § 41.009, art. II. By resolution adopted in 1947 by the Rio Grande Compact Commission, the gauging station at San Marcial was abandoned and the station at Elephant Butte Reservoir was substituted. See Resolution, at 7. When in 2003 New Mexico needed water to meet obligations to the silvery minnow under the Endangered Species Act, through a series of letters, New Mexico offered to relinquish a portion of its accrued credits in phases so that it could store a like amount of water upstream of Elephant Butte Reservoir for later release for the silvery minnow, and Texas accepted the offer of the release of credits. Rio Grande Compact Commission, Report of the Rio Grande Compact Commission 2003, at 35–39.

In March 2008, the two water districts and the Bureau of Reclamation formalized the allocation of water by executing an Operating Agreement for the Rio Grande Project. Additionally, the parties agreed to produce an Operations Manual to contain detailed information regarding methods, equations, and procedures used by the parties to account for water charges and operating procedures for the Rio Grande Project.

On August 8, 2011, however, New Mexico filed a lawsuit against the United States concerning the Operating Agreement. *See New Mexico v. United States*, No. 1:11-cv-00691-JB-ACT (D.N.M.). New Mexico challenged the Bureau of Reclamation's action in entering into the Operating Agreement, and sought, among numerous other claims, a declaration that the Operating Agreement was void as a matter of law and an injunction enjoining the bureau from implementing the Agreement. The two water districts intervened in the lawsuit.

On January 8, 2013, Texas initiated an original action in the U.S. Supreme Court by filing a motion for leave to file complaint. *Texas v. New Mexico & Colorado*, No. 220141 ORG (U.S. Docketed Jan. 10, 2013). Texas accused New Mexico of taking actions that reduced Texas's water supplies and the apportionment of water to which Texas is entitled under the Rio Grande Compact. Texas asked the Court to declare Texas's rights to the waters of the Rio Grande pursuant to the Compact and the federal act authorizing the Rio Grande Project. Colorado and New Mexico responded, asking the Court to deny Texas's motion. On January 27, 2014, the Court granted Texas's motion for leave to file complaint, and on November 3, 2014, the Court appointed a special master to administer the case.

C. 1906 Convention

Also affecting the Rio Grande above Fort Quitman is the United States' required delivery to Mexico. About the time the Rio Grande Project was approved by Congress, the United States also entered the 1906 Convention, cited in section IV above. The 1906 Convention obligates the United States to deliver 60,000 acre-feet of water per year to Mexico at a dam between El Paso and Ciudad Juarez. The treaty requires that in cases of "extraordinary drought or serious accident to the irrigation system in the United States," the amount delivered to Mexico must be diminished in the same proportion as the water delivered to lands under irrigation in the Rio Grande Project in the United States. The rest of the water in the portion of the Rio Grande from its source in Colorado down to Fort Quitman is allocated for use in the United States.

VI. The Rio Grande below Fort Quitman: Unique in Texas Water Law

A. The Segments of the Rio Grande below Fort Quitman

For state regulatory purposes, the Rio Grande below Fort Quitman is divided into three segments: the Upper Rio Grande (from Fort Quitman to Amistad Dam), defined at 30 Texas Administrative Code section 303.2(21); the Middle Rio Grande (from Amistad Dam to Falcon Dam), defined at 30 Texas Administrative Code section 303.2(13); and the Lower Rio Grande (from Falcon Dam to the mouth of the Rio Grande), defined at 30 Texas Administrative Code section 303.2(11).

B. Controlling Law on the Rio Grande below Fort Quitman

The 1945 Treaty, cited in section IV above, applies to the Upper, Middle, and Lower Rio Grande. The Texas Commission on Environmental Quality (TCEQ) regulates water use by Texas in these segments of the Rio Grande through its Rio Grande Watermaster, but regulation varies with the location. *See* 30 Tex. Admin. Code ch. 303. Water rights originally adjudicated in the Lower and Middle Rio Grande are based on water stored in two international reservoirs. The system used to regulate and manage these water rights was a product of those water rights adjudications in the mid-twentieth century. It is unique in Texas water law. See Chapter 13 of this book for a discussion of enforcement by the Rio Grande Watermaster.

C. The 1945 Treaty

One of the main portions of the 1945 Treaty deals with the Rio Grande below Fort Quitman. Article 4 of the treaty apportions the waters of the Rio Grande below Fort Quitman. The flow in the main channel of the Rio Grande is divided equally between the United States and Mexico. *See* 1945 Treaty, arts. 4.A(b), (d), 4.B(b), (d). However, the water that reaches the Rio Grande from tributaries is not divided. The United States is allotted all of the waters that reach the Rio Grande from significant U.S. tributaries, such as the Pecos and Devils Rivers. See 1945 Treaty, art. 4.B(a). Mexico is allotted all of the waters that reach the Rio Grande from some of Mexico's tributaries. *See* 1945 Treaty, art. 4.A(a). However, some of the major Mexican tributaries to the Rio Grande, such as the Rio Conchos, which enters the Rio Grande near Presidio, Texas, are divided two-thirds to Mexico and one-third to the United States. *See* 1945 Treaty, arts. 4.A(c), 4.B(c). The average share of water from these Mexican tributaries that is allotted to the United States must not be less than 350,000 acre-feet per year. If it is less, Mexico is required to make up the difference over a five-year period, except in periods of "extraordinary drought." *See* 1945 Treaty, art. 4.B(c), and the final paragraph of art. 4.

Article 5 of the 1945 Treaty contemplates the construction of three or more reservoirs on the Rio Grande. Of the three sites mentioned, two have been constructed: Falcon Reservoir between Roma-Los Saenz and Laredo, and Amistad Reservoir downstream of the confluence of the Rio Grande and the Pecos River.

Article 8 of the 1945 Treaty addresses storage and provides, among other things, that the International Boundary and Water Commission (IBWC) will develop regulations for storage, conveyance, and delivery of water to the United States and Mexico. It also contains some general provisions relating to water accounting. Article 9 addresses some other accounting issues and also provides that the IBWC will account for water use, storage, conveyance, water losses, and other aspects of water accounting.

The IBWC was created under a prior United States–Mexico treaty in 1889 and was called the International Boundary Commission. Its name was changed to International Boundary and Water Commission in the 1945 Treaty. IBWC has both Mexican and U.S. branches, the latter being a bureau of the U.S. Department of State. Information about IBWC is available at www.ibwc.state.gov/index.html.

D. The Weighted Priorities, or Amistad-Falcon, System of Water Rights

1. A Unique Enclave in Texas Water Law

In most of Texas, water rights are governed by the "prior appropriation" system. Under this system, the oldest claim to water in the watercourse is senior and has priority, in times of shortage, over junior water rights whose holders could also claim a right to the water, regardless of the type of use made of the water. This time-priority system is expressed as follows in the Water Code: "As between appropriators, the first in time is the first in right." Tex. Water Code § 11.027. The prior appropriation system applies to water rights throughout most of Texas, including those in the tributaries of the Rio Grande and the main channel ("main stem") of the Rio Grande above Amistad Dam. See Chapter 3 of this book for further discussion of the prior appropriation system.

The one exception to the rule of prior appropriation is the weighted priorities system, or the Amistad-Falcon system, which was applied to water rights adjudicated in the main stem of the Rio Grande downstream of Amistad Reservoir. Then-existing water rights in the Lower Rio Grande below Falcon Reservoir were adjudicated by the district court in Hidalgo County, in a lawsuit filed by the State of Texas in 1956. *See State v. Hidalgo County Water Control & Improvement District No. 18*, 443 S.W.2d 728, 738 (Tex. Civ. App.—Corpus Christi 1969, writ ref'd n.r.e.). Beginning in the 1970s, existing water rights in the Middle Rio Grande (from Falcon Dam to Amistad Dam) were adjudicated under the Water Rights Adjudication Act of 1967. *See* Tex. Water Code §§ 11.301–.341. The proceeding, commonly called the Middle Rio Grande Adjudication, was conducted before the Texas Water Rights Commission, the predecessor agency of the TCEQ. The Water Rights Commission's Final Determination applied the system of weighted priorities from *Hidalgo County* to the rights adjudicated in the main stem of the Middle Rio Grande below Amistad Dam. *See* Texas Water Rights Commission, Final Determination of Water Right Claims from the Rio Grande and Its Tributaries from Falcon Dam Upstream to Amistad Dam (1974). The Water Rights Commission's decision to apply the priority of use system in the Middle Rio Grande Adjudication was upheld by the district court. *See In re Adjudication of the Middle Rio Grande and Contributing Texas Tributaries*, No. 322,018 (200th Dist. Ct., Travis County, Tex. Nov. 9, 1982).

In *Hidalgo County*, the appellate court recognized three categories of use, prioritized as follows:

1. Domestic, Municipal, and Industrial uses (DMI): A 60,000-acre-foot reserve was set aside for municipalities, and certain other DMI rights were recognized by the appellate court. *Hidalgo County*, 443 S.W.2d at 731–32.

2. Class A Irrigation uses: These were claimants whose rights were based on compliance with prior appropriation statutes or other legal theories. 443 S.W.2d at 748–49.

3. Class B Irrigation uses: These were claimants who had used water in good faith and whose water rights were recognized under the court's equity powers. 443 S.W.2d at 749–50.

Class A and Class B water rights also include mining and industrial uses. *See* 30 Tex. Admin. Code § 303.43.

2. *Water Allocations in the Lower and Middle Rio Grande*

In its opinion on motion for rehearing, the *Hidalgo County* court acknowledged that the Water Rights Adjudication Act of 1967 provided for the Water Rights Commission to take over the administration of adjudicated water rights. The court therefore ordered that the Water Rights Commission assume control of adjudicated water rights in the Lower Rio Grande sixty days after the judgment in *Hidalgo County* became final. *Hidalgo County*, 443 S.W.2d at 761. The rules of the Texas Water Rights Commission and its successor agencies, including the TCEQ, have evolved from the *Hidalgo County* ruling and from its subsequent application to the Middle Rio Grande. When *Hidalgo County* was pending, a master in chancery, later called a "watermaster," administered the Lower Rio Grande for the court. Since then, as allowed by statute, the executive director of the TCEQ has appointed watermasters to administer all of the Rio Grande below Fort Quitman. *See* Tex. Water Code §§ 11.325, 11.326; see also Chapter 13 of this book.

The current operations of the Lower and Middle Rio Grande are established in the TCEQ's rules. *See* 30 Tex. Admin. Code §§ 303.21, 303.22. Falcon and Amistad reservoirs are operated as a single water storage system. Priority-of-use water right holders in the Amistad-Falcon system have accounts based on storage in the reservoirs. A reserve for all DMI rights, now consisting of 225,000 acre-feet, is maintained in the reservoirs when possible, and allocating water to the DMI reserve is the first priority under the TCEQ's allocation rules. *See* 30 Tex. Admin. Code § 303.22(a)(1).

Each month, based on figures from the IBWC for the last Saturday of the previous month, the 225,000-acre-foot reserve for DMI rights is replenished in the watermaster's accounting. *See* 30 Tex. Admin. Code § 303.22(a)(1). From the remaining water in storage, the water account balances for the Class A and Class B rights are deducted by the watermaster. Then, from the remaining water, an operating reserve of 75,000 acre-feet is deducted. If there is water remaining, it is allocated to the Class A and Class B irrigation rights. Consistent with the ruling in *Hidalgo County*, Class A rights are allocated 1.7 times as much water as Class B. *See Hidalgo County,* 443 S.W.2d at 747; *see also* 30 Tex. Admin. Code § 303.22(b).

3. *Water Marketing, Change of Use, and Change of Priority in the Amistad-Falcon System*

The TCEQ's rules provide for the conversion of Class A and Class B rights to DMI rights. *See* 30 Tex. Admin. Code § 303.43. Section 303.43 provides that all "Class A and B priority rights in the Lower and Middle Rio Grande which have been or will be acquired for domestic, municipal, or industrial use" must be amended to authorize the change in purpose of use. One acre-foot of Class A water rights, when converted to DMI use, will become a 0.5 acre-foot of DMI rights. One acre-foot of Class B water rights, when converted to DMI use, will become a 0.4 acre-foot of DMI rights. *See* 30 Tex. Admin. Code § 303.43(1). Once converted, these irrigation or mining rights are to be allocated water from the United States' share of reservoir storage on an equal basis with any domestic, municipal, and industrial right recognized in *Hidalgo County*. *See* 30 Tex. Admin. Code § 303.43(2).

The logic of these ratios derives from the fact that within the Amistad-Falcon system balances in the water accounts for DMI are replenished on a priority basis, whereas Class A and Class B rights are not. The United States' share of water in storage is limited by treaty and by the arid climate of the Southwest, so a change in priority must be accounted for by a decrease in the amount of water that the holder of a converted water right is authorized to take.

In addition to these conversion rules, water rights in the Lower and Middle Rio Grande that have a call on water from storage in Amistad and Falcon reservoirs are subject to a number of specific procedures relating to the sale of a water right or the sale of annual water allocations under a water right ("contractual sales"). *See* 30 Tex. Admin. Code §§ 303.51–.55 (relating to contract sales), 297.81–.83, 303.41, 303.71–.72 (applying to sales of water rights). If any changes to the water rights themselves are involved (change in use, change in authorized place of diversion or use, etc.), the TCEQ's general rules on amendments apply. *See* 30 Tex. Admin. Code ch. 297. Rules at 30 Texas Administrative Code sections 303.41–.44 may apply as well.

E. Contrasting Situation for Water Rights Originating in the Upper Rio Grande and Rio Grande Tributaries

1. In General

Water rights in the Upper Rio Grande and the tributaries of the Rio Grande are subject to supervision by the watermaster. *See* 30 Tex. Admin. Code §§ 303.11, 303.13, 303.23. Like water rights holders in the Lower and Middle Rio Grande, holders of rights in the Upper Rio Grande and Rio Grande tributaries must first file declarations of intent to divert water with the watermaster (although the conditions and limitations on these Upper Rio Grande and tributary declarations are not so strict). *See* 30 Tex. Admin. Code § 303.11(b). Additionally, these water rights originating upstream of Amistad and Falcon reservoirs are not part of the weighted priorities system that governs water rights based on storage in the two international reservoirs. Instead, they are based on the prior appropriation system that applies in the rest of Texas. *See* 30 Tex. Admin. Code § 303.23(a).

2. Connection between the Priority of Use System and the Rest of the Rio Grande

Historically, there has been little guidance on the relationship between water rights in the Upper Rio Grande and tributaries and water rights tied to storage in Amistad and Falcon reservoirs. Transfers of water rights between the Middle Rio Grande (between Amistad and Falcon dams) and the Lower Rio Grande (below Falcon Dam) are allowed, but transfers of water rights out of the Lower and Middle Rio Grande have been prohibited by TCEQ rule at least since 1986. *See* 30 Tex. Admin. Code § 303.42(3); *see also* 11 Tex. Reg. 1815 (proposed rule Apr. 18, 1986), 11 Tex. Reg. 2890 (notice of adoption June 20, 1986).

TCEQ rules also provide that holders of water rights that are based in the Upper Rio Grande and tributaries essentially get first use of the water flowing through those portions of the Rio Grande Basin; thereafter the remaining water is available to holders of water rights based in the Middle and Lower Rio Grande. *See* 30 Tex. Admin. Code § 303.23(a).

Transfers of diversion points or authorized places of use into the Middle or Lower Rio Grande from outside the Middle and Lower Rio Grande were not authorized until 2001 and were limited to transfers from the Upper Rio Grande (between Fort Quitman and Amistad Dam). *See* 30 Tex. Admin. Code § 303.42(4); *see also* 26 Tex. Reg. 920, 926 (proposed rule Jan. 26, 2001), 26 Tex. Reg. 3012, 3018 (notice of adoption Apr. 20, 2001).

TCEQ's application of these transfer rules was the subject of one reported case. *See Brownsville Irrigation District v. Texas Commission on Environmental Quality*, 264 S.W.3d 458 (Tex. App.—Austin 2008, pet. denied). In *Brownsville Irrigation District*, the Austin court of appeals discussed the rules and upheld TCEQ's application of a "conversion factor" to compensate for the effects of the transfer. 264 S.W.3d at 464.

VII. The Pecos River and Its Compact

A. The River and Its Course

The Pecos River is a major tributary of the Rio Grande. It rises in the mountains east of Santa Fe, New Mexico, and runs through much of eastern New Mexico. The Pecos passes through Fort Sumner, Roswell, Artesia, and Carlsbad, New Mexico, before it enters Texas, forming the boundary between Reeves and Loving counties. In Texas, the Pecos flows southeast, emptying its waters into the Rio Grande at Amistad Reservoir, between Comstock and Langtry about thirty-eight miles northwest of Del Rio. The topography of the river valley ranges from mountain pastures in the north, with an elevation of more than 13,000 feet above sea level, to grasslands, semiarid irrigated farmlands, desert with sparse vegetation, and, in the lowermost reaches of the river, deep canyons. *See* Delmar J. Hayter, *The Handbook of Texas Online*, *Pecos River*, www.tshaonline.org/handbook/online/articles/rnp02. A map of the Pecos River is included in Figure 1.

B. The Pecos River Compact

1. *History of the Pecos River Compact*

The Pecos River Compact was born of a controversy that began early in the twentieth century. In 1914, the U.S. Reclamation Service (the precursor to the U.S. Bureau of Reclamation) issued a report on the state of irrigated agriculture in Texas that indicated agriculture in the Pecos Valley of Texas was on the rise, but that it was becoming increasingly risky because there were two dams on the Pecos upstream in New Mexico (i.e., Avalon and McMillan dams, between Carlsbad and Roswell, New Mexico) and a third dam was being contemplated. *See* G. Emlen Hall, *High and Dry: The Texas–New Mexico Struggle for the Pecos River* 38–39 (University of New Mexico Press 2003). Accounts vary; some say Texas threatened to sue New Mexico for equitable apportionment and made efforts to block federal funding for the third dam in New Mexico. Hall, at 38–39. Other accounts say Texas and New Mexico were encouraged by the successful completion of negotiations on the Colorado River Compact in 1922. Elliott, at 1253. In any event, the legislatures of both states authorized a commission to negotiate a compact for the Pecos River in 1923, and a compact was negotiated in 1924. Elliott, at 1253.

The 1924 compact provided that New Mexico could irrigate 76,000 acres of farmland between Santa Rosa, New Mexico, and the Texas state line, and it placed restrictions on the construction of additional reservoirs in New Mexico. At the same time, it authorized Texas to construct Red Bluff Reservoir near the New Mexico state line and irrigate 40,000 acres of farmland. The compact was negotiated and signed in 1924, and the Texas legislature approved it. Elliott, at 1253. However, the New Mexico legislature insisted on adding provisions that guaranteed some reservoir storage in the Upper Pecos Valley of New Mexico. This reportedly caused controversy within New Mexico between Carlsbad area farmers and water users in the Upper Pecos Valley. The governor of New Mexico, finding no consensus within his state, vetoed his legislature's approval of the compact. Hall, at 39–40.

The 1930s were not free of controversy, as battles in Congress ensued over the funding of a third dam in New Mexico. Attempts were made to resolve the dispute through an agreement with the Reclamation Service to which Texas and New Mexico were also parties. The agreement was ratified by Texas but not by New Mexico. New Mexico reportedly did curtail groundwater withdrawal in the Roswell area. *See Texas v. New Mexico*, 462 U.S. 554, 557 n.3 (1983). By that time, groundwater production in New Mexico near Roswell was beginning to have a significant impact on the Pecos River.

The controversies of the 1930s were followed by negotiations on the current Pecos River Compact, which began in 1945 and were completed in 1948. The compact was approved by Congress in 1949. Act of Jan. 3, 1949, ch. 184, 63 Stat. 159. See also section II.C above.

2. Language of the Pecos River Compact

The Pecos River Compact is codified in Texas Water Code section 42.010. The compact does not expressly limit the number of acres irrigated with surface water as the 1924 compact did. Instead, it restricts depletion of flow in the Pecos beyond conditions that prevailed on the river in 1947 without limited depletions to those caused by surface water use. *See* Hall, at 40–41.

Article III, which is the heart of the Pecos River Compact, provides that New Mexico may not "deplete by man's activities the flow of the Pecos River at the New Mexico–Texas state line below an amount which will give to Texas a quantity of water equivalent to that available to Texas under the 1947 condition." The compact defines "deplete by man's activities" as any "beneficial consumptive uses of water within the Pecos River Basin," but it does not include reductions in river flow due to "encroachment of salt cedars" or "deterioration of the channel of the stream." *See* Tex. Water Code § 42.010, art. II(e).

The "1947 condition" is based on the engineering studies performed by the engineering advisory committee to the compact negotiators. The engineering advisors studied records of conditions on the Pecos River starting in 1905 and performed a set of water routing studies, showing the Pecos under six different conditions, including a simulation of water use and water supply conditions in 1947. The advisors also drafted the *Manual of Inflow-Outflow Methods of Measuring Changes in Stream-Flow Depletion*. Derived from data in the 1947 study, it was to be used in determining how much water Texas should expect to receive over a given period for any particular levels of precipitation, under the consumption conditions prevailing in New Mexico in 1947. The compact negotiators approved the engineering advisory committee report on December 3, 1948. *See Texas v. New Mexico*, 462 U.S. 554, 557–59 (1983); S. Doc. No. 109, 81st Cong., 1st Sess. (1949); Pecos River Compact (codified at Tex. Water Code § 42.010, art. II(f), (g)).

The Pecos River Compact apportions water salvaged by conservation efforts and unappropriated floodwaters. *See* Tex. Water Code § 42.010, art. III(b)–(d), (f). The water salvage operations contemplated were primarily removal of phreatophytes, such as salt cedar, commonly found along the Lower Pecos in New Mexico and the Upper Pecos in Texas.

The compact creates the Pecos River Commission, which is made up of a Texas commissioner, a New Mexico commissioner, and a nonvoting federal commissioner. The commission is authorized to establish and maintain gauging stations, engage in studies of the Pecos River, collect data, and analyze data from the Pecos. The commission is also authorized to make findings on water deliveries, water salvage, and water not consumed beneficially. Tex. Water Code § 42.010, art. V(d). Notably, the commission may also "make findings on any change in depletion by man's activities." Tex. Water Code § 42.010, art. V(d)5.

3. Operations under the Pecos River Compact

The controversy between Texas and New Mexico did not end with the ratification and approval of the compact in 1948–49. It was almost immediately apparent that the engineering studies on which the compact apportionment was based did not reflect the reality on the Pecos River. Stateline flows were regularly below the levels predicted in the engineering studies, with no explanation. In 1957, the Pecos River Commission authorized a "Review of Basic Data" by its engineering advisors to try to reconcile differences. The result, reported in the early 1960s, indicated that New Mexico had fallen short in its water deliveries to Texas from 1951 to 1960 by approximately 53,000 acre-feet, far less than would have been the result had the original inflow-outflow method been used. This led to an impasse within the Pecos River Commission, which in turn resulted in Texas filing a lawsuit against New Mexico in 1974. *See Texas v. New Mexico*, 462 U.S. at 562–63.

The U.S. Supreme Court did several things in *Texas v. New Mexico* that affect Pecos River Compact operations to this day. Foremost among them, the Court refused to adopt a method of calculating New Mexico's water delivery obligations to Texas that it deemed wholly inconsistent with the intent of the compact framers, based on the idea that the Court was limited in its actions by the intent of the compact. However, the Court did hold that an alternative method within the contemplation of the compact framers would be within its authority to adopt. *Texas v. New Mexico*, 462 U.S. at 571–76. An alternative method, embodied in the *River Master's Manual*, mentioned below, is in use today. Second, although the Court declined to assume full control over compact management, it did determine that a special master called a "River Master" could be appointed to perform the ministerial duty of calculating New Mexico's annual delivery obligations. *See Texas v. New Mexico*, 482 U.S. 124, 134 (1987).

The Pecos River Commission remains the agency designated to administer the Pecos River Compact, but since the 1980s water accounting on the Pecos River has been conducted by a special master, the "Pecos River Master," appointed by the U.S. Supreme Court. The procedures prescribed for the river master to produce the annual accounting, including a comment period for the two states, are outlined in the Supreme Court's "Amended Decree." *Texas v. New Mexico*, 485 U.S. 388 (1988) (per curiam). On May 15 of each year, the river master submits his calculations for New Mexico's water delivery obligations for the previous calendar year to Texas and New Mexico in the form of a "preliminary report." The two states have until June 15 to review and reply to the calculations. The river master's "final report" is due July 1. Either state may seek review of the river master's report by the Supreme Court, but only on a showing that the river master's conclusions are "clearly erroneous." 485 U.S. at 393. The equations used by the river master (i.e., the replacement for the old inflow-outflow method adopted in 1948) are contained in a *River Master's Manual*, available from the TCEQ. A procedure is established in the amended decree for amending the manual. *See* 485 U.S. at 392.

VIII. The Canadian River and Its Compact

A. The River and Its Course

The Canadian River crosses from New Mexico west of Amarillo, flows eastward and northward through the Texas Panhandle, and into Oklahoma. The North Canadian is a northern tributary that flows from New Mexico into northern Texas, and then into Oklahoma, where it flows southeast to meet with the main stem of the river. *See* Hobart Huson, *The Handbook of Texas Online*, *Canadian River*, http://tshaonline.org/handbook/online/articles/rnc02. Palo Duro Creek and Wolf Creek are tributaries of the North Canadian in Texas. A map of the Canadian River Basin appears in Figure 2.

B. The Canadian River Compact

1. *History of the Canadian River Compact*

The Canadian River Compact came about after several Panhandle communities began planning for Sanford Dam to serve as a surface-water reservoir on the river's main stem. The intention was to alleviate dependency on pumping water and provide additional flood protection and store water for municipal and industrial uses. The communities lobbied for a compact on the river to define the rights

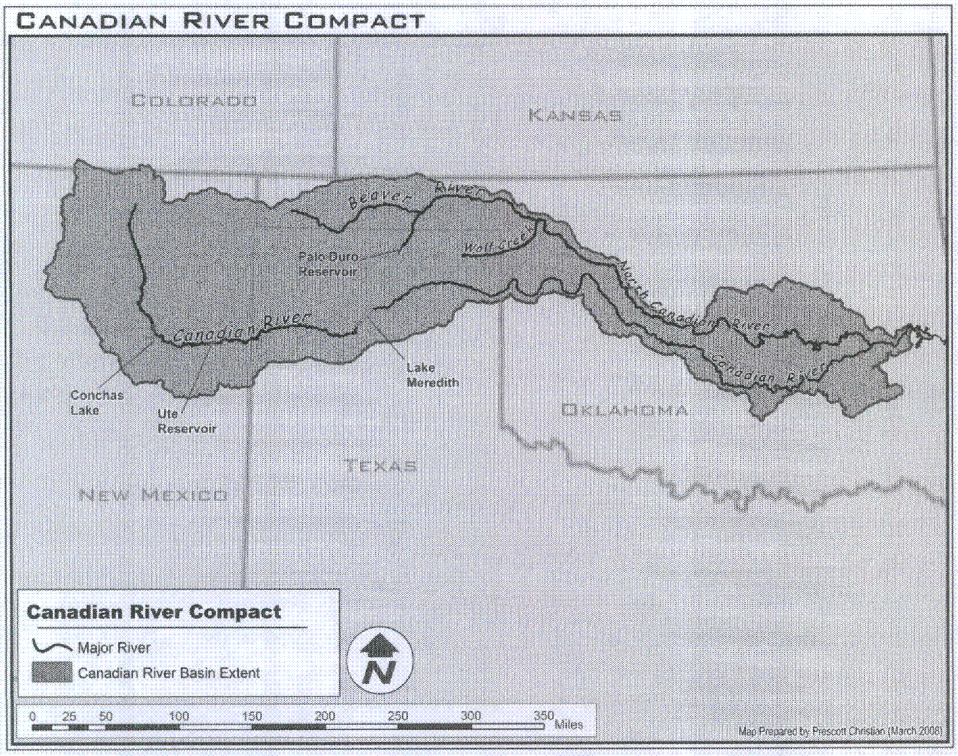

Figure 2. The Canadian River Compact, Courtesy Prescott Christian, Texas Commission on Environmental Quality.

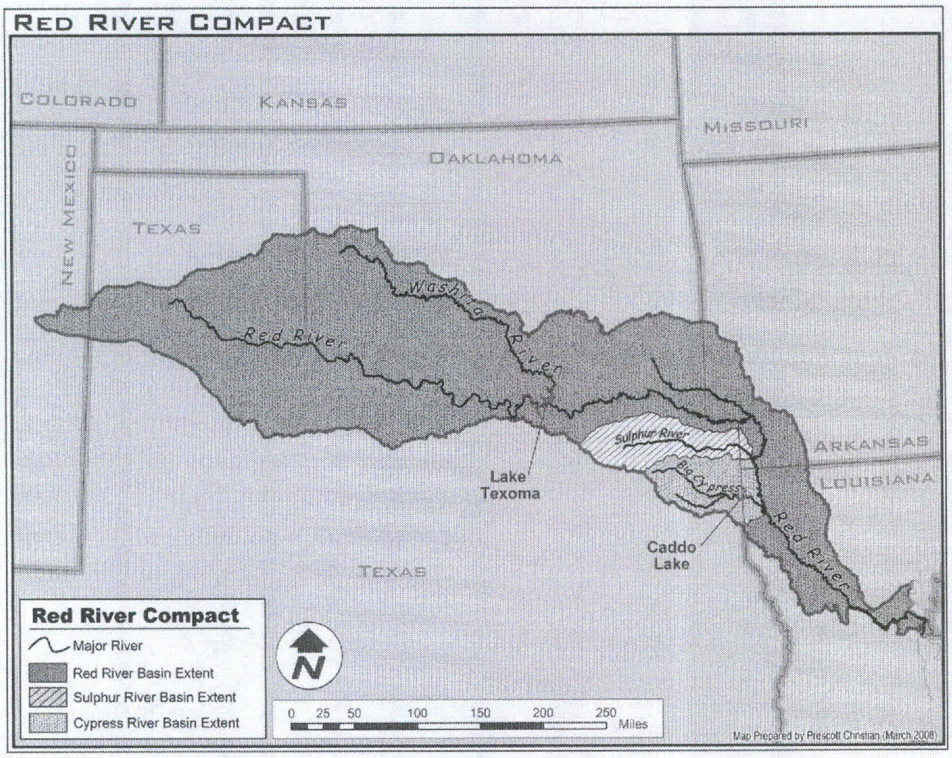

Figure 3. The Red River Compact. Courtesy Prescott Christian, Texas Commission on Environmental Quality.

of each state to the use of Canadian River water. The Canadian River Compact resulted. Elliott, at 1261.

Thus, the compact expressly states that one of its purposes is to "make secure and protect present developments within the States." Tex. Water Code § 43.006, art. I. Unlike compacts such as those on the Rio Grande and the Pecos, the Canadian River Compact does not expressly require a state to deliver a particular amount of water to the downstream state. Rather, the language of the compact addresses the uses a state may make of its Canadian River water. *See* Tex. Water Code § 42.006, arts. IV–VI.

2. *Language of the Canadian River Compact*

The Canadian River Commission administers the Canadian River Compact. Each state designates or appoints a commissioner. The president of the United States is asked to designate a fourth commissioner, who serves as the presiding officer but has no right to vote on any deliberations before the commission. All commissioners from the states must be present for the commission to conduct business, and a unanimous vote is required for any actions taken by the commission. *See* Tex. Water Code § 43.006, art. IX(a).

The core of the Canadian River Compact is the establishment of allowed uses. Rights to water perfected by beneficial use are protected. *See* Tex. Water Code § 43.006, art. III. For Oklahoma, as the downstream state, the compact is simple—it is entitled to free and unrestricted use of all Canadian waters in the state. *See* Tex. Water Code § 43.006, art. VI. New Mexico and Texas have limitations on the amount of conservation storage. "Conservation storage" is defined as that portion available for domestic, municipal, irrigation, and industrial uses, and exempts water allocated to flood control, power production, and sediment control. Tex. Water Code § 43.006, art. II(d).

New Mexico has free and unrestricted use of all water upstream of Conchas Dam. *See* Tex. Water Code § 43.006, art. IV(a). Below Conchas Dam, New Mexico's free and unrestricted use of the Canadian River is subject to a limitation on conservation storage of no more than 200,000 acre-feet. *See* Tex. Water Code § 43.006, art. IV(b). On the North Canadian, New Mexico may store only water that is unappropriated in accordance with New Mexico and Oklahoma law. *See* Tex. Water Code § 43.006, art. IV(c).

Texas's free and unrestricted use is subject to two main limitations:

1. Texas may impound water on the North Canadian only for municipal uses, household and domestic uses, livestock watering, and the irrigation of lands for providing food and feed for those living on the land. *See* Tex. Water Code § 43.006, art. V(a).

2. On the main stem of the Canadian, Texas may impound up to 500,000 acre-feet, until Oklahoma provides more than 300,000 acre-feet of conservation storage, in which case Texas would be limited to 200,000 acre-feet plus whatever amount Oklahoma has stored.

See Tex. Water Code § 43.006, art. V(b).

The compact also sets out the remedy if Texas impounds any amount greater than specified. *See* Tex. Water Code § 43.006, art. V(c). However, the compact authorizes the commission to permit New Mexico and Texas to impound more water, provided that no state is deprived of water needed for beneficial use. *See* Tex. Water Code § 43.006, art. VII.

3. *Operations under the Canadian River Compact: Oklahoma and Texas Versus New Mexico—The Canadian Litigation*

In the 1980s, litigation resulted after Texas and Oklahoma had a dispute with New Mexico concerning the compact's article IV(a) and (b). *See Oklahoma v. New Mexico*, 501 U.S. 221 (1991). Article IV(a) gives New Mexico free and unrestricted use of all waters originating in the Canadian River's drainage basin above Conchas Dam; article IV(b) gives the state free and unrestricted use of waters originating in the drainage basin below Conchas Dam, subject to a conservation storage limitation of 200,000 acre-feet. *See* Tex. Water Code § 43.006, art. IV(a), (b). Before the compact was negotiated and approved by the three states, Texas sought to build Sanford Dam for the purpose of serving the municipal and industrial requirements of eleven cities in the Texas Panhandle region. *Oklahoma v. New Mexico*, 501 U.S. at 224–25. New Mexico proposed that the Sanford Project could not be constructed until the compact was approved. 501 U.S. at 226. After the compact was approved, the Sanford Dam and its companion Lake Meredith were completed in 1964. Prior to completion, however, New Mexico built Ute Dam and Reservoir upstream of Sanford Dam, with a capacity of 109,600 acre-feet. Later, in the early 1980s, New Mexico enlarged Ute Reservoir, increasing its capacity to 272,800 acre-feet. However, a portion of this was occupied by silt and not available for storing water. 501 U.S. at 226. Initially, Texas and Oklahoma sued New Mexico over the enlargement of the Ute Reservoir, complaining that its storage capacity violated the 200,000-acre-foot limitation in article IV(b). 501 U.S. at 227. Later, the Canadian River above Conchas Dam flooded, water spilled over the Conchas Dam, and Ute Reservoir caught the majority of the spill water. Texas and Oklahoma added a complaint that the spill water was subject to the limitation. 501 U.S. at 227.

The Supreme Court found that the article IV(b) limitation applied to stored water, not the physical reservoir capacity. 501 U.S. at 230–31. However, the Court agreed with Texas and Oklahoma that waters originating in the Canadian River Basin above Conchas Dam but reaching the mainstream of the river below Conchas due to being spilled or released was subject to the limitation if it was impounded in Ute Dam or other downstream dams in New Mexico. 501 U.S. at 232. The Court considered documents showing that the building of Sanford Dam was based in part on the assumption that it would be entitled to runoff between Conchas Dam and Sanford Dam, subject to the 200,000-acre-foot limitation. 501 U.S. at 237–38. New Mexico's contention that it was entitled, without limitation, to any water originating above Conchas Dam, but flowing into Ute Reservoir, would have had a serious effect on the viability of the Sanford Dam Project. 501 U.S. at 239.

4. *Operations under the Canadian River Compact: Palo Duro Reservoir*

More recently, the state of Oklahoma has complained at annual Canadian River Commission meetings that Texas is in violation of the compact as a result of the construction of Palo Duro Reservoir. The reservoir was constructed by the Palo Duro River Authority on Palo Duro Creek in Hansford County, Texas, about ten miles north of Spearman, Texas, and approximately twelve miles from the Texas-Oklahoma border. Members of the Palo Duro River Authority are the counties of Hansford and Moore and the city of Stinnet. The reservoir began impounding water in 1991.

The Palo Duro River Authority originally constructed the reservoir to impound water to be made available for municipal uses. As mentioned above, article V of the compact allows Texas to impound any water on the North Canadian River in Texas "for municipal uses, for household and domestic uses, livestock watering, and the irrigation of lands which are cultivated solely for the purpose of providing food and feed for the households and domestic livestock actually living or kept on the property." Tex. Water Code § 43.006, art. V(a). In addition to other contentions, Oklahoma has claimed that water is currently impounded for recreational use in violation of the compact. Texas contends that the reservoir is within the terms of the compact. In the early 1990s, the two states met to discuss the issues surrounding Palo Duro Reservoir. In 2001, Oklahoma's legislature adopted a resolution asking the Oklahoma attorney general to sue the State of Texas regarding this matter. S. Con. Res. 18, 48th Leg., 1st Reg. Sess. (Okla. 2001). No litigation has been filed to date.

IX. The Red River and Its Compact

A. The Red River and Its Course

The Red River begins in New Mexico and flows eastward across the Texas Panhandle until it forms the boundary between the states of Texas and Oklahoma. The river becomes the state line between Texas and Arkansas at the northeastern corner of Texas. It enters into Arkansas, continues eastward, then flows southeast to enter Louisiana, where it continues in a southeasterly direction across the state. These four states are the signatory states to the Red River Compact. *See* Diana J. Kliener, *The Handbook of Texas Online*, *Red River*, www.tshaonline.org/handbook/online/articles/rnr01. A map of the Red River Basin appears in Figure 3.

The compact defines "Red River" to be the stream below the crossing of the Texas-Oklahoma state boundary at longitude 100 degrees west. Tex. Water Code § 46.013, art. III, § 3.01(b). The "Red River Basin" is all of the drainage areas of the Red River and its tributaries east of the New Mexico-Texas border and above its junction with the Atchafalaya and Old Rivers in Louisiana. Tex. Water Code § 46.013, art. III, § 3.01(c).

B. The Red River Compact

1. *History of the Red River Compact*

The Red River Compact is Texas's most recent interstate stream compact. It was prompted by the drought of the 1950s, with the first negotiations occurring in 1956. Twenty years later, Texas and Oklahoma reached an agreement concerning the apportionment of water in the watershed above Denison Dam in Grayson County, and the compact was finally negotiated. Elliott, at 1267, 1273.

2. *Language of the Red River Compact*

The Red River Compact is administered by the Red River Compact Commission, which is composed of two representatives from each state (Arkansas, Louisiana, Oklahoma, and Texas) and one representative appointed by the president of the United States. Tex. Water Code § 46.013, art. IX, § 9.01. The federal commissioner is the chair but does not have the right to vote. Tex. Water Code § 46.013, art. IX, § 9.01. The executive director of the TCEQ or a designated member of the agency serves as one of the commissioners for Texas.

Representatives from three states constitute a quorum for commission meetings. Action concerned with administration of the compact requires six concurring votes; action that affects existing water rights in a state requires eight concurring votes. Tex. Water Code § 46.013, art. IX, § 9.03.

The compact defines five reaches of the Red River, spanning from west to east, and additionally sets out subbasins in some of the reaches. Water flows in the subbasins are apportioned to the states in differing percentages. *See* Tex. Water Code § 46.013, arts. IV–VIII. If a reach or subbasin is entirely in one state, that state has free and unrestricted use of that water. *See, e.g.*, Tex. Water Code § 46.013, art. IV, §§ 4.03(b), 8.01. There is no requirement in the compact to conduct any sort of accounting of each state's use of water on the Red River, unless an affected state deems an accounting necessary. *See* Tex. Water Code § 46.013, art. II, § 2.11.

3. Litigation Relating to the Compact

The Red River Compact has been the subject of recent litigation. The Tarrant Regional Water District ("Tarrant Regional"), a Texas conservation and reclamation district, sought authorization from the State of Oklahoma to take water from some streams in Oklahoma and export the water to Texas. Tarrant Regional also filed suit in the United States District Court for the Western District of Oklahoma against the members of the Oklahoma Water Resources Board and Oklahoma Conservation Storage Commission ("Oklahoma"), seeking to enjoin Oklahoma officials from enforcing certain Oklahoma statutes that prohibited or restricted water export out of the state. Tarrant Regional first argued that article 5.05 of the Red River Compact, addressing a portion of the Red River Basin identified as Reach II, Subbasin 5, gave all signatory states rights to certain Subbasin 5 waters that were not used by Oklahoma, and that article 5.05 gave states or parties authorized by them the right to obtain that water within the boundaries of the other states. This, Tarrant Regional argued, meant that the Compact preempted Oklahoma's export restrictions. Tarrant Regional also argued that Oklahoma's export restrictions placed impermissible burdens on interstate commerce in water that Oklahoma was not using under article 5.05 of the Compact, and were thus unconstitutional. *See* U.S. Const. art. I, § 8, cl. 3. Tarrant Regional also argued that the Red River Compact preempted Oklahoma law. Oklahoma responded that the Red River Compact expressly provided that the signatory states had unrestricted control over water within their boundaries and that the Compact did not authorize other states to cross state boundaries to obtain water. By approving the Compact, Oklahoma argued, Congress had given its consent to the states' imposing commercial restrictions on the water so apportioned.

The district court agreed with Oklahoma's position and granted summary judgment in favor of Oklahoma. *Tarrant Regional Water District v. Herrmann*, No. CIV-07-0045-HE, 2009 WL 3922803 (W.D. Okla. Nov. 18, 2009). The Tenth Circuit Court of Appeals affirmed the district court's ruling. *Tarrant Regional Water District v. Herrmann*, 656 F.3d 1222 (10th Cir. 2011). The U.S. Supreme Court affirmed the Tenth Circuit's decision, holding that the Compact did not authorize the signatory states to cross each other's boundaries and that all waters of the Red River had been apportioned, so there was no violation of the Commerce Clause. 133 S. Ct. 2120 (2013).

The City of Hugo, Oklahoma, filed a similar lawsuit based on similar Commerce Clause claims in the United States District Court for the Eastern District of Oklahoma. The City of Irving, Texas, intervened in the case based on a water supply contract it had with the City of Hugo. The district court granted summary judgment for Oklahoma in this case as well. *City of Hugo, Oklahoma v. Nichols*, No. CIV-08-303-JTM, 2010 WL 1816345 (E.D. Okla. Apr. 30, 2010). On appeal, the Tenth Circuit held that the City of Hugo lacked standing to bring its case against the State of Oklahoma. *City of Hugo v. Nichols*, 656 F.3d 1251, 1255–57 (10th Cir. 2011), *cert. denied sub nom. City of Hugo v. Buchanan*, 132 S. Ct. 1744 (2012). The court also held that the City of Irving could not sustain an action because its claims were based solely on a contract with the City of Hugo, which had no standing to sue the Oklahoma defendants. Therefore, the court held, the City of Irving's claims were not redressable. *Nichols*, 656 F.3d at 1263–65. The court of appeals remanded the case to the district court to be dismissed for want of jurisdiction. *Nichols*, 656 F.3d at 1265.

X. The Sabine River and Its Compact

A. The River and Its Course

Texas and Louisiana share the Sabine River. The river rises east of Dallas and flows southeasterly until the southeastern corner of Panola County, where the river forms the boundary between Texas and Louisiana. The river empties into Sabine Lake, which ultimately drains into the Gulf of Mexico. See Christopher Long, *The Handbook of Texas Online*, *Sabine River*, www.tshaonline.org/handbook/online/articles/rns03. The Sabine River Compact covers the "Stateline reach," which is that portion of the river from the point where its downstream waters first touch both Texas and Louisiana, defined as the "Stateline," until the river enters into Sabine Lake. *See* Tex. Water Code § 44.010, art. I(a), (d). A map of the Sabine River Basin appears in Figure 4.

B. The Sabine River Compact

1. *History of the Sabine River Compact*

Local water users in both Texas and Louisiana had competing claims to the Sabine River. These claims included a dispute over the political boundary between the states. In 1949, a former Louisiana governor claimed that Louisiana owned the Sabine River along its length between the states. The local water users finally agreed on the need for a compact to apportion the waters. Elliott, at 1263–64.

2. *Language of the Sabine River Compact*

The Sabine River Compact is administered by the Sabine River Compact Administration, made up of two members from each state, with all members appointed by their respective governor, and one ex-officio chair appointed by the president of the United States. The chair cannot vote and cannot be a resident of either state. *See* Tex. Water Code § 44.010, art. VIII(a), (b). The Louisiana members are required to be residents of the Sabine Watershed. Three members from the states constitute a quorum, and any commission action requires three votes. *See* Tex. Water Code § 44.010, art. VII(c).

All free water in the Stateline reach is divided equally between Texas and Louisiana. *See* Tex. Water Code § 44.010, art. V(a). Each state must use its apportionment of the natural stream flows as they occur, and there is a prohibition against accruing any credits or debits. *See* Tex. Water Code § 44.010, art. V(g). Each state has the right to use the main channel of the Sabine River to convey stored water, without any loss of ownership of the stored water. *See* Tex. Water Code § 44.010, art. V(e). Neither state can construct a dam in the Stateline reach without the other state's consent. *See* Tex. Water Code § 44.010, art. V(g). Additionally, domestic and stock water uses are not subject to any apportionment under the terms of the compact. *See* Tex. Water Code § 44.010, art. V(j).

In the compact, both states expressly recognize the necessity of maintaining a minimum flow at the state line for the benefit of water users below the state line. The compact sets out limitations that require a minimum flow of thirty-six cubic feet per second. Reservoirs and permits above the state line as of January 1, 1953, are not liable for the maintenance of the flow. Both states agree that after January 1, 1953, no state will authorize any additional uses that would have the effect of reducing the flow at the state line to less than thirty-six cubic feet per second. *See* Tex. Water Code § 44.010, art. V(b).

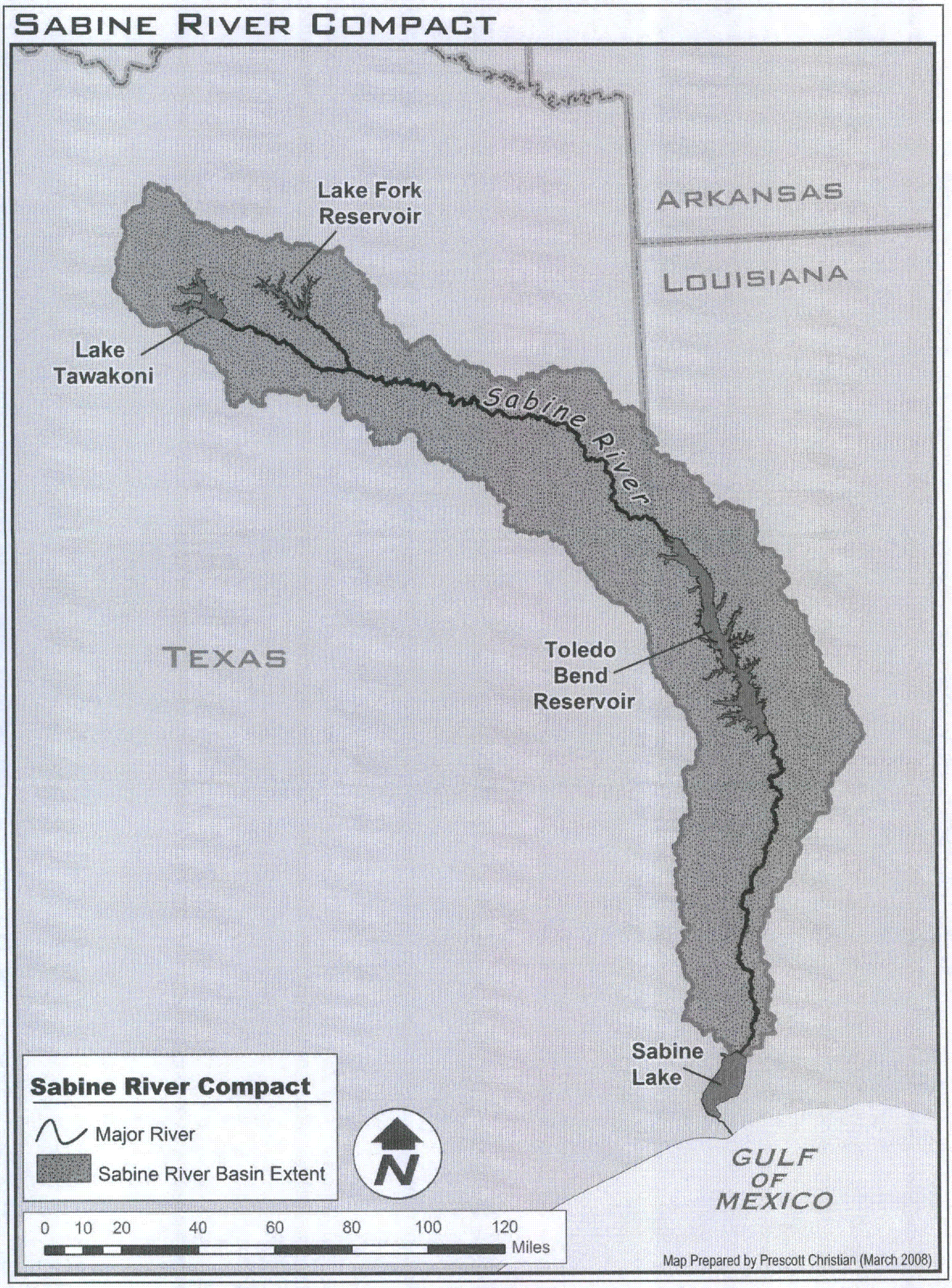

Figure 4. The Sabine River Compact. Courtesy Prescott Christian, Texas Commission on Environmental Quality.

XI. Conclusion

The border and interstate streams of Texas reflect a variety of laws relating to the administration of water rights. Each system of laws is unique to each individual stream, depending on where the stream is located and the compacts and treaties that govern the stream. Practitioners should take care to consider the impact of these different systems on surface water, and even groundwater, transactions in interstate and international river basins.

CHAPTER 15

Surface Water Rights Transactions

Edmond R. McCarthy, Jr.,[1] Lynn Ray Sherman,[2] and Derek Seal[3]

I. Introduction

The continued development of new water supplies and the expansion, modification, and reprioritizing of existing water resources are critical to the future of Texas. The state's population is expected to grow approximately 82 percent, from 25.4 million in 2010 to 46.3 million by 2060. Texas Water Development Board, *Water for Texas 2012* 132 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. Due in part to population growth, water use will increase in all sectors. Industrial and manufacturing water use is projected to grow to 2.9 million acre-feet per year by 2060. 2012 State Water Plan, at 140. By 2060, municipal water use is expected to be more than 8.4 million acre-feet per year. 2012 State Water Plan, at 136.

One method of addressing these changing water needs is by reallocating existing water supplies through wholesale water transactions and through transfers of water rights by sale or lease. Under Texas law, supplying water on a wholesale basis is distinguished from the conveyance or other transfer of an appropriative surface water right or a groundwater right. This chapter discusses the transfer of surface water rights by sale or lease; Chapter 18 of this book covers transactions involving groundwater rights; and Chapter 31 addresses the supply of water on a wholesale basis.

This chapter addresses the major issues and practical considerations involved in real property transactions involving appropriative surface water rights. First, the chapter summarizes the law of real property ownership rights in appropriative surface water rights, which is discussed more fully in Chapter 3 of this book. This chapter briefly describes and compares the primary methods for conveying or acquiring surface water rights: by purchase or lease. Acquisition through condemnation is addressed in Chapter 38. Next, due diligence considerations are explored, followed by sections describing key issues in water rights purchases and leases. Finally, the chapter discusses the Texas Water Bank and Water Trust and irrigation rights.

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II. Ownership of Surface Water Rights

The ownership of surface water rights is defined in terms of "state water." Although the terms "state water" and "surface water" do not refer to exactly the same water, for the most part, surface water is considered to be state water. There are a few exemptions, such as diffused surface water runoff; however, "state water" includes all "water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state." Tex. Water Code § 11.021(a). Thus, state water includes rainfall and spring flows that have reached a watercourse or other surface water body. Additionally, state water includes "water imported from outside the boundaries of the state for use in the state." Tex. Water Code § 11.021(b). As discussed in greater detail in Chapter 3 of this book, state water is the property of the state and may be regulated for use by the state. *See, e.g., Texas Water Rights Commission v. Wright*, 464 S.W.2d 642 (Tex. 1971). In general, Texas regulates its state water under the prior appropriations doctrine, and in that context, it is commonly referred to as surface water. See Chapter 3 of this book for a discussion of the development and use of the prior appropriations doctrine.

To sell or lease surface water, the seller or lessor must hold a valid water right. *See* Tex. Water Code §§ 11.081, 11.082, 11.084, 11.121. As mentioned above, surface water is owned by the state. Although there are certain exemptions from permitting, to lawfully divert, store, or use the waters of the state for any nonexempt purpose, an individual or entity must first obtain a water right from the state. *See* Tex. Water Code § 11.121. Most of the following discussion addresses the unique considerations that arise when transferring an appropriative water right, although the overall transactional concepts could be applied to water rights exempted from permitting. See Chapter 9 of this book for further discussion of water rights permitting and exemptions.

Currently, the state of Texas grants surface water rights by way of permits. Earlier water rights are evidenced by certified filings and certificates of adjudication. For ease of discussion, this chapter uses the generic term "water rights permit" to apply to all variations of state-issued water rights. *See* Tex. Water Code §§ 11.022, 11.023, 11.0235(a), 11.081, 11.082, 11.084, 11.121; *see also* Tex. Water Code §§ 11.323 ("certificates of adjudication"), 11.307 ("certified filings"). See also Chapter 3.

A water rights permit grants a usufructuary right or a "right of use," which authorizes the permittee to divert and use the water for specified beneficial purposes. *See In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 444–45 (Tex. 1982); *Wright*, 464 S.W.2d at 647–48; *see generally Lakeside Irrigation Co. v. Markham Irrigation Co.*, 285 S.W. 593, 596 (Tex. 1926); *Clark v. Briscoe Irrigation Co.*, 200 S.W.2d 674, 679 (Tex. Civ. App.—Austin 1974, no writ); Frank R. Booth, *Ownership of Developed Water: A Property Right Threatened*, 17 St. Mary's L.J. 1181, 1184–85, 1187–88 (1986); R. Lambeth Townsend, *Cancellation of Water Rights in Texas: Use It or Lose It*, 17 St. Mary's L.J. 1217, 1218 (1986).

The permittee—that is, the water right holder—does not hold title to the corpus of the water; that title remains in the state. *See South Texas Water Co. v. Bieri*, 247 S.W.2d 268, 272 (Tex. Civ. App.—Galveston 1952, writ ref'd n.r.e.); Wells A. Hutchins, *Texas Law of Water Rights* 77–81 (1966). Nevertheless, a permittee owns the water right and, upon its perfection, holds it as a vested property right. *See* Tex. Water Code §§ 11.025–.027; *Board of Water Engineers v. McKnight*, 229 S.W. 301 (Tex. 1921); *Clark*, 200 S.W.2d 674; *Guelker v. Hidalgo County Water Improvement District No. 6*, 269 S.W.2d 551 (Tex. Civ. App.—San Antonio 1954, writ ref'd n.r.e.); *Harrell v. F.H. Vahlsing, Inc.*, 248 S.W.2d 762 (Tex. Civ. App.—San Antonio 1952, writ ref'd n.r.e.). The measure of a perfected right under the prior appropriation doctrine is the maximum amount beneficially used, after reasonable development, pursuant to the appropriative claim. *See In re Contests of City of Eagle Pass, to the Adjudication of Water Rights in Middle Rio Grande Basin & Contributing Texas Tributaries*, 680 S.W.2d 853 (Tex. App.—Austin 1984, writ ref'd n.r.e.).

A water right can be bought, sold, assigned, or otherwise alienated by the water rights holder (*see Pfluger v. Clack*, 897 S.W.2d 956 (Tex. App.—Eastland 1995, writ denied)), and, as against all others, the water right holder possesses a superior property right to use the water, including the right to lawfully dispose of and reuse it. *See Bieri*, 247 S.W.2d at 272; *cf.* Tex. Water Code §§ 11.025–.027. The superior right of the water right holder, however, assumes that the water will be put to beneficial, nonwasteful use. *See In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d at 444–45; *Wright*, 464 S.W.2d at 647–48; *see generally Clark*, 200 S.W.2d at 679; *Lakeside Irrigation Co.*, 285 S.W. at 596; Tex. Water Code §§ 11.025, 11.134(b)(3)(A); Booth, at 1184–85, 1187–88; Townsend, at 1218.

As long as the water has been legally reduced to possession by the water right holder and remains under the control of the water right holder, the water right holder has the right to use and reuse the water, and thus to sell, assign, or otherwise alienate it. *See Guelker*, 269 S.W.2d 551; *Bieri*, 247 S.W.2d 268. Once the water right holder loses physical control of the water and allows it to escape or otherwise return to a watercourse, unless the water right holder has secured authorization to use the bed and banks of the watercourse to transport the water for subsequent reuse (*see* Tex. Water Code § 11.042), the rights of the water right holder are lost and the water becomes available again to the state for reappropriation. *See Domel v. City of Georgetown*, 6 S.W.3d 349, 353 (Tex. App.—Austin 1999, pet. denied); *Bieri*, 247 S.W.2d 268; *cf. City of San Marcos v. Texas Commission on Environmental Quality*, 128 S.W.3d 264 (Tex. App.—Austin 2004, pet. denied).

The extent and duration of the superior right of the water right holder are defined by the terms of the water right permit. As discussed in greater detail below, the water right permit states the annual maximum amount authorized for diversion and identifies the priority date. It designates the location of the authorized diversion point and establishes the authorized diversion rate in gallons per minute (gpm) or cubic feet per second (cfs). The permit identifies the authorized uses of the water, which are sometimes tied to use in a specific location. The permit may include provisions such as minimum stream flow restrictions or requirements for return flow. *See* 30 Tex. Admin. Code §§ 297.41–.59. Finally, it identifies the term or duration of the water right. Permits may be obtained in perpetuity (*see* Tex. Water Code § 11.121), on a temporary basis (*see* Tex. Water Code § 11.138), or as a "term permit" (*see* Tex. Water Code § 11.1381). In addition, permits may be "seasonal" (*see* Tex. Water Code § 11.137) or for an "emergency" (*see* Tex. Water Code § 11.139).

III. Methods for Conveying or Acquiring Surface Water Rights

The two major types of transactions addressed in this chapter are the purchase and lease of surface water rights. The decision whether to purchase water under a wholesale water contract or whether to purchase or lease a water right can be driven by market demands, the parties' respective needs, and the water right itself. Location, priority, quantity, reliability, and authorized uses can all affect which type of transaction will be used.

IV. Due Diligence

Due diligence is arguably the most important step in a potential surface water rights purchase or lease. Although every project and transaction is unique, due diligence generally covers matters related to (1) the quality, quantity, and reliability of the water right; (2) whether an amendment to the water right will be required for development and use of the water; and (3) other issues or circumstances that affect the economic or logistical feasibility of the intended project. These issues are significant for evaluating (1) whether to purchase or lease the water rights, (2) what the terms of the agreement will be, and (3) what consideration will be paid. Likewise, they are important to the water rights holder who is considering how to establish marketable surface water rights.

Some of these due diligence matters should be addressed even before determining the most appropriate location and method for acquiring surface water rights (lease, sale, supply contract, or, if available, condemnation) and drafting and negotiating the terms of the transaction. Other matters involve investigations and analysis that are most effectively conducted during the pendency of the transaction—for example, during the option period. This section provides an overview of some common due diligence matters in a surface water rights transaction.

A. Regulatory Due Diligence

Many of the critical aspects of the planning and investigation underlying a surface water transaction involve the assessment of the subject water right. Because a surface water right is restricted to the terms of the water right permit, an amendment to the water right is generally required. The restrictions on the water right will affect the prospective buyer or lessee's development and use of the water right. Because surface water rights are administered by the Texas Commission on Environmental Quality (TCEQ), this regulatory due diligence is essentially a matter of TCEQ regulation. In those river basins subject to the jurisdiction of the state's watermaster program, due diligence must include a visit with the watermaster's office. *See* Tex. Water Code §§ 11.325–.3291.

1. The Water Right Permit

As currently authorized, what are the parameters of the water right included in the permit, certified filing, or certificate of adjudication? The due diligence analysis should include creating a summary description of the authorized water right that contains the following:

1. The annual maximum amount authorized for diversion, including any special conditions or other operating constraints imposed.

2. The priority date established in the water right. Under the doctrine of seniority or "first in time, first in right," each water right is assigned a specific priority date. *See* Tex. Water Code §§ 11.027, 11.141. During times of shortage, this system determines the allocation of water among appropriators from the same source of supply. A senior right holder is entitled to fully exercise his right before junior right holders receive any water. *See* Tex. Water Code § 11.027; 30 Tex. Admin. Code § 297.44; *but see* Tex. Water Code § 11.053 (authorizing the TCEQ's executive director to suspend water rights diversions under drought conditions but exempt "junior rights" held by municipalities and electric generators); *see generally Texas Commission on Environmental Quality v. Texas Farm Bureau*, 460 S.W.3d 264, 266 (Tex. App.—Corpus Christi 2015, pet. filed).

3. The location, with a map, identifying the authorized diversion point.

4. The authorized diversion rate in gallons per minute (gpm) or cubic feet per second (cfs), including any special conditions or other operating constraints.

5. The authorized uses of the water, including any special conditions or other operating constraints.

6. The areas or locations where the respective uses are authorized, including any special conditions or other operating constraints.

7. Any minimum stream flow restriction.

8. Any return flow or surplus water requirements.

9. The term or duration of the water right.

2. *Amending the Water Right*

To develop and use the water right, will the parameters of the water right need to be changed? Due diligence should include an analysis of what changes, if any, will be needed to the water right and whether such changes will require an amendment.

a. Change of Ownership

Upon conveyance of a water right, an application must be filed with the TCEQ requesting transfer of the water right to the new owner. *See* Texas Commission on Environmental Quality, *Change of Ownership Form* (rev. Aug. 21, 2014), *available at* www.tceq.state.tx.us/assets/public/permitting/forms/10204.pdf. The application form must be accompanied by a fee of $100 payable to the commission. *See* 30 Tex. Admin. Code § 295.139(d). This application is to be used only for change of ownership and cannot be used to secure any other amendment to the water right.

b. Water Right Amendment Application

To change the place of use, purpose of use, point of diversion, rate of diversion, or acreage to be irrigated or otherwise alter an existing water right, the water right must be amended. An amendment application must be filed with the TCEQ. *See* Tex. Water Code § 11.122; *see generally* 30 Tex. Admin. Code chs. 295, 297.

The application must be filed on the TCEQ-prescribed form. *See* Texas Commission on Environmental Quality, *Application for Amendment to a Water Right* (rev. Feb. 2010), *available at* www.tceq.state.tx.us/assets/public/permitting/forms/10201.pdf; *see also* Tex. Water Code ch. 11; 30 Tex. Admin. Code chs. 281, 288, 295, 297; *see generally* Texas Natural Resource Conservation Commission, RG-141, *A Regulatory Guidance Document for Applications to Divert, Store or Use State Water* 13–15 (June 1995) [hereinafter Regulatory Guidance Document]. The amendment application form is simple, asking for very limited information. In most cases, the TCEQ requires additional information before the application will be processed and approved.

A water right amendment is subject generally to all of the same statutory and regulatory requirements as a new water right application. *See* Tex. Water Code § 11.122; *see also City of Marshall v. City of Uncertain*, 206 S.W.3d 97 (Tex. 2006). Accordingly, an application to amend a water right will require not only the "short form" but also documentation to support all aspects of the required changes to the water right. *See* Tex. Water Code § 11.122. The TCEQ's application form for a new water right under Water Code section 11.121 and the TCEQ rules applicable to new water rights (*see* 30 Tex. Admin. Code chs. 295, 297) provide guidance for preparing the amendment application.

c. Notice and Hearing for an Amendment

Determining whether an amendment is required is only the first step in a due diligence analysis. Equally important is determining the extent of potential public participation in the amendment process. This is critical because third-party participation in the amendment process increases the time and expense associated with obtaining an amendment.

Some amendment applications are processed and issued without the need for public notice or opportunity for a public hearing, while others require such procedural steps. *See* Tex. Water Code § 11.122(b). The *City of Marshall* case addressed the agency's interpretation of which water rights permit amendment applications require notice and hearing and which do not, holding that although section 11.122(b) significantly restricts the issues that may be reviewed in connection with a water right amendment application, the statute does not preclude the possibility of a contested case hearing being held. *City of Marshall*, 206 S.W.3d at 110–11. The court reasoned that the statute's requirement for compliance with "other applicable requirements" that must be considered includes conformance with administrative requirements, beneficial use of the water right, protection of the public welfare, groundwater effects, consistency with state and applicable regional water plans, and the avoidance of waste and achievement of water conservation. *City of Marshall*, 206 S.W.3d at 108–09. Although the *City of Marshall* holding does not automatically require that a hearing be held on these issues, it does mandate that the application include sufficient information to allow the TCEQ to determine whether notice and hearing are required on the amendment's potential adverse effects. The court specifically held that these impacts "can in most instances be determined from a facial review of the permit application without an evidentiary hearing." *City of Marshall*, 206 S.W.3d at 112.

The *Marshall* court stated that a hearing would be required for an application to amend a water right that included movement of a diversion point or a proposed change in use from a nonconsumptive to a consumptive one. *City of Marshall*, 206 S.W.3d at 111. Based on the *City of Marshall* decision, in order to determine which amendment applications require notice and hearing, the TCEQ will have to determine what type of review is required by looking at the impact of an amendment application on public interest criteria and the impact of an amendment application on water rights and the environment that is beyond the full use assumption of the "four corners" doctrine. The parties to a water rights transaction should be aware, therefore, that the type and extent of necessary review, notice, and opportunity for hearing are unclear for many types of water right amendments. See Chapters 6, 7, and 9 of this book for detailed discussion of this issue.

3. Changing the Point of Diversion, Place of Use, or Point of Return Flow

To develop and use the water right, will the point of diversion, place of use, or point of return flow need to be changed? If so, this will require an amendment as discussed above. Due diligence should include an analysis of whether such a change has the potential to affect other water rights and is likely to result in a reduction in the amount of water authorized to be diverted.

a. Potentially Affected Water Rights

A summary description of the potentially affected water rights should be created as follows:

1. Identify any water rights near the existing diversion point and existing return flow point and locate them on a map.

2. Identify any water rights near the location where water from the existing water right is used

and locate them on a map.

3. Obtain copies of the identified water rights to allow an evaluation of the potential for impacts from any required change in diversion point, location of use, or location of return flows.

b. Reduction in the Potential Yield of the Water Right

One of the issues to be addressed when selling a water right may be the need to relocate or add an additional point of diversion to facilitate the beneficial use of the water. Irrespective of whether the new diversion point is upstream or downstream of the existing diversion point, the change may result in a reduced quantity of water that can be diverted under the water right. The reduction may result from a variety of factors, including the following:

1. The movement of a diversion point upstream could result in the reduction of the potential yield of the water. This occurs when the change in diversion point leapfrogs a senior water right. This also occurs when the change results in a smaller contributing drainage basin, which in turn would result in a smaller calculated yield of the water right.

2. If the water right is moved downstream, the yield of the water right may be reduced to prevent the water right holder from benefiting from the increased watershed drainage area that contributes water to the water right at the new point of diversion. Carriage losses must generally be accounted for in the amended water rights, which will reduce the yield. "Carriage losses" is a term used to describe the water lost during transport between the original and new points of diversion due to seepage, evaporation, evapotranspiration, and other stream losses. *See* Regulatory Guidance Document, at 8.

4. Bed and Banks Transport

Does the proposed water transaction contemplate the purchase of a water right associated with a large storage project (whether on-channel or off-storage) such that the purchaser's location of intended beneficial use will necessitate the transport of the water using the "bed and banks" of a state water course? If so, a special authorization referred to as a bed and banks permit must be obtained. Purchases of water from storage and requirements for permits authorizing the use of the bed and banks of state watercourses are discussed in greater detail in Chapters 9, 27, and 31 of this book.

5. Interbasin Transfers

To develop and use the water right, must the water right be moved to another water basin? If so, the first step in the due diligence analysis is to determine whether the restrictions and special requirements for interbasin transfer will apply to the transaction. As discussed in Chapter 9, such restrictions and requirements can be fairly onerous. Therefore, it should be determined whether any of the exceptions apply to the transaction.

Interbasin transfers are controlled by Texas Water Code section 11.085. Section 11.085(v) excepts the following transfers:

1. a proposed transfer that, in combination with any existing transfers, totals less than 3,000 acre-feet of water per year from the same water right;

2. a request for an emergency transfer of water;

3. a proposed transfer from a basin to its adjoining coastal basin;

4. a proposed transfer from the part of the geographic area of a county or municipality, or the part of the retail service area of a retail public utility as defined by Texas Water Code section 13.002, that is within the basin of origin for use in that part of the geographic area of the county or municipality, or that contiguous part of the retail service area of the utility, not within the basin of origin; or

5. a proposed transfer that is imported from a source wholly outside the boundaries of this state, except water that is imported from a source located in the United Mexican States, for use in this state, and transported by using the bed and banks of any flowing natural stream in this state.

Tex. Water Code § 11.085(v).

6. Cancellation

Has the water right been beneficially used during the last ten years, or is it subject to cancellation under Texas Water Code section 11.173? Texas has canceled few water rights. The statutes contain many exemptions from cancellation, and active cancellation has not been state policy. This could change, however, as water resources become stretched even further by the growing population. See Chapter 3 of this book. The due diligence analysis should include the following steps:

1. Obtain copies of the annual water use reports for the past ten years, required to be filed with the TCEQ pursuant to Water Code section 11.031.

2. Obtain copies of all documents showing water sales or other water use during the past ten years, including water contracts, leases, and so on.

3. Review TCEQ files to ensure that there have been no cancellation notices, notices of violation, or other compliance issues during the past ten years.

7. Water Conservation and Drought Contingency Plans

Does the water right holder have a water conservation plan and a drought contingency plan, and were the plans submitted to the TCEQ and Texas Water Development Board (TWDB)? Depending on the specified type of use and volume of water appropriated, a holder of an existing appropriative right must develop, submit, and implement a water conservation plan. *See* Tex. Water Code § 11.1271(b); 30 Tex. Admin. Code § 288.30. This plan must also be submitted to the TWDB, and the water right holder must report annually to the TWDB on its progress in implementing the plan. *See* Tex. Water Code § 16.402; *see also* 30 Tex. Admin. Code §§ 288.1–.7, 288.30, 295.9. See Chapter 9 of this book for further discussion of water conservation plans.

All retail public water suppliers must develop drought contingency plans and submit them to the TCEQ for approval. *See* Tex. Water Code § 11.1272; 30 Tex. Admin. Code ch. 288. Additionally, wholesale and retail public water suppliers and irrigation districts that hold an existing water right must develop and submit drought contingency plans. *See* Tex. Water Code § 11.1272; 30 Tex. Admin. Code §§ 288.20–.22. See Chapter 22 of this book for further discussion of drought contingency planning.

Due diligence analysis should include a review of (1) the water right holder's water conservation plan and drought contingency plan and (2) documentation showing that the plans have been submitted to and approved by the appropriate state agencies, including any required periodic updates.

8. *Watermaster Program*

Is the water right subject to the jurisdiction of a watermaster operation program? There are four watermaster programs: Rio Grande, South Texas, Concho, and Brazos (below Possum Kingdom Reservoir). The four programs differ, but each may include the following requirements: (1) installation of a meter; (2) payment of a watermaster fee; (3) watermaster approval of a declaration of intent before the diversion, transport, or release of water; and (4) maintenance of records of diversion, transport, and release of water. *See* Tex. Water Code §§ 11.325–.3291; 30 Tex. Admin. Code chs. 303 (Rio Grande watermaster program), 304 (South Texas, Concho, and Brazos programs). See also Chapter 13 of this book.

The first step in the due diligence analysis is to determine whether the water right is subject to the jurisdiction of a watermaster program. If so, the following steps should be taken for further analysis:

1. Become familiar with the TCEQ rules under which the applicable watermaster operates.

2. Obtain documentation showing that the water right is in compliance with applicable regulations.

3. Ensure that the water right holder is current on the payment of applicable watermaster fees and assessments.

4. Review any required records of diversion, transport, and release of water.

9. *Environmental Issues*

The year 2010 brought both a new decade as well as a new set of issues to be considered in connection with surface water transactions. Specifically, environmental concerns have risen to the forefront of issues to be addressed as part of a surface water transaction.

The following factors all contributed to this new emphasis on environmental concerns associated with surface water:

1. the continuing recurrence of a drought or severe drought conditions somewhere in the state;

2. a growing population and a need to develop new water resources to meet the growth;

3. a growing need for construction of new or major repair of existing water related infrastructure;

4. budget deficits or financial shortfalls; and

5. endangered species issues.

While the technical aspects of the issues and how they are addressed in the surface water permitting context are discussed elsewhere in this book, particularly as they may affect water rights permitting (see, e.g., Chapters 1–2, 9, 11, 12, and 32), they are worth summarizing here for those who will be involved in the transaction negotiations.

As discussed in Chapter 11, the TCEQ must consider environmental flows in the surface water rights permitting process. *See* Tex. Water Code §§ 11.235–.237, 11.0841, 11.134, 11.147, 11.1471, 11.148, 11.1491. Required studies are being conducted of each of the state's major river basins to develop information on which the TCEQ must adopt "appropriate environmental flow standards" for each basin and its receiving bay and estuary systems in the form of a rulemaking. *See* Tex. Water Code

§§ 11.02362, 11.1471(a). The rules will establish criteria that are "adequate to support a sound ecological environment, to the maximum extent reasonable considering other public interests and other relevant factors." Tex. Water Code § 11.1471(a)(1).

The TCEQ must establish a "set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs" out of the calculated volume of "unappropriated water," if any, available in the affected river basin. Tex. Water Code § 11.1471(a)(2). These environmental flow standards must be considered as part of any new water right appropriation or amendment to an existing water right that would increase the volume of water appropriated that was pending or is filed with the TCEQ on or after September 1, 2007. *See* Tex. Water Code § 11.1471(a)(3); Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.27. The environmental flows rules are found in 30 Texas Administrative Code chapter 298.

Rules setting "stream flow standards" have been adopted for (1) the Trinity and San Jacinto River basins, including Galveston Bay; (2) the Sabine and Neches River basins, including Sabine Lake Bay; (3) the Colorado and Lavaca River basins, and Matagorda and Lavaca Bays; (4) the Guadalupe, San Antonio, Mason, and Aransas Rivers; (5) the Mission, Copano, Aransas, and San Antonio Bays; (6) the Nueces River and Corpus Christi and Baffin Bays; (7) the Brazos River and its associated bay and estuary system; and (8) the river basin and bay system consisting of the Rio Grande, Rio Grande estuary, and Lower Laguana Madre. *See* Tex. Water Code § 11.02362(b); *see generally* TCEQ Interoffice Memorandum to the Commissioners (Oct. 15, 2010). See Chapter 11 of this book for further discussion of this environmental flow process.

Another uncertainty to be considered when performing due diligence for a surface water transaction is the potential effect of a suit under the Endangered Species Act filed in March 2010. The Aransas Project (TAP) filed suit in federal district court in Corpus Christi, Texas, against the then three current commissioners of the TCEQ and the then current TCEQ South Texas Watermaster. *See Aransas Project v. Shaw*, No. C-10-75 (S.D. Tex. Mar. 3, 2010). In its complaint, TAP sought injunctions affecting the use of existing water rights and the development of any new water rights in the Guadalupe and San Antonio River basins.

On March 11, 2013, Judge Jack issued a seventy-three-page memorandum opinion and verdict in favor of TAP. *See Aransas Project v. Shaw*, 930 F. Supp. 2d 716 (S.D. Tex. 2012) ("*TAP*"). Key holdings among the multiple findings and conclusions in the court's opinion included the following:

1. TAP's evidence had demonstrated that at least twenty-three cranes had died during the 2008–09 wintering at the Aransas National Wildlife Refuge. *TAP*, 930 F. Supp. 2d at 756, 780;

2. The state's management of the water in the Guadalupe and San Antonio River basins had through its permitting system caused a reduction in freshwater inflows to the San Antonio Bay and its estuary system. *TAP*, 930 F. Supp. 2d at 780–81;

3. The drought conditions contributed to the reduction in freshwater inflows that the state's water management practices had caused. *TAP*, 930 F. Supp. 2d at 780–81;

4. The reduction in freshwater inflows had caused the salinity levels in the San Antonio Bay to increase. *TAP*, 930 F. Supp. 2d at 780;

5. The increase in the salinity levels had reduced the availability of critical foodstuffs for the whooping cranes, such as blue crabs and wolfberries. *TAP*, 930 F. Supp. 2d at 780;

6. The reduced food supply had caused harm to the whooping cranes, causing them to become emaciated and die. *TAP*, 930 F. Supp. 2d at 780–81;

7. That all of this constituted a "take" of the endangered whooping cranes by the TCEQ defendants. *TAP*, 930 F. Supp. 2d at 788–89.

8. The TCEQ, its chairman, and its executive director had violated section 9 of the ESA, and continue to do so through their water management practices, which include the decision not to monitor domestic and livestock water rights owners or to exercise emergency powers available to protect the endangered whooping cranes. *TAP*, 930 F. Supp. 2d at 789; and

9. Texas water diversion regulations promulgated by the TCEQ, its chairman, its executive director, and the Texas legislature are preempted by federal law when they purport to authorize water diversions that result in a taking of whooping cranes. *TAP*, 930 F. Supp. 2d at 789.

Based on her finding that a "take" had occurred under section 9 of the ESA, Judge Jack concluded that the case was "well-suited for an [Incidental Take Permit] and corresponding [Habitat Conservation Plan]," and included the following in her ordered relief:

1. The TCEQ, its chairman, and its executive director are enjoined from approving or granting new water permits affecting the Guadalupe or San Antonio Rivers until the state provides reasonable assurances to the court that such permits will not take whooping cranes in violation of the ESA; and

2. Within thirty days of the date of entry of the order, the TCEQ, its chairman, and its executive director shall seek an Incidental Take Permit that will lead to development of a Habitat Conservation Plan.

TAP, 930 F. Supp. 2d at 788–89.

The defendants sought and received an emergency stay of Judge Jack's order from the Fifth Circuit court of appeals together with an expedited briefing schedule and order for oral arguments in the appeal. *See Shaw v. Aransas Project*, Cause No. 13-40317 (5th Cir. Mar. 26, 2013). The court heard oral arguments on August 8, 2013.

On June 30, 2014, the Fifth Circuit court of appeals overturned the district court's judgment against the TCEQ commissioners, executive director, and South Texas watermaster. *Aransas Project v. Shaw*, 756 F.3d 801 (5th Cir. 2014) (per curiam). In summary, the Fifth Circuit concluded that as a matter of law the evidence did not support findings of either foreseeability or causation between the deaths of the cranes and the actions of the TCEQ. *Aransas Project*, 756 F.3d at 823. Based on a lack of causation and, therefore, liability on the part of the TCEQ, the Fifth Circuit also concluded that the injunctive relief ordered by the district court was an erroneous abuse of discretion. *Aransas Project*, 756 F.3d at 823–24.

The tone of the opinion was clearly that the district court's conclusions were erroneous and that the court had too quickly adopted the position and arguments of the plaintiffs without fully analyzing the evidence presented. *See Aransas Project*, 756 F.3d at 818–22. The Fifth Circuit, however, was guarded in its criticism and went to some lengths to be deferential to the lower court. *See Aransas Project*, 756 F.3d at 813–17. The opinion was very respectful of the whooping cranes and their status as an endangered species. *See Aransas Project*, 756 F.3d at 805–06.

The decision sends a loud warning that Texas must consider the environment in developing a balance between achieving its water supply needs and the ripple effects of those activities, including any resulting impacts to the environment. Among the areas of interest in the decision was the court's analysis of the trial court's rulings on testimony and analysis/methodology relied on by TAP's expert, biologist Tom Stehn, for counting the whooping cranes and his resultant mortality conclusions. *See Aransas Project*, 756 F.3d at 814–18. The court evaluated the reliability of Stehn's methodology and the resulting conclusions he reached, but found that, despite some doubt about the mortality numbers, his conclusions that there were twenty-three crane deaths in 2008–09 was not clearly erroneous. *Aransas Project*, 756 F.3d at 814–17. Similarly, while the Fifth Circuit found error in the district court's refusal to reopen the record and consider a 2011 U.S. Fish and Wildlife Service report criticizing Stehn's methodology and results, the court found the same to be harmless. *Aransas Project*, 756 F.3d at 816.

TAP filed a petition for rehearing en banc that was denied, but it resulted in the publication of a substituted opinion in which the Fifth Circuit revised its analysis of the district court's "erroneous view of proximate cause." *Aransas Project v. Shaw*, 775 F.3d 641, 658 (5th Cir. 2014).

Responding to the ruling to deny TAP's petition for rehearing en banc, Judge Prado, joined by Judges Dennis and Graves, filed a strong dissent criticizing the panel's decision for having engaged in what was described as "effectively second-guess[ing] the district court's ultimate conclusion, rather than evaluat[ing] the decision-making process for clear error." *Aransas Project v. Shaw*, 774 F.3d 324, 327 (5th Cir. 2014) (Prado, J., dissenting). The dissent also criticized the panel's decision for "improperly reweighing the factual findings of district courts de novo in violation of Federal Rules of Civil Procedure 52.a." 774 F.3d at 326. The dissent summarized the panel's decision as having "disregarded the district court's credibility determinations and reweighted evidence." 774 F.3d at 331.

On March 16, 2015, TAP filed a petition for writ of certiorari with the U.S. Supreme Court that was denied in *Aransas Project v. Shaw*, 135 S. Ct. 2859 (2015).

Accordingly, environmental flows and endangered species are issues that parties engaging in surface water transactions must now add to their due diligence "checklist."

B. Title Matters

Under a contract for the sale or lease of surface water rights, the buyer or lessee should have the right to conduct a title examination and to terminate the contract if there are significant uncured title problems. The acquiring party should conduct the same type of due diligence on the surface water rights as a purchaser or lessee of land would conduct.

Confirmation that the seller or lessor named in the contract owns the surface water rights and the rights to the diversion point is merely the first step. The buyer or lessee should determine whether there are restrictions, leases, easements, liens, or other title matters that could adversely affect their use of the surface water rights.

1. Marketable Water Right

Does the seller or lessor have marketable title to the surface water—that is, a valid water right recognized by the TCEQ? A related issue that is relevant in some transactions is whether the seller or lessor has the legal right to access and use the diversion point, point of return flows, if relevant, and easement or infrastructure to transport the water to the place of use.

The following steps should be taken to ensure marketable title:

1. Review all documents that constitute the water rights. Specifically, identify documents that constitute the current water right. This could be a certificate of adjudication, a certified filing, or a water right permit, and any amendments. Available documents that constitute the chain of title should be separately identified. This could include water deeds or other conveyance documents from the seller's or lessor's predecessors in title.

2. Determine whether title or other legal right is needed for the diversion point, point of return flow, and transport of the water from the watercourse to the place of use. If so, review all supporting documentation.

3. Obtain a tentative title commitment from a title company that issues title insurance for water rights. The title insurer will issue a title commitment that describes the surface water rights and land, if applicable, identifies the record owner of the rights and land, and lists easements, restrictions, liens, and other matters of record that affect title to the rights and, if applicable, the land. This will help to identify any potential infirmities to the seller's or lessor's fee simple title to the water rights that have not been identified previously.

4. The water right holder should identify any known contracts, leases, or similar obligations that the holder is obligated to honor. The length of the remaining term and a summary of the obligations under the contracts should be provided. The contracts should be made available for review.

2. Water Right Previously Leased or Subordinated

Is the water right issued on the basis of a contract with a third party who has leased or subordinated superior rights in order for the water right to be issued? If the answer is yes, is that contract still in effect and, if so, is it being conveyed or assigned along with the water right?

V. Structuring the Sale of a Surface Water Right

The foregoing "primer" on the basics of surface water rights and due diligence issues leads into the structure of the deal. Parties must have patience in pursuing a water deal because such deals do not occur overnight and negotiations can be protracted, particularly due to the potential for third-party interference not common in traditional real estate transactions. This third-party interference can come from the TCEQ or other water right holders. Additionally, once the terms of a deal have been negotiated, the period for exercising due diligence can be exceedingly long, often extended because of developments surrounding needed changes to the water right. See the discussion above regarding water right permit amendments. Some practitioners describe water deals as moving in "geologic time."

Like any real property transaction, the parties must assess their respective goals and objectives and then develop a structure for a deal. Several basics should be addressed in any water deal. First, who will be responsible for the transactional costs, including preparing and processing applications at the TCEQ? Second, what warranties, if any, will be given regarding the quantity and quality of water covered by the water right, particularly if the type and location of use or the diversion point of the water right will be changed?

The following is not an exhaustive list of all the terms that can or should be addressed in a water rights deal, but it can serve as a starting point. The following topics, which are not necessarily part of a conventional real estate transaction, are often part of the purchase or lease of a surface water right.

A. Option Contract vs. Firm Deal

Many uncertainties surround a water deal until the necessary approvals and amendments have been received from controlling regulatory entities such as the TCEQ. Thus, water deals usually require an out clause for the acquiring party. There are a variety of means to accomplish this, including granting an option period during which due diligence is completed and the parties pursue the necessary regulatory approvals and amendments. Details should be negotiated regarding the term of an option period, the responsibilities of the parties during the option period, who will bear any costs associated with the option period, and who has the right to use the water right during the option period.

The option period should be of limited duration and have designated benchmarks, at which times the parties may decide whether to continue or terminate the deal. Because of the time necessary to process even a minor amendment at the TCEQ, a period of between nine and twelve months is a reasonable option term. A benchmark that might be established is the point at which the amendment application has been determined to be administratively complete and notice is published. This would allow the parties the opportunity to cancel the deal if the notice triggers protests and requests for a contested case hearing. See Chapter 9 of this book regarding administrative completeness, notice requirements, and the opportunity for a contested case hearing.

Because of the unpredictability of processing a water right amendment (see the discussion above), the term of the option should contemplate the possibility of an extension if the approvals and amendment applications seem to be progressing but the closing requirements will not be satisfied before the end of the option period. Because an extension of the option period could require forbearance in the use and marketing of the water right, which represents a lost opportunity, payment of some additional nonrefundable consideration by the buyer or lessee may be necessary.

B. Consideration

One of the biggest questions in negotiating a water deal is the value of the water right. There are usually no comparable market sales or other traditional pricing tools for pricing water rights as there are for sales of other real property. The legislature has established a definition of "fair market value" in surface water rights transaction, which is similar to the definition in traditional real estate transactions:

> Whenever the law requires the payment of fair market value for a water right, fair market value shall be determined by the amount of money that a willing buyer would pay a willing seller, neither of which is under any compulsion to buy or sell, for the water in an arms-length transaction and shall not be limited to the amount of money that the owner of the water right has paid or is paying for the water.

Tex. Water Code § 11.0275.

As with all real property transactions, the terms and conditions negotiated in a water deal will affect the purchase price to be paid for the water right. The price paid will necessarily result from negotiations between the parties, particularly in the absence of any benchmark price or comparable sale. The following factors will influence the negotiations on the value of the water right:

1. Quantity of permitted water. As amended, the amount of water available to the acquiring party postclosing may be less than the water right authorizes. The purchase price may be the net per-acre-foot price based on the authorized water right, with some type of reduction if the TCEQ reduces the authorized amount. (See the discussion of change in diversion point, place of use, and point of return flow above.)

2. Quality of the water, if it affects the acquiring party's intended purpose of use.

3. Location of authorized diversion point and its proximity to the proposed diversion point and place of use.

4. Types of use authorized by the existing water right and the need for amending the use authorization.

5. Reliability of the yield from the water right.

6. The water right's seniority based on its priority date.

7. The existence of water rights with diversion points located between the existing point of diversion and the proposed point of diversion, if those water rights could affect the reliability of yield.

8. The term or duration of the water right.

C. TCEQ Approvals and Amendments to the Water Right

As discussed above, in many instances the transfer of a water right requires approval from the TCEQ. At a minimum, it requires notification of the TCEQ. Often, for the water right to be used by the acquiring party, it must first be amended. These regulatory steps not only represent additional time but also pose a risk of loss and can result in significant costs. For example, certain amendments, such as changes in diversion points, purpose of use, and place of use, may result in a reduction of the authorized diversion amount under the water right.

The buyer or lessee may ask the acquiring party to assist or otherwise cooperate during the option period in securing the necessary TCEQ approvals and amendments to the water right. Such a request is reasonable, and it normally should be at no cost to the seller or lessor. Accordingly, the deal should provide for reimbursement of the seller's or lessor's actual out-of-pocket costs, including professional fees incurred in such an effort (e.g., engineering and legal fees). If the potential costs will be significant, the parties may agree to develop a budget and provide for an upfront deposit or escrow of the monies to cover the seller or lessor's costs as a precondition to their participation.

The bottom line is that the overall deal should be negotiated on the basis of the original water right, so that any risk of loss resulting from needed changes is borne by the acquiring party. The parties, however, may negotiate a price reduction, particularly if reduced quantity or reliability is anticipated.

D. Condemnation Proceedings

Although not common, a water right is an interest in real property subject to condemnation. *See* Tex. Prop. Code § 21.0121. Because of the length of time that could pass before closing, the possibility that a water right could be the subject of condemnation proceedings should be addressed. Specifically, in the event of condemnation, the transaction should provide for (1) how any condemnation proceeds will be paid and (2) whether the buyer or lessee can terminate the deal if the remaining quantity of water right postcondemnation is insufficient to meet its needs. See Chapter 38 of this book for a discussion of the condemnation of water rights.

E. Assignability

The seller or lessor should be entitled to assign its interests as long as the assignee agrees in writing to honor the deal with the buyer or lessee. To protect the seller's or lessor's expectations under the sale, the deal should address the buyer's or lessee's right to assign the deal. The assignability provision should include, at a minimum, the following:

1. The assignee must be a qualified entity—that is, one able to perform and comply with the sale terms, particularly the financial obligations.

2. The assignee must acknowledge in writing its obligation to fulfill all terms of the sale.

3. The buyer or lessee has continued liability for the full and faithful performance of the terms of the sale, in the event of a default by the assignee.

F. Miscellaneous Boilerplate Provisions

Like any real estate transaction, the sales contract should include miscellaneous boilerplate provisions such as the following:

1. governing law (Texas law applies);
2. venue of any lawsuit (any litigation must be filed in a county or counties to be selected by the seller or lessor);
3. alternative dispute resolution (ADR) (the seller or lessor may want to require or to avoid arbitration or other forms of ADR);
4. notice and contact information;
5. force majeure clause;
6. amendments and modifications of the contract;
7. savings clause;
8. third-party beneficiaries (the seller or lessor will likely want to negate the existence of any such beneficiaries);
9. drafting interpretations;
10. counterparts or duplicate originals; and
11. events of default and remedies.

VI. Structuring the Lease of a Surface Water Right

The same basic principles applicable to the purchase of a water right, as discussed in section V above, generally apply to the lease of a water right. Structuring a water right lease involves additional considerations, however, as discussed below.

A. Valuation

Because of the lack of an established market for water rights, the true value of the right is unknown. In general, however, the price per acre-foot of the sale for the water right will be higher than the per-acre-foot lease price. Over the life of the lease, however, the total return or cost could be greater than the per-acre-foot price received in a sale. At the end of the lease, the water right owner will still have the water right, and the market value of the right will likely have appreciated over the life of the lease.

B. Option Period

The transaction should provide for payment of some additional consideration in the event of an extension of the term of the option period. This is because an extension of the term of the option period discussed in section V.A above could delay the lessor's receipt of rent under a lease or require forbearance in the use or marketing of the water right (i.e., lost opportunity).

C. Other Provisions Affecting the Lease Price

In addition to the all-important negotiation of the lease price, the parties should address related issues that will affect the overall value of the transaction.

1. Guaranteed Annual Payment

Surface water leases may be structured and labeled in various ways, such as take-or-pay, minimum take, or guaranteed purchase. Each of these structures ensures that the lessor receives an annual payment.

2. Payment Based on Beneficial Use Compared to Payment Based on Actual Use

The lessor wants to negotiate a lease for the water that ensures payment whether or not water is actually used by the lessee. As mentioned above, this is easily handled if the transaction includes a take-or-pay provision. If, however, the transaction contemplates payment only if the lessee gets the benefit of the water—that is, the ability to actually use it—then the lessor should be careful how the payment obligation is structured.

It is possible for a lessee to lease water for the purpose of trading its use or nonuse to improve the reliability of, or otherwise enhance, water available from another water right or source under the control of the lessee. For example, in response to pressures from environmental interests or demands by downstream water right holders, a lessee developing a water project could negotiate a lease that would tie up a water right but that would not actually divert the water. In this manner the nonuse of the leased water right could facilitate having higher flows in a stream segment or to bays and estuaries.

To accomplish this, the lessee might lease one or more water rights and either not use them—for example, leave the water in the watercourse—or agree to have stricter stream flow conditions on the leased water right to reduce the quantity of water diverted annually. Although the lessee in such a scenario would be using the water in the sense that it would be receiving some benefit from the leased water, the lessee would not be diverting the water. If the transaction is drafted so that the lessee's obligation to pay is based on the volume of water actually diverted, then the lessor would not get paid and, therefore, would not receive the intended benefit of the bargain. Moreover, the lessee's nonuse of the water over an extended period of time could jeopardize the underlying water right by subjecting it to cancellation.

To address this possibility, the parties can negotiate a take-or-pay clause, negotiate a higher price for the water per acre-foot with a minimum annual take requirement, or require payment for the beneficial use of the water right in any form or fashion, including trading or nonuse.

3. Price Escalation Clause

The duration or term of any lease involving a substantial amount of water will likely be for twenty-plus years. The lessor will want to provide for periodic increases of the annual rent during the term to reflect the appreciation in the value of the water right over time. This can be addressed in a variety of ways. The parties may agree to increases at a set interval, such as annually or every five years. The increases could be specified as a percentage increase or could track an index like the consumer price index. The periodic increase could be tied to some other market price indicator; for example, a large water purveyor (possibly even the lessee) has a rate or price it charges third parties, which the parties agree sets the market price. Another method would be to include a most-favored-nations clause that requires an increase if the lessee pays a higher amount to some other supplier.

D. Cancellation of Water Rights

Water rights are subject to cancellation, in whole or in part, for nonbeneficial use during a ten-year period. *See* Tex. Water Code § 11.173. Although a take-or-pay clause should help to ensure that the lessor will get paid, it may not ensure that the water is beneficially used during the term of the lease. To avoid the prospect of cancellation due to nonuse, the parties may negotiate various types of clauses in the lease.

1. A clause mandating that the lessee protect the water right from cancellation and beneficially use the water right by actually diverting the leased water at least once every ten years.

2. A clause mandating that the lessee defend against any action brought by the TCEQ to cancel the water right and to give immediate notice to the lessor of receipt of any notice of cancellation proceedings being initiated by the TCEQ.

3. A clause allowing the lessor to beneficially use, or cause to be beneficially used, the water right to prevent cancellation. This clause should also provide that in the event it is exercised, (a) the lessee is still required to pay the rent on 100 percent of the water (including the quantity used by the lessor), and (b) the lessor has no obligation to either replace the water used or to rebate or refund any portion of the rent (even if the lessor does a spot sale to a third party).

E. Watermaster Fees and Other Assessments

If the water right is located in a river basin subject to the jurisdiction of a watermaster, the lease should address payment of watermaster fees and other assessments. Even if the water right is not located in a watermaster area, any long-term lease should address this issue because of the possibility of watermaster operations expanding throughout the state. Based on the rationale that the lessee is benefiting from the use of the water, the lease should provide that the lessee be responsible for the payment of all assessments on the water right and the use of the water. This includes, specifically, any annual watermaster fees or water quality fees under the Clean Rivers Program. It also includes any other type of assessment such as ad valorem taxes.

F. Annual Reports

Any requirement to file reports regarding the use of the water right or the use of water under the water right should be expressly made the obligation of the lessee. For the lessor's protection, however, the lease should require that the lessee provide the lessor with a copy of all filed reports. The copies should be required to be delivered to the lessor by a date sufficiently before the filing deadline so that the lessor can accomplish the filing in the event the lessee defaults.

G. Third-Party Offers and a Right of First Refusal

Much can happen during the life of a lease, particularly where the term is twenty-plus years. For example, the lessor could receive an offer to purchase the underlying water rights. The lease may be negotiated to allow such a sale and should address the following related issues as well:

1. Whether the sale of the underlying water right during the term of the lease triggers a right in the lessor to terminate the lease early, if necessary to close the sale. If so, the circumstances of such termination should be addressed, including what notice is provided to the lessee and whether the lessee is entitled to a replacement water source or some compensation because of the termination.

2. Whether the lessee should be entitled to a right of first refusal to buy the water rights for the same deal offered to the lessor. If so, the terms of the right of first refusal and the lessee's closing obligations should be specified.

H. Early Termination

The lessor's right, and in some instances the lessee's right, to terminate the lease before the expiration of its term should be addressed. This includes termination for cause and nonpayment of rent, as well as termination under other circumstances, such as a third-party offer to purchase or condemnation.

I. Advance Payment of Rent

The lessee should be required to pay rent in advance. There are several reasons for requiring advance payment. First, once the water is used, it cannot be recovered for nonpayment. Not only will it most likely have been consumed, but once it is diverted it counts against the water right and cannot be double counted or added back in during the calendar year. Additionally, because water rights are usable on an annual calendar-year basis, once the calendar year has expired, the right to use it during that year has been lost. The unused portion of the water right cannot be banked or carried forward for use in a subsequent calendar year.

J. Condemnation Proceedings

As noted in section V.D of this chapter, water rights are an interest in real property and, though not common, can be subject to condemnation. *See* Tex. Prop. Code § 21.0121. Because of the limited availability of new water rights and the length of the lease term, the possibility that a water right could be the subject of condemnation proceedings should be addressed. The lease should consider how, in the event of condemnation, the condemnation proceeds should be paid. Should they be paid to the lessor, or should some portion of the proceeds be allocated to the lessee because they are intended to reimburse the lessee for some loss other than the loss of the water rights themselves? Condemnation might also be a factor in or trigger a lessee's right to terminate the lease.

K. Assignability

As noted in section V.E of this chapter, to protect the parties' expectations under the lease, the lease should address the parties' right to assign the deal. At a minimum, the lease should include the following requirements for assigning the lease:

1. a qualified entity—that is, one able to perform and comply with the lease terms;
2. an entity that acknowledges in writing its obligation to fulfill all of the lease terms;
3. an entity who is reasonably approved by the nonassigning party; and
4. the continued liability of the assigning party for the full and faithful performance of the lease terms by the assignee.

L. Notice to the TCEQ

If the lease is considered a wholesale water supply contract pursuant to Texas Water Code section 13.144, the obligation to provide notice to the TCEQ should be designated in the agreement. See Chapter 31 of this book regarding wholesale water contracts.

VII. Other Unique "Sources" of Surface Water Rights

Although the vast majority of water rights are privately held, there are two unique sources from which one may acquire the right to use state water by either purchase or lease: the Texas Water Bank and Texas Water Trust, and canal company water rights.

A. Texas Water Bank and Texas Water Trust

In 1993, the Texas legislature mandated that the TWDB establish the Texas Water Bank. Tex. Water Code § 15.702; Act of May 21, 1993, 73d Leg., R.S., ch. 647, § 1 (adding subchapter K, Texas Water Bank). The purpose of the Texas Water Bank was to facilitate water marketing and transactions to transfer water and water rights to provide sources of adequate water supplies for use within the state. *See* Tex. Water Code § 15.702. The business plan to accomplish this goal was premised on "the provision of information describing the availability of and needs for water in the State." *See* Texas Water Development Board, *A Texan's Guide to Water and Water Rights Marketing*, *available at* www.twdb.texas.gov/publications/reports/infosheets/doc/WaterRightsMarketingBrochure.pdf. Pursuant to the enabling legislation, the TWDB adopted rules for the operation of the Water Bank, which are codified in 31 Texas Administrative Code chapter 359.

Water rights deposited into the Water Bank can be sold and leased. One benefit of the Water Bank legislation is the authorization to deposit a water right into the Water Bank, which, during its initial ten-year term, becomes exempt from cancellation under Texas Water Code chapter 11, subchapter E.

See Tex. Water Code § 15.704; *see also* Tex. Water Code §§ 11.171–.177. The exemption from cancellation, however, is good only one time. *See* Tex. Water Code § 15.704(a). Water rights can be listed on the TWDB Web site for marketing purposes, even though not actually on deposit, without paying the deposit fee. *See* Texas Water Development Board, *Texas Water Bank & Trust*, www.twdb.texas.gov/waterplanning/waterbank/. Such listed water rights do not have the same protection from cancellation as those on deposit in the Water Bank. *See* Tex. Water Code § 15.704(b).

The Water Bank was envisioned as a clearinghouse for water and water rights availability information, much like a multiple listing service for real estate. The TWDB, however, does not act as a broker or agent for either buyers or sellers. The TWDB does not actively market the water or water rights posted on its Web site, regardless of whether the listed water or water right is deposited in the bank. *See* Tex. Water Code § 15.703.

Two sessions after it created the Texas Water Bank, the Texas legislature established the Texas Water Trust. *See* Act of June 1, 1997, 75th Leg., R.S., ch. 1010, § 2.16 (codified at Tex. Water Code § 15.7031). The purpose of the Water Trust is to establish "within the water bank a place to hold water rights dedicated to environmental needs, including instream flows, water quality, fish and wildlife habitat, and bay and estuary inflows." *See* Tex. Water Code § 15.7031(a); *cf.* Tex. Water Code § 15.703(a)(10) (authorizing the TWDB Water Bank to accept and hold "donations of water rights to meet instream, water quality, fish and wildlife habitat, or bay and estuary inflow needs"); *see generally* Edmond R. McCarthy, Jr., *Environmental Flows: Water Development Perspective*, 34 St. B. Tex. Envtl. L.J. 248, 255–56 (2004). The Texas Parks and Wildlife Department (TPWD) works closely with the TWDB in connection with the Texas Water Trust. The TPWD, along with the TCEQ, must be consulted by the TWDB in the adoption of rules that govern the process for holding and transferring water rights into the Water Trust. *See* Tex. Water Code § 15.7031(b). Additionally, the TCEQ must review and approve the dedication of any water right placed into the Water Trust. That process must be done in consultation with the TWDB and the TPWD. *See* Tex. Water Code § 15.7031(c). See Chapter 11 of this book for further discussion of the Texas Water Trust and environmental flow issues.

Unlike water placed in the Water Bank, there is no limit on the duration for which water may be placed in the Texas Water Trust. Instead, water rights may be held in the Water Trust for a term specified by contractual agreement with the holder of the water right or in perpetuity. *Compare* Tex. Water Code § 15.704(a) (water right may be deposited in the Water Bank for an initial term of up to ten years), *with* Tex. Water Code § 15.7031(d) (water rights may be held in the Water Trust for a term specified by contract or in perpetuity). An additional distinction between a deposit into the Water Bank and into the Water Trust is that the fees the depositor must pay for placing the water right in the Water Bank are waived in the case of deposits into the Water Trust. *See* Tex. Water Code § 15.705 (establishing fees for deposits into the Water Bank); 31 Tex. Admin. Code § 359.14(b) ("Fees associated with deposits to or transfer from the Texas Water Trust of water rights or rights to use water are waived."). Information regarding the Texas Water Bank and the Texas Water Trust can be found on the TWDB's Web site or by contacting the TWDB's Water Bank manager. The TWDB maintains two separate registries for "sellers" and "buyers" in the Water Bank. The Seller's Registry and the Buyer's Registry can also be viewed on the TWDB Web site. Application forms for making deposits into the Water Bank, as well as a statement of responsibilities of Water Bank participants, and a fee schedule are also available on the TWDB Web site. *See* Texas Water Development Board, *Texas Water Bank & Trust*, www.twdb.texas.gov/waterplanning/waterbank/.

B. Canal Company Water Rights

In the more common practice of an individual irrigation water right holder, the water right is tied directly to the land owned solely by the water right holder for irrigation of a specified acreage described by metes and bounds within the water right. The water right owned by a canal company, however, authorizes the water right holder with control over or possession of the water with authority to contract or supply the water to third parties located within the service area of the water right holder. *See* Tex. Water Code § 11.036; *see generally Willis v. Neches Canal Co.*, 16 S.W.2d 266 (Tex. Comm'n App. 1929, judgm't adopted); *Town of Griffing Park v. City of Port Arthur*, 628 S.W.2d 101 (Tex. App.—Beaumont 1981, writ ref'd n.r.e.) (water right holder, not its customers, is the "appropriator" of the water); *Garwood Irrigation Co. v. Lower Colorado River Authority*, 387 S.W.2d 746 (Tex. Civ. App.—Austin 1965, writ ref'd n.r.e.) ("The irrigators have no rights except through Garwood [Irrigation Company], and are not appropriators, but are customers of appropriators," citing *Willis*, 628 S.W.2d 101). See also Chapter 3 of this book for a history of canal companies and water rights. This commercial aspect of the irrigation rights causes the water right, and the canal company accordingly, to be subject to the provisions of Texas Water Code sections 11.036–.041.

Section 11.040 provides that a permanent water right is an easement that passes with the title to the land to which it is appurtenant. *See* Tex. Water Code § 11.040. The owner of a permanent water right is entitled to use the water according to the terms of his contract. In the absence of a contract, the owner of the permanent water right "is entitled to use the water at a just, reasonable, and nondiscriminatory price." Tex. Water Code § 11.040(c); *see also* Tex. Water Code §§ 11.038–.039. The term "permanent water right" is not defined expressly in the statute. Based on case law, however, such a right is one that expressly entitles the holder to contract for water service from a canal company. Moreover, it is one that expressly has been conveyed or granted or reserved from a conveyance that becomes a vested property right that is treated as a covenant running with the land. It is distinguished as such from the implied right that is statutorily created. *See generally City of Wichita Falls v. Bruner*, 165 S.W.2d 480 (Tex. Civ. App. 1942, writ ref'd w.o.m.); *Edinburg Irrigation Co. v. Ledbetter*, 286 S.W. 185 (Tex. Comm'n App. 1926); *Chapman v. American Rio Grande Land & Irrigation Co.*, 271 S.W. 392 (Tex. Civ. App.—San Antonio 1925, writ ref'd); *Combs v. United Irrigation Co.*, 110 S.W.2d 1157 (Tex. Civ. App.—San Antonio 1937, writ dism'd); *Edinburg Irrigation Co. v. Paschen*, 235 S.W. 1088 (Tex. Comm'n App. 1922, judgm't adopted); Tex. Water Code § 11.040; Hutchins, at 280.

Water Code section 11.038 creates what has come to be known as a statutory right to purchase water service from an irrigation company (or district). *See* Tex. Water Code § 11.038. This right extends to landowners who hold possessory interest in real property adjacent to a canal or similar facility. A statutory water right creates a right for a landowner who does not have a permanent right, and has not been able to reach an agreement with an irrigation company, to purchase water. Generally, cases out of which this right evolved describe the right as one based on easement. *See Edinburg Irrigation Co.*, 286 S.W. 185; *American Rio Grande Land & Irrigation Co. v. Mercedes Plantation Co.*, 208 S.W. 904 (Tex. Comm'n App. 1919, judgm't adopted). This right, however, appears to be limited by the fact that the landowner has to be willing to pay the reasonable and nondiscriminatory rates charged by the irrigation company as well as abide by the rules and regulations of the irrigation company. The statute also expressly provides that the party that owns or controls the water right must furnish the water "if the person has any water not contracted to others." *See* Tex. Water Code § 11.038(b). See Chapter 31 of this book for further discussion of wholesale water suppliers.

VIII. Conclusion

Recognized as a limited resource, water is a hot commodity in Texas. The history of water in Texas and the evolution of Texas's water law have both been driven by Texas's continuing state of drought. *See In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 441 (Tex. 1982); *see generally* Dylan O. Drummond et al., *The Rule of Capture in Texas—Still Misunderstood After All of These Years*, 37 Tex. Tech L. Rev. 1, 42 (2004). As both the terms "history" and "evolution" suggest, time and patience are needed when one engages in a water deal.

Depending on the type of project—for example, long-term municipal water supply versus year-to-year irrigation—factors that can affect the transaction and project development and implementation include (1) a lack of infrastructure—for example, treatment, transmission and delivery, or storage facilities; (2) regulatory requirements; and (3) opposition at the local level based on the project's interference with local water uses and needs. Water markets are not yet well developed in Texas and, as a result, water deals take time and creativity to develop.

The good news for the owners of existing surface water rights is that, coupled with continually narrowing options for the development of new sources of supply, there has been an increased interest in water development to meet future demands following the passage of Senate Bill 1 in 1997, Act of June 1, 1997, 75th Leg., R.S., ch. 1010.

CHAPTER 16

Chapter 36 Groundwater Conservation Districts and Subsidence Districts

Michael Booth,[1] Trey Nesloney,[2] and Deborah Trejo[3]

I. Introduction

Groundwater conservation districts and subsidence districts are created pursuant to article XVI, section 59, of the Texas Constitution. "There may be created within the State of Texas, or the State may be divided into, such number of conservation and reclamation districts as may be determined to be essential to the accomplishment" of preserving, conserving, and developing the natural resources of the State. Tex. Const. art. XVI, § 59(b). Both types of districts have powers to regulate the use of groundwater and to prevent the waste of groundwater or the degradation of water

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quality. However, the types of powers granted to each type of district and the primary purposes they serve differ in certain ways.

II. Chapter 36 Groundwater Conservation Districts

A groundwater conservation district (GCD or district) is a local regulatory agency created "to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions." Tex. Water Code § 36.0015. GCDs "are the state's preferred method of groundwater management through rules developed, adopted, and promulgated by a district in accordance with the provisions" of chapter 36 of the Texas Water Code. Tex. Water Code § 36.0015. As discussed in detail below, the Texas Commission on Environmental Quality (TCEQ or commission) is the only administrative agency with jurisdiction to create GCDs and has significant oversight authority. *See* Tex. Water Code §§ 36.011(b), 36.301–.310.

A common mistake regarding GCDs is to assume that chapter 36 of the Texas Water Code encompasses all the details as to the powers, duties, funding, administration, and authority of each specific district. In fact, one must also have a full understanding of the district's groundwater management plan, the district's rules, and the special laws or TCEQ orders creating the district to make this determination. This chapter does not attempt to survey these numerous and varied plans, rules, and legislation, but instead focuses on the general law applicable to GCDs.

A. Creation, Addition of Territory, and Consolidation

The territory encompassed within a GCD is established when it is created. There are several methods by which a GCD can be created, as discussed below. Once a district is created, its boundaries can be changed by adding territory, which is referred to as annexation. Finally, two or more GCDs may combine, consolidating their authority and duties into a single district. These processes are discussed below.

1. Creation

In Texas, a GCD can be created by special act of the legislature, upon petition to the TCEQ by landowners, or by the TCEQ through the priority groundwater management area (PGMA) process. Most GCDs have been created through the legislature. Once created, almost every GCD must be confirmed in a referendum election. *But see* Tex. Spec. Dist. Code §§ 8811.003 (confirmation election of the Corpus Christi Aquifer Storage and Recovery Conservation District not required), 8820.004 (confirmation election of the Northern Trinity Groundwater Conservation District not required).

a. Legislative Action

"The conservation and development of all of the natural resources of this State . . . and the preservation and conservation of all such natural resources of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all laws as may be appropriate thereto." Tex. Const. art. XVI, § 59(a). "There may be created within the State of Texas, or the State may be divided into, such number of conservation and reclamation districts as may be determined to be essential to the accomplishment" of these purposes. Tex. Const. art. XVI, § 59(b). Pursuant to this constitutional authority, the legislature may form new GCDs through special legislation.

A local senator or representative will introduce special legislation that creates a new GCD. Although the specifics of the legislation may vary in each case, typical district-creation legislation authorizes district powers and duties, appoints temporary directors, and establishes procedures for subsequent directors' elections and voter approval, which is known as confirming the GCD.

Each individual piece of special legislation that creates a new GCD may also differ in certain ways. The legislature can draft special laws that vary the powers, authorities, management, or financing mechanisms outlined in the general law. For example, district-creation legislation may give the GCD additional authority or responsibilities above those provided in chapter 36 of the Texas Water Code, such as water control and improvement. Alternatively, the legislation may also limit the powers available to a GCD, such as the power of eminent domain. To fully understand the scope of a GCD's power and structure (or any type of special district for that matter), one must read and understand not only chapter 36 but also the special laws that created the GCD, including any subsequent amendments. *See, e.g.*, Tex. Spec. Dist. Code §§ 8812.101 (prohibiting the Victoria County Groundwater Conservation District from exercising the power of eminent domain), 8819.103 (forbidding the Panola County Groundwater Conservation District from purchasing, selling, transporting, or distributing surface water or groundwater for any purpose). See Chapter 7 of this book for a discussion of other types of special law water districts.

b. Landowner Petition

A GCD can also be created through landowner petition. *See generally* Tex. Water Code § 36.013; *see also* 30 Tex. Admin. Code § 293.18 (creating TCEQ's implementing regulation). The petition requesting creation must be filed with the TCEQ for review and certification under section 36.015 of the Texas Water Code. Tex. Water Code § 36.013(a). The petition must be signed by a majority of the landowners within the proposed district, or if there are more than fifty landowners in the proposed district, at least fifty of those landowners. Tex. Water Code § 36.013(b). The petition must include (1) the name of the proposed district; (2) the area and boundaries of the proposed district, including a map generally outlining the boundaries; (3) the purpose or purposes of the district; (4) a descriptive statement of any projects proposed to be undertaken by the district; (5) the names of at least five individuals qualified to serve as temporary directors; and (6) financial information, including the projected maintenance tax or production fee rate and a proposed budget of revenues and expenses for the district. Tex. Water Code § 36.013(c).

The TCEQ reviews the petition for statutory compliance, gives notice of the application, and conducts a public meeting in a central location within the area of the proposed district on the application not later than the sixtieth day after the date the commission issues notice. Tex. Water Code § 36.014(a). The notice must contain the date, time, and location of the public meeting and must be published in one or more newspapers of general circulation in the area of the proposed district. Tex. Water Code § 36.014(a).

Not later than ninety days after the date the TCEQ holds the public meeting on the petition, the TCEQ must certify the petition as administratively complete if the signatures and petition contents meet the statutory requirements. *See* Tex. Water Code § 36.015(a). The TCEQ may not certify a petition if the commission finds that the proposed district cannot be adequately funded to carry out its purposes based on the financial information provided in the petition or that the boundaries of the proposed district do not provide for the effective management of the groundwater resources. Tex. Water Code § 36.015(b). The TCEQ, after the amendments, must "give preference to boundary lines that are coterminous with those of a groundwater management area but may also consider boundaries along existing political boundaries if such boundaries would facilitate district creation and confirmation." Tex. Water Code § 36.015(b). If the TCEQ certifies the petition as administratively complete, the TCEQ must issue an order, notify the petitioners, and appoint the temporary directors named in the petition. Tex. Water Code § 36.015(e). If the TCEQ does not certify the petition, it must provide the reasons to the petitioners in writing. Tex. Water Code § 36.015(d).

If a GCD is created by landowner petition, not later than the 120th day after the date all temporary directors have been appointed and have qualified, the temporary directors must meet and order an election. Tex. Water Code § 36.017(a). The election is held to elect permanent directors and to confirm the creation of the district. Tex. Water Code § 36.017(a). If a majority of the votes cast in the election favor the creation of a district, the temporary board declares the district created. Tex. Water Code § 36.017(f). If the majority of the votes cast are against the creation of the district, the district has no further authority, except that the organization of the district is maintained until all the debts are paid. *See* Tex. Water Code § 36.017(i). A district, the major portion of which is located in one county, may not be organized to include land in another county unless the election held in the other county to confirm the creation of the district is approved by a majority of the voters of the other county voting in an election called for that purpose. Tex. Water Code § 36.019(a).

The Gonzales County Underground Water Conservation District was created by landowner petition to the Texas Water Commission (TCEQ predecessor agency) in 1993. *See* Gonzales County Underground Water Conservation District, *Creation of the District*, www.gcuwcd.org/. The Blanco-Pedernales Groundwater Conservation District was also created through landowner petition. *See* Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 77th Legislature*, at 53 (Jan. 2001), *available at* www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053_01.pdf [hereinafter 2001 PGMA-GCD Report]. It was confirmed through an election in 2001. *See* Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 78th Legislature*, at 41 (Jan. 2003), *available at* www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053_03.pdf [hereinafter 2003 PGMA-GCD Report]. Additionally, a landowner petition was used in 1995 to create the Comal County Groundwater Conservation District covering the northern portion of the county, but its confirmation failed. *See* 2001 PGMA-GCD Report, at 62. Both creations were processed under an earlier version of the GCD-creation procedure. The current procedure was enacted in 2001. *See* Acts of June 15, 2001, 77th Leg., R.S., ch. 966, §§ 2.34–.36, 36.013–.015.

In 2002, the landowner petition process under the current version of the law was used to create the Lake Country Groundwater Conservation District in Wood County. *See* 2003 PGMA-GCD Report, at 41. The electorate rejected confirmation of the district in February 2003. *See* Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 79th Legislature*, at 27 (Jan. 2005), *available at* www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/053_04.pdf [hereinafter 2005 PGMA-GCD Report].

c. TCEQ Action

The TCEQ can create a GCD, on its own motion, as part of the PGMA process. A PGMA is an "area designated and delineated by the commission as an area that is experiencing or is expected to experience critical groundwater problems." Tex. Water Code § 35.002(12). The procedure for designating a PGMA is detailed in chapter 35 of the Texas Water Code. *See generally* Tex. Water Code § 35.008; *see also* 30 Tex. Admin. Code ch. 294, subch. E (TCEQ's implementing regulations). The process requires the executive director of the TCEQ and the executive administrator of the TWDB to "meet periodically to identify, based on information gathered by the commission and the Texas Water Development Board, those areas of the state that are experiencing or that are expected to experience, within the immediately following 50-year period, critical groundwater problems." Tex. Water Code § 35.007(a). If the executive director of the TCEQ concludes that an area of the state should be considered for designation as a PGMA, the executive director shall prepare a report to the TCEQ. Tex. Water Code § 35.007(b). The TCEQ then must call an evidentiary hearing to consider the designation of a PGMA and to determine whether creating a GCD over all or part of the PGMA is "feasible and practicable." Tex. Water Code § 35.008(b)(2).

At the conclusion of the hearing, the TCEQ issues an order stating the findings and conclusions, including whether a PGMA should be designated and whether a GCD should be created. *See* Tex. Water Code § 35.008(f). If GCD creation has been recommended, the TCEQ then allows time for local landowners to take action to create a GCD in response to the order. *See* Tex. Water Code § 35.012(a). If local landowners do not take action to create a GCD, the TCEQ shall create a GCD "[w]ithin two years, but no sooner than 120 days, from the date on which the commission issues an order." Tex. Water Code § 35.012(b); *see also* 30 Tex. Admin. Code §§ 293.19, 294.43. The TCEQ then appoints temporary directors and orders "that an election be called by the temporary directors to authorize the district to assess taxes and to elect permanent directors." Tex. Water Code § 36.0151(a). Unlike most GCDs created through special legislation and all GCDs created by landowner petition, no confirmation election is required when a GCD is created by the TCEQ in its own motion, although all taxing authority must be approved by the voters.

Over the last three decades, the state has completed studies on eighteen separate areas to determine whether they were appropriate for designation as either a "critical area," the predecessor to a PGMA, or as a PGMA. Seven of the study areas were determined to have or were expected to have critical groundwater problems and were designated as PGMAs, two of which have been merged into the Hill Country Priority Groundwater Management Area. The study areas that have been designated as PGMAs are (1) parts of Reagan, Upton, and Midland counties; (2) all of Swisher and parts of Briscoe and Hale counties; (3) part of Dallam County; (4) part of El Paso County; (5) all of Bandera, Blanco, Gillespie, Kendall, and Kerr and parts of Bexar, Comal, Hays, and Travis counties (the Hill Country area); (6) all of Bosque, Coryell, Hill, McClennan, and Somervell counties (Central Texas–Trinity Aquifer); and (7) all of Collin, Cooke, Dallas, Denton, Ellis, Fannin, Grayson, Hood, Johnson, Montague, Parker, Tarrant, and Wise counties (North Central Texas–Trinity and Woodbine Aquifers). The TCEQ has determined that ten of the PGMA study areas do not meet the criteria for designation, and no further evaluation of those areas is planned. *See* Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 82nd Legislature*, at 1 (Jan. 2011), *available at* www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053_07.pdf [hereinafter 2011 PGMA-GCD Report].

Locally initiated district creation or additions of territory to existing district activities have occurred in six of the seven PGMAs. The single exception is the El Paso County PGMA. TCEQ action to create a GCD in an unregulated PGMA area or to annex PGMA territory into an existing district is still required in all or part of six counties in four PGMAs. However, successful district creation has not occurred in western Briscoe County in the Briscoe, Hale, Swisher County PGMA; southeast Midland County and northeast Upton County in the Reagan, Upton, Midland County PGMA; northwest Comal County and southwest Travis County in the Hill Country PGMA; and Dallas County in the North Central Texas–Trinity and Woodbine Aquifers PGMA. *See* Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 84th Legislature*, at 22 (fig. 2), 33 (Jan. 2015), *available at* www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/053-09.pdf [hereinafter 2015 PGMA-GCD Report]. The map at Plate 4 shows the seven designated PGMAs, the areas within these designations that are currently included within a GCD, and the areas determined to not meet requirements for designation as PGMAs. *See* 2015 PGMA-GCD Report, at 22 (fig. 2).

Currently, the western portion of Briscoe County is the only portion of the Briscoe, Swisher, and Hale County PGMA that has not been included within a GCD. In 2013, the TCEQ executive director issued a report recommending that it be added to High Plains Water District. After a contested case hearing, on December 10, 2014, the TCEQ issued an order making this recommendation. *See* 2015 PGMA-GCD Report, at 20.

Similarly, portions in Upton and Midland counties in the Reagan, Upton, and Midland County PGMA have not joined or established a GCD. In 2014, the TCEQ executive director recommended that northeastern Upton County and southeastern Midland County be added to Glasscock GCD. *See* 2015 PGMA-GCD Report, at 20.

As of July 19, 2011, all thirteen counties in the North Central Texas–Trinity and Woodbine Aquifers PGMA are in a GCD except Dallas County. If no GCD is established through local or legislative efforts before September 1, 2015, the TCEQ has the authority to establish one. *See* Tex. Water Code § 36.0151; *see also* 2015 PGMA-GCD Report, at 21.

Western Comal County and western Travis County in the Hill Country PGMA are not within the jurisdiction of a GCD. Since July 2010, the TCEQ has made efforts to either establish a GCD in these areas or to add these areas to existing GCDs. The administrative process was complicated by the change in law in 2011, which changed the administrative procedure for such an action. *See* Act of May 28, 2011, 82d Leg., R.S., ch. 886, § 4, eff. Sept. 1, 2011. In early 2014, after extensive administrative hearings and failed legislative action, the contested case hearing process was ended. The TCEQ executive director decided to further evaluate the situation, leaving open the option of filing a new petition to create a GCD or add these areas to existing GCDs at a future time. *See* 2015 PGMA-GCD Report, at 18.

2. *Addition of Territory*

There are three methods of adding territory to an existing GCD, other than through special legislation. Adjacent landowners may petition the district to add their property into the district. Those owning property that is not contiguous with a district may petition to have their property annexed into the district. Finally, the TCEQ may add territory to an existing GCD through the PGMA process.

a. Adjacent Landowner Petition

First, the owner or owners of land contiguous to a district may file a notarized petition with the GCD's board of directors requesting that the land be included in the district. *See generally* Tex. Water Code §§ 36.321–.324. If multiple landowners are involved, all the landowners must sign the petition. The board may annex the land in the petition if it is considered to be to the advantage of the petitioner(s) and to the existing district. *See* Tex. Water Code § 36.323(a). For example, this process has been used to add territory to the Irion County Water Conservation District, the Kenedy County Groundwater Conservation District, the Coastal Bend Groundwater Conservation District, and the Brush County Groundwater Conservation District. *See* 2003 PGMA-GCD Report, at 43 (reporting that the Irion County Water Conservation District was petitioned by three adjacent landowners and the board added the land to the district in 2001); Texas Commission on Environmental Quality and Texas Water Development Board, Priority Groundwater Management Areas and Groundwater Conservation Districts, *Report to the 80th Legislature*, at 31 (Jan. 2007), *available at* www.tceq.state.tx.us/assets/public/comm_exec/pubs/sfr/053_05.pdf [hereinafter 2007 PGMA-GCD Report] (stating that territory was added to the Kenedy County Groundwater Conservation District and the Coastal Bend Groundwater Conservation District by adjacent landowner petition in 2006); 2011 PGMA-GCD Report, at 37 (reporting addition of contiguous territory by landowner petition to the Brush County GCD in 2010).

b. Annexation of Territory

Second, landowners of a defined area of territory, whether or not that area is contiguous to the existing district, may file a petition with the district's board of directors requesting inclusion in that district. *See generally* Tex. Water Code §§ 36.325–.331. If the territory is not contiguous to the district, it must be within the same groundwater management area, priority groundwater management area, or a groundwater subdivision designated by the TCEQ or its predecessors. *See* Tex. Water Code § 36.331. See also Chapter 21 of this book regarding PGMAs and GMAs. The petition must be signed by a majority of the landowners in the territory, at least fifty landowners if the number of landowners is greater than fifty, or the county commissioner's court of the county in which the area is located if the area is identified as a priority groundwater management area or includes the entire county. *See* Tex. Water Code § 36.325(b). At least one hearing must be held in the existing district, and one hearing must be held in the territory to be added. *See* Tex. Water Code § 36.326. If the district's board finds after the hearing on the petition that the addition of the land would benefit the district and the territory to be added, the board may add the territory to the district by resolution. *See* Tex. Water Code § 36.327. "The board does not have to include all the territory described in the petition if it finds that a modification or change is necessary or desirable." Tex. Water Code § 36.327. Annexation of the territory is not final until ratified by a majority vote of the voters in the territory to be added. *See* Tex. Water Code § 36.328(a). This process has been used by various GCDs to add territory. *See* 2003 PGMA-GCD Report, at 43 (adding territory including all of Runnels County and portions of Tom Green and Concho counties to the Lipan-Kickapoo Water Conservation District in 2001); 2005 PGMA-GCD Report, at 27 (annexing the southeastern two-thirds of Mason County to Hickory Underground Water Conservation District No. 1); 2007 PGMA-GCD Report, at 31 (annexing Hardin and Tyler counties to the Southeast GCD in 2005). There cannot be two valid annexations of the same property to two different GCDs; however, in a case of two competing claims for the same territory, it is unknown under the current statutory provisions whether the first GCD to initiate annexation or the first to finalize annexation would acquire jurisdiction of the territory. *See* Tex. Att'y Gen. Op. No. GA-0795 (2010), *available at* www.oag.state.tx.us/opinions/opinions/50abbott/op/2010/htm/ga-0795.htm (discussing jurisdiction for territory in eastern Caldwell County annexed by Gonzales County Underground Water Conservation District by landowner petition, but also annexed by individual landowner petition to the Plum Creek Conservation District before ratification election was completed for the Gonzales County Underground Water Conservation District annexation); *but see* Act of May 25, 2011, 82d Leg., R.S., ch. 658 (Senate Bill 1225 resolving this situation by allowing the landowners to select which GCD they want to have jurisdiction over their property). If territory is annexed to one GCD and then subsequently included in special legislation creating a different GCD, the special law prevails over the prior general law annexation for the purposes of statutory law. *See* Tex. Att'y Gen. Op. No. GA-0792 (2010), *available at* www.oag.state.tx.us/opinions/opinions/50abbott/op/2010/htm/ga-0792.htm; *but see* Act of May 24, 2011, 82d Leg., R.S., ch. 735 (House Bill 1060 resolving this issue by de-annexing approximately 410 acres of territory in Bastrop County from the Barton Springs–Edwards Aquifer Conservation District).

c. PGMA Process

Third, the TCEQ can add territory to an existing district through the PGMA process. *See generally* Tex. Water Code § 35.013. In this process, the TCEQ issues an order recommending that a PGMA or a portion of a PGMA be added to one or more existing GCDs. *See* Tex. Water Code § 35.008(g)(2). If the TCEQ issues an order making this recommendation, it must submit a copy of the order to the board of the GCD to which it is recommending the PGMA be added. *See* Tex. Water Code § 35.013(b). "Not later than the 120th day after the date of receiving the copy," the board of directors of the existing GCD shall vote on the addition of the PGMA to the GCD. Tex. Water Code § 35.013(b). If the board of the GCD votes to accept the addition, and the GCD has not approved an ad valorem tax by the date of the TCEQ's order, the district's board shall enter an order adding the territory to the GCD. Tex. Water Code § 35.013(b-1). If an ad valorem tax has already been approved by the date of the TCEQ's order, and the GCD board votes to accept the addition, an election must be held in the added PGMA within 270 days of the GCD board's vote to determine if the added area will assume a proportional share of the debts or taxes of the GCD. Tex. Water Code § 35.013(c)(3). If a majority of the voters in the added area vote in favor of the proposition, the district's board declares that the PGMA assumes a proportional share of the debts or taxes of the GCD; if the voters in the added area vote against the proposition, the district's board must adopt rules to implement statutory production fees in the added area according to section 35.013(g-1) of the Water Code. Tex. Water Code § 35.013(f). If either the board of the GCD votes against the addition or if the proposition is defeated in the election by the voters within the added area, the TCEQ then has one year to create one or more GCDs covering the PGMA or recommend that the area be added to another existing GCD. Tex. Water Code § 35.013(h).

On December 10, 2014, the TCEQ considered an administrative law judge's proposal for decision and approved an order recommending that the Briscoe, Hale, and Swisher County PGMA territory located in the western portion of Briscoe County be added to the High Plains Underground Water Conservation District No. 1 (HPWD). 2015 PGMA-GCD Report, at 33. However, the HPWD board of directors voted not to add the Briscoe PGMA territory on March 13, 2015, meaning that subsequent TCEQ action will be required. Texas Commission on Environmental Quality, *Priority Groundwater Management Areas*, www.tceq.texas.gov/groundwater/pgma.html.

The TCEQ executive director pursued but ultimately withdrew administrative efforts to add PGMA territory in northwest Comal County and southwest Travis County to the Trinity Glen Rose GCD and the Barton Springs–Edwards Aquifer Conservation District, respectively. 2015 PGMA-GCD Report, at 17. The efforts were withdrawn to allow for, and to encourage, local and legislative efforts to address groundwater management in those parts of the Hill Country PGMA. 2015 PGMA-GCD Report, at 19. During the 84th legislative session, the legislature created the Comal Trinity Groundwater Conservation District, which now has jurisdiction over the PGMA territory in Northwest Comal County. *See* Act of May 29, 2015, 84th Leg., R.S., ch. 656 (H.B. 2407) (codified at Tex. Spec. Dist. Code ch. 8875). There were also efforts during the session to create a GCD with jurisdiction over the PGMA territory in southwest Travis County. House Bill 4038 was proposed to create the Western Travis County Groundwater Conservation District, but the bill died in the house. *See* Tex. H.B. 4038, 84th Leg., R.S. (2015).

The executive director has also solicited public comments through January 30, 2015, on a draft report that recommends the addition of the PGMA portions of Upton and Midland counties to the Glasscock GCD. 2015 PGMA-GCD Report, at 33. The report will be finalized after the public comments have been reviewed and considered. Texas Commission on Environmental Quality, *Priority Groundwater Management Areas*, www.tceq.texas.gov/groundwater/pgma.html.

3. Consolidation

Two or more GCDs may consolidate into one district. To initiate a consolidation, the board of a district adopts a resolution proposing a consolidation and delivers a copy of the resolution to the board of each district with which consolidation is proposed. Tex. Water Code § 36.351(a). Adjacent districts may consolidate portions of either district if one district relinquishes land within that district to the jurisdiction of the other district. Tex. Water Code § 36.351(b). A consolidation occurs only if the board of each involved district adopts a resolution containing the terms and conditions of the consolidation.

Tex. Water Code § 36.351(c). After a hearing, the board may, by resolution, approve the terms and conditions for consolidation and enter an order consolidating the district. Tex. Water Code § 36.353(b).

An election to ratify the consolidation is required in each district that initiates consolidation. Tex. Water Code § 36.354(a). A district may be consolidated only if a majority of the electors in each district that is required to conduct an election vote in favor of consolidation. Tex. Water Code § 36.354(d). Failure of any one district to ratify the consolidation does not prevent the consolidation of other districts. Tex. Water Code § 36.354(d).

In 2004, the Dallam County Underground Water Conservation District No. 1 was consolidated into the North Plains Groundwater Conservation District. *See* 2007 PGMA-GCD Report, at 31. In 2014, the Anderson County Underground Water Conservation District consolidated with the Neches and Trinity Valleys Groundwater Conservation District. *See* 2015 PGMA-GCD Report, at 12.

B. Administration

Texas Water Code chapter 36 establishes the basic parameters of GCD administration. Most such provisions are found in subchapter C. Subchapter C addresses the board of directors, what comprises a quorum for purposes of conducting district business, district officers, management practices and personnel, elections, meetings, records, contracts, lawsuits, and employee benefits, as well as other administrative issues. The following section discusses directors, officers, general manager, meetings, records, and bylaws.

1. Directors

Chapter 36 distinguishes between temporary and permanent directors. The distinctions include how the directors are determined and their powers and duties once in office. Other general law controls certain aspects of serving as a district director, particularly on the subject of removal from office, dual officeholding, and conflicts of interest.

a. Temporary Directors

Once a GCD is created, temporary directors are appointed to manage the affairs of the district. (See also section II.G below, which explains that temporary directors can be appointed under Water Code section 36.303.) Their responsibilities include finding funds, conducting the confirmation election, and assisting in the election or appointment of permanent directors. Temporary directors serve until the permanent directors are elected and have qualified for office or until the voters do not approve the creation of the district in the confirmation election. *See* Tex. Water Code § 36.016(c).

If a GCD is created through action by the legislature, the special legislation usually addresses the appointment and names the temporary directors. If the GCD is created through a landowner petition, the petition must include the names of at least five individuals qualified to serve as temporary directors. *See* Tex. Water Code § 36.013(c)(5); *see also* 30 Tex. Admin. Code § 293.13. The TCEQ appoints these temporary directors when it issues an order creating the district. *See* Tex. Water Code § 36.016(a). If the TCEQ creates a GCD in a PGMA under section 36.0151, the county commissioners court of the county that contains the area of the district must appoint five temporary directors under the procedures in section 36.0161. *See* Tex. Water Code § 36.016(b).

b. Permanent Directors

Special legislation creating a GCD generally describes when and how the permanent directors are to be selected, through either election or appointment. *See, e.g.*, Tex. Spec. Dist. Code §§ 8819.052 (stating that permanent directors of the Panola County Groundwater Conservation District must be elected), 8830.051 (stating that the commissioners court of each county within the Upper Trinity Groundwater Conservation District must appoint two permanent directors who serve staggered four-year terms and may serve multiple consecutive terms). If a GCD is created under section 36.015 or as the result of the PGMA process, not later than the 120th day after the date all temporary directors have been appointed and have qualified, the temporary directors must meet and order an election to elect permanent directors. *See* Tex. Water Code §§ 36.017(a), 36.0171(a). The temporary directors must publish notice of the election in a newspaper with a general circulation within the boundaries of the proposed district before the thirtieth day preceding the date of the election. *See* Tex. Water Code §§ 36.017(c), 36.0171(c). The board of directors must consist of not fewer than five but not more than eleven directors elected for four-year terms. *See* Tex. Water Code § 36.051(a). Unless a district has a population of less than 50,000, a member of a governing body of another political subdivision is ineligible for appointment or election as a director. *See* Tex. Water Code § 36.051(b); *but see* Tex. Att'y Gen. Op. No. JC-0455A (2002) (stating that section 36.051(b) did not repeal the common-law doctrine of incompatibility with regard to districts of fewer than 50,000 population).

c. Powers and Duties

The board of directors governs and is responsible for the management of all the affairs of the district. *See* Tex. Water Code §§ 36.051(a), 36.057(a). A majority of the membership of the board constitutes a quorum for any meeting, and a concurrence of a majority of the entire membership of the board is sufficient for transacting any business of the district. Tex. Water Code § 36.053. The board may adopt bylaws to govern the affairs of the district to perform its purposes. Tex. Water Code § 36.057(f). See the discussion below.

d. Removal and Vacancies

Directors are officers who are subject to removal in accordance with article V, section 24, of the Texas Constitution and chapter 87 of the Local Government Code. *See generally* Tex. Loc. Gov't Code §§ 87.001–.041; Tex. Const. art. V, § 24. An officer may be removed for incompetency, official misconduct, or intoxication. Tex. Loc. Gov't Code § 87.013(a). "Incompetency" is defined as gross ignorance of official duties, gross carelessness in the discharge of those duties, or unfitness or inability to promptly and properly discharge official duties because of a serious physical or mental defect that did not exist at the time of the officer's election. Tex. Loc. Gov't Code § 87.011(2). "Official misconduct" means intentional, unlawful behavior relating to official duties by an officer entrusted with the administration of justice or the execution of the law. The term includes an intentional or corrupt failure, refusal, or neglect of an officer to perform a duty imposed on the officer by law. Tex. Loc. Gov't Code § 87.011(3).

Directors of a GCD are subject to the provisions of chapter 171 of the Local Government Code relating to the regulation of conflicts of officers of local governments. Tex. Water Code § 36.058; *see, e.g.*, Tex. Att'y Gen. Op. No. GA-0796 (2010), *available at* www.oag.state.tx.us/opinions/opinions/50abbott/op/2010/htm/ga-0796.htm (discussing whether conflict of interest provisions in Local Government Code chapter 171 required two GCD directors to disclose their interests and abstain from voting on a district rule). They and the general manager are also subject to Local Government Code chapter 176, which requires the disclosure of certain business and other relationships between the officers of a local governmental entity, including a conservation district, and those who do, or seek to do, business with the local governmental entity. Each member of a district's board of directors and the general manager has disclosure obligations under chapter 176. Additionally, any person or entity (excluding another governmental entity) that contracts or seeks to contract for the *sale or purchase* of property, goods, or services with a district will qualify as a "vendor" that must comply with the applicable disclosure requirements of chapter 176. *See generally* Tex. Loc. Gov't Code §§ 176.001–.012.

A director is disqualified and vacates the office of director if the director is appointed or elected as a member of the governing body of another political subdivision, unless the GCD has a population of fewer than 50,000. Tex. Water Code § 36.051(b); *see also* Tex. Water Code § 36.051(d) (providing additional dual officeholding exceptions for GCDs with a population of fewer than 50,000).

Unless provided otherwise in its enabling legislation, the board of directors fills vacancies in the office of director by appointment. If the vacant office is not scheduled for election for longer than two years at the time of the appointment, the board must order an election for the unexpired term to be held as part of the next regularly scheduled director's election. The appointed director's term shall end on qualification of the director elected at that election. Tex. Water Code § 36.051(c).

2. Officers

After a district has been created and the directors have been qualified, the board must meet; elect a president, vice president, secretary, and any other officers or assistant officers the board may deem necessary; and begin to discharge its duties. Tex. Water Code § 36.054(a). After each director's election, the board must elect officers. Tex. Water Code § 36.054(b). The board may appoint another director, the general manager, or any employee as assistant or deputy secretary to assist the secretary, and that person is entitled to certify as to the authenticity of any record of the district, including all proceedings relating to bonds, contracts, or indebtedness of the district. Tex. Water Code § 36.054(d). Within thirty days after any election or appointment of a director, a district must notify the executive director of the TCEQ of the name and mailing address of the director chosen and the date that director's term of office expires. *See* Tex. Water Code § 36.054(e); *see also* Texas Commission on Environmental Quality, District Registration Form (TCEQ-00179 2013), *available at* www.tceq.texas.gov/assets/public/permitting/forms/0179.pdf.

3. General Manager

Except in a district that is composed of the territory of more than one county, a director may be employed as general manager of the district. Tex. Water Code § 36.056(c). The compensation of a general manager who also serves as a director must be established by the other directors. Tex. Water Code § 36.056(c). The board may employ or contract with a person to be the general manager, and the board of directors may also delegate to the general manager full authority to manage and operate the affairs of the district subject only to the orders of the board. Tex. Water Code § 36.056(a). The board may, by resolution, authorize its general manager or another employee to execute documents on behalf of the district. Tex. Water Code § 36.057(f).

4. Meetings, Records, and Bylaws

As with other aspects of GCD administration, Texas Water Code chapter 36 addresses meetings, records, and bylaws. With regard to meetings and records, however, the broader requirements of the

Texas Open Meetings Act and the Public Information Act expand on the sparse chapter 36 requirements.

a. Meetings and Records

The board must designate one or more places inside or outside the district for conducting the meetings of the board. Tex. Water Code § 36.062(b). Notice of the meetings must be given pursuant to, and meetings are subject to, the Texas Open Meetings Act, Texas Government Code chapter 551. *See* Tex. Water Code § 36.063; Tex. Gov't Code §§ 551.001–.146. The meetings must be held at least quarterly. *See* Tex. Water Code § 36.064. The board must designate and the district must maintain one or more regular offices for conducting the business of the district and maintaining the records of the district. *See* Tex. Water Code § 36.062(a). The board must keep a complete account of all its meetings and proceedings and shall preserve its minutes, contracts, records, notices, accounts, receipts, and other records in a safe place. Tex. Water Code § 36.065(a). The records are subject to the Texas Public Information Act, Texas Government Code chapter 552. *See* Tex. Gov't Code §§ 552.001–.353. Additionally, GCDs are subject to the requirements of the Local Government Records Act and must develop policies and procedures for the administration of an active and continuing records management program. *See* Tex. Loc. Gov't Code §§ 201.001–.009.

b. Bylaws

The board may adopt bylaws to govern the affairs of the district to perform its purposes. Tex. Water Code § 36.057(f). Bylaws differ from rules because they address the internal procedure of the board, not the GCD's interaction with the public, which is the general subject of rules. For a more in-depth discussion of GCD rules and rulemaking powers, see section II.E.1 below. Some of the procedures or issues commonly addressed in a GCD's bylaws include the office hours of the district, board member terms, the code of ethics or code of conduct for the directors and employees of the district, indemnification of directors and employees, and the financial procedures of the GCD.

C. Finances

As with any governmental entity, the finances of the district are strictly regulated. Texas Water Code chapter 36 includes three subchapters dedicated to this topic. Subchapter E addresses district finances in general. Subchapter F covers bonds and notes. Subchapter G establishes requirements related to district revenues and taxing authority.

1. Financial Procedure

Chapter 36 provides specific requirements for district expenditures, establishing a fiscal year, annual audit and budgets, investments, and certain funding.

a. Expenditures

A GCD may disburse money only by check, draft, order, or other instrument. Tex. Water Code § 36.151(a). Any disbursement must be signed by at least two directors; however, the board of directors by resolution may allow a certain employee, or a combination of employees and directors, to sign disbursements on behalf of the board. Tex. Water Code § 36.151(b).

b. Fiscal Year

The GCD must be operated on the basis of a fiscal year established by the board of directors. Tex. Water Code § 36.152(a).

c. Annual Audit

The GCD must have an annual audit made of the financial condition of the district. Tex. Water Code § 36.153(a). The only exception to this requirement is if the district had not more than $500 in receipts from any source during the calendar year; not more than $500 in disbursements of funds during the calendar year; no bonds or other liabilities with terms of more than one year outstanding during the calendar year; and no cash or investments amounting to more than $5,000 at any time during the calendar year. Tex. Water Code § 36.153(c). The annual audit and other district records must be open to inspection during regular business hours at the principal office of the district. Tex. Water Code § 36.153(b).

d. Annual Budget

The board of directors of a GCD shall prepare and approve an annual budget. Tex. Water Code § 36.154(a). The annual budget contains a complete financial statement for the GCD and includes (1) a statement of the outstanding obligations of the district, (2) the amount of cash on hand to the credit of each fund of the district, (3) the amount of money received by the district from all sources during the previous year, (4) the amount of money available to the district from all sources during the ensuing year, (5) the amount of the balances expected at the end of the year in which the budget is being prepared, (6) the estimated amount of revenues and balances available to cover the proposed budget, and (7) the estimated tax rate or fee revenues that will be required. Tex. Water Code § 36.154(b).

e. Voter Approval of Indebtedness

Article XVI, section 59(c), of the Texas Constitution, under which a GCD is created, reads in part as follows: "The Legislature shall not authorize the issuance of any bonds or provide for any indebtedness against any reclamation district unless such proposition shall first be submitted to the qualified property tax-paying voters of such district and the proposition adopted." Tex. Const. art. XVI, § 59(c). Therefore, if a GCD issues an obligation to pay for "indebtedness," the proposition must be approved by the voters in the district. The test for what is or is not a "debt" or "indebtedness" under Texas law is a factual determination by the court. *See, e.g., Cameron County Water Improvement District No. 8 v. Western Metal Manufacturing Co. of Texas*, 125 S.W.2d 650, 653 (Tex. Civ. App.—El Paso 1939, writ dism'd judgm't cor.) (finding no "indebtedness" due to intent for the obligation to be paid out of current revenues for the year and burden on revenues for future years); *Hidalgo County Water Improvement District No. 2 v. Feick*, 111 S.W.2d 742, 746 (Tex. Civ. App.—Beaumont 1937, writ dism'd) (using multiple factual determinations to decide whether a contract created a "debt" within the meaning of article XVI, section 59, of the Texas Constitution); *Toole v. First National Bank*, 168 S.W. 423, 428 (Tex. Civ. App.—Galveston 1914, writ ref'd) (holding that a "debt" was created if insufficient funds were available in current revenues to cover the contract).

f. Account Management

The board of directors of a GCD must name one or more banks to serve as a depository for the district's funds. Tex. Water Code § 36.155(a). The district's funds, other than those transmitted to a bank for payment of bonds issued by the district, must be deposited as received with the depository bank and remain on deposit. This does not limit the power of the board of directors to place a portion of the GCD's funds on time deposit or to purchase certificates of deposit. Tex. Water Code § 36.155(b). "To the extent that funds in the depository are not insured by the Federal Deposit Insurance Corporation, they shall be secured in the manner provided by law for the security of funds by the Public Funds Collateral Act, chapter 2257, Government Code." Tex. Water Code § 36.155(c).

Funds of the GCD must be invested in accordance with the provisions of the Public Funds Investment Act, Texas Government Code chapter 2256. Tex. Water Code § 36.156(a). The board of directors, by resolution, may provide that an authorized representative of the district may invest and reinvest the district's funds and provide for money to be withdrawn from the appropriate accounts of the district for investments on such terms as the board considers advisable. Tex. Water Code § 36.156(b).

2. Revenues

GCDs are financed primarily through the imposition of maintenance taxes, often referred to as ad valorem taxes, or through production and administration fees. Texas Water Code chapter 36, subchapter G, grants a GCD the power to levy taxes and set fees. However, this power is not absolute. Often the legislation that created the GCD will limit the tax rate or fees, and the Texas Water Code also contains restrictions and conditions that apply to all districts unless overridden by special legislation.

a. Taxes

The board of directors of a GCD may annually levy taxes to pay the bonds issued by the district that are payable in whole or in part by taxes. Tex. Water Code § 36.201(a). The board may annually levy taxes to pay the maintenance and operating expenses of the district at a rate not to exceed 50 cents on each $100 of assessed valuation. Tex. Water Code § 36.201(b). However, a GCD may not levy a tax to pay for its maintenance and operating expenses until the tax is approved by a majority of the electors voting at an election in the district held for that purpose. Tex. Water Code § 36.201(c).

The board of directors must take into account the income of the district from other sources when setting the tax rate. Tex. Water Code § 36.203. The Texas Tax Code governs the appraisal, assessment, and collection of district taxes. Tex. Water Code § 36.204(a).

b. Fees

A GCD has the power to set fees for administrative acts of the district, such as filing applications, although fees cannot unreasonably exceed the costs to the district of performing the administrative function for which the fee is charged. Tex. Water Code § 36.205(a). A district shall set and collect fees for all services provided outside the boundaries of the district; however, the fees may not unreasonably exceed the cost to the district of providing the services outside the district. Tex. Water Code § 36.205(b).

A district may assess production fees based on the amount of water authorized by permit to be withdrawn from a well or the amount actually withdrawn. A district may assess the fees in lieu of, or in conjunction with, any taxes otherwise levied by the district. A district may use revenues generated by the fees for any lawful purpose. Production fees shall not exceed $1 per acre-foot payable annually for water used for agricultural use or $10 per acre-foot payable annually for water used for any other purpose. Tex. Water Code § 36.205(c). The rate of fees set for agricultural uses shall be no more than 20 percent of the rate applied to municipal uses. Tex. Water Code § 36.206(b). District fees may not be used to purchase groundwater rights unless the purchased rights are acquired for conservation purposes and are permanently held in trust, not to be produced. Tex. Water Code § 36.205(c). A GCD may assess a transportation fee under section 36.122 of the Water Code for transfers of groundwater out of the district. *See* Tex. Water Code § 36.205(g).

c. Grants

Although most districts are funded primarily by taxes and fees, some districts also accept outside funding for their operations in the form of grants or loans. A GCD may make or accept any grant, gratuity, advance, or loan that the board of directors deems appropriate and has approved. *See* Tex. Water Code § 36.158.

d. Funds

The Texas Water Development Board (TWDB) may allocate funds from the water assistance fund to a GCD to conduct initial data collection, develop and implement a groundwater management plan, and participate in regional water plans. Tex. Water Code § 36.159. The TWDB may provide funds to a GCD if the TWDB determines that such funding will allow the district to comply or continue to comply with the provisions of chapter 36 of the Water Code. *See* Tex. Water Code § 36.161(a). In addition, the TWDB, the TCEQ, the Parks and Wildlife Department, the Texas Agricultural Extension Service, and institutions of higher education may allocate funds to carry out the objectives of chapters 35 and 36 of the Water Code. Tex. Water Code § 36.160. See also Chapter 37 of this book, discussing financing water projects.

The TWDB uses the groundwater district loan assistance fund to provide loans to pay for the creation and initial operations of newly confirmed districts and legislatively created districts that do not require a confirmation election. Tex. Water Code § 36.372(a); *see also* Tex. Water Code ch. 36, subch. L. The TWDB establishes the rules for the use and administration of the groundwater district loan assistance fund. Tex. Water Code § 36.372(b); *see also* 31 Tex. Admin. Code ch. 363, subch. H (using TWDB rules to implement Water Code chapter 36, subchapter L).

3. *Bonds and Notes*

A GCD may issue and sell bonds and notes in the name of the district for any lawful purpose of the district; however, a district may not issue bonds unless the TCEQ determines that the project to be financed by the bonds is feasible and issues an order approving the issuance of the bonds. Tex. Water Code § 36.171(a); *see also* Tex. Water Code ch. 36, subch. F. The TCEQ shall consider the written feasibility application submitted by the district, the engineer's report that must be submitted with the district's application, and any other evidence allowed by TCEQ rules to determine feasibility. *See* Tex. Water Code § 36.171(b)–(f); *see also* 30 Tex. Admin. Code ch. 293, subch. E (stating TCEQ rules on the issuance of bonds by districts).

A GCD may provide for the payment of principal and interest on the bonds and notes in several ways. The bonds may be paid by the levy and collection of ad valorem taxes or by fees. Tex. Water Code § 36.172(1), (2). Payment can also be made by pledging all or any part of the designated revenues from the ownership or operation of the district's works, improvements, and facilities and from the sale, transportation, and distribution of water. Tex. Water Code § 36.172(3).

Bonds or notes secured in whole or in part by taxes may not be issued by the district until authorized by a majority vote of the qualified voters of the district at an election held for that purpose. Tex. Water Code § 36.180(a).

Bonds and notes issued by a district must be submitted to the attorney general for examination. Tex. Water Code § 36.181(a). The attorney general shall approve them if the attorney general finds that the bonds or notes have been authorized in accordance with the law. Tex. Water Code § 36.181(b).

D. Groundwater Management Powers and Duties

The numerous powers and duties of a GCD are prescribed in detail by the statutory provisions in chapter 36, subchapter D, of the Texas Water Code. *See generally* Tex. Water Code §§ 36.101–.124. However, the power of a GCD is limited by the terms of the applicable statutes authorizing its creation, and it can exercise no authority that the Texas legislature has not clearly granted. *See South Plains Lamesa Railroad, Ltd. v. High Plains Underground Water Conservation District No. 1*, 52 S.W.3d 770, 779–80 (Tex. App.—Amarillo 2001, no pet.). As previously noted, the true scope of a GCD's power and structure can be determined only by examining both the general laws, found primarily in chapter 36 of the Water Code, and the special laws or orders that created the GCD. The powers listed below could be modified or eliminated depending on special legislation or order authorizing the GCD.

Chapter 36 of the Water Code invests GCDs with unique powers designed to perform their duty to conserve, preserve, and protect groundwater; to recharge groundwater resources and prevent waste; and to control subsidence. *See* Tex. Water Code § 36.0015. These powers fall generally into three categories: planning; data collection and dissemination; and well regulation, including limiting production. Districts have additional powers to enable them to accomplish these goals. These additional powers will be discussed in the final part of this section.

1. Planning

A GCD is required to adopt and update periodically a plan describing how it will meet its statutory duties, particularly as those duties relate to management of the groundwater resources under district jurisdiction. On a regional basis, a groundwater district must also participate in joint planning activities with other districts in its designated groundwater management area. These duties are discussed below.

a. Management Plan

A management plan outlines the goals of a GCD and the steps needed to reach those goals. *See* Tex. Water Code § 36.1071(a), (e). See also Chapter 21 of this book. A district's management plan must be developed in coordination with the TCEQ and the TWDB, which provide technical assistance to the GCD. *See* Tex. Water Code § 36.1071(c), (d); *see also* 31 Tex. Admin. Code §§ 356.50–.57 (TWDB, groundwater management plan approval). The goals of a management plan are to (1) provide for the most efficient use of groundwater; (2) control and prevent waste of groundwater; (3) control and prevent subsidence; (4) address conjunctive surface water issues; (5) address natural resources issues; (6) address drought conditions; (7) address conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control; and (8) address the desired future conditions adopted by the GCD under section 36.108 of the Water Code. Tex. Water Code § 36.1071(a). In the groundwater management plan, the GCD must include estimates of the modeled available groundwater in the district based on the desired future conditions, the amount of usable groundwater available, the amount being used, the amount of recharge, and the projected water supply and demand. *See* Tex. Water Code § 36.1071(e)(3). In developing its management plan, the district must use the groundwater availability modeling information provided by the TWDB together with any available site-specific information that was provided by the district and reviewed by the TWDB. Tex. Water Code § 36.1071(h). The GCD must adopt rules necessary to implement the management plan. Tex. Water Code § 36.1071(f). The district must adopt amendments to the management plan as necessary, after notice and a hearing. Tex. Water Code § 36.1071(g). The statute does not specify the nature of the notice and hearing; it is assumed Open Meetings Act procedures are adequate.

A GCD must file its management plan with the executive administrator of the TWDB for review and approval within three years of forming the district or, if the district required confirmation, not later than three years after the election confirming the district's creation. *See* Tex. Water Code § 36.1072(a-1). The executive administrator must approve a management plan if it is administratively complete. Tex. Water Code § 36.1072(b). A management plan takes effect on approval by the executive administrator of the TWDB, which must be done within sixty days or, if appealed, on approval by the TWDB. *See* Tex. Water Code § 36.1072(b), (d).

If the executive administrator does not approve the management plan, the executive administrator must provide to the district, in writing, the reasons for the action. Tex. Water Code § 36.1072(f). Within 180 days after the GCD receives notice that its groundwater management plan was not approved, the district must submit a revised plan for review and approval. The executive administrator's decision may be appealed to the TWDB. If the TWDB decides not to approve the groundwater management plan on appeal, the district may request that the conflict be mediated. If mediation does not resolve the conflict, the district can appeal the decision of the TWDB to a district court in Travis County. Tex. Water Code § 36.1072(f).

The GCD may review the management plan annually and must review and readopt the management plan with or without revisions at least once every five years. Tex. Water Code § 36.1072(e). Readopted plans must be provided to the TWDB within sixty days. Tex. Water Code § 36.1072(e). Any amendments to the management plan must be submitted to the executive administrator of the TWDB within sixty days of their adoption by the GCD board. Tex. Water Code § 36.1073.

District implementation of the management plan is subject to review by the State Auditor's Office, which determines whether the district is "operational," defined as being actively engaged in achieving the objectives of the district's management plan based on an analysis of the district's activities. *See* Tex. Water Code § 36.302(c). If a GCD fails to submit a management plan or an amendment to a management plan, or if the district is found to be not operational by the State Auditor's Office, section 36.303 of the Water Code gives the TCEQ the power to issue an order to (1) require the GCD to take certain actions or to refrain from taking certain actions; (2) dissolve the board and call an election for the purpose of electing a new board; (3) request the attorney general to bring suit for the appointment of a receiver to collect the assets and carry on the business of the GCD; or (4) dissolve the district. *See* Tex. Water Code §§ 36.301, 36.303(a); *see also* 30 Tex. Admin. Code §§ 293.22–.23 (TCEQ's implementing regulations). See also the discussion in section II.G below regarding the dissolution of a GCD.

All GCDs located within the same management area must file their management plans with the other districts in the management area and with the regional water planning groups for consideration in the regional water planning process. *See* Tex. Water Code § 36.108(b). A person with a legally defined interest in groundwater in the district or the regional water planning group may file a petition with the TWDB stating that a conflict requiring resolution may exist between the district's approved groundwater management plan and the state water plan. Tex. Water Code § 36.1072(g). If the conflict cannot be resolved with the technical assistance of the TWDB within forty-five days, the district and the person or regional water planning group may mediate the conflict. If mediation fails, the TWDB must resolve the conflict within sixty days. If the TWDB determines that the district's groundwater management plan must be revised, the district must give notice of and hold a hearing and shall revise its plan based on the information provided by the TWDB. The district must then resubmit the revised groundwater management plan to the TWDB for approval. The district may appeal the decision of the TWDB to a district court in Travis County. Tex. Water Code § 36.1072(g). See also Chapter 20 of this book discussing regional and state water planning.

b. Joint Planning

GCDs are required to do joint planning within groundwater management areas. A groundwater management area is "an area designated and delineated by the Texas Water Development Board under Chapter 35 as an area suitable for management of groundwater resources." Tex. Water Code § 36.001(13). See also Chapter 21 of this book for further discussion of groundwater management areas. The primary goal of joint planning is to define the desired future conditions of the groundwater resources within the groundwater management area. *See* Robert E. Mace et al., *A Streetcar Named Desired Future Conditions: The New Groundwater Availability for Texas (Revised)* 3, *in The Changing Face of Water Rights in Texas* (State Bar of Texas 2008).

Not later than September 1, 2010, and every five years thereafter, GCDs within the same groundwater management area are required to "consider groundwater availability models and other data or information for the management area and shall propose for adoption desired future conditions for the relevant aquifers within the management area." Tex. Water Code § 36.108(d). Before voting on the desired future conditions, the GCDs must consider (1) aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another; (2) the water supply needs and water management strategies included in the state water plan; (3) hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge; (4) other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water; (5) the impact on subsidence; (6) socioeconomic impacts reasonably expected to occur; (7) the impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees and assigns in groundwater as recognized under section 36.002 of the Texas Water Code; (8) the feasibility of achieving the desired future condition; and (9) any other information relevant to the specific desired future conditions. Tex. Water Code § 36.108(d). The districts then submit these desired future conditions to the executive administrator of the TWDB. Tex. Water Code § 36.108(o). Chapter 21 of this book describes the history of groundwater management planning and the current status of the law controlling groundwater management area joint planning.

Chapter 36 of the Texas Water Code offers two processes that allow a challenge to issues associated with desired future conditions. A petition can be filed with the TCEQ requesting an inquiry into a specific GCD's actions associated with desired future conditions. There is also a separate and independent petition procedure available whereby an appeal can be made to the TWDB to challenge the desired future conditions themselves. These processes are described in further detail in Chapter 21 of this book.

2. *Data Collection and Dissemination*

A GCD has the power to make surveys of groundwater reservoirs or subdivisions and facilities to determine the quantity of water available for production and use and to determine the improvements, development, and recharging needed by a reservoir or its subdivision. Tex. Water Code § 36.106. A GCD may carry out research projects and collect information regarding the use of groundwater, water conservation, the practicability of recharging a groundwater reservoir, or any other research projects deemed necessary by the board of directors. *See* Tex. Water Code §§ 36.107, 36.109. On request of a district, the executive director of the TCEQ and the executive administrator of the TWDB must provide information they acquire concerning the groundwater resources within the district's jurisdiction. Tex. Water Code § 36.120.

A GCD must provide requested information to the TCEQ and the TWDB concerning the groundwater resources within its jurisdiction and its plans and activities in conserving and protecting groundwater resources. Tex. Water Code § 36.120.

3. *Well Regulation, Including Production Limits*

One of the most contentious powers granted to a GCD is also, to some extent, a required duty of the district: well regulation, including production limits. Well regulation covers permitting, spacing, and construction, among other powers.

a. Well Permitting

A GCD must require a permit for the drilling, equipping, operating, or completing of wells or for substantially altering the size of wells or well pumps. A GCD may require that a change in the withdrawal or use of groundwater during the term of a permit issued by the district may not be made unless the district has first approved a permit amendment authorizing the change. Tex. Water Code § 36.113(a). However, a district's permitting authority is limited until its groundwater management plan is approved by the TWDB.

> Prior to the development of the management plan and its approval under Section 36.1072, the district may not adopt rules other than rules pertaining to the registration and interim permitting of new and existing wells. . . . [T]he district may accept applications for permits under Section 36.113, provided the district does not act on any such application until the district's management plan is approved as provided in Section 36.1072.

Tex. Water Code § 36.1071(f).

An application for a permit or a permit amendment must be sworn to and be in writing. Tex. Water Code § 36.113(b). A GCD may require that the application include the name and address of the applicant and the owner of the land on which the well will be located, documentation establishing authority to construct and operate a well if the applicant is not the owner of the property, a statement of the nature and purpose of the proposed use and the amount of water to be used for each purpose, a water conservation plan, a drought contingency plan, a water well closure plan, the location of each well, and the estimated rate at which water will be withdrawn. *See* Tex. Water Code § 36.113(c)(1)–(7).

The district, by rule, must determine which activities regulated by the district require a permit or permit amendment. Tex. Water Code § 36.114(a). Under chapter 36, no one may drill, alter, or operate a well without first obtaining a permit from the GCD. *See* Tex. Water Code § 36.115. A GCD must exempt wells that are to be used solely for domestic needs, or for providing water for livestock or poultry, if the well is located or to be located on a tract of land larger than ten acres and drilled, completed, or equipped so that it is incapable of producing more than 25,000 gallons of groundwater a day. *See* Tex. Water Code § 36.117(b)(1). Other mandatory exemptions are related to oil and gas or mining operations, as discussed below. A GCD may exempt other wells from obtaining an operating permit. The district, by rule, must determine whether a hearing is required for those activities that do require a permit or permit amendment. *See* Tex. Water Code § 36.114(b).

For all applications for which a hearing is not required, the board shall act on the application at a meeting unless the board by rule has delegated to the general manager the authority to act on the application. Tex. Water Code § 36.114(c). The GCD must promptly consider and act on each administratively complete application. Tex. Water Code § 36.114(d). If, within sixty days after the date an administratively complete application is submitted, the application has not been acted on or set for a hearing on a specific date, the applicant may petition the district court of the county where the land is located for a writ of mandamus to compel the district to act on the application or set a date for a hearing on the application, as appropriate. Tex. Water Code § 36.114(e). For applications requiring a hearing, the initial hearing shall be held within thirty-five days after the setting of the date, and the district shall act on the application within sixty days after the date the final hearing on the application is concluded. Tex. Water Code § 36.114(f). The district may by rule set a time when an application will expire if the information requested in the application is not provided to the district. Tex. Water Code § 36.114(g). An administratively complete application requires information listed in sections 36.113 and 36.1131. Tex. Water Code § 36.114(h).

The hearing process on a permit or a permit amendment is detailed. Chapter 36, subchapter M, of the Water Code deals specifically with the processes and procedures associated with hearings on permits and permit amendments. *See generally* Tex. Water Code §§ 36.401–.419. Although generally subchapter M applies to contested permit applications, some provisions appear to apply to uncontested applications as well. Under subchapter M, the GCD must provide notice at least ten days before the date of the hearing. *See* Tex. Water Code § 36.404(c). The GCD may require each person who participates in a permit hearing to submit a hearing registration form. Tex. Water Code § 36.405. The hearing must be conducted by (1) a quorum of the GCD board, (2) an individual to whom the board has delegated in writing the responsibility to preside as a hearings examiner over the hearing or matters related to the hearing, or (3) the State Office of Administrative Hearings. Tex. Water Code § 36.406(a). Unless the hearing is conducted by the State Office of Administrative Hearings, a presiding officer directs the permit hearing; the presiding officer can be the board president, a delegated hearings examiner, or a selected director. *See* Tex. Water Code § 36.406(b), (c). The presiding officer of the permit hearing convenes the hearing, designates the parties, establishes the order for presentation of evidence, administers oaths, examines persons presenting testimony, ensures the presentation of evidence without prejudice, prescribes reasonable time limits for testimony, and exercises procedural rules under section 36.415. *See* Tex. Water Code § 36.406(d). The presiding officer can also allow testimony to be submitted in writing, allow supplemental testimony, and refer the parties to an alternative dispute resolution procedure on any matter in the hearing. *See* Tex. Water Code § 36.406(f)–(h). The presiding officer must submit a report of the hearing to the board within thirty days of the completion of the permit hearing. Tex. Water Code § 36.410(a). The board must act on the permit or permit amendment application within sixty days of the date when the final hearing on the application is concluded. *See* Tex. Water Code §§ 36.411, 36.114(f).

In making a decision on a permit or permit amendment, the district must consider whether (1) the application conforms to the requirements prescribed by chapter 36 of the Texas Water Code and is accompanied by the prescribed fees, (2) the proposed use of water unreasonably affects existing groundwater and surface water resources or existing permit holders, (3) the proposed use of water is dedicated to any beneficial use, (4) the proposed use of water is consistent with the district's approved management plan, (5) the applicant has agreed to avoid waste and achieve water conservation, and (6) the applicant has agreed that reasonable diligence will be used to protect groundwater quality and has agreed to follow well-plugging guidelines at the time of well closure. Tex. Water Code § 36.113(d)(1)–(4), (6), (7). The district may impose more restrictive permit conditions on new permit applications and permit amendment applications to increase use by historic users if the limitations (1) apply to all subsequent new permit applications and permit amendment applications to increase use by historic users, regardless of the type or location of use; (2) bear a reasonable relationship to the existing district groundwater management plan; and (3) are reasonably necessary to protect existing use. Tex. Water Code § 36.113(e). The Texas Supreme Court has reviewed a challenge to the transfer permit rules of one GCD, regarding whether a GCD under the Water Code may allow the conversion of a historic use to a new use without complying with the limitations applicable to all other new uses; the court held that it may not. *See Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910 (Tex. 2008).

Permits and permit amendments may be issued subject to the rules promulgated by the district and subject to terms and provisions with reference to the drilling, equipping, completion, alteration, or operation of, or production of groundwater from, wells or pumps that may be necessary to prevent waste and achieve water conservation; minimize as far as practicable the drawdown of the water table or the reduction of artesian pressure; lessen interference between wells; or control and prevent subsidence. Tex. Water Code § 36.113(f). In issuing a permit for an existing or historic use, a district may not discriminate between land that is irrigated for production and land or wells on land that was irrigated for production and enrolled or participating in a federal conservation program. Tex. Water Code § 36.113(g). "A district, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition under Section 36.108" of the Water Code. Tex. Water Code § 36.1132(a). In issuing permits, a GCD shall manage total groundwater production on a long-term basis to achieve an applicable desired future condition and consider (1) the modeled available groundwater determined by the executive administrator of the TWDB, (2) the executive administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by GCD rules and section 36.117 of the Texas Water Code, (3) the amount of groundwater authorized under permits previously issued by the GCD, (4) a reasonable estimate of the amount of groundwater that is actually produced under permits issued by the GCD, and (5) yearly precipitation and production patterns. Tex. Water Code § 36.1132(b).

Subchapter M provides for a suit in a district court regarding a GCD's permit decision once the decision on the permit or permit amendment is final. *See* Tex. Water Code § 36.413(b). An applicant or party must exhaust its administrative remedies under subchapter M before filing suit in a district court under subchapter H. *See* Tex. Water Code § 36.413(b), (c) (allowing a suit against the district under section 36.251 regarding a permit decision but requiring the decision to be final and a request for a rehearing to be timely filed); *see also* Tex. Water Code § 36.251 (stating that a subchapter H suit "may only be filed after all administrative appeals to the district are final"). See section II.F below for a more detailed discussion on suits filed under subchapter H.

b. Water Wells Associated with Oil, Gas, and Mineral Operations

Chapter 36 of the Texas Water Code applies to water wells, including water wells used to supply water for activities related to the exploration or production of hydrocarbons or minerals; however, chapter 36 does not apply to "production or injection wells drilled for oil, gas, sulphur, uranium, or brine, or for core tests, or for injection of gas, saltwater, or other fluids, under permit issued by the Railroad Commission of Texas." Tex. Water Code § 36.117(*l*). A district may not deny an application for a permit to drill and produce water for hydrocarbon production activities if the application meets all applicable rules as promulgated by the district. Tex. Water Code § 36.117(g).

A GCD may not require any permit issued by the district for—

> drilling a water well used solely to supply water for a rig that is actively engaged in drilling or exploration operations for an oil or gas well permitted by the Railroad Commission of Texas provided that the person holding the permit is responsible for drilling and operating the water well and the water well is located on the same lease or field associated with the drilling rig.

Tex. Water Code § 36.117(b)(2). However, a GCD may require a well of this type to be permitted and to comply with all district rules if "the groundwater withdrawals that were exempted under Subsection (b)(2) are no longer used solely to supply water for a rig that is actively engaged in drilling or exploration for an oil or gas well permitted by the Railroad Commission of Texas." Tex. Water Code § 36.117(d)(2). The well must be registered with the district and equipped and maintained in compliance with the district's rules requiring the installation of casing, pipe, and fittings to prevent the escape of groundwater and to prevent pollution. *See* Tex. Water Code § 36.117(h). The driller of a well of this type must also file with the GCD the well log required by Texas Occupations Code section 1901.251, and, if available, the geophysical log. Tex. Water Code § 36.117(i). For the Railroad Commission's interpretation of these chapter 36 provisions, see Railroad Commission of Texas, *Water Use in Association with Oil and Gas Activities*, available online at www.rrc.state.tx.us/about-us/resource-center/faqs/oil-gas-faqs/faq-water-use-in-association-with-oil-and-gas-activities/.

A district may not require any permit issued by the district for "drilling a water well authorized under a permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code, or for production from the well to the extent the withdrawals are required for mining activities regardless of any subsequent use of the water." Tex. Water Code § 36.117(b)(3). However, a GCD may require a well of this type to be permitted and to comply with all district rules if "the groundwater withdrawals that were exempted under Subsection (b)(3) are no longer necessary for mining activities specified in the permit issued by the Railroad Commission of Texas under Chapter 134, Natural Resources Code." Tex. Water Code § 36.117(d)(3). The GCD may require compliance with the GCD's well spacing rules for drilling of any well except a well exempted under subsection (b)(3). Tex. Water Code § 36.117(f). Someone who holds a permit issued by the Railroad Commission under chapter 134 of the Natural Resources Code that authorizes the drilling of water must still report monthly to the GCD (1) the total amount of water withdrawn during the month, (2) the quantity of water necessary for mining activities, and (3) the quantity of water withdrawn for other purposes. Tex. Water Code § 36.117(e)(1)–(3). The well must be registered with the district and equipped and maintained in compliance with the district's rules requiring the installation of casing, pipe, and fittings to prevent the escape of groundwater and to prevent pollution. *See* Tex. Water Code § 36.117(h). The driller of a well of this type must also file with the GCD the well log required by Texas Occupations Code section 1901.251, and, if available, the geophysical log. Tex. Water Code § 36.117(i).

Regarding uranium mining, a cased exploration well used for exploration or used for rig supply purposes is subject to a GCD's rules regarding registration of wells if the well is located in the GCD and the well is used for monitoring purposes, and the cumulative amount of water produced from the wells located inside the area subject to and completed under an exploration permit issued under Texas Natural Resources Code chapter 131 exceeds forty acre-feet in one permit year. *See* Tex. Nat. Res. Code § 131.354(b); 16 Tex. Admin. Code § 11.140(d). A cased exploration well used for exploration or used for rig supply purposes is subject to a GCD's rules regarding registration, production, and reporting if the well is located in the GCD and the well is used for rig supply purposes, and the cumulative amount of water produced from the wells located inside the area subject to and completed under the exploration permit exceeds forty acre-feet in one year. Tex. Nat. Res. Code § 131.354(c). A GCD must use the number of acres described in the exploration permit in determining any district production requirements. Tex. Nat. Res. Code § 131.354(e). Each month, the holder of the exploration permit must report to the district the total amount of water produced from each cased exploration well within the area subject to the exploration permit that is being used for exploration or for rig supply purposes. *See* Tex. Nat. Res. Code § 131.354(d).

The permittee shall file a groundwater production report no later than the last day of each month, and it shall contain information for the previous month regarding the water produced, reported in gallons and acre-feet. 16 Tex. Admin. Code § 11.140(e). The monthly report shall include the monthly production data and cumulative data for the permit year. 16 Tex. Admin. Code § 11.140(e)(2). Once a well begins production, monthly reports will be required until the end of the permit year, even if production temporarily ceases during that year. 16 Tex. Admin. Code § 11.140(e)(2).

When the Railroad Commission receives an application for an exploration permit, it must provide written notice to each GCD in the area and again when it issues the permit. *See* Tex. Nat. Res. Code § 131.356(a)(1), (b)(1). After an exploration permit has been issued, the permit holder must provide the GCD in that area with pre-exploration water quality information, premining water quality information, and well logs unless they contain confidential information. *See* Tex. Nat. Res. Code § 131.357(a)(1)–(3); 16 Tex. Admin. Code §§ 11.141–.142. If a permit is issued for a cased exploration well used for exploration or used for rig supply purposes, the permit holder must provide the GCD with (1) the permit holder's name, address, and telephone number; (2) the well completion information; (3) the location of each well in the district, including a legal description and the acreage of the property where the well is located; (4) verification that each well will be used for an industrial purpose; and (5) the type and capacity of the pump used in each well. *See* Tex. Nat. Res. Code § 131.357(c).

c. Transport Out of the District

Production of groundwater inside a GCD to be used outside the GCD is referred to as "transport," "transfer," or "export" of groundwater; these terms are seemingly used interchangeably. *See* Tex. Water Code § 36.122. If an application for a permit or a permit amendment proposes the transfer of groundwater outside of a district's boundaries, the district "may also consider" the provisions in section 36.122 of the Water Code. Tex. Water Code § 36.122(a). Section 36.122 "clearly authorizes a groundwater district to promulgate rules requiring a landowner to obtain a permit or permit amendment for the transfer of groundwater out of the district." *Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 209 S.W.3d 146, 160 (Tex. App.—El Paso 2006), *rev'd on other grounds*, 263 S.W.3d 910 (Tex. 2008). Except as provided in section 36.113(e), a GCD may not impose more restrictive permit conditions on transporters than the district imposes on existing in-district users; however, the district may impose a reasonable fee or surcharge for an export fee. *See* Tex. Water Code § 36.122(c)–(e). The district may not deny a permit based on the fact that the applicant seeks to transfer groundwater outside the district but may limit a permit if the limitation is warranted because of (1) the availability of water in the district and in the proposed receiving area; (2) the projected effect on aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the district; and (3) the approved regional water plan and approved district management plan. *See* Tex. Water Code § 36.122(f), (g).

Section 36.122 of the Water Code gives GCDs the option of considering its provisions when dealing with transfers of groundwater out of the district. Because of the voluntary nature of the provision, GCDs have been known to use some subsections in section 36.122 while ignoring others. See Chapter 18 of this book for a more in-depth analysis of this issue and how it affects transfers of groundwater out of a district.

Section 36.122 of the Water Code also sets limits on permit terms and transfer fees. *See* Tex. Water Code § 36.122(h)–(*l*). A transfer permit term must be at least three years if construction of a conveyance system has not been initiated before the issuance of the permit, or at least thirty years if construction of a conveyance system has been initiated before the issuance of the permit. Tex. Water Code § 36.122(i). If transfer authorization is granted through a separate transfer permit, GCDs can adopt rules that set a transfer permit term at thirty years, as required by section 36.122(i)(2), but retain a two- or five-year term for production permits. This would essentially defeat the support for infrastructure financing, which was the original goal of facilitating thirty-year permits in section 36.122(i). This could be a pressing issue for water transfers in the future.

d. Spacing and Production Regulation

Chapter 36 of the Water Code specifically grants a GCD the power to regulate the spacing of wells and the production of groundwater. *See* Tex. Water Code § 36.116. A district by rule may regulate well spacing by (1) requiring all water wells to be spaced a certain distance from property lines or adjoining wells; (2) requiring wells with a certain production capacity, pump size, or other characteristic related to the construction or operation of and production from a well to be spaced a certain distance from property lines or adjoining wells; or (3) imposing spacing requirements adopted by the district board. Tex. Water Code § 36.116(a)(1). A GCD may regulate the production of groundwater by (1) setting production limits on wells, (2) limiting the amount of water produced based on acreage or tract size, (3) limiting the amount of water that may be produced from a defined number of acres assigned to an authorized well site, (4) limiting the maximum amount of water that may be produced on the basis of acre-feet per acre or gallons per minute per well site per acre, (5) implementing managed depletion, or (6) using any combinations of those methods. Tex. Water Code § 36.116(a)(2). In regulating production of groundwater, a GCD must select a method that is appropriate based on the hydrogeological conditions of the aquifer or aquifers in the district and may limit the amount of water produced based on contiguous surface acreage. Tex. Water Code § 36.116(e). A GCD may adopt different rules for each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within the boundaries of the district, or each geographic area overlying an aquifer or subdivision of an aquifer located in whole or in part within the boundaries of the district. Tex. Water Code § 36.116(d). The power of a GCD to regulate spacing and production is limited by the terms of the applicable statutes authorizing its creation, and a GCD can exercise no authority that the Texas legislature has not clearly granted. *See South Plains Lamesa Railroad, Ltd. v. High Plains Underground Water Conservation District No. 1*, 52 S.W.3d 770, 779–80 (Tex. App.—Amarillo 2001, no pet.).

In promulgating any rules limiting groundwater production, the district may preserve historic or existing use before the effective date of the rules to the maximum extent practicable consistent with the district's management plan. Tex. Water Code § 36.116(b). In regulating the production of groundwater based on tract or acreage, a GCD may consider the service needs or service area of a retail water utility. Tex. Water Code § 36.116(c).

e. Capping and Plugging of Wells

A GCD may require the owner or lessee of land on which an open or uncovered well is located to keep the well permanently closed or capped. Tex. Water Code § 36.118(a). If the owner or lessee refuses to cap the well, any person, firm, or corporation employed by the district may go on the land and close or cap the well. Tex. Water Code § 36.118(c). A reasonable expense incurred by the district in capping the well constitutes a lien on the land on which the well is located. Tex. Water Code § 36.118(d).

Chapter 36 of the Water Code requires that a groundwater permit holder agree to comply with closure and plugging requirements for a well. *See* Tex. Water Code §§ 36.113(c)(6), (d)(7), 36.1131(b)(7). Under the Texas Water Well Drillers Act, all abandoned or deteriorated wells must be plugged within 180 days; and within thirty days of plugging, a plugging report must be submitted to the Texas Department of Licensing and Regulation and to the GCD where the well is located. *See* Tex. Occ. Code § 1901.255(c), (d). Under section 1901.256, a GCD must enforce compliance with section 1901.255 related to wells located in the boundaries of the district. Such enforcement may include bringing an action for an injunction or to recover a civil penalty. *See* Tex. Occ. Code § 1901.256. All GCDs must enter into a memorandum of understanding with the TCEQ and the Department of

Licensing and Regulation regarding abandoned wells and enforcing compliance with plugging requirements. *See* Tex. Occ. Code § 1901.257; *see also* 16 Tex. Admin. Code § 76.111.

f. Reporting and Recordkeeping

A GCD may require that records be kept and reports be made of the drilling, equipping, and completing of water wells and of the production and use of groundwater. Tex. Water Code § 36.111(a). To implement the recording and reporting, a GCD may adopt rules that require an owner or operator of a water well that is required to be registered with or permitted by the district to report groundwater withdrawals using reasonable and appropriate reporting methods and frequency, except for domestic and livestock wells that are exempt from permitting. Tex. Water Code § 36.111(b). A GCD must require that accurate drillers' logs be kept of water wells and that copies of those drillers' logs and electric logs be filed with the district. Tex. Water Code § 36.112. The Texas Department of Licensing and Regulation requires every well driller who drills, deepens, or alters a well to record and maintain a State of Texas Well Report and provide a copy of the report to the GCD in which the well is located. *See* 16 Tex. Admin. Code § 76.70(1).

4. Additional Powers

Texas Water Code chapter 36 gives GCDs powers in addition to those described above. For example, districts have powers associated with owning and operating property, including water; the power of eminent domain; and the right to enter private property to fulfill their duties.

a. Owning and Operating Property

A GCD has the power to build, acquire, or obtain by any lawful means any property necessary for the district to carry out its purpose and the provisions of chapter 36 of the Water Code. Tex. Water Code § 36.103(a). A GCD may (1) acquire land to erect dams or to drain lakes, draws, and depressions; (2) construct dams; (3) drain lakes, depressions, draws, and creeks; (4) install pumps and other equipment necessary to recharge a groundwater reservoir or its subdivision; and (5) provide the necessary facilities for water conservation purposes. Tex. Water Code § 36.103(b)(1)–(5). This authority extends to purchasing, selling, transporting, and distributing surface water or groundwater. Tex. Water Code § 36.104.

b. Eminent Domain

A GCD can exercise the power of eminent domain to acquire by condemnation a fee simple or other interest in property located inside the district if the property interest is necessary for conservation purposes, including recharge and reuse. Tex. Water Code § 36.105(a). Eminent domain may not be used by a GCD to acquire rights to groundwater, surface water, or water rights or for the purpose of production, sale, or distribution of groundwater or surface water. Tex. Water Code § 36.105(b). The special laws creating a GCD may exclude certain powers from those afforded a district under the general laws in chapter 36, including the power of eminent domain. *See, e.g.*, Tex. Spec. Dist. Code §§ 8812.101 (prohibiting the Victoria County Groundwater Conservation District from exercising the power of eminent domain), 8835.103 (stating that the Brazos Valley Groundwater Conservation District does not have the power of eminent domain granted by Tex. Water Code § 36.105), 8820.102 (prohibiting the Northern Trinity Groundwater Conservation District from exercising the power of eminent domain).

c. Right to Enter Land

GCD directors, engineers, attorneys, agents, operators, and employees may go on any land to inspect, make surveys, or perform tests to determine the condition, value, and usability of the property, with reference to the proposed location of works, improvements, plants, facilities, equipment, or appliances. Tex. Water Code § 36.123(a).

> District employees and agents are entitled to enter any public or private property within the boundaries of the district or adjacent to any reservoir or other property owned by the district at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state or compliance with any rule, regulation, permit, or other order of the district.

Tex. Water Code § 36.123(b). District employees or agents must give notice of their presence and exhibit proper credentials. Tex. Water Code § 36.123(b).

E. Implementation and Enforcement

1. Rulemaking

A GCD may make and enforce "fair and impartial" rules to conserve, preserve, protect, and recharge groundwater or a groundwater reservoir or its subdivisions in order to control subsidence, prevent degradation of water quality, or prevent waste of groundwater and to carry out the powers and duties as provided by chapter 36 of the Texas Water Code. *See* Tex. Water Code §§ 36.101(a), 36.102. Since GCDs have the power to make rules to prevent "waste" of groundwater, the broad definition of waste, by itself, gives a GCD extensive authority under its rulemaking power.

The Water Code defines "waste" as any one of the following: (1) withdrawing groundwater at a rate and amount that could cause intrusion of unsuitable water into the aquifer; (2) producing groundwater for nonbeneficial uses; (3) escape of groundwater to a non-groundwater-containing reservoir or geologic strata; (4) pollution of groundwater resources by intrusion of saltwater or by other deleterious matter; (5) willfully or negligently causing, suffering, or allowing groundwater to escape into any watercourse or land other than that of the owner of the well unless authorized by permit, rule, or order; (6) unauthorized escape of groundwater irrigation tailwater onto land other than that of the owner of the well; (7) for water produced from an artesian well, willfully causing or knowingly permitting the water to run off the owner's land or to percolate through the stratum above which the water is found; or (8) drilling or operating a well or wells without a required permit or producing groundwater in violation of a district rule adopted under section 36.116(a)(2) of the Water Code. *See* Tex. Water Code §§ 36.001(8), 36.119(a).

The scope of a district's rulemaking authority is tied to the contents and passage of its groundwater management plan, and a GCD must adopt rules necessary to implement its plan. *See* Tex. Water Code § 36.1071(f). Until its groundwater management plan is passed, the district's rulemaking authority is limited.

> Prior to the development of the management plan and its approval under Section 36.1072, the district may not adopt rules other than rules pertaining to the registration and interim permitting of new and existing wells and rules governing spacing and procedure before the district's board; however, the district may not adopt any rules limiting the production of wells, except rules requiring that groundwater produced from a well be put to a nonwasteful, beneficial use.

Tex. Water Code § 36.1071(f).

Except for emergency rules, the board of directors can adopt rules only after giving proper notice of and holding a rulemaking hearing. *See* Tex. Water Code § 36.101(b). This includes rules governing procedure before the board. Notice must be given at least twenty days before the date of the rulemaking hearing and must include the time and date of the rulemaking hearing, its location, a brief explanation of the subject of the proposed rules, and the location of an Internet site where the proposed rules may be reviewed and copied. *See* Tex. Water Code § 36.101(d), (e). Proper notice of the rulemaking hearing includes posting notice at the district office, providing notice to the county clerk of each county in the district, publishing notice in one or more newspapers of general circulation in the county or counties in which the district is located, making available a copy of all proposed rules at a place accessible to the public during normal business hours, and posting the proposed rules on the district's Web site, if available. *See* Tex. Water Code § 36.101(d). The presiding officer conducts the rulemaking hearing, and the hearing must be recorded. *See* Tex. Water Code § 36.101(f), (h). In addition to the notice provided under section 36.101(d), a person may request that the district provide personal notice of any rulemaking hearing, which is effective for the remainder of the calendar year. Tex. Water Code § 36.101(i). A district may require each person who participates in a rulemaking hearing to submit a hearing registration form. Tex. Water Code § 36.101(g).

For a district to adopt an emergency rule, which does not require notice and a hearing, the board of directors must find that a substantial likelihood of imminent peril to the public health, safety, or welfare or a requirement of state or federal law requires adoption of the rule on less than a twenty-day notice. Tex. Water Code § 36.1011(a)(1). The board of directors must prepare a written statement of the reasons for the emergency rule. Tex. Water Code § 36.1011(a)(2). The emergency rule is not effective for longer than ninety days, unless notice and a hearing, as summarized above, take place within ninety days of its adoption, in which case it is effective for an additional ninety days. *See* Tex. Water Code § 36.1011(b), (c).

A GCD must compile its rules and make them available for use and inspection at the district's principal office. Tex. Water Code § 36.101(c).

2. GCD Enforcement

To enforce its rules, the board of directors of a GCD by rule may "set reasonable civil penalties for breach of any rule of the district not to exceed $10,000 per day per violation, and each day of a continuing violation constitutes a separate violation." Tex. Water Code § 36.102(b). Many GCDs use this provision to set up an enforcement section in their rules with detailed notice and penalty procedures. *See, e.g., Rules of the Cow Creek Groundwater Conservation District* (amended Dec. 12, 2012), *available at* www.ccgcd.org/Rules/CCGCDRULES%20eff%2012-12-2012.pdf (explaining that Rule 7 allows the district to issue notices of rule violations, implement enforcement fees, and penalize violators on a penalty schedule for noncompliance with a district rule, order, or permit); *Rules of the Hill Country Underground Water Conservation District* (June 10, 2014), *available at* www.hcuwcd.org/RulesAmendedJune10-2014.pdf (showing that Rule 11 allows the district to send notice to violators, investigate possible violations by entering land, and assess civil penalties for violations).

A GCD may also enforce the provisions in chapter 36 of the Water Code and its rules by injunction, mandatory injunction, or other appropriate remedy in a court of competent jurisdiction. Tex. Water Code § 36.102(a). However, in 2008 the Eastland court of appeals held that this section of chapter 36 authorizing GCD enforcement did not waive a political subdivision's or municipality's immunity from suit for monetary damages because the statute did not specifically authorize a suit or assessment of penalties against a political subdivision or municipality. *See City of Aspermont v. Rolling Plains Groundwater Conservation District*, 258 S.W.3d 231, 234 (Tex. App.—Eastland 2008), *aff'd*, 353 S.W.3d 756 (Tex. 2011). Although the court determined that the City of Aspermont was immune from the Rolling Plains GCD's suit for monetary damages for failure to file monthly reports and refusal to pay export fees, the court did hold that the city was not immune from a cause of action brought by the GCD asking the court to construct the applicable legislation and declare that the city is subject to and must comply with the GCD's applicable rules and regulations. *Aspermont*, 258 S.W.3d at 236. After *Aspermont*, the Texas legislature amended section 36.102 of the Water Code to specify that a district may enforce its rules "against any person," and if the person is a governmental entity that has violated the GCD's rules, the limits on the amount of fees, costs, and penalties that a district may impose "constitute a limit of liability of the governmental entity for the violation." *See* Tex. Water Code § 36.102(e).

In addition to GCD enforcement under chapter 36, chapter 26 of the Water Code allows a GCD to bring local enforcement actions with regard to water-quality-related matters. *See* Tex. Water Code §§ 26.171–.180. If a GCD prevails in any suit to enforce its rules, the district may seek and the court shall grant recovery for attorney's fees, costs for expert witnesses, and other costs incurred by the district. Tex. Water Code § 36.102(d); *see also* Tex. Water Code § 36.066(g) ("If the district prevails in any suit other than a suit in which it voluntarily intervenes, the district may seek and the court shall grant, in the same action, recovery for attorney's fees, costs for expert witnesses, and other costs incurred by the district before the court."); *Edwards Aquifer Authority v. Day*, 274 S.W.3d 742, 755 (Tex. App.—San Antonio 2008), *aff'd*, 369 S.W.3d 814 (Tex. 2012) (holding that award of attorney's fees is mandatory when a GCD prevails in the lawsuit).

3. Complaints and Citizen Suits

A landowner or other person who has a right to produce groundwater from land that is adjacent to the land on which a well or wells are drilled or operated without a required permit or permits or from which groundwater is produced in violation of a district rule adopted under section 36.116(a)(2) of the Water Code, or who owns or otherwise has a right to produce groundwater from land that lies within one-half mile of the well or wells, may sue the owner of the well or wells for damages or to restrain or enjoin the illegal drilling. *See* Tex. Water Code § 36.119(b); *see, e.g., City of Amarillo v. Premium Standard Farms, Inc.*, No. 07-06-00467-CV, 2007 WL 2163399 (Tex. App.—Amarillo July 24, 2007, no pet.) (mem. op.) (explaining that plaintiff sought injunction for alleged overproduction but court ruled that sufficient evidence was not introduced at hearing). The suit can be filed with or without joinder of the district. Tex. Water Code § 36.119(b). Before such a suit is filed, however, a written complaint must be filed with the GCD having jurisdiction over the well or wells drilled or operated without a required permit or in violation of the district rule. Tex. Water Code § 36.119(g). The district must investigate the complaint within ninety days and determine whether the district rules have been violated. *See* Tex. Water Code § 36.119(g).

F. Judicial Review

Someone affected by and dissatisfied with any provision or with any rule or order made by a GCD is entitled to file a suit against the district or its directors to challenge the validity of the law, rule, or order. Tex. Water Code § 36.251. See also the preceding discussion regarding administrative appeals of permit actions under Water Code chapter 36, subchapter M. The suit shall be filed in a court of competent jurisdiction in any county in which the district or any part of the district is located and may be filed only after all administrative appeals to the district are final. Tex. Water Code § 36.251. The burden of proof at trial is on the petitioner. Tex. Water Code § 36.253. Generally, the review on appeal is governed by the substantial evidence rule. Tex. Water Code § 36.253. (The review is de novo, however, when an action is challenged on the ground the GCD has acted beyond its statutory authority. *Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 263

S.W.3d 910, 917 (Tex. 2008).) The substantial evidence rule means that a court may not substitute its judgment for the judgment of the state agency on the weight of the evidence on questions committed to agency discretion but shall reverse or remand the case for further proceedings if substantial rights of the appellant have been prejudiced because the administrative findings, inferences, conclusions, or decisions are (1) in violation of a constitutional or statutory provision, (2) in excess of the agency's statutory authority, (3) made through unlawful procedure, (4) affected by other error of law, (5) not reasonably supported by substantial evidence considering the reliable and probative evidence in the record as a whole, or (6) arbitrary or capricious or characterized by abuse of discretion or clearly unwarranted exercise of discretion. Tex. Gov't Code § 2001.174. Due to the nature of the substantial evidence review, the petitioner must attempt to develop the record as much as possible when going through the administrative appeals process before the GCD board because no additional evidence can be introduced on appeal. *See, e.g., In re Edwards Aquifer Authority*, 217 S.W.3d 581 (Tex. App.—San Antonio 2006, no pet.).

G. Oversight of GCD Duties

The State Auditor's Office and the TCEQ have oversight authority over certain aspects of a GCD's operations and actions. The State Auditor's Office must periodically audit a GCD's operations to determine whether it is fulfilling its duties. The TCEQ has oversight authority both on its own initiative and as a result of a petition for inquiry about specific GCD action or inaction.

1. *Legislative Audit Review*

A GCD is subject to review by the State Auditor's Office under the direction of the legislative audit committee. Tex. Water Code § 36.302(a). The auditor must determine whether the district is operational, defined as being actively engaged in achieving the objectives of the district's management plan based on an analysis of the district's activities. Tex. Water Code § 36.302(c). If the auditor determines that the district is not operational, the TCEQ must take proper action as provided by section 36.303. Tex. Water Code § 36.302(f). For example, the State Auditor's Office released an audit report on February 26, 2010, on the Kinney County Groundwater Conservation District concluding that the district was not operational because it had failed to meet 80 percent of the objectives of its 2008 management plan, and finding deficiencies in the financial and operation practices of the district. *See* Tex. State Auditor's Office, *A Follow-Up Audit Report on the Kinney County Groundwater Conservation District*, SAO Report No. 10-023 (Feb. 2010), *available at* www.sao.state.tx.us/reports/main/10-023.pdf. The TCEQ considered the matter on August 11, 2010, and directed TCEQ staff to enter into a compliance agreement with the Kinney County GCD to address management plan implementation, address the recommendations of the State Auditor's Office, document permitting procedures, and develop a debt reduction plan. *See* 2011 PGMA-GCD Report, at 55 (reporting on TCEQ noncompliance review of the Kinney County GCD).

2. *Failure to Submit a Management Plan or Conduct Joint Planning*

Appropriate action must be taken by the TCEQ under section 36.303 of the Water Code if a GCD fails to submit or receive approval of a management plan or an amendment to a management plan. *See* Tex. Water Code § 36.301. Additionally, if the TCEQ finds that a district has failed to conduct joint planning, the TCEQ may take any action it feels necessary under section 36.303. *See* Tex. Water Code § 36.3011; 30 Tex. Admin. Code §§ 293.22, 293.23 (TCEQ's implementing regulations). See Chapter 21 of this book regarding groundwater management area joint planning.

3. Petition for Inquiry

Chapter 36 allows an "affected person" with respect to a groundwater management area to file a petition with the TCEQ requesting an inquiry for any of the following reasons: (1) a GCD fails to submit its management plan to the executive administrator; (2) a GCD fails to participate in the joint planning process; (3) a GCD fails to adopt rules; (4) a GCD fails to adopt the applicable desired future conditions adopted by the management area at a joint meeting; (5) a GCD fails to update its management plan before the second anniversary of the adoption of desired future conditions by the management area; (6) a GCD fails to update its rules to implement the applicable desired future conditions before the first anniversary of the date it updated its management plan with the adopted desired future conditions; (7) the rules adopted by a GCD are not designed to achieve the desired future conditions adopted by the management area during the joint planning process; (8) the groundwater in the management area is not adequately protected by the rules adopted by the GCD; or (9) the groundwater in the management area is not adequately protected because of the failure of a district to enforce substantial compliance with its rules. Tex. Water Code § 36.3011(b).

Within ninety days of the filing of the petition, the TCEQ must either dismiss the petition or select a review panel. Tex. Water Code § 36.3011(c). Not later than the 120th day after appointment, the review panel must review the petition and any evidence relevant to the petition and adopt a report to be submitted to the TCEQ. Tex. Water Code § 36.3011(e)–(g). Not later than the forty-fifth day after receiving the panel's report, the TCEQ shall take action to implement any or all of the panel's recommendations. Tex. Water Code § 36.3011(h).

4. Action by the TCEQ, Including Dissolution

Under section 36.303 of the Water Code, the TCEQ, after notice and a hearing, can issue an order requiring the GCD to take certain actions or to refrain from taking certain actions, dissolve the board and call an election for the purpose of electing a new board, request the attorney general to bring suit for the appointment of a receiver to collect the assets and carry on the business of the GCD, or dissolve the district. Tex. Water Code § 36.303(a). If the TCEQ dissolves the district's board, it must appoint five temporary directors. Tex. Water Code § 36.016(a). In addition to those options, the TCEQ may recommend to the Texas legislature other actions that the TCEQ deems necessary to accomplish comprehensive management in the district. *See* Tex. Water Code § 36.303(b); *see also* 30 Tex. Admin. Code §§ 293.22, 293.23 (TCEQ's implementing regulations). If the attorney general brings a suit for the appointment of a receiver for a district under section 36.303(a)(3), a district court must appoint a receiver if an appointment is necessary to protect the assets of the district. Tex. Water Code § 36.3035(a). The receiver must execute a bond in an amount to be set by the court to ensure the proper performance of the receiver's duties. Tex. Water Code § 36.3035(b). After appointment of the receiver and execution of the bond, the receiver takes possession of the assets of the district specified by the court. Tex. Water Code § 36.3035(c). Until discharged by the court, the receiver performs the duties that the court directs to preserve the assets and carry on the business of the district and must strictly observe the final order involved. Tex. Water Code § 36.3035(d). On a showing of good cause by the district, the court may dissolve the receivership and order the assets and control of the business returned to the district. Tex. Water Code § 36.3035(e).

The TCEQ may dissolve a GCD that has been determined to be not operational and has no outstanding bonded indebtedness. Tex. Water Code § 36.304(a). A district composed of territory entirely within one county may be dissolved even if the district has outstanding indebtedness that matures after the year in which the district is dissolved, under provision for the levy and collection of taxes sufficient to pay the principal of and interest on the indebtedness when due. Tex. Water Code § 36.304(b). Appeals from any TCEQ order shall be filed and heard in the district court of any of the counties in which the land is located. Tex. Water Code § 36.309.

III. Subsidence Districts

The Texas legislature often grants special powers or responsibilities to GCDs through the legislation that creates them. However, at times the legislature has formed special districts with unusual purposes and powers to effectively deal with specific and challenging groundwater problems. One of these types of special districts is called a subsidence district.

Subsidence districts are created with the primary purpose of controlling and preventing subsidence. Subsidence is the lowering of the elevation of the surface of land caused by groundwater withdrawals, which contributes to increased flooding. *See* Tex. Spec. Dist. Code § 8801.001(5). "To minimize as far as practicable the drawdown of the water table and the reduction of artesian pressure and to control and prevent subsidence," the subsidence district is authorized to regulate the spacing of wells and the production of groundwater from those wells. Tex. Spec. Dist. Code § 8801.119(a).

A. Creation and Purpose

Like GCDs, subsidence districts are created to regulate groundwater pursuant to article XVI, section 59, of the Texas Constitution. The two existing subsidence districts—the Harris-Galveston Subsidence District (HGSD) and the Fort Bend Subsidence District (FBSD)—have been designated as "conservation and reclamation" districts, and are no longer subject to chapter 36 of the Texas Water Code. *See* Tex. Spec. Dist. Code §§ 8801.002, 8801.102, 8834.002, 8834.006. Like GCDs, subsidence districts have powers to regulate the use of groundwater and to prevent the waste of groundwater or the degradation of water quality. *See, e.g.*, Tex. Spec. Dist. Code §§ 8801.053, 8801.108(a), 8834.052, 8834.060, 8834.110, 8834.201, 8834.203, 8834.215. However, subsidence districts have as their primary purpose the prevention of subsidence. *See* Tex. Spec. Dist. Code §§ 8801.053, 8834.003. Subsidence districts, like GCDs, are also subject to the duties and obligations of applicable general laws and likewise receive the benefits of such laws.

The HGSD and the FBSD are completely separate districts, with their own enabling legislation and separate boards of directors. However, the two boards entered into an interlocal agreement through which the staff of the HGSD serves as the staff of the FBSD. This staff-sharing arrangement was anticipated even before the FBSD was created in 1989, so the FBSD's enabling legislation was modeled after the HGSD's legislation. For example, the two subsidence districts are very similar in terms of their rules, regulatory programs, permit requirements, fee structures (but not amounts), and hearing procedures. Because the statutes and goals are similar, and because the same staff works for both boards, the rules and procedures for the two subsidence districts are almost identical, with similar registration and permitting forms used by both.

For additional information, see the Harris-Galveston Subsidence District Web site, www.hgsubsidence.org/, and the Fort Bend Subsidence District Web site, www.fbsubsidence.org.

B. Board Meetings

Subsidence districts are subject to the Texas Open Meetings Act (TOMA), Texas Government Code chapter 551. The HGSD and the FBSD are required to have at least monthly meetings of their boards, also subject to TOMA. *See* Tex. Spec. Dist. Code §§ 8801.055, 8834.056.

Under TOMA, the meetings of a subsidence district's board must generally be open to the public, notice of the meeting must be posted at a place generally accessible to the public at the subsidence district's administrative offices, and notice must be provided to the county clerk at least seventy-two hours before the meeting. *See* Tex. Gov't Code §§ 551.002, 551.043, 551.054.

C. Rulemaking

Subsidence districts are required to act pursuant to rules adopted by their boards of directors. The HGSD's and the FBSD's organic acts require the subsidence districts to adopt rules to implement the acts and to accomplish the districts' purposes. *See* Tex. Spec. Dist. Code §§ 8801.108(a), 8834.112. The HGSD and the FBSD are specifically authorized to adopt rules "to prevent the waste of groundwater or the degradation of water quality." *See* Tex. Spec. Dist. Code §§ 8801.108(a), 8834.112(b). The FBSD organic act also requires the district to adopt rules necessary to carry out the district's purposes. Tex. Spec. Dist. Code § 8834.112.

Procedurally, subsidence districts are required to provide notice and an opportunity to be heard before adopting rules. The FBSD is required to provide a ten-day notice, and the HGSD is required to provide only the seventy-two-hour TOMA notice before conducting a rulemaking hearing. *See* Tex. Spec. Dist. Code §§ 8801.110(a), 8834.115. Public comments may be submitted orally or in writing at rulemaking hearings. *See* Tex. Spec. Dist. Code §§ 8801.109(c), 8834.114(c). For the rules of the districts, see the Fort Bend Subsidence District Rules (amended 2009), available online at www.fbsubsidence.org/assets/pdf/FBRules.pdf, and the Harris-Galveston Subsidence District Rules (amended Sept. 11, 2013), available online at hgsubsidence.org/wp-content/uploads/2014/11/RULES2013-09-11.pdf.

D. District Regulatory Plans

The subsidence districts have each adopted District Regulatory Plans (DRPs) "to establish policy in the areas of groundwater regulation, permits and enforcement and to establish District Regulatory Areas and regulatory requirements for each area." *See* Harris-Galveston Subsidence District, *District Regulatory Plan 2013*, at 1 (amended May 8, 2013), *available at* http://hgsubsidence.org/wp-content/uploads/2013/07/HGSD-2013-Regulatory-Plan-with-Amendment.pdf [hereinafter HGSD DRP]; Fort Bend Subsidence District, *2003 Regulatory Plan*, at 1 (amended Aug. 28, 2013), *available at* www.fbsubsidence.org/docs_reports/2013/2003%20Regulatory%20Plan%20Amended%20August%2028,%202013.pdf [hereinafter FBSD DRP].

The HGSD DRP has as its overall goal the reduction of groundwater withdrawals to no more than 20 percent of demand as soon as possible. HGSD DRP, at 1. The HGSD DRP divides the district into three regulatory areas and sets out a schedule for required groundwater withdrawals based on the area. HGSD DRP, at 6. The HGSD has adopted disincentive fees to permitted withdrawals in excess of 20 percent of total water demand, or in excess of 10 percent of demand in the case of Region 1. HGSD DRP, at 6. The purpose of the fee is to encourage alternative water supplies.

The FBSD DRP divides the FBSD into two regulatory areas and one subarea. FBSD DRP, at 4. One of the goals of the FBSD DRP is to control and prevent subsidence as soon as possible. FBSD DRP, at 2. Disincentive fees are charged when a permittee's withdrawals exceed 40 percent of demand in Area A. FBSD DRP, at 4. Permittees in Area A are required to submit Groundwater Reduction Plans to the District. FBSD DRP, at 6.

E. Application Processing

Subsidence districts are statutorily mandated to require certain permits and may choose to require others as part of their management of groundwater. Subsidence districts require permits for the drilling, equipping, operating, or completing of wells or well pumps. Tex. Spec. Dist. Code §§ 8801.155, 8834.206. Additionally, subsidence districts are authorized more broadly to regulate to protect water quality. *See, e.g.*, Tex. Spec. Dist. Code §§ 8801.001(5-a)(D), 8801.108(a), 8834.001(7), 8834.112. Subsidence districts may require that other types of permits be obtained before engaging in certain activities, including aquifer recharge and storage activities and groundwater monitoring. *See, e.g.*, Tex. Spec. Dist. Code §§ 8801.053(a), 8801.101, 8801.108, 8801.114, 8801.119, 8834.052, 8834.112; *but see* Tex. Att'y Gen. Op. No. GA-0498 (2007), *available at* www.texasattorneygeneral.gov/opinions/opinions/50abbott/op/2007/htm/ga-0498.htm (noting that the Edwards Aquifer Authority Act specifically authorizes only term, emergency, and regular permits and opining that bifurcated permits that limit the permittee's exercise of guaranteed statutory minimums are not authorized). The subsidence districts' organic acts provide that a permit may not be required for certain types of wells, thereby establishing categories of exempt uses, depending on the use of the groundwater and the size of the wells. *See* Tex. Spec. Dist. Code §§ 8801.152, 8834.202. Otherwise providing for the same permitting exemptions, the FBSD adds an exemption that the HGSD does not have: if a well owner owns only one well and its casing diameter is less than five inches, then it is exempt, but if the well owner has more than one well, then all the wells must be permitted. Tex. Spec. Dist. Code § 8834.202; *see also* FBSD Rules § 5.7; HGSD Rules § 5.8 (outlining exemptions and exclusions from permitting requirements).

In deciding whether to grant or deny a permit, subsidence districts are required to consider, *inter alia*, the availability of alternative, competitively priced surface water, the economic impact on the applicant of denial weighed against the likely effects of subsidence if the permit is granted, and "other relevant factors." *See* Tex. Spec. Dist. Code §§ 8801.158(b), 8834.209(b). Subsidence districts are required to act promptly on administratively complete applications for a permit or permit amendment or to set a hearing to consider the application and are required to hold a hearing on all permit applications. *See* Tex. Spec. Dist. Code §§ 8801.157, 8834.208, 8834.209.

Permits may impose a whole host of requirements on permittees relating to the protection of groundwater resources. *See* Tex. Spec. Dist. Code §§ 8801.158(d), 8834.209(d). Among other things, permittees may be required to submit reports, pay annual fees, comply with drought restrictions or conservation requirements, and reduce reliance on groundwater. *See* Tex. Spec. Dist. Code §§ 8801.113, 8801.151, 8801.158(d), 8801.161, 8801.162, 8834.103, 8834.209(d), 8834.212, 8834.214, 8834.215. Additional permit conditions may include the requirement that a permittee prepare and implement a groundwater conservation plan and accompanying best management practices to conserve groundwater. *See* Tex. Spec. Dist. Code §§ 8801.158(d), 8834.209(d).

A cornerstone of the regulatory programs implemented by subsidence districts with respect to permits is the permit disincentive fee the subsidence districts use to discourage overreliance on groundwater. Such fees are specifically authorized by the subsidence districts' organic acts. *See* Tex. Spec. Dist. Code §§ 8801.161(a-1), 8834.212(a)–(b). The HGSD district has adopted permit disincentive fees by rule, and the FBSD has adopted permit disincentive fees by board resolution. *See* HGSD Rules § 5.6(c); Fort Bend Subsidence District, Resolution No. 05-211, *Resolution Adopting a Disincentive Permit Fee Rate* (Apr. 27, 2005), *available at* www.fbsubsidence.org/docs_reports/2011/DF%20Resolution.pdf.

F. Hearings

Unlike GCDs, subsidence districts must hold hearings on all applications for permits. *See* Tex. Spec. Dist. Code §§ 8801.157, 8834.208; *see also* Tex. Water Code § 36.114(b). The HGSD is required to provide written notice to applicants of the hearing. *See* Tex. Spec. Dist. Code § 8801.157(b). The FBSD's board is required to notify interested persons, post notice, and publish notice in a newspaper at least ten days before the hearing. Tex. Spec. Dist. Code § 8834.208(b). The HGSD's and the FBSD's organic acts contain permit hearing procedures authorizing persons to appear at hearings and present testimony, evidence, exhibits, or other information individually or through their counsel. Tex. Spec. Dist. Code §§ 8801.109, 8834.114. Subsidence districts may use hearing examiners to conduct their permit hearings but are required to adopt procedures for their use by rule. Tex. Spec. Dist. Code §§ 8801.109(d), 8834.114(d), (e).

Subsidence district procedural rules relate to, among other things, registering to testify, evidentiary rules, the filing of written materials, recording, and continuances. HGSD Rules §§ 7.3–7.5; FBSD Rules §§ 7.3–7.5. Following a permit hearing, the hearings examiner is required to prepare a report. HGSD Rules § 7.6; FBSD Rules § 7.6. The report must be submitted, and the board must take action within sixty days of the close of the hearing record. HGSD Rules § 7.6(c); FBSD Rules § 7.6(c). Subsidence district rules allow for a motion for rehearing to be filed within twenty days of the board's decision and require that such a motion be filed as a prerequisite to appeal. HGSD Rules § 7.8; FBSD Rules § 7.8.

An appeal of a final action by a subsidence district must be filed within forty-five days of the date the action became final. Tex. Spec. Dist. Code §§ 8801.202, 8834.251(b).

G. Programs

Subsidence districts are granted broad authority to implement and enforce their organic acts to protect groundwater within their jurisdictions similar to the authority granted districts subject to Texas Water Code chapter 36. *See* Tex. Spec. Dist. Code §§ 8801.003, 8801.053, 8801.108, 8834.002, 8834.003, 8834.052, 8834.110, 8834.112, 8834.201, 8834.203, 8834.216.

Subsidence districts' organic acts and rules are silent on the transfer of groundwater outside the district, and thus such applications would presumably be processed under substantially the same criteria as other applications. Because the districts consider the availability of alternative water supplies and permit applications must demonstrate that "there is no other adequate and available substitute or supplemental source of surface water at prices competitive with those charged by suppliers of surface water within the District" (HGSD Rules § 5.2(d); FBSD Rules § 5.2(d)), and because the districts have adopted disincentive permit fees (HGSD Rules § 5.6(c)), exportation of groundwater is not expected to be an issue for these subsidence districts.

Entities within the jurisdiction of a subsidence district, particularly those that use or intend to use groundwater, such as developers, water utilities, and other industrial, agricultural, and municipal users, or whose activities have the potential to affect groundwater, should consult the subsidence district's regulations.

H. Enforcement

Subsidence districts are authorized to administer and enforce their organic acts and carry out their purposes of regulating groundwater to prevent subsidence through rulemaking, and indeed they are required to make and enforce rules. *See* Tex. Spec. Dist. Code §§ 8801.003, 8801.053, 8801.108, 8834.003(b), 8834.052, 8834.112, 8834.201, 8834.252.

Subsidence districts may file suit to seek injunctive relief and civil penalties or may request that the attorney general do so on their behalf. *See* Tex. Spec. Dist. Code §§ 8801.204, 8834.252. Subsidence districts may obtain civil penalties for violating district rules of between $50 and $5,000 per day per violation, with each day of a continuing violation constituting a new violation. *See* Tex. Spec. Dist. Code §§ 8801.204(a)(2), 8834.252(a).

IV. Conclusion

Groundwater conservation districts are created for and have been charged with protecting, conserving, and managing groundwater use in Texas. A subsidence district's purpose is to prevent subsidence, and a district accomplishes this goal by using its power to decrease groundwater use. The sizes, duties, and levels of responsibilities of these different types of districts can vary greatly. To fully understand the scope and power of the district's authority, one must investigate and understand the general and special laws associated with that specific district as well as the district rules, regulatory plans, and orders and forms. Also important are other relevant areas of law affecting local governments.

CHAPTER 17

Edwards Aquifer Authority

Darcy Alan Frownfelter[1]

I. Scope

This chapter discusses the regulation and management of the Edwards Aquifer (Aquifer) by the Edwards Aquifer Authority (Authority) pursuant to the Edwards Aquifer Authority Act (EAA Act). *See* Act of May 30, 1993, 73d Leg., R.S., ch. 626, *as amended by* Act of May 16, 1995, 74th Leg., R.S., ch. 524; Act of May 29, 1995, 74th Leg., R.S., ch. 261; Act of May 6, 1999, 76th Leg., R.S., ch. 163; Act of May 25, 2001, 77th Leg., R.S., ch. 1192; Act of May 28, 2001, 77th Leg., R.S., ch. 966, §§ 2.60–.62, 6.01-.05; Act of June 1, 2003, 78th Leg., R.S., ch. 1112, § 6.01(4); Act of May 23, 2007, 80th Leg., R.S., ch. 510; Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.01–.12; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.01–.12; Act of May 21, 2009, 81st Leg., R.S., ch. 1080; and Act of May 20, 2013, 83d Leg., R.S., ch. 783.

The intent of this chapter is to provide practical guidance to persons interested in the regulation of the Aquifer by the Authority. Issues relating to the Endangered Species Act and historical developments that led to the creation of the Authority are not covered in detail.

II. The Edwards Aquifer

A. Regulatory Definition

The EAA Act defines the Aquifer in section 1.03(1) as follows:

> "Aquifer" means the Edwards Aquifer, which is that portion of an arcuate belt of porous, water-bearing, predominately carbonate rocks known as the Edwards and Associated Limestones in the Balcones Fault Zone extending from west to east to northeast from the hydrologic division near Brackettville in Kinney County that separates underground flow toward the Comal Springs and San Marcos Springs from underground flow to the Rio Grande Basin, through Uvalde, Medina, Atascosa, Bexar, Guadalupe, and Comal counties, and in Hays County south of the hydrologic division near Kyle that separates flow toward the San Marcos River from flow to the Colorado River Basin.

The text of the EAA Act is available online at www.edwardsaquifer.org/uploads/default/files/a5db55cf60aba6861cc3f143fed1ab36.pdf.

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1. Darcy Alan Frownfelter has served as General Counsel to the Edwards Aquifer Authority since 1997. Mr. Frownfelter would like to acknowledge the assistance of Mark Hamilton, Deborah Clarke Trejo, Becky McKenzie, and Jan Ahlstrom in the preparation of this chapter.

The Aquifer is contained in the "Edwards and Associated Limestones." The "associated limestones" include the Salmon Peak Limestone, McKnight Formation, West Nueces Formation, Devil's River Limestone, Person Formation, Kainer Formation, Edwards Group, and Georgetown Formation. *See* 30 Tex. Admin. Code § 213.3(8). These limestones are the namesake for the Aquifer. They are of Lower Cretaceous Age and yield moderate to high quantities of produced groundwater. *See Sierra Club v. Lynn*, 364 F. Supp. 834, 840 (W.D. Tex. 1973), *aff'd in part and rev'd in part*, 502 F.2d 43 (5th Cir. 1974) [hereinafter *Lynn*]. The Edwards and Associated Limestones units have an average thickness of approximately five hundred feet.

The following portions of the Aquifer are outside the defined jurisdictional boundaries of the Authority. Therefore, the legal regimes applicable to these portions of the Aquifer are not discussed in this chapter:

1. In Kinney County, withdrawals from the Aquifer are under the jurisdiction of the Kinney County Groundwater Conservation District.

2. In Zavala County, withdrawals from the Aquifer are under the jurisdiction of the Wintergarden Groundwater Conservation District.

3. In Frio County, withdrawals from the Aquifer are under the jurisdiction of the Evergreen Underground Water Conservation District.

4. In the part of Atascosa County, outside of the Authority's boundaries, withdrawals from the Aquifer are under the jurisdiction of the Evergreen District.

5. In the part of Comal County, outside of the Authority's boundary, withdrawals from the Aquifer are not currently regulated, and it remains to be seen whether the newly formed Comal Trinity Groundwater Conservation District will exercise any jurisdiction over this portion of the Aquifer. *See* Act of May 29, 2015, 84th Leg., R.S., ch. 656, § 1 (adding Tex. Spec. Dist. Code ch. 8875).

6. In the part of Hays County, outside of the Authority's boundaries, withdrawals from the Aquifer appear to be under the jurisdiction of the Barton Springs–Edwards Aquifer Conservation District.

B. Geologic Setting

The Aquifer is the product of numerous geologic processes, including carbonate deposition, uplift, down faulting, volcanism, and karstification processes (bedrock dissolution). Meteoric waters absorbing carbon dioxide from the atmosphere and from decaying vegetation created a weak carbonic acid that, over time, dissolved the limestone and created preferential flow paths allowing rapid infiltration of surface water into the Aquifer. In addition, dissolution through the process of corrosion mixing enhanced the Aquifer's porosity, permeability, and water-bearing capacities. *See generally* Edwards Aquifer Authority, *Comprehensive Water Management Plan* 48 (2004) (hereinafter 2004 CWMP).

A unique groundwater system has evolved in the Edwards and Associated Limestones within the "Balcones Fault Zone." This fault zone generally includes the southern and eastern edges of the Edwards Plateau and northern edges of the Gulf Coastal Plain. The Balcones Fault Zone comprises an arcuate belt of high density, normal faults generally extending from mid-Kinney County eastward through San Antonio, and then turns northeast through Austin to Waco. The Balcones Fault Zone Edwards Aquifer is divided into three segments by groundwater or surface water divides (from west to northeast): (1) Southern segment, (2) Barton Springs segment, and (3) Northern segment. Only the Southern segment is managed by the Authority.

C. Regulatory Organization of the Aquifer

1. Southern Segment

As mentioned above, the Southern segment is one of the three segments of the Balcones Fault Zone. Under section 1.08(a) of the Act, the Southern segment is the only segment of the Balcones Fault Zone over which the Authority has jurisdiction. The boundaries of the Authority have been drawn largely to encompass the geographic extent of this segment. For the remainder of this chapter, "Aquifer" refers to the Southern segment of the Aquifer.

The Aquifer extends from the groundwater divide east of Brackettville in Kinney County, east to San Antonio, and then northeast to the groundwater divide near Kyle in Hays County. This segment is 180 miles long and ranges from 5 to 40 miles wide, encompassing approximately 3,340 square miles (2.14 million acres). Approximately 1.89 million acres (88 percent) of the Recharge and Artesian Zones of the Aquifer fall within the boundaries of the Authority. The boundaries of the Authority encompass approximately 5,150 square miles (3.3 million acres). Approximately 57 percent of the land within the Authority's boundaries overlies the Recharge Zone and Artesian Zone of the Aquifer. If the Saline Zone of the Aquifer is included, approximately 87 percent of the land within the Authority overlies the Aquifer.

The Aquifer is a karstified carbonate aquifer characterized by the presence of sinkholes, sinking or losing streams, caves, springs, and a well-integrated subsurface flow system. The Aquifer possesses triple porosity/permeability characteristics with groundwater flow occurring in the rock matrix; within fractures, faults, and bedding plane partings; and within conduits (less than one centimeter in diameter). The combined primary and secondary/tertiary porosity of the limestone creates extremely high Aquifer permeability and the capability to produce large quantities of high-quality water. 2004 CWMP, at 51. Because the Edwards Limestone is extremely permeable, groundwater velocity in some portions of the Aquifer has been measured at more than 10,000 feet per day.

Most wells do not fully penetrate the Aquifer, yet some wells yield thousands of gallons per minute with little or no drawdown. Thus, groundwater withdrawal is generally limited by the size of the pump and not the physical properties of the Aquifer. R.W. Maclay, U.S. Geological Survey, *Water-Resources Investigations Report 95-4186* (1995). There may be as much as 173 million acre-feet (AF) of fresh water in storage in the Aquifer. 2004 CWMP, at 52.

The Artesian Zone of the Aquifer is the most productive and utilized segment of the Balcones Fault Zone aquifer system. Its great economic importance to Texas is well recognized. The legislature found that the Aquifer "is the primary source of water for the residents of the region, and is vital to the general economy and welfare of the state." EAA Act § 1.06(a); *see also Shields v. Norton*, 289 F.3d 832, 834 (5th Cir. 2002), *cert. denied*, 537 U.S. 1071 (2002); *Sierra Club v. Glickman*, 156 F.3d 606, 610 (5th Cir. 1998) [hereinafter *Glickman*]; *Sierra Club v. City of San Antonio*, 112 F.3d 789, 791 (5th Cir. 1997), *cert. denied*, 522 U.S. 1089 (1998). Historically, the Aquifer has been the sole source of water supply for the 2.1 million people living in the Aquifer region. *See* Edwards Aquifer Authority, *Groundwater Management Plan 2010–2015* 19, tbl. 6 (Jan. 2011).

Economic and social interests, terrestrial and aquatic life, and other water users depend on the Aquifer for water supply. EAA Act §§ 1.01, 1.06(a). Usage is broad and includes irrigation, livestock, municipal, industrial, and domestic supply. The median estimated well production for 1934–2013 was 328,600 AF/year. Edwards Aquifer Authority, *Hydrologic Data Report for 2013* 32, tbl. 7 (Report No. 14-02, Dec. 2014) [hereinafter 2013 Hydrologic Data Report]. For these reasons, the Texas legislature determined that the Aquifer is "a unique and complex hydrological system." EAA Act § 1.01.

2. Pools

Under the EAA Act, the Aquifer is divided into two "pools": the San Antonio Pool and the Uvalde Pool. *See* EAA Act §§ 1.14(f), 1.19. A pool is a region within the Aquifer where a unique set of hydrogeologic conditions exist relative to other areas of the Aquifer. These unique conditions include isolated water levels, spring flow responses to changes in storage, and unique water quality conditions dependent on Aquifer stresses.

a. San Antonio Pool

The San Antonio Pool is the largest pool of the Aquifer. It is defined as all portions of the Aquifer other than under Uvalde County, Texas. Edwards Aquifer Authority Rules (EAA Rules) § 702.1(168). The text of the EAA rules is available online at www.edwardsaquifer.org/uploads/default/files/e316c655d9d4a77b88cd84a26e932085.pdf. The following counties within the boundaries of the Authority are included within the San Antonio Pool: Atascosa (partial), Bexar (all), Caldwell (partial), Comal (partial), Hays (partial), Guadalupe (partial), and Medina (all). The San Antonio Pool is the easternmost portion of the Aquifer and is most directly hydrogeologically connected to Comal Springs and San Marcos Springs.

Because spring flows are highly correlated with Aquifer water levels in the San Antonio Pool, the Authority uses three key reference points in its management of withdrawals from the pool: (1) Aquifer levels as measured at index well J-17 (State Well No. AY-68-37-203) in Bexar County; (2) spring discharge at Comal Springs in New Braunfels; and (3) spring discharge at San Marcos Springs in San Marcos. *See* EAA Act §§ 1.03(23), 1.26(b) at tbl. 1.

b. Uvalde Pool

The Uvalde Pool is defined as that portion of the Aquifer underlying the boundaries of Uvalde County. EAA Rules § 702.1(202). The Uvalde Pool is the westernmost portion of the Aquifer and, geologically, is considered the portion of the Aquifer west of the Knippa Gap, a geologic structure that appears to control groundwater movement from west to east. The Uvalde Pool includes recharge from the Nueces and Frio rivers and contributes approximately 50 percent of the water within the Aquifer. Water levels in the Uvalde County index well do not correlate well with discharge at Comal Springs and San Marcos Springs, located more than one hundred miles east. Withdrawals from this pool are managed solely on water level conditions as measured at index well J-27 (State Well No. YP-69-50-302) in Uvalde County. EAA Act § 1.26(b) at tbl. 2. Withdrawals from the Uvalde Pool are not managed based on spring flow conditions at either Comal Springs or San Marcos Springs.

c. Other Pools

To better manage the Aquifer, the Authority may designate other pools within the Aquifer. New pools must be created through Authority rulemaking. The boundaries for any new pool must be defined in accordance with the hydrogeologic research supporting the creation of the pool. Additionally, in order to manage withdrawals from any new pool, the Authority may designate new index wells to monitor Aquifer water levels. EAA Act § 1.14(g).

3. *Contributing Zone*

The Contributing Zone is the dissected surface of the Edwards Plateau—also referred to as the Texas Hill Country. The essential role of this zone associated with the Aquifer is to collect and concentrate diffuse surface sheet flow for transport to the Recharge Zone. Rain falls on the Contributing Zone, runoff enters watercourses arising there, the watercourses then traverse the Recharge Zone, and they finally enter the Aquifer as recharge. *See Lynn*, 502 F.2d at 49. Additionally, the Trinity Aquifer, located beneath the Contributing Zone, and groundwater near the boundary between the Trinity and Edwards Aquifers have been shown to directly recharge the Edwards Aquifer.

Although normally associated with the Aquifer, the Contributing Zone is not, strictly speaking, a part of the Aquifer. *See* 2004 CWMP, at 42. Nonetheless, this area is of regulatory significance to the Authority because activities occurring within this area can cause point or nonpoint source pollution that can degrade the quality of surface waters providing recharge to the Aquifer. For this reason, the Authority has been given extraterritorial authority to assert its water quality authority within portions of this area. *See* EAA Act § 1.08(c) (creating a five-mile water quality buffer zone extending from the Authority's boundaries). However, because the Aquifer itself is not located in the Contributing Zone, the Authority exercises no water quantity jurisdiction in this zone.

The Contributing Zone lies upgradient of the Recharge Zone of the Aquifer. This zone encompasses approximately 5,460 square miles (3.5 million acres). Approximately 418,000 acres (12 percent) of the Contributing Zone fall within the boundaries of the Authority.

4. *Recharge Zone*

The Recharge Zone is the area where the Edwards Limestone outcrops at the surface. A series of parallel faults in the Balcones Fault Zone has exposed the Edwards Limestone at the surface along the southern boundary of the Texas Hill Country and accounts for the Aquifer's relative dip downward toward the Gulf of Mexico. This area is of regulatory concern to the Authority because sources of point or nonpoint pollution, or spills or releases, may occur at the surface that can contaminate surface water recharging the Aquifer, or enter through sinkholes, caves, faults, and fractures, pass through the unsaturated zone, and directly enter the Aquifer. Depending on Aquifer conditions and the thickness of the Edwards Limestone, small volumes of groundwater from the Aquifer can be withdrawn from wells located in the Recharge Zone.

The Recharge Zone is located within the Balcones Fault Zone. This zone covers approximately 1,221 square miles (781,000 acres). Approximately 668,000 acres (86 percent) of the Recharge Zone fall within the boundaries of the Authority. With the exception of a small portion in Kinney, Comal, and Hays counties, the Recharge Zone is located within the Authority's boundaries. The Recharge Zone varies in width from one-half to several miles and extends for 180 or more miles.

The Edwards Limestone outcrop is characterized as "honeycombed with fissures and cracks" and "consists of many small pores and fissures inlaid among less permeable material." *Lynn*, 502 F.2d at 49. These preferential flow paths (caves or conduits) associated with the karstic nature of the Aquifer allow extremely rapid recharge during heavy rains. Monitoring wells located in the Recharge Zone have risen as much as 150 feet in response to heavy rains. Recharge into the Aquifer can vary widely based on the amount of precipitation the Contributing and Recharge zones receive and the water levels in the Aquifer. From 1934 to 2013, estimates of annual recharge ranged from 43,700 AF in 1956 to 2,486,000 in 1992. The median annual recharge of the Aquifer for 1934 through 2013 is 556,950 AF/year. *See* 2013 Hydrologic Data Report, at 22.

In the Recharge Zone, the Aquifer is recharged in essentially two ways. First, surface streams in the Contributing Zone flow south or east and traverse the Recharge Zone. Fourteen major watercourses that arise in the Contributing Zone traverse the Recharge Zone and provide recharge to the Aquifer.

See Lynn, 502 F.2d at 49. During low flow conditions, most surface water is captured by the Aquifer as the surface watercourses cross the outcrop and enter fractures, faults, and joints that transport the water to the Aquifer as recharge.

Groundwater within the Recharge Zone occurs under unconfined (water table) conditions. The unsaturated zone in the Recharge Zone of the Aquifer is variable depending on water levels in the Artesian Zone and can range from 150 to 300 feet. Edwards Aquifer Authority, *Edwards Aquifer Authority Synoptic Water Level Program 1999–2004 Report 14* (Sept. 2006) [hereinafter 2006 SWLPR]. The flow path for groundwater in the Recharge Zone is principally toward the Artesian Zone (from north to south or from northwest to southeast). 2006 SWLPR, at 114. Second, and of less significance, rain that falls directly on the Recharge Zone encounters the outcrop; infiltrates at sinkholes, caves, faults, fractures, and conduits; and makes its way into the Aquifer. One other form of recharge for the Aquifer is interformational flow. *See Lynn*, 502 F.2d at 49. This process, however, is unrelated to the processes that occur in the Recharge Zone.

5. *Artesian Zone*

The Artesian Zone is the down dip portion of the Aquifer formed by the Balcones Fault Zone. The Edwards Limestone is confined between the overlying Del Rio Clay and the underlying less permeable units in the Upper Glen Rose Limestone. Where the Edwards Limestone is fully saturated, it is considered to be in confined (or artesian) conditions. *See Lynn*, 502 F.2d at 49. The overwhelming volume of groundwater withdrawn from the Aquifer is taken from the Artesian Zone.

Additionally, Comal Springs and San Marcos Springs, the principal springs of interest in the management of the Aquifer, are on the eastern side of the Artesian Zone. *Glickman*, 156 F.3d at 610; *Lynn*, 502 F.2d at 48; *Sierra Club v. Babbitt*, 995 F.2d 571, 573 (5th Cir. 1993) [hereinafter *Babbitt*]. Consequently, the major portions of the Authority's water quantity jurisdiction and Aquifer withdrawal management functions are implemented for the Artesian Zone. Because of the relatively low permeability of overlying units, water quality issues related to spills over the Artesian Zone are of less concern to the Authority. However, poorly constructed water wells have resulted in contaminated water entering the Aquifer in the Artesian Zone and have resulted in water quality problems.

The Artesian Zone of the Aquifer lies on the "downthrown" (or southeast) side of the Balcones Fault Zone. This zone covers approximately 2,120 square miles (1.36 million acres). Approximately 1.23 million acres (90 percent) of the Artesian Zone fall within the boundaries of the Authority. With the exception of a few small portions in Atacosa, Frio, Hays, Kinney, and Zavala counties, the Artesian Zone of the Aquifer lies within the Authority's boundaries.

Groundwater in the Artesian Zone moves through the Aquifer generally from west to east and then northeast to ultimately discharge from a number of locations (from west to east), such as Leona Springs (Uvalde), San Pedro Springs and San Antonio Springs (San Antonio), Hueco Springs (Comal County) and Comal Springs (New Braunfels), and San Marcos Springs (San Marcos). Residence time in the Aquifer ranges from a few hours or days to many years, depending on the depth of circulation, location of recharge, distance of flow paths, and other Aquifer parameters.

6. *Transition Zone*

The Transition Zone of the Aquifer is located in geologic formations cropping out in proximity to and south and southeast of the Recharge Zone, including portions of the Del Rio Clay, Buda Limestone, Eagle Ford Group, Austin Chalk, Pecan Gap Chalk, and Anacacho Limestone. 30 Tex. Admin. Code § 213.3(36). These units provide some protection of the Aquifer, but they are faulted and fractured in nature. Because the groundwater gradient in these units is also downward, contamination related to surface activities could enter the Aquifer through these units.

The Transition Zone covers approximately 157 square miles (84,500 acres) and is located entirely within the boundaries of the Authority in Bexar, Comal, and Medina counties, and partially within the boundaries of the Authority in Hays County.

7. Contributing Zone within the Transition Zone

The Contributing Zone within the Transition Zone of the Aquifer is the area or watershed where runoff from precipitation flows downgradient to the Recharge Zone of the Aquifer. 30 Tex. Admin. Code § 213.22(3). This area is of concern to the Authority for reasons similar to those for the Contributing Zone: activities that occur on the surface of the land, if not controlled, can contaminate surface waters recharging the Aquifer.

The Contributing Zone within the Transition Zone is located generally south and southeast of the Recharge Zone and specifically includes areas where stratigraphic units not included in the Aquifer crop out at higher elevations and drain to watercourses where stratigraphic units of the Recharge Zone of the Aquifer crop out. 30 Tex. Admin. Code § 213.22(3). This zone covers approximately 23 square miles (15,000 acres) and is located entirely within the boundaries of the Authority in Bexar and Comal counties and partially within Hays County.

Because the hydrogeology and geomorphology of the Aquifer are complex, the Authority has tailored the regulation and management of each zone to the zone's unique characteristics. The various zones of the Aquifer system also influence the quality of the native groundwater in the Aquifer.

D. Water Quality

1. Fresh Water Zone

The quality of the groundwater in the Aquifer is generally very high. In some areas, fresh water can be found in the Aquifer as far as 3,500 feet below sea level. The down dip boundary of the fresh water portion of the Aquifer is generally defined by the presence of total dissolved solids (TDS) at concentrations lower than 1,000 milligrams per liter. Protecting this water quality poses challenges because of the character of the Aquifer. Karst aquifers, such as the Edwards, are extremely vulnerable to contamination from surface activities because of thin to nonexistent soils on the Recharge Zone, direct infiltration of surface water, and very high groundwater velocities. Groundwater monitoring and remediation of contamination also pose challenges because of the difficulty in intercepting the preferential flow paths formed by conduit flow conditions. The rapid movement of water in the Aquifer also produces dynamic changes in water chemistry in and near the Recharge Zone. Rapid changes in water chemistry related to the influx of surface water pose problems of sampling frequency. If groundwater chemistry is changing within hours of rainfall, sampling water quality on a quarterly or yearly basis may not be sufficient. Biologic pathogens and nitrates pose the greatest threat to the Aquifer. However, volatile organic compounds (VOCs), herbicides, pesticides, metals, and semi-VOCs are additional threats. Wells in the Aquifer have been closed in the past because of pathogens and VOCs.

2. Saline Zone

The southern and eastern boundary of the Artesian Zone is generally defined as the interface between the Saline Zone and the fresh water Artesian Zone. *See* 2004 CWMP, at 61. This zone is separated from the Artesian Zone of the Aquifer by an interface commonly referred to as the "bad water line." This line demarcates the portion of the Aquifer in which natural water quality exceeds a TDS concentration of 1,000 milligrams per liter. The primary issue associated with the bad water line is its stability during periods of long and intense withdrawals from the Aquifer—for example, during protracted droughts. It is important to the region that the fresh water zone of the Aquifer not become contaminated due to the intrusion of the Saline Zone. Moreover, the bad water line is near Comal Springs and San Marcos Springs, posing a potential threat to those resources. The Authority has been studying issues related to the bad water line for some time. Current investigations have shown that movement of the saline water zone has had no impact on any production wells in spite of the presence of large well fields adjacent to the bad water line.

E. Hydrologic Connection to Surface Water Systems

The above discussion has concerned itself with the Aquifer as a separate and distinct resource. The Aquifer also exists in a larger context and is a principal part of the groundwater/surface water continuum associated with the Guadalupe River Basin. Comal Springs and San Marcos Springs sit on the eastern edge of the Aquifer. *Babbitt*, 995 F.2d at 573. The Aquifer is the source for spring flows emanating from both of these springs. Comal Springs is the headwaters of the Comal River, a tributary to the Guadalupe River, and San Marcos Springs is the headwaters of the San Marcos River, also a tributary to the Guadalupe River.

The volume of flow emanating from Comal and San Marcos Springs is influenced by the water level of the Aquifer, which is influenced by the ratio of recharge over time to both natural discharge through springs and artificial discharge through wells. *See Babbitt*, 995 F.2d at 573. Without regulation, during drought conditions, withdrawals from the Aquifer could increase and thereby reduce flows from the springs. *See Schuele v. Babbitt*, 229 F. Supp. 2d 638, 645 (W.D. Tex. 2000), *vacated sub nom. Shields v. Norton*, 289 F.3d 832 (5th Cir. 2002), *cert. denied*, 537 U.S. 1071 (2002). This is significant because during droughts, the springs may provide a significant source of flow to certain reaches in the Guadalupe River.

Spring flow from the Aquifer provides some base flow for the Guadalupe River. Additionally, the river basins traversing the Recharge Zone of the Aquifer (i.e., the Guadalupe, San Antonio, and Nueces) provide recharge to the Aquifer. Thus, the Edwards Aquifer, associated surfaces streams, Comal Springs/San Marcos Springs system, and downstream water courses are hydrologically connected. In recognition of these facts, the Texas legislature found that groundwater in the Aquifer "has a hydrologic interrelationship to the Guadalupe, San Antonio, San Marcos, Comal, Frio, and Nueces river basins." EAA Act § 1.06(a).

F. Sole Source Designation

As discussed above, the Aquifer is the primary source of water to supply the San Antonio region. Although the San Antonio region has made some gains in diversifying its water supply, at one time the Aquifer was the sole source for the region. Nevertheless, the Aquifer remains the dominant source of water. In recognition of its sole source status, in 1977 the Aquifer was designated by the U.S. Environmental Protection Agency (EPA) as a "sole source aquifer." *See* 42 Fed. Reg. 51,574 (Sept. 29, 1977) (redesignated at 52 Fed. Reg. 23,986 (June 26, 1987)). This action was taken under section 1424(e) of the Safe Drinking Water Act. Sole source aquifers are groundwater supplies designated by the EPA as the sole or principal source of drinking water for a region. Once an aquifer is so designated, projects that receive federal funding and may contaminate the Aquifer are subject to EPA approval. *See* 40 C.F.R. pt. 149, subpt. B (Review of Projects Affecting the Edwards Underground Reservoir, a Designated Sole Source Aquifer in the San Antonio, Texas Area). If the project has the potential to contaminate the Aquifer, then the project must be modified to reduce or eliminate the risk, or else federal funding will be withdrawn. Because projects invoking EPA review are limited to those that receive federal funding, the sole source aquifer designation for the Aquifer does not play much of a role in state management of withdrawals from the Aquifer. It is, however, a major expression of the importance of the Aquifer to the region.

III. Edwards Aquifer Authority

A. Brief History

In 1959, the Aquifer first came under a form of management through the creation of the Edwards Underground Water District (EUWD). Act of Apr. 29, 1959, 56th Leg., R.S., ch. 99, as amended. The EUWD was charged with, among other things, recharge of the Aquifer, waste and pollution prevention, comprehensive water planning, and drought management.

During the tenure of the EUWD, the common-law rule of capture remained intact for the Aquifer. Therefore, existing and future new users of the Aquifer were free to withdraw from the Aquifer as much groundwater as they could beneficially use without regard to liability to third parties. *See Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (Tex. 1904). This prospect was of great concern to downstream water rights holders in the Guadalupe River Basin and environmental springflows interests. This concern stemmed from there being no remedy under prevailing case law to prevent continued reliance on the Aquifer and the reduction of spring flows at Comal Springs and San Marcos Springs. *See Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.) (stating that surface water users downstream of spring discharges have no cause of action against upgradient pumpers for diminishment of spring flows due to groundwater withdrawals alleged to have caused the reduced spring flows); *City of San Antonio v. Texas Water Commission*, 392 S.W.2d 200, 210 (Tex. Civ. App.—Austin 1965), *aff'd*, 407 S.W.2d 752 (Tex. 1966) (finding that the dependability of the natural flows of the Guadalupe River had been destroyed due to increased pumping in the San Antonio region causing decreased spring flows).

To bring the Aquifer under some form of management, downstream surface water users claimed that the Aquifer was not, in fact, percolating water, but instead was an "underground river" and, thus, was "state water" subject to management under the prior appropriation doctrine by the state. This claim first took form in 1989, when the Guadalupe Blanco River Authority (GBRA) filed *Guadalupe Blanco River Authority v. Royal Crest Homes*, No. 89-0381 (22nd Dist. Ct., Hays County, Tex., filed June 15, 1989). This case remains pending, although no action has occurred in years. Taking a cue from this lawsuit, in 1992, the state issued emergency rules declaring the Aquifer to be an "underground river" subject to state regulation. *See* 17 Tex. Reg. 6601 (Sept. 25, 1992). However, these rules were promptly voided by a state trial court because the court found that the Aquifer was percolating underground water. *See McFadin v. Texas Water Commission*, No. 92-05214 (331st Dist. Ct., Travis County, Tex., 1992, appeal dism'd by agreement).

The environmental community also took efforts to force the regulation of the Aquifer using the Endangered Species Act (ESA) as its legal tool. This tactic is not uncommon when state water law is found lacking. *See, e.g.*, Jennie L. Bricker & David Filippi, *Endangered Species Act Enforcement & Western Water Law*, 30 Envtl. L. 735 (Fall 2000). A series of ESA lawsuits were filed, with some seeking to bring the Aquifer under federal control so that withdrawals would be regulated for the benefit of threatened and endangered species dependent on discharges from Comal and San Marcos Springs. *Sierra Club v. Lujan*, No. MO-91-CA-069 (W.D. Tex., Feb. 1, 1993), *appeal dism'd*, *Sierra Club v. Babbitt*, 995 F.2d 571 (5th Cir. 1993), was successful in requiring the U.S. Fish & Wildlife Service (USFWS) to designate minimum spring flows for Comal and San Marcos Springs to ensure the protection of endangered species. In 1993, the EAA Act was passed in response to *Sierra Club v. Lujan* to create the Authority to avoid a federal takeover of the Aquifer.

Sierra Club v. Glickman, 156 F.3d 606 (5th Cir. 1998), resulted in the U.S. Department of Agriculture establishing conservation programs for farmers irrigating from the Aquifer. *Sierra Club v. Babbitt*, No. MO-96-CA-19 (W.D. Tex., Midland/Odessa Div.), successfully enjoined the U.S. Department of Interior to continue to operate the San Marcos National Fish Hatchery and Technology Center and to continue to serve as a refugium for certain endangered species associated with the Aquifer. *Sierra Club v. City of San Antonio*, 112 F.3d 789 (5th Cir. 1997), *cert. denied*, 522 U.S. 1089 (1998), followed in an unsuccessful effort to certify a defendant class of Aquifer users with the purpose of forcing reduction in withdrawals from the Aquifer to levels necessary to maintain minimum spring flows from Comal and San Marcos Springs. The Fifth Circuit found that federal intervention was not appropriate under the *Burford* abstention doctrine. *See Sierra Club v. City of San Antonio*, 112 F.3d 789, 793; *see also Sierra Club v. City of San Antonio*, 115 F.3d 311 (5th Cir. 1997) (addressing various intervention issues). *Shields v. Babbitt*, 229 F. Supp. 2d 638 (W.D. Tex. 2000), *vacated sub nom. Shields v. Norton*, 289 F.3d 832 (5th Cir. 2002), *cert denied*, 537 U.S. 1071 (2002), unsuccessfully sought to bring a *Lopez* Commerce Clause challenge to the application of the ESA to the Aquifer and the threatened and endangered species at Comal and San Marcos Springs. In *Center for Biological Diversity v. Norton*, No. 1:03-CV-02402-JOB (D.D.C. 2003), it was successfully claimed that the USFWS violated the ESA by failing to designate "critical habitat" for the Peck's cave amphipod, Comal Springs riffle beetle, and Comal Springs dryopid beetle at the time those species were listed. Finally, in *WildEarth Guardians v. Salazar*, No. 1.08-cv-A72-CKK (D.D.C. 2009), the parties settled a claim that the USFWS had failed to make the ESA ninety-day finding relative to the Comal Springs Salamander, Texas Cave Diving Beetle, and the Texas Troglobitic Water Slater.

Despite this plethora of Aquifer-related ESA litigation, the Authority has been in existence since June 1996 and performing its duties under the Act. The remainder of this chapter will focus on the law of the Aquifer as found in the EAA Act as administered by the Authority.

B. Legal Nature of the Authority

The Authority was created as a "conservation and reclamation district" pursuant to article XVI, section 59, of the Texas Constitution. EAA Act §§ 1.02, 1.06(b), 1.08(a). It is a groundwater conservation district (GCD). *See* Tex. Water Code § 36.001(1). The Authority is not a "state agency" because it has jurisdiction over only a portion of the State of Texas, and the members of its governing body are elected in local elections or appointed by locally elected officials. *See Guaranty Petroleum Corp. v. Armstrong*, 609 S.W.2d 529, 531 (Tex. 1980). As a conservation and reclamation district, the Authority is an instrumentality established by the Texas legislature at the local level to provide for the conservation, development, and preservation of the natural resources in its boundaries. *See* Tex. Const. art. XVI, § 59(b). It is a political subdivision of the state and stands on the same footing as counties and other political subdivisions. *See* Tex. Const. art. XVI, § 59(b); *Bennett v. Brown County Water Improvement District No. 1*, 272 S.W.2d 498, 500 (Tex. 1954), *accord Willacy County Water Control & Improvement District No. 1 v. Abendroth*, 177 S.W.2d 936, 937 (Tex. 1944). As a conservation and reclamation district, the Authority is a governmental agency and body politic and corporate. Tex. Const. art. XVI, § 59(b); EAA Act § 1.02(a). The Authority performs governmental functions and exercises the state's police power essentially as agents of the state to protect the health, safety, comfort, and welfare of the public, specifically by regulating and managing the Aquifer for the overall welfare of the public. *See Banker v. Jefferson County Water Control & Improvement District No. 1*, 277 S.W.2d 130, 133–34 (Tex. Civ. App.—Beaumont 1955, writ ref'd n.r.e.).

C. Governance

1. Board of Directors

The Authority is governed by a seventeen-member board of directors. EAA Act § 1.09(a). Fifteen of the directors are elected from single-member districts, and two are appointed. EAA Act § 1.09(a). One of the appointed directors is selected by the South Central Texas Water Advisory Committee. EAA Act § 1.091(b). The other appointed director is named, on an alternating basis, by the county commissioners court of Medina County and Uvalde County. EAA Act § 1.091(c). Elected directors serve staggered four-year terms, with elections occurring in even-numbered years. EAA Act § 1.09(a), (b). Appointed directors also serve four-year terms. EAA Act § 1.091(d).

The board governs itself through its bylaws. *See* Edwards Aquifer Authority Bylaws (EAA Bylaws) (May 2013). Its meetings are conducted under the Texas Open Meetings Act. See EAA Bylaws art. 14.05(a); Tex. Gov't Code ch. 551. The procedural rules governing board meetings are Robert's Rules of Order, as modified by the board. *See* EAA Bylaws art. 6.09(b); Edwards Aquifer Authority Parliamentary Rules of Conduct (1998). Board meetings are open to the public. Notice of board meetings is posted (1) outside the Authority's business office in San Antonio, (2) at the Bexar County Courthouse in San Antonio, and (3) on the Web site maintained by the Texas secretary of state. *See* Tex. Gov't Code § 551.053(a), (b). To be valid, actions of the board must be adopted by the affirmative vote of a majority of the fifteen voting members when a quorum of those directors is present. EAA Act § 1.09(f). With the exception of voting on matters before the board, appointed directors are authorized to fully participate in board meetings in the same manner as elected directors. EAA Act § 1.091(e). Directors receive no compensation but may be reimbursed for expenses. *See* EAA Act §§ 1.09(g), 1.091(f).

2. Committees of the Board

The board functions through a "committee system." *See* EAA Bylaws art. XI. Under this system, staff first makes presentations to the appropriate committee on an issue under consideration. The committee then takes a vote to make a recommendation to the full board. Committees may vote to recommend approval or denial, make no recommendation, or table the matter for later consideration. EAA Bylaws art. 11.03(d). Committees have no authority to make final decisions for, or otherwise bind, the board. They may make recommendations only on matters that the board may have under consideration. The executive committee is authorized to set the agenda for a board meeting. EAA Bylaws arts. 6.05, 11.01(b)(2).

The various standing committees of the board are organized around the following: (1) Aquifer management and planning, (2) agenda development (executive committee), (3) finance and administration, (4) permits and compliance, (5) research and technology, and (6) legislative issues. EAA Bylaws art. 11.01. From time to time, ad hoc committees may also be established at the discretion of the board chair.

Board committees are not subject to the Texas Open Meetings Act. *See* Tex. Water Code § 36.064(b); EAA Bylaws art. 14.05(b). However, notice of committee meetings is given consistent with the Open Meetings Act. Committee meetings are open to the public. Appointed directors are authorized to fully participate in committee meetings in the same manner as elected directors, including voting on matters coming before the committee.

3. *General Manager and Staff*

The board of the Authority may hire an executive director as its chief administrative officer. EAA Act § 1.11(d)(5). In keeping with the practice of most groundwater conservation districts (GCDs), the Authority refers to its executive director as its "general manager." The Authority may also hire employees as necessary to enable it to carry out its powers and duties. EAA Act § 1.11(d)(5). The board has delegated the staff-hiring function to its general manager. *See* EAA Act § 1.11(d)(6). The general manager and staff implement the EAA Act and board policy as directed by the board. Authority staff is generally organized according to the various administration, water quantity, water quality, and research programs of the Authority.

D. Applicable Law

The Texas Constitution specifically provides that GCDs, such as the Authority, have only such powers and authorities as "may be conferred by law." *See* Tex. Const. art. XVI, § 59(b). As a conservation and reclamation district, the Authority has two types of powers. First, it has all those powers expressly granted to it by the legislature. *See, e.g., Tri-City Fresh Water Supply District No. 2 of Harris County v. Mann*, 142 S.W.2d 945, 948 (Tex. 1940); *Franklin County Water District v. Majors*, 476 S.W.2d 371, 373 (Tex. Civ. App.—Texarkana 1972, writ ref'd n.r.e.). Second, the Authority has those powers that are necessarily implied to carry out its express powers under the EAA Act. *See* Tex. Att'y Gen. Op. No. JC-0011 (1999) (citing *Texas Roofing Co. v. Whiteside*, 385 S.W.2d 699, 701 (Tex. Civ. App.—Amarillo 1965, writ ref'd n.r.e.)); *cf. State v. Public Utility Commission of Texas*, 883 S.W.2d 190, 194 (Tex. 1994); *Benavides Independent School District v. Guerra*, 681 S.W.2d 246, 249 (Tex. App.—San Antonio 1984, writ ref'd n.r.e.); *Jackson County Hospital District v. Jackson County Citizens for Continued Hospital Care*, 669 S.W.2d 147, 154 (Tex. App.—Corpus Christi 1984, no writ).

Other than the EAA Act, the Authority additionally may look to other general laws to support its authority to manage and regulate the Aquifer and conduct its affairs. Section 1.08(a) authorizes the Authority to look to chapters 36, 49, and 51 of the Texas Water Code and other "general laws" for supplemental authority. The EAA Act actually refers to chapter 52 of the Texas Water Code, which formerly related to underground water conservation districts. However, chapter 52 has since been repealed and recodified as chapter 36, addressing GCDs. *See* Act of May 29, 1995, 74th Leg., R.S., ch. 933, § 6. The specific reference to chapter 52 in the EAA Act notwithstanding, it has been held that the subsequent recodification to chapter 36 applies to the Authority. *See, e.g., In re Edwards Aquifer Authority*, 217 S.W.3d 581, 587–88 (Tex. App.—San Antonio, 2006, no pet.). In the 84th legislature, the EAA was exempted from the application of Texas Water Code chapter 36, subchapter D (Powers and Duties). Act of May 31, 2015, 84th Leg., R.S., ch. 1196, § 4 (adding Tex. Water Code § 36.125). Additionally, the EAA Act refers to chapter 50 of the Texas Water Code, formerly relating to general law districts. Chapter 50 has also been repealed and recodified in chapter 49, relating to provisions applicable to all districts. *See* Act of May 25, 1995, 74th Leg., R.S., ch. 715, §§ 2, 39. The Texas Attorney General has concluded that chapter 49 applies to the Authority. *See* Tex. Att'y Gen. Op. No. JC-0006, at 2 (1999). This result is consistent with the logic of *In re Edwards Aquifer Authority* for the applicability of chapter 49 to the Authority due to the specific reference in section 1.08(a) to chapter 50 and its subsequent recodification into chapter 49.

Texas Water Code chapter 36 is the basic law applicable to GCDs. To the extent that they are relevant, the Authority looks to these others laws to "fill in any gaps" on issues about which the Act is silent. However, in the event of a conflict, the Act prevails. *See* EAA Act § 1.08(a). It is beyond the scope of this chapter to discuss the legal authority of the Authority derived from chapters 36, 49, and 51, and other applicable general laws.

E. Jurisdiction

1. Geographic Jurisdiction

a. Groundwater Quantity

For water quantity management of the Aquifer, the jurisdictional boundaries of the Authority encompass all of Bexar, Medina, and Uvalde counties and the parts of Atascosa, Caldwell, Comal, Guadalupe, and Hays counties within the boundaries of the Authority. *See* EAA Act §§ 1.02(a), 1.04.

b. Groundwater Quality

For water quality management of the Aquifer, the Authority's jurisdiction includes its general jurisdictional boundaries and an extraterritorial jurisdiction of five miles beyond its boundaries. *See* EAA Act § 1.08(c). The Authority's extraterritorial water quality jurisdiction does not include the portion in Bandera County. EAA Act § 1.08(c). The purpose of the five-mile water quality buffer zone is to give the Authority an opportunity to prevent pollution of surface water from entering the Authority's boundaries that may ultimately recharge the Aquifer. EAA Act § 1.08(c). The Authority's water quality jurisdiction extends to the entirety of Bexar, Medina, and Uvalde counties and parts of Atascosa, Bastrop, Caldwell, Comal, Edwards, Frio, Gonzales, Guadalupe, Hays, Kendall, Kinney, Maverick, Real, Travis, Wilson, and Zavala counties.

2. Subject Matter Jurisdiction

a. Groundwater Quantity

i. Withdrawals from Wells

The Authority has jurisdiction over groundwater residing *in situ* in the Aquifer underlying its boundaries. *See* EAA Act § 1.08(b). The Authority has no jurisdiction over groundwater in any other aquifer. The Authority has jurisdiction to manage withdrawals from the Aquifer and to manage points of withdrawals from which Aquifer groundwater is taken. *See* EAA Act § 1.15(a). These functions are accomplished primarily through its permit program. Persons may not generally make withdrawals from the Aquifer unless they first obtain a groundwater withdrawal permit from the Authority. *See* EAA Act § 1.15(b). Likewise, wells, or other works designed for the withdrawal of groundwater from the Aquifer, may not be constructed without a well construction permit having first been issued by the Authority. EAA Act § 1.15(b).

Additionally, the Authority continues to retain jurisdiction over the use of groundwater after it has been withdrawn from the Aquifer. EAA Act § 1.08(b) (noting that the Authority's powers extend to water *withdrawn* from the Aquifer). This jurisdiction is exercised for various purposes, including regulation to prevent waste (*see, e.g.*, EAA Act § 1.35(c)), use for a beneficial purpose, and conservation and efficient use (*see, e.g.*, EAA Act § 1.23). The use of water is also regulated to ensure that it is used only within the Authority's boundaries. EAA Act § 1.34(a). Finally, to ensure that water is used in appropriate amounts during drought conditions, the Authority may regulate the use of water by end users through its critical period program. *See, e.g.*, EAA Act § 1.26.

ii. Discharges from Springs

The Authority has not been given the power to regulate naturally occurring discharges of groundwater from the Aquifer through springs. Spring flow hydrologically connected to the Aquifer is essentially the surface expression of groundwater from the Aquifer. *See Water and Water Rights* ¶ 11.06(c)(2) (Robert E. Beck ed., LexisNexis 3d ed. 2014). Unless a spring is altered by the installation of man-made facilities to enhance its discharge, the discharge of groundwater from the Aquifer through a spring is not a "withdrawal." *See* EAA Act § 1.03(25) (defining "withdrawal" as the taking of water from the Aquifer from a man-made facility). Nor can an unaltered natural spring opening be considered a "well." *See* EAA Act § 1.03(22) (defining "well," among other things, to require a bored, drilled, or driven shaft or an artificial opening). As such, a spring and its discharge would not qualify as a "withdrawal point" or a "withdrawal" subject to the Authority's management and permitting authority under section 1.15(a) and (b) of the EAA Act.

After groundwater from the Aquifer is discharged through a spring, the Authority loses jurisdiction over the water. Groundwater from the Aquifer, upon arising to the surface through a spring, is no longer located "within" the Aquifer. *See* EAA Act § 1.08(b). Moreover, as discussed above, spring discharges are not "withdrawals" from the Aquifer to which the Authority's continuing jurisdiction applies. *See* EAA Act § 1.08(b). Rather, discharges from springs into a watercourse are regulated by the Texas Commission on Environmental Quality (TCEQ) as state surface water. *See Edwards Aquifer Authority v. Day*, 369 S.W.3d 814, 822–23 (Tex. 2012).

b. Groundwater Quality

The Authority was created, among other things, to protect the Aquifer and is empowered by the Act to prevent the waste or pollution of its groundwater. The Authority is given broad powers to "manage, conserve, preserve, and protect the aquifer . . . and prevent the waste or pollution of water in, the aquifer." EAA Act § 1.08(a). The Act prohibits the pollution, or contribution to the pollution, of the Aquifer. EAA Act § 1.35(d). The Texas Supreme Court in *Bragg v. Edwards Aquifer Authority* commented that "[t]he Legislature created the [Authority] for the express purpose of . . . managing the water in the aquifer. . . . It provided the Authority with 'all of the powers, rights, and privileges necessary to manage, conserve, preserve, and protect the aquifer and to . . . prevent the waste or pollution of water in, the aquifer.'" 71 S.W.3d 729, 736 (Tex. 2002).

The Act defines "pollution" as "the alteration of the physical, thermal, chemical, or biological quality of any water in the state, or [its] contamination . . . that renders the water harmful, detrimental, or injurious to humans . . . or public health, safety or welfare or that impairs the usefulness of the public enjoyment of the water for any . . . purpose." EAA Act § 1.03(17). The phrase "any water in the state" is broad enough to include both groundwater in the Aquifer and surface water recharging the Aquifer.

Closely related to the authority to prevent pollution is the Authority's responsibility to prevent "waste" of groundwater in the Aquifer. *See, e.g.*, EAA Act §§ 1.03(17) (defining "pollution"), 1.03(21) (defining "waste"), 1.08(a) (authorizing the Authority to "prevent the waste or pollution of water in, the aquifer"), 1.35(c), (d) (prohibiting the waste and pollution of the Aquifer). "Waste" is defined, in relevant part, to include (1) "withdrawal of underground water from the aquifer at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes"; and (2) "pollution or harmful alteration of underground water in the aquifer by salt water or other deleterious matter admitted from another stratum or from the surface of the ground." EAA Act § 1.03(21)(A), (D).

Additionally, the EAA Act refers to the Authority's power to carry out its pollution control powers outside of its delineated boundaries extended into a five-mile buffer zone. *See* EAA Act

§ 1.08(c). The Authority is to regulate withdrawals from the Aquifer and to limit those withdrawals to protect the water quality of the Aquifer, the surface springs dependent on the Aquifer, aquatic and wildlife habitat, and threatened and endangered species. EAA Act § 1.14(a).

c. Surface Water

The Authority has no power to regulate the appropriation of surface water within its boundaries. *See* EAA Act § 1.08(b); *Edwards Aquifer Authority v. Day*, 274 S.W.3d 742, 752 (Tex. App.—San Antonio 2008), *aff'd*, 369 S.W.3d 814 (Tex, 2012). Surface water in Texas is owned by the state and held in trust for the public. *See City of Marshall v. City of Uncertain*, 206 S.W.3d 97, 101 (Tex. 2006). The TCEQ retains jurisdiction over the management of surface water. *See generally* Tex. Water Code §§ 11.001–.561. Surface water—water in a watercourse—is essentially aligned with the definition of "state water" in Texas Water Code section 11.021(a). *See City of Marshall*, 206 S.W.3d at 101 n.6; *City of San Marcos v. Texas Commission on Environmental Quality*, 128 S.W.3d 264, 272 (Tex. App.—Austin 2004, pet. denied).

3. *Interjurisdictional Issues*

a. In General

The Texas legislature has given to the Authority the mission of regulating and managing the Aquifer for the benefit of its many stakeholders. This mission includes identifying and quantifying the groundwater rights in the Aquifer, protecting the Aquifer from pollution, and ensuring adequate flows for the threatened and endangered species associated with the Aquifer. *See* EAA Act §§ 1.14, 1.16. As this mission is carried out, downstream surface water rights holders in the Guadalupe River Basin are indirectly benefited by the nonconsumptive environmental flows from Comal and San Marcos Springs. Many other federal, state, and local governments have regulatory authority over some of these issues or have a stake in how the Authority accomplishes its mission. Given the gravity of the Authority's mission, the legislature has directed all state and other local units of governments to cooperate with the Authority to the maximum extent practicable to facilitate the Authority's accomplishment of its mission. *See* EAA Act § 3.04. The Authority is to report to the Texas legislature on the level of cooperation the Authority has received from the other governmental entities. EAA Act § 3.04.

b. Groundwater Quantity

There are not many opportunities for interjurisdictional conflicts between the Authority and state agencies over the management and regulation of the Aquifer. Through the EAA Act, the legislature assigned to the Authority the management of the Aquifer. The Texas Parks & Wildlife Commission (TP&WC) has an interest in the management of the Aquifer for the benefit of threatened and endangered species associated with the Aquifer, but it has no authority to regulate withdrawals from the Aquifer. The Texas Water Development Board (TWDB) has groundwater planning functions, but it has no direct regulatory authority over the Aquifer. The TCEQ administers the state's surface water rights laws, but it has no authority to regulate or manage withdrawals from the Aquifer. *See City of Sherman v. Public Utility Commission*, 643 S.W.2d 681, 686 (Tex. 1983) (noting that Texas Water Code chapter 52 (now chapter 36) is the "sole source of statutory regulation of groundwater production"); *see also McFadin v. Texas Water Commission*, No. 92-05214 (331st Dist. Ct., Travis County, Tex. 1992, appeal dism'd by agreement) (holding that the predecessor agency to the TCEQ had no authority to enact rules to regulate the Aquifer).

Nor is there much potential for interjurisdictional conflicts over the regulation of withdrawals of the Aquifer at the local level. Counties do not generally assert jurisdiction over the withdrawal of groundwater from the Aquifer. Municipal corporations may prohibit groundwater withdrawals as a condition of water service, but do not otherwise regulate withdrawals from the Aquifer.

Multiple GCDs have been created with jurisdictions overlapping that of the Authority. *See* EAA Act §§ 1.42(a), 1.43. Within the boundaries of the Authority, the Leona Gravels, Austin Chalk, and Buda aquifers overlie the Edwards Aquifer. At some locations, the Trinity Aquifer is adjacent to or underlies the Aquifer. 2004 CWMP, at 50. The primary interaction between the Authority and other overlying GCDs occurs when a person wants to drill through the Aquifer in order to enter an underlying aquifer. In such an event, the person drilling the well would need to seek a well construction permit from both the Authority and the other GCD with jurisdiction.

The seven other GCDs managing other aquifers with boundaries overlapping the Authority's are (1) the Uvalde County Underground Water Conservation District, (2) the Medina County Groundwater Conservation District, (3) the Evergreen Underground Water Conservation District, (4) the Guadalupe County Groundwater Conservation District, (5) the Plum Creek Conservation District, (6) the Trinity Glen Rose Groundwater Conservation District, and (7) the Barton Spring/Edwards Aquifer Conservation District.

Section 1.42(b) of the EAA Act additionally provides that other GCDs may manage and regulate the Aquifer. However, the district's management may not conflict with, or be duplicative of, the EAA Act, the Authority's rules, or orders of the board. *See* EAA Act § 1.42(c). In light of the comprehensive scope of the management and regulation of the Aquifer manifested by the Act and the Authority's rules and programs, there is virtually no remaining room for any other GCD to regulate the Aquifer without first seeking a delegation from the Authority.

If requested by a GCD, the Authority may delegate its authority to the GCD if the GCD can demonstrate to the Authority's satisfaction that it can perform at the level dictated by the EAA Act. To obtain delegation, the GCD must show that is has (1) full and complete statutory authority to enforce the delegated functions, (2) rules and policies to implement the delegated functions, (3) a monitoring system to track the adequacy of the GCD's performance, and (4) positive performance of previously delegated functions. *See* EAA Act § 1.42(c), (d). After notice and a corrective action period, the Authority may terminate a delegation of authority to a GCD for nonperformance. *See* EAA Act § 1.42(e). To date, no other GCD has sought such a delegation or otherwise regulates the Aquifer.

c. Groundwater Quality

More opportunity exists for interjurisdictional conflicts in the area of protecting Aquifer water quality. Each level of government—federal, state, and local—has its own array of regulatory programs intended to protect the Aquifer from contamination. The issue that arises under such circumstances is whether the programs may coexist with one another because a local unit of government is exercising concurrent jurisdiction over the Aquifer, or whether one or more programs is preempted. The law of preemption generally provides that a local regulation may be preempted by an express statement of preemptive intent, or by implication in the event of "occupation of the field," or a "conflict" between the local and state or federal law.

In general, federal and state law tend to avoid preempting local regulation of local water quality issues. With some exceptions, state and federal laws are crafted so as not to expressly preempt the Authority from protecting the water quality of the Aquifer. An example of express preemption is the sole authority of the TCEQ to designate water quality standards consistent with the Clean Water Act. *See* Tex. Water Code § 26.023. Otherwise federal and state law are careful not to reserve exclusive jurisdiction over Aquifer water quality in the federal or state governments.

For example, TCEQ regulations in 30 Texas Administrative Code chapter 213 are designed to protect the Aquifer from pollution by regulating activities that occur in the Contributing and Recharge zones that can generate nonpoint source pollution and affect the quality of the surface water that may recharge the Aquifer. TCEQ's chapter 213 rules cover a broad range of development activities that may affect surface water quality that could involve the Aquifer. However, the chapter 213 rules themselves make clear that other entities, such as the Authority, may also adopt water quality rules to protect the Aquifer. *See* 30 Tex. Admin. Code §§ 213.1(2) (providing that chapter 213 is not intended to restrict the powers of any other governmental entity to regulate activities that may pollute the Aquifer or hydrologically connected surface waters), 213.11 (specifically recognizing the authority of GCDs), 213.4(a)(5) (authorizing delegation of the TCEQ's program to a local unit of government on a showing that, among other things, the local entity has a similar program in place). This leads to the conclusion that the Authority and the TCEQ share concurrent jurisdiction over Aquifer water quality.

Local governments, such as municipalities, also have the authority within their respective jurisdictions to regulate activities that may affect Aquifer water quality. Pursuant to its inherent police power, a city may enact reasonable regulations to promote the health, safety, and welfare of its people. *City of College Station v. Turtle Rock Corp.*, 680 S.W.2d 802, 805 (Tex. 1984). Local water quality regulations may cover the same subject matter as the Authority's water quality rules. Normal rules of statutory construction provide that, where possible, competing laws should be read in harmony with one another. *See General Elevator Corp. v. Champion Papers*, 590 S.W.2d 763, 764 (Tex. Civ. App.—Houston [14th Dist.] 1979, writ ref'd n.r.e.). However, when competing local regulation differs from the Authority's rules, the more specific and restrictive rule will control. *See City of Baytown v. Angel*, 469 S.W.2d 923, 924 (Tex. Civ. App.—Houston [14th Dist.] 1971, writ ref'd n.r.e.).

F. Rulemaking

1. *In General*

The Authority has been given broad grants of authority under the EAA Act. The Authority must implement its powers and duties through rulemaking. *See* EAA Act § 1.11(a). The legislature may use broad standards in delegating rulemaking authority to agencies required to investigate and find facts (as the court in *Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (Tex. 1996), characterized the Authority's permit program) in order to properly carry out legislative policy. *State v. Texas Municipal Power Agency*, 565 S.W.2d 258, 273 (Tex. Civ. App.—Houston [1st Dist.] 1978, writ dism'd).

The duty to adopt implementation rules applies to the administration of its substantive programs and procedural rules governing practice before the Authority. *See* EAA Act § 1.11(a). Procedural rules are to include rules governing matters subject to contested case hearings, consistent with subchapters C, D, and F of the Administrative Procedures Act, Texas Government Code chapter 2001. EAA Act § 1.15(f). The Authority's procedural rules governing the practice before the agency are found at chapter 707 of the Authority's rules. *See* EAA Rules §§ 707.101–.625. The Authority's rulemaking procedural rules implementing section 1.115 of the EAA Act are at chapter 703. *See* EAA Rules §§ 703.1–.15.

In conducting its rulemaking, the Authority is not required to comply with the Texas Private Real Property Rights Preservation Act, chapter 2007, Texas Government Code. Thus, the Authority is not required to prepare "takings impact assessments" to support its rulemaking. *See Bragg v. Edwards Aquifer Authority*, 71 S.W.3d 729, 736–37 (Tex. 2002).

2. Regular Rulemaking

The Authority must follow certain procedures when engaging in rulemaking. The rulemaking procedures apply only to "rules" of the Authority. They do not apply to the adoption of Authority bylaws or internal procedures of the board of the Authority and staff. *See* EAA Act § 1.115(f).

Before September 1, 2001, the Authority was required to comply with the Texas Administrative Procedures Act (APA) (Tex. Gov't Code ch. 2001). *See* EAA Act § 1.11(h), *repealed by* Act of May 28, 2001, 77th Leg., R.S., ch. 966, § 6.03. In 2001, this duty was repealed and replaced by a scaled-down set of requirements in section 1.115 of the EAA Act.

Under section 1.115 of the EAA Act, the Authority must give written notice of its proposed rules to all persons with applications pending before the Authority and holders of Authority permits. EAA Act § 1.115(b). The Authority must conduct a public hearing on all proposed rules. EAA Act § 1.115(b). At least a fourteen-day notice of the public hearings must be given by publication in a newspaper of general circulation within the Authority's boundaries. EAA Act § 1.115(b). The Authority is to prepare a general statement of the subject matter of the proposed rules and include the statement in the notice of public hearings. EAA Act § 1.115(b)(2). Persons may file written comments on the proposed rules. EAA Act § 1.115(c). The Authority must allow at least forty-five days for public comments before the board may take action on the proposed rules or adopt them as final rules. EAA Act § 1.115(c). The board is required to consider the written comments in the decision-making process. EAA Act § 1.115(c). In adopting proposed rules as final rules, the board must issue an order containing a statement of the reasons and justifications for the rules and the Authority's responses to any written comments. EAA Act § 1.115(c). The Authority is not required to officially respond to oral comments that may have been made at a public hearing. An action on the order to adopt final rules must take place at an open meeting conducted under the Texas Open Meetings Act. *See* EAA Act § 1.115(d). At that board meeting, the board must allow the public to comment on the proposed action to adopt the rules, as well as the Authority's responses to the written public comments. EAA Act § 1.115(d). Final rules of the Authority become effective on the tenth day after the date of the board's action to adopt the order adopting final rules. EAA Act § 1.115(d).

3. Emergency Rulemaking

In the normal course of action, the Authority adopts its final rules through "regular" rulemaking procedures. However, it may, under appropriate circumstances, invoke more abbreviated emergency rulemaking procedures.

The Authority may adopt rules through emergency procedures under two circumstances: (1) if circumstances may result in "imminent harm to human health, safety, or welfare," or (2) if compliance with ordinary rulemaking procedures prevents "an effective response to emergency aquifer or springflow conditions." EAA Act § 1.115(e). Under these circumstances, the board needs to give only a five-day public notice of the proposed action to adopt emergency rules. EAA Act § 1.115(e). Emergency rules are effective for 120 days and may be renewed for another 60 days. EAA Act § 1.115(e). The Authority's rules implementing emergency rules are found at section 703.15. *See* EAA Rules § 703.15.

G. Revenues

1. Property Taxes Prohibited

The Authority is prohibited from assessing ad valorem property taxes to fund its operations. *See* EAA Act § 1.28(a).

2. Fees

a. Aquifer Management Fees

The Authority may assess aquifer management fees (AMFs) to finance its administrative expenses and programs. EAA Act § 1.29(b). Authority rules to implement its fee authority are in chapter 709. *See* EAA Rules §§ 709.15–.45. The Authority assesses two types of AMFs: aquifer management fees to provide revenue for its administrative expenses, and "program" aquifer management fees to provide revenues to fund its Edwards Aquifer Habitat Conservation Plan. EAA Rules § 709.18(a). AMFs are not considered taxes imposed merely for the purposes of raising revenue for the Authority, but rather are assessed for the purpose of regulating the Aquifer. For this reason, the Authority is not required to conduct an election prior to assessing the AMFs against water users. *See* Tex. Att'y Gen. LO-97-012 (1997). AMFs must be equitable and based on Aquifer use recognized under the Authority's water management plan. EAA Act § 1.29(b). The Authority may not collect more in AMFs than is reasonably necessary for its administration. EAA Act § 1.29(b). Moreover, the Authority may not use AMFs to pay for the costs of reducing withdrawals or permit retirements or of judgments or related claims. EAA Act § 1.29(h). Differential fee structures between different types of use are permissible. *See* EAA Act § 1.29(e). AMFs for agriculture uses may not exceed $2.00 per AF and must be assessed on the amount of groundwater actually withdrawn in a calendar year. *See* EAA Act § 1.29(e). Agricultural use includes irrigation and certain industrial uses. Industrial uses qualifying for the lower agricultural use fee include cultivation; floriculture, viticulture, silviculture, and horticulture; nursery growers; animal breeding; wildlife management; equine animals; and cover crops. *See* EAA Act § 1.03(26), (27).

Nonagricultural users are assessed AMFs based on the face value of their initial regular permits (IRPs), irrespective of the amount of groundwater actually withdrawn. *See* EAA Act § 1.29(e). Nonagricultural users are municipal users and industrial users who cannot qualify for agricultural treatment.

The Authority may enter into "in-lieu-of-AMF" contracts with other GCDs with overlapping jurisdiction. Under these contracts, GCDs would pay a portion of the expenses of the Authority on behalf of the well owners inside the GCD with groundwater withdrawal permits issued by the Authority. *See* EAA Act § 1.29(b). The GCDs would collect revenues through ad valorem property taxes instead of the well owner paying AMFs directly to the Authority. The amount of a GCD's total payment to the Authority under this system would equal what the Authority would have been entitled to had the Authority assessed AMFs directly on the well owner. *See* EAA Act § 1.29(b). None of the six GCDs with overlapping jurisdiction has yet availed itself of this approach.

b. Application Fees

The Authority may assess permit application fees not exceeding $25. EAA Act § 1.29(f).

c. Registration Fees

The Authority may assess registration fees not exceeding $10. EAA Act § 1.29(g).

d. Administrative Fees

The Authority may assess administrative fees to recover its costs of performing certain administrative acts. EAA Rules §§ 709.41–.45.

3. Bond Proceeds

The Authority may issue revenue bonds for land, facilities, and equipment. EAA Act § 1.28(b). Any revenue bonds issued by the Authority are subject to review and approval by the Texas attorney general. EAA Act § 1.28(c). Bond proceeds of the Authority may be organized into those funds and accounts and invested as the Authority deems appropriate. EAA Act § 1.28(d).

H. Contracts

The Authority may enter into contracts. EAA Act §§ 1.11(d)(2), 1.27(d).

I. Suits

The Authority may sue and be sued. EAA Act § 1.11(d)(3).

J. Financial Assistance

The Authority may receive financial assistance through gifts, grants, awards, and loans to carry out its programs. EAA Act §§ 1.11(d)(4), 1.24(b). When acquiring groundwater withdrawal permits from the Aquifer, the Authority is specifically authorized to look to the TWDB for funding assistance. *See* EAA Act § 1.22(c).

K. Property Ownership and Water Rights

The Authority may own real and personal property. EAA Act § 1.11(d)(7). This includes the right to acquire surface water and groundwater rights. EAA Act § 1.22(b). Groundwater rights may be acquired from any aquifer (including the Aquifer). Surface water rights may be from any watercourse whether inside or outside of the Authority's boundaries. In administering its financial assistance programs, the Authority may also acquire all or part of a groundwater withdrawal permit to be transferred to the Authority. *See* EAA Act § 1.24(c). The amount that the Authority may require to be transferred is equal to the amount of the permit that is conserved or made available due to the construction of a water management project. *See* EAA Act § 1.24(c).

L. Eminent Domain

The Authority has the power of eminent domain but may not exercise this power to acquire groundwater rights. EAA Act § 1.11(g).

M. Authority Oversight

1. *In General*

The Authority has more extensive management responsibilities than the typical GCD. GCDs generally manage aquifers within their jurisdictions for the benefit of the direct users of the aquifer. In addition to this function, the Authority must also conduct fact-finding proceedings to determine who qualifies for groundwater rights in the Aquifer, prevent the contamination of the Aquifer, and manage the Aquifer for the benefit of threatened and endangered species. EAA Act §§ 1.14, 1.16. Because of the hydrologic connection between the Aquifer and the Guadalupe River Basin, downstream surface water rights holders in this Basin are also affected by the Authority's Aquifer management responsibilities. The Authority is to perform all of these functions in a way that avoids federal intervention from the courts. Perhaps because of these enhanced management responsibilities, the legislature felt a special need to create various bodies overseeing the activities of the Authority.

2. *South Central Texas Water Advisory Committee*

a. In General

The South Central Texas Water Advisory Committee (SCTWAC) is a twenty-member body whose members are appointed from various cities and counties within the boundaries of the Authority and in the Guadalupe, San Antonio, and Nueces River Basins. *See* EAA Act § 1.10(a). The SCTWAC is charged with advising the Authority on downstream water rights and issues. *See* EAA Act § 1.10(a). Other duties of the SCTWAC include assisting the Authority in the development of its demand management plans. EAA Act § 1.10(i)(1).

The Authority is required to send to SCTWAC members all communications of the Authority that are delivered to the Authority's board. EAA Act § 1.10(e). Although SCTWAC members may participate in Authority board meetings on matters within their scope, they may not vote on matters pending before the board. EAA Act § 1.10(e). Funding for SCTWAC activities is provided by the Authority from AMFs assessed on holders of Authority groundwater withdrawal permits. *See* EAA Act § 1.29(i).

b. Effectiveness Reports

Every even-numbered year, the SCTWAC must file a report with the TCEQ and the Authority assessing the "effect on downstream water rights of the management of the aquifer," and the Authority is required to consider the report in its management of the Aquifer. EAA Act § 1.10(h).

c. Reconsideration of Authority Actions and TCEQ Review

The SCTWAC may ask the board to reconsider an action taken by the board that the SCTWAC deems to be "prejudicial to downstream water interests" in the Guadalupe River Basin. EAA Act § 1.10(f). Upon such request, the board has three options: (1) it may vote to reconsider the matter, rescind the prior action, and take other action; (2) it may vote to reconsider and, after further review, let the prior action stand; or (3) it may vote not to reconsider the matter and let its prior action stand.

If the SCTWAC is not satisfied with the action taken by the board on its request for reconsideration, the SCTWAC may request the TCEQ to review the action. EAA Act § 1.10(f).

Although the TCEQ must conduct the requested review, it retains discretion as to whether to make a recommendation to the board. EAA Act § 1.10(f). Any TCEQ recommendation to the board is purely advisory. It is solely within the discretion of the board to determine the import of the TCEQ's recommendation. However, if the board determines that the board's "action is contrary to an action of the [TCEQ] affecting downstream interests," then the board must reverse itself. EAA Act § 1.10(f).

The SCTWAC has invoked this procedure only once when it sought to overturn certain rulemaking of the Authority. *See* In the Matter of the Request of the South Central Texas Water Advisory Committee for the Texas Commission on Environmental Quality to Review the Final Action of the Board of Directors of the Edwards Aquifer Authority Taken on December 16, 2003, to Adopt Resolution and Order No. 12-03-478 Relative to Certain Rulemaking (TCEQ Docket No. 2004-1705-MIS, docketed Oct. 22, 2004). In December 2003, the Authority had adopted final rules to create a system of uninterruptible and interruptible withdrawal rights packaged within its IRPs (the principal permit the Authority issues to authorize withdrawals of groundwater from the Aquifer). These rights are referred to as the "junior/senior" permit system. The Authority adopted this system to reconcile conflicting sections of the EAA Act. Section 1.14(b) created a "cap" of 450,000 AF per year for aggregate permit withdrawal amounts under IRPs. Section 1.16(e) required the Authority to issue IRPs in certain specified statutory minimum withdrawal amounts. The sum of the statutory minimums exceeded the cap. In January 2006, the TCEQ determined that the junior/senior system was prejudicial to downstream surface water rights holders on the Guadalupe River Basin and recommended that the Authority find the rulemaking to be contrary to an action of the TCEQ and to repeal the rulemaking. *See also* Tex. Att'y Gen. Op. No. GA-0498 (2007) (concluding, among other things, that the Authority must issue IRPs qualifying for a statutory minimum without an interruptible component). This matter was essentially mooted by legislative action in 2007 wherein the conflict between the 450,000-AF-per-year cap and the statutory minimum was resolved by amending section 1.14(c) of the EAA Act to raise the cap to 572,000 AF per year. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.02, 2.09; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.02, 12.09 (repealing section 1.14(b) and amending section 1.14(c) of the Act). See also the discussion in section IV.C below.

3. *Edwards Aquifer Legislative Oversight Committee*

The Edwards Aquifer Legislative Oversight Committee consists of six members of the Texas legislature—three members of the senate appointed by the lieutenant governor and another three members appointed by the speaker of the house of representatives. EAA Act § 3.01(a). Among other things, the committee oversees and reviews the activities of the Authority in implementing the Act, compliance with the ESA, and the control of water pollution in the Aquifer region. EAA Act § 3.01(c)(1), (3), (4). From time to time the committee holds a hearing to perform its oversight functions.

4. *Texas Commission on Environmental Quality*

a. Requests for Review

As noted above, the TCEQ exercises an oversight function in reviewing requests of the SCTWAC to review actions of the Authority to ensure that the Authority's actions are not in conflict with the TCEQ's actions. *See* EAA Act § 1.10(f). In this way, the TCEQ may ensure that the Authority's actions do not encroach upon the jurisdiction of the TCEQ to administer surface water rights in the Guadalupe River Basin.

b. Mandamus

In the event the Authority does not perform its nondiscretionary duties under the Act, the TCEQ may bring a mandamus action against the Authority. The TCEQ may also bring such an action when, in its judgment, the Authority is not enforcing the Act against those in violation of its terms. EAA Act § 1.39.

IV. Administration of Groundwater Rights

A. Groundwater Rights in the Aquifer

1. In General

The Act provides for three types of groundwater rights in the Aquifer. First, a temporary interim authorization right was created to provide for the orderly transition from the common law to the statutory-based permit system established by the Act. A second category of rights is groundwater withdrawal permits. The Act foresees that at the end of this transition process users of the Aquifer will end up with a permitted right. The third category of groundwater rights in the Aquifer are wells that are deemed exempt from permitting or metering. Exempt wells are certain small production wells used for domestic, livestock, and other beneficial uses. After June 28, 1996, persons desiring to withdraw groundwater from the Aquifer must establish one of these rights to have the legal authority to make a withdrawal from the Aquifer. *See* EAA Act § 1.15(b).

2. Interim Authorization

Interim authorization status (IA Status) is a statutorily created right that existed for a limited time to provide a bridge from the common law to the EAA Act. *See* EAA Act § 1.17. The Authority's rules implementing IA Status were found in subchapter D of chapter 711 until repealed in 2008. *See* EAA Rules §§ 711.60–.74 (repealed). Persons owning IA Status wells were authorized to continue to withdraw groundwater from the Aquifer after the effective date of the EAA Act until final action was taken on their permit application. Because the Authority has taken final action on all applications, no well owners are currently in IA Status.

3. Groundwater Withdrawal Permits

Once IA Status has been terminated, the general rule for groundwater rights in the Aquifer is that a person may not withdraw groundwater from the Aquifer without first having obtained a groundwater withdrawal permit from the Authority. *See* EAA Act §§ 1.15(b), 1.35(a). The only exception to this rule is exempt wells (discussed below). An IRP is the preferred permit because it is the most secure and "senior" relative to all other permits. The rules of the Authority implementing permitted wells are found at subchapter E of chapter 711. *See* EAA Rules §§ 711.90–.112. Permitted rights are discussed in more detail in section IV.C below.

4. Exempt Wells

Owners of certain small production wells are exempt from certain aspects of the Authority's regulation. There are three types of exempt wells: (1) domestic or livestock wells, (2) limited production wells, and (3) wells at certain federal facilities. *See* EAA Act § 1.33(a), (d); EAA Rules § 711.20(a)(4). Domestic use is drinking, washing, or culinary purposes and irrigation of family gardens or orchards. *See* EAA Act § 1.03(9)(A), (B). Livestock use is the watering of animals. *See* EAA Act § 1.03(9)(C). Limited production wells include any beneficial use that is authorized by the Act. *See* EAA § 1.33(d); EAA Rules § 711.61(a)(2). Federal facilities wells are those located on a federal facility and for which the Authority has not approved a transfer of the ownership of the well to another person before September 1, 2003. *See* EAA Rules § 711.20(a)(4). The exempt well rules of the Authority are found at subchapters C (Exempt Wells) and D (Limited Production Wells) of chapter 711. *See* EAA Rules §§ 711.20–.50, 711.60–.72. Owners of exempt wells are not required to obtain groundwater withdrawal permits. *See* EAA Act § 1.15(b). Managing exempt wells differently from wells requiring a permit does not violate equal protection. *See Bragg v. Edwards Aquifer Authority*, 342 F. App'x 43 (5th Cir. 2009).

Although exempt from permitting, exempt wells must be registered. *See* EAA Act § 1.33(b). For this reason, owners of exempt wells were not required to file IRP applications with the Authority. *See* EAA Act § 1.16(c). Additionally, exempt domestic or livestock wells are not required to be metered. *See* EAA Act § 1.33(a). However, exempt limited production wells may under certain circumstances be required to be metered. *See* EAA Act § 1.33(d). Finally, owners of exempt wells are not required to pay aquifer management fees for withdrawals from the wells. *See* EAA Rules §§ 709.17, 711.22(b)(4), 711.64(b)(1).

For the owner of a domestic or livestock well to qualify for exempt well status, the well must (1) produce no more than 25,000 gallons per day (gpd), (2) be used solely for domestic or livestock use, and (3) not serve a subdivision requiring platting. EAA Act § 1.33(a), (c). For the owner of a limited production well to qualify for exempt well status, the well must (1) have been drilled on or before June 1, 2013, (2) have been used for a beneficial use, and (3) either not be capable of producing more than 1,250 gpd or be metered and produce no more than 1.4 AF per calendar year. EAA Act § 1.33(d).

An exempt well for domestic or livestock use must be constructed such that it is incapable of producing more than 25,000 gpd. EAA Rules § 711.20(1). In contrast, if not constructed to be capable of producing more than 1,250 gpd, a limited production well must be metered. *See* EAA Rules § 711.61(a)(3). Domestic or livestock wells may not be used to serve a subdivision requiring platting. EAA Act § 1.33(c). The Authority has defined the serving of a subdivision requiring platting to mean "provides, or is constructed and equipped to be capable of providing, piped water for any use to more than three service connections located within a subdivision requiring platting." EAA Rules § 711.38(2). All subdivisions of land are considered to require platting unless they fall within an exception contained in Texas Local Government Code chapters 212 or 232. EAA Rules § 711.34

Exempt well status is not permanent. Changes to a well or its use or operation could occur whether or not the well continues to qualify for exempt well status. The owner of an exempt well has a duty to advise the Authority of changed circumstances that may affect the status of the well. *See* EAA Rules §§ 711.44(b), 711.70(c).

Unlike the wells that potentially qualified for an IRP, IA Status was not provided for wells potentially qualifying for exempt well status. Owners of exempt wells are required to register with the Authority to assert and attain recognition of the wells' exempt status. *See* EAA Act § 1.33(b). Wells that are thought by their owners to be exempt but that have not been registered are not exempt until the Authority has recognized the status. *See* EAA Rules §§ 711.16, 711.21, 711.62. Withdrawals from unregistered wells are prohibited. *See* EAA Rules § 711.226. Well owners were first required to register their wells by May 7, 2001. *See* EAA Rules §§ 707.307 (repealed), 711.26 (repealed). This date was later amended to December 31, 2005. *See* EAA Rules § 711.16(a).

The Act does not impose any limits on the number of exempt wells that may be drilled into the Aquifer or on the total volume of groundwater that may be withdrawn by exempt wells.

B. Management of Withdrawals

1. *In General*

The Authority must manage all withdrawals from the Aquifer and withdrawal points. EAA Act § 1.15(a). The Authority manages the Aquifer primarily through the administration of its groundwater withdrawal permit program. That program is discussed in detail in section IV.C below.

2. *Beneficial Use and Waste Prevention*

The Authority must manage the Aquifer to maximize the beneficial use of groundwater available for withdrawal from the Aquifer. EAA Act § 1.14(a)(4). The Act defines "beneficial use" as "the use of the amount of water that is economically necessary for a purpose authorized by law, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose." EAA Act § 1.03(4). Groundwater withdrawn from the Aquifer must be put to a beneficial use. *See* EAA Act §§ 1.03(21)(B), 1.35(c).

The converse of beneficial use is waste. Persons may not waste groundwater withdrawn from the Aquifer. EAA Act § 1.35(c). The Authority possesses all powers, rights, and privileges necessary to prevent the waste of the Aquifer. *See* EAA Act § 1.08(a). Waste encompasses the following acts: (1) failing to put groundwater to a beneficial use; (2) allowing groundwater to escape from the Aquifer to some other non-water-bearing formation; (3) allowing groundwater from the Aquifer to escape into a watercourse or other feature without a discharge permit issued by the TCEQ; (4) allowing irrigation tailwater to escape to another person's land without consent of the landowner; and (5) allowing unregulated withdrawals from artesian wells. EAA Act § 1.03(21)(B), (C), (E)–(G); Tex. Water Code § 11.205.

3. *Purposes of Use*

The Act recognizes three purposes of use eligible for a groundwater withdrawal permit: irrigation, municipal, and industrial. The Act also refers to domestic uses and livestock uses. If these uses qualify as exempt, however, they are not eligible for permitting. EAA Act §§ 1.16(c), 1.33.

a. Industrial Use

The EAA Act defines "industrial use" as follows:

> [T]he use of water for or in connection with commercial or industrial activities, including manufacturing, bottling, brewing, food processing, scientific research and technology, recycling, production of concrete, asphalt, and cement, commercial uses of water for tourism, entertainment, and hotel or motel lodging, generation of power other than hydroelectric, and other business activities.

EAA Act § 1.03(11).

This definition includes purposes of use that would not normally be thought of as industrial, such as typical commercial uses like food and beverage production, research, entertainment, and lodging. Additionally, the inclusion of "other business activities" as a catch-all category brings many other activities under the industrial classification.

b. Irrigation Use

The EAA Act defines "irrigation use" as the use of water for the irrigation of pastures and commercial crops, including orchards. EAA Act § 1.03(12).

c. Municipal Use

The EAA Act defines "municipal use" as follows:

> [T]he use of water within or outside of a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity, including the use of treated effluent for certain purposes specified as follows. The term includes:
>
> (A) the use of water for domestic use, the watering of lawns and family gardens, fighting fires, sprinkling streets, flushing sewers and drains, water parks and parkways, and recreation, including public and private swimming pools;
>
> (B) the use of water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands;
>
> (C) the application of treated effluent on land under a permit issued under Chapter 26, Water Code, if;
>
> (i) the primary purpose of the application is the treatment or necessary disposal of the effluent;
>
> (ii) the application site is a park, parkway, golf course, or other landscaped area within the authority's boundaries; or
>
> (iii) the effluent applied to the site is generated within an area for which the commission has adopted a rule that prohibits the discharge of the effluent.

EAA Act § 1.03(14).

4. Metering

The Authority must implement a metering program and ensure compliance. *See* EAA Act § 1.11(b). Authority rules implementing its meter program are at subchapter M of chapter 711. *See* EAA Rules §§ 711.400–.422. Permitted wells are required to have meters installed. *See* EAA Act § 1.31(a). An alternative measuring method may also be used. *See* EAA Act § 1.31(a). In either case, the new installation or method must be approved by the Authority. *See* EAA Act § 1.31(a). For irrigation wells in existence on September 1, 1993, the Authority bears the costs of meter installation and maintenance. EAA Act § 1.31(b). Meter costs for all other permitted wells are borne by the well owner. Owners of exempt wells are not required to install meters. EAA Act § 1.33(a).

5. Reporting

Each year, permit holders are required to report to the Authority their annual groundwater use for the preceding calendar year. EAA Act § 1.32. The Authority's rules implementing its reporting requirements are at section 711.414. The Authority must ensure compliance with its reporting program. EAA Act § 1.11(b). Owners of domestic or livestock exempt wells are not required to file groundwater use reports. *See* EAA Rules § 711.22(b)(3). The owners of limited production wells are generally required to file annual groundwater use reports. *See* EAA Rules § 711.69.

6. *Interruption of Withdrawals*

Groundwater withdrawal permits state the maximum amount the holder of the permit may withdraw on an annual basis. These amounts are not absolutely firm in the sense that they can be withdrawn in any year under any conditions. Under the EAA Act, there is no guarantee that permit holders will be able to fully exercise their authorized annual groundwater withdrawal amount in any particular calendar year. A principal feature of the EAA Act is that withdrawals may be interrupted to accomplish the Aquifer management strategies of the Authority, such as providing sufficient spring flows from Comal and San Marcos Springs for the benefit of listed threatened and endangered species. An interruption is a temporary curtailment of the right to withdraw groundwater from the Aquifer. *See* EAA Rules § 702.1(97).

The Act authorizes interruptions under the following conditions: (1) the general interruption levels for the San Antonio Pool or the Uvalde Pool are triggered (*see* EAA Act § 1.14(f)); (2) environmental flows are needed to satisfy federal law requirements to protect threatened and endangered species associated with the Aquifer (*see* EAA Act § 1.14(h)); (3) the Aquifer management objectives in section 1.14(a) of the EAA Act require additional spring flows (*see* EAA Act § 1.14(h)); and (4) the Authority's critical period management plan is triggered (*see* EAA Act §§ 1.14(h)(1), 1.26). In their practical application, all of these interruption scenarios work hand in hand to accomplish the same objective of ensuring adequate spring flows from Comal and San Marcos Springs primarily for the benefit of the threatened and endangered species associated with the Aquifer.

a. Section 1.14(f) Interruptions

The Authority must interrupt the right to withdraw from the San Antonio Pool when the Aquifer at index well J-17 is below 660 mean sea level (msl). EAA Act § 1.14(f). For the Uvalde Pool, the interruption level is measured at index well J-27 and is triggered when the Aquifer is below 845 msl. EAA Act § 1.14(f). Although the Act appears to give discretion to the Authority to interrupt withdrawals when the Aquifer is above these levels, the Texas attorney general has determined that the Authority may not interrupt IRPs when the Aquifer is equal to or above these levels. *See* Tex. Att'y Gen. Op. No. GA-0498 (2007). The Authority implements these mandatory interruption criteria by incorporation into the interim critical period management plan required by section 1.26(b) of the EAA Act described in section IV.B.6.b below.

b. Section 1.14(h) Interruptions

To accomplish the species protection purposes of the EAA Act, the Authority must implement and enforce water management practices to ensure that, not later than December 31, 2012, the continuous minimum spring flows of Comal and San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law. EAA Act § 1.14(h). To meet this requirement, the Authority shall require (1) phased adjustments (i.e., interruptions) of the amount of water that may be used or withdrawn from the Aquifer or (2) implementation of alternative management practices. The Authority currently implements interruptions based on this criterion through its critical period management plan under section 1.26 of the EAA Act (described in section IV.B.6.d below) and certain conservation measures found in the Edwards Aquifer Habitat

Conservation Plan [hereinafter EAHCP]. The text of the EAHCP is available online at http://eahcp.org/documents/Final%20HCP%20November%202012.pdf.

In February 2013, the USFWS issued an incidental take permit to the Authority, among others, under section 10(a) of the Endangered Species Act of 1973. *See* U.S. Fish and Wildlife Service, Incidental Take Permit No. TE63663A-O, *available at* www.eahcp.org/files/admin-records/NEPA-and-HCP/USFWS_Permit_03-18-2013_revd_1030_a.m._Final.pdf. In so doing, the USFWS also approved the EAHCP.

The approved EAHCP includes "minimization and mitigation measures" (known as "Conservation Measures"). These measures are designed to ensure that any incidental take resulting from the Authority's management of the Aquifer (as well as the activities of the other permittees) will be "minimized and mitigated to the maximum extent practicable and will not appreciably reduce the likelihood of the survival and recovery of the threatened and endangered species associated with the Aquifer in the Comal and San Marcos Springs and Rivers ecosystems." EAHCP § 1.1.1.

The EAHCP contains four specific Conservation Measures that are designed as spring flow protection measures: (1) the Voluntary Irrigation Suspension Program Option (VISPO); (2) Regional Water Conservation Program (RWCP); (3) Critical Period Management—Stage V (CPM Stage V); and (4) use of the San Antonio Water System's Twin Oaks Aquifer Storage and Recovery Project for springflow protection (SAWS ASR). *See* EAHCP §§ 5.1.2–.4, 5.5.1, respectively. The VISPO is a program to pay irrigators to forbear pumping from the Aquifer during certain drought conditions. The RWCP is a program to pay Aquifer users to implement certain conservation programs in exchange for leaving a portion of the conserved water in the Aquifer unpumped. The CPM Stage V is a new stage added to the Authority's existing CPM Program, discussed in section IV.B.6.d below. The SAWS ASR is a program for the Authority to acquire Edwards groundwater rights to provide to SAWS for recharge into its ASR project, in exchange for SAWS agreeing to forbear pumping from the Aquifer during certain drought conditions. See chapter 32 of this book for additional discussion of the EAHCP.

c. Section 1.14(a) Interruptions

The Authority may interrupt withdrawals if the Aquifer management objectives require additional spring flows. These management objectives include (1) protect the water quality of the Aquifer and the Comal and San Marcos Rivers (*see* EAA Act § 1.14(a)(1), (2)); (2) maximize the use of the Aquifer in an efficient manner (*see* EAA Act § 1.14(a)(3), (4)); (3) protect threatened and endangered species (*see* EAA Act § 1.14(a)(6), (7)); (4) provide for appropriate instream flows in the Guadalupe River Basin and the San Antonio Bay (*see* EAA Act § 1.14(a)(8)); and (5) recognize the hydrogeologic connection between the Aquifer and the Guadalupe River system (*see* EAA Act § 1.14(a)(5)). Withdrawal limitations under subsections (6) and (7) are provided for in the EAHCP as discussed above in section IV.B.6.b.

d. Critical Period Interruptions

The Authority is required to prepare and implement a critical period management plan (CPMP). *See* EAA Act § 1.26. Although the Act does not define a critical period, it is generally understood to be any condition (normally drought) in which Aquifer levels decline and thereby result in reductions in spring flows at Comal and San Marcos Springs. The Authority's current CPMP rules are located at subchapter E of chapter 715. *See* EAA Rules §§ 715.200–.221. Notably, the CPMP must allow irrigators to finish out one crop even though critical period conditions exist. EAA Act § 1.26(a)(5), (g).

7. *Wells Drilled after June 1, 1993*

As another method of managing withdrawals, owners of wells drilled after June 1, 1993, are prohibited from making withdrawals of groundwater from the Aquifer. *See* EAA Act § 1.14(e). Exceptions to this prohibition are for replacement wells, test wells, exempt wells, and wells constituting a transferred point of withdrawal of an IRP from a well that was constructed before June 1, 1993. *See* EAA Act § 1.14(e). Exceptions also include wells authorized by permit, such as emergency wells or term permit wells. *See* EAA Rules § 711.222(b)(2) (2007) (repealed). The purpose of this prohibition is to protect the preferred status of well owners qualifying for an IRP based on historical use between January 1, 1972, and May 31, 1993, and to prevent a "water rush" on the Aquifer. *See Barshop*, 925 S.W.2d at 632 (noting the EAA Act was passed one day before the close of the historical period to preclude new users from establishing preferred historical rights).

C. Groundwater Withdrawal Permit Program

1. *Groundwater Withdrawal Permits and the Permitting Caps*

The linchpin of the Authority's management of the Aquifer is its groundwater withdrawal permit program. The Texas legislature charged the Authority with ensuring compliance with permitting and regulating permits. EAA Act § 1.11(b). Except for the temporary groundwater rights—IA Status (which essentially no longer exists) and exempt domestic or livestock wells—landowners may no longer withdraw groundwater from the Aquifer unless they first obtain a permit from the Authority. *See* EAA Act § 1.15(b). This is the most fundamental law governing the management of the Aquifer. It is through permits that the Authority is able to impose limitations and conditions on withdrawals in order to implement the Authority's overall Aquifer management objectives in section 1.14(a) of the EAA Act.

The Authority is not able to issue permits in any amount it chooses. The EAA Act imposes an Aquifer-wide cap on the amount of permitted withdrawals. The Act does not use the term "cap" to describe the limit on the aggregate volume of IRPs that may be issued. The meaning derives from the Texas Supreme Court's use of this term in the *Barshop* opinion. *See* 925 S.W.2d at 624. The cap was the legislature's expression of the amount of groundwater that was appropriate for withdrawal from the Aquifer while providing safeguards for spring flows at Comal and San Marcos Springs. The legislature originally established a pair of sequential caps while also giving the Authority the option of raising those caps if studies and consultations so justified. *See* EAA Act § 1.14(d) (repealed). The first of those two caps, 450,000 AF per year, began on June 28, 1996, and would have changed to the second, 400,000 AF per year, on January 1, 2008, and continued indefinitely thereafter. However, on June 15, 2007, the legislature repealed those caps and replaced them with the current 572,000-AF-per-year cap. In addition, this new "cap" became a "minimum" in that the Authority is now required to issue permits in the sum of no less than 572,000 AF per year. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.02, 2.09; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.02, 12.09 (repealing section 1.14(b) and amending section 1.14(c) of the Act). Unlike the prior law, the Authority has no authority to raise the new cap.

2. *Permit Contents*

Groundwater withdrawal permits contain the essential elements of a groundwater right in the Aquifer, including the applicable limitations and conditions. *See, e.g.*, EAA Act § 1.16(h). Through the permit, the owner has notice of the parameters of the right and the terms and conditions under which the right may be exercised. The basic conditions for permits are found at subchapter F of chapter 711 of the Authority rules. *See* EAA Rules §§ 711.130–.134. Among the important permit elements are ownership, total annual groundwater withdrawal amount, place of use, purpose of use, point of withdrawal, and interruption conditions. *See, e.g.*, EAA Act § 1.15(d); EAA Rules § 711.112.

3. *Categories of Permits*

a. In General

The Act authorizes the Authority to issue four types of groundwater withdrawal permits: (1) initial regular permits (EAA Act §§ 1.15(c), 1.16); (2) additional regular permits (EAA Act §§ 1.15(c), 1.18); (3) term permits (EAA Act §§ 1.15(c), 1.19); and (4) emergency permits (EAA Act §§ 1.15(c), 1.20). The features of each of these permits are described below. By contract, the Authority also authorizes withdrawals from the aquifer for recharge recovery. EAA Act § 1.44. These contracts are discussed further in section V.C.4. below.

b. Initial Regular Permits

Initial regular permits (IRPs) are the basic permits issued by the Authority. This type of permit has the most senior and preferred status of all permits. The permit term for IRPs is perpetual. EAA Act § 1.16(g). An IRP's most basic feature is issuance based on historical use and priority to a proportionate share of the 572,000-AF-per-year cap. Because of legislative action in 2007, the Authority issued final IRPs in the fall of 2008.

A basic requirement for eligibility is that the well owner must have filed the IRP application on or before December 30, 1996. EAA Rules § 711.98(a). Because new future users of the Aquifer are not able to meet this requirement, new permanent appropriations from the Aquifer are precluded. This forces new users to enter the water market to obtain groundwater rights from an existing IRP holder.

c. Additional Regular Permits

The Authority may issue additional regular permits (ARPs) if, after all IRPs have been issued, groundwater remains available for permitting. *See* EAA Act § 1.18(a). Persons eligible for ARPs are those able to establish actual beneficial use of groundwater from the Aquifer after the historical period—that is, on or after June 1, 1993. *See* EAA Act § 1.18(b). As discussed in section IV.C.4 below, after final action on all IRP applications was completed in April 2006 no water remained available for permitting under the 572,000-AF-per-year cap. *See* EAA Act § 1.14(c) (declaring that 572,000 AF per year equals the sum of the IRPs issued, or pending final action, on January 1, 2005). The "sum of the regular permits as of January 1, 2005" language in the 2007 amendments to section 1.14(c) effectively represent a statement of legislative intent that the Authority is to issue the full 572,000 AF per year to the IRP holders and applicants as of that time. Because, as of January 1, 2005, the Authority had not yet issued any ARPs (and would not have been able to issue them because the 450,000-AF-per-year cap had been exceeded), there is no groundwater available for permitting for ARPs. For this reason, the Authority has not issued any ARPs.

d. Term Permits

Term permits are intended for those periods when Aquifer levels are very high. Under this condition, there is essentially a temporary additional supply from the Aquifer. Because Aquifer levels are high, it is assumed that additional withdrawal would not be detrimental to spring flows at Comal and San Marcos Springs. Term permits may be issued for a period not to exceed ten years. *See* EAA Act § 1.19(a). Withdrawals under term permits do not apply against the 572,000-AF-per-year cap. *See* EAA Rules § 711.166(a).

Term permit withdrawals must be consistent with the Authority's critical period management plan. Holders of term permits may exercise their rights to withdraw from the San Antonio Pool of the Aquifer only when (1) the Aquifer as measured at index well J-17 is greater than 675 msl, (2) spring flows at Comal Springs are greater than 350 cubic feet per second (cfs), and (3) spring flows at San Marcos Springs are greater than 200 cfs. *See* EAA Act § 1.19(b). Withdrawals may be made from the Uvalde Pool when the Aquifer as measured at index well J-27 is greater than 865 msl. *See* EAA Act § 1.19(c). When the Aquifer is equal to or below these levels for either pool, holders of term permits must cease all withdrawals from that pool until the Aquifer and spring flows recover. *See* EAA Act § 1.19(b), (c).

e. Emergency Permits

Emergency permits may be issued only to prevent the loss of life or to prevent severe, imminent threats to the public health or safety. EAA Act § 1.20(a). Emergency permits may not have a term exceeding thirty days. EAA Act § 1.20(b). If necessary, emergency permits may be renewed. EAA Act § 1.20(c). Withdrawals under emergency permits do not apply against the 572,000-AF-per-year cap. *See* EAA Act § 1.20(d); EAA Rules § 711.168.

f. Recharge Recovery Contract

Recharge recovery contracts are intended to authorize withdrawals from the Aquifer of groundwater in storage from an artificial recharge project. *See* EAA Act § 1.44. A contract is required to recover the water placed in storage under recharge projects. *See* EAA Act §§ 1.15(b), 1.44. The Authority's rules implementing its aquifer recharge, storage, and recovery contracting authority are found at subchapter J of chapter 711. *See* EAA Rules §§ 711.240–.245. Because additional water is being recharged to the Aquifer over and above what would occur under normal conditions, withdrawals under recharge recovery permits do not apply against the 572,000-AF-per-year cap. *See, e.g.*, EAA Act § 1.44(d).

4. Permit Administration

a. Permit Transfers

One purpose of the EAA Act was to create a water market in Aquifer groundwater rights. The Authority has adopted permit transfer rules designed to foster and create certainty in this market.

i. In General

A permit transfer is a change in ownership, point of withdrawal, purpose of use, place of use, or maximum rate of withdrawal. EAA Rules § 711.324. The Authority generally has the power to regulate transfers to ensure compliance with the Act. *See, e.g., Herrmann v. Lindsey*, 136 S.W.3d 286, 288–89 (Tex. App.—San Antonio 2004, no pet.) (discussing with approval the administrative actions of the Authority to regulate transfers of irrigation permit applications). Transfer applications are not subject to contested case hearings. *See* EAA Rules § 707.601. The Authority's rules implementing its transfer program are found at subchapter L of chapter 711. *See* EAA Rules §§ 711.324.–330.

Ownership of groundwater withdrawal permits and IRP applications is generally transferable. *See Barshop*, 925 S.W.2d at 630 (permits); *Herrmann*, 136 S.W.3d at 288 n.1 (IRP applications). With the exception of irrigation IRPs, ownership of a permit is freely transferable separately from the ownership of a place of use. EAA Rules § 711.324(b). Absent an express reservation, the ownership of transfers of the place of use is presumed to transfer ownership of an IRP. EAA Rules § 711.324(c). Additionally, except for irrigation IRPs, the place of use and purpose of use for an IRP are freely transferable. *See* EAA Rules § 711.324(a)(3)–(4), (d), (e).

ii. Special Rules Applicable to Irrigation IRPs

An irrigation IRP consists of two parts: (1) a 50-percent portion that is freely transferable as to place of use and purpose of use, and (2) a 50-percent portion that is permanently appurtenant to the original acres of land irrigated during the historical period that provided the basis for the original issuance of the IRP. *See* EAA Act § 1.34(c). The Authority refers to these two parts respectively as unrestricted irrigation groundwater (UIG) and base irrigation groundwater (BIG). EAA Rules § 702.1(24), (199). UIG is freely transferable as to place and purpose of use. EAA Rules § 711.324(a)(3)–(4), (e). For BIG, the place or purpose of use may not be transferred. *See Herrmann*, 136 S.W.3d at 288; *see also* EAA Rules § 711.324(d). Reservations of BIG in the event of a sale of the surface estate to a third party are unenforceable, and BIG is transferred with the land as a matter of law. *Herrmann*, 136 S.W.3d at 288; *Edwards Aquifer Authority v. Horton*, No. 04-09-00375-CV, 2010 WL 374551 (Tex. App.—San Antonio Feb. 3, 2010, pet. denied) (mem. op., not designated for publication); *see also* EAA Rules § 711.324(d). On the other hand, UIG may be reserved in the grantor. *See* EAA Rules § 711.324(e). Temporary transfers not to exceed ten years are authorized; however, the BIG remains appurtenant to the original historical irrigated lands. *See* EAA Rules § 711.330(d).

iii. Special Rules Applicable to "Cibolo Creek Transfers"

A "Cibolo Creek transfer" is a transfer of a point of withdrawal from west of Cibolo Creek (i.e., Bexar, Medina, Atascosa, and Uvalde counties) to east of Cibolo Creek (i.e., to Comal, Guadalupe, Hays, and Caldwell counties). EAA Rules § 711.329(a). Amending an IRP to transfer a point of withdrawal from west to east of Cibolo Creek is prohibited. EAA Rules § 711.336(12). Similarly, transferring an IRP for this purpose is also prohibited, except for two very limited exceptions. EAA Rules §§ 711.328(a)(12)(B), 711.329(a).

First, if the transfer is a sale, and the sale was approved by the Authority on or before July 11, 2006, or the sale occurred after this date, and it is to remedy a small pending compliance matter for unauthorized withdrawals at an unpermitted well installed on or before January 9, 2007, a Cibolo Creek transfer is authorized. *See* EAA Rules § 711.329(a)(3)(B). In such a situation, further amendments to move the point of withdrawal are prohibited unless the original well is plugged. EAA Rules § 711.329(b). Cibolo Creek transfers to remedy compliance issues for post-January 9, 2007 wells are prohibited. Note that under this rule, post-July 11, 2006 sales involving Cibolo Creek transfers are generally prohibited. EAA Rules § 711.329(a)(3)(A).

Second, Cibolo Creek transfer leases after the effective date of the rules (i.e., December 18, 2009) are authorized only if (1) the well to which the transfer is made was installed before January 9, 2007; (2) the lease terms call for the lease to expire on or before December 31, 2014; (3) a certain transfer-to-the-groundwater-trust ratio is satisfied; (4) no subsequent transfers or amendments of the point of withdrawal are made; and (5) upon expiration of the lease the point of withdrawal reverts back to west of Cibolo Creek. *See* EAA Rules § 711.329(a)(1). Note that Cibolo Creek transfer leases that were approved by the Authority before December 18, 2009, remain in effect and are allowed to expire according to their terms, after which time the point of withdrawal reverts back to west of Cibolo Creek. EAA Rules § 711.329(a)(2).

Finally, none of the Cibolo Creek transfer rules limit the transfers or amendments of originally issued IRPs, whether located west or east of Cibolo Creek, as long as a transfer of the point of withdrawal from west to east of Cibolo Creek is not implicated.

iv. Further Limits on Transfers

Permit transfers are further limited by the prohibition of the transportation of groundwater from the Aquifer from a point of withdrawal located in Uvalde County or Medina County. *See* EAA Act § 1.28(b). Additionally, groundwater withdrawn from the Aquifer may not be transferred for use outside the boundaries of the Authority. *See* EAA Act § 1.34(a).

v. Groundwater Trust

The Authority operates a groundwater trust. *See* EAA Act § 1.22(a). The Authority's rules implementing its trust program are at subchapter N of chapter 711. *See* EAA Rules §§ 711.502–.540. The purpose of the trust includes the acquisition of IRPs for the possible subsequent sale or other transfer to third parties in need of water. *See* EAA Act § 1.22(a)(1), (3). The Authority may also acquire IRPs to manage overall demand on the Aquifer. EAA Act § 1.22(a)(2). In such a case, IRPs would not be transferred out of the trust for use. Instead, they would reside in the trust for as long as the Authority deemed appropriate.

b. Permit Amendments

Once a permit is issued, the permit holder may request changes to the point of withdrawal, purpose of use, place of use, or maximum rate of withdrawal. *See* EAA Rules §§ 711.332–.336.

c. Permit Corrections

Once a permit is issued, the general manager may make nonsubstantive changes to it. *See* EAA Rules § 711.350. This procedure is intended to allow either the Authority or an applicant to correct a permit to update basic information, to correct clerical or typographical errors, and to more accurately state physical information.

d. Permit Conversions

If water conservation equipment is installed on the historically irrigated lands of an irrigation IRP, the holder of the IRP may convert a portion of BIG to UIG. *See* EAA Act § 1.34(b); EAA Rules §§ 711.338–.342. The amount that may be converted is limited to the amount of water actually conserved by the installed conservation equipment. EAA Act § 1.34(b). After conversion, the portion of converted BIG becomes freely transferable as to place and purpose of use. BIG may also be converted if the historically irrigated acres are developed. *See* EAA Rules § 711.342(6); *see also*

Persyn Family LP v. Edwards Aquifer Authority, No. 2007-CI-18500 (407th Dist. Ct., Bexar County, Tex., judgment issued Mar. 13, 2008).

e. Forbearance of IRP Rights

IRP holders may forgo the right to make withdrawals from the Aquifer and seek a special surface water permit from the TCEQ. *See* EAA Act § 1.30(b), (c)(1). Under this conjunctive management principle, the TCEQ may issue special permits to divert water from the Guadalupe River downstream of Comal and San Marcos Springs in exchange for limiting the right to make IRP withdrawals. *See* EAA Act § 1.30(a), (b). The Act defines "diversion" as "the removal of state water from a watercourse or impoundment." EAA Act § 1.03(8). Special permits issued under section 1.30 of the Act may not impair senior water rights, vested riparian rights, or surface water permits issued by the TCEQ pursuant to applications that were filed before May 31, 1993. *See* EAA Act § 1.30(c), (d). As an aid to the implementation of this section, when water is discovered by the TCEQ to be available in the Guadalupe-Blanco River Basin, notice must be given to the Authority that such water is available for appropriation. *See* EAA Act § 3.02. The TCEQ has not yet issued rules to implement section 1.30.

f. Permit Consolidation

Persons owning two or more groundwater withdrawal permits of the same type may consolidate the permits. EAA Rules §§ 711.344–.348. For consolidation, the permits must have a common point of withdrawal. If not, then all the points of withdrawal must be operated and managed by the same permit holder, be located within the same pool, and be located either east of Cibolo Creek or west of Cibolo Creek.

g. Loss of Permit

IRPs remain in effect until the permit is abandoned or canceled. EAA Act § 1.16(g). IRPs are not subject to retirement. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.03, 2.05, 2.07, 2.09; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.03, 12.05, 12.07, 12.09 (amending sections 1.16(g) and 1.22(a)(3) and (4) to delete references to retire; amending section 1.29(h) to prohibit the use of Authority revenues for retirement purposes; and repealing sections 1.21 and 1.29(a), (c), and (d) relating to retirement of IRPs). The Authority's rules implementing abandonment procedures are found in subchapter L of chapter 711. *See* EAA Rules § 711.352. Under these rules, permits are subject to only voluntary abandonment. At any time, the board may enter an agreed order for declaration of abandonment evidencing the present intent of the owner of an IRP to discontinue permanently the withdrawal and beneficial use of all or part of the groundwater under the IRP. The Authority has not adopted any cancellations rules.

V. Water Quantity Programs

The Authority has the duty to manage the Aquifer for the benefit of the general welfare of the State of Texas (*see* EAA Act §§ 1.01, 1.06(a)) and to develop and implement a variety of Aquifer management programs to assist it in meeting the management objectives set forth in the Act. A primary Aquifer management tool of the Authority is its permit program described above. However, the Authority has other programs through which it manages the Aquifer; these are discussed in this section.

A. Comprehensive Water Management Planning

The Act requires the Authority to develop and implement a comprehensive water management plan (CWMP) that addresses conservation, future water supply, and demand management. *See* EAA Act § 1.25(a). The Authority may not delegate plan development to another GCD. EAA Act § 1.25(a). This Authority's CWMP was first approved by the board in December 2004.

As part of the CWMP, the Authority must develop and implement a twenty-year plan for providing alternative water supplies to the Edwards Aquifer region. The plan must consider alternative technologies, investigate financial assistance available from the TWDB for the development of alternative supply projects, assess the costs and benefits of each project, and perform appropriate environmental analysis. The plan is based on five-year goals and objectives. In developing this plan, the Authority is to seek assistance from the SCTWAC, the TWDB, and other GCDs. Annual review is to be provided by the TWDB, the TCEQ, and the Edwards Aquifer Legislative Oversight Committee. *See* EAA Act § 1.25(b).

The Authority's CWMP and alternative water supply planning processes preceded the creation of the statewide "regional planning process" under Texas Water Code section 16.053(a). See Chapter 20 of this book regarding state water planning. The Authority is located in Region L for purposes of regional planning. Because of the significant overlap between the two processes, the Authority's planning efforts have largely been subsumed by the larger regional planning effort being done by the Region L planning group. Thus, the Authority has not developed a separate alterative supply plan.

B. Conservation Program

All reasonable measures must be taken to conserve water use from the Aquifer. *See* EAA Act § 1.01. The Authority must limit withdrawals from the Aquifer to achieve water conservation. EAA Act § 1.14(a)(3). The Act defines "conservation" as "any measure that would sustain or enhance water supply." EAA Act § 1.03(7).

1. Conservation Plans

The Authority is required to develop a conservation plan, which is updated biennially. *See* EAA Act § 1.23(c). Every odd-numbered year the Authority files its conservation plan with the Texas legislature. The Authority's first plan was filed in March 2005.

Additionally, the Authority may require holders of IRPs and term permits to file and implement conservation plans. EAA Act § 1.23(a). The Authority plan serves as a guidance document for the implementation of individual plans by permit holders. The Authority's rules implementing its conservation program are found at subchapter C of chapter 715. *See* EAA Rules §§ 715.100–.124.

2. Conservation Financial Assistance

The Authority may administer conservation-related financial assistance programs to water users of the Aquifer. EAA Act § 1.11(d)(1). Additionally, the Authority may issue grants or loans to finance the purchase or installation of conservation equipment. *See* EAA Act § 1.24(c). The rules for the program are found at subchapter D of chapter 715. *See* EAA Rules §§ 715.136–.166.

3. Reuse Program

a. Reuse Plans

The Authority is required to develop a reuse plan. *See* EAA Act § 1.23(c). The Act defines "reuse" as follows: "authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before the water is discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water." EAA Act § 1.03(19). The Authority considers reuse to be a conservation strategy and, therefore, implements this program through its conservation program. The Authority's conservation plan serves as the guidance document for the implementation of individual reuse plans. The Authority's rules implementing its reuse program are found at subchapter C of chapter 715. *See* EAA Rules §§ 715.100–.124.

b. Reuse Credits

The Authority is required to "allow for credit to be given for certified reuse of the water" withdrawn from the Aquifer. EAA Act § 1.13. Section 1.13 provides very little practical opportunity for a water user to meet the credit criteria. Among other things, the "amount of aquifer withdrawals [that will be] replaced by reuse" must be certified by the Authority. EAA Act § 1.13(3). In practice, a water utility that implements a reuse program does not manage the reuse water as replacement water for Aquifer withdrawals. Instead, this water is managed as another source of supply in addition to Aquifer withdrawals.

c. Reuse Financial Assistance

The Authority may administer reuse-related financial assistance programs to water users of the Aquifer. *See* EAA Act §§ 1.11(d)(1), 1.24(c).

C. Recharge Program

The Authority has "all of the powers, rights, and privileges necessary to . . . increase the recharge of . . . the aquifer." EAA Act § 1.08(a). The Act defines "recharge" as "increasing the supply of water to the aquifer by naturally occurring channels or artificial means." EAA Act § 1.03(18).

1. Authority Recharge Projects

The Authority may own, construct, operate, and maintain recharge facilities. EAA Act § 1.11(f). However, projects may not have as their purpose the recirculation of water at Comal or San Marcos Springs. EAA Act §§ 1.11(f), 1.26A(n). Before constructing recharge facilities, the Authority must give notice to other local government units that may desire to participate in the project. *See* EAA Act § 1.11(f-1). The local government units may choose to merely comment on or participate in the project. *See* EAA Act § 1.11(f-2).

2. Authority Recharge Dams

The Authority may own, construct, operate, and maintain recharge dams for the purpose of recharging the Aquifer. *See* EAA Act § 1.45(a). The Authority currently operates and maintains four recharge dams previously constructed by the EUWD. Recharge dams may be constructed in either the Recharge Zone or the Contributing Zone of the Aquifer. *See* EAA Act § 1.45(a). However, the Authority may not construct a recharge dam for the purpose of recirculating water at Comal or San Marcos Springs. Moreover, the Authority may not construct new recharge dams that would impair senior surface water rights or vested riparian rights. *See* EAA Act § 1.45(a). The TCEQ may issue a permit to appropriate state water for an Authority recharge dam in the Nueces River Basin only for unappropriated flood water in excess of "historic yield" of the flood water to the Nueces River Basin. *See* EAA Act § 1.45(c). The Act provides that the TCEQ determines the historic yield, which is the lesser of the "average annual yield for the period from 1950 to 1987" or the "annual yield for 1987." EAA Act § 1.45(b).

3. *Interlocal Recharge Contracts*

The Authority may enter into contracts with other political subdivisions for artificial recharge of the Aquifer. EAA Act § 1.44(a). These contracts are to be entered into under the Interlocal Cooperation Act to provide for the subsequent recovery of the recharged water by the contracting political subdivision or its assignee. *See* Tex. Gov't Code ch. 791. The Texas attorney general has found that the Authority has the legal authority to adopt rules regarding aquifer recharge, storage, and recovery and specifically to establish limitations based on historic recharge. *See* Tex. Att'y Gen. Op. No. GA-0708 (2009).

The Authority may not unreasonably deny requests to enter into recharge contracts. EAA Act § 1.44(b). In determining whether to enter into recharge contracts, the Authority may consider the following issues: (1) identification of the source water intended for recharge; (2) identification of the recharge method (i.e., either injection wells or recharge dams); (3) if surface water is to be recharged, proof that the political subdivision is the owner of any permits issued by the TCEQ to appropriate the state water intended for recharge; (4) identification of the methodologies to quantify the amount of recharge and the amount that qualifies for recovery; (5) reports of recharge amounts; (6) protection of the water quality of the Aquifer; (7) identification of the location of the recharge points; (8) identification of points of withdrawal for the recharge recovery wells; and (9) protection of the rights of other holders of IRPs issued by the Authority. *See generally* EAA Act § 1.44(a)–(c), (e). Withdrawals of groundwater under these interlocal recharge contracts do not apply against the 572,000-AF-per-year cap. *See* EAA Act § 1.44(d).

4. *Use of Aquifer Groundwater for Non-ASR Projects*

Groundwater withdrawn from the Aquifer may be used as source water for an IRP holder's ASR project. Aquifer water would be withdrawn and injected into another aquifer for storage until needed at a later time. The Authority is to ensure that groundwater from the Aquifer is not wasted. See the discussion in section IV.B.2 above. The definition of waste includes the escape of groundwater from the Aquifer to any other reservoir that does not contain groundwater. EAA Act § 1.03(21)(C). To prevent waste, the Authority may require that IRP holders intending to withdraw groundwater from the Aquifer for an ASR project in another aquifer ensure that the Aquifer water is recoverable and would not be lost.

5. *Precipitation Enhancement*

The Authority participates with other GCDs in the Aquifer region to operate and maintain a precipitation enhancement program to foster recharge into the Aquifer.

D. Financial Assistance

The Authority may issue grants or make loans for the purchase or installation of equipment or facilities for water management projects. EAA Act § 1.24(c).

E. Research and Data Collection

The Authority is authorized to study and conduct research on the Aquifer. *See* EAA Act § 1.27. The Authority may conduct research on enhancement or augmentation of spring flows at Comal and San Marcos Springs, Aquifer yield enhancement, recharge enhancement, water quality monitoring, Aquifer resource management (including conservation, water use, reuse, and drought management measures), and alternative water supplies, among other issues. *See* EAA Act § 1.27(a), (b). The Authority may also implement demonstration projects for the purpose of spring flow augmentation, recharge enhancement, and yield enhancement. EAA Act § 1.27(c). Research and data collection provide the foundation for the Authority programs and plans because the Authority seeks to have the best science knowledge to provide the technical basis for its management strategies. The Authority funds extensive research and data collection on an annual basis to improve the understanding of the Aquifer.

VI. Water Quality Programs

A. In General

The quality of the groundwater in the Aquifer is currently very good. As discussed in sections III.E.1.b and III.E.2.b above, the Authority has been given broad authority to preserve and protect the Aquifer and prevent its waste or pollution. See EAA Act § 1.08(a). The Authority is to limit withdrawals to protect the quality of the groundwater within the Aquifer. *See* EAA Act § 1.14(a)(1). Moreover, the Authority's power to enforce the Aquifer's water quality standards may be exercised within its jurisdictional boundaries and within a five-mile extraterritorial water quality buffer zone. *See* EAA Act § 1.08(c). In so doing, the Authority must apply its pollution control regulations equally and uniformly throughout these areas. EAA Act § 1.08(c).

B. Well Construction, Operation, and Maintenance

Poorly constructed wells can act as preferential pathways into the Aquifer. For this reason, the Authority's well construction program emphasizes water quality. This program is intended to ensure that wells are constructed and maintained to prevent the introduction of contaminants into the Aquifer. The details of this program are found at subchapter C of chapter 713 of the Authority's rules. *See* EAA Rules §§ 713.200–.247. These rules apply only within the boundaries of the Authority. EAA Rules § 713.2001.

Well owners or drillers may not begin construction of a well or other works designed for the withdrawal of groundwater from the Aquifer without first obtaining a well construction permit. EAA Act § 1.15(b). The Act defines "well" as follows: "a bored, drilled, or driven shaft or an artificial opening in the ground made by digging, jetting, or some other method where the depth of the shaft or opening is greater than its largest surface dimension, but does not include a surface pit, surface excavation, or natural depression." EAA Act § 1.03(22). The Authority requires that the owners of new wells file with the Authority the water well drillers' logs that relate to the well. EAA Act § 1.11(d)(11).

C. Closed Wells

Wells that are abandoned, or closed improperly, can provide unwanted conduits into the Aquifer. The Authority has an active program to identify abandoned wells and require their closure. The requirements for well closure and plugging are at subchapter D of chapter 713 of the Authority's rules. *See* EAA Rules §§ 713.300–.322. These rules apply only within the boundaries of the Authority. EAA Rules § 713.302. To close a well, the well owner or driller must first obtain a well plugging permit from the Authority. *See* EAA Rules § 713.306(b). A well-capping permit must first be obtained from the Authority to cap a well. *See* EAA Rules § 713.304(b).

D. Storage Tanks

The Authority generally prohibits the installation of new underground storage tanks on the Recharge Zone of the Aquifer. The Authority's rules on Recharge Zone protection are at subchapter G of chapter 713. *See* EAA Rules §§ 713.601–.639. These rules apply within the boundaries of the Authority and its five-mile water quality buffer zone. *See* EAA Act § 1.08(c); EAA Rules § 713.603. Certain exceptions are recognized for smaller or special-purpose tanks. All existing aboveground storage tanks must be removed from service within fifteen years of installation, or be upgraded to tertiary containment. Underground storage tanks must be removed from service within thirty years of installation, or be upgraded. In the event of a leak or modification of the tanks before those dates, the owner of the tank must install tertiary containment for the tanks. *See* EAA Rules § 713.637(b), (c).

E. Fire Control

Under recent amendments to the EAA Act, the Authority is required to adopt rules for the control of fires in the Recharge Zone. In the development of these rules, the Authority is to first consult with fire departments and fire marshals whose jurisdictions overlap the Recharge Zone of the Aquifer. EAA Act § 1.081. The Authority's rule on the control of fires on the Recharge Zone is in subchapter F of chapter 713. *See* EAA Rules § 713.513.

F. Spill Reporting

Persons spilling certain materials on the Recharge or Contributing zones of the Aquifer must notify the Authority within seventy-two hours of the incident. *See* EAA Rules §§ 713.401(a), 713.403(b). The Authority's spilling report rules are at subchapter E of chapter 713 of the Authority's rules. *See* EAA Rules §§ 713.400–.409. The purpose of this regulation is to aid in the prevention of pollution of the Aquifer and hydrologically connected surface streams in order to protect existing and potential uses of groundwater. EAA Rules § 713.400. The materials regulated under subchapter E of chapter 713 are materials discharged or released in violation of a permit issued by the Commission under Texas Water Code section 26.121, and discharges or spills of oil, petroleum products, used oil, hazardous substances, industrial solid waste, or other substances. EAA Rules § 713.400. The duty to notify applies only to discharges or spills in a quantity equal to or greater than the "reportable quantity" identified for the material. EAA Rules §§ 713.403(a), 713.405. The responsible person must take action to abate and contain the spill or discharge to prevent the pollution of the Aquifer. EAA

Rules § 713.409(a). The general manager of the Authority may make other recommendations to state and local officials and third parties on how to respond to the discharge or spill. EAA Rule § 713.407. Subchapter E of chapter 713 does not apply to air releases, solid waste management units, fertilizers and pesticides, discharges authorized by permit, certain continuous and stable discharges reported to the United States Environmental Protection Agency, motor vehicles, rolling stock, or airplanes or to sources regulated by the Railroad Commission of Texas. EAA Rules § 713.401(b).

G. Facilities Registration

Persons owning certain facilities in the Recharge Zone or Contributing Zone within five miles of the Recharge Zone of the Aquifer must register the facility with the Authority. *See* EAA Rules §§ 713.501(a), 713.503. The Authority's regulated substances, registration, storage, and planning rules are at subchapter F of chapter 713 of the Authority's rules. *See* EAA Rules §§ 713.500–.513. The purpose of this regulation is to aid in the prevention of pollution of the Aquifer and hydrologically connected surface streams in order to protect existing and potential uses of groundwater. EAA Rules § 713.500. The facilities regulated under subchapter F of chapter 713 are facilities storing for resale or nonresidential use more than 10,000 pounds or 1,000 gallons of "regulated substances." EAA Rules § 713.501(a). A regulated substance includes any hazardous substance, petroleum or petroleum product, any substance listed in 30 Texas Administrative Code section 290.104, or any substance listed in 40 C.F.R. section 716.120. *See* EAA Rules § 702.1(85), (137), (138), (163). Certain standards for the storage of regulated materials are provided by the rules. *See* EAA Rules § 713.505. Additionally, the owner of the facility must prepare a spill prevention and response plan. *See* EAA Rules §§ 713.507, 713.509. The plan is to be maintained on site and posted in a prominent location. *See* EAA Rules § 713.511. Subchapter F of chapter 713 does not apply to underground or aboveground storage tanks regulated under subchapter G of chapter 713 of the Authority's rules, or containers greater than fifty-five gallons in size. *See* EAA Rules § 713.501.

H. Research and Data Collection

The Authority has an active Aquifer groundwater quality monitoring program. *See generally* 2013 Hydrologic Data Report, at 40. The Authority coordinates its program with the U.S. Geological Survey and the TWDB. Sampling points for the program include springs, wells, and surface watercourses throughout the region. The results of this program are published annually in the Authority's Hydrologic Data Report. *See, e.g.*, 2013 Hydrologic Data Report, at 40–64.

VII. Enforcement

A. In General

The Authority is authorized to enforce the Act. *See* EAA Act § 1.40(a). Persons may not violate the Act or an Authority rule. EAA Act § 1.35(e). Permittees may not violate the terms or conditions of their permits. EAA Act § 1.35(b). The Authority is to ensure compliance with the terms and conditions of its permits and the permit program. EAA Act § 1.11(b). The board may issue orders to enforce the Act, its rules, the terms and conditions of permits, or its orders. EAA Act §§ 1.11(c), 1.36(a). The Authority's enforcement rules are found at chapter 717. *See* EAA Rules §§ 717.100–.118.

B. Well Enforcement

The Authority may close abandoned, wasteful, and dangerous wells. EAA Act § 1.11(d)(8). The Authority may enforce Texas Occupations Code chapters 1901 and 1902, and its implementation rules at title 16 Texas Administrative Code chapter 76, relating to water well driller and water well pump installers. EAA Act § 1.11(d)(10). The EAA Act actually refers to Texas Water Code chapter 32 and its implementation rules. However, chapter 32 of the Texas Water Code was repealed by Act of May 22, 2001, 77th Leg., R.S., ch. 778, § 5; Act of May 22, 2001, 77th Leg., R.S., ch. 1421, § 13(b). Chapter 32 of the Water Code was largely recodified in Texas Occupations Code chapter 1901.

C. Civil Penalties

The Authority may seek civil penalties in state district court for violation of the Act or the Authority's rules, permits, or orders. EAA Act § 1.40(a). Civil penalties may range from $100 to $10,000 per violation per day. EAA Act § 1.40(b). The Authority retains any civil penalties it collects. EAA Act § 1.40(c).

D. Injunctive Relief

The Authority may seek injunctive relief in state district court to enforce the Act. EAA Act § 1.38.

E. Attorney's Fees

When seeking civil penalties or injunctive relief, the Authority may also recover attorney's fees. *See* EAA Act §§ 1.38, 1.40(b). If the Authority prevails in its enforcement action, the district court shall award the Authority its attorney's fees. *See* Tex. Water Code § 36.066(g). The Authority retains attorney's fees it collects. EAA Act § 1.40(c).

F. Permit Suspensions

The Authority, by rule, may provide for the suspension of a permit for violations of Authority rules, orders, or permits or the failure to pay required fees. EAA Act § 1.36(b).

G. Administrative Penalties

1. In General

The Authority may assess administrative penalties for violations of the Act, Authority rules, or orders. EAA Act § 1.37(a). The penalty amounts may not be less than $100 or more than $1,000 for each violation and for each day of a continuing violation. EAA Act § 1.37(a). In determining the appropriate penalty amount, the Authority is to consider the compliance history of the respondent, the amount required to deter future violations, any corrective efforts taken by the respondent, the enforcement costs of the Authority, and other matters that justice may require. EAA Act § 1.37(b).

2. *Staff Investigation—No Violation*

Authority staff investigates possible violations. EAA Act § 1.37(c). Based on the investigation, Authority staff will determine whether a violation has occurred. If no violation is found, no further enforcement action will be taken and the matter will be closed.

3. *Staff Investigation—Violation Found; Preliminary Report and Notice*

If Authority staff concludes that a violation has occurred, it will issue a preliminary report containing the relevant facts and staff conclusions and recommending an appropriate administrative penalty amount. EAA Act § 1.37(c). The Authority must give notice to the respondent that the report has been prepared. EAA Act § 1.37(d). The notice summarizes the investigation, stipulates the recommended penalty amount, and tells the respondent that he may seek an informal review of the report. EAA Act § 1.37(d). The respondent has ten days after receipt of the notice of the report to either consent to the findings and recommendations in the report or file a request with the Authority for an informal review. EAA Act § 1.37(e).

4. *Informal Review and Notice*

If the respondent requests an informal review, the Authority conducts an informal review of the preliminary report. EAA Act § 1.37(g). After the review, the Authority gives notice to the respondent of the results. EAA Act § 1.37(g). After reviewing the results of the informal review, the respondent may consent to the contents of the report. However, if the respondent wishes to contest the review and the report, he has ten days after receipt of the notice to file a request with the Authority for a hearing. EAA Act § 1.37(h).

5. *Settlement by Consent*

The respondent may consent to the preliminary report (or the results of the informal review) and the recommended penalty and conclude the matter by settlement. *See* EAA Act § 1.37(e)–(f). If the matter is settled, the Authority will assess the penalty and give notice to the respondent of the assessment. EAA Act § 1.37(f).

6. *Default Order*

If the respondent fails to timely request an informal review, or a request for a hearing, the Authority will assess the penalty and give notice to the respondent of the assessment. EAA Act § 1.37(f).

7. *Contested Case Hearing*

After review of the result of the informal review, the respondent may request a formal hearing. *See* EAA Act § 1.37(h). These hearings are contested case hearings conducted under the Texas Administrative Procedures Act, codified at Texas Government Code chapter 2001. EAA Act § 1.37(r). The EAA Act actually refers to the "Administrative Procedure and Texas Register Act (Article 6252-13a, Vernon's Texas Civil Statutes)." In 1993 this act was repealed and recodified at Texas Government Code chapter 2001. *See* Act of May 4, 1993, 73d Leg., R.S., ch. 268, § 1.

8. Judicial Review

Respondents may seek judicial review from final orders of the board assessing an administrative penalty. *See* EAA Act § 1.37(j)(2), (3), (n)(1). The standard of review is the substantial evidence rule. EAA Act § 1.37(n)(2). On review, the court may uphold the penalty at the level set by the Authority, reduce the amount, or order that no penalty is owed. EAA Act § 1.37(o). If the court reduces the amount or orders that no penalty is owed, any penalties previously paid by the respondent are to be returned plus interest, along with any supersedeas bond that was posted. *See* EAA Act § 1.37(p).

9. Collection of Administrative Penalties

Administrative penalties are assessed by board order issued at an open meeting conducted pursuant to the Texas Open Meeting Act, codified at Texas Government Code chapter 551. In the event the respondent does not pay the penalty and it has not been stayed by a court, the Authority may seek the assistance of the Texas attorney general for collection. EAA Act § 1.37(m). Administrative penalties are to be remitted to the Authority. EAA Act § 1.37(q). The respondent must pay the penalty to the Authority within the following timeframes:

1. as provided by the terms of any settlement agreement that the respondent may have entered into with the Authority;

2. in the event the respondent consents to the finding and recommendation of the preliminary report discussed above (or the results of the informal review discussed below), then payment must be made within thirty days of receipt of the Authority's notice assessing the penalty (EAA Act § 1.37(f));

3. in the event the respondent fails to timely request an informal review of the findings and recommendations in the preliminary report discussed above, then payment must be made within thirty days of receipt of the Authority's notice assessing the penalty (EAA Act § 1.37(f));

4. in the event the respondent requests an informal review, but fails to timely request a contested case hearing, then payment must be made within thirty days of receipt of the Authority's notice assessing the penalty (EAA Act § 1.37(i)); or

5. in the event of a contested case hearing, unless stayed pending judicial review (*see* EAA Act § 1.37(j)(3), (k), (*l*) (providing the procedures for a respondent to stay the assessment of an administrative penalty pending judicial review of the Authority's action)), payment must be made within thirty days after issuance of the Authority's final order in the matter (EAA Act § 1.37(j)). The EAA Act provides that the respondent must pay the penalty within thirty days of the Authority's order becoming final "as provided by Subsection (c), Section 16, Administrative Procedure and Texas Register Act (Article 6252-13a, Vernon's Texas Civil Statutes)." This provision has been recodified at Texas Government Code sections 2001.144–.146.

H. Enforcement by the TCEQ

The TCEQ has the same authority as the Authority to seek and recover civil penalties for violation of the Act or the Authority's rules, permits, or orders. EAA Act § 1.40(a). Civil penalties collected by the TCEQ are paid into the general revenue fund of the State of Texas. EAA Act § 1.40(d). When seeking civil penalties, the TCEQ may also recover attorney's fees. *See* EAA Act

§ 1.40(b). Attorney's fees collected by the TCEQ are paid into the general revenue fund of the State of Texas. EAA Act § 1.40(d). If the Authority is not performing its duties under the Act, the TCEQ may bring a mandamus action against the Authority to perform such duties and to recover attorney's fees. EAA Act § 1.39. The TCEQ may also bring such an action when the Authority is not enforcing the Act against those who may be violating its terms.

VIII. Conclusion

By the late 1980s and early 1990s, it had become clear that the common-law rule of capture, which placed no limits on withdrawals, no longer served the regional stakeholders interested in the management of the Aquifer. In the face of inaction by the State of Texas, pursuant to the ESA, the federal district court for the Western District of Texas took the first step to "federalize" the management of the Aquifer to protect threatened and endangered species dependent on Comal and San Marcos Springs. *See Sierra Club v. Lujan*, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex. Feb. 1, 1993), *dism'd*, *Sierra Club v. Babbitt*, 995 F.2d 571 (5th Cir. 1993).

The State of Texas responded in 1993, under the authority of the Conservation Amendment of the Texas Constitution, by passing the EAA Act, which for the first time authorized the management of the Aquifer by creating a statutory-based permit system with little or no resemblance to the common-law rule of capture. In so doing, it fundamentally changed the manner in which a groundwater right in the Aquifer is established—from one based on ownership of land (the rule of capture) to one based on beneficial use during a prescribed historical period. The Act created the Authority with comprehensive management powers to administer this new system.

In creating the Authority, the State has been able to successfully invoke the *Burford* abstention doctrine and avoid interference from federal courts in the management of the Aquifer. *See Sierra Club v. City of San Antonio*, 112 F.3d 789 (5th Cir. 1997), *cert. denied*, 118 U.S. 879 (1998); *see also Day v. Edwards Aquifer Authority*, No. Civ. A. SA-03-CA0429-FB, 2004 WL 1118721 (W.D. Tex. Mar. 26, 2004). The legislature also made the Authority the lead agency for ensuring compliance with the dictates of the ESA to protect the threatened and endangered species associated with the Aquifer at Comal and San Marcos Springs. In this role, the Authority would become the intermediary between the users of the Aquifer and the U.S. Fish & Wildlife Service. Umbrella protection for Aquifer users would be afforded by the Authority's taking responsibility for Aquifer management, thereby shielding users from potential ESA liability for the taking of threatened and endangered species based on their use of the Aquifer.

The basic constitutionality of this approach has been approved by the Texas Supreme Court in the *Barshop* case. However, several key issues have yet to be ruled on by the courts, primarily in the areas of regulatory takings and governance. How these issues are ultimately addressed will play a large role in whether the Aquifer will be susceptible to continued management under the EAA Act.

CHAPTER 18

Groundwater Transactions

Susan M. Maxwell[1] and Denise V. Cheney[2]

I. Introduction

Transactions and water marketing involving the purchase or lease of groundwater rights, severed from the land, are becoming increasingly common throughout Texas. This trend involves both public- and private-sector entities and encompasses a broad spectrum of the financial and geographic scope of projects, including some that involve tens of thousands of acres across multiple counties. The current State Water Plan recognizes that groundwater supplied approximately 60 percent of the 16.1 million acre-feet of water used in Texas in 2008, principally for agricultural uses but also as a substantial portion of municipal water supplies. Texas Water Development Board, *Water for Texas 2012* 163 (2012), *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. Because of the limited availability of unappropriated surface water in most parts of the state and groundwater shortages in some areas, groundwater resources have been the primary focus of emerging water-marketing efforts and also have been identified by municipalities and other utilities as a critical potential alternative source of supply, either alone or in conjunctive use projects with surface water.

In the context of this increased emphasis on developing new groundwater supplies and making existing supplies available for different uses (or for use in different places), transactions involving groundwater rights will continue to evolve in different forms. Some transactions involve acquisition of rights to production of previously undeveloped groundwater resources; others involve transfer of existing, quantified permitted rights. Most transactions relate to real property located within a local groundwater conservation district and therefore subject to the district's rules and permitting requirements; however, even those that are not subject to a district's jurisdiction are affected by larger-scale planning for groundwater resources. Because of the variability both of local regulatory regimes and of groundwater resources in different areas of Texas, as well as other financial, project, and planning issues of the parties, there are many important considerations in developing, evaluating, and documenting a potential groundwater transaction, whether a purchase or a lease.

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The purpose of this chapter is to address the major issues and practical considerations involved in real property transactions for groundwater rights severed from the land. First, in the context of Texas law on ownership of groundwater, which is discussed more fully in Chapter 4 of this book, this chapter describes and compares the primary methods for conveying or acquiring groundwater rights and sets out the framework within which the parties define the nature and scope of the rights thus purchased or leased, including issues involving the reserved and ongoing rights of the owner of the surface estate. Second, this chapter outlines an array of due diligence matters typically implicated in groundwater transactions, whether purchase or lease, discussing the significance of those issues for the parties. Finally, it addresses financing and other issues to be considered in the unique context of groundwater transactions, including the valuation and marketability of groundwater rights.

The chapter is not designed to be a stand-alone resource for drafting the real estate documents needed for a particular transaction and does not attempt to discuss term by term the types of provisions that may be appropriate for a particular lease, contract of sale, deed, and so on. However, the State Bar of Texas's *Texas Real Estate Forms Manual* has a chapter on water rights conveyancing documents, which contains additional practice-oriented guidance and basic forms for groundwater sales. *See* State Bar of Texas, 2 *Texas Real Estate Forms Manual* ch. 31 (2d ed. 2011 & Supp. 2014) [hereinafter Forms Manual]. These sample forms are discussed in section III below.

II. Ownership of Groundwater Rights

A. Common Law of Absolute Ownership

As fully discussed in Chapter 4 of this book, the Texas Supreme Court long ago applied the English common-law rule of capture to groundwater and held that the owner of land could pump unlimited quantities of water from under his land, regardless of whether his action drained water from under his neighbor's land. *See Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (1904). There are few significant limitations at common law on the landowner's right to capture and use groundwater. A landowner cannot capture and use groundwater maliciously, for the purpose of injuring a neighbor, or in a manner that constitutes wanton and willful waste. *See City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798 (1955). A landowner may be liable for damages if he negligently pumps groundwater in a manner that causes subsidence of neighboring land. *Friendswood Development Co. v. Smith-Southwest Industries, Inc.*, 576 S.W.2d 21, 30 (Tex. 1978).

The rule of capture in Texas also includes some general principles that facilitate groundwater transactions and marketing. Under the common law, a landowner can use groundwater at a location other than his land and sell groundwater that he captures below the surface of his land for off-site use by a third party. *See Texas Co. v. Burkett*, 296 S.W. 273 (1927). The use of groundwater at a distant location, even though the majority may be lost in transit, is also permissible. *See City of Corpus Christi*, 276 S.W.2d at 802–03. As discussed below, however, there may be practical limitations on a landowner's ability to alienate and transport groundwater based on regulation by a local groundwater conservation district.

B. Reexamining the Nature of the Ownership Interest

In recent years, a question has arisen about whether a landowner has a property right in groundwater in place under his land or whether the landowner's property interest in the groundwater actually "vests" only when the landowner has "captured" the groundwater and put it to a beneficial use. The issue has arisen in the context of whether a landowner can challenge the regulations of a groundwater conservation district on the grounds that they constitute a "taking" of the landowner's groundwater rights. The Edwards Aquifer Authority (EAA) has argued that the rights of property owners to pump water in the future could not be "taken" by the Edwards Aquifer Authority Act because such rights are not yet vested and therefore are not constitutionally protected. *See Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (Tex. 1996). In *Barshop*, the supreme court found it unnecessary to address the issue, expressly declining "to definitively resolve the clash between property rights in water and regulation of water." *Barshop*, 925 S.W.2d at 626.

This issue of "ownership in place" has recently been squarely addressed by the Texas Supreme Court in another case in which landowners have brought "takings" claims based on the permitting decisions of the EAA. *See Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012). Affirming the judgment of the court of appeals, the court held that "land ownership includes an interest in groundwater in place that cannot be taken for public use without adequate compensation." *Day*, 369 S.W.3d at 817. The court's analysis included an extensive review of the major rule of capture cases and legislative treatment of groundwater rights and regulation, and the court concluded that the oil and gas case law precedent of recognizing both the rule of capture and ownership in place is also appropriate for groundwater. *Day*, 369 S.W.3d at 823, 828–32. The court affirmed the authority of the EAA and other groundwater conservation districts (GCDs) to regulate groundwater production but recognized that such regulation can, at least theoretically, result in a compensable takings claim under the Texas Constitution. The takings claims were remanded for further proceedings. *Day*, 369 S.W.3d at 843.

In another recent case, the issue of whether a landowner has a vested right in the groundwater under its land arose in the context of a property conveyance by a private party to a municipality. *See City of Del Rio v. Clayton Sam Colt Hamilton Trust*, 269 S.W.3d 613 (Tex. App.—San Antonio 2008, pet. denied). The question before the court was whether the landowner legally could—and properly did—reserve to itself the corresponding groundwater rights when conveying the surface estate. The Trust had conveyed to the City a fifteen-acre tract from a ranch that it owned, from which tract the Trust had not previously produced groundwater. Although the deed contained a provision to reserve to the Trust "all water rights associated with said tract," the conveyancing documents did not include express easement rights for the Trust that would allow it to produce groundwater from the tract conveyed to the City. After the City drilled a high-capacity well on the tract to develop a supplemental municipal water supply, the Trust filed suit asserting its ownership of the groundwater beneath the City's fifteen-acre tract.

The district court entered a declaratory judgment in favor of the Trust regarding the validity and enforceability of the Trust's reservation of water rights and the Trust's ownership of the groundwater rights beneath the fifteen-acre tract. The court of appeals affirmed on the basis that "under the absolute ownership theory, the Trust was entitled to sever the groundwater from the surface estate by reservation." *City of Del Rio*, 269 S.W.3d at 617. The court rejected the city's argument that the failure of the Trust to reserve surface use rights on the fifteen-acre tract in order to drill and produce the reserved groundwater constituted a violation of the prohibition against perpetuities, because the Trust could access the groundwater beneath the fifteen-acre tract from its adjacent lands. *City of Del Rio*, 269 S.W.3d at 618–19. (The court might have reached a different decision, however, had the Trust not been able to access the reserved groundwater from its other land.) The Texas Supreme Court denied the city's petition for review. The *City of Del Rio* case well illustrates the need for careful analysis and precise document drafting regarding the parties' intended future use of both the surface rights and the water rights involved in a particular groundwater transaction.

The decisions in the *City of Del Rio* and the *EAA v. Day* cases have far-reaching implications for present and prospective groundwater transactions and groundwater marketing projects in Texas. As the takings claims in *Day* proceed through the lower courts, and as other such cases may follow, GCDs and various stakeholders in groundwater permits and projects will continue to test the parameters of the districts' exercise of their regulatory authority.

Even before the *Day* decision, the 82nd Legislature had also addressed the issue of groundwater ownership and the rights to produce groundwater, amending chapter 36 of the Texas Water Code expressly to recognize "that a landowner owns the groundwater below the surface of the landowner's land as real property," and that "[n]othing in [the Water Code] shall be construed as granting the authority to deprive or divest a landowner [including lessees, heirs, or assigns] of the groundwater ownership and rights" described in the statute. Tex. Water Code § 36.002. The statute, further amended in 2015, expressly extends that scope of rights to include "any other right recognized under common law," and also incorporates the common-law exceptions and defenses under the rule of capture reflected in Texas case law, but specifies that the landowner is not entitled to capture a specific amount of groundwater below the surface of his land. *See* Act of May 23, 2015, 84th Leg., R.S., ch. 590, § 1 (amending Tex. Water Code § 36.002(b)). The statute still recognizes the authority of a groundwater conservation district to impose well spacing or tract size requirements and to limit groundwater production as provided under chapter 36, discussed at section IV.B below. *See* Tex. Water Code § 36.002(d).

C. Examining New Issues

With the issue of ownership rights in groundwater having been firmly resolved in *Day*, new issues involving the extent of those rights are being examined by Texas courts. As previously discussed, the *City of Del Rio* case illustrates the importance of ensuring that the groundwater rights owner has adequate surface rights to access and develop his groundwater. A recent case, *City of Lubbock v. Coyote Lake Ranch, LLC*, 440 S.W.3d 267 (Tex. App.—Amarillo 2014, pet. granted), raises the issue of whether a groundwater rights owner with a blanket easement can be restricted in his use of the surface estate through application of the accommodation doctrine.

The city of Lubbock acquired groundwater rights under a 1953 deed that gave the city a blanket easement to develop, produce, and transport its groundwater. When the city began to develop a well field on the property, the landowner sued for an injunction, alleging that the accommodation doctrine applied to groundwater development. The doctrine is one that has been imposed by courts in connection with oil and gas development as a means of "balancing the rights of the surface and mineral owners to use their respective estates while recognizing and respecting the dominant nature of the mineral estate." *Coyote Lake Ranch*, 440 S.W.3d at 272 (quoting *Merriman v. XTO Energy, Inc.*, 407 S.W.3d 244, 250 (Tex. 2013)). To assert the doctrine, the surface owner must prove that the use of the surface by the mineral estate is not reasonably necessary because there are alternate reasonable ways of producing the minerals that would allow the surface owner to continue his existing use. The trial court granted the injunction, but the court of appeals reversed and remanded the case, finding that the similarity between oil and gas and groundwater "does not necessarily translate into the analogy being taken further, all the way into governing the rights and defining the relationships between landowners and other entities." *Coyote Lake Ranch*, 440 S.W.3d at 274–75. If it is ultimately decided that the accommodation doctrine applies despite the terms of an express blanket easement, it will be difficult for a groundwater rights owner to have assurance that he will be able to exercise all the rights granted to him in a surface easement—even if the rights were the product of negotiation.

The other major emerging area since the *Day* decision involves defining the circumstances in which a GCD's regulatory decision making, including denial or limitation of groundwater permitting rights, amounts to an unconstitutional taking. Most notably, an appellate court in a closely watched case has affirmed the lower court's decision that the EAA had taken the property of local pecan farmers by severely limiting their permitted groundwater rights, and quantifying the value of the denied water rights. *See Edwards Aquifer Authority v. Bragg*, 421 S.W.3d 118 (Tex. App.—San Antonio 2013, pet. denied) (applying the U.S. Supreme Court's *Penn Central* factors). The outcome of the *Bragg* case, and perhaps others to come, will further inform practitioners' and property owners' strategies in groundwater transactions.

III. Methods for Conveying or Acquiring Groundwater Rights

A. Nature and Description of Groundwater Rights

Groundwater belongs to the owner of the surface estate in land and is part of the real property. *Texas Co. v. Burkett*, 96 S.W. 273 (1927); *see* Tex. Water Code § 36.002(a). Groundwater rights may be owned or leased in place as part of the land or may be severed from the land. Severed groundwater rights, being a real property interest, may be acquired in fee simple or through a lease. Groundwater rights that are severed from the land may allow production on-site from the tract of land from which they are severed or may allow production only off-site, from different land. As another alternative, the owner of the groundwater rights may grant a license to another person for use of the groundwater.

Many factors must be considered in determining the best method of acquisition for a given transaction, including (1) the time period in which production will be commenced, (2) the duration of the intended use, (3) acquisition costs, (4) the willingness of landowners to sell or lease groundwater rights, and (5) the terms that can be negotiated for a lease or sale. For example, if the groundwater rights are being acquired for future production, with no intention to commence production in the near future, a production lease that requires production within a specified time period may be used. Such a production lease may not be practical, however, unless it contains a pooling clause that allows production from pooled groundwater to continue the lease in effect or some other provision that enables the lessee to keep the lease in effect despite the lack of production. Depending on market conditions, if immediate and long-term production is contemplated, it may be more cost-effective to purchase the groundwater rights or to purchase the land in fee than to lease the groundwater rights.

One of the most important factors in determining the method of acquisition is the willingness of the landowner to lease or sell groundwater rights. In areas where the leasing of groundwater rights is common, for example, a landowner may be unwilling to enter into any arrangement other than a lease. In areas with little or no history of separate groundwater rights transactions, some landowners may be unwilling to lease or sell the groundwater rights and will consider only a sale of the land. Conversely, persons acquiring groundwater rights may prefer to purchase the land to avoid any issues or uncertainty relating to reserved groundwater and retained use of the surface.

1. *Groundwater Rights for On-Site Production*

In a transaction in which groundwater will be produced on-site, the ability to use the groundwater requires the right to use the surface of the land for access, testing, exploration, drilling, development, and transportation of the groundwater, as well as the right to capture, use, and produce the groundwater itself. The Texas Supreme Court relied significantly on analogous principles from oil and gas law in its *Day* decision regarding the landowner's ownership interest in groundwater in place. However, whereas the law governing oil and gas rights has been determined through many years of usage and case law, the particulars of usage and law governing groundwater rights are largely unwritten and relatively untested. It is well established in oil and gas law, for example, that an oil and gas lessee has surface use rights that are implied by law and dominant over the rights of the surface owner. *See Phillips Petroleum Co. v. Cargill*, 340 S.W.2d 877 (Tex. Civ. App.—Amarillo 1960, no writ). As the *City of Del Rio* case illustrates, the case law has been less developed regarding the implied surface use rights of the owner of groundwater rights. Consequently, it is essential that the documents evidencing or conveying the groundwater rights, whether contract, lease, or deed, expressly (1) define "groundwater," (2) identify the land subject to the rights with a sufficient legal description, and (3) describe the grantee's rights in both the groundwater and the surface estates. If any groundwater rights are to be retained by the landowner, the contract or conveyance should also specifically describe the rights being reserved, including any limitations on use.

The groundwater rights sales contract form in the Forms Manual applies to a sale by a landowner that severs the groundwater rights from the land and applies to a sale of groundwater rights to be produced on-site, providing examples of provisions that can be used to address these three issues. The contract form uses the following terms:

> Real Property: The Real Property described in Exhibit A. [*Exhibit A will set out the legal description for the land.*]
>
> Groundwater: All of the underground water, percolating water, artesian water, and any other water from any and all depths and reservoirs, formations, depths and horizons beneath the surface of the Real Property, excluding underflow or flow in a defined subterranean channel.
>
> Groundwater Rights: (1) The Groundwater [*include if applicable:* except the Reserved Groundwater] and the right to test, explore for, drill for, develop, withdraw, capture, or otherwise beneficially use the Groundwater; (2) the right to use the surface of the Real Property for access to and to explore for, develop, treat, produce, and transport the Groundwater; and (3) all permits, licenses, or other governmental authorizations relating to any of the foregoing. If a separate Easement Agreement is required by this contract, the Groundwater Rights include the easement rights.

2 Forms Manual ch. 31, form 31-1.

If the seller reserves any portion of the groundwater rights, the description of the groundwater rights would contain an exception for the reserved groundwater. The contract form uses the following description for the reserved groundwater:

> Reserved Groundwater: Seller reserves the right to use the Groundwater in connection with its surface estate in the Real Property for the following purposes only: [*state purposes for which the reserved groundwater may be used and any limit on the quantity of reserved groundwater that seller may use including any limit on the number of wells that seller may drill or maintain.*]

2 Forms Manual, ch. 31, form 31-1.

The rights reserved to the seller, including any limitation on those rights, should be described with specificity. If the buyer plans to use the groundwater for commercial use, for example, the buyer will want to prohibit the seller from using the reserved groundwater for commercial use or production. Such a limitation may be in the form of restricting the use of the groundwater to domestic and livestock use by the seller and seller's family members for household purposes. The buyer may also want to prohibit any lease of the reserved groundwater rights or use of the reserved groundwater in oil and gas or mineral production. If the mineral estate has been severed from the land, however, this restriction would not be enforceable against the owner of the mineral estate unless the mineral owner agreed in writing to be bound by these terms.

The seller's ability to use reserved groundwater may be limited in a number of other ways. One way would be to limit the amount of groundwater that the seller can produce from the real property within a specified period of time. Another way would be to limit the number, and pumping capacity, of the wells that the seller is permitted to operate on the land.

If the seller has obtained any permit relating to the groundwater from the local GCD, the sale contract should include a description of the permit and a requirement that the permit be transferred in connection with the closing. As discussed in section IV.B below, these might include various types of

GCD-issued permits for drilling, production/operation, or export/transport of groundwater outside the district.

2. Groundwater Rights for Off-Site Production

If the groundwater rights to be acquired do not include the right to produce groundwater directly from the land from which the groundwater rights are derived, the description of the groundwater rights will exclude the right to use the surface of the land for exploration, testing, drilling, and production. The buyer may have to access the groundwater from adjacent real property, so that, in effect, the buyer is merely draining groundwater from the tract from which it purchased the groundwater rights, but the buyer would be able to include the amount of acreage from that tract in meeting applicable well spacing or production requirements established by the local GCD, if any. For further discussion of the practical implications of such regulatory controls, see section V.B below.

3. Groundwater Rights in the Edwards Aquifer

Groundwater rights obtained within the jurisdiction of the EAA are highly regulated, and many of the owner's rights are derived through the EAA permit issued in connection with the groundwater rights. Although a detailed discussion of special issues and terms applicable only to EAA-permitted groundwater transactions is beyond the scope of this chapter, it is important to note that documents for groundwater transactions in the EAA may require provisions not generally applicable to the purchase of groundwater rights relating to other aquifers. For example, a contract form intended to be used for the purchase of groundwater rights within the EAA for off-site production would generally contain a description of groundwater rights different from the definition of the term used in the groundwater rights contract discussed above:

> Groundwater Rights: The Seller's perpetual right to withdraw up to ____ acre feet per annum of ______ Aquifer permitted irrigation/industrial/or municipal groundwater, (the "Groundwater") heretofore relating to the Real Property. The Groundwater includes all of the real and personal property rights, appurtenances, hereditaments, licenses, and contracts, if any, related to or pertaining to the Groundwater including Permit(s) #______ (and if recorded), recorded in Volume ___, Page ___ of the Official Public Records of ______ County, Texas (the "Permit"), as amended or modified, as applicable, insofar as it pertains to the Groundwater, including, but not limited to:
>
> (a) all of the (i) real and personal property rights, (ii) appurtenances, (iii) authorities, (iv) licenses, (v) consents, and (vi) contracts, if any, relating to or pertaining to the Groundwater, which shall also include (1) all common law property rights in and to the Groundwater as well as (2) those rights or interests that now or in the future may be useful or necessary to withdraw and/or beneficially use the Groundwater. (All of this subsection (a) is collectively referred to as the "Appurtenant Rights.");
>
> (b) all permit rights (including the right in and to the Permit that relates to the Groundwater) allowing for possession, withdrawal, and/or use of the Groundwater (the "Permit Rights"); and
>
> (c) any and all other rights to withdraw and beneficially use the Groundwater, Appurtenant Rights, Permit, or Permit Rights, together with all modifications, amendments, renewals, extensions, or successor or substitute permits relating to any of the above-described items.

See Chapter 17 of this book for a discussion of the special statutory and regulatory requirements of the EAA regarding groundwater permits.

4. Previously Severed Groundwater Rights

In a transaction in which the conveyance of the groundwater rights will constitute the severance of those rights from the land, the buyer and seller may negotiate the rights that the buyer will obtain, including any surface rights, and the consideration to be paid for the groundwater and the use of the surface estate. This description of these rights would be a major component of the sale contract.

Where the groundwater rights have already been severed from the land, and the buyer is purchasing these severed rights, the description of the groundwater rights has already been established in the deed, and in any easement, previously conveyed to the seller. Consequently, the description of the severed groundwater rights would be the description used in the deed and, if applicable, the easement.

B. Purchase of Groundwater Rights in Fee Simple Absolute

Because the ownership of groundwater rights constitutes the ownership of a real property interest, the instrument for conveyance is a deed, which may be either a general warranty deed or a special warranty deed, as agreed on by the seller and buyer. The deed should contain the same description of groundwater rights used in the contract of sale, including a description of surface use rights, in the event the seller and buyer do not agree on more extensive rights to be conveyed in a separate easement document at closing. If the buyer will have the right to engage in on-site production, it is important that the surface use rights be broad enough to allow testing, exploration, drilling, installation and operation of needed facilities, production and other beneficial use, and transportation, because case law has not established that the owner of severed groundwater rights has surface use rights implied by law.

It is advisable that the contract require that the surface use rights be granted in a separate easement document to be signed at closing. Use of a separate easement document will allow the parties to address the easement terms in greater detail than would normally be set out in a deed and to provide default and remedies provisions not otherwise applicable to the conveyance of fee title to the groundwater rights.

1. Contract for the Sale of Groundwater Rights from the Landowner

In a transaction for the sale of groundwater rights, the sales contract used is similar to a sales contract for land or other real property interest but with provisions applicable to the groundwater rights being conveyed. In addition to a description of those groundwater rights, the contract will contain customary sales contract provisions, such as (1) warranties and representations by the parties; (2) the requirement for the seller to provide copies of documents related to the groundwater rights; (3) a title review and objection period; (4) requirements for the provision of title insurance, if it is to be obtained; (5) an inspection period in which the buyer can perform due diligence activities; (6) closing requirements; (7) a closing date and location; and (8) default and remedies provisions.

In a sale that severs the groundwater rights from the land, the contract should provide a definition of groundwater, the legal description of the land from which the groundwater rights are obtained, and a description of the grantee's rights in both the groundwater and surface estates. If a permit from a GCD has been granted to the seller, the contract should describe the permit and require it to be transferred to the buyer as part of the sales transaction.

The contract should expressly address the obligation of the seller and buyer to pay ad valorem property taxes at closing and after closing. Currently, ad valorem property taxes are assessed against the land and improvements thereon and are not separately assessed against severed groundwater rights. This could change in the future. The contract should require the seller to continue paying the taxes assessed against the land and seller's improvements after closing and should provide that the buyer will pay taxes on the groundwater rights, if in the future they are separately assessed.

If the buyer or lessee is relying on third-party financing to acquire or develop the groundwater rights, the contract should expressly make the buyer's obligation to purchase or lease the groundwater rights contingent on obtaining such financing before closing.

The contract may contain a list of the documents to be executed at closing, which would typically include a general or special warranty deed, as agreed on by the parties, an easement agreement, and a transfer request for any existing groundwater permits. If there is a lien on the seller's land, the list of documents would include a full or partial release of the lien to be executed by the lien holder at closing. A partial release, if used, would release the lien only as to the groundwater rights being conveyed to the buyer. If a separate easement is to be granted, it is advisable to have the lien holder execute a subordination agreement at closing, in which the lien holder subordinates its lien to the rights granted to the buyer in the easement. If a subordination agreement is not obtained, a foreclosure by the lien holder at any time after closing could terminate the buyer's easement rights.

The buyer's rights to use the surface estate after closing should be addressed as part of the contract negotiations and fully set out in the sales contract. It is advisable to provide in the contract (1) the surface use rights, which will be granted in a separate easement document to be executed at closing and will fully address any limitations on the buyer's use of the surface estate; (2) the respective obligations of the buyer and seller for the payment of ad valorem property taxes; (3) the maintenance and repair of improvements; (4) any compensation to be paid to the surface owner for the use of the surface estate; (5) liability for damage to improvements; (6) insurance and indemnification requirements; and (7) default and remedies provisions. These rights could be in the form of a blanket easement for access, installation, and operation of wells, waterlines, pipelines, and other facilities or an easement granting use rights in specific areas of the land.

The Forms Manual contains forms illustrating the types of easement rights and limitations on use and payment terms that may be negotiated in a groundwater sales contract. The easement form set out in the Forms Manual for use in groundwater transactions is a blanket easement that grants the easement holder broad rights for access and for the installation and operation of wells, pipelines, electric transmission and communication lines and conduits, storage tanks, water treatment facilities, and other structures and facilities used in connection with groundwater production. *See* 2 Forms Manual ch. 31, form 31-3. The Blanket Easement Agreement form also includes a sanitary control easement around well sites and the right to install and maintain pipelines for the transportation of groundwater. An easement document may grant the buyer the right to operate pipelines only for the use of groundwater produced from the seller's land, or it may grant the buyer the right to use the pipelines for the transportation of groundwater from any source. The latter provision gives the buyer greater flexibility in the design and operation of its groundwater system.

The rationale for granting a blanket easement with broad rights is that at the time the buyer and seller close on the sale, particularly for large groundwater projects, the buyer may not have conducted all of the testing and investigation necessary to determine the types of facilities to be installed on the land, the location of these facilities, and the time period for the commencement of installation. A blanket easement will provide the buyer with sufficient rights to conduct investigations, design its groundwater system, and determine the most advantageous placement of facilities in the land for the buyer's groundwater project, taking into account factors such as the location of the buyer's pipelines and other facilities on adjacent properties.

Although the blanket easement may contain a provision allowing the landowner to obtain one or more partial releases of the blanket easement, some landowners may not want to tie up their property with a blanket easement in perpetuity. The Forms Manual has an addendum form that may be used with the blanket easement to limit the time period available to the easement holder for making a determination of the types and location of facilities to be installed. This Easement Location Addendum form requires the easement holder to identify the facilities to be installed and the location of the easement areas by field note description, within a specified period of time, and to release the blanket easement from areas not subject to the specific easement rights. *See* 2 Forms Manual ch. 31, form 31-4.

The Forms Manual also has an addendum form for use with the blanket easement that sets out restrictions on the easement holder's use of the surface estate. The landowner may, for example, want to require the easement holder to use existing driveways and roads on the real property, where possible, instead of building new ones, and to contribute to the cost of repair and maintenance of driveways and roads that it uses. Similarly, the landowner may want to establish construction standards for roads built by the easement holder and specific requirements for restoring the property after the installation of facilities and for removing debris. The Surface Use Restrictions Addendum form provides examples of these types of obligations and limitations on the use of the surface estate. *See* 2 Forms Manual ch. 31, form 31-6.

The Forms Manual has a third addendum form, entitled the Surface Damage Payment Addendum, that may be used with the blanket easement form to set out the compensation to be paid in connection with the exercise of rights under the easement. It is possible for the buyer and seller to agree that the compensation paid for the groundwater rights at closing will constitute full payment to the landowner for all use made of the surface estate by the easement holder in the future. It is not uncommon, however, for landowners to want additional compensation after closing in connection with the use of the surface estate. The Surface Damage Payment Addendum form sets out the compensation to be paid to the landowner for the installation of roads, pipelines, and other facilities by the easement holder. *See* 2 Forms Manual ch. 31, form 31-5.

The deed, easement, and any full or partial release and subordination agreement executed in connection with the sale must be recorded in the real property records of the county or counties in which the real property is located. If a transfer of permit form is executed, it should be handled as required under the applicable rules of the local GCD. Although it has not been customary in areas subject to the jurisdiction of a GCD (other than the EAA) to record a copy of the groundwater permit in the county real property records, consideration may be given to doing so. To be recordable in the real property records, the permit must contain an acknowledgment or jurat, or otherwise meet the requirements for recordation set out in sections 12.001 and 12.0011 of the Texas Property Code.

2. Contract for the Sale of Groundwater Rights in the Edwards Aquifer

Groundwater rights under the jurisdiction of the EAA are subject to special EAA regulations and are often acquired for production off-site. The buyer's rights to use the groundwater will be determined by the terms of the groundwater permit issued by the EAA. These groundwater rights arise from a particular well, located on a specific tract of land, as described in the groundwater permit. The sale contract will reference both the groundwater permit and the real property on which the well is located.

If the groundwater rights are subject to an existing groundwater lease, the sale contract must address the assignment of the lease rights at closing. The sale contract will contain terms generally applicable to the sale of real property and may set out a list of the documents to be signed at closing. Conveyance of the groundwater rights will be by general or special warranty deed and includes transfer of any existing EAA-issued permits. The deed is recorded in the real property records of the county in which the original permit was recorded (which is the county where the real property from which the permit derives is located). The transfer of permit is filed with the EAA; if and when the

EAA issues a new or amended permit to the buyer, that permit is recorded in the same real property records as the deed.

3. *Contract for the Sale of Previously Severed Groundwater Rights*

In a sale of groundwater rights that have been previously severed from land, the definitions of groundwater and groundwater rights have already been established in the deed granted to the seller. Consequently, the description of the groundwater rights in the sale contract would refer to those rights described in the seller's deed and, if a separate easement document was executed, in the seller's easement. The contract would set out the other types of sale provisions described above and would require the groundwater rights to be conveyed by general or special warranty deed at closing, with a transfer of any existing groundwater permit. If the seller's groundwater rights include rights under a separate easement, the contract would require an assignment of the easement rights to be executed at closing.

C. Other Methods of Conveyance or Acquisition of Groundwater Rights

1. *Lease*

a. Production Lease

If a production-based lease is used, the lease may constitute the conveyance of a determinable fee interest in the groundwater rights to the lessee, as in the case of an oil and gas lease. The terms of a groundwater production lease are similar to those of an oil and gas production lease. The lease will specify a primary term in which exploration, drilling, and production are to be commenced and completed and will provide that once production is achieved, the lease will continue as long thereafter as production is maintained. The lease may require a minimum payment per acre of land, until production is achieved, and may contain provisions allowing the primary term to be extended or for the lease to be continued beyond the primary term despite a lack of production. Once production is obtained, the lessor is generally paid a royalty based on the sales price of the groundwater, as defined in the lease. The lease may contain other provisions such as a pooling agreement, a requirement to drill offset wells, and an escalation provision for the royalty payments.

There is no industry-standard groundwater production lease. The Texas Farm Bureau has a form of production lease called the Model Lease of Groundwater Rights (copyrighted), which illustrates the terms that should be addressed in drafting a groundwater rights production lease. For a copy of the lease form, see John E. Gangstad, *Drafting a Groundwater Production Lease*, *in The Changing Face of Water Rights in Texas* (State Bar of Texas 2004).

b. Lease for a Term of Years

A landowner who is reluctant to enter into a production lease with its potentially limitless duration may be willing to enter into a long-term lease of the groundwater rights. Often, the owner and prospective tenant will negotiate a contract to enter into a lease, which sets out the primary business terms of the lease and provides for a closing date. The contract may also contain an inspection period to enable the lessee to conduct due diligence activities and to terminate the contract if the groundwater rights are not suitable as well as provisions allowing the prospective lessee to make objections to title and giving the owner the right to cure such objections within a stated period of time.

A lease of groundwater rights for a term of years has the same types of terms found in a standard real property lease, including (1) a description of the leased property, (2) the term of the lease, (3) the rent payments due, (4) the requirements for a security deposit, (5) a description of the rights and obligations of the parties to install and maintain improvements, (6) insurance and indemnification requirements, and (7) default and remedy provisions. If the parties have not previously entered into a contract for the lease of the groundwater rights, as discussed above, the lease may provide the lessee with an initial period in which to conduct due diligence activities and to perform hydrologic and other tests to determine the economic feasibility of production of the groundwater, and with a right to terminate before the expiration of the initial period. It may also provide the lessee with the right to make title objections and the lessor with the right to cure objections.

The lease may give the lessee a period of time in which to determine the types and locations of the facilities that will be installed in the land. The lease may require the lessee to provide a map or survey specifying the location of areas to be used for the installation of roads and facilities and to provide a field note description of the areas in which the facilities will be installed. If rent is in the form of a royalty based on the sale of the groundwater, the lease may require production to be obtained within a specified time period and to be maintained for the duration of the lease or provide that the lessee has to pay rental at a rate that is equal to or greater than the anticipated royalty payment. The lease should address the responsibility of the lessor and lessee for the payment of ad valorem property taxes during the term of the lease. As in the case of a contract for the purchase of groundwater rights, the lease would normally require the lessor to pay ad valorem property taxes assessed against the land and the lessor's improvements and would provide that if ad valorem property taxes are assessed on the severed groundwater rights in the future, the lessee would be responsible for paying those taxes.

To keep the rental payments and other business terms of the groundwater rights lease private, generally a memorandum of the lease, and not the lease itself, will be recorded in the real property records of the county or counties in which the land is located. The lessee, however, may want its surface use rights to be set out in the real property records so that persons dealing with the land will be put on notice of the location and nature of the lessee's use rights in the land. The parties may therefore agree that the terms of the lease governing the location, installation, and maintenance of facilities be set out in a separate easement document that will have the same duration as the lease term and be recorded in the same county or counties as the memorandum of lease. The lessee's surface use rights may be subject to the same types of limitations as those discussed above relating to contracts for the sale of groundwater rights.

A lease for a term of years is subject to the lease provisions of chapters 91 and 93 of the Texas Property Code. If the lessee has the right to use or occupy the lessor's property for the purpose of production, the lessee would be entitled to the right to notice and other protections given to tenants under the forcible entry and detainer statutes in chapter 24 of the Texas Property Code.

2. License

A landowner may grant a license to use groundwater from a specific tract of property. A license may be granted, for example, to allow a neighboring property owner to obtain groundwater from a well located on the licensor's property. A license is a right to use real property rather than a real property interest. It differs from a lease in that it can be terminated at the will of the licensor, absent an agreement to the contrary. A lease, on the other hand, can be terminated only as provided in the lease document, or absent an agreement on termination in the lease, in accordance with the provisions of chapter 91 of the Texas Property Code. A licensee is not entitled to the rights and protections afforded a lessee by statute, including the tenant lien rights provided by section 91.004 of the Property Code.

In an agreement drafted for the use of groundwater or groundwater rights, care should be taken to distinguish whether the right granted is a license or a lease in order to clearly establish the rights and obligations of the parties.

3. *Water Supply Contract*

In lieu of a purchase or lease of groundwater rights, the parties may prefer in some circumstances simply to enter into a water supply contract, by which the surface owner (or some other entity that controls groundwater production from the real property) sells groundwater supply to the buyer. Even in the case of a long-term supply need, this type of contract alternative may be particularly appealing in circumstances where the acquiring party cannot or does not wish to commit the capital investment for required infrastructure and other resources to develop and transport the groundwater supply itself. Depending on how the contract is structured (e.g., providing for a variable demand, or "take-or-pay" for a specified quantity of groundwater), a water supply contract may also provide more flexibility in cases where the groundwater supply is being acquired as a backup supply to surface water for times of drought or as a component of a conjunctive use project. In any event, the parties will still need to consider the most appropriate contract terms for a particular situation to deal with issues such as quantity supplied, pricing, and rights and obligations of the parties in the event of unanticipated deficiencies in groundwater quantity and quality. See Chapter 31 of this book for a discussion of wholesale water contracting.

4. *Condemnation*

Finally, certain types of governmental entities have the power to acquire real property, including groundwater rights, through their powers of eminent domain and condemnation. In addition to exercises of eminent domain, at times owners of land or groundwater rights have challenged as "regulatory takings" or inverse condemnation the rules or other actions of a GCD or political subdivision affecting groundwater rights. *See, e.g., Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012). The 78th Legislature amended the Texas Property Code to impose various requirements on the condemnation of water rights by municipalities and to provide for separate valuation of groundwater rights in excess of the market value of the fee simple estate. *See* Act of May 26, 2003, 78th Leg., R.S., ch. 1032 (codified at Tex. Prop. Code §§ 21.0121, 21.0421). To date, this is a relatively untested provision, but it signals to municipalities that condemnation of groundwater rights should be approached with careful consideration. See Chapter 38 of this book for a detailed discussion of governmental acquisition of groundwater rights by involuntary means.

IV. Due Diligence

For any potential groundwater rights purchase or lease, a number of due diligence matters must be addressed. Although the issues vary for different projects and transactions, these matters generally relate to (1) the quality and quantity of the subject groundwater resources; (2) the current and future uses of the surface of the land; (3) title to the groundwater rights and surface estate, and the existence of restrictions or encumbrances that could interfere with the intended use; (4) environmental concerns; (5) the regulatory regimes that will affect development and use of the groundwater; and (6) other issues or circumstances affecting the economic or logistical feasibility of the intended groundwater project. Some of these due diligence matters may be significant not only for evaluation of the terms (including consideration) of the transaction itself, but also with an eye toward establishing marketable groundwater rights and groundwater supplies for further development.

Some due diligence matters, such as needs assessment and basic regulatory due diligence, should be addressed even before determining the most appropriate location and method for acquiring groundwater rights (lease, sale, supply contract, or, if available, condemnation) and drafting and negotiating the terms of the transaction. Other matters involve investigations and analysis that are most effectively conducted during the pendency of the transaction—for example, during the inspection or feasibility period provided for in a contract of sale of groundwater rights. Although it is not possible to design a single due diligence blueprint appropriate for all groundwater transactions, this section provides an overview and discussion of the types of issues that parties should consider.

A. Needs Assessment

To determine the preferred method of acquisition (usually lease or purchase) and appropriate terms for the transaction, the parties must first have a reasonably defined sense of the short- and long-term needs for groundwater that the transaction is intended to address. For the acquiring party, this assessment largely depends on (1) the amount of groundwater needed to be produced, (2) how quickly production must begin and how long it is expected to last, (3) the type(s) of groundwater use contemplated, and (4) the place of use of the groundwater, which in turn involves the extent to which other infrastructure will be required to develop and use the groundwater. The amount of investment and financial risk associated with a purchase of groundwater rights, as opposed to a lease, should also be considered.

For the conveying party (presumably, the surface owner), significant considerations include the extent to which its own intended uses of the (reserved) groundwater from the property and the surface itself will be affected by the groundwater development of the buyer or lessee. This is a matter not only regarding the current owner's present and contemplated future uses but also one potentially affecting the future marketability and value of the surface estate.

B. Regulatory Due Diligence

Many of the critical aspects of the planning and investigation underlying a groundwater transaction involve assessment of the regulatory regimes that will affect the prospective buyer or lessee's development and use of groundwater resources as well as the surface owner's retained rights to the use of the surface and (often) some groundwater. These potential regulatory implications may have a greater or lesser degree of significance for the party interested in acquiring groundwater rights depending, among other things, on the nature of the acquiring party (individual, political subdivision, corporate entity, etc.), the amount of groundwater rights involved, and the intended purpose and place of use of the groundwater involved. Because groundwater rights are privately owned and not administered or regulated by a state agency, this regulatory due diligence is essentially a matter of various potential forms of local regulation.

Most important among these types of regulation are the rulemaking and permitting authority of local GCDs and subsidence districts. The vast majority of groundwater production in Texas occurs in areas under the jurisdiction of one of these districts, and there is great variety among their regulatory approaches. The legislature continues to create new GCDs in more parts of the state and has given those districts clearer authority over certain types of regulation of groundwater production and use. Thus, a party contemplating or negotiating a groundwater rights purchase or lease should be familiar with the applicable enabling legislation, rules, and management plan of the local district (or multiple districts), if any, with jurisdiction in the area of interest. Although the parties may be significantly constrained by the existing regulatory regime, working knowledge of the GCD's rules and practices can provide critical information for assessing the feasibility of a particular project, or at least the suitability of particular groundwater rights property for the project.

Moreover, a new framework for regional and statewide water planning has been implemented over the last decade, and it affects many aspects of water rights transactions and project development. Thus, even beyond this primary layer of direct GCD regulation, the parties should also be familiar with the status and outcomes of joint planning efforts being conducted within the applicable groundwater management area and any applicable municipal or county regulations affecting water wells. Because this information may affect the proposed terms and conditions—or even the very feasibility—of the transaction, much of this regulatory due diligence should be conducted before drafting a lease or contract of sale and before approaching prospective sellers or lessors.

1. Applicable Groundwater Conservation District or Subsidence District

The legislature has emphasized that underground water or groundwater conservation districts are the state's preferred method of groundwater management "in order to protect property rights, balance the conservation and development of groundwater to meet the needs of this state, and use the best available science in the conservation and development of groundwater." *See* Act of May 31, 2015, 84th Leg., R.S., ch. 993, § 1 (amending Tex. Water Code § 36.0015(b)). As of June 2015, there are 96 confirmed GCDs and two subsidence districts in Texas; three other GCDs are pending confirmation elections, including another new district created by the 84th Legislature. *See* Texas Water Development Board, *Groundwater Conservation Districts of Texas* (rev. Nov. 2014) [hereinafter TWDB Map], *available at* www.twdb.texas.gov/mapping/doc/maps/GCDs_8x11.pdf. See also Plate 2. *See also* Act of May 31, 2015, 84th Leg., R.S., ch. 993, § 1 (adding Tex. Spec. Dist. Code ch. 8875). See Chapter 16 of this book for a detailed discussion of GCDs. Information compiled by the Texas Water Development Board (TWDB) reflects that increasingly more of the land and groundwater resources of Texas are under the jurisdiction of one of these districts. As of this writing, two-thirds of Texas counties (177) are fully or partially within a GCD (excluding subsidence districts), and more than 85 percent of the groundwater produced in Texas is within one of these districts. *See* TWDB Map; Texas Water Development Board, *Groundwater Conservation District Facts*, www.twdb.texas.gov/groundwater/conservation_districts/facts.asp. Thus, the first task is to determine whether the land that is the subject of a potential groundwater rights transaction is located within one or more GCDs or subsidence districts. Information and maps of GCDs are available on the TWDB Website at www.twdb.texas.gov. Contact information, Web site links, and (for most GCDs) copies of district rules and district management plans are available online at www.twdb.texas.gov/groundwater/conservation_districts/index.asp. During the 2015 legislative session, the Texas Property Code was amended, requiring a seller's disclosure notice to address whether the seller is aware (actual knowledge, without any duty of investigation) of any portion of the subject property being located within a GCD or a subsidence district. *See also* Act of May 21, 2015, 84th Leg., R.S., ch. 524 (amending Tex. Prop. Code § 5.008(b)).

Most GCDs have been legislatively created. Thus, a determination of a district's powers and methods of groundwater regulation should begin with a review of its enabling legislation. Chapter 36 of the Texas Water Code provides the regulatory authority of general law GCDs and controls on issues not addressed in a district's enabling legislation. The powers and duties of the two subsidence districts are found in special legislation. *See* Tex. Spec. Dist. Code ch. 8801 (Harris-Galveston Coastal Subsidence District); Act of May 26, 1989, 71st Leg., R.S., ch. 1045, *amended by* Act of May 13, 2005, 79th Leg., R.S., ch. 238 (Fort Bend Subsidence District). The general law provisions for GCDs, Texas Water Code chapter 36, subchapter A, expressly do not apply to the subsidence districts. *See* Act of May 13, 2005, 79th Leg., R.S., ch. 238, §§ 7, 26. The amendment of Water Code section 36.002, regarding groundwater ownership and rights, expressly does not affect the regulatory authority of the EAA or the subsidence districts. *See* Tex. Water Code § 36.002(e). See Chapter 16 of this book for a discussion of GCDs and subsidence districts generally, including the nature of their regulatory powers, and Chapter 17 regarding the EAA.

Each GCD has the power to implement its statutory authority through rulemaking and permitting. *See* Tex. Water Code §§ 36.101, 36.113. If the subject land is within a GCD or a subsidence district, the prospective acquiring party should review, together with chapter 36 and the district's enabling legislation, the regulations of the district to determine any substantive or procedural requirements and limitations on the water rights owner's (or lessee's) ability to access and produce groundwater. By rule, a GCD determines each activity regulated by the district for which a permit or permit amendment is required. Tex. Water Code § 36.114(a). Districts may require permits for drilling water wells and for operating or producing water from a well. They may also have specific requirements relating to test wells, which may affect a prospective acquiring party's due diligence activities during the inspection period provided for in a lease or contract of sale. Within a GCD, all wells are required to be permitted unless they are exempted by statute or the district's rules. *See* Tex. Water Code §§ 36.113, 36.115, 36.117. All exempt wells must be registered with the GCD. *See* Tex. Water Code § 36.117(h)(1). Thus, a party contemplating a lease or purchase of groundwater rights should enter into its due diligence and negotiations with an understanding of district rules that will affect the terms of drilling and production permits the party may need to obtain. The most common and significant types of rules with implications for groundwater transactions are discussed below, in terms of the general law provisions and illustrative examples from various GCDs' rules.

a. Production Limitations

Depending on the type of groundwater development project the acquiring party is contemplating, production limitations imposed by the local GCD are likely to be a significant consideration in shaping the groundwater transaction. The nature and extent of production limitations, if any, have implications for the terms drafted for the transaction and the conveyancing documents, for the acquiring party's feasibility assessment of the transaction, and for the selling or leasing party's retained rights of surface use and reserved groundwater. The legislature recognizes various means by which a GCD may regulate groundwater production through district rules, namely by—

1. setting production limits on wells,
2. limiting the amount of water produced based on acreage or tract size,
3. limiting the amount of water that may be produced from a defined number of acres assigned to an authorized well site,
4. limiting the maximum amount of water that may be produced on the basis of acre-feet per acre or gallons per minute per well site per acre,
5. using managed depletion, or
6. using any combination of the regulatory methods listed above.

See Tex. Water Code § 36.116(a)(2). Most of the GCDs in Texas use one or more of these methods of groundwater production limitations. *See generally* Texas Alliance of Groundwater Districts, *TAGD Groundwater Conservation District Index*, http://texasgroundwater.org/gcdi-map.html. As a result of the ongoing joint planning process to determine "desired future conditions" and "modeled available groundwater" for each aquifer in Texas, discussed briefly below and in Chapter 21 of this book, it is expected that GCDs will amend their production limitation rules in a variety of ways. *Cf.* Tex. Water

Code § 36.108. Under the statute regarding groundwater ownership rights, GCDs will now also be required to consider in their rulemaking these ownership rights, the public interest in conservation, protection, recharge, waste prevention, and subsidence control, and the goals developed as part of the GCD's statutorily required management plan. *See* Tex. Water Code § 36.101(a).

A local GCD may limit groundwater production by setting restrictions tied to particular wells, such as the allowable size or capacity of individual wells or limits on the rate of production and maximum allowable annual production from each well. *See, e.g.*, Guadalupe County GCD Rule 5.4(i) (eff. Jan. 1, 2011) (limiting instantaneous and average production rates for permitted wells), *available at* www.gcgcd.org/uploads/3/4/6/6/3466695/gcgcd_rules.pdf. A party seeking to acquire groundwater rights will need to consider how these types of limitations may affect the overall scope and cost of its planned project as a result of the amount or types of equipment and related infrastructure required. For example, if more, smaller wells are required to achieve the targeted amount of production, it may be necessary to drill and operate more wells, alter well field design, or modify the supporting storage and transportation infrastructure (e.g., pipelines) required to develop the groundwater and deliver it to its place of use.

A local GCD may also regulate production using a variety of limitations relating to the tract size or amount of acreage of groundwater rights that the permit applicant owns or controls. This may take the form of a certain number or formula for the number of acres required to support a particular size well. *See, e.g.*, Brazos Valley GCD Rule 7.1(c) (amended Aug. 14, 2014) (giving a production formula based on acreage for new wells drilled in all aquifers except the alluvium), *available at* https://brazosvalleygcd.org/wp-content/uploads/2012/12/BVGCD-Rules-Adopted-8-14-14.pdf. There may be a limited number of acre-feet or gallons of water produced annually for each acre of the permittee's groundwater rights. *See, e.g.*, Fayette County GCD Rule 8.1(b) (rev. Sept. 8, 2014) (setting a maximum of two acre-feet per contiguous acre per year, with some exclusions), *available at* www.fayettecountygroundwater.com/#!district-rules.coxq; Bee GCD Rules 11(a), 11(b) (amended Oct. 18, 2012) (limiting a well or well system to ten gallons per minute (gpm) per contiguous acre and one acre-foot per acre per year), *available at* www.beegcd.com/uploads/2012_Bee_Rules__FINAL_.pdf; Headwaters GCD (Kerr County) Rules 7(J), 8 (amended Feb. 12, 2014) (providing that the district's board shall annually set production limits in terms of gallons per year, with different production caps applicable to different types of use), *available at* http://hgcd.org/wp-content/uploads/2015/07/District-Rules-Revised-February-2014.pdf. The per-acre amount of production might be higher based on larger tract size. *See, e.g.*, Hill Country UWCD (Gillespie County) Rule 5.6(D) (amended June 10, 2014), *available at* http://hcuwcd.org/RulesAmendedJune10-2014.pdf.

Chapter 36 expressly provides that a GCD may limit the amount of water produced based on contiguous surface acreage. Tex. Water Code § 36.116(e)(2). Thus, a party leasing or purchasing groundwater rights may wish to strategize its acquisitions in light of the local GCD's rules regarding treatment of contiguous acreage for permitting purposes. This has obvious implications for larger scale groundwater development projects. For example, in the case of the Canadian River Municipal Water Authority (CRMWA), which serves eleven member cities in the Texas Panhandle, its groundwater program has involved the acquisition of approximately 436,000 acres of groundwater rights, mostly in a four-county area and contiguous acreage under the applicable rules of the Panhandle GCD (requiring a minimum 0.25 common boundary between contiguous tracts), and CRMWA's permitted rights and production authorization is based on this total amount of groundwater rights acreage (generally authorizing annual production of one acre-foot per acre). *See* Panhandle GCD Rule 4.3(g) (approved Mar. 18, 2014) (allowing maximum total annual production not to exceed one acre-foot per acre), *available at* https://panhandlegroundwaterdistrict.files.wordpress.com/2011/05/rules-2014.pdf. Rules on contiguous acreage, however, can be significant even in smaller scale projects. The amount of annual production authorized for a well may be tied to a required number of acres, with the GCD's rules defining "contiguous acreage" to guide the district in determining whether the permit applicant has sufficient acreage to support the permit sought. *See, e.g.*, Brazos Valley GCD Rules 7.1(c), 1.1(7). In regulating groundwater production based on tract size or acreage, a GCD may consider "the service needs or service area of a retail water utility." Tex. Water Code § 36.116(c) (referencing the definition at Tex. Water Code § 13.002).

GCDs may regulate production on the basis of "managed depletion," which is an approach that aims to control the amount and rate of depletion districtwide over the long term. For example, the Panhandle GCD, with groundwater resources in the Ogallala Aquifer, has a depletion rule based on the district's "50/50" management standard that 50 percent of the current supplies or saturated thickness of groundwater in the district remain in place fifty years after the adoption of its rules. Accordingly, the rules provide for an acceptable annual rate of decline (1.25 percent) and have detailed provisions for defining and separately regulating "study areas" and "conservation areas" where the decline rate is exceeding that defined rate. A permittee's annual authorized groundwater production may be further limited under these circumstances. *See* Panhandle GCD Rule 15.3(e); see also Lost Pines GCD Rules 9.1, 9.2 (eff. Jan. 1, 2013) (allowing the district to set production limits and to designate "management zones" to facilitate long-term management of available groundwater), *available at* www.lostpineswater.org/Forms----Documents.aspx. In cases with these types of regulatory regimes and geologic features, a party acquiring groundwater rights (as well as the party retaining only limited reserved groundwater rights) will want to consider the likelihood and implications of further production limitations based on the implementation of a "managed depletion" rule.

It is also important to keep in mind that a GCD may adopt different rules applicable to different portions of the groundwater resources and land within its jurisdiction. In the interest of better management of groundwater resources or based on the district's determination that aquifer conditions and uses differ substantially in different geographic areas of the district, the GCD may adopt different rules for each aquifer, aquifer subdivision, or geologic strata located in whole or in part within the district, or for each geographic area overlying these aquifers and aquifer subdivisions. Tex. Water Code § 36.116(d). In regulating groundwater production, a district "shall select a method that is appropriate based on the hydrogeological conditions of the aquifer or aquifers in the district." Tex. Water Code § 36.116(e)(1). As hydrology and mapping of local groundwater resources have improved and become more accessible, more districts have relied on these data to customize their production regulations in ways that are tailored to aquifer-specific resources. *See, e.g.*, Brazos Valley GCD Rule 7.1(d) (setting a specific maximum production limitation (not to exceed 3300 gpm) for new wells drilled in the Simsboro Formation); *see also* Post Oak Savannah GCD Rule 5.2.1 (amended June 2014) (stating that land and water rights in land not located over the aquifer from which a well is authorized production are not included in calculating the volume of water production permitted), *available at* www.posgcd.org/district-information/district-rules/. For these reasons, the parties to a groundwater transaction should focus their analysis on those portions of the GCD's rules applicable to the particular resources of interest within the district.

A transacting party may encounter a variety of other types of production limitation regulatory approaches. In some cases, the GCD's rules generally provide for production limitations under circumstances where it is deemed necessary to avoid drawdown affecting neighboring wells. Under these types of rules, the likelihood of limitations on production may be less foreseeable at the time of a groundwater transaction. In the unique case of subsidence districts, where the emphasis is on generally shifting reliance on groundwater resources to more surface water usage, groundwater production may be limited in terms relating to the adequacy and availability to the permittee of substitute or supplemental surface water supplies. *See, e.g.*, Harris-Galveston Subsidence District Rule 5.2(d) (amended Sept. 11, 2013), *available at* http://hgsubsidence.org/wp-content/uploads/2014/11/RULES2013-09-11.pdf. Finally, in the unique case of the EAA, groundwater production is regulated within the framework of a statutorily imposed districtwide cap on annual groundwater production. Under the EAA's rules, discussed in detail in Chapter 17 of this book, many additional substantive and procedural considerations affect groundwater transactions; these are beyond the scope of this chapter.

In summary, any party contemplating a groundwater transaction involving land within a GCD's or subsidence district's jurisdiction should carefully examine that district's rules on production limitations as they would apply to the particular groundwater project. These rules potentially have implications for, among other things, the strategic location of acquisitions, valuation (for both parties) of groundwater rights being purchased or leased, the costs of the groundwater project, and the future marketability of the groundwater rights. The extent to which these types of production limitations matter to a particular person or entity acquiring groundwater rights depends on many factors, including the intended amount of groundwater production, the short- versus long-term needs for the groundwater, and the purpose and place of use of the groundwater.

b. "Historic or Existing Use" Limitations

Within certain constraints, a GCD may also regulate groundwater production in a manner designed to preserve "historic or existing use" before the effective date of the district's rules, to the maximum extent practicable consistent with the district's management plan, and as provided by Water Code section 36.113. *See* Tex. Water Code § 36.116(b). These constraints mean that a district may impose more restrictive permit conditions on new permits or permit amendments if the limitations (1) apply to all such subsequent applications (regardless of type or location of use), (2) bear a "reasonable relationship" to the GCD's existing management plan, and (3) are reasonably necessary to protect existing use. *See* Tex. Water Code § 36.113(e). The general law statute also prohibits a GCD, in issuing a permit for an existing or historic use, from discriminating between land that is irrigated for production and land (or wells thereon) that is no longer thus irrigated and is part of a federal conservation program. *See* Tex. Water Code § 36.113(h).

Increasingly, GCDs have incorporated "historic or existing use" limitations into their groundwater production rules, designed in a variety of ways depending on local concerns and groundwater resources. Because a "historic or existing use" recognition may give the permit holder some measure of protection or authorize a higher level of production than what the GCD currently authorizes for operating permits, this type of permit can affect the marketability and value of these groundwater rights. However, a GCD may limit the "historic or existing use" authorization to the amount and type of use historically established as of the time frame set by the district, and thus these types of authorizations may or may not be readily transferable, as a practical matter. *See, e.g.*, Brazos Valley GCD Rule 8.3(g) (providing that historic use operating permits preserve only the amount and type of actual use for which they were issued and groundwater production only from the specific aquifer or formation then authorized).

Finally, as discussed in Chapter 4 of this book, the parameters of GCDs' ability to regulate under the "historic or existing use" groundwater production statute and the groundwater transfer ("export") statute, and thus to affect the marketability of groundwater rights, is at the heart of a case recently decided by the Texas Supreme Court. The court found that "the District's transfer rules, in essence, grant franchises to some landowners to export water while denying that right to others. Because the limitations are not uniformly applied to these new applications and are not necessary to protect existing use, the District's transfer rules exceed the statutory authorization and are thus invalid." *See Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910, 918 (Tex. 2008).

c. Well Spacing Requirements

Parties to groundwater transactions should also consider the implications of the GCD's well spacing requirements. In the same statute that addresses regulation by production limitations, the legislature also recognizes various means by which a GCD may regulate the spacing of water wells through district rules, namely by—

1. requiring all water wells to be spaced a certain distance from property lines or adjoining wells;

2. requiring wells with a certain production capacity, pump size, or other characteristic related to the construction or operation of and production from a well to be spaced a certain distance from property lines or adjoining wells; or

3. imposing spacing requirements adopted by the board.

See Tex. Water Code § 36.116(a)(1). Well spacing and production limitations can be used for purposes such as minimizing drawdown of the water table, minimizing reduction of artesian pressure, controlling subsidence, preventing interference between wells, preventing degradation of water quality, or preventing waste. Tex. Water Code § 36.116(a). A recent survey of the regulatory approaches of GCDs, which includes information regarding 81 of the 96 existing confirmed districts, demonstrates that most GCDs have adopted one or more types of regulations over well spacing. Texas Alliance of Groundwater Districts, *TAGD Groundwater Conservation District Index*, www.texasgroundwater.org/gcdi-map.html.

The most common types of these regulations are minimum spacing (setbacks) from property lines (or from the perimeter of the permittee's total qualifying contiguous area) and minimum spacing in relation to existing wells. A GCD's well spacing requirements may apply differently (or not at all) to wells exempt from permitting and may vary depending on the specific aquifer or formation involved. A district may regulate in terms of a number of wells that can be located in a particular acre or section. These types of spacing requirements are often based on the size or pumping capacity of the new well sought to be permitted, with greater distances required for higher capacity wells. *See, e.g.*, Lost Pines GCD Rule 8.2. If a potential buyer or lessee would be acquiring rights to existing wells, those may be exempt from spacing requirements, but modifications to those wells—for example, to increase production capacity—would likely be subject to the permit amendment process and the district's spacing requirements. *See* Tex. Water Code § 36.113(a), (f).

As with production limitations themselves, a GCD's well spacing rules applicable to any new wells may affect the acquiring party's feasibility assessment regarding a transaction involving particular property. Well spacing requirements may affect the amount and cost of potential groundwater production from the subject acreage depending in part on the number and location of existing wells on or near that property. The prospective acquiring party should approach this assessment with some sense of its preferences and constraints affecting the number, size, and location of planned water well(s) (or well field design, for multiple wells), in order to evaluate these in terms of modifications that may be required as a result of GCD spacing requirements, as applied to property boundaries and existing wells. From the seller or lessor perspective, these rules may be a significant measure of the protection that existing wells may have from new wells drilled and produced by the buyer or lessee.

d. Permit Transfers or Amendments

In a case in which the buyer or lessee is acquiring groundwater rights that are already permitted in some form by the local GCD, the parties will need to be aware of the applicable requirements for transfer of ownership of those rights. In many cases, if only a change of ownership is involved, with *no* other modifications to the permit, such a transfer is merely a ministerial act to be performed by district staff. Even in this scenario, the parties to a groundwater transaction should at least be aware of the procedural requirements (e.g., form of request and processing time) of the GCD for approval of a transfer. *See, e.g.*, Headwaters GCD Rule 12(B) (stating the documentation requirements for production rights transfer). However, if any other changes are intended upon acquisition by the buyer or lessee, such as the amount or rate of production, a change in well location, or purpose or place of use, this will instead be treated as a permit amendment subject to all of the GCD's substantive and procedural requirements. *See, e.g.*, Panhandle GCD Rule 3.2; *see generally* Act of May 19, 2015, 84th Leg., R.S., ch. 308, §§ 2, 4 (amending Tex. Water Code § 36.113, and adding Tex. Water Code §§ 36.1145, 36.114). In any event, the parties should consider whether it is appropriate to condition closing on the transaction on the successful transfer or amendment of the existing permitted groundwater rights, and how that would affect timing of the transaction and of the buyer's or lessee's groundwater project.

e. Export Requirements

Central to many groundwater development and marketing projects in Texas is the ability to develop groundwater resources for transportation to and use in another part of the state. Because many GCDs are single-county districts (some cover only a portion of a county), groundwater transactions increasingly involve the need to "export" or "transport" the groundwater out of the district issuing the drilling and production permits. At this point, dozens of the existing GCDs exercise their statutory authority to promulgate rules requiring authorization to transfer groundwater out of the district. *See* Tex. Water Code § 36.122; see also the discussion in Chapter 16 of this book. In the case of a special law district such as the EAA, rules may be even more restrictive. For example, the EAA requires that groundwater withdrawn from the Edwards Aquifer must be used within the EAA's boundaries. *See* EAA Rule 711.220 (eff. Dec. 19, 2014), *available at* www.edwardsaquifer.org/legislation-and-rules/rules-and-regulations. Even transfers of place of use within the EAA (if from a point located west of Cibolo Creek to a point east of Cibolo Creek) are regulated to satisfy other requirements protecting endangered and threatened species and spring flows. *See* EAA Rule 711.329. The parameters of a district's export regulation authority and the practice of this type of regulation are discussed in section V.B below, regarding the impact of export regulation on the marketability of groundwater rights acquired.

f. Permit Terms

The acquiring party to a groundwater rights transaction should consider the duration of permitted rights likely to be approved by the GCD whether regarding a transfer of existing permitted groundwater rights or the prospects for obtaining a future permit. Drilling permits are typically granted for relatively short periods of time, generally requiring commencement of drilling within several months of issuance. Some GCDs' rules also provide for special types of permits designed to facilitate the marketing of groundwater rights. *See, e.g.*, Panhandle GCD Rule 4.2 (providing for "initial production permits," which themselves do not authorize drilling or production, but preliminarily quantify the amount of groundwater per acre that may be authorized for annual production from a property, in the amount of one acre-foot per acre). As discussed above and in section V.B below, the duration of permitted "export" or "transport" rights should also be considered in some cases.

The most typical feasibility issue regarding permit terms, however, involves the duration of production or operating permits approved by the district. A GCD's rules may be open-ended regarding the duration of terms of such permits, subject to the permittee's compliance with other district rules, allowing for flexibility depending on the details of a particular permit application. However, a district's rules may make the term of a production or operating permit standard and relatively short and not automatically renewable as a matter of course. *See, e.g.*, Guadalupe County GCD Rule 5.3(e) (eff. Jan. 1, 2011) (making production permits valid for a period not to exceed five years, renewable). The party acquiring groundwater rights should consider the term (and renewability) of permitted rights in evaluating a prospective purchase or lease, because this will have implications not only for the investment involved in the planned development and use of the groundwater but also for the future marketability of the groundwater rights. Recent legislation should provide permit holders more protection, by allowing more routine (without hearing) operating permit renewals in most cases where amendments are not sought and, for permit amendment applications, maintaining the operating permit provisions in effect until the amendment process is resolved. *See* Act of May 19, 2015, 84th Leg., R.S., ch. 308, § 4 (adding Tex. Water Code §§ 36.1145, 36.1146).

g. Fees

The acquiring party to a groundwater rights transaction should also consider how the fees, if any, imposed by the GCD will affect the planned development and use of the groundwater rights to be purchased or leased. Aside from administrative fees relating to processing permit applications or well registration, which are generally nominal (*see* Tex. Water Code § 36.205(a)), districts may assess water production fees on pumping in the district in lieu of, or in conjunction with, any taxes otherwise levied by the district. *See* Tex. Water Code § 36.205(c). These production fees may be based on the amount of water authorized by permit to be withdrawn from a well or on the amount actually withdrawn, but they cannot exceed the annual rates of $1 per acre-foot for water used for agricultural use and $10 per acre-foot for water used for any other purpose. *See* Tex. Water Code § 36.205(c). However, these provisions do not apply to the EAA, the two subsidence districts, or some legislatively created GCDs. *See* Tex. Water Code § 36.205(d), (e). As discussed above, a GCD may also impose an administrative processing fee and a fee or surcharge for exporting water out of the district. *See* Tex. Water Code § 36.122(d), (e). Additional considerations are the timing of and basis for the assessment. For example, a GCD might assess the fee on the amount of groundwater authorized to be exported, with assessment beginning at the time of permit issuance, or it might assess the fee on the amount of groundwater actually exported, with the assessment based on periodic export reports. In short, depending on the purpose of use, place of use, and amount of anticipated production, a prospective buyer or lessee of groundwater rights should factor into its feasibility assessment the aggregate additional costs of its groundwater project resulting from applicable water production and export fees.

h. Procedural Requirements

The parties to a groundwater sale or lease should also consider whether any procedural requirements in the local GCD's rules will affect the timing or process of the transaction. For example, depending on the rules governing transfer of existing permitted rights, this transfer may not be approved and effective until after closing on a sale or execution of a lease. From the perspective of the acquiring party, it may be desirable to condition the closing on that party's ability to secure reasonably acceptable permit rights from the district, without which the transaction is of little benefit to the buyer or lessee. Even if the GCD's procedural requirements do not themselves affect the buyer or lessee's assessment of the feasibility or desirability of the transaction, the acquiring party should factor into its planning the application of district rules governing (1) notice and hearing provisions regarding potential protests of a permit application and (2) the time frame and procedure for review and approval of test wells, drilling permits, and production or operating permits.

Various recent amendments to chapter 36 of the Water Code further specify and standardize the procedures by which a GCD may conduct a hearing on a permit application or amendment, including in some circumstances contracting with the State Office of Administrative Hearings (SOAH) or other hearing examiner. These amendments require districts to revise or develop new procedural rules for permit hearings, in some cases affecting the applicant's costs of proceeding but also placing some new limitations on districts' handling of uncontested applications. *See generally* Act of May 20, 2015, 84th Leg., R.S., ch. 405 (amending Tex. Water Code ch. 36, subch. M).

i. Other Permitting Practice Considerations

Beyond the local GCD's procedural rules and practices discussed above, part of the due diligence for a party acquiring or seeking to amend groundwater rights includes an assessment of the potential opposition to the permits that would be required for that party's desired use of the groundwater. In areas where groundwater development and transport projects are increasing in number and scope, there are examples of permit applicants encountering significant opposition and ending up in litigation. Other local landowners or interest organizations may contest the application and trigger the need for further proceedings. In a pending lawsuit, without a properly filed contested case hearing request and with the GCD staff's recommendation for approval, the GCD's board declined to grant in full the requested operating and transport permits. *See Forestar (USA) Real Estate Group, Inc. v. Lost Pines Groundwater Conservation District*, No. 15369, 335th Judicial Dist. Ct., Lee County, Tex., filed Mar. 14, 2014; *but see* Act of May 20, 2015, 84th Leg., R.S., ch. 405 (adding Tex. Water Code § 36.4051(d), which allows an applicant to then seek a contested case hearing following such a decision). Practitioners should also be aware that groundwater rights holders in an area subject to GCD jurisdiction may lose groundwater to groundwater rights holders in adjacent areas not subject to regulation by any GCD or regulated by a neighboring GCD with less stringent production or transport limitations. In short, a would-be permit applicant's strategy should consider the local GCD's recent permitting approach, including how the district's governing body responds to other local stakeholders, and might also include looking beyond the boundaries of the GCD with direct regulatory authority over the subject property.

j. Other Information to Obtain from the GCD

As part of its due diligence, the acquiring party in a groundwater rights transaction should consider other additional information obtained from the local GCD. Of course, the nature and the importance of such additional information will vary depending on the scope and nature of the transaction and the groundwater development project to which it relates. A private person acquiring groundwater rights for one well or a small amount of additional production will likely not have the same concerns as a buyer or lessee that is, for example, a municipality seeking to develop additional groundwater supplies as a long-term strategy or a private entity seeking to develop large quantities of groundwater for marketing.

Even prior to the documentary due diligence review discussed below, the prospective buyer or lessee may find it useful to communicate with staff from the local GCD to discuss the prospective transaction or project and to obtain additional information or guidance regarding the application or interpretation of district rules. This might particularly be the case where any unique aspects of the acquiring party's planned development and use of the groundwater present issues unresolved or unclear under the district's rules. Because the proliferation of GCDs in Texas is a relatively recent phenomenon, and because statutory requirements regarding groundwater planning, management, and regulation are evolving, the parties may be dealing with a GCD that has only recently adopted its management plan and initial rules or is presently undergoing that process. Although a detailed consultation regarding the acquiring party's plans for particular acquisitions and development may not be appropriate in every situation, in some cases it can assist the parties in developing appropriate terms for the transaction, especially the acquiring party in understanding and factoring in the regulatory regime that will affect its development and use of the rights to be purchased or leased.

In any event, the acquiring party should consider contacting the local GCD to review or inspect documentation relating to the subject property and existing wells in production on that property. This documentation may include records such as (1) well registrations for existing wells on the property that are exempt from permitting, which may affect the extent and production location of water rights reserved to the surface owner; (2) drilling logs and water use reports on existing wells, including exempt wells associated with oil and gas activities; and (3) documentation relating to existing permitted water rights on the property, including maps, hydrologic analysis (including water quality and quantity), and other data supporting the application for and approval of those permitted rights. These types of information will assist the prospective buyer or lessee in evaluating aspects of the transaction, including (1) the amount of groundwater that can reasonably and economically be produced from the property; (2) the nature and amount of other groundwater rights in production on the property, to which any prospective development project would be subject; and (3) the resulting implications for valuation of and consideration for the groundwater rights to be acquired.

2. *Groundwater Management Area Joint Planning*

Parties to purchases or leases of groundwater rights should also be aware of the new tools for groundwater management implemented by the Texas legislature in recent years, because these processes and their results can affect the regulation of groundwater in a specific area of the state. Each GCD is required to develop a management plan that addresses various management goals, includes specific performance standards and detailed actions and procedures to carry out the plan, and estimates various aspects of the groundwater resources within the district. *See* Tex. Water Code § 36.1071(e).

Beyond the district level, in 2005 the legislature enacted a collaborative process whereby GCDs with groundwater resources in a common aquifer, defined by groundwater management areas (GMAs) designated by the TWDB, are now required to conduct joint planning and to make regionalized determinations of groundwater availability. See Chapter 4 of this book for a discussion of GMAs. All the GCDs within a GMA are required to meet at least annually for joint planning. *See* Tex. Water Code § 36.108(c). Each of these planning groups must determine how it wants to manage the groundwater resources within its GMA by the adoption of a policy statement known as the "desired future conditions" (DFCs) of the aquifers in the area. *See* Tex. Water Code § 36.108. These initial DFCs were submitted by September 2010 to the TWDB, which uses them to estimate the amount of groundwater that could be permitted and withdrawn from the aquifers for beneficial use while maintaining those desired future conditions. This water estimate is called the "modeled available groundwater" (MAG). *See* Tex. Water Code §§ 36.001(25), 36.108(o).

This newly unfolding process of regionally adopted DFCs, which become the basis for quantifying amounts of modeled available groundwater, is significant for purposes of planning groundwater projects and transactions. The MAG numbers will be used by GCDs in their groundwater management plans and permitting. GCDs are now required, to the extent possible and based on proper applications, to issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition under Water Code section 36.108. *See* Tex. Water Code § 36.1132. Parties to acquisitions of groundwater rights could be affected by the adopted DFCs and the MAG determination because these quantified assessments of groundwater conditions could thus be used by a GCD to limit local groundwater production. See Chapter 21 of this book for a discussion of this joint planning process within GMAs. At this point, it is difficult to predict how the process of adopting DFCs and calculating the MAG, overhauled by the

82nd Legislature in 2011, may affect groundwater permitting, and therefore transactions, for different areas around the state.

Not all parts of Texas are located within a GCD or a subsidence district. However, this is a situation in flux. Additionally, as discussed in Chapter 4 of this book, the Texas Commission on Environmental Quality (TCEQ) has statutory authority to designate a "priority groundwater management area" (PGMA) if the area is currently experiencing, or is anticipated to experience within the next fifty years, critical groundwater problems, such as shortages, contamination of groundwater supplies, or land subsidence through the withdrawal of groundwater. *See* Tex. Water Code § 35.007. This PGMA designation then facilitates the creation of one or more new GCDs or the annexation of the area into an adjoining GCD. *See* Tex. Water Code § 35.012. By these various legislative and regulatory processes, there continues to be considerable momentum toward increased coverage of the state with these local and aquifer-based means of groundwater regulation and planning. For further discussion of how the PGMA process is affecting GCD formation and annexation, see Chapter 13 of this book.

Within this framework, parties to groundwater transactions not only should examine the general law provisions, enabling legislation, management plan, and current rules of the applicable GCDs in the area of interest but should also examine the management plan of the GCDs that have jurisdiction over the subject property and monitor the progress of the emerging aquifer-wide joint planning process that will ultimately result in the calculation and implementation of regionally based groundwater availability.

3. *Other Applicable Regulatory Authority*

Because Texas's approach to groundwater regulation and management is grounded in local control through GCDs and subsidence districts, this discussion of regulatory due diligence focuses principally on issues relating to district planning and regulation. However, a prospective buyer or lessee of groundwater rights should also consider the potential effect on its intended development and use of the water from other sources of regulatory authority.

First, municipalities in Texas have varying levels of statutory authority to regulate the drilling of water wells within their city limits and their extraterritorial jurisdiction (ETJ). A home-rule municipality may regulate well drilling and groundwater production by ordinance, for the purpose of regulating for public health and safety purposes, to prohibit nuisances, and to prevent pollution. *See generally* Tex. Loc. Gov't Code §§ 51.072, 54.004, 217.042, 401.002; Tex. Water Code § 26.177; Tex. Att'y Gen. Op. No. JM-226 (1984). A general law municipality has more limited ability, for the purpose of establishing and enforcing a municipal setting designation, to regulate groundwater extraction, production, or use by persons other than retail public utilities and in order to prevent the use of or contact with groundwater that presents an actual or potential threat to public health. *See* Tex. Loc. Gov't Code §§ 212.003(a), 401.005. Therefore, if the subject land involved in the transaction is located within the city limits or ETJ of a municipality, the acquiring party should also be aware of any applicable regulations affecting drilling and equipping of water wells (location, size, drilling and casing specifications, etc.) and groundwater production.

Municipalities and counties may require a determination of groundwater availability in certain circumstances. Under Water Code section 35.019, counties in PGMAs have the authority to protect a sustainable yield of that county's water supply via the adoption of certain water availability requirements for development in areas where platting is required. *See* Tex. Water Code § 35.019. Under Local Government Code sections 212.0101 and 232.0032, all municipalities and counties in Texas are authorized to require a water availability certification for plat applications for creating a new subdivision that would rely on groundwater for a water supply. *See* Tex. Loc. Gov't Code §§ 212.0101, 232.0032. Relatedly, some GCDs' rules expressly recognize the county's authority to adopt water availability requirements (in the county's subdivision rules) for areas where platting is required in order to prevent current or projected water use in the county from exceeding the county's safe sustainable supply. *See, e.g.*, Headwaters GCD Rule 6(A)(c) (stating that Kerr County's subdivision rules are minimum requirements for well spacing for subdivisions outside municipal boundaries).

Second, again depending on the nature and location of the subject land, other federal or state agencies may have regulatory jurisdiction that affects the viable development and use of the groundwater. For example, the U.S. Fish and Wildlife Service (or the Texas Parks and Wildlife Department) may have some authority that affects groundwater development and use if there are endangered or protected species (or their habitat) in a particular area. See Chapter 32 of this book for a discussion of the Endangered Species Act. If the area includes wetlands as defined under federal law, the U.S. Army Corps of Engineers may have some authority that affects groundwater development and use. See Chapters 34 and 35 of this book for discussions of the Corps of Engineers' jurisdiction over water projects. These types of considerations should be factored in, at least in terms of their applicability and general implications, before a sale or lease of groundwater rights is finalized.

C. Physical Inspection and Testing

For virtually every purchase or lease of groundwater rights, it will be necessary for the acquiring party to conduct some types of physical inspection of the subject land and groundwater resources to determine the feasibility of the contemplated project. Under some circumstances, the results of such examinations may even affect the ultimate terms of the transaction (e.g., price) or provide a basis for one or both parties to terminate the contract or lease. Some of the most common types of physical inspections are addressed below.

1. Hydrology Issues

With nine major aquifers and twenty-one minor aquifers located wholly or partially in Texas, and a great variety of geologic features and other conditions among them, the hydrology of local groundwater resources is an important part of the due diligence relating to a groundwater rights transaction. In cases in which the party contemplating a new groundwater development or marketing project has such flexibility, this information may indeed guide or determine the ideal location for the project. Even where projects are more geographically defined by constraints affecting the parties, however, hydrologic analysis can help to shape the terms of the transaction, including valuation of the groundwater leased or sold, and terms regarding the amounts and types of production and reservation of groundwater from the property. For example, the extent and location of recharge are likely to affect the parties' assessment of such terms. In areas where there is more than one aquifer or specific formation, the transaction may be confined only to production from one of those formations or may have varying provisions for groundwater developed from each source of supply. In areas where there is documented consistency of average saturated thickness of groundwater throughout the area of interest, there may be little need to conduct further hydrologic testing.

Increasingly more and better information is available regarding groundwater supplies in each part of Texas. As discussed in Chapter 19 of this book, groundwater availability models have been developed for each major aquifer in Texas. As discussed in Chapter 21, the water planning and management processes developed by the legislature in recent years are aimed in part at developing improved data and mechanisms for evaluating groundwater resources in distinct areas.

Depending on the groundwater development project and the indicators from these generally available sources of information, the parties may also require additional hydrologic analysis to evaluate their particular transaction. One or both parties may wish to have more reliable data regarding the average saturated thickness of the groundwater in the particular subject property (and nearby properties), the variability of such thickness in the aquifer or formation involved, the features of the aquifer in the subject area, and the resulting effects of those features on the movement of the groundwater. Such analysis would typically involve drilling one or more test wells in the subject area and could also involve review of hydrologic and well production data maintained by the local GCD. In some instances, completion of the transaction may even be conditioned on the results of particular hydrologic analysis conducted by or on behalf of the parties.

For example, in CRMWA's groundwater development project discussed at section IV.B.1.a above, the subject area included groundwater rights in four Panhandle counties overlying the Ogallala Aquifer. CRMWA's purchase contract with each surface owner estimated the purchase price based on the estimated saturated thickness of groundwater under the tract and provided for hydrologic analysis by an independent hydrologist during the review period. The results of that analysis of the average saturated thickness of groundwater underlying the property, subject to challenge by either party and further review by other agreed-on hydrologists, became the basis for determining the per-acre price for CRMWA's purchase of groundwater rights for that particular tract. Also depending on that analysis, CRMWA had grounds to terminate the contract within the review period if the quantity of recoverable groundwater made the transaction uneconomical.

2. *Water Quality*

In the same vein as hydrology issues regarding water quantity and features of the local groundwater resources, the acquiring party in many cases will also want to conduct some water quality testing during the inspection period. This can be accomplished in conjunction with drilling test wells to examine hydrologic features, as discussed above. Alternatively, the acquiring party may be able to review data available from the local GCD, if any, or conduct water quality testing based on samples provided from existing wells on the subject property. As with water quantity analysis, the outcome of water quality testing may affect the valuation of the groundwater being leased or sold. Depending especially on the type of use(s) intended to be made of the groundwater and the costs of remedying water quality problems (assuming that is possible), this analysis also may ultimately determine whether the transaction is feasible in relation to particular property and groundwater. For example, a political subdivision that is acquiring groundwater rights for municipal supply must consider whether, and at what expense, the groundwater can be treated to meet applicable drinking water standards. See Chapter 29 of this book for a detailed discussion of drinking water quality issues.

3. *Environmental Conditions*

When drafting and negotiating a lease or contract of sale, the parties should contemplate what provisions are appropriate to provide for investigation and remediation of as well as disclosures by the surface owner regarding environmental conditions on the subject property. As in any other transaction conveying an interest in real property, the acquiring party will want to have some protection in the contract or lease in the event that environmental conditions affect the groundwater resources to a degree that makes the transaction unfeasible. Some present or past use of the surface estate may have involved, for example, an industrial use or underground storage of hydrocarbons or hazardous materials that may have contaminated the groundwater. In some cases, publicly available information regarding the present or past use of the property may signal the acquiring party that these protections may be needed; even if not, the acquiring party may wish to include these protections in any contract of sale or lease.

The transaction documents should give the acquiring party options to address these types of circumstances. For example, a contract of sale can expressly provide that the buyer can obtain (at the buyer's expense) a Phase I Environmental Assessment of the property during the review period. The contract may further provide negotiated terms for (1) notice to the seller of the results of the Phase I Assessment; (2) the seller's options and obligations regarding remediation on the basis of that assessment; (3) the circumstances under which a more extensive Phase II Environmental Assessment is appropriate, and at which party's option; (4) the seller's options and obligations regarding remediation on the basis of the Phase II Assessment, if any; and (5) the buyer's options if the seller cannot or will not remediate the conditions. For an explanation of these assessments, see American Society of Testing and Materials (ASTM) *International Standard Practice* E 1527-05 (Phase I Environmental Assessment) and E 1903-97 (2002) (Phase II Environmental Assessment).

If a buyer is concerned about potential contamination of the groundwater, including the past use of an adjacent tract, the buyer may desire to obtain protection from liability afforded by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to an innocent landowner, contiguous property owner, or bona fide prospective buyers through a Phase I Environmental Assessment that meets the ASTM standards for "all appropriate inquiries." *See* 42 U.S.C. § 9601(35)(B)(i); 40 CFR pt. 312. A buyer purchasing severed groundwater rights is acquiring a fee simple interest in real property that is separate from the surface estate. While there is no decision interpreting the liability of a groundwater rights owner under CERCLA, there are cases that have found the owner of a mineral estate liable as a CERCLA owner, because a mineral estate, under applicable state law, constitutes a separate fee simple estate in property. *See, e.g., City of Grass Valley v. Newmont Mining Corp.*, No. 2:04-cv-00149-GEB-DAD, 2007 WL 4287603 (E.D. Cal. Dec. 4, 2007) (distinguishing a mineral estate under California law from an easement); *see also Halliburton Energy Services, Inc. v. NL Industries*, 648 F. Supp. 2d 840, 896 (S.D. Tex. 2009) (citing *Grass Valley*). Because groundwater rights in Texas, like a mineral estate, constitute a separate fee simple estate in the real property, the groundwater rights owner is arguably subject to the same liability and the same protections under CERCLA as the owner of a mineral estate. *See* Grady B. Jolley, *Checklist for Environmental Due Diligence in Purchasing Groundwater Interest, in The Changing Face of Water Rights in Texas* 8.2 (State Bar of Texas 2015).

4. Surface Use

As discussed above, the parties should carefully consider what provisions in the contract of sale, lease, or conveyancing documents are needed to reflect the parties' intent regarding the surface owner's continued use of the surface estate, the nature and extent of reserved groundwater rights, and the buyer's or lessee's surface use rights. Unlike in an oil and gas lease, in groundwater transactions it has not been established that surface use rights are impliedly conveyed. Thus, careful consideration and drafting of such provisions are critically important.

Even before the inspection period or due diligence review for a contract of sale, the buyer or lessee should carefully consider what types of surface use (of land, water, and mineral resources) may or may not be compatible with the intended production and use of the groundwater resources. For example, in some parts of the state, significant oil and gas and other mineral development involves substantial infrastructure and operations on and under the surface of the land. Depending on the terms of the mineral leases in effect, these operations also (1) will involve some degree of access to and use of the surface; (2) often include rights to the use of groundwater from the property related to those operations, which may include unlimited amounts of water for flooding and secondary recovery operations; and (3) may include rights to inject water, air, saltwater, hydrocarbons, or other materials into the subsurface. In addition to oil and gas and mining, many other types of surface uses (e.g., particular types of industrial or agricultural operations) may not coexist readily with the acquiring party's intended production, use, and transportation of the groundwater.

Even if surface use issues do not outright frustrate the feasibility of the acquiring party's groundwater project, at a minimum the parties should address these matters with particularity in the contract, lease, deed, easement agreement, and so on, so that the intended resulting rights of both parties are protected following the transaction. As examples, the definition of "reserved groundwater" might well be limited (in terms of type, location, or quantity) to established historic use of groundwater by the surface owner. The contract of sale or lease may also require prospectively that any new mineral leases affecting the property contain provisions limiting the use of groundwater for certain purposes or may prospectively limit the number of residential units that may receive their water supply from groundwater produced from the property.

5. *Other Assessments*

The parties may wish to include in the contract of sale or lease provisions for obtaining other assessments of the subject property that will help inform the parties regarding the specific terms of the transaction, which depend on a complete and correct description and valuation of the subject property.

a. Survey

The buyer will likely require provisions in the contract of sale that the seller provide copies of any existing surveys of the property and, at the buyer's option, that the seller provide a new survey of the real property, at the seller's expense, with the required survey category (e.g., boundary survey, land title survey) specified in the contract. Different types of surveys and survey certifications are available, depending on the nature of the property and the requirements of the parties. *See* Texas Society of Professional Surveyors, *Manual of Practice for Land Surveying in the State of Texas* (12th ed. 2013) (describing the various categories and conditions for surveys in Texas, the level of accuracy required for each category of survey, matters to be depicted on the survey, and the nature of certificates). At a minimum, the survey will describe (and may quantify the acreage of) the real property that is the subject of the groundwater rights transaction in a manner that should conform to the legal description both in the contract of sale and in the title commitment or title opinion. More detailed types of surveys will further enable the acquiring party to assess the various types of easements, improvements, or other encumbrances that affect the subject property, as well as access to roadways and utilities. *See* 2 Forms Manual ch. 31, § 31.21:3 (discussing relevant considerations regarding specific survey categories that may be used in groundwater transactions).

b. Appraisal

For either a sale or lease, the parties may wish to have the groundwater rights separately appraised. As discussed in section V.A below, in many areas of the state, a number of variables influence the ability to achieve an accurate and substantive appraisal of groundwater rights. As groundwater markets in Texas become more developed, the basis for appraisal activity and evaluation of comparable transactions should improve.

D. Infrastructure Needs

The party acquiring groundwater rights (or groundwater supply, under contract) should also consider, even in the early stages of mapping a targeted area for potential acquisitions, the amount, types, and cost of infrastructure that will be needed to develop and produce the groundwater from a particular location. For small projects, this may involve only the siting of one groundwater well. For projects of larger scale, in terms of either geographic area covered or amount of groundwater to be produced, this will usually involve a number of additional considerations. A multiple-wells project requires well field design factoring in the number and location of the acquiring party's planned wells in relation to existing wells and various other land use features on the surface. In addition to the wells themselves, the acquiring party must also evaluate the facilities that will be needed to transport, and possibly also to collect and store, the groundwater until it is delivered to its ultimate place of use. This involves not only the additional facilities themselves (e.g., pipelines) but also any easement rights needed for these facilities in addition to the easement rights negotiated with the owners of the property from which the groundwater is produced. As Texas groundwater development and marketing projects increasingly contemplate developing these water resources for use many miles away from the source, these infrastructure considerations, and acquisition of surface rights to provide for them, have become a critical aspect of the overall planning for, and negotiation of, groundwater transactions.

E. Title Matters

1. Generally

A contract for the sale or lease of groundwater rights should give the buyer or lessee the right to conduct due diligence activities, including title examination. The acquiring party should have the right to terminate the contract if significant, uncured title problems affect the owner's title to the groundwater rights or land or unreasonably interfere with the buyer's or lessee's intended use of the groundwater rights.

A party purchasing or leasing groundwater rights should conduct the same type of due diligence on the groundwater rights that the buyer or lessee of land would conduct. This means confirming that the seller or lessor named in the contract owns the groundwater rights (and the land, if surface use rights are to be granted as part of the sale or lease) and determining the existence of restrictions, leases, easements, liens, or other title matters that could adversely affect the buyer's or lessee's use of the groundwater rights. For example, restrictive covenants that prohibit drilling groundwater wells have been upheld as being valid and enforceable. *See Dyegard Land Partnership v. Hoover*, 39 S.W.3d 300 (Tex. App.—Fort Worth 2001, no pet.). Oil and gas leases may provide the oil and gas lessee with the right to inject saltwater or other substances into the subsurface of the land, which could potentially interfere with the buyer's or lessee's groundwater rights. Similarly, existing pipeline or utility easements may be in locations that would interfere with the planned location of the groundwater facilities.

The contract should give the buyer or lessee the right to make objections to title based on its title examination and provide the landowner with the right to cure title objections. The buyer or lessee should have the right to terminate the contract or lease if the objections are not cured within a stated period of time. In general, title assurance is obtained through an attorney opinion of title based on an abstract of title or through a policy of title insurance on the groundwater rights.

2. Attorney Opinion of Title

If an attorney opinion of title is to be obtained, the prospective buyer or lessee will contract with an attorney to obtain an abstract of title on the property and to review the abstract. The attorney will prepare a letter describing (1) the owner of the groundwater rights, (2) the ownership of the land if the buyer or lessee will have the right to produce groundwater on site, and (3) the existence of leases, easements, restrictions, oil and gas leases, and other title matters that could adversely affect the buyer's or lessee's groundwater rights or interfere with production.

One disadvantage to obtaining an attorney opinion of title is that it may take a long time to get the opinion because the abstract must first be prepared by a title company, landman, or abstractor, and then the attorney requires time in which to review the title and prepare the opinion letter. Another disadvantage is that in the event of an error in the opinion, the buyer or lessee may have to sue the attorney. In that case, recovery may be limited to the amount of malpractice insurance maintained by the attorney. In a high-dollar transaction, the amount of malpractice coverage may not be sufficient to cover the loss sustained by the buyer or lessee.

3. *Title Insurance*

Title insurance covering groundwater rights in Texas was available in the past from a small number of title insurers. However, it does not appear that any major Texas underwriter is currently issuing coverage for groundwater rights. This leaves the buyer who wants to obtain title insurance with the sole option described in section IV.E.2 above. This is generally a much more costly process than obtaining title insurance (in a recent transaction, the cost of obtaining title insurance for the acquired groundwater rights, had it been available, would have been just over $2,000, while obtaining the attorney opinion of title cost more than $30,000). This approach also provides less financial assurance of recovery for mistakes than would a policy of title insurance that would provide defense of title and recovery for title defects not excluded from coverage up to the face amount of the policy, which is generally the purchase price of the groundwater rights. In addition, title insurance underwriters are required by Texas law to maintain significant reserves to cover potential losses.

It is possible that title insurance may once again be available to cover groundwater rights in Texas. Small insurers may issue policies on specific types of ownership rights, such as groundwater rights permitted by the EAA, but currently, buyers are generally without this option.

V. Other Issues for Consideration

A. Valuation of Groundwater Rights

With newly emerging and yet undeveloped groundwater markets in various parts of Texas, there is no standard method of determining the valuation of groundwater rights severed from the surface estate for purposes of defining terms for a purchase or lease. The field of groundwater rights appraisal is beginning to develop in Texas, but the types of data on which an appraiser may appropriately rely vary in different parts of the state. In areas where there have been numerous and robust groundwater sales, such as within the EAA, it is possible to obtain an appraisal of groundwater rights based on comparable sales. However, in areas where there have yet been few sale or lease transactions or where the water quantity and quality are highly variable, it may be difficult to obtain a reliable appraisal of groundwater rights without having hydrologic information specific to the subject groundwater resources. Moreover, for transactions involving groundwater resources subject to the jurisdiction of a GCD, the appraiser should consider the implications of the GCD's rules on the valuation and pricing of the groundwater (or groundwater rights) to be leased or sold.

Within this emerging framework, the parties to a transaction are certainly free to negotiate whatever valuation and pricing terms they deem appropriate to the local market and their own issues and concerns. For illustrative purposes, the following are two alternative approaches for determining a purchase price for groundwater rights. The first method is based on a stated price per acre of groundwater rights being purchased. (In the case of a fee simple determinable interest or a lease, this could similarly be a stated price per acre-foot of groundwater produced from the subject property.) This method may be used when the buyer or lessee is not obtaining any independent hydrologic information on the subject groundwater resources.

The second method is based on a stated price per "average saturated foot" of groundwater per acre of groundwater rights being purchased, with the estimated saturated thickness of the subject groundwater being determined by a hydrologist during the inspection period provided by the contract of sale. Under this method, the purchase price is directly related to the amount of groundwater in place under the land. Thus, the final purchase price cannot be calculated until the hydrologist's report is complete and could ultimately be significantly higher or lower than the parties' initial estimate. (Also, if a survey is to be obtained, the final purchase price depends on the precise amount of acreage determined under the survey.) Under this second method of valuation, if the parties intend to obtain a survey, appraisal, and hydrology report, these should be delivered during the inspection period so that the buyer is able to terminate the contract during the inspection period based on results affecting price. The parties may also wish to apply a minimum or maximum price to the formula provided for in the contract of sale, and in the case of hydrologic analysis, may include provisions to reevaluate the hydrology or further negotiate the final purchase price of the subject groundwater rights.

B. Marketability and Transfers of Groundwater Acquired

A GCD's regulation of transfer (also known as "export" or "transport") of groundwater out of the district should be considered in terms of its potential effects on the feasibility of a groundwater development or marketing project. This section addresses the statutory and regulatory parameters within which GCDs have been exercising this authority and offers some other practical considerations that may affect groundwater transactions.

1. Statutory Requirements

Texas Water Code section 36.122, adopted as part of S.B. 1 (1997) and substantially amended by S.B. 2 (2001), provides express but limited authority for a GCD to regulate the transfer of water out of the district. A district may promulgate rules requiring authorization for a permit (or permit amendment) involving the transfer of groundwater outside the GCD's boundaries. *See* Tex. Water Code § 36.122(a), (b). The district may not impose more restrictive permit conditions on transporters than it imposes on existing in-district users. Tex. Water Code § 36.122(c); *but see* Tex. Water Code § 36.113(e) (effectively qualifying this prohibition of discrimination against transporters by allowing more restrictive permit conditions on new or increased-use permit applications, as long as they apply to all new applications, regardless of type or location of use). A GCD must be "fair, impartial, and nondiscriminatory" in applying section 36.122. Tex. Water Code § 36.122(q). A district may also impose a fee or surcharge for an export fee under one of several statutory methods. *See* Tex. Water Code § 36.122(e), (p).

In reviewing a proposed groundwater transfer, the GCD must consider (1) the availability of water in the district and in the proposed receiving area during the period for which the water supply is requested; (2) the projected effect of the proposed transfer on aquifer conditions, depletion, subsidence, or effects on existing permit holders or other groundwater users within the district; and (3) the approved regional water plan and the GCD's approved management plan. Tex. Water Code § 36.122(f). Permits involving a groundwater transfer must specify the amount of water that may be transferred out of the district, which may be periodically reviewed and limited, and the period for which the water may be transferred. *See* Tex. Water Code § 36.122(h), (k). A GCD may not adopt rules expressly prohibiting groundwater export and may not deny a permit based on the fact that the applicant seeks to transfer groundwater, but a GCD may limit a permit if the above-mentioned conditions warrant. Tex. Water Code § 36.122(g), (o).

2. GCD Rules and Practical Considerations

Part of the difficulty in evaluating the feasibility and marketability implications of a GCD's export (or "transport") rules arises from the variability in districts' approaches to section 36.122 and whether the statute's provisions are considered mandatory or optional. Some language in the statute indicates that a GCD "*may also consider* the provisions of [section 36.122]" in determining whether to grant a permit or amendment under section 36.113 that proposes groundwater transfer. *See* Tex. Water Code § 36.122(a) (emphasis added); *see also* Tex. Water Code § 36.122(b) (stating that a district "*may* promulgate rules" requiring a permit or amendment under section 36.113 for an out-of-district transfer) (emphasis added). On the other hand, numerous provisions in section 36.122, discussed above, impose mandatory requirements on districts' handling of groundwater transfer proposals. The Texas Supreme Court has recently offered some guidance on the limits of a GCD's authority to issue permits for out-of-district transfers. *See Guitar Holding Co. v. Hudspeth County Underground Water Conservation District No. 1*, 263 S.W.3d 910 (Tex. 2008).

In practice, this ambiguity has meant that some GCDs have incorporated into their rules some of the section 36.122 provisions but not others. For example, many districts charge the fees authorized by section 36.122(e), but they do not necessarily also follow the statutory provision regarding the period for which the water may be transferred. Under section 36.122(i), this term shall be at least three years if construction of a conveyance system has not been initiated before permit issuance, or at least thirty years if such construction has been initiated before permit issuance. *See* Tex. Water Code § 36.122(i); *see also* Tex. Water Code § 36.122(j) (automatically extending the minimum three-year term under subsection (i)(1) to a longer term if construction has begun before the expiration of the initial term). In some cases, a GCD's export permit rule provides for a very short term (shorter than the statutory minimum), which may or may not be renewable. *See* Mary K. Sahs, *Groundwater Conservation Districts: Their Role in Sales and Exports*, *in Texas Water Law Conference*, CLE International, San Antonio (2008), app. A (summarizing a telephone survey on the use of section 36.122 provisions by GCDs).

Under these circumstances, even a smaller scale groundwater development project may be deemed inadvisable, particularly if it requires substantial infrastructure investment by the party acquiring groundwater rights.

Finally, the *Guitar* case, discussed more fully in Chapter 4 of this book, presents a significant illustration of the potential effects of a GCD's rules on the ability to develop and market groundwater resources for use outside the district. In that case, the plaintiff-appellant challenged the "historic and existing use" permit rules of Hudspeth County Underground Water Conservation District No. 1. Because the district's rules authorized granting permits preferentially to landowners with historic irrigation use and allowed change of use and groundwater export for these historic use permits, effectively a limited number of landowners (historic irrigators) held the permits for nearly all of the reliable groundwater supply of the district. Under these circumstances, even a landowner with ownership or control of substantial acreage within the district, such as plaintiff-appellant Guitar Holding Co., was precluded from developing and marketing groundwater for export. The Texas Supreme Court found that "the District's transfer rules, in essence, grant franchises to some landowners to export water while denying that right to others. Because the limitations are not uniformly applied to these new applications and are not necessary to protect existing use, the District's transfer rules exceed the statutory authorization and are thus invalid." *Guitar Holding Co.*, 263 S.W.3d at 918.

C. Obligations upon Termination (Sale)

The sale contract for groundwater rights should expressly provide that certain obligations survive termination of the contract. Payment and indemnification obligations as to events occurring before termination, for example, should be made to survive termination of the contract.

If easement rights are granted in a separate easement document, the easement document should expressly provide that certain obligations survive termination of the easement. Payment obligations, indemnification obligations for events occurring before termination, and the right or obligation to remove facilities after termination should expressly survive termination of the easement.

D. Provisions Surviving Closing (Sale)

The sale contract for groundwater rights should expressly provide that certain obligations of the seller or buyer survive closing. Indemnification obligations as to events occurring before closing, for example, should be made to survive closing.

The responsibility for the payment of ad valorem property taxes on the land and the groundwater rights should also expressly survive closing. Currently, ad valorem property taxes are assessed against the land but are not separately assessed against severed groundwater rights. The contract should require the seller to continue paying the taxes assessed against the land after closing. The contract should also provide that if the taxes are ever separately assessed against the severed groundwater rights, the buyer will be responsible for paying these taxes.

VI. Financing Issues

A. Liens on Groundwater Rights

If financing is to be obtained for the purchase, lease, or development of groundwater rights, the lender will require documentation to secure and perfect its lien against the groundwater rights. In general, the lender will obtain a deed of trust that creates a lien on the groundwater rights (or on the lessee's leasehold interest in the case of a lease of groundwater rights) on any easement obtained by the buyer or lessee and on any groundwater permit transferred to or obtained by the buyer or lessee. If the collateral includes wells, storage tanks, or other facilities that are or may become fixtures, or any items of personal property, the lender will also require the execution of a security agreement and financing statements. The deed of trust may be drafted to constitute a financing statement for fixtures, and upon recordation in the county real property records it will create a Uniform Commercial Code (UCC) lien on the fixtures. If the collateral includes personal property, the lender will require a UCC1 financing statement to be filed in the Office of the Secretary of State for the appropriate state, as required by the UCC.

B. Security Interest in Personalty

It is not always clear whether some items of collateral, including groundwater permits, groundwater wells, or other facilities, are fixtures or personal property. Consequently, it is advisable for the lender to take the steps necessary to perfect its security interest in both personal property and fixtures.

C. Control over Collateral

A lender may want to exert control over the groundwater permit by restricting the ability of the buyer or lessee to modify the permit without the consent of the lender during the term of the loan. The deed of trust and other loan documents should contain this prohibition. However, there is not currently a way in which a lender can require the GCD that issued the groundwater permit to obtain proof of the lender's consent before acting on an application to modify the permit. A lender may wish to provide written notice to the GCD of the lender's lien rights in the groundwater permit, as well as a document signed by the permittee acknowledging that modifications in the permit require prior lender approval. There is no assurance, however, that the district will require lender consent to the modification or even include the notice and documentation in the files maintained for the permit.

VII. Conclusion

As the population of Texas rapidly shifts and grows, among the emerging trends in water development is an increasing focus on groundwater resources. Private and public entities of all sizes and in various parts of the state are exploring the potential for more widespread use of groundwater as a source of future water supply. Some of these negotiations and transactions involve locally based projects, while others contemplate developing and marketing groundwater resources for use in other parts of the state. In any event, this increase in and variety of transactional activity raises many questions for prospective parties buying, selling, or leasing groundwater rights in Texas. As illustrated in this chapter, parties have various options in structuring their transactions and developing their groundwater projects. As the law and new markets in groundwater transactions evolve, this will continue to be a critical area of Texas water resources law.

CHAPTER 19

Forecasting Underground Rain: Groundwater Availability Modeling

Robert E. Mace[1] and Cynthia K. Ridgeway[2]

I. Introduction

Understanding and managing groundwater resources are paramount to the future of Texas. In 2008, groundwater provided 60 percent of all the water used in the state for a variety of agricultural, municipal, and industrial uses. *See* Texas Water Development Board, *Water for Texas 2012* 163 (2012), *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. As Texas faces almost a doubling of its population in the next fifty years and the ever-present threat of drought, Texans need to know how their aquifers respond to pumping and drought. Recognizing the importance of this knowledge, the state has formalized its water planning to include an analysis of current and future groundwater supplies and resources. *See* Tex. Water Code § 16.053; see also Chapter 21 of this book. The state has enhanced its planning for groundwater management by requiring groundwater conservation districts to develop desired future conditions for their groundwater resources. *See* Tex. Water Code § 36.108(d); see also Chapter 16 of this book. Desired future conditions will significantly influence projections in regional and state water planning. In the development of water plans and desired future conditions, groundwater availability models play an important role. This chapter provides a background for how groundwater availability models are made, what the groundwater availability modeling program is, who is required to use groundwater availability models, and how groundwater availability modeling information can be used.

If you have ever watched the weather on television, you have undoubtedly heard the meteorologist refer to weather models—for example, "If the models are correct, thunderstorms are going to pass through here at about three o'clock tomorrow afternoon." The meteorologists' forecasts, based on their computer models, predict how fronts may move over time, where rain might fall, and when weather changes might occur. These weather models are based on the physics of the atmosphere and how air flows relative to high- and low-pressure systems, among other influences. Numerical groundwater flow models are similar to weather models except that they are made by modelers trained in the science of hydrogeology instead of meteorology, they are guided by groundwater physics instead of atmospheric physics, and they forecast for periods of many years instead of days. Meteorologists

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predict the aboveground rain; groundwater modelers predict the underground rain—the rain that leaked into the aquifer days or many years ago.

If you have ever used the weather forecast to plan your activities for the weekend, then you have benefited from modeling. For example, if you are planning a picnic for Saturday, there is a good chance that you are religiously following the weather forecasts. Just as weather models are useful for planning, so are groundwater models. If you are planning to build a large well field, you probably want a forecast about whether the aquifer can support additional pumping. If you are a groundwater conservation district or a nearby landowner, you probably want to know how that pumping is going to affect the water levels in your wells. Without models, these predictions are difficult to make, especially with complicated aquifers and pumping scenarios.

Numerical groundwater flow modeling is a valuable tool for better understanding groundwater flow in aquifers and better managing groundwater resources. Numerical models are one of the few tools available that consider a complex array of aquifer variables and allow these variables to interact with one another. Exploring these interactions with a model can reveal how an aquifer behaves. Once a model is working properly, it can also be used to make predictions important for managing groundwater resources, such as predicting how water levels and spring flows might respond to increased pumping.

Regional groundwater flow models can be roughly divided into two types: scientific and management. The purpose of scientific models is to better understand how water flows in the aquifer and to test ideas about how the aquifer works. Management models are generally used to make predictions or test management scenarios. In many cases, management models build on previously completed scientific models. However, management models may increase considerably the understanding of an aquifer just as scientific models may help with managing aquifers. It is not uncommon to develop models with a dual purpose: to better understand the aquifer and to develop a tool for management.

Groundwater flow models have been developed for Texas's aquifers for at least fifty years. One of the earliest groundwater models for Texas was an electric-analog model (using resistors and capacitors!) developed in 1965 for the Gulf Coast Aquifer in the Houston area. *See* L.A. Wood & R.K. Gabrysch, *Analog-Model Study of Ground Water in the Houston District, Texas*, Texas Water Commission Bulletin 6508 (1965); Figure 1. Such an electric-analog model is based on the fact that the mathematical forms of the equations that govern the flow of electricity are the same as those that govern the flow of groundwater. One of the earliest *numerical* groundwater flow models for Texas was developed in 1970 for the Ogallala Aquifer near Lubbock. *See* B.J. Claborn et al., *Numerical Model of the Ogallala as a Management Tool, in Ogallala Aquifer Symposium*, Texas Tech University, International Center for Arid and Semi-Arid Land Studies, Special Report Number 39, at 89–110 (R.B. Mattox & J.D. Miller eds., 1970). A few aquifers have had several different models developed for them. For example, at least sixteen models have been developed for the Ogallala Aquifer in Texas (*see* R.E. Mace & A.R. Dutton, *Numerical Modeling of Ground-Water Flow in the Ogallala Aquifer in Texas, in Sociedad Mexicana de la Ciencia del Suelo*, Memoria del Simposio Internacional de Aguas Subterráneas, at 98–109 (J.Z. Castellanos et al. eds., 1998); A.R. Dutton & R.E. Mace, *Evolución de los Modelos Numéricos de Flujo de Agua Subterránea en el Acuífero de Ogallala en Texas*, 19 Revista Mexicana de Ciencias Geológicas 2, at 107–20 (2002)), and at least fifteen models have been developed for the Edwards Aquifer. Several models were developed for the same aquifer to accommodate different geographic regions and different purposes, and to reflect better modeling techniques, better understanding of the aquifers, and increased computer capabilities. Models tend to be transitory tools that improve existing models, or they are superseded by better models in response to additional or improved information on the aquifer or superior computing power and programs.

The Texas Water Development Board (TWDB) pioneered the development of management models for the state's aquifers with models for—

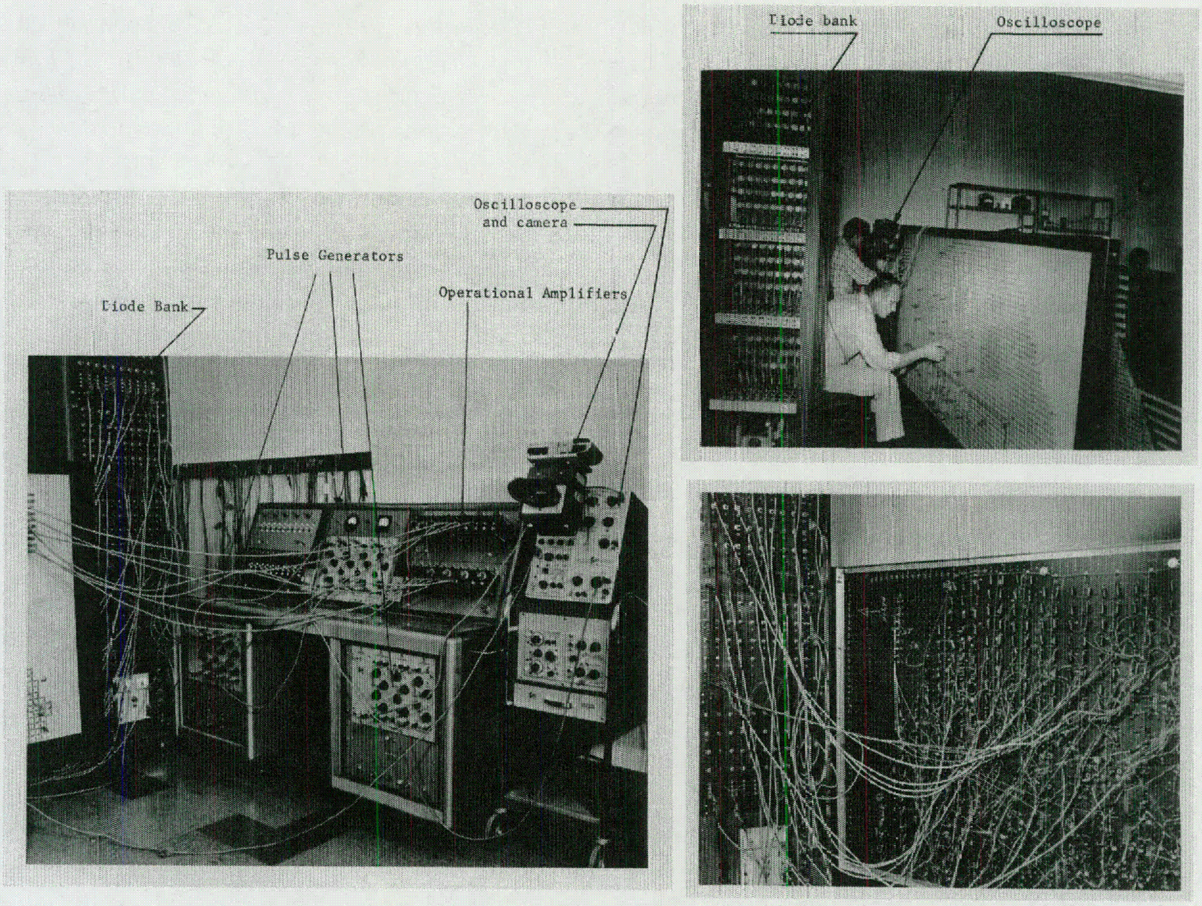

Figure 1. Photographs of an electric-analog model of the Gulf Coast Aquifer in the Houston area (from Wood and Gabrysch, 1965).

1. the San Antonio segment of the Edwards Aquifer (*see* W.B. Klemt et al., *Ground-Water Resources and Model Applications for the Edwards (Balcones Fault Zone) Aquifer in the San Antonio Region, Texas*, Texas Department of Water Resources Report 239 (1979));

2. the Ogallala Aquifer (*see* T.R. Knowles et al., *Evaluating the Ground-Water Resources of the High Plains of Texas*, Texas Department of Water Resources, Final Report LP-173 (1982); T.R. Knowles et al., *Evaluating the Ground-Water Resources of the High Plains of Texas*, Texas Department of Water Resources Report 288 (1984); T.R. Knowles, *Assessment of the Ground-Water Resources of the Texas High Plains*, *in Ogallala Aquifer Symposium II: Texas Tech University Water Resources Center, Proceedings*, at 217–37 (G.A. Whetstone ed., 1984)); and

3. the Carrizo-Wilcox and Gulf Coast aquifers (*see* W.R. Meyer & J.E. Carr, *A Digital Model for Simulation of Ground-Water Hydrology in the Houston Area, Texas*, Texas Department of Water Resources LP-103 (1979); J.E. Carr et al., *Digital Models for Simulation of Ground-Water Hydrology of the Chicot and Evangeline Aquifers along the Gulf Coast of Texas*, Texas Department of Water Resources Report 289 (1985)).

The U.S. Geological Survey has developed many of the scientific models in the state, including models for—

1. the Ogallala Aquifer (*see* R.R. Luckey, *The High Plains Regional Aquifer-Flow System Simulation of the Central and Northern High Plains*, *in Ogallala Aquifer Symposium II: Texas*

Tech University Water Resources Center, Proceedings, at 48–66 (G.A. Whetstone ed., 1984); R.R. Luckey et al., *Digital Simulation of Ground-Water Flow in the High Plains Aquifer in Parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming*, U.S. Geological Survey Professional Paper 1400-D (1986));

2. the Edwards Aquifer (*see* R.M. Slade et al., *Simulation of the Flow System of Barton Springs and Associated Edwards Aquifer in the Austin Area, Texas*, U.S. Geological Survey Water-Resources Investigations Report 85-4299 (1985); R.W. Maclay & L.F. Land, *Simulation of Flow in the Edwards Aquifer, San Antonio Region, Texas, and Refinements of Storage and Flow Concepts*, U.S. Geological Survey Report Water-Supply Paper 2336-A (1988));

3. the Gulf Coast Aquifer (*see* P.D. Ryder, *Hydrogeology and Predevelopment Flow in the Texas Gulf Coast Aquifer Systems*, U.S. Geological Survey Water-Resources Investigations Report 87-4248 (1988));

4. the Carrizo-Wilcox Aquifer (*see* Ryder); and

5. the Edwards-Trinity (Plateau) Aquifer (*see* E.L. Kuniansky & K.Q. Holligan, *Simulations of Flow in the Edwards-Trinity Aquifer System and Contiguous Hydraulically Connected Units, West-Central Texas*, U.S. Geological Survey Water-Resources Investigations Report 93-4039 (1994)).

More recent modeling efforts of the U.S. Geological Survey in Texas have been dual purpose: scientific models that can also be used as management tools. *See, e.g.*, R.J. Lindgren et al., *Conceptualization and Simulation of the Edwards Aquifer, San Antonio Region, Texas*, U.S. Geological Survey Scientific Investigations Report 2004-5277 (2004); M.C. Kasmareck, *Hydrogeology and Simulation of Groundwater Flow and Land-Surface Subsidence in the Northern Part of the Gulf Coast Aquifer System, Texas, 1891–2009*, U.S. Geological Survey Scientific Investigations Report 2012-5154 (2012); B.R. Clark et al., *Simulation of Groundwater Flow in the Edwards-Trinity and Related Aquifers in the Pecos County Region, Texas*, U.S. Geological Survey Scientific Investigations Report 2013-5228 (2013).

In 1998, the TWDB initiated work on a management model of the Hill Country part of the Trinity Aquifer and a modeling process that would become the template for the groundwater availability modeling program in Texas. *See* R.E. Mace et al., *Groundwater Availability of the Middle Trinity Aquifer, Hill Country Area, Texas—Numerical Simulations through 2050*, Texas Water Development Board Report 353 (2000). Groundwater availability models are computer-based, three-dimensional, numerical groundwater flow models to simulate groundwater flow systems at a regional scale. The models estimate current and future trends in the amount of water available for use from an aquifer. Because the groundwater availability models simulate large areas, these models allow users to see the big picture and understand groundwater flow through all or large parts of an aquifer. These models differ from the other groundwater flow models developed by the TWDB and others in that they involve substantial stakeholder involvement, are standardized, are publicly available, and are designed to be updated in the future.

The groundwater availability models are a critical part of groundwater management in Texas. The models are used by groundwater conservation districts, regional water planning groups (see Chapter 20 of this book), and others to evaluate the amount of groundwater available for use and the potential effects of pumping and drought on the state's aquifers. Groundwater availability models will be an important tool for groundwater conservation districts in evaluating desired future conditions and managing modeled available groundwater numbers, numbers that will greatly influence projections of groundwater availability in regional and state water plans. *See* R.E. Mace et al., *A Streetcar Named Desired Future Conditions: The New Groundwater Availability for Texas*, *in The Changing Face of*

Water Rights in Texas (State Bar of Texas 2006). See Chapter 21 of this book for a discussion of groundwater management area joint planning, desired future conditions, and modeled available groundwater.

II. The Birds and the Bees of Groundwater Modeling

Creating a regional groundwater flow model is complicated and time consuming. A tremendous amount of information has to be compiled, processed, and interpreted. Important decisions have to be made about what is important to model, what is not important to model, and what assumptions to make. Fortunately, there is a standard recipe that groundwater modelers follow when creating a model. This recipe includes (1) defining the purpose, (2) developing the conceptual model, (3) building the model architecture, and (4) calibrating the model. *See, e.g.*, M.P. Anderson & W.W. Woessner, *Applied Groundwater Modeling—Simulation of Flow and Advective Transport* (Academic Press 1992). After a groundwater model is completed, it can be used to make predictions.

A. Purpose

Defining the purpose of the model is important because it guides how large the model needs to be and what physical phenomena need to be considered. The stated purpose helps to define the focus of the model. For example, if you decide to build a house, your architect is going to want to know how you will use the house. Do you have six kids? Are you an empty nester? Do you frequently entertain? A house with lots of kids will generally be very different from a house with two adults who party all the time. The same is true of groundwater models. If the purpose of the model is to predict the effects of regional pumping on water levels, it will be a much larger model than if the purpose is to predict water level declines around a few wells. The purpose of the model is also tied to what you want to better understand or predict. A model developed to simulate the effects of regional pumping is very different from a model developed to predict the movement of contaminants beneath a gas station.

B. Conceptual Model

The conceptual model is a description of the groundwater modeler's best understanding of how water moves into, through, and out of the aquifer. Instead of a model in a computer, it is an intellectual model—a model in the modeler's head of how the aquifer works. In developing the conceptual model, the modeler must compile, organize, and describe the information necessary for building the numerical model. The conceptual model includes information on (1) hydrostratigraphy (What are the aquifers and aquitards?); (2) framework (Where are the aquifers and aquitards located underground?); (3) water levels and regional groundwater flow (Where is the water table, what are the water pressures, and where is the water going?); (4) recharge (How much water is coming into the aquifer?); (5) rivers, streams, lakes, gulfs, and springs (How does the aquifer interact with surface water?); (6) hydraulic properties (How easily can water move through the aquifers and aquitards?); (7) water quality (How good is the water?); (8) cross-formational flow (How much water flows into and out of the aquifer from neighboring geologic formations?); and (9) discharge (How much water is being pumped? How much water flows to rivers, streams, lakes, and springs?).

To develop this conceptual model, modelers examine previous research, including earlier modeling efforts on the aquifer. In addition, the modeler often collects new information. Once all of this information is compiled, the modeler will evaluate the information and develop his best idea about how water comes into, flows through, and exits the aquifer. The modeler usually has to make assumptions about the aquifer, generally based on similar aquifers or the currently accepted scientific idea on how a hydrologic phenomenon works. When the modeler has a good and defensible story to tell about how the aquifer works—in other words, a good and defensible conceptual model—he can start to work on building the numerical model.

C. Model Architecture

Model architecture refers to the nuts and bolts of how a model is put together. Just as an office building is assembled as a gridwork of offices or office "cells," a model is assembled as a gridwork of model cells with each cell representing a piece of the aquifer. When an office building is put up, it is built from blueprints and an architectural plan. Numerical groundwater models are built from the conceptual model, the hydrogeologic blueprint of the aquifer.

The groundwater modeler has a number of important decisions to make. Which aquifer layers will be modeled? How big is the model? How big should the cells be? How will the aquifer layers be modeled? How will recharge, springs, rivers, lakes, and pumping be numerically represented in the model? At what time in the past should the model start simulating the aquifer? To make the model simpler and more manageable, the modeler sometimes has to make assumptions that certain aspects of the aquifer are not important enough to include in the model. As the modeler makes these decisions, the rough shell of the model begins to appear.

D. Calibration

If our conceptual model were perfect and we knew all the properties everywhere in the aquifer, then the model would not need to be calibrated. This rarely, if ever, happens, especially with regional groundwater flow models. This is because the conceptual model is generally a simplification of the real world, and we do not know all the properties everywhere in the aquifer. Therefore, groundwater modelers perform what is called a calibration. Calibration is the process by which parameters in the model are adjusted within realistic ranges (as defined during the development of the conceptual model) to get the model to reproduce measured values of historical water levels, spring flows, or other hydrologic information. The calibration process is like taking a shower. Let's say you get into the shower and the water is too hot. What do you do? You either turn down the hot water or turn up the cold water. Now let's say, after your adjustment, the shower is too cold. You keep adjusting until the temperature of the water is within an acceptable range. In other words, you calibrate the temperature of the shower by adjusting the hot and cold water until you reach the desired temperature. Calibrating a model is similar. For example, if water levels in the model are too low compared to measured values, you might increase the recharge in the model to raise the water levels to be more acceptable.

Model calibration rarely, if ever, results in a perfect fit of measured water levels, spring flows, and other hydrologic information. For example, if you have adjusted the recharge to calibrate the model, the water levels in some cells may be higher than measured values and the water levels in other cells may be lower. The differences between the measured values and the simulated values represent the error of the model. The reason calibrated models never exactly match measured values is because the groundwater model is an approximation of reality; we do not know everything about the aquifer. Approximations are not perfect. Models can, however, be finely adjusted to perfectly match measured information, something called overcalibration. Paradoxically, calibrated models that perfectly match measured information tend to be worse predictors of the future than calibrated models that do not perfectly match measured information. This is because an overcalibrated model makes assumptions and assigns model parameters, such as recharge and hydraulic properties, with no supporting information.

Making assumptions is like being up in a tree and starting to climb out on a limb. The more assumptions you make, the farther out on a limb you are. With overcalibration, you are making many, many assumptions not supported by the data—you are no longer climbing out on a limb, you are climbing out on a twig! Good groundwater modelers calibrate only as far as their data and assumptions will let them go, and no farther. An evaluation of calibrated models should never be guided only by how well they fit measured data; they also must include the models' assumptions and final hydrologic parameters.

Groundwater models are first calibrated to predevelopment conditions of water levels, spring flows, and base flows in streams. Predevelopment conditions represent what the aquifer looked like before there was extensive pumping in the aquifer. After the model has been calibrated in this manner, the model is calibrated to reproduce water levels and water level changes and spring flows and spring flow changes in response to pumping and recharge since predevelopment times. Once the model is calibrated, the model is done and ready to peek into the future.

E. Predictions

After a model is calibrated, it can be used to predict how water levels and spring flows might respond to future pumping and drought. Modelers can then put projections of pumping and recharge into the model and run the model to get the answers. Modelers call this a "model run."

The accuracy of the prediction depends on how well you can project pumping and recharge into the future and how accurately the model represents the aquifer. Even if you know everything about the aquifer and have a perfectly calibrated model, the model will not give an accurate prediction if the projections of pumping and recharge are not accurate. For example, if you had an honest-to-goodness perfect model and put into it a projection of 10,000 units of pumping when it turns out that people pumped only 5,000 units, the honest-to-goodness perfect model would not give the correct answer. One might say that the model was not really a good model; however, this would not be correct. The model was fine; the projection was inaccurate, resulting in an inaccurate model run.

In reality, the model prediction answered a "What if " question. What if 10,000 units of water were pumped from the aquifer? Other model runs could be easily done (for example, what if 7,000 units of water were pumped from the aquifer? What about 15,000 units?). This is the power of groundwater models: once they are developed, it is relatively easy to make different model runs with different projections of pumping and other parameters such as recharge and lake levels.

On the other hand, the projection may be perfect but the model flawed, leading to an incorrect prediction. Since no model is perfect, it is unlikely that a model will return a perfect prediction. The real question is: How accurate might the prediction be?

Some models or, for that matter, some predictions may be more accurate than others. Let's say the nurse rolls you into an operating room for brain surgery and gives you the choice of two surgeons: one who has performed a number of other surgeries, is well educated about brain surgery, but has not yet performed his first brain surgery, and another who has performed a number of other surgeries, is well educated about brain surgery, and has successfully performed the brain surgery a hundred times. Which surgeon would you prefer? Unless the brain damage you have suffered is clouding your judgment, you are going to go with experience.

Sometimes models used for predictive runs are like the brain surgeon who has successfully performed the brain surgery a hundred times. For example, policymakers often debate about how to manage the Edwards Aquifer in the San Antonio region. The policy decisions often revolve around whether a management scheme causes Comal Springs and San Marcos Springs to go dry. The groundwater model for the Edwards Aquifer in the San Antonio region was calibrated to water levels and spring flows from 1939 to 2000, including a period during the 1950s when Comal Springs stopped flowing. Therefore, in its calibration the model has real-life "experience" in simulating when the springs go dry. This "experience" does not guarantee that the model can make accurate predictions (there are still a number of assumptions in the model and in the projections of pumping and recharge), but it does give us greater confidence that the model can predict when the springs go dry.

Now let's move a little to the north and take a look at the Edwards Aquifer in the Austin area. Similar to the San Antonio area, policy decisions often revolve around whether a management scheme causes springs to go dry—in this case, Barton Springs. However, unlike Comal Springs, Barton Springs has not gone dry in recorded history. Therefore, the calibrated model does not have the benefit of "experiencing" the springs going dry. Like the well-educated surgeon who has not yet performed his first brain surgery, the well-calibrated model has not experienced the springs going dry. This is not to say that the model will not make an accurate or nearly accurate prediction of when the springs will go dry, but we may not have as much confidence in the predictions as in the model for the San Antonio segment.

In most cases, groundwater models are like well-educated surgeons who have yet to perform their first brain surgery—we are asking the models to do something they haven't experienced yet. Generally, the models have some experience, such as past water level declines and spring flow declines, which is used to calibrate them. When these models are used for predictive simulations, the groundwater modeler is assuming that the conceptual model and calibration used to develop the model also apply in the future under new conditions. A good modeler will take a close look at what the model is doing when it is asked to go where it has not been yet, such as when it simulates how the aquifer is interacting with surface water features or other aquifers. For example, if a large well field is placed in an area that has not previously experienced large water level declines, the modeler will look at the model to see how it interacts with aquifer boundaries such as streams, bordering layers, and artificial boundaries to make sure the model is still realistic. If the model is not realistic, it either cannot be used to evaluate the problem or cannot be used until it is modified to improve its performance.

F. Limitations

All models have limitations. Just because a model is able to make a simulation does not mean that it should be used to make that simulation. Each model has a "comfort zone" within which it can be expected to reasonably reproduce reality. This comfort zone is often defined by the purpose of the model, the certainty of the conceptual model, the quality of the calibration, and how realistically the model behaves during predictive runs. Models often cannot be used outside of their defined purpose. For example, a model developed with the purpose of simulating regional groundwater flow is unlikely to be useful for simulating contaminant transport beneath a gas station. The certainty of the conceptual model can also limit the applicability or certainty of a model. For example, uncertainty about recharge rates can limit the accuracy of a model if a predictive simulation stretches the limits of the aquifer as represented in the model. The use of the model may also be limited by how well the model simulates the past. For example, if the question at hand requires accuracy down to one foot of water level change but the model has an average error of ten feet, then the model may not be an appropriate tool to address that question. How a model behaves during a predictive run is also important to consider when assessing limitations. For example, a model may behave realistically during calibration and for predictive simulations with modest increases in pumping; however, large increases in pumping may cause unrealistic hydrologic behavior in the model. In all of these cases, the judgment of an experienced modeler is needed to carefully evaluate whether the model is an appropriate tool for the task at hand.

III. The Groundwater Availability Modeling Program

The groundwater availability modeling program initiated by the TWDB set out to develop or obtain numerical groundwater flow models of the thirty major and minor aquifers of the state. *See* Texas Water Development Board, *Groundwater Models*, www.twdb.texas.gov/groundwater/models/gam/index.asp. The legislature quickly recognized the importance of groundwater models, particularly after regional water planning came into existence in 1997. In Senate Bill 2, the 77th Legislature directed that section 16.012 of the Texas Water Code be amended to require the executive administrator of the TWDB to "obtain or develop groundwater availability models for major and minor aquifers in coordination with groundwater conservation districts and regional water planning groups." *See* Act of June 15, 2001, 77th Leg., R.S., ch. 966, § 2.15.

A unique aspect of the groundwater availability modeling program is the involvement in the entire modeling process of interested parties, or stakeholders. These parties include groundwater conservation districts, regional water planning groups, consultants, river authorities, environmental groups, state agencies, water suppliers, and other interested citizens. By including public involvement in the modeling process, the groundwater availability modeling program can address or incorporate many of the local constituents' ideas, data, and concerns about the aquifer. For example, groundwater conservation districts routinely provide additional information on geology, water levels, and springs to assist in modeling, and they have provided operating assumptions for predictive scenarios.

Some of the larger or more complex aquifers require more than one model, while some models incorporate a combination of aquifers. As required by law, the TWDB developed or obtained the initial versions of seventeen groundwater availability models for the state's nine major aquifers before October 1, 2004. See Plate 6, Major Aquifers of Texas. These nine aquifers currently supply approximately 95 percent of the groundwater produced in the state. Since October 2004, the TWDB has developed or obtained initial versions of eight additional models (including the Dockum, Igneous/West Texas Bolsons, Lipan, Nacatoch, Presidio-Reford Bolsons, Rustler, West Texas Bolsons, and Yegua-Jackson), as well as a number of additions and enhancements to the existing models. Some of the initial models came from external cooperators, including El Paso Water Utilities, the Edwards Aquifer Authority, and the U.S. Geological Survey. One of the models, the initial model for the northern part of the Gulf Coast Aquifer, was supported jointly by the TWDB, the U.S. Geological Survey, the Harris-Galveston Coastal Subsidence District, and the Fort Bend Subsidence District. This model was later updated in 2013 by the U.S. Geological Survey in cooperation with the Harris-Galveston Subsidence District, the Fort Bend Subsidence District, and the Lone Star Groundwater Conservation District.

Updating and improving these initial models are vital components of the groundwater availability modeling program. The models are meant to be "living tools" that can be updated as new information becomes available, adapted to reflect changing aquifer conditions, or refined to better address the needs and concerns of the groups using them. To accommodate the ongoing needs of the groundwater conservation districts, planning groups, regional water suppliers, and other model users, the TWDB has already begun the process of updating and adjusting several existing groundwater availability models. Since 2004, seven existing models have been updated. Besides the update to the model for the northern portion of the Gulf Coast Aquifer mentioned above, the Queen City and Sparta aquifers were added to the three representing the Carrizo-Wilcox Aquifer, and the Edwards-Trinity (High Plains) Aquifer was added to the southern portion of the Ogallala Aquifer model. The TWDB currently plans to develop groundwater management area–based models based, in large part, on the existing models. One such model was developed for Groundwater Management Area 16 as part of the joint planning process.

Currently, the TWDB is working on modeling the remaining minor aquifers in Texas. Thus far, thirteen of the minor aquifers are included in existing groundwater availability models. See Plate 7, Minor Aquifers of Texas. The remaining eight minor aquifers not yet modeled will require at least six additional groundwater availability models.

All the completed models use MODFLOW-96 (*see* A.W. Harbaugh & M.G. McDonald, *User's Documentation for MODFLOW-96, an Update to the U.S. Geological Survey Modular Finite-Difference Ground-Water Flow Model*, U.S. Geological Survey Open-File Report 96-485 (1996)), MODFLOW 2000 (*see* A.W. Harbaugh et al., MODFLOW-2000, *the U.S. Geological Survey Modular Ground-Water Model—User Guide to Modularization Concepts and the Ground-Water Flow Process*, U.S. Geological Survey Open-File Report 00-92 (2000)), or more recent MODFLOW code as the modeling code. All models use MODFLOW modules that are freely available (that is, no proprietary modules are used). Initially the final models (including supporting graphics) were compatible with *Processing MODFLOW for Windows (PMWIN)* version 5 or later (*see* W.H. Chiang & W. Kinzelbach, *Processing Modflow—A Simulation System for Modeling Groundwater Flow and Pollution* (1998)), a proprietary pre- and post-processor to MODFLOW. Beginning in 2006, the preferred pre- and post-processor to MODFLOW was changed to Groundwater Vistas (*see* J.O. Rumbaugh & D.B. Rumbaugh, *Guide to Using Groundwater Vistas Version 4* (Environmental Simulations, Inc. 2004)). The final models may be run on a personal computer using the Microsoft Windows-DOS operating system (Microsoft Windows 95 or later).

IV. Who Is Required to Use Groundwater Availability Models?

Groundwater conservation districts and regional water planning groups are required to use groundwater availability models. Groundwater conservation districts are required by statute to use groundwater availability modeling information when it is available in developing their groundwater management plans. *See* Tex. Water Code §§ 36.1071(e)(3)(E), (h), 36.108(d); also see Chapters 16 and 21 of this book. More specifically, groundwater availability models and the data used to develop the models are useful tools for evaluating some of the parameters currently required in groundwater management plans, such as—

- the annual amount of recharge from precipitation, if any, to the groundwater resources within the district (Tex. Water Code § 36.1071(e)(3)(C));
- the annual volume of water that discharges to springs and any surface water bodies, including lakes, streams, and rivers (Tex. Water Code § 36.1071(e)(3)(D)); and
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district (Tex. Water Code § 36.1071(e)(3)(E)).

Groundwater conservation districts are also required to consider information from groundwater availability models when they develop desired future conditions for their aquifers as part of joint planning in groundwater management areas. *See* Tex. Water Code § 36.108(d); see also Chapter 21 of this book. For example, before voting on the proposed desired future conditions for a relevant aquifer within a groundwater management area, the groundwater conservation districts consider the total estimated recoverable storage, provided by the executive administrator of the Texas Water Development Board, along with the other factors listed in Water Code section 36.108. The desired future conditions of an aquifer are the quantified conditions of groundwater resources at a specified time or times in the future or in perpetuity as identified by groundwater conservation districts in a groundwater management area. *See* Tex. Water Code § 36.108. The TWDB will use groundwater availability models to calculate or verify modeled available groundwater based on the desired future conditions of aquifers as identified by the groundwater conservation districts. Groundwater conservation districts are then required to include the modeled available groundwater value in their groundwater management plan and to use it for consideration when permitting. *See* Tex. Water Code

§ 36.1132. Although groundwater conservation districts are required to consider groundwater availability modeling information, the choice of how to manage an aquifer still lies with groundwater conservation districts, as defined in the desired future conditions.

Regional water planning groups are required to use modeled available groundwater values for groundwater availability. *See* Tex. Water Code § 36.1071(e)(3)(A).

V. How Can Groundwater Availability Modeling Information Be Used?

There are two primary types of groundwater availability modeling information: the model itself and the information in the model. The model can be used to predict water levels and flows in response to pumping and drought. For example, if a new well field is planned, the groundwater availability models can be used to predict possible effects of the well field on water levels in the aquifer. The information inside a groundwater availability model may also be very useful. For example, groundwater availability models include information on recharge, aquifer geometry (depth and thickness), and aquifer properties (transmissivity, hydraulic conductivity, storativity, and water levels). Aquifer geometry and property information can be used to calculate water in storage and drawdown around individual wells. The TWDB uses the aquifer geometry, aquifer properties, and water levels when developing the volumes of estimated recoverable storage for the aquifers; *see* Tex. Water Code § 36.108(d); see also Chapter 21 of this book.

Groundwater availability models can also be used to evaluate desired future conditions and estimate modeled available groundwater. For example, groundwater conservation districts might be considering a particular desired future condition such as maintaining spring flows at 50 percent of current levels. The groundwater availability models can then be used to adjust pumping amounts until that desired future condition is reached in the model. The amount of pumping in the model that achieves this desired future condition would be the estimate of the modeled available groundwater. The districts can then evaluate the modeled available groundwater number and adjust the desired future condition as appropriate. For instance, in the above example, let's say that the districts decide that the resulting modeled available groundwater number is not enough water. The districts can then revise their desired future condition (maintain spring flows at 40 percent of current levels) and use the model to reevaluate the modeled available groundwater. This iterative process is similar to defining consensus yield. *See* R.E. Mace et al., *Estimating Groundwater Availability in Texas*, *in Water Allocation in Texas: The Legal Issues* (Texas Rural Water Association and Texas Water Conservation Association 2001). See also Chapter 21 of this book.

Here are two more examples of how groundwater availability modeling information can be used in evaluating desired future conditions:

1. The desired future condition of the aquifer is equal to some desired volume of water in the aquifer. For example, the desired future condition may be 50 percent of the water left in the aquifer after fifty years. Groundwater availability modeling information can be used to estimate the volume of water in an aquifer for a specified area at a specified time under specified conditions.

2. The desired future condition of the aquifer is equal to an average water elevation, spring flow, or base flow level. For example, the desired future condition may be a minimum spring flow of ten cubic feet per second during a repeat of the drought of record. Groundwater availability modeling information can be used to assess the effects of pumping and drought on water levels, spring flow, and base flow. For example, the Barton Springs/Edwards Aquifer

Conservation District has used the groundwater availability model for their aquifer to assess the possible effects of increased pumping on water levels and spring flows.

Groundwater availability models are particularly suited to investigating the effects of well fields, changes in pumping and pumping patterns, and changes in climate, such as droughts. Therefore, groundwater availability models can be used in these cases. Because they are regional models, groundwater availability models themselves cannot be used to accurately assess the impacts of individual wells. However, the collective effect of individual wells can be assessed. To predict water level declines around individual wells, groundwater availability models can be used in conjunction with analytical models. An example of an analytical model to evaluate drawdown versus time or drawdown versus distance from the pumping well is available at the Texas Water Development Board Web site, www.twdb.texas.gov/groundwater/models/analytical/index.asp.

VI. Conclusion

When you plan a picnic, you check the weather forecast for rain—weather predicted by models. Similarly for aquifers, when you plan for your water resources, you check the aquifer forecast—water levels and spring flow changes predicted by regional groundwater flow models. Creating a regional groundwater flow model is complicated and time consuming; a tremendous amount of information has to be compiled, processed, and interpreted. In developing a model, groundwater modelers (1) define the purpose (What will the model be used for?); (2) develop the conceptual model (What is our understanding of how the aquifer works?); (3) build the model architecture (How should the model be put together?); and (4) calibrate the model (How well can the model reproduce the past without making unsupported assumptions?). After a groundwater model is completed, it can be used to make predictions.

As required by statute, the TWDB initiated the groundwater availability modeling program to develop or obtain numerical groundwater flow models of the thirty major and minor aquifers of the state. Groundwater availability models are computer-based, three-dimensional, numerical groundwater flow models used to simulate groundwater flow systems on a regional scale. The models estimate current and future trends in the amount of water available for use from an aquifer. They can also be used to predict water levels and spring flows in response to different pumping and climate scenarios. In addition, they provide other important information, such as recharge values, estimates of total recoverable storage, and the location of the aquifer beneath the surface.

Groundwater conservation districts and regional water planning groups are required to use groundwater availability models. Groundwater conservation districts are required by statute to use groundwater availability modeling information in developing their groundwater management plans and in identifying the desired future conditions of their aquifers. The groundwater availability models are also potential tools to estimate modeled available groundwater. Regional water planning groups are required to include modeled available groundwater in their regional water plans.

The TWDB has developed or obtained groundwater availability models for all of the major aquifers of the state and for about two-thirds of the minor aquifers. The groundwater availability models are "living tools" that can be—and are being—updated as new information becomes available, adapted to reflect changing aquifer conditions, and refined to better address the needs and concerns of the groups using them. The TWDB currently plans to review the completed models every five years for possible updates or enhancements.

Acknowledgments

We thank the staff of the Groundwater Availability Modeling Section and our stakeholders for many helpful conversations and Ms. Merry Klonower for her review and suggestions. We also thank Mr. John Ashworth, Ms. Mary Sahs, and Mr. Lynn Sherman for their comments on an early draft of the chapter.

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Glossary

Aquifer—geologic materials that are capable of producing useful amounts of water.
Aquitard—geologic materials that are not capable of producing useful amounts of water.

Calibration—the process through which parameters in a model are adjusted within acceptable ranges to reproduce as accurately as possible observed behavior.

Confined aquifer—an aquifer that is capped by an aquitard and is fully saturated such that the water level in a well completed in the aquifer rises above the top of the aquifer.

Desired future conditions—the desired, quantified conditions of groundwater resources (such as water levels, water quality, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts within a groundwater management area as part of the joint planning process. 31 Tex. Admin. Code § 356.10(6)

Hydraulic conductivity—the ease with which water can move through a unit area of geologic material. Hydraulic conductivity is equal to the transmissivity divided by the aquifer thickness.

Modeled available groundwater—the amount of water that the executive administrator determines may be produced on an average annual basis to achieve a desired future condition. 31 Tex. Admin. Code § 356.10(13).

Recharge—the water that reaches the water table of an aquifer. Tex. Water Code § 36.001(26).

Storativity—a hydrologic parameter that quantifies how much water is released or taken up by an aquifer for a change in water level.

Transmissivity—the ease with which water can move through a unit width of geologic material in an aquifer. Transmissivity is equal to the hydraulic conductivity multiplied by the aquifer thickness.

Unconfined aquifer—has a surface pressure equal to the atmosphere and has the water table as its upper boundary.

Water level—the position at which water in a well rests.

Water table—the surface to which water rises in an unconfined aquifer.

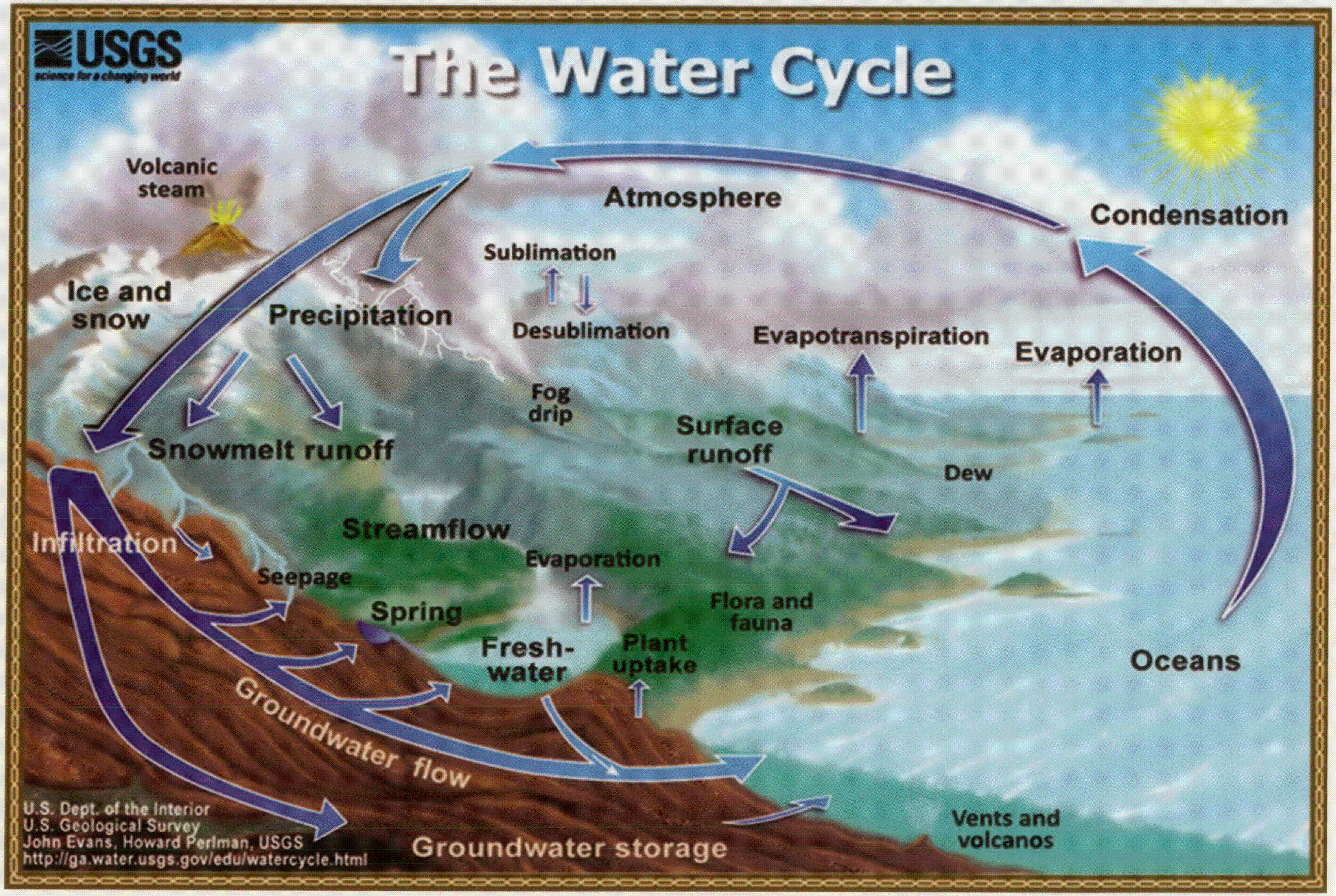

Plate 1. Diagram of the Hydrologic Cycle. U.S. Geological Survey, *The Water Cycle—USGS Water Science School*, *available at* http://ga.water.usgs.gov/edu/watercycle.html.

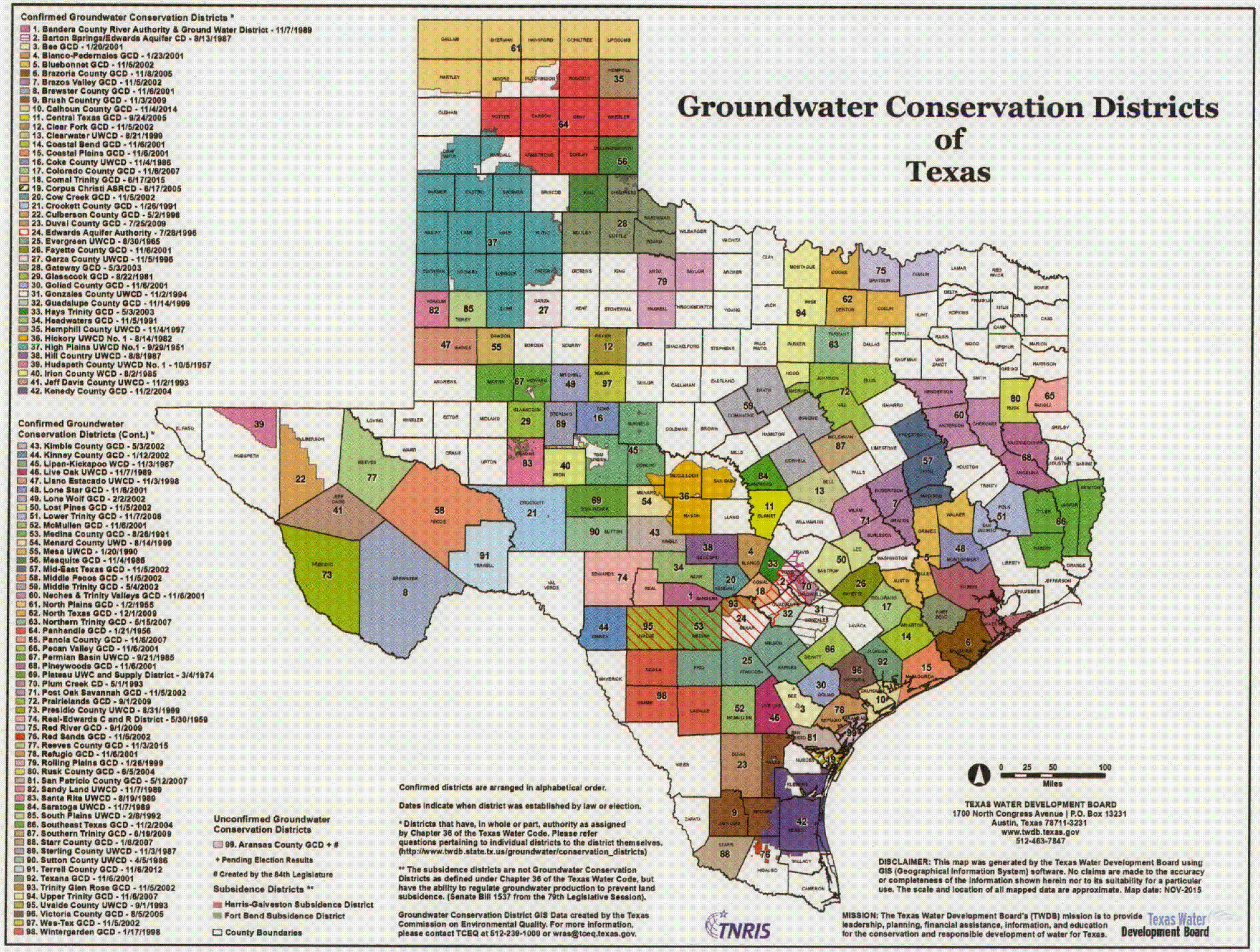

Plate 2. Groundwater Conservation Districts of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/GCDs_8x11.pdf.

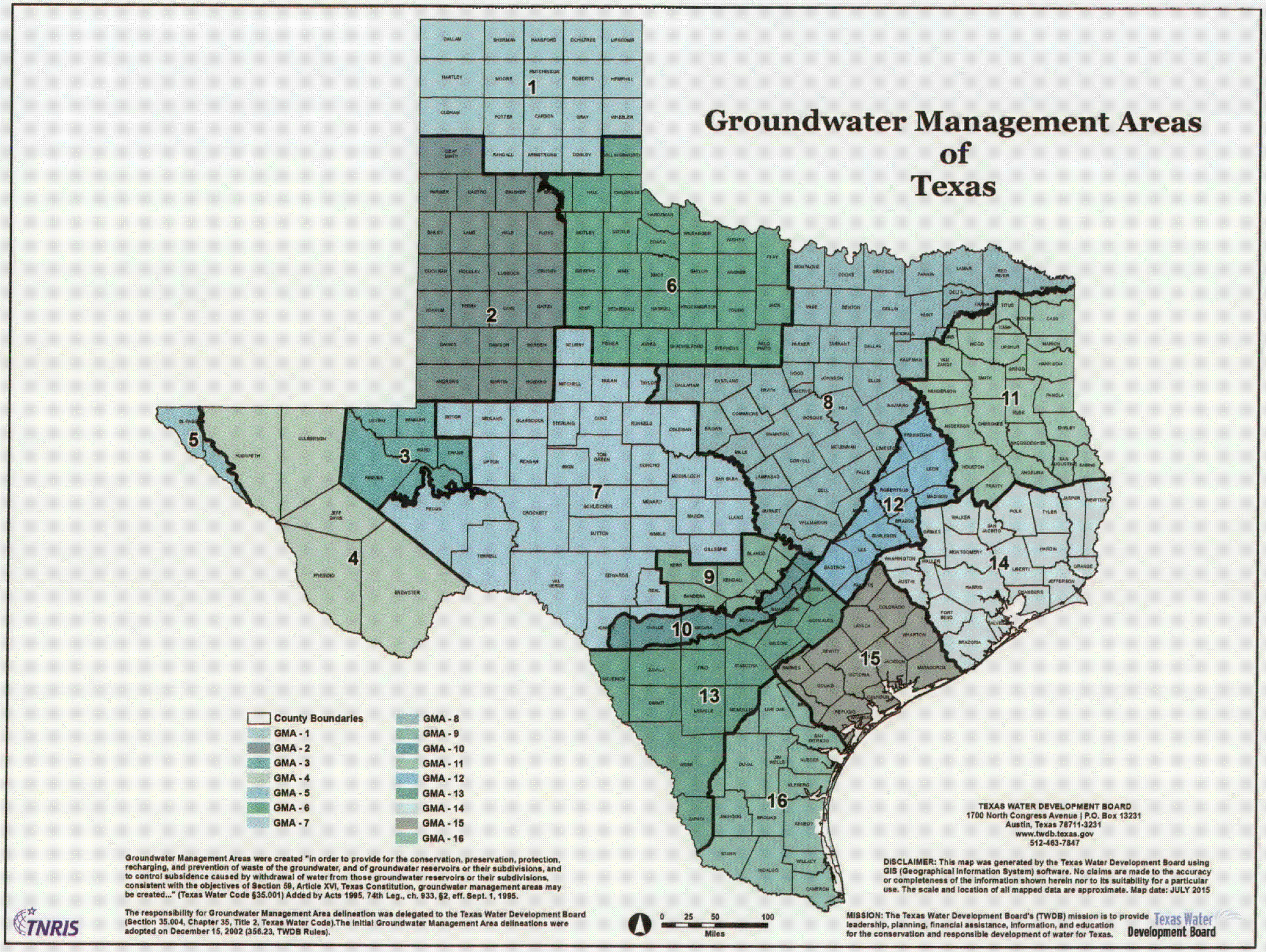

Plate 3. Groundwater Management Areas of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/GMAs_8x11.pdf.

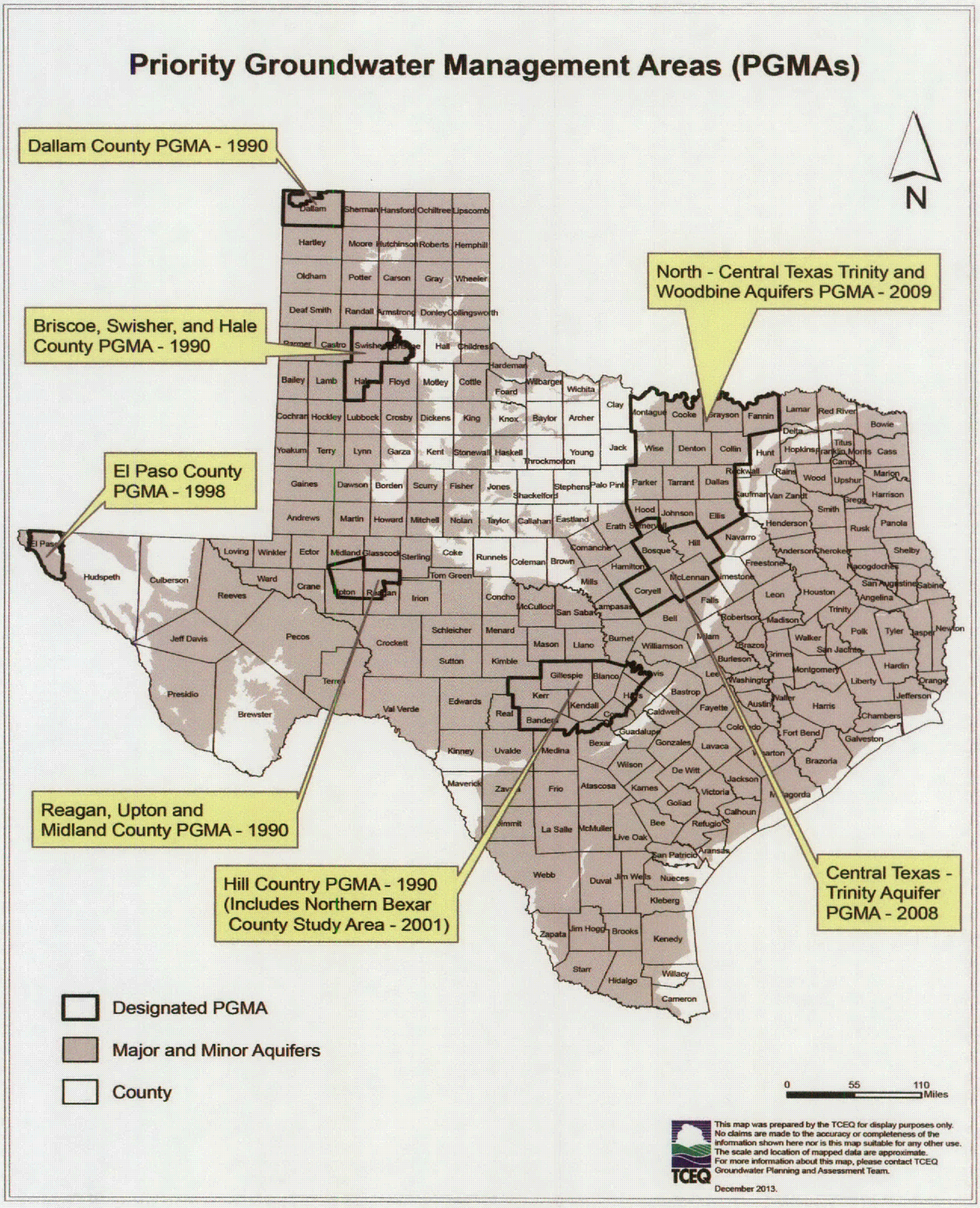

Plate 4. Priority Groundwater Management Areas (PGMA). Texas Commission on Environmental Quality, *available at* www.tceq.state.tx.us/assets/public/permitting/watersupply/groundwater/maps/pgma_areas.pdf.

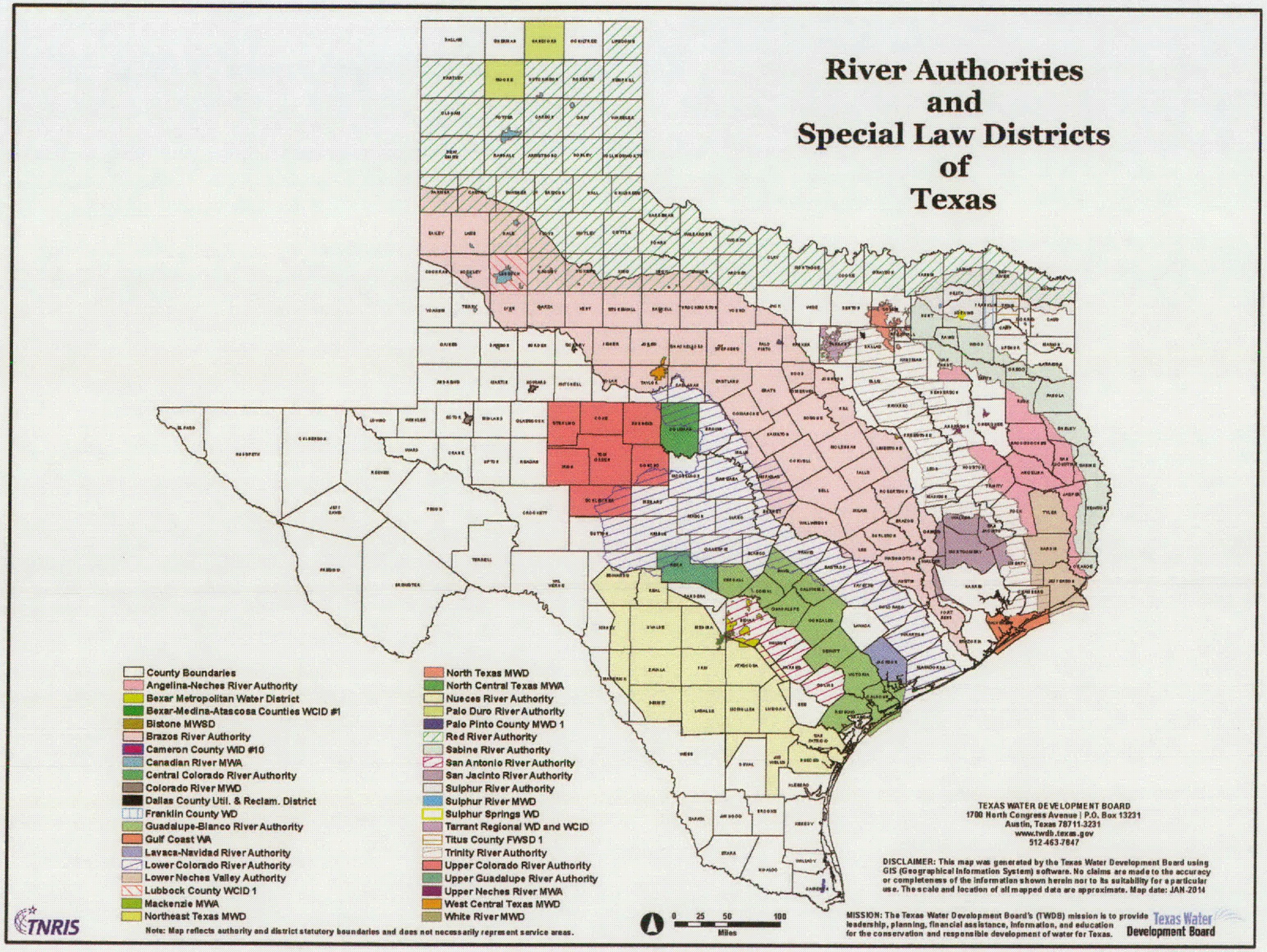

Plate 5. River Authorities and Special Law Districts of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/RA_SLD_8x11.pdf.

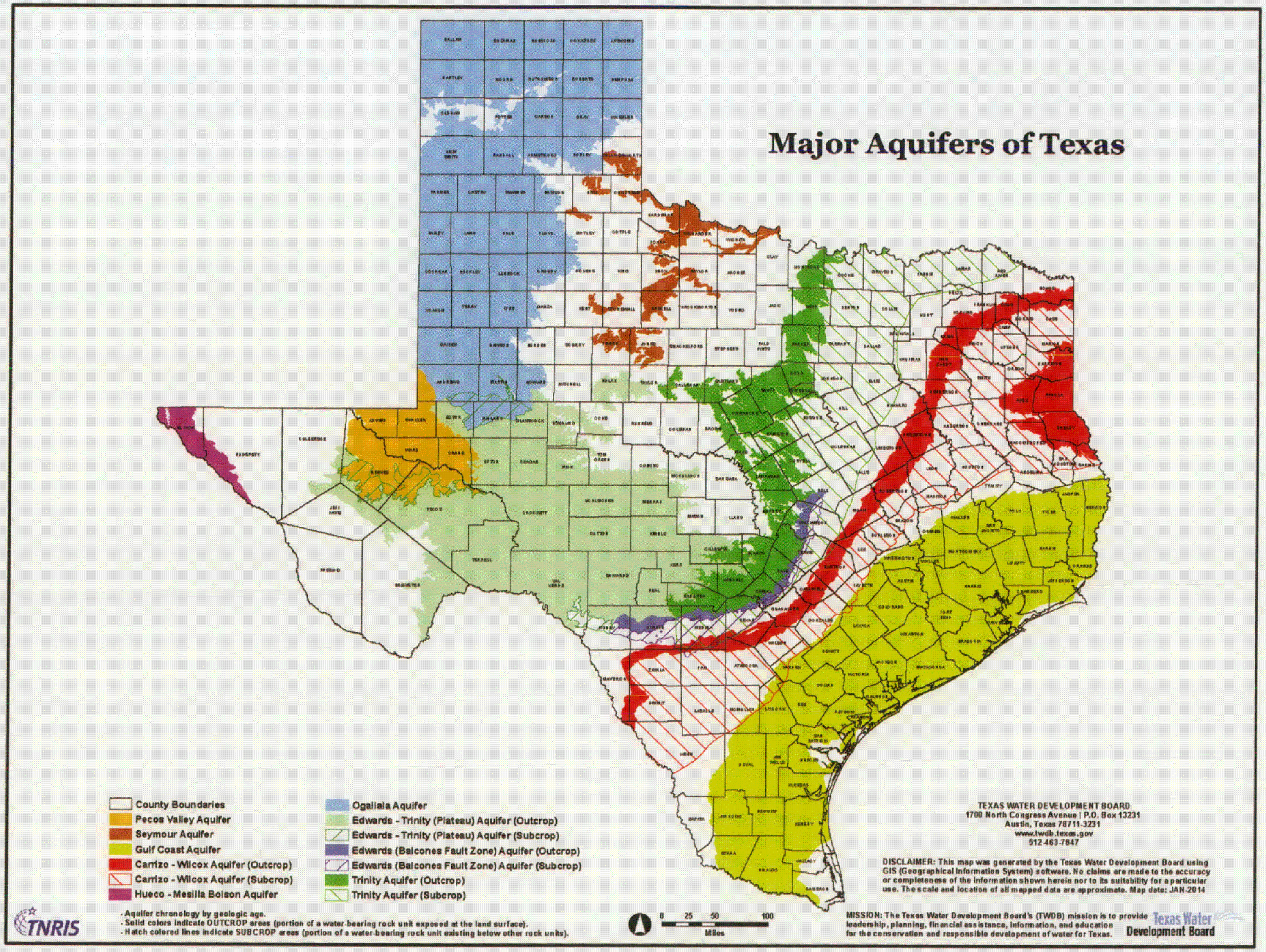

Plate 6. Major Aquifers of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/Major_Aquifers_8x11.pdf.

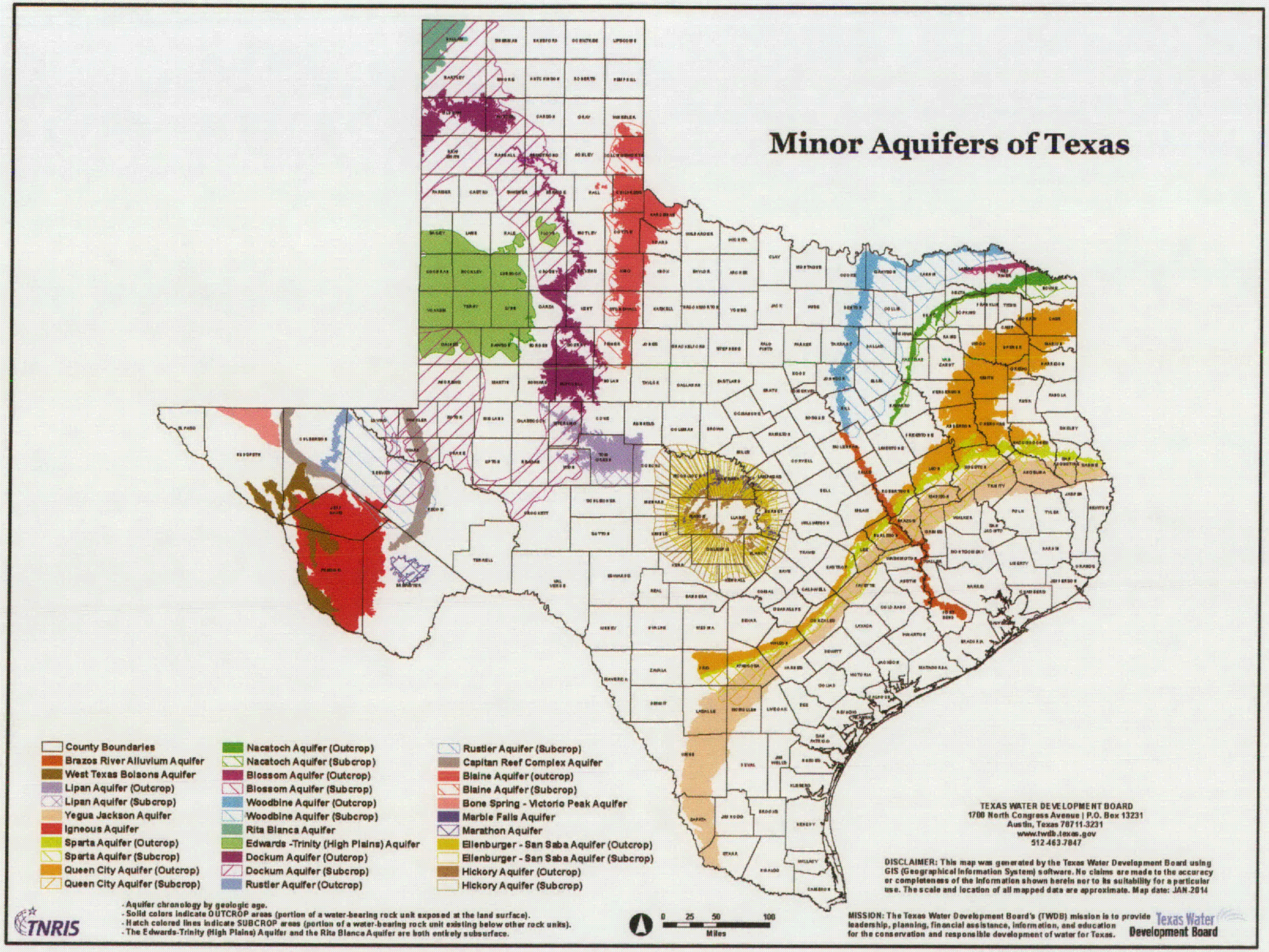

Plate 7. Minor Aquifers of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/Minor_Aquifers_8x11.pdf.

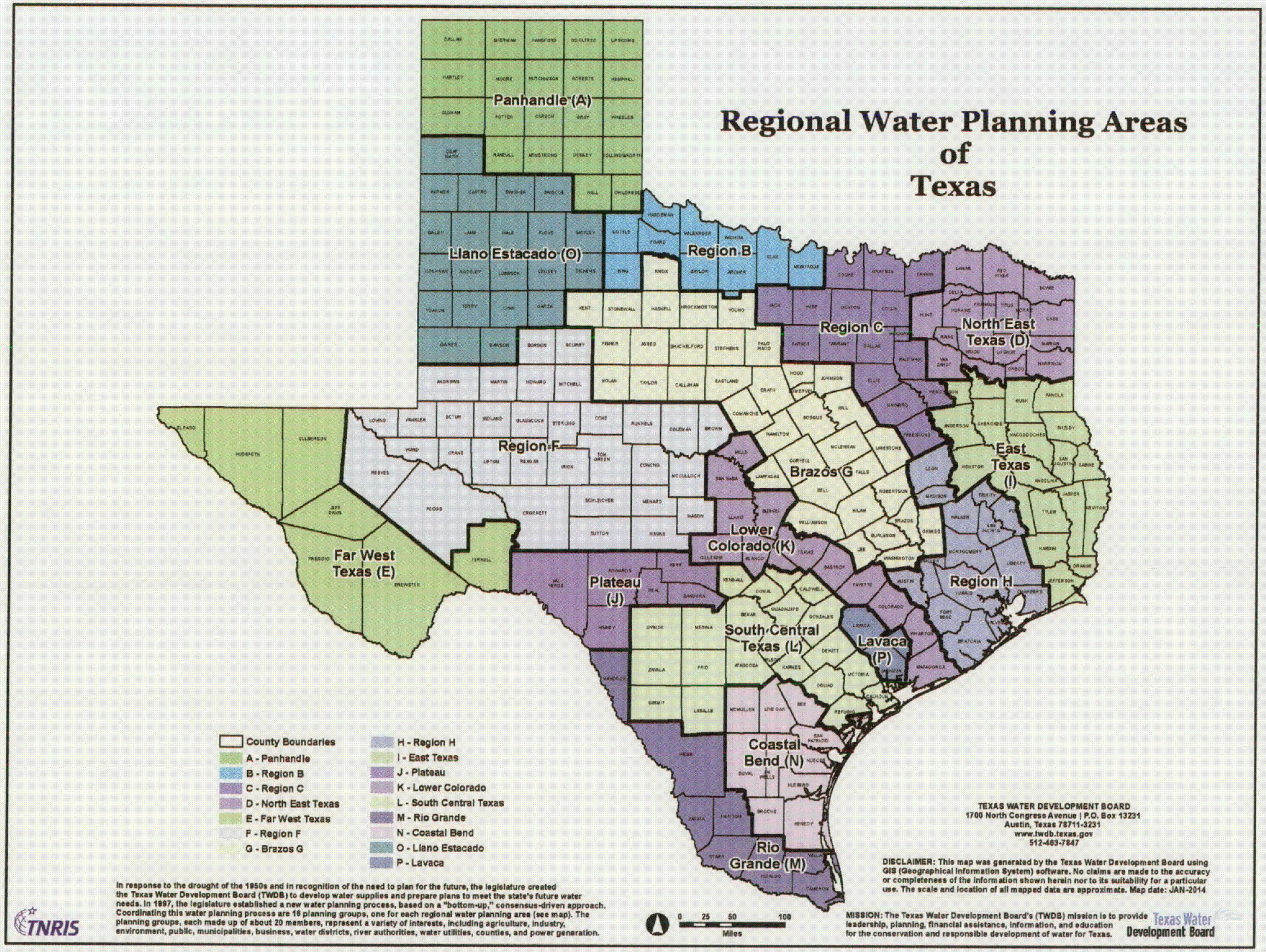

Plate 8. Regional Water Planning Areas of Texas. Texas Water Development Board, *available at* www.twdb.texas.gov/mapping/doc/maps/RWPAs_8x11.pdf.

CHAPTER 20

State Water Planning

Cynthia Smiley[1]

I. Texas Water Planning: A Historical Overview

In the early 1900s, as the vast open lands of Texas became more populated and the consequences of droughts and floods became more significant, the Texas legislature began to address issues regarding management and development of the state's water resources. The methods and their effectiveness have evolved over time. Familiarity with the history of the state's water planning is essential to an understanding of the significance and intent of the current planning process.

A. The Early Efforts

In July 1953, responding to a request for guidance from then U.S. Senator Lyndon B. Johnson, the Bureau of Reclamation's Area Planning Office in Austin, Texas (within the U.S. Department of the Interior), prepared a report entitled "Water Supply and the Texas Economy: An Appraisal of the Texas Water Problem." *See* S. Doc. No. 83-57 (1953). The report included planning regions and looked at water needs; it was an early version of the highly developed water planning efforts that are underway today. *See* Texas Water Development Board, *Water for Texas 2012* 15 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp.

In the 1950s, Texas experienced one of the worst droughts in its history. In response to these severe conditions, and looking for a way to avoid a repeat of the devastation that caused 244 of the 254 Texas counties to be classified as disaster areas, the Texas legislature reacted with a concerted effort to fund the state's water supply and conservation needs with the creation of the Texas Water Development Board (TWDB or Board) and the Texas Water Development Fund in 1957. *See* Act of May 21, 1957, 55th Leg., R.S., ch. 425, 1957 Tex. Gen. Laws 1268 (H.B. 161); Tex. H.R.J. Res. 3, 55th Leg., R.S., 1957 Tex. Gen. Laws 1636. On November 5, 1957, Texas voters approved the constitutional amendment that added new section 49-c to article III of the Texas Constitution, and the TWDB and its funding capabilities became a reality. Also that year, the legislature passed the Texas Water Planning Act, which mandated a formal process for developing a plan to meet the state's future water needs. *See* Act of Nov. 12, 1957, 55th Leg., 1st C.S., ch. 11, 1957 Tex. Gen. Laws 23 (S.B. 1). These were the beginnings of the statewide water planning process that continues, with growing importance, today.

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B. Pre-1997 Senate Bill 1 Water Planning

The state began preparing water plans in 1961 and also produced plans in 1968, 1984, 1990, 1992, and 1997. 2012 State Water Plan, at 17. These plans acknowledged the need to develop future water supplies in view of the state's growing population, and they approached the challenge with various recommendations as the years passed. The early plans were created at a time when the primary method of supplying water was the large-scale construction of reservoirs. From 1950 to 1980, 179 "major water supply reservoirs" (i.e., reservoirs having a capacity of 5,000 acre-feet or more) were constructed in Texas. 2012 State Water Plan, at 18. In 1997, the TWDB was designated as the state agency to coordinate with the U.S. Army Corps of Engineers and the U.S. Department of the Interior's Bureau of Reclamation in the planning of water resource development projects in Texas. Tex. Water Code § 16.091. The focus on reservoirs was reflected in the first two state water plans, but by 1980 reservoir construction had slowed due to a decline in the number of viable sites, increased difficulty in environmental permitting, and the rising cost of construction. 2012 State Water Plan, at 18.

In contrast to the proposed use of large-scale structures to capture and store water, the water plans of the 1980s and 1990s focused to a greater extent on water management and infrastructure development in an effort to better use existing water resources. For example, after 1984, the plans more frequently included consideration of conservation, reuse, desalination, and other water supply proposals. 2012 State Water Plan, at 17. The process for developing the state water plan changed over time as well. The TWDB increased the participation in water planning by including stakeholders and other state agencies, such as the Texas Parks and Wildlife Department, the Texas Department of Agriculture, and the Texas Water Commission, a predecessor agency of the current Texas Commission on Environmental Quality (TCEQ). *See* 2012 State Water Plan, at 22; Tex. Water Code § 16.051(d). Then and now, the TWDB serves as the state agency with primary responsibility for water planning and for administering water financing for the state. Tex. Water Code § 6.011.

C. New Directions: S.B. 1, S.B. 2, H.B. 1763, and H.B. 4

After nearly four decades, with the state's increasing population growth and expanding economy, and with population concentration in large urban areas and as agriculture became a decreasing percentage of the state's economic growth, lawmakers realized the need to modernize and regularize the state water planning process. These changes and this realization led to the enactment of major water planning bills, starting in 1997: Senate Bill 1, Senate Bill 2, House Bill 1763, and House Bill 4.

1. Senate Bill 1 (1997)

Recognizing the lack of incentive structure in previous legislation, in 1997 the legislature passed Senate Bill 1, one of the most extensive overhauls of the Texas Water Code in thirty years. *See* Act of June 1, 1997, 75th Leg., R.S., ch. 1010, 1997 Tex. Gen. Laws 3610, eff. Sept. 1, 1997 [hereinafter S.B. 1]. The water planning provisions of S.B. 1 are now codified in Texas Water Code chapter 16, subchapter C (entitled "Planning"). S.B. 1 was drafted in response to the devastating drought of 1996. 2012 State Water Plan, at 19. Against the backdrop of that drought and growing concerns over a rapidly increasing state population, S.B. 1 sought to (1) encourage local participation by creating a stakeholder process in the state water plan; (2) support drought contingency planning (see Chapter 22 of this book); (3) emphasize conservation and environmental protection (see Chapters 11 and 23); (4) harness and streamline the state's regulatory system (see Chapter 9); and (5) provide certain funding (see Chapter 37) and permitting incentives (see Chapter 9) to achieve these goals. Martin Hubert, *Senate Bill 1, the First Big and Bold Step Toward Meeting Texas's Future Water Needs*, 30 Tex. Tech L. Rev. 53, 55 (1999).

To encourage local participation, the legislature substantially modified the method for adopting a state water plan. Instead of having one central agency, such as the TWDB, developing the entire plan, S.B. 1 called for the designation of regions, each composed of various interest groups, each of which would develop a localized regional water plan. Upon adoption by the respective regional water planning groups (RWPGs) these regional water plans would be submitted to the TWDB for approval and incorporation into a comprehensive state water plan. In other words, the planning process evolved from a "top-down" approach to a "bottom-up" model. The 2002, 2007, and 2012 water plans were adopted using the new S.B. 1 model. 2012 State Water Plan, at 21.

2. *Senate Bill 2 (2001)*

To address the funding issues lingering after the enactment of S.B. 1 in 1997, the 2001 legislature adopted Senate Bill 2, sometimes referenced as the "financial follow-up to Senate Bill 1." Act of May 27, 2001, 77th Leg., R.S., ch. 966, 2001 Tex. Gen. Laws 1880, eff. Sept. 1, 2001 [hereinafter S.B. 2].

Among other additions, S.B. 2 created two new sources of funding: the Water Infrastructure Fund (WIF) and the Rural Water Assistance Fund (RWAF), now codified at Texas Water Code chapter 15, subchapters Q and R, respectively. The WIF consisted of a general revenue fund for projects recommended by state and regional water plans. The RWAF was designed to assist rural political subdivisions in financing water projects that would otherwise be financially impracticable. Both funds would be administered by the TWDB. See also Chapter 37 of this book.

3. *House Bill 1763 (2005)*

Although House Bill 1763, strictly speaking, did not address the state water plan, it sought to address the divide between surface water and groundwater planning and management. *See* Act of May 30, 2005, 79th Leg., R.S., ch. 970 [hereinafter H.B. 1763]. Before this legislation, the RWPGs determined water supply and demand regardless of the source as surface water or groundwater. H.B. 1763 established a formal process requiring local groundwater conservation districts (GCDs) to methodically and scientifically determine groundwater availability and the policies involved in the use of that groundwater. The new groundwater management area (GMA) joint planning process directed GCDs, on a regional basis, to articulate their groundwater resource management goals (desired future conditions) based on groundwater availability, called "managed available groundwater" in the legislation. The RWPGs must use the desired future conditions and the managed available groundwater in developing their regional water plans. *See* 31 Tex. Admin. Code § 357.32(d). Subsequently, the term was changed to "modeled available groundwater." *See* Tex. Water Code § 36.1084; *see also* Tex. Water Code § 16.053. Under the changes made during the 82nd legislative session in 2011, the planning function of the desired future condition adoption became more apparent, mirroring more closely the overall state water planning process. See Chapter 21 of this book for an in-depth discussion of the GMA joint planning process.

4. *House Bill 4 (2013)*

In 2013, the state was again facing the devastating impacts of drought. Since July 2011, the governor had issued (and continuously renewed) monthly Emergency Disaster Proclamations under Texas Government Code section 418.014 certifying that exceptional drought conditions posed a threat of imminent disaster in certain listed counties. In at least seven of those gubernatorial disaster proclamations, all 254 counties in the state were listed. As a result, a substantial number of bills were filed and debated during the 83rd Legislature. Among them was House Bill 4 (H.B. 4), which significantly changed the TWDB, requiring a full-time three-member board instead of the six-member board that had served in the past. *See* Act of May 20, 2013, 83d Leg., R.S., ch. 207, §§ 1.01, 1.07, eff. Sept. 1, 2013 (codified at Tex. Water Code §§ 16.052(a), 6.061) [hereinafter H.B. 4]. Giving legislative recognition to the dire need for funding of the State Water Plan, H.B. 4 also provided sweeping changes in the funding of water projects. The water funding provisions were dependent on passage of an amendment to the Texas Constitution, which appeared on the November 5, 2013, ballot as Proposition 6 and passed, receiving 73 percent of the vote. *See* H.B. 4, § 2.27. Water funding provisions are discussed in detail in Chapter 37 of this book.

II. State Water Planning

As discussed above, today's state water planning process is best described as a "bottom-up" approach, using local and regional efforts to generate a comprehensive statewide plan covering the next fifty years, which looks beyond the immediate future to the possible long-term needs of the state. The statutory framework for today's water planning, found in Texas Water Code chapter 16, subchapter C, is fairly detailed, with a strong emphasis on the regional planning groups, public participation, open government processes, and numerous opportunities for notice and comment. The implementing regulations for the planning process follow the statutory language establishing guidelines for regional water planning (*see* 31 Tex. Admin. Code ch. 357) and state water planning (*see* 31 Tex. Admin. Code ch. 358).

Following the bottom-up theme of today's water planning framework, the remainder of this chapter will first describe the regional work that forms the basis for the state plan and then describe the TWDB's development and adoption of the state water plan.

A. Regional Water Planning

Water planning on the regional level in the bottom-up framework began with delineation of planning areas and appointment of representatives to form planning groups and continues with ongoing work by and coordination among those groups and the TWDB, as summarized below.

1. Formation of Regional Water Planning Groups

To implement the directives of S.B. 1 and its September 1, 1998, deadline, the TWDB divided the state into sixteen regional water planning areas (RWPAs). These areas are defined predominantly by county and geographic boundaries, but the TWDB also considered other factors, such as "river basin and aquifer delineations," "water utility development patterns," "socioeconomic characteristics," and "political subdivision boundaries." The TWDB must review and update these regional planning area designations at least every five years or when necessary. *See* Tex. Water Code § 16.053(b); 31 Tex. Admin. Code § 357.11. The sixteen current planning areas are shown on Plate 8, also available online at the TWDB Web site, www.twdb.texas.gov/mapping/doc/maps/RWPAs_8x11.pdf. While the boundaries of the planning areas have remained constant since they were delineated in 1998, the TWDB has continuing authority to alter them. *See* 31 Tex. Admin. Code § 357.11.

After designating the boundaries of the various RWPAs, the TWDB designated an "initial coordinating body" of representatives within each area to begin the planning process. *See* Tex. Water Code § 16.053(c). Once appointed, the initial coordinating body was directed to designate other persons to provide representation for the various interests in the region, including the public, counties, mu-nicipalities, industries, agricultural interests, environmental interests, small businesses, electric generating utilities, river authorities, water districts, and water utilities. *See* Tex. Water Code § 16.053(c). These groups became known as Regional Water Planning Groups (RWPGs). In a step toward better coordination between the legal, planning, and management aspects of surface water and groundwater, the 2011 legislature amended section 16.053(c) of the Water Code to require GCDs in each GMA within an RWPA to appoint a representative of that district to serve on the planning group. *See* Tex. Water Code § 16.053(c); 31 Tex. Admin. Code § 357.11(d). See Chapter 21 of this book for a discussion of GMAs.

The RWPGs must maintain at least one representative of the twelve interest groups on the RWPG. *See* 31 Tex. Admin. Code § 357.11(d). In practice, many planning groups have designated additional representatives from various water-related interests within their geographic areas, and the number of voting members in the RWPG may exceed the twelve-person minimum.

In addition to the voting members of the RWPG, the TWDB rules require inclusion of certain nonvoting members, who receive meeting notifications and information in the same manner as the voting members. Representatives of the TWDB, the Texas Parks and Wildlife Department, and the Texas Department of Agriculture serve as ex officio members of each RWPG. *See* Tex. Water Code § 16.053(c); 31 Tex. Admin. Code § 357.11(e). Other nonvoting members include designees of adjacent RWPGs and representatives of entities with certain surface water rights or contracts in the RWPA. *See* 31 Tex. Admin. Code § 357.11(e)(3), (4).

As part of the RWPG's initial duties, each planning group was directed to adopt bylaws consistent with TWDB regulations. *See* 31 Tex. Admin. Code § 357.11(c) (providing mandates for bylaw adoption). Although the bylaws must be consistent with the regulations, in practice they differ among RWPGs. The bylaws for all sixteen of the RWPGs are available online at the TWDB Web site at www.twdb.texas.gov/waterplanning/rwp/regions/index.asp. RWPGs must have acceptable bylaws on file with the TWDB to obtain funding through a regional water planning grant. *See* 31 Tex. Admin. Code § 355.91(a).

2. *Preparation of Regional Water Plans*

With bylaws in place and with designated members of the RWPGs in attendance, the regional planning groups commenced planning in 1998. Composing a regional plan is a massive endeavor that requires a substantial amount of review, research, and study as well as fulfillment of the TWDB's water plan development guidelines and the regulatory "preplanning" requirements of 31 Texas Administrative Code chapter 357. Under these rules, and generally adopted as part of their bylaws, the RWPGs must establish certain organizational ground rules, such as the definition of a quorum and terms of membership. *See* 31 Tex. Admin. Code § 357.11(c). The "preplanning" section of these TWDB rules sets forth a list of the tasks that RWPGs must perform. *See* 31 Tex. Admin. Code § 357.12.

The TWDB's water planning guidelines are located in 31 Texas Administrative Code chapters 357 and 358. Generally, these guidelines contain the general goals of the regional planning process, impose deadlines for submittal of regional plans and revised regional plans, and require the plans to be consistent with 31 Texas Administrative Code chapters 358 (State Water Planning Guidelines) and 357 (Regional Water Planning Guidelines).

To assist in performing the required tasks, eligible applicants, including an RWPG, may apply to the TWDB executive administrator for a regional water planning grant. *See* 31 Tex. Admin. Code ch. 355, subch. C. These grants are available for certain activities directly related and necessary to the development or revision of regional water plans. *See* 31 Tex. Admin. Code § 355.91; *but see* 31 Tex. Admin. Code § 355.92(a) (identifying certain activities that do not qualify for funding under this grant program). The criteria for evaluating grant applications, which include financial need, are listed in 31 Texas Administrative Code section 355.91(e).

3. *Contents of Regional Water Plans*

After meeting the preplanning requirements, an RWPG may begin to develop its regional water plan. The statutory foundation for regional planning appears in Texas Water Code section 16.053. Generally, it requires each RWPG to develop a regional water plan using the latest state water plan and local water plans prepared under Water Code section 16.054 as guides. The RWP must provide for the "orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region." Tex. Water Code § 16.053(a). House Bill 30, passed during the 84th legislative session, added a new item to the list of topics to include in an RWP. Under amended Water Code section 16.053(e), regional water plans must consider opportunities and benefits of developing large-scale desalination facilities for seawater or brackish groundwater. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 990, § 2, eff. Sept. 1, 2015 (adding Tex. Water Code § 16.053(e)(5)(J)). Section 16.053(e) was also amended by Senate Bill 1101, which expands the scope of a regional water plan to address "potential impacts on public health, safety, or welfare in this state" in conjunction with a plan's consideration of any existing water or drought planning efforts in the region. *See* Act of May 29, 2015, 84th Leg., R.S., ch. 1180, § 1, eff. Sept. 1, 2015 (amending Tex. Water Code § 16.053(e)(5)(A)). Extensive, detailed content requirements are contained in 31 Texas Administrative Code chapter 357.

Much of the data collected during the regional planning process is ultimately used to determine the supply and demand for water resources. The plan must present projections of population and water demands, by decade, for the various water user groups. *See* 31 Tex. Admin. Code § 357.31. In practice, assessing and allocating to the various water user groups the increasing demands for water based on population growth raises some challenging issues, such as whether new growth (expected demand) is within a county's jurisdiction, a rural water entity's retail service area, or a municipality's jurisdiction.

As part of its planning, an RWPG must also evaluate source water availability and adequacy during drought-of-record conditions. The TWDB rules provide specific directions on how to conduct these evaluations. *See* 31 Tex. Admin. Code § 357.32. See Chapter 22 of this book for more about the interface between state water planning and drought planning. After making these calculations, an RWPG must identify future or present needs and evaluate potential water management strategies to meet those needs. *See* 31 Tex. Admin. Code § 357.34.

The evaluation of source water availability and adequacy during drought requires consideration of groundwater and surface water sources that are important for water supply or natural resource protection purposes. *See* 31 Tex. Admin. Code § 357.32(c), (d). To evaluate sources of groundwater, the RWPG may coordinate with the TWDB to obtain the needed information. Groundwater availability models, which are another immediate outcome of the passage of S.B. 1, were developed to assist planning groups and GCDs in their management and planning efforts. 2012 State Water Plan, at 27, 157. As discussed in more detail in Chapter 21 of this book, the evaluation of groundwater sources has been controversial. Currently, the evaluation is performed by GCDs through the GMA joint planning process. The data is commonly referred to as modeled available groundwater. The RWPGs are required to use the groundwater availability estimates calculated by the TWDB based on the desired future conditions adopted by the districts during joint planning. *See* Tex. Water Code § 16.053(e)(3)(A); *but see* Tex. Water Code § 16.053(e)(2-a) (amended in 2015 by S.B. 1101, applying only to Region D). If a conflict arises between a GCD and an RWPG about the modeled available groundwater reflected in a GCD's management plan, the district may petition for resolution of the conflict. *See* Tex. Water Code § 16.053(p)–(p-4). See Chapter 21 of this book for further information about GMA joint planning.

4. Process for Submittal and Adoption of Regional Plans

An important feature of Code section 16.053 is a mandatory deadline for the RWPGs to submit their adopted regional plans. Specifically, the statute requires that regional plans be submitted to the TWDB by January 5, 2001, and at least every five years thereafter. *See* Tex. Water Code § 16.053(i). Approved regional plans are incorporated into the state water plan the following year.

Before an RWPG can adopt its final regional water plan, however, it must prepare and submit an Initially Prepared Plan (IPP) to the TWDB executive administrator. An IPP is a draft regional water plan that will be presented at a public hearing and submitted to the TWDB for review and comment. 30 Tex. Admin. Code § 357.10(17). Under 30 Texas Administrative Code section 357.50(e)(2), the executive administrator has the authority to establish the schedule for submittal of IPPs and the final regional water plans. The deadline for the required 2011–2016 regional planning cycle was May 1, 2015.

The IPP must address the requirements for the final regional water plan, and the RWPG must certify that its IPP is complete and was adopted by the RWPG. At the same time that the IPP is submitted to the TWDB for comment, it is also released to the public, and a process for public notice and comment begins. *See* 31 Tex. Admin. Code § 357.50(b). During this process, the RWPG must solicit and consider comments from the TWDB executive administrator, federal or state agencies, and the general public in compliance with the time periods set forth in 31 Texas Administrative Code section 357.50(d). The regional water planning rules contain extensive provisions relating to notice and opportunity for comment, including a detailed list of public participation requirements. *See* 31 Tex. Admin. Code § 357.21. Once the RWPG has accepted comments for the specified periods of time, the RWPG may proceed to plan adoption as provided by its bylaws. If there are conflicts to resolve among the members, the RWPG may request the assistance of the executive administrator. *See* 31 Tex. Admin. Code § 357.61.

Continuing to work against deadlines, often with enormous amounts of information to review and consider, the RWPGs meet and address the issues raised about their IPPs during the comment period. The planning group prepares a final regional water plan and votes to adopt it. At that point, the regional plan is ready to be submitted to the TWDB for approval. The submittal must include the following information:

1. technical reports and data required by 31 Texas Administrative Code chapter 357;
2. an executive summary of key findings and recommendations; and
3. summaries of all comments received and the RWPG's response to those comments.

See 31 Tex. Admin. Code § 357.50(e)(1). An RWPG also must notify the executive administrator if conflicts exist between its plan and other regions' plans (interregional conflicts). *See* 31 Tex. Admin. Code § 357.50(f).

In the 2011–2016 planning cycle, RWPGs must have adopted and submitted their final regional plans to the TWDB by December 1, 2015, to be considered for approval in the next state water plan.

5. Process for TWDB Approval of Regional Plans

After a regional water plan has been adopted and submitted to the TWDB, the agency reviews it for approval using the criteria in 31 Texas Administrative Code section 357.50(j). Agency approval makes a plan eligible for incorporation into the state water plan. *See* 31 Tex. Admin. Code § 358.4. To be approved, the regional plan must be formally adopted by the RWPG that produced it. *See* 31 Tex. Admin. Code § 357.50(j). In addition, the plan must satisfy the requirements of Texas Water Code chapter 16 and 31 Texas Administrative Code chapters 357 and 358; include specified water conservation practices and drought management measures; and be consistent with the long-term protection of the state's water, agricultural, and natural resources (as described in the guidance principles in 31 Texas Administrative Code chapter 358). *See* 31 Tex. Admin. Code § 357.50(i). If a regional plan meets the criteria mentioned above and does not present an interregional conflict, the TWDB may approve the plan. 31 Tex. Admin. Code § 357.50(j). Copies of current and previous regional plans are available at the TWDB Web site at www.twdb.texas.gov/waterplanning/rwp/plans/index.asp.

6. *Interregional Conflicts*

The issue of interregional conflicts was raised in the case of *Texas Water Development Board v. Ward Timber, Ltd.*, 411 S.W.3d 554 (Tex. App.—Eastland 2013, no pet.), which involved a judicial challenge to the TWDB's approval of the 2011 Region C Regional Water Plan. In late 2010, the TWDB approved the regional plans submitted by both Regions C (North Central Texas) and D (North East Texas). However, the two regions had taken different views on the proposed Marvin Nichols Reservoir in northeast Texas; Region C supported its construction as a new water supply project, while Region D opposed it due to its expected impacts on agricultural and natural resources. In approving the regional plans, the TWDB had applied the narrow definition of "interregional conflict" in its rules at that time, concluding that the regions were not arguing over a potential overallocation of the same water supply across two regions. *See* 31 Tex. Admin. Code § 357.10(15). However, the enabling legislation for the rules states that the TWDB may approve a regional water plan only after it has determined that all interregional conflicts involving that RWPA have been resolved. *See* Tex. Water Code § 16.053(h)(7). The district court declared that the conflicting regional plans constituted an interregional conflict that the TWDB had responsibility to resolve during the process of the development and adoption of the 2012 State Water Plan, and it remanded the case back to the TWDB to resolve the conflict. *Ward Timber*, 411 S.W.3d at 556–57.

The appeals court affirmed the district court's ruling that an interregional conflict existed between these two regions and that as a result the TWDB had improperly approved these 2011 regional plans, noting that the TWDB's narrow interpretation of interregional conflict was inconsistent with legislative intent. *Ward Timber*, 411 S.W.3d at 574. These proceedings were followed by additional legal proceedings, hearings, and negotiations, and eventually an outcome in which both Regions C and D adopted revisions to their regional plans and submitted their revised regional plans and supporting documents to the TWDB for consideration. These proceedings also triggered a significant revision of the TWDB's water planning rules and a heightened interest in identifying and resolving potential interregional conflicts as early as possible during a planning cycle. In July 2015, the TWDB proposed additional amendments to chapter 357 of its regional water planning rules to further address the issues raised in the *Ward Timber* case.

7. *Amendment of Adopted Regional Plans*

An RWPG can amend an adopted water plan at any meeting provided it gives proper notice and allows the TWDB, the public, and other governmental agencies thirty days to submit comments regarding the proposed amendment. *See* 31 Tex. Admin. Code § 357.21(d). The proposed amendment must be submitted to the TWDB, which will consider it for approval under the standards of 31 Texas Administrative Code chapter 357. *See* 31 Tex. Admin. Code § 357.51. In addition to the regulatory discussion on amendments to adopted plans, the authorizing statute further provides a process for adoption of "minor amendments." *See* Tex. Water Code § 16.053(h)(11).

Amendment of an adopted regional water plan may be the result of a political subdivision in the RWPA asking that an RWPG consider specific changes based on changed conditions or new information. *See* 31 Tex. Admin. Code § 357.51(a). In such an instance, the RWPG must follow the process outlined in section 357.51 to address any unresolved conflicts between a political subdivision and the planning group, and the political subdivision may petition the executive administrator to request TWDB review of the regional water plan. *See* 31 Tex. Admin. Code § 357.51(a). At the culmination of the petition process, if the RWPG disagrees with a change requested by the executive administrator, the matter will be presented to the TWDB for a decision. *See* 31 Tex. Admin. Code § 357.51(a).

The TWDB can also require a RWPG to amend its plan if the TWDB determines, after using the process described above, that an interregional conflict exists between adopted regional plans. *See* 31 Tex. Admin. Code § 357.62.

An additional amendment process may occur if the TWDB determines that an adopted regional plan fails to meet the requirements of Texas Water Code chapter 16 and 31 Texas Administrative Code chapters 357 and 358. *See* 31 Tex. Admin. Code § 357.63(a). If an RWPG is directed to change its regional water plan, the RWPG may request a reasonable amount of time to make such changes. *See* 31 Tex. Admin. Code § 357.63(b).

GCDs may also initiate reviews and amendments of regional (and state) water plans. The process outlined in 31 Texas Administrative Code section 357.64, the implementing rule for Texas Water Code section 16.053(p)–(p-4), provides that a district may identify and propose resolutions to conflicts that exist between the district's approved groundwater management plan (developed under Water Code section 36.1071) and the approved state water plan. In this process, the TWDB executive administrator again plays the role of providing assistance, facilitating conflict resolution, and assisting in mediation between the GCD and the RWPG. If those efforts fail, the executive administrator makes recommendations for the TWDB's consideration, and the TWDB may ultimately require revisions to an approved regional water plan or to a district's approved management plan. *See* 31 Tex. Admin. Code § 357.64(c). See Chapters 16 and 21 of this book for further discussion.

B. The State Water Plan

The TWDB is responsible for preparing, developing, formulating, and adopting a comprehensive state water plan in successive five-year periods, which began on January 5, 2002. *See* Tex. Water Code § 16.051(a). The sixteen approved regional water plans for each five-year cycle are combined by the TWDB into the comprehensive state water plan. The plan provides for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; furthering economic development; and protection for the agricultural and natural resources of the entire state. *See* Tex. Water Code § 16.051(a). Stressing the importance of the plan's critical role as a planning tool, the 2011 legislature adopted language requiring that it incorporate "an evaluation of the state's progress in meeting future water needs, including an evaluation of the extent to which water management strategies and projects implemented after the adoption of the preceding state water plan have affected that progress." *See* Tex. Water Code § 16.051(a-1).

When adopted by the TWDB, the state water plan serves as a guide to state water policy, and the TCEQ must take the water plan into consideration in matters coming before it. *See* Tex. Water Code § 16.051(b). In coordination with the TCEQ, the Texas Department of Agriculture, and the Texas Parks and Wildlife Department, the TWDB must adopt rules establishing guidance principles for the state water plan that reflect the public interest of the entire state. *See* Tex. Water Code § 16.051(d).

These rules were adopted in 1998, as 31 Texas Administrative Code chapter 358, "State Water Planning Guidelines," and have been amended several times since the initial adoption.

To keep the guidance principles of the state water plan current, they too are reviewed and updated on a five-year schedule. *See* Tex. Water Code § 16.051(d). Development of the state and regional water plans is guided by the principles set forth in 31 Texas Administrative Code section 358.3. These twenty-eight principles reflect a variety of important considerations in water planning, including the principle that all surface waters are held in trust by the state and are generally governed by the prior appropriation doctrine, and the principle that the use of groundwater in Texas is governed by the rule of capture doctrine, unless such use is regulated by a GCD. *See* 31 Tex. Admin. Code § 358.3(13), (15). See Chapters 2 (discussing the prior appropriation doctrine) and 4 (discussing groundwater law and regulation) of this book.

1. Content of the State Water Plan

The content of the state water plan is prescribed by statute and rule. *See* Tex. Water Code § 16.051; 31 Tex. Admin. Code § 358.4. The rule lists a minimum of eight topics to be addressed in the state water plan. *See* 31 Tex. Admin. Code § 358.4(b). These topics include consideration of recommendations of river and stream segments of unique ecological value and sites of unique value for construction of reservoirs. *See* 31 Tex. Admin. Code § 358.4(b)(5). The Board may also include legislative recommendations to further the goals of water planning, including recommendations that would facilitate more voluntary water transfers. *See* Tex. Water Code § 16.051(e); 31 Tex. Admin. Code § 358.4(b)(6). As described above, and dramatically illustrated in the *Ward Timber* case, interregional conflicts must be resolved before a regional plan can be approved and incorporated into the state water plan.

In deference to concerns about meeting future water requirements, the statute, as revised by the 2011 legislature, now requires not only an evaluation of the state's progress in meeting future water needs but also an analysis of the previous plan's projects that receive the board's financial assistance. The statute also encourages the board to use implementation data from RWPGs. *See* Tex. Water Code §§ 16.051(a-1)(2), 16.051(a-2). See Chapter 37 of this book for a discussion of financing water projects.

2. Adoption of the State Water Plan

Before adoption of a new or amended state water plan, the TWDB publishes notice in the *Texas Register* and mails notice to each RWPG at least thirty days in advance of its action. 31 Tex. Admin. Code § 358.4(a). After holding a hearing, the TWDB may decide to adopt the new plan or amendment. 31 Tex. Admin. Code § 358.4(a).

3. Amendment of the State Water Plan

Various provisions in the TWDB rules relate to amendment of the regional plans and possible conforming amendments in the state water plan, including 31 Texas Administrative Code section 357.51. In the 2005 legislative session, Texas Water Code section 16.053 was amended to provide that the TWDB, by rule, must allow "reasonable flexibility" for the timely amendment of the state plan. *See* Tex. Water Code § 16.053(r).

Because the amendment of an adopted state water plan is solely within the discretion of the TWDB, it appears to be significantly more difficult for an RWPG to amend its plan after that plan has been incorporated into the state plan. In such a circumstance, not only would the regional plan require amendment but the state plan would as well. Procedures for amending regional and state water plans are set forth in 31 Texas Administrative Code section 357.51.

4. *Impact of the State Water Plan on Water Projects*

The inclusion of an approved regional water plan in the state water plan adopted by the TWDB has significant implications. First, the TWDB may provide financial assistance to political subdivisions for water supply projects only if (1) the needs to be addressed by the project will be addressed in a manner that is consistent with the state water plan; (2) there is an approved, current regional plan encompassing the project's area; (3) the project is consistent with the regional water plan; and (4) the water audit required under Texas Water Code section 16.0121 has been completed and filed. *See* Tex. Water Code § 16.053(j). For example, water needs, as determined by a region's supply and demand analyses, may provide the impetus for new water projects. When a region determines that an increase in future supply is needed, the region will develop projects to achieve this goal. Later, if projects are proposed that are not mentioned in or that are inconsistent with the state and regional water plans, then the TWDB may deny a request for state funding of those projects. *See* Tex. Water Code § 16.053(j).

If a regional water planning group does not adopt and submit its plan on time, and if financial assistance from the TWDB is in jeopardy, water suppliers within the regional planning area will have to either seek special assistance from the legislature (as did Region L in 2007—*see* Act of May 23, 2007, 80th Leg., R.S., ch. 1279, 2007 Tex. Gen. Laws 4278, eff. June 15, 2007) or pursue a waiver of the requirement. Although the TWDB may waive these prerequisites for financial assistance, the granting or denial of the waiver is left to the agency's administrative discretion. *See* Tex. Water Code § 16.053(k).

Second, under the terms of Texas Water Code section 11.1501, when the TCEQ considers an application for use of state water (surface water), the TCEQ must consider the state water plan and any approved regional water plan for the area or areas in which the water is proposed to be stored, diverted, or used. *See* Tex. Water Code § 11.1501. Most important, to grant an application under Water Code section 11.121 for the appropriation of state water, the TCEQ must conclude, along with other findings, that the proposed appropriation addresses a water supply need in a manner that is consistent with the state and regional water plans. *See* Tex. Water Code § 11.134(b)(3)(E). The statute allows a waiver of this requirement if the TCEQ determines that conditions warrant a waiver. *See* Tex. Water Code § 11.134(b)(3)(E).

At times, a new project may be proposed that needs financial assistance and TCEQ water rights permits, but it is not included in the relevant regional and state water plans. To obtain the necessary financing and permits for such a project, a water supplier has two options: (1) it can attempt to obtain an amendment to include its project in the adopted, approved regional plan and the state plan, or (2) it can seek a waiver of Texas Water Code sections 11.134(b) or 16.053(j).

III. Conclusion

In the last twenty years, the state has made significant progress in its water planning, development, and conservation efforts. State laws enacted in recent years have taken a proactive, yet somewhat prescriptive, approach to water planning. At the same time, the state's current consensus-driven, bottom-up approach to water planning and water projects is facing its own challenges. Meeting the demand for water in many regions of Texas is a serious challenge, even with improved planning tools. The issues faced by the RWPGs are often scientifically, logistically, and politically complex. The tasks of the RWPGs, including the preparation and adoption of regional plans, are subject to specific deadlines, while the participants and others with sources of needed information may have different degrees of responsiveness. Although a five-year planning cycle may appear to provide a generous amount of time to complete the assigned tasks, in reality an RWPG may barely complete its preparation of an Initially Prepared Plain when work begins on the next planning cycle. Planning groups often have numerous participants, thus increasing the likelihood that diverse interests will be represented as intended. These numbers, however, decrease the odds of reaching consensus. As evidenced in recent years, locally driven plans for management of water resources may be at odds with the long-term resource development and conservation objectives of a neighboring region, of the state, or of a neighboring state. Clearly, the state's water planning laws and activities present interesting and challenging work for everyone involved.

CHAPTER 21

Groundwater Management Area Joint Planning

Monique Norman[1] and William R. Hutchison[2]

I. Introduction

Groundwater resource planning and management are integral to the state's overall water planning and management, as discussed in Chapter 20 of this book. Texas's dual nature of water resource law—surface water law and groundwater law—complicates these processes. Other complexities arise from the regulatory approach that has evolved for management of groundwater resources. Groundwater conservation districts (GCDs) "are the state's preferred method of groundwater management." Tex. Water Code § 36.0015. These governmental entities have been created in different configurations—single county, multicounty, partial county, single aquifer, multiaquifer, and partial aquifer. See Chapter 16 of this book discussing GCDs. Groundwater planning and management must consider two hydrologic facts: (1) aquifer characteristics and uses vary greatly across the state and often across a district, and (2) the political boundary of a GCD does not necessarily coincide with groundwater flow and the effects of groundwater pumping.

In 2005, the Texas legislature addressed these hydrologic management and planning issues by creating a framework for groundwater planning that focuses on a more regional basis, while acknowledging the importance and responsibilities of local groundwater management by GCDs. This groundwater management area joint planning process requires GCDs within specified groundwater management areas to work together to develop policy goals for groundwater resources within those areas. The Texas legislature created a unique model in which local, regional, state, and stakeholder interests all have important roles in groundwater planning and management to meet the future needs of Texas. This chapter explains various groundwater planning concepts, discusses the history of groundwater availability planning, and then describes the current groundwater management area joint planning process.

II. Available Groundwater Supplies

As discussed in Chapter 20 of this book, the limits of existing water supplies and the increasing demands of population growth necessitate cautious water planning, including determining available

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groundwater supplies. While the term "groundwater availability" connotes a physical inventory of developable groundwater resources, in fact it has a more narrow meaning. As a result of the statutory language of the joint planning process, the term is used to define the amount of groundwater that may be used from an aquifer over a specific period of time, that is consistent with the management goals established by a governmental entity based on science and public policy considerations. *See* Robert E. Mace et al., *Estimating Groundwater Availability in Texas, in Water Allocation in Texas: The Legal Issues*, Texas Rural Water Association and Texas Water Conservation Association Water Law Seminar, Austin (2001) [hereinafter *Estimating Groundwater Availability*]; *see also* Chapter 19 of this book for an in-depth discussion of determining groundwater availability.

Curently, GCDs overlying the same aquifer determine groundwater availability for that aquifer, with the assistance of the Texas Water Development Board (TWDB or board). The groundwater availability estimates thus determined are one of several tools with which a GCD manages the resource and authorizes groundwater production. The state uses the groundwater availability estimates for planning purposes in the regional and state water plans and for the review of state loans for groundwater projects. See Chapter 20 of this book on state water planning and Chapter 37 on financing water projects. As discussed below, this system has evolved over decades.

Setting groundwater availability limits for Texas aquifers requires a balance between providing adequate water supplies for today's needs and preserving the viability of an aquifer for future generations. As mentioned above, groundwater availability is based on a combination of science and public policy. The science, known as hydrology or hydrogeology, aids in determining how an aquifer functions and how it reacts to different pumping scenarios. Groundwater availability determinations are also public policy statements on how the resource should be managed considering current and projected demands and other factors. Robert E. Mace, Address at the Texas Association of Groundwater Districts Meeting (Jan. 30, 2007); see also Chapter 19 of this book regarding groundwater availability modeling. Issues have been raised about not only how groundwater availability should be determined but also who should make the determination. As history reveals and as summarized below, the relationship between *groundwater* resource planning and management, and overall state water resource planning and management, at times has been contentious and continues to pose a challenge to all water resource stakeholders. Views differ on whether groundwater availability should be determined by the local GCDs, the regional water planning groups (see Chapter 20), the TWDB, or the Texas Commission on Environmental Quality (TCEQ or commission). Under current law, groundwater availability is determined by GCDs in the groundwater management area joint planning process. *See* Tex. Water Code §§ 36.108–.1086.

III. Groundwater Planning

To understand the groundwater management area joint planning process, one must be familiar with the legislatively created planning concept of groundwater management areas (GMAs) and priority groundwater management areas (PGMAs). Unlike GCDs, subsidence districts, and the Edwards Aquifer Authority, these two types of areas are not political subdivisions or governmental entities. They have no authority or duties. They are not legal entities—they cannot sue or be sued. Both GMAs and PGMAs are areas designated by the TWDB and the TCEQ, respectively, to facilitate the management of the state's groundwater resources.

A. Groundwater Management Areas

The concept of designated areas designed to facilitate the management of the state's groundwater resources has existed since H.B. 162, 51st Legislature (1949), and has undergone many legislative changes leading up to S.B. 2 in 2001. *See* Robert E. Mace et al., *A Streetcar Named Desired Future Conditions: The New Groundwater Availability for Texas (Revised)*, at app. A ("Legislative History Concerning Groundwater Management Areas"), *in The Changing Face of Water Rights in Texas* (State Bar of Texas 2008) [hereinafter *A Streetcar Named Desired Future Conditions*]. While GMAs existed before 2001, their designation occurred piecemeal. *See* Texas Natural Resource Conservation Commission and Texas Water Development Board, *Priority Groundwater Management Areas and Groundwater Conservation Districts, Report to the 76th Legislature*, at 32 & fig. 3 (Jan. 1999). Senate Bill 2, 77th Legislature (2001), however, required the TWDB to designate GMAs for all major and minor aquifers of the state no later than September 1, 2003. Act of May 27, 2001, 77th Leg., R.S., ch. 966, § 2.22 (codified at Tex. Water Code § 35.004). The TWDB was given the task of designating these management areas with the objective of providing the most suitable area for the management of the groundwater resources. The TWDB was directed to establish boundaries that coincide with groundwater reservoirs or subdivisions of groundwater reservoirs, to the extent feasible. The TWDB was also authorized to consider the boundaries of political subdivisions when establishing GMA boundaries. *See* Tex. Water Code § 35.004(a). The TWDB proposed sixteen GMAs covering the entire state of Texas. Since their establishment in 2003, the boundaries between two different sets of management areas have been amended to address local concerns. See Plate 3, Texas Water Development Board, Groundwater Management Areas, *available at* www.twdb.texas.gov/mapping/doc/maps/GMAs_8x11.pdf. As discussed later in this chapter, under H.B. 1763, these GMAs serve as joint planning areas for purposes of developing desired future conditions and calculating modeled available groundwater based on large segments of the aquifers, not just political boundaries.

B. Priority Groundwater Management Areas

As the legislature explored how best to understand and manage the state's groundwater resources, in 1985 it also introduced the concept of a "critical area process," which ultimately became the PGMA process. Based on information gathered by the TCEQ and the TWDB, the TCEQ must identify areas of the state "that are experiencing or that are expected to experience, within the immediately following 50-year period, critical groundwater problems." Tex. Water Code § 35.007(a). "The ultimate purpose of priority groundwater management areas is the creation of groundwater conservation districts, either through local initiative or by the Commission." *A Streetcar Named Desired Future Conditions*, at 1. Although adequate management of groundwater was the reason for establishing the PGMA review and designation procedure, PGMAs are not an integral part of the GMA joint planning process addressed in this chapter, but are mentioned here to avoid confusion, considering their objective and name. For additional information on PGMAs, see Chapter 16 of this book, which discusses various methods of creating GCDs, including the PGMA process.

IV. Before Joint Planning: Determining Groundwater Availability

Before the creation of GCDs, and long before the current GMA joint planning, determining groundwater availability was merely a function of a well owner deciding whether sufficient groundwater was available at a particular well site. Under the rule of capture, no groundwater regulations existed, and groundwater availability was determined on a well-by-well basis by what was sometimes called the law of the biggest pump. *See, e.g., Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (Tex. 1904); see also Chapter 3 of this book. With the passage of the Underground Water Conservation Districts Act of 1949 and the creation of GCDs beginning in the 1950s, GCDs had the authority to manage and limit groundwater production. Because groundwater management decisions can best be made based on knowledge about the availability of groundwater to be managed, a GCD had implied authority to determine groundwater availability. Act of May 23, 1949, 51st Leg., R.S., ch. 306. (The High Plains Underground Water Conservation District No. 1 in Lubbock, Texas, was the first to be organized in 1951; the North Plains Groundwater Conservation District and the Panhandle Groundwater Conservation District were created in 1955.) Until 1997, the TWDB determined groundwater availability for planning purposes but did not require the GCDs to adopt their estimates. Since that time, the law has evolved as the state continues to refine all aspects of its water planning and management. See Chapters 20 and 22 of this book, which address state water planning and drought planning.

A. Pre-Senate Bill 1: Groundwater Conservation District Management Plans and Water Availability

Requiring GCDs to develop management plans outlining their methods for managing the groundwater resources within their boundaries was a further step toward local determination of the availability of Texas groundwater resources. In 1989 and 1995, legislation was passed requiring GCDs to develop comprehensive management plans. *See* Act of May 29, 1989, 71st Leg., R.S., ch. 936; Act of May 29, 1995, 74th Leg., R.S., ch. 933. At that time, requirements for the contents of management plans were general: providing for "the most efficient use of the groundwater, for controlling and preventing waste of groundwater, and for controlling and preventing subsidence" and specifying "in as much detail as possible, the acts, procedures, performance, and avoidance that are or may be necessary to effect the plan, including specifications and proposed rules." *See* Act of May 29, 1989, 71st Leg., R.S., ch. 936; Act of May 29, 1995, 74th Leg., R.S., ch. 933. GCDs were required to file a copy of their management plans and rules with the TCEQ or its predecessor agency; submittal to the TWDB was not required. *See* Act of May 29, 1989, 71st Leg., R.S., ch. 936; Act of May 29, 1995, 74th Leg., R.S., ch. 933. Additionally, the first steps toward joint planning were required for GCDs. The districts were required to forward their management plans to other districts within their management area, to review the goals of each district's management plan, and to consider how they affected groundwater planning throughout the management area and how effective the goals were in conserving and protecting groundwater. *See* Act of May 29, 1995, 74th Leg., R.S., ch. 933, § 2, sec. 36.108(b). Districts could petition the TCEQ, or its predecessor agency, to request an inquiry into whether neighboring districts adopted adequate rules to protect the local groundwater. *See* Act of May 29, 1995, 74th Leg., R.S., ch. 933, § 2, sec. 36.108(d).

In 1997, the passage of Senate Bill 1 (*see* Act of June 1, 1997, 75th Leg., R.S., ch. 1010 [hereinafter S.B. 1]) shifted the responsibility of determining groundwater availability for planning away from the TWDB and the GCDs to the newly created regional water planning groups. Under this legislation, the availability determinations in a district's groundwater management plan had to be consistent with those of the planning groups. *See* S.B. 1, art. 1; see also Chapter 20 of this book. GCDs were required, for the first time, to include groundwater availability information in the management plans submitted to and reviewed by the TWDB. *See* Tex. Water Code §§ 16.053–.056 (as enacted by S.B. 1, § 1.01, except as provided in § 9.02(b)–(f) (1997)).

B. Determining Groundwater Availability under S.B. 1

In 1997, the 75th Legislature put in place a "bottom-up" water planning process designed to ensure that the water needs of all Texans are met as Texas moves into the future. *See* S.B. 1, art. 1. S.B. 1 required individuals representing eleven interest groups to serve as members of regional water planning groups to prepare regional water plans for their respective areas. *See* S.B. 1, art. 1. The legislative directive in S.B. 1 was to—

> prepare a regional water plan, using an existing state water plan . . . and local water plans . . . as a guide, . . . that provides for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region.

Tex. Water Code § 16.053(a) (as enacted by S.B. 1, § 1.01 (1997)). See Chapter 20 of this book for a detailed discussion of S.B. 1 and state water planning.

Although the creation of the regional water planning groups was a step toward addressing Texas's significant water supply concerns due to population growth, it also raised local groundwater control concerns. S.B. 1 proclaimed that GCDs were "the state's preferred method of groundwater management." *See* Tex. Water Code § 36.0015 (as enacted by S.B. 1, § 4.21 (1997)). However, this local control statement was tempered by the provision that took away GCDs' authority to determine groundwater availability by delegating that responsibility primarily to the regional water planning groups. *See* Tex. Water Code § 16.053(e)(4)(B) (as enacted by S.B. 1, § 1.02 (1997) (stating that each regional water planning group must submit to the TWDB a regional water plan that includes consideration of the certified GCD management plans and other plans).

S.B. 1 also significantly changed the GCD management plan requirements. A GCD must adopt a management plan that addresses, among other things, all of the following management goals that apply to the district:

1. providing the most efficient use of groundwater;
2. controlling and preventing waste of groundwater;
3. controlling and preventing subsidence;
4. addressing conjunctive surface water management issues; and
5. addressing natural resource issues.

See Tex. Water Code § 36.1071(a) (as enacted by S.B. 1, § 4.28 (1997)).

Purusant to S.B. 1, upon the required submittal to the TWDB, the board certified the plan if it was administratively complete, but the board could not make substantive determinations regarding the plan. *See* Tex. Water Code § 36.1072 (as enacted by S.B. 1, § 4.28 (1997)). Additionally, GCDs were required to submit their groundwater management plans to the regional water planning groups for their "consideration." Tex. Water Code § 16.053(e)(4)(B) (as enacted by S.B. 1, § 1.02 (1997)). After the planning groups determined the groundwater availability for the different aquifers throughout the state, they were required to submit their adopted regional water plans for approval and inclusion in the state water plan. Tex. Water Code § 16.053(i) (as enacted by S.B. 1, § 1.02 (1997)). The board approved a regional water plan only after it determined that all interregional conflicts involving that regional water planning area were resolved; the plan included water conservation practices and drought management measures; and the plan was consistent with long-term protection of the state's water resources, agricultural resources, and natural resources. *See* Tex. Water Code § 16.053(h) (as enacted by S.B. 1, § 1.02 (1997)). The board then confirmed that the GCDs' water availability calculations in their management plans would allow for the implementation of the regional water plan. *See* Tex. Water Code § 36.1071(e)(4) (as enacted by S.B. 1, § 4.28 (1997)).

C. Conflicting Groundwater Availability Estimates under the S.B. 1 Process

GCDs did not always agree with the regional water plans' estimates of groundwater availability. Under such circumstances, a district could appeal the regional planning group's determinations of availability. *See* Tex. Water Code § 16.053(h)(6) (as enacted by S.B. 1, § 1.02 (1997)). After 2005, if a district filed a petition with the Board stating that a conflict requiring resolution existed between the district's board-certified management plan and an approved state water plan, the board was required to provide technical assistance to and facilitate coordination between the district and the involved regional planning group to resolve the conflict. Tex. Water Code § 16.053(p). Mediation between the GCD and the planning group was required within forty-five days of the petition being filed with the board. Tex. Water Code § 16.053(p). If the board determined that resolution of the conflict required a revision of an approved regional water plan, the board suspended the approval of the plan and provided information to the regional water planning group. Tex. Water Code § 16.053(p-1). The regional water planning group then prepared any revisions to its plan specified by the board and held at least one public hearing. Tex. Water Code § 16.053(p-1). After considering all public and board comments, the planning group prepared, revised, and adopted its plan and submitted it to the board for approval and inclusion in the state water plan. Tex. Water Code § 16.053(p-1).

If the board determined that resolution of the conflict required a revision of the GCD's approved management plan, the board provided that information to the district. Tex. Water Code § 16.053(p-2). The GCD was required to prepare any revisions to its plan based on the information provided by the board and hold a public hearing in the district. Tex. Water Code § 16.053(p-2). After considering all public and board comments, the district prepared, revised, and adopted its plan and submitted the revised plan to the board. Tex. Water Code § 16.053(p-2). If the GCD disagreed with the decision of the board, it could appeal the decision to a Travis County district court. Tex. Water Code § 16.053(p-3). The standard of review on appeal would be trial de novo. Tex. Water Code § 16.053(p-3).

V. Groundwater Management Area Joint Planning

As early as 2002, the state water plan recommended that "[t]he Legislature should consider requiring groundwater conservation districts to include in their groundwater management plans a management goal quantifying the desired future condition of the aquifer. The future condition could be described using water quantity and water quality parameters." *See* Texas Water Development Board, *Water for Texas—2002* 5 (2002). During the 79th legislative session in 2005, the responsibility for determining groundwater availability was delegated back to GCDs through the passage of House Bill 1763. *See* Act of May 30, 2005, 79th Leg., R.S., ch. 970 [hereinafter H.B. 1763]. Under this procedure, a GCD was required to work with the other districts within its GMA to develop and manage groundwater availability. *See* Tex. Water Code § 36.1072.

The regional planning groups are required to use the groundwater availability estimates adopted by the GCDs during joint planning. *See* Tex. Water Code § 16.053(e)(3)(A); 31 Tex. Admin. Code § 357.32(d). Procedures were also put in place to allow the regional water planning groups, the affected GCDs, and other affected persons to appeal the GCDs' findings. *See* Tex. Water Code

§ 16.053(p)–(p-4). While the responsibility for determining groundwater availability remains with GCDs, the GMA joint planning process has evolved over time, as discussed below.

Two key phrases are at the heart of GMA joint planning: "desired future condition" and "modeled available groundwater," previously "managed available groundwater." *Compare* H.B. 1763, §§ 2, 8 (former versions of Texas Water Code sections 36.001(25), 36.108(o)), *with* Tex. Water Code §§ 36.001(25), 36.1084 (current versions). Under joint planning, GCDs wholly or partially within each GMA (member districts) adopt desired future conditions of the aquifers located in the GMA; the TWDB calculates available groundwater; and appeals can be initiated. The deadline for *adoption* of the desired future conditions during the first cycle of joint planning was September 1, 2010. After that deadline, activities associated with the first cycle of joint planning continued: calculation of the managed available groundwater (later, modeled available groundwater), and appeals of the desired future conditions. These first-cycle activities are all controlled by the law established by H.B. 1763. As of September 1, 2011, all joint planning activities, other than those of the first cycle, are controlled by law established by Senate Bill 660. *See* Act of May 29, 2011, 82d Leg., R.S., ch. 1233, §§ 23–26, eff. Sept. 1, 2011 [hereinafter S.B. 660]. The joint planning process must be repeated and desired future conditions must be adopted every five years. Tex. Water Code § 36.108(d). In 2013, the 83rd Legislature amended section 36.108 by adding subsection (d-5), which postpones the deadline for the second round of proposals for adoption of desired future conditions until May 1, 2016. *See* Act of May 20, 2013, 83d Leg., R.S., ch. 785, § 1 (S.B. 1282), eff. Sept. 1, 2013.

For the first cycle of joint planning, member districts relied on the TWDB definition of desired future condition because it was not defined by statute. *See* 31 Tex. Admin. Code § 356.2(8), *repealed* 37 Tex. Reg. 10,238 (2012). The term is now defined as "a quantitative description, adopted in accordance with [Texas Water Code] Section 36.108, of the desired condition of the groundwater resources in a management area at one or more specified future times." Tex. Water Code § 36.001(30).

The districts in each GMA must submit their adopted desired future conditions to the TWDB. For the first-cycle desired future conditions, the TWDB calculated the managed available groundwater in the management area based on the desired future conditions adopted by the districts. The TWDB later reissued these initial estimates as modeled available groundwater estimates.

The statutory definition simply referred broadly to section 36.108, and the TWDB rules defined managed available groundwater based on Texas Water Code section 36.1132. *See* H.B. 1763, § 2 (former version of Texas Water Code section 36.001(25)); 31 Tex. Admin. Code § 356.2(13), *repealed* 37 Tex. Reg. 10,238 (2012). For future joint planning cycles, the term *managed available groundwater* has been replaced by the term *modeled available groundwater*. *See* Tex. Water Code § 36.1084. "'Modeled available groundwater' means the amount of water that the executive administrator [of the TWDB] determines may be produced on an annual average basis to achieve a desired future condition established under [Texas Water Code] Section 36.108." Tex. Water Code §§ 36.001(25). In short, the districts in a GMA adopt a desired future condition for the aquifers in the management area. The TWDB calculates water availability to achieve the desired future conditions. Under this system, policy and science play roles in the determination of groundwater availability, which is then expressed as a modeled available groundwater number. Desired future conditions are policies informed by science and collaboration between the GCDs within a GMA. The science that supports a desired future condition is contained in hydrogeologic data and groundwater availability models that are used in developing desired future conditions. Various aspects of this joint planning can be challenged through statutory appeal processes.

A. Adoption of a Desired Future Condition

The first round of desired future conditions, which were adopted by September 1, 2010, considered the uses or conditions of an aquifer within the management area that differed substantially from one geographic area to another. *See* H.B. 1763, § 8 (former version of Tex. Water Code § 36.108(d)). Once the TWDB amended 31 Texas Administrative Code chapter 356 to list issues to be considered by the TWDB when considering, during an appeal, whether a desired future condition is reasonable, member districts added these regulatory considerations when developing the desired future conditions. *See* 31 Tex. Admin. Code §§ 356.40–.46.

For subsequent changes made to a desired future condition, districts must consider nine factors:

1. aquifer uses or conditions within the management area, including conditions that differ substantially from one geographic area to another;
2. the water supply needs and water management strategies included in the state water plan;
3. hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge;
4. other environmental impacts, including impacts on spring flow and other interactions between groundwater and surface water;
5. the impact on subsidence;
6. socioeconomic impacts reasonably expected to occur;
7. the impact on the interests and rights in private property, including ownership and the rights of management area landowners and their lessees and assigns in groundwater as recognized under [Texas Water Code] Section 36.002;
8. the feasibility of achieving the desired future condition; and
9. any other information relevant to the specific desired future conditions.

Tex. Water Code § 36.108(d).

After considering and documenting the above-listed factors, GCDs may establish different desired future conditions for each aquifer, aquifer subdivision, or geologic strata located in their management area or for each geographic area overlying an aquifer within the management area. *See* Tex. Water Code § 36.108(d-1). If different desired future conditions are adopted for different geographic areas overlying an aquifer or subdivision of an aquifer, the desired future conditions must be compatible. *See* 31 Tex. Admin. Code § 356.2(8), *repealed* 37 Tex. Reg. 10,238 (2012). Desired future conditions adopted after the first cycle must provide a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater and control of subsidence in the management area. *See* Tex. Water Code § 36.108(d-2).

The process of establishing a desired future condition typically involves the districts meeting over an extended period of time while consulting with hydrologists, the board, stakeholders, and the public. The member districts have always been required to comply with the Open Meetings Act and the Public Information Act when holding GMA joint planning meetings. *See* Tex. Water Code § 36.108(e). Now such meetings must also comply with the expanded requirements of section 36.108(e), (e-1), (e-2), and (e-3). The district representatives may elect one district to be responsible for providing the notice of a joint meeting. Notice must be provided at least ten days before the meeting. The notice must be submitted for posting by the secretary of state and county clerk of each county located wholly or partly in a district that is located wholly or partly in the management area. The notice must also be posted at the district office of each member district. Tex. Water Code § 36.108(e). The notice must include the date, time, and location of the meeting; a summary of any action proposed to be taken; the names of member districts; and contact information so the public can obtain additional information. Tex. Water Code § 36.108(e-2). The failure or refusal of one or more districts to post notice for a joint meeting does not invalidate an action taken at the joint meeting. Tex. Water Code § 36.108(e-3).

While there was minimal statutory guidance regarding the procedure for establishing a desired future condition during the first cycle of joint planning, the process has become more formalized for the second round of joint planning. *Compare* H.B. 1763, § 8 (former version of Texas Water Code section 36.108), *with* Tex. Water Code §§ 36.108–.1086 (current version). As mentioned above, the process of establishing a desired future condition typically involves the member districts meeting over an extended period of time while consulting with hydrologists, the board, and the public. Under current law, member districts meet until they have adopted a "proposed" desired future condition. This proposal must be approved during a joint planning meeting, by a two-thirds vote of the representatives of all the member districts. *See* Tex. Water Code § 36.108(d-2). Once the proposed desired future condition is approved, it is distributed to the member districts, and a public comment period of not less than ninety days begins. During the public comment period, after posting notice as required by section 36.063, each district must hold a public hearing on any proposed desired future condition relevant to that district. During the public comment period, a copy of the proposed desired future condition and supporting materials must be available in the district office. After the public hearing, the district must compile a summary of relevant comments received, any suggested revisions to the proposed desired future condition, and the basis for such revisions. These materials will be considered at the next joint planning meeting. *See* Tex. Water Code § 36.108(d-2).

A joint planning meeting to consider final adoption of the proposed desired future condition must be held after all member districts have submitted district summaries or the public comment period under section 36.108(d-2) has expired, whichever is earlier. Before voting to adopt the final desired future condition, the member districts' representatives must review the district summaries, consider any district's suggested revisions to the proposed desired future condition, and finally adopt the desired future condition. The resolution adopting the desired future condition must be approved by a two-thirds vote of all the member districts' representatives. Once a desired future condition is adopted, the district representatives must submit to the TWDB and to all member districts proof that notice was posted for the joint planning meeting at which the desired future condition was finally adopted; a copy of the adoption resolution; and a desired future condition explanatory report. The report must—

1. identify each desired future condition;
2. provide the policy and technical justifications for each desired future condition;
3. include documentation that the factors under [Texas Water Code] Subsection [36.108](d) were considered by the districts and a discussion of how the adopted desired future conditions impact each factor;
4. list other desired future condition options considered, if any, and the reasons why those options were not adopted; and
5. discuss reasons why recommendations made by advisory committees and relevant public comments received by the districts were or were not incorporated into the desired future conditions.

Tex. Water Code § 36.108(d-3). As soon as possible after a member district receives the desired future condition resolution and explanatory report, the district must adopt any desired future condition that applies to the district. *See* Tex. Water Code § 36.108(d-4).

B. Calculation of Water Availability

As mentioned above, the adoption of desired future conditions under the first cycle of joint planning was completed by September 1, 2010. The first cycle continued, however, as managed available groundwater calculations (and later, modeled available groundwater) were issued by the TWDB and as desired future conditions were challenged. Because these first-cycle activities were controlled by pre–S.B. 660 law, this section discusses first-cycle joint planning water availability separately from such activities after the first cycle of joint planning.

1. Managed Available Groundwater

For desired future conditions adopted before September 1, 2011, once the desired future conditions were adopted for each of the aquifers within the GMA, the desired future conditions were submitted to the TWDB as required. *See* H.B. 1763, § 8 (formerly Tex. Water Code § 36.108(o)); *see also* 31 Tex. Admin. Code ch. 356, subch. C. The board then provided each district and regional water planning group located wholly or partly in the management area with the managed available groundwater calculations in the management area, based on the desired future conditions of the groundwater resources established under section 36.108 of the Texas Water Code. *See* H.B. 1763, § 8 (formerly Tex. Water Code § 36.108(o)).

During the first cycle, several GMAs submitted desired future conditions early during the period and the TWDB issued managed available groundwater for those desired future conditions. The TWDB reported managed available groundwater as equivalent to the total pumping that would achieve the desired future condition and did not explicitly consider the uses that were exempt from permitting. Water Code section 36.117(b) sets mandatory exemptions from permitting; section 36.117(a) allows GCDs to exempt other uses from requiring a permit; and in some cases the enabling legislation of a district either expands exempt uses or narrows their scope. For example, see the Hays Trinity Groundwater Conservation District enabling legislation that expands exempt use: Act of May 28, 1999, 76th Leg., R.S., ch. 1331, and Act of May 27, 2001, 77th Leg., R.S., ch. 966, art. 3, pt. 3. See also Chapter 16 of this book for a discussion of exempt uses.

Based on this early experience interpreting the requirements of a rather broadly written section 36.108, questions arose about whether exempt use pumping should be considered when the TWDB calculated the managed available groundwater. These questions centered around former Water Code section 36.001(25), which defined "managed available groundwater" to mean "the amount of water that may be permitted by a district for beneficial use in accordance with the desired future condition of the aquifer." *See* H.B. 1763, § 2. The TWDB staff did not include exempt pumpage in their calculation of managed available groundwater because of the "water that may be permitted" language in the definition. Because GCDs cannot require a permit for any exempt use of groundwater, exempt use amounts were excluded from managed available groundwater numbers. *See* Memorandum from William R. Hutchison, Director, Groundwater Resources Division, and Kenneth L. Petersen, General Counsel, to Texas Water Development Board Members (June 9, 2010), *available at* www.blancocountygroundwater.org/gma9/TWDB%20 Exempt%20Use%20Proposal%20WS08MAG_Numbers.pdf.

This approach was changed by the TWDB at a work session on June 17, 2010. The board directed that the practice of reporting managed available groundwater be modified to include (1) total pumping required to achieve the desired future condition; (2) estimated exempt use; and (3) the managed available groundwater, which is the total pumping minus the estimated exempt use. At the time of this change, eleven final managed available groundwater reports had been issued. Consequently, those eleven reports were reissued to conform to the revised approach.

Since that time, the managed available groundwater reports were initially released as draft reports and provided to the districts for review, particularly with respect to the exempt use estimates. Districts had the opportunity to update or revise the exempt use estimates developed by the TWDB for domestic and livestock exempt uses. In addition, districts had the opportunity to submit estimates of exempt use associated with oil and gas exploration. Before issuing a final managed available groundwater report, the TWDB staff provides to the board members a side-by-side comparison of managed available groundwater with current groundwater use, current state water plan groundwater availability numbers, recharge estimates, estimates of drainable water in place, and an estimate of the maximum sustained pumping level. An example of this comparison is contained in the memorandum from William R. Hutchison, Director, Groundwater Resources Division, to the Texas Water Development Board Members dated June 15, 2011, that covers sixteen managed available groundwater reports.

2. Modeled Available Groundwater

That the TWDB calculate water availability designed to achieve a desired future condition remains a requirement, although legislation during the 82nd Legislature made significant changes to how that is to be done and the purpose of those numbers.

"'Modeled available groundwater' means the amount of water that the [TWDB] executive administrator determines may be produced on an annual average basis to achieve a desired future condition established under [Texas Water Code] Section 36.108." Tex. Water Code § 36.001(25). The replacement of "managed available groundwater" by this term as statutorily defined, in conjunction with other changes to Water Code chapter 36 made during the 82nd legislative session, represents a substantial change in how water availability is calculated and how GCDs must use that number.

As mentioned previously, for desired future conditions adopted after September 1, 2011, the districts' required submittal to the TWDB has changed. (For all practical purposes, these are desired future conditions adopted after the first cycle because none were adopted between the first-cycle adoption deadline of September 1, 2010, and the effective date of the legislation, September 1, 2011.) The submittal must include (1) the desired future conditions adopted under section 36.108, (2) proof that notice was posted for the joint planning meeting, and (3) the desired future conditions explanatory report. *See* Tex. Water Code § 36.1084(a). The TWDB executive administrator must provide to each district and regional planning group located wholly or partly in the management area "modeled available groundwater" based on the adopted desired future conditions. *See* Tex. Water Code § 36.1084(b).

The change in requirement to report modeled available groundwater, which is the pumping that will achieve the desired future condition, rather than the managed available groundwater, which accounts for the uses exempt from permitting, is significant. Before current law (during the first cycle of joint planning), there was confusion about whether the managed available groundwater was considered to be a cap on allowable permitted well production, or if permits could be issued in excess of the managed available groundwater because the actual pumping was the important factor in managing the desired future condition. *See* H.B. 1763, § 11 (former version of Tex. Water Code § 36.1132). Now, a GCD, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve the applicable desired future condition. Thus the 82nd Legislature settled the discussion about whether to include exempt pumpage in the water availability numbers provided by the TWDB during the joint planning process. (However, the TWBD is still required to develop estimates of exempt use pursuant to the addition of Water Code section 36.1132(b), which states that the executive administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by district rules and section 36.117 is to be considered when a district is issuing permits.)

This change, in conjunction with other changes in section 36.1132, requires GCDs to manage total groundwater production on a long-term basis to achieve the applicable desired future condition and to consider five specific factors in making permitting decisions: modeled available groundwater, current and projected exempt use, amount of permitted groundwater, estimated amount of groundwater actually being produced under permits, and annual precipitation and production patterns.

In summary, during the first cycle of joint planning, many GCDs and other stakeholders interpreted Water Code section 36.1132 as a cap imposed on the districts' ability to issue groundwater production permits. This interpretation put enormous pressure on the GCDs, the TWDB, and the joint planning process, which was being implemented for the first time. Under the changes made during the 82nd legislative session, the planning function of the desired future condition adoption becomes more apparent, mirroring more closely the overall state water planning process.

C. The First Cycle of Joint Planning

The statutory deadline for the submittal of adopted desired future conditions to the board was September 1, 2010. *See* Tex. Water Code § 36.108(d). The first desired future conditions were adopted in late 2007; the last, on August 30, 2010. All joint planning committees met the statutory deadline. What follows is a summary of the various desired future condition attributes and development processes based on the authors' count of seventy-four desired future conditions that were adopted to complete the initial cycle.

As previously noted, GCDs within a GMA were required to decide on how to express the desired future condition. Fifty-four of the adopted desired future conditions were expressed in terms of drawdown of groundwater levels over a fifty-year period. Thirteen of the adopted desired future conditions were expressed in terms of volume remaining after fifty years. Three were expressed in terms of spring flow. One was expressed as a minimum groundwater elevation. Two were expressed as a hybrid of drawdown and volume. One was expressed as a hybrid of drawdown and spring flow.

In terms of the geographic extent of the adopted desired future conditions, thirty-nine of the adopted desired future conditions were expressed as county-wide averages; nineteen were expressed as averages over an entire GMA; eight were expressed as averages over a GCD; six were expressed as averages over a geographic area other than a county or GCD; one was expressed as a hybrid of counties and districts; and one was expressed as a hybrid of a GMA and a county.

The differences between desired future conditions adopted by different GMA joint planning committees are varied. The following examples illustrate this point. The desired future condition adopted on September 17, 2008, for the Trinity Aquifer in GMA 8 is expressed as drawdown over a fifty-year period for each of the forty-one counties and four aquifer layers (Paluxy, Glen Rose, Hensell, and Houston), for a total of 159 separate desired future conditions. *See* Groundwater Management Area 8, *Resolution to Adopt Desired Future Conditions for Aquifer(s) in Groundwater Management Area 8* (attached to Memorandum from Cheryl Maxwell, Groundwater Management Area 8 Administrator, to J. Kevin Ward, Executive Administrator, Texas Water Development Board (June 9, 2008)), *available at* www.twdb.texas.gov/groundwater/docs/DFC/GMA8_DFC_Adopted_2008-0519.pdf.

In contrast, the desired future condition for the Carrizo-Wilcox, Queen City, and Sparta aquifers in GMA 13 is expressed as an overall GMA-wide average. *See* Groundwater Management Area 13, *Resolution for the Adoption of the Desired Future Conditions of the Aquifers in Groundwater Management Area 13* (attached to Memorandum from Mike Mahoney, Groundwater Management Area 13 Administrator, to J. Kevin Ward, Executive Administrator, Texas Water Development Board (Apr. 13, 2010)), *available at* www.twdb.texas/gov/groundwater/docs/DFC/GMA13_DFC_Adopted_2010-0409.pdf. In the GMA 13 example, the districts adopted one specific scenario of a specific groundwater availability model run, and the associated county-aquifer drawdowns are tied to that desired future condition statement in order to guide the development of total pumping estimates (i.e., the pumping that will achieve the desired future condition) and managed available groundwater estimates. *See* Shirley C. Wade & Marius Jigmond, Texas Water Development Board, *GAM Run 09-034* (June 29, 2010), *available at* www.twdb.texas.gov/groundwater/docs/GAMruns/GR09-34.pdf.

In comparison, the districts in GMA 11 expressed the desired future condition of the Carrizo-Wilcox, Queen City, Sparta, and Yegua-Jackson aquifers as a GMA-wide average, which was tied to a specific groundwater availability model run. *See* Groundwater Management Area 11, *Desired Future Conditions Resolutions No. 1* (attached to Memorandum from Monique Norman, Attorney, to J. Kevin Ward, Executive Administrator, Texas Water Development Board (May 4, 2010)), *available at* www.twdb.texas.gov/groundwater/docs/DFC/GMA11_DFC_Adopted_2010-0413.pdf). In contrast to GMA 13, however, the districts in GMA 11 included a table that summarized the individual aquifer-county drawdowns in their desired future condition resolution.

The process of developing the initial seventy-four desired future conditions varied from management area to management area and sometimes even within a management area, depending on a variety of factors, ranging from level of current use, planned future use, availability of groundwater availability models, and the confidence in the available data and models. In many cases, several model runs were completed and the results discussed before adopting a desired future condition. Some critics of the process asserted that the districts were "reverse-engineering" the desired future conditions by specifying pumping (e.g., the managed available groundwater) and then adopting the resulting drawdown results as the desired future condition. However, it must be remembered that among the input parameters for a predictive groundwater model run is pumping, and among the outputs of a predictive groundwater model run is drawdown. Thus, an iterative approach of running several predictive scenarios with models and then evaluating the results is a necessary (and time-consuming) step in the process of developing desired future conditions.

One aspect to the reverse-engineering critique of the process has been that "science" should be used in the development of desired future conditions. The context of this critique refers to a fairly narrow definition of the term *science* and fails to recognize that the adoption of a desired future condition is primarily a policy decision. The call to use science in the development of desired future conditions seems to equate the term *science* with the terms *facts* and *truth.* Although the Latin origin of the word means knowledge, the term *science* also refers to the application of the scientific method. The scientific method is discussed in many textbooks and can be viewed as a means to quantify cause-and-effect relationships and to make useful predictions. *See, e.g.*, James H. Zumberge & Clemens S. Nelson, *Elements of Physical Geology* (John Wiley & Sons 1976); David Deming, *Introduction to Hydrogeology* (McGraw-Hill 2002). In the case of groundwater management, the scientific method can be used to understand the relationship between groundwater pumping and drawdown, or groundwater pumping and spring flow. A groundwater model is a tool that can be used to run "experiments" to better understand the cause-and-effect relationships within a groundwater system as they relate to groundwater management.

An example illustrating this iterative method within the process of developing desired future conditions can be found in the documents associated with the desired future condition of the Edwards-Trinity (Plateau) and Pecos Valley aquifers in GMA 7. The desired future condition resolution summarized eleven scenarios of groundwater pumping. *See* Groundwater Management Area 7, *Designation of Desired Future Conditions for the Edwards-Trinity (Plateau) Aquifer in Groundwater Management Area 7* (July 29, 2010), *available at* www.twdb.texas.gov/groundwater/docs/DFC/GMA7_DFC_Adopted_2010-0729.pdf), referencing a Groundwater Availability Model Run report (*see* William R. Hutchinson, *Draft GAM Run 09-035 (version 2)* (Aug. 7, 2010), *available at* www.twdb.texas.gov/groundwater/docs/GAMruns/GR09-35draft_v2.pdf).

The districts in GMA 7 initiated the process with a county-by-county estimate of future pumping, and this represented Scenario 1. Scenario 2 represented a 10 percent increase in pumping in each county of GMA 7 as compared to Scenario 1. Scenarios 3, 4, and 5 represented 20, 30, and 40 percent pumping increases in each county of GMA 7, respectively. The results of Scenarios 1 to 5 were summarized, distributed to the district representatives, and discussed at the July 29, 2010, meeting of GMA 7. The discussion focused on the districts' "vision" of groundwater conditions that qualitatively described the need to minimize drawdown in the eastern portion of GMA 7 in order to maintain spring flow and river baseflow and allow for drawdown in the western portion of GMA 7 where irrigated agriculture used large amounts of groundwater. The primary issue that needed to be resolved was the compatibility of these two qualitative goals. Recall that the purpose of joint planning was to regionalize groundwater management decisions among neighboring districts within a GMA. GMA 7 included twenty GCDs (the most in any GMA), and the dynamics of discussing the impacts of various pumping scenarios was unique given the large number of stakeholders.

At the meeting, and after the general relationship between pumping and drawdown was presented and discussed, the district representatives provided updates to pumping on a county-by-county basis. Those updated pumping amounts were put into the model and runs were completed at the meeting, and the results summarized and discussed. Scenarios 6 to 10 were run during the meeting in this iterative fashion based on this input from the district representatives. As a result of these model runs, the districts adopted Scenario 10 as meeting their qualitative vision of future drawdown conditions as their desired future condition.

D. Role of Regional Water Planning Groups

The legislative changes in 2005 altered the regional water planning groups' role in determining groundwater availability. Before House Bill 1763, the planning groups had to consider only GCDs' availability estimates; they had no obligation to use those numbers. *See* Tex. Water Code § 36.1071(b) (as enacted by S.B. 1, § 4.28 (1997)). The regional water planning groups are now required to use, not just consider, the districts' modeled available groundwater calculations that were adopted through the joint planning process. Tex. Water Code § 36.1071(b). The one exception to this is Region D, in North East Texas. Region D, as of September 1, 2015, will determine the supply of groundwater for regional planning purposes. Before Region D's groundwater supply numbers can be used in its regional water plan, the TWDB is first required to review and approve that Region D's proposed groundwater supply is physically compatible, using the board's groundwater availability models, with the desired future conditions adopted under Water Code section 36.108 for the relevant aquifers in the GMA that are regulated by GCDs. *See* Act of May 29, 2015, 84th Leg., R.S., ch. 1180, § 1 (amending Tex. Water Code § 16.053(e)(2-a) to affect Region D, the only regional planning group that does not have a GCD within its boundaries).

However, the regional water planning groups are not left without a voice in the groundwater availability determination process; they may petition a GCD to the State Office of Administrative Hearings (SOAH) to appeal the reasonableness of the district's desired future condition of an aquifer and file with the TCEQ petitions for inquiry regarding other related joint planning issues. *See* Tex. Water Code § 36.1083. See the discussion below.

In 2011, the legislature also required, with the passage of S.B. 660, the regional water planning groups to add GMA designees to the regional planning groups. That bill amended section 16.053(c) of the Water Code to require that "the groundwater conservation districts located in each management area, as defined by Section 36.001, located in the regional water planning area shall appoint one representative of a groundwater conservation district located in the management area and in the regional water planning area to serve on the regional water planning group." S.B. 660, § 9; *see also* S.B. 660, § 20. See discussion in Chapter 20 of this book. This leaves Region D as the only regional planning group that does not have a GMA representative because it does not have a GCD located within its boundaries.

E. Role of Unprotected Areas

Unprotected areas and *white areas* are terms used to describe areas in the state that are not included within the boundaries of a GCD. In these areas, the rule of capture still applies to groundwater production, without governmental regulations or protections. *See Sipriano v. Great Spring Waters of America, Inc.*, 1 S.W.3d 75 (Tex. 1999); *Houston & T.C. Ry. Co. v. East,* 81 S.W. 279 (Tex. 1904). This remains true even after 2011 and 2012, when both the Texas legislature and the Texas Supreme Court declared that groundwater rights are real property rights. *See* Tex. Water Code § 36.002; *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012). The common-law tort preclusion of the rule of capture remains intact, and landowners cannot sue their neighbors, whether within a GCD or not, for pumping the groundwater from their land (unless done so wastefully or maliciously). The groundwater rights laws allow a groundwater rights owner or lessee to seek action against a district for a constitutional regulatory taking. For this reason, among others, groundwater rights are more protected within a GCD.

GMAs contain varying amounts of unprotected areas. For example, in 2010, GMA 12 was almost entirely covered by GCDs, whereas GMA 5 did not have a single district. *See* S.B. 1, art. 1. In the GMA joint planning, the existing districts are responsible for determining the desired future conditions for the entire area, including the unprotected areas. *See* Tex. Water Code §§ 36.108–.1086. However, there is currently no enforcement of the desired future conditions and related water availability (managed available groundwater or modeled available groundwater) in the unprotected areas. The responsibility of the GMA joint planning members to determine groundwater availability for the unprotected areas is used as a planning method and also as an incentive for GCDs to be formed in the unprotected areas of the state that have groundwater resources. Groundwater availability for the unprotected areas will be included in the regional water plans. If a groundwater project is not listed in the regional water plan, it will not be eligible for state funding. *See Estimating Groundwater Availability*. Additionally, if a new GCD is created in an unprotected area, the desired future conditions adopted through the joint planning process must be used, at least until the next time the desired future conditions are considered by the joint planning members.

VI. Challenging Adoption of Desired Future Conditions and Other Decisions Related to the Joint Planning Process

Inevitably, the adoption of desired future conditions will result in some conflict. GCDs' availability determinations will become increasingly more difficult as districts weigh the differing interests of existing and future users, in-district and out-of-district users, and the effects of increased pumping on the aquifers and existing wells, to name a few competing interests. As urban populations increase, conflict will likely intensify between the interests of urban and rural water needs and between the use and conservation of rural groundwater resources. On the administrative level, these conflicts will be addressed by the three agencies with oversight over actions related to the joint planning process. Appeals of a desired future condition go to SOAH, with input from the TWDB; petitions for an inquiry into district actions or inactions related to the joint planning process are heard by the TCEQ.

A. Appeal of a Desired Future Condition

In the first round of adoptions of desired future conditions, a person with a legally defined interest in the groundwater could petition the TWDB that a desired future condition was unreasonable. The board would then make a reasonableness decision on the petition after it conducted a public hearing. In 2015, the Texas legislature changed the desired future condition appeal process by passing H.B. 200, which removed the TWDB from the reasonableness determination decision process and allows affected persons to directly challenge an individual GCD's adopted desired future condition through an administrative hearing process conducted by SOAH. *See* Tex. Water Code § 36.1083(b) (as amended by Act of May 31, 2015, 84th Leg., R.S., ch. 993, § 4). However, the TWDB is still required to contribute its hydrological expertise and recommendations to SOAH. The new appeals process applies to desired future conditions adopted on or after September 1, 2015.

An affected person may file a petition with a GCD within the GMA that approved the desired future condition. The act of filing a petition with a district appealing the reasonableness of a desired future condition automatically triggers the GCD to contract with SOAH to conduct the hearing. The petition is required to provide evidence that the district did not establish a reasonable desired future condition of the groundwater resources in the management area. The petition must be filed no later than the 120th day after the date on which a GCD adopts a desired future condition under section 36.108(d-4). *See* Tex. Water Code § 36.1083(b).

Although "affected person" is defined in section 36.1083(a)(1) as having "the meaning assigned by Section 36.1082," section 36.1082 was repealed by the 84th Legislature with the passage of H.B. 2767. *See* Act of May 20, 2015, 84th Leg., R.S., ch. 415, § 23. Because of the conflicting 2015 legislation between H.B. 200 and H.B. 2767, "affected person" is no longer defined in section 36.1082 of the Water Code but in section 36.3011(a). *See* Tex. Water Code § 36.3011(a). The apparent intent was to define "affected person" as the former "person with a legally defined interest in the groundwater" within the GMA, a GCD in or adjacent to the GMA, or a regional water planning group for a region in the GMA. *See* Tex. Water Code § 36.1083(a), (b).

The petitioned GCD must, within sixty days of receiving the petition, contract with SOAH to conduct the contested case hearing and submit a copy of the petition to SOAH. *See* Tex. Water Code § 36.1083(h). And, within ten days of receiving the petition, the district must submit a copy of the petition to the TWDB. *See* Tex. Water Code § 36.1083(e). The TWDB must then complete a study to be delivered to SOAH within 120 days of receiving the copy of the petition. *See* Tex. Water Code § 36.1083(f). The TWDB study shall be based on an administrative review determination of whether the desired future condition meets the Water Code section 36.108(d) criteria. *See* Tex. Water Code § 36.1083(e). The TWDB study must contain scientific and technical analysis of the desired future condition, including consideration of (1) aquifer hydrology; (2) the Water Code section 108(d-3) explanatory report and factors; and (3) any relevant groundwater availability models, published studies, estimates of total recoverable storage capacity, average annual amounts of recharge, inflows, and discharge of groundwater, or information provided in the petition and available to the TWDB. *See* Tex. Water Code § 36.1083(e). During the period between the filing of the petition and TWDB delivering its study to SOAH, the GCD may seek mediation assistance for the issues raised in the petition from the Center for Public Policy Dispute Resolution, the TWDB, or other alternative dispute resolution. *See* Tex. Water Code § 36.1083(j).

Before SOAH conducts the contested case hearing, it must follow notice, payment, and prehearing requirements. The administrative law judge may consolidate hearings that are requested that affect two or more districts. *See* Tex. Water Code § 36.1083(r). The notice requirements must be consistent with the GCD and SOAH rules, including a general hearing notice, and individual notice to the petitioner, persons requesting notice, nonparty GCDs and regional water planning groups in the same management area, the TWDB, and the TCEQ. *See* Tex. Water Code § 36.1083(k). At the prehearing conference, SOAH must determine preliminary matters, including whether the petition should be dismissed for failure to state a claim for which relief can be granted or whether a person seeking to participate in the hearing is an affected person who is eligible to participate. *See* Tex. Water Code § 36.1083(*l*). Initially, the petitioner is required to pay the costs associated with the SOAH contract for the hearing and to deposit a sufficient amount with the district so that the district may pay the contract amount before the hearing. *See* Tex. Water Code § 36.1083(m). However, after the conclusion of the hearing, SOAH may assess costs to one or more participatory parties, and the district shall refund any excess money to the petitioner. SOAH's decision to apportion the contract costs must take into consideration who requested the hearing, who prevailed, who is financially able to pay, how much a party participated, and any other relevant factors for a just and reasonable assessment of costs. *See* Tex. Water Code § 36.1083(m).

In conducting the hearing, SOAH is required to consider the TWDB study in response to the petition and the desired future condition explanatory report submitted to the TWDB under Water Code section 36.108(d-3). *See* Tex. Water Code § 36.1083(g)(1). The TWDB must make its relevant staff available to SOAH as expert witnesses, if requested by SOAH or a party to the hearing. Tex. Water Code § 36.1083(g)(2.) The contested case hearing shall be held at the GCD's office or regular meeting location of the district's board, unless the board provides for meetings to be held in other locations, and in accordance with the Texas Administrative Procedure Act and SOAH rules. *See* Tex. Water Code §§ 36.1083(i), 36.403(c); Tex. Gov't Code ch. 2001.

When the GCD receives the SOAH administrative law judge's findings of fact and conclusions of law in a proposal for decision, including a dismissal of the petition, the district is required to issue a final order stating the district's decision on the contested case matter and the district's findings of fact and conclusions of law. Tex. Water Code § 36.1083(n). The administrative law judge must prepare separate findings of fact and conclusions of law for each GCD that is party to the same contested case hearing. *See* Tex. Water Code § 36.1083(r). Pursuant to the Administrative Procedure Act, the district may change a finding of fact or conclusion of law issued by the administrative law judge or may vacate or modify an administrative law judge's order. *See* Tex. Water Code § 36.1083(n); Tex. Gov't Code § 2001.058(e). If the district modifies or vacates the proposal for decision, the district must issue a report detailing its reasons for disagreement and provide policy, scientific, and technical justifications for the district's decision. *See* Tex. Water Code § 36.1083(o).

If the petitioned GCD, in its final order, finds that the desired future condition is unreasonable, the districts in the same management area shall meet in a joint planning meeting to revise the petitioned district's desired future conditions. *See* Tex. Water Code § 36.1083(p). The revision meeting shall be conducted within sixty days of the district's final order and follow the desired future condition adoption procedure of Water Code section 36.108. *See* Tex. Water Code § 36.1083(p). Only the unreasonable desired future condition for the petitioned district must be amended. The petitioned district's final order deeming the condition unreasonable does not affect the desired future conditions for the other GCDs in the management area that did not participate in the contested case hearing. *See* Tex. Water Code § 36.1083(q).

Within forty-five days of the petitioned GCD issuing a final order, the order may be appealed to a district court with jurisdiction over any part of that district's territory. *See* Tex. Water Code § 36.10835(a). The district court shall decide the appeal under the substantial evidence standard of review. *See* Tex. Water Code § 36.10835(a); Tex. Gov't Code § 2001.174. If the district court rules that the appealed desired future condition is unreasonable, the court shall strike the desired future condition and order the management area districts to reconvene within sixty days of the court order, to hold a joint planning meeting and amend the struck desired future condition under Water Code section 36.108. *See* Tex. Water Code § 36.10835(a). The court's findings do not apply to other desired future conditions that were not before the court. Tex. Water Code § 36.10835(b).

B. Petition for a Texas Commission on Environmental Quality Inquiry

An "affected person" may file a petition with the TCEQ requesting an inquiry for numerous issues related to joint planning. *See* Tex. Water Code § 36.3011. (Citations in this section of the chapter are to the current law because only one such petition was filed under pre–S.B. 660 law.) The following have standing under the definition of "affected person":

1. an owner of land in the management area;
2. a GCD or subsidence district in or adjacent to the management area;
3. a regional water planning group with a water management strategy in the management area;
4. a person who holds or is applying for a permit from a district in the management area;
5. a person with a legally defined interest in groundwater in the management area; or
6. any other person defined as affected by [TCEQ] rule.

Tex. Water Code § 36.3011(a).

An inquiry can be requested for any of the following reasons: failure of a district to submit its management plan to the TWDB; to participate in joint planning; to adopt rules; to adopt the desired future condition applicable to that district; and to update its management plan within two years of adoption of the desired future condition applicable to that district or update its rules to implement the desired future conditions before the first anniversary of the date when it updated its management plan. A petition for an inquiry can also be filed if a district's rules are not designed to achieve the desired future condition or do not adequately protect the groundwater in the management area. Finally, such an inquiry may be sought if a district fails to enforce substantial compliance with its rules, thereby failing to adequately protect groundwater within the management area. Tex. Water Code § 36.3011(b).

Within ninety days of the petition being filed, the commission must review the petition and either dismiss it if the commission finds inadequate evidence to support the allegations or refer the matter to a review panel. Tex. Water Code § 36.3011(c).

If the commission determines referral is necessary, then it appoints a five-member review panel. The commission has the discretion to appoint a director or general manager of a district located in a different GMA to the review panel but may not appoint more than two members of a review panel from any one GCD. The proceedings of the panel must be recorded and documented by the recording secretary. Tex. Water Code § 36.3011(d).

Within 120 days of the appointment, the review panel must review the petition and relevant evidence and consider and adopt a report in open meeting. The report must be submitted to the commission. The panel may hold public hearings in the GMA to take evidence, as directed by the commission, and may negotiate or resolve disputes by any lawful means. *See* Tex. Water Code § 36.3011(e).

The review panel's report must be submitted to the commission and include a summary of all evidence taken in any hearing on the petition, list findings and recommendations of actions appropriate for the commission to take and reasons the actions are appropriate, and other information deemed appropriate. *See* Tex. Water Code § 36.3011(f), (g).

Within forty-five days of receiving the panel's report, the commission or its executive director shall take action to implement the panel's recommendations including any action against a GCD that it deems necessary in accordance with Water Code section 36.303. Tex. Water Code § 36.3011(h). The commission may order the GCD to take certain appropriate actions. Tex. Water Code § 36.303(a)(1). In extreme circumstances, the commission may dissolve the GCD. Tex. Water Code § 36.303(a)(2)–(4). The commission may also recommend to the legislature actions it deems necessary to accomplish comprehensive management in the GCD. *See* Tex. Water Code § 36.303(b).

C. Challenges Made to the First Cycle of Joint Planning

Many of the desired future conditions adopted during the first joint planning cycle were challenged through petitions to the TWDB. One was rejected because it was submitted after the statutory deadline for submittal (GMA 8). One was withdrawn before a TWDB decision was made (GMA 11). The TWDB found in four instances that the challenged desired future conditions were reasonable, and no further appeal actions were taken (GMAs 7, 10, 12, and 13). The petitions and staff reports are available at the TWDB Web site at www.twdb.texas.gov/groundwater/petitions/index.asp.

Challenges to certain desired future conditions adopted by the districts in GMAs 1 and 9 were each legally significant in their own way. The TWDB received two administratively complete petitions challenging the desired future conditions for the Ogallala Aquifer adopted by the districts in GMA 1. After considering these petitions, the board found the desired future conditions to be reasonable. *See* Minutes of Texas Water Development Board Meeting (Feb. 17, 2010), *available at* www.twdb.texas.gov/board/agenda/2010Minutes/Brd_02.pdf. The board approved the staff recommendation that the desired future conditions were reasonable. The staff's analysis concluded that (1) the GCDs engaged in joint planning; (2) the desired future conditions do not prohibit someone from pumping their groundwater; (3) county lines can be used to define geographic areas for different desired future conditions provided that aquifer uses and conditions support the areas; (4) the districts reasonably considered environmental impacts and spring flows; (5) the districts balanced the various interests, uses, and potential uses; and (6) the desired future conditions are physically possible. *See* News Release, Texas Water Development Board, *Texas Water Development Board Rules on Groundwater Management Area 1 Desired Future Conditions* (Feb. 17, 2010); *see also* Texas Water Development Board, *Report on Appeal of the Reasonableness of the Desired Future Conditions Adopted by the Groundwater Conservation District in Groundwater Management Area 1 for the Ogallala and Rita Blanca Aquifers* (Feb. 10, 2010), *available at* www.twdb.texas.gov/groundwater/petitions/doc/GMA1/2009_Petitions/Mesa_G&J_Ranch/TWDB_Staff_Report_GMA1_Petitions_02-10.pdf.

Following the board's decision, the petitioners Mesa Water L.P. and G&J Ranch, Inc., sued the TWDB on March 16, 2010, in Travis County district court under Texas Water Code § 6.241 seeking to set aside the board's decision and a finding that the desired future conditions were unreasonable. The plaintiffs' suit sought several declarations under the Uniform Declaratory Judgment Act and claimed, in part, that the districts in GMA 1 adopted desired future conditions contrary to Texas law because they discriminated between groundwater rights owners in the same aquifer or subdivision of an aquifer because they were based on political subdivisions. The plaintiffs sought several declarations regarding former Water Code section 36.108 and the TWDB's authority to require GCDs to revise their adopted desired future conditions in accordance with the TWDB's recommendations. The plaintiffs asserted that the appeal process resulted in a deprivation of property without due process because they were denied the right to take discovery, compel evidence, object to testimony, or cross-examine witnesses. *See* Plaintiffs' Original Petition ¶ 21, *Mesa Water L.P. & G&J Ranch, Inc. v. Texas Water Development Board*, No. D-1-GN-10-000819 (201st Dist. Ct., Travis County, Tex. Mar. 16, 2010).

The TWDB, represented by the Texas Attorney General's office, filed a plea to the jurisdiction asserting sovereign immunity to suit on the basis that the staff's recommendation that the board not find the desired future conditions unreasonable was not a final order that fixed the plaintiffs' rights or liabilities. *See* TWDB's First Amended Plea to the Jurisdiction, ¶¶ 32–50, *Mesa Water L.P. & G&J Ranch, Inc. v. Texas Water Development Board*, No. D-1-GN-10-000819 (201st Dist. Ct., Travis County, Tex. Mar. 16, 2010). The TWDB also asserted that the plaintiffs' claims were not ripe; the plaintiffs lacked standing to sue; and the board's action did not result in the taking of the plaintiffs' property. *See* TWDB's First Amended Plea to the Jurisdiction, at ¶¶ 51–59. The trial court agreed and granted the plea to the jurisdiction on December 9, 2010. *See* Order Granting Plea to the Jurisdiction, *Mesa Water L.P. & G&J Ranch, Inc. v. Texas Water Development Board*, No. D-1-GN-10-000819 (201st Dist. Ct., Travis County, Tex. Mar. 16, 2010).

While pursuing the district court appeal of the TWDB's action, on October 22, 2010, Mesa Water L.P. filed with the TCEQ a request for an inquiry relating to joint groundwater management in GMA 1 under former Water Code section 36.108(f)–(k). Mesa Water claimed that the GMA 1 planning process failed to result in adequate planning and did not establish reasonable future desired conditions for the Ogallala aquifer in GMA 1. Mesa Water requested that, following the inquiry, the commission issue an order (1) requiring the districts to adopt a single desired future condition for each of the subdivisions of the Ogallala Aquifer in GMA 1 and to adopt and enforce equitably rules designed to achieve the desired future condition; (2) dissolving the boards of directors of the districts in GMA 1; or (3) dissolving the districts in GMA 1. *See* Petitioner's Request for Inquiry, TCEQ Docket No. 2010-1611-MIS, Oct. 22, 2010.

The districts in GMA 1 and the TCEQ executive director filed responses to the petition, all arguing that former section 36.108(f)–(k) does not allow for a review of the reasonableness of the desired future conditions. The executive director asserted that only the TWDB has authority to conduct such a review and its staff had determined that GMA 1's desired future conditions were reasonable. The GCDs and the executive director asserted that Mesa Water's attack on the districts' rules was premature because the TWDB had not yet issued the managed available groundwater amounts, and the districts must have the managed available groundwater before they can amend management plans in a manner consistent with the desired future conditions. The districts also asserted that the joint planning process was adequate and that the adoption of different desired future conditions for different geographical areas over the same aquifer is authorized. *See* Executive Director's Response to Petition for Inquiry, TCEQ Docket No. 2010-1611-MIS. The commissioners dismissed Mesa Water's petition at the December 14, 2010, meeting. *See* Texas Commission on Environmental Quality, Meeting Minutes, Item 4 (Dec. 14, 2010), *available at* www.tceq.state.tx.us/assets/public/comm_exec/agendas/comm/marked/2010/101214.pdf. In 2011, T. Boone Pickens and Mesa Water sold 211,000 acres of groundwater rights, the basis of the petition, to the Canadian River Municipal Water Authority.

The TWDB also received three administratively complete petitions concerning desired future conditions established for GMA 9 during the first cycle of joint planning. The submitted desired future condition for the Edwards Group of the Edwards-Trinity (Plateau) Aquifer was the subject of a petition presented to the board on January 21, 2010. At that meeting, the board found that the adopted desired future condition of zero drawdown was not reasonable. The board further recommended that the desired future condition in Kerr County be nine feet of drawdown and that the Edwards Group of the Edwards-Trinity (Plateau) Aquifer be found not relevant in Bandera and Kendall counties. *See* Minutes of the Texas Water Development Board Special Meeting (Jan. 21, 2010), *available at* www.twdb.texas.gov/board/agenda/2010Minutes/Special_01.pdf; News Release, Texas Water Development Board, *Texas Water Development Board Rules on Groundwater Management Area 9 Desired Future Conditions* (Jan. 21, 2010). At their July 26, 2010, meeting, the GCDs in GMA 9 adopted new desired future conditions for the Edwards Group of the Edwards-Trinity (Plateau) Aquifer. In Bandera and Kendall counties, the new desired future condition is the same as the original desired future condition: zero drawdown. The districts in GMA 9 also found that the Edwards Group of the Edwards-Trinity (Plateau) Aquifer is not relevant for purposes of joint planning in Kerr County. *See* Letter from Ronald G. Fieseler, Groundwater Management Area 9 Coordinator, to J. Kevin Ward, Executive Administrator, Texas Water Development Board (Aug. 26, 2010).

VII. Conclusion

Groundwater management area joint planning was mandated in 2005 by House Bill 1763, passed by the 79th Legislature. GCDs worked together in their GMAs to develop and to adopt desired future conditions by the statutory deadline of September 1, 2010. These desired future conditions have been submitted, and the TWDB-developed managed available groundwater values have been or will be included in the future regional and state water plans. The second planning cycle is in progress, and stakeholders have the opportunity throughout the process to participate in determining GCDs' desired future conditions. Proposed desired future conditions must be adopted by May 1, 2016. The local GCDs, the regional planning groups, the TWDB, the TCEQ, and the stakeholders all have valuable roles in groundwater management in Texas.

CHAPTER 22

Drought Planning and Response

Dinniah C. Tadema[1]

The availability of clean and plentiful water is an important environmental concern in the United States. Many regions throughout the nation are characterized by increasing populations, increasing water demand, changing trends and patterns of water use, changing social behavior, and growing environmental awareness. Water availability is becoming more limited, and how water is allocated and managed will continue to be contentious, especially during periods of drought. Droughts are a normal part of the climate for most regions. Recent widespread periods of drought, such as in the eastern and western portions of the United States, have led many communities to issue mandatory water restrictions.

The nation has also been plagued with the impacts associated with drought. For example, Texas's drought-related crop and livestock losses between 1998 and 2011 cost more than $14 billion, with nearly $7.6 billion of those losses attributable to 2011 alone. *See* Patrick Beach, *Drought Cost Texas Close to $8 Billion in Agricultural Losses in 2011, Study Finds, Austin-American Statesman*, Mar. 21, 2012, *available at* www.statesman.com/news/news/state-regional/drought-cost-texas-close-to-8-billion-in-agricultu/nRmNt/. In addition, in 2011, the drought killed an estimated 5.6 million trees in urban areas and 301 million in rural areas. *See* Susan Combs, Texas Comptroller of Public Accounts, *Texas Water Report: Going Deeper for the Solution* 12, Publication # 96-1746 (Jan. 14, 2014), *available at* www.window.state.tx.us/specialrpt/water/96-1746.pdf#24. As of March 25, 2015, 777 community water systems in Texas have mandatory water use restrictions in place because of drought or water shortages. *See* Texas Commission on Environmental Quality, *Map of Water Systems under Water Use Restrictions*, www.tceq.texas.gov/drinkingwater/trot/location.html.

The first section of this chapter examines the concept of drought and why drought is important in the context of water rights law. The second section describes the traditional method of dealing with drought—drought response—and describes the legal powers and duties of governmental entities in dealing with dangerous drought conditions. The third and final section focuses on the state's move toward a more proactive approach to drought planning. Section III discusses Texas's existing laws pertaining to preparing and planning for drought conditions and shortages of water, including the state water plan, the state drought preparedness plan, and finally the legal responsibilities of water rights holders and water providers to develop and implement drought contingency plans.

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I. Why Is Drought Important?

The primary function of drought planning is to ensure the uninterrupted supply of water in an amount sufficient to satisfy essential human needs. The purpose of this section is to explore the concept of drought, the lack of a comprehensive definition of drought, and the relevance of drought in the context of water rights law.

A. The Concept of Drought

Clean and plentiful water is a meaningful concern in the United States. Because water is a limited natural resource, water allocation and management is a primary source of contention, especially during periods of drought.

Although drought conditions can severely disrupt the normal availability of water, drought is a normal part of the climate for virtually all areas of the United States. Drought can cover large regions of the United States.

> Drought differs from other natural hazards in many ways. First, it is a "creeping phenomenon," making its onset and end difficult to determine. The effects of drought accumulate slowly over a considerable period of time, and may linger for years after the termination of the event. Second, the absence of a precise and universally accepted definition of drought adds to the confusion about whether or not a drought exists and, if it does, its severity. Third, drought impacts are less obvious and spread over a larger geographical area than are damages that result from other natural hazards. . . . For these reasons, quantification of impacts . . . is a far more difficult task for drought than it is for other hazards.

Donald A. Wilhite, *Improving Drought Management in the West: The Role of Mitigation and Preparedness* 42, Report to the Western Water Policy Review Advisory Commission, National Drought Mitigation Center (1997) [hereinafter *Improving Drought Management*], *available at* http://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1061&context=elusive_docs.

B. Lack of a Comprehensive Drought Definition

A contributing factor to the difficulty of anticipating and mitigating the negative repercussions of drought is that drought is not precisely or uniformly defined. Because drought affects many economic and social sectors, scores of drought definitions have been developed by a variety of disciplines. As noted above, however, there is no universally accepted or comprehensive definition of drought. As a starting point, for example, the National Drought Policy Commission (NDPC) provides a generic definition of drought as "a persistent and abnormal moisture deficiency having adverse impacts on vegetation, animals, or people." National Drought Policy Commission, U.S. Department of Agriculture, *Preparing for the Drought in the 21st Century*, Executive Summary 3 (2000). The NDPC suggests that the definition of what drought is and what drought is not has profound implications for the environment and all segments of society, yet may be different for each.

The National Oceanic and Atmospheric Administration (NOAA), on the other hand, defines drought as a "period of abnormally dry weather which persists long enough to produce a serious hydrologic imbalance" (e.g., crop damage, water supply shortage). NOAA asserts that the severity of drought depends on the degree of moisture deficiency, the duration of the condition, and the size of the affected area. NOAA uses four different operational definitions of drought: meteorological, agricultural, hydrological, and socioeconomic. A *meteorological* drought is "a measure of the departure of precipitation from normal." Due to climatic differences, what is considered a drought in one location may not be a drought in another. An *agricultural* drought is "a situation when the amount of moisture in the soil no longer meets the needs of a particular crop." A *hydrological* drought "occurs when surface and subsurface water supplies are below normal." And, finally, a *socioeconomic* drought refers to "the situation that occurs when a physical water shortage begins to affect people." *See* National Oceanic and Atmospheric Administration, U.S. Department of Commerce, *What is meant by the term drought?*, www.wrh.noaa.gov/fgz/science/drought.php?wfo=fgz.

Droughts, as defined by the U.S. Army Corps of Engineers, are "periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or streamflow." Institute for Water Resources, U.S. Army Corps of Engineers, *National Study of Water Management During Drought: The Report to the U.S. Congress* xi (IWR Report 94-NDS-12, 1995) [hereinafter *Water Management During Drought*], *available at* www.iwr.usace.army.mil/Portals/70/docs/iwrreports/94-NDS-12.pdf.

As illustrated by these examples, a single, universally accepted definition of drought does not exist. Because "drought occurs with varying frequency in nearly all regions of the globe . . . and in all types of economic systems, . . . the approaches taken to define [drought] should be impact and region specific. The lack of a precise and objective definition in specific situations has been an obstacle to understand drought, which has led to indecision and/or inaction on the part of managers, policy makers, and others." *Improving Drought Management*, at 4. Therefore, it is imperative for individual water suppliers to draw on past and current conditions to develop their own definitions and concepts of drought. Specific definitions will facilitate the preparation of contingency plans for future drought conditions.

C. The Importance of Drought in Texas Water Rights Law

The nebulous nature of drought aside, the relevance of drought in water rights law is unquestionable. The continuous availability of water is central to the water rights system in Texas. Before a permit is issued to appropriate state water, section 11.134(b)(2) of the Texas Water Code requires the Texas Commission on Environmental Quality (TCEQ) to make a determination that unappropriated water is available in the source of supply. *See* Tex. Water Code § 11.134(b)(2). In making such a determination, the TCEQ uses historic stream flow records. *See* 30 Tex. Admin. Code § 297.42(c). The drought of record, and any other drought that occurred during the period of record, is incorporated into the historic stream flow records. The resulting naturalized flows provide the baseline for water availability. In this manner, past droughts limit the amount of water available for appropriation. See Chapter 12 of this book for a more thorough discussion of how historic stream flow records are used in the TCEQ's Water Availability Modeling (WAM).

In addition to the role that drought plays in determining water availability, drought also affects other TCEQ requirements for water rights applications; namely, almost every application for a new or amended water right requires the submission of a drought contingency plan before the TCEQ will consider such applications administratively complete. *See* 30 Tex. Admin. Code § 295.9. See Chapter 9 of this book for additional discussion of drought contingency plan requirements for water rights applications. For a thorough discussion of drought contingency plans, see section III below.

II. The State's Responses to Drought Crises

At least one serious drought has plagued parts of Texas in every decade in the twentieth century. Because every decade has been marred by at least one severe drought, the phenomenon of drought is hardly cyclic in nature and makes predictability a "formidable chore." Robert F. Riggio et al., *Texas*

Drought: Its Recent History, 1931-1985 61 (Texas Water Commission 1987). As a subtle phenomenon characterized by too little rain for too long a period of time, fewer severe droughts manifest in "varying intensities in some parts of Texas virtually every year." Riggio et al., at 61.

The most catastrophic drought to strike Texas was the mammoth dry spell that afflicted every sector of the state in the 1950s. Riggio et al., at 1. Near the drought's end in 1957, all but ten of Texas's 254 counties were declared federal drought disaster areas. Texas Water Resources Institute, Texas A&M University, *The Drought of the 1950s*, 22 Tex. Water Resources 4 (1996). Many other droughts, some lasting only a few months and others continuing for several years, have dealt harshly with Texas during the twentieth century. Riggio et al., at 61. According to climatologists, the drought that began in October 2010 may ultimately exceed the drought of the 1950s for many parts of the state. Chris Tomlinson, *In 2013, Texas Drought Could be Worst Ever in Some Areas, Climatologist Says*, Associated Press, Feb. 5, 2013, *available at* www.huffingtonpost.com/2013/02/05/2013-texas-drought-worst-ever-climate-change_n_2624106.html. The drought occurring 2007 through 2009 is considered by the Office of the State Climatologist to be separate from the current drought, which the governor proclaimed beginning in late 2010. *See* John W. Nielsen-Gammon, Office of the State Climatologist, *The 2011 Texas Drought: A Briefing for the Texas Legislature* (Oct. 31, 2011), *available at* http://climatexas.tamu.edu/files/2011_drought.pdf; *Proclamation by the Governor of the State of Texas*, March 9, 2015, http://gov.texas.gov/news/proclamation/20631.

The General Accounting Office (GAO) first reported in 1979 that, despite this inevitable nature of drought, the traditional mind-set of government in the United States was to react to drought through emergency assistance to affected areas of the nation. Despite the obvious limitations of this method of dealing with drought, many of the statutes and regulations pertaining to drought in the state of Texas focus on crisis management. As will be discussed in later sections of this chapter, there is currently a shift in policy toward a more proactive planning approach to drought. However, that is not to say that planning will ever completely mitigate or prevent the negative impacts of droughts. Therefore, there will always be a need for governmental entities to have the power to step in and provide assistance during the crises caused by inevitable drought situations. The remaining portions of this section describe the responsibilities and authorities of the governor, the Texas Commission on Environmental Quality, and the Texas Water Development Board to respond to crisis situations caused by serious drought.

A. The Office of the Governor

The governor's role in responding to drought situations is typically confined to providing assistance in the form of governmental aid. However, in a serious water shortage, the governor has broader authority to mobilize people and resources to address emergencies. The Texas Disaster Act of 1975 (the Disaster Act) gives the governor broad powers to declare a state of disaster and respond to such disasters. *See* Tex. Gov't Code ch. 418. The Disaster Act specifically includes drought in the definition of "disaster." *See* Tex. Gov't Code § 418.004(1). The governor, by executive order or proclamation, may declare a state of disaster if the governor finds that a disaster has occurred or that the occurrence or threat of disaster is imminent. Tex. Gov't Code § 418.014(a). Upon declaring such a disaster, the governor has broad power to intervene to provide relief in a serious water shortage emergency. The governor may even go so far as to commandeer private water resources or "reassign resources, personnel, or functions of State executive departments" in coping with a disaster. *See* Tex. Gov't Code § 418.017(c). In the drought that began October 2010, Governor Perry invoked section 418.016 of the Government Code in disaster proclamations. The proclamations suspend "all rules and regulations that may inhibit or prevent prompt response to [the drought] threat" for the duration of the disaster. See Governor's Emergency Disaster Proclamation, signed July 5, 2011, and renewed multiple times as of March 9, 2015, for many counties, available on the governor's Web site at http://

gov.texas.gov/news/proclamation/. The TCEQ issued at least seventeen temporary water right permits or amendments good for the duration of the disaster proclamations with certain procedural requirements waived pursuant to the governor's proclamations. However, in most drought situations, it is more likely that the governor's disaster relief will entail economic relief.

To qualify for certain federal relief for a drought disaster, the governor must first take appropriate response action under state law, including a declaration of a disaster. *See* 42 U.S.C. § 5170. For major disaster relief, such as aid from the Federal Emergency Management Agency, the president must declare a major disaster for the area. *See* 42 U.S.C. § 5191. The president will make such a declaration based only on a finding that effective response is beyond the "capabilities of the State and affected local governments and that Federal assistance is necessary."42 U.S.C. § 5191.

In most drought scenarios, there is not a need for such drastic federal intervention. If federal assistance is needed, lesser measures such as low-interest Farm Service Agency loans from the U.S. Department of Agriculture (USDA) will more likely be initiated. The USDA is authorized to disperse aid with a presidential declaration of a major disaster or a designation by the secretary of agriculture or an administrator. *See* State of Texas Drought Preparedness Council, *State Drought Preparedness Plan* (Feb. 15, 2006), *available at* www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/droughtPrepPlan.pdf. In January 2006 and again in March 2009, Texas Governor Rick Perry declared a drought disaster for all 254 counties in Texas and requested that the USDA begin implementing its disaster relief loan program. Press Release, Office of Governor Rick Perry, *Perry Declares Statewide Drought Disaster* (Jan. 19, 2006), *available at* http://texaslivingwaters.org/wp-content/uploads/2013/04/tlw-news-1-19-06.pdf; Letter from Governor Rick Perry to U.S. Secretary of Agriculture Tom Vilsack (Mar. 6, 2009), *available at* texasagriculture.gov/Portals/0/DigArticle/1508/28675_DroughtWaiver.pdf.

To assist the governor in his efforts, the Drought Preparedness Council was created by the 76th Legislature in 1999. *See* Tex. Water Code § 16.055(b). The council creates the drought preparedness plan to identify drought conditions and direct and coordinate relief efforts. This topic is discussed in more detail in section III below because it falls within the category of planning for response rather than strictly reactionary response.

The role of the office of the governor in responding to drought may be categorized as primarily economic or disaster relief. For the most part, statutes and rules that more specifically affect water rights in a time of drought are within the purview of the TCEQ.

B. The Texas Commission on Environmental Quality

When drought occurs, the TCEQ has specific authority to grant emergency relief to water rights holders and water users. The TCEQ's authority arises out of the general authority granted under section 5.501 of the Texas Water Code, which provides that the TCEQ may issue a temporary or emergency order that is "mandatory, permissive, or prohibitory" and by such an order "issue a temporary permit or temporarily suspend or amend a permit condition." *See* Tex. Water Code § 5.501(a). The TCEQ has adopted procedures for emergency and temporary orders. *See* 30 Tex. Admin Code chs. 35, 36. With respect specifically to water rights and water use, four additional provisions address emergency relief measures that the TCEQ may take.

First, in a drought emergency, the TCEQ may suspend permit conditions "relating to beneficial inflows to affected bays and estuaries and instream uses if the commission finds that an emergency exists that cannot practicably be resolved in another way." *See* Tex. Water Code §§ 5.506(a), 11.148(a); 30 Tex. Admin. Code § 35.101. Second, under Water Code section 5.506(a-1), fresh water inflow set-asides established pursuant to Water Code section 11.1471 for each river basin and bay system in the state may be made available temporarily for other beneficial uses during an emergency. *See* Tex. Water Code §§ 5.506(a-1), 11.1471. See Chapter 11 of this book for further discussion of environmental flows. Outside of the emergency relief found in Water Code section 11.148, the TCEQ may issue an emergency order under Water Code section 11.139. If the TCEQ finds that "emergency conditions exist which present an imminent threat to the public health and safety and which override the necessity to comply with established statutory procedures," the TCEQ may issue an emergency order under Water Code section 11.139 for 120 days and renew that order for an additional sixty days. Tex. Water Code § 11.139(a). Finally, Water Code section 11.053 gives the executive director the authority to temporarily suspend or adjust water rights during a period of drought or other emergency shortage of water based on the priority of the water rights. *See* Tex. Water Code § 11.053(a). See Chapter 13 of this book for further discussion of drought suspension orders. In recent dry years, several applications have been filed with the TCEQ under these provisions.

During a period of drought in 2006, the Lower Colorado River Authority (LCRA) filed an application for an emergency order to suspend the instream flow requirements for its Permit No. 5715, calling on the TCEQ's authority under Water Code sections 5.506, 11.139, and 11.148. *See* Texas Commission on Environmental Quality, TCEQ Docket No. 2006-1091-WR. The LCRA estimated in July 2006 that the Lometa Reservoir had only ninety to one hundred days of usable water supply. If granted, this emergency order would have allowed the LCRA, by reducing its required instream flows, to divert more water out of the Colorado River into the Lometa Reservoir, which supplied LCRA customers in the City of Lometa. In a July 18, 2006, letter to the LCRA, the executive director of the TCEQ declined the request and, in doing so, commented that the LCRA had implemented only the first stage of its drought contingency plan. The executive director also concluded that because the LCRA had not taken steps to limit nonessential water usage, the LCRA had not shown that there was an "imminent threat to public health, safety, and welfare that overrides the necessity to comply with general procedures for changing a water right." Essentially, the executive director determined that the LCRA had failed to meet its burden under 30 Texas Administrative Code section 35.101(a)(1) and (2) by not instituting sufficient drought conservation measures and by failing to explore other feasible alternatives. The LCRA then took its request to the TCEQ commissioners.

Ultimately, the LCRA withdrew its request for the emergency order in a May 4, 2007, letter to the TCEQ. The LCRA cited an emergency interconnect agreement with the City of Lampasas and higher than average rains in the spring of 2007 as the reasons the emergency situation was abated. Although the commissioners did not have an opportunity to comment on the request for the emergency order, the executive director's response at least gives guidance to the water rights community that a request for extraordinary emergency relief must be accompanied by a demonstration that serious drought measures have been instituted and the feasibility of alternative solutions has been thoroughly explored. This interpretation of 30 Texas Administrative Code section 35.101 by the executive director seems to have been codified in section 11.053 of the Water Code, which was enacted by the 2011 legislature. *See* Tex. Water Code § 11.053(b)(4). See also the discussion of section 11.053 in Chapter 13 of this book.

During the current drought, the LCRA has repeatedly sought emergency relief under Water Code sections 5.501, 11.138, and 11.139 as well as the governor's emergency disaster proclamation. Beginning in 2011 and over the following four years, the LCRA applied for emergency orders to temporarily amend its 2010 Water Management Plan. The LCRA requested and was granted permission to curtail releases of interruptible stored water from the Highland Lakes for downstream irrigation. *See* Texas Commission on Environmental Quality, TCEQ Docket Nos. 2011-2096-WR; 2013-0225-WR; 2014-0124-WR; 2014-1044-WR. The LCRA based its request on the fact that inflows into the Highland Lakes were significantly lower than anticipated, and with persistent drought conditions releases of interruptible water could cause storage levels to fall below 600,000 acre-feet, which would have far-reaching implications for all of the LCRA's water customers.

Water Code section 11.139 allows the commission to grant an emergency order to amend an existing permit if the commission finds that emergency conditions exist that "present an imminent threat to the public health and safety and which override the necessity to comply with established statutory procedures and there are no feasible practicable alternatives to the emergency authorization." Tex. Water Code § 11.139(a). Additionally, "[i]f an imminent threat to the public health and safety exists which requires emergency action before the commission can take action . . . the executive director may grant an emergency authorization." Tex. Water Code § 11.139(f). After the executive director issues an emergency order, the TCEQ commissioners must hold a hearing to affirm, modify, or set aside the executive director's order. *See* Tex. Water Code § 11.139(f).

For each of the LCRA's requests to curtail releases of interruptible water, the executive director found an imminent threat to the public health and safety and granted the LCRA's requests to temporarily amend its 2010 Water Management Plan in accordance with Water Code section 11.139. Specifically, the executive director found that if stored water is released and water to the LCRA's firm customers is reduced before alternatives can be developed, the LCRA will have difficulty in meeting its firm customers' water needs. The TCEQ commissioners then affirmed or affirmed and modified each of the executive director's emergency orders. *See* Texas Commission on Environmental Quality, TCEQ Docket Nos. 2011-2096-WR; 2013-0225-WR; 2014-0124-WR; 2014-1044-WR. The LCRA also sought and was granted relief to temporarily suspend permit conditions related to beneficial inflows to bays and estuaries and instream uses during the spring of 2014 and 2015. Specifically, the LCRA sought to amend its water management plan to reduce the requirement to maintain a minimum streamflow of 500 cubic feet per second for six weeks between March and May of 2014 and 2015 from Bastrop to Eagle Lake for the Blue Sucker. *See* Texas Commission on Environmental Quality, TCEQ Docket Nos. 2014-0438-WR; 2015-0219-WR. The LCRA requested that its applications be processed under Water Code sections 5.506, 11.139, or 11.148 as appropriate and the governor's emergency disaster proclamation related to drought. The TCEQ granted the LCRA's request to reduce the streamflow requirements for six consecutive weeks between March and May from Bastrop to Eagle Lake in accordance with Water Code section 11.148.

In response to Dow Chemical Company's senior priority calls on November 14, 2012, and June 26, 2013, the TCEQ's executive director issued suspension orders in the Brazos River Basin in accordance with Water Code sections 11.027 and 11.053 and 30 Texas Administrative Code chapter 36. *See* Texas Commission on Environmental Quality, TCEQ Docket Nos. 2012-2421-WR; 2013-1253-WR. The executive director's orders suspended water rights in the basin below Possum Kingdom Reservoir with priority dates on or after February 14, 1942. See Chapter 13 of this book for further discussion of drought suspension orders.

C. The Texas Water Development Board

The Texas Water Development Board (TWDB) also has authority to provide water rights-related relief during times of water shortage. Under the storage acquisition fund, the TWDB is authorized to use state treasury dollars for projects "including the design, acquisition, lease, construction, reconstruction, development, or enlargement in whole or part of any existing or proposed water storage project." Tex. Water Code § 15.302(a). The water owned by the TWBD may be released "with or without charge, to relieve any emergency condition arising from drought, public calamity, or any other reason causing a severe water shortage, if the [TCEQ] first determines the existence of the emergency, and requests the board to release water to alleviate the emergency condition." Tex. Water Code § 15.325(a). As the TWBD becomes involved in more water supply projects, the importance of these provisions is likely to increase.

III. A Proactive Approach to Drought

In the late 1980s, a comprehensive study of droughts in Texas was conducted using monthly National Weather Service rainfall data at many sites from 1931 to 1980. Droughts were defined by the "quantity and duration of rainfall events." Precipitation data were normalized to account for differences in rainfall between arid west Texas and humid east Texas. Droughts covering three, six, and twelve months were identified and classified by their severity, duration, and location. The study results revealed that it was more likely that a six-month or year-long drought would occur somewhere in Texas than a near-normal or wet-weather spell for the same period. Additionally, droughts that lasted at least six months were expected once every sixteen months, while droughts lasting more than a year were likely to visit Texas once every three years. Droughts lasting six months or less occurred more frequently in west Texas, and longer droughts were found most often in north Texas. Riggio et al., at 61. Clearly, drought is a perpetual antagonist for the state. Therefore, it is crucial that drought is fully understood and anticipated if Texas is to ensure that its citizens will have an adequate supply of water in the future.

Unfortunately, drought is not just a condition of rainfall levels; it is also greatly influenced by water demands. A relatively minor drought (in terms of low rainfall) becomes a major concern as the population and water use increase. For Texas, the population is expected to almost double in the next fifty years, from about 25 million in 2010 to about 46 million in 2060. *See* Texas Water Development Board, *Water for Texas 2012* 4 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/. Additionally, municipal water demand is projected to increase from almost 5 million acre-feet in 2010 to just over 8 million acre-feet in 2060. 2012 State Water Plan, at 3. Hence, drought seems certain to continue to affect municipal water users in the coming years.

The 2012 State Water Plan (discussed below) estimates that there were shortfalls in Texas of around 3.6 million acre-feet of water per year during drought conditions in 2010, and that estimated shortage jumps to 8.3 million acre-feet per year during similar conditions in 2060 if Texas does not implement new water supply projects or management strategies. 2012 State Water Plan, at 4. It is evident from these projections that drought contingency planning in Texas is imperative.

Because widespread periods of drought conditions emphasize vulnerability, there is a need for a proactive approach to drought management that places emphasis on preparedness planning. Efforts have been made to reduce the nationwide vulnerability to drought. Unfortunately, droughts are often dealt with poorly. They are "too rarely documented, critically analyzed, and shared with other regions." *Water Management During Drought*, at xii. It is generally agreed that a proactive approach to drought management is a more effective mitigation tool than the reactive approach. Donald A. Wilhite, *Drought Planning: A Process for State Government*, 27 Water Resources Bull. 29 (1991) [hereinafter *Drought Planning*]; *see also* National Drought Policy Commission, U.S. Department of Agriculture, *Preparing for Drought in the 21st Century* (2000), *available at* http://govinfo.library.unt.edu/drought/finalreport/fullreport/reportdload.htm.

A. Planning for Drought

The state has done much to create a more proactive planning approach to drought, including the development of state, regional, and local water plans; the creation of drought response and preparedness plans; and, perhaps most important, the required development of drought contingency plans by regulated communities.

1. The State and Regional Water Plans

After the drought of record that occurred across Texas in the 1950s, the state began creating and implementing a state water plan. Section 16.051 of the Texas Water Code requires the TWDB to "prepare, develop, and adopt a comprehensive state water plan that incorporates the regional water plans approved under Section 16.053 [of the Texas Water Code]." Tex. Water Code § 16.051(a). The purpose of the plan is to quantify and develop the state's water resources with an eye on future population growth and to remain mindful that drought can and does inevitably occur in Texas. The goal of the plan is to meet the water needs of the state's communities, agricultural and business interests, and the environment even in times of severe drought.

Plans were adopted in 1961, 1968, 1984, 1990, 1992, 1997, 2002, 2007, and 2012. *See* Texas Water Development Board, *State Water Planning*, www.twdb.texas.gov/waterplanning/swp/. In 2002, the state established the current five-year system of adopting and amending the state water plan. *See* Tex. Water Code § 16.051(a). Since 2002, the state uses a "bottom-up" approach by incorporating into the state water plan the regional water plans developed under section 16.053 of the Water Code. The TWDB designates representatives from many different interest groups to serve on the regional planning groups throughout the state. The regional water planning groups use current state and local plans (*see* Tex. Water Code §§ 16.053, 16.055) to develop regional plans.

The implementation of the state water plan is important to water rights holders, water suppliers, and the rest of the water community because the plan defines the extent of water use in the state. The TCEQ can grant an application for state water only if the proposed appropriation "addresses a water supply need that is consistent with the state water plan and the relevant approved regional water plan for any area in which the proposed appropriation is located, unless the commission determines that conditions warrant waiver of this requirement." Tex. Water Code § 11.134(b)(3)(E). See Chapter 20 of this book for a more detailed discussion of this topic.

2. The Drought Preparedness Plan

The state drought preparedness plan is separate from, but complementary to, the state water plan. *See* Tex. Water Code §§ 16.055, 16.0551. The purpose of the plan, when viewed in conjunction with section 16.055 of the Texas Water Code, is to quickly identify when drought conditions are occurring and to coordinate a fast, efficient response plan for dealing with all levels of drought emergencies. This plan serves as a bridge between planning and response measures. The plan does not attempt to eliminate drought emergencies, but instead focuses on quickly identifying when a drought is occurring and then facilitating a fast and efficient response.

The plan is created by the Drought Preparedness Council, which is composed of representatives of many related governmental entities and other representatives of the governor's choosing and is headed by the state drought manager. The state drought manager is, by law, the coordinator of the division of emergency management of the office of the governor. *See* Tex. Water Code § 16.055(a). The goal of the council is to create a well-coordinated intergovernmental response in a drought emergency. Therefore, it is imperative that the council give clear direction and centralize control of the relief efforts.

To facilitate the council's objectives, the state drought preparedness plan includes a system of drought monitoring and data collection by which drought situations can be identified. The plan also includes five "levels of concern" by which threat levels can be effectively quantified and communicated to the appropriate authorities and the general public: Level 1—Advisory, Level 2—Watch, Level 3—Warning, Level 4—Emergency, and Level 5—Disaster. Four "phases for emergency management" provide a chronological timetable for what actions should be taken and when: mitigation, preparedness, response, and recovery. *See* Drought Preparedness Council, *State Drought*

Preparedness Plan (2006), *available at* www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/droughtPrepPlan.pdf.

3. Drought Contingency Planning

Drought contingency planning is a proactive approach that addresses one area of disaster preparedness. Drought contingency planning is a principal tool to improve responses to drought. *See* Donald A. Wilhite et al., *Planning for Drought: Moving from Crisis to Risk Management*, 36 J. Am. Water Resources Assn. 697 (2000).

A distinction must be made between water conservation planning and drought contingency planning. The goal of water conservation planning is to achieve lasting, year-round water use efficiency improvements for the purpose of extending existing water supplies. By contrast, a drought contingency plan is focused on a temporary supply management and demand management response to temporary and potentially recurring water supply shortages and other water supply emergencies. *See* Turner Collie & Braden Inc., *Drought Contingency Planning Survey and Evaluation Report of Findings and Recommendations: Report Prepared for the Texas Commission on Environmental Quality* 2 (1998). See Chapter 23 of this book for a discussion of conservation planning.

As stated above, the primary purpose of drought contingency planning is to ensure an uninterrupted supply of water in an amount sufficient to satisfy essential human needs. Another purpose of the drought contingency plan development process is to "improve mitigation efforts through more timely, effective, and efficient assessment and response activities." *See Drought Planning*, at 29. Experience, the expectation of future droughts, and the desire to improve future response efforts are also key factors in the decision to pursue plan development. *See Drought Planning*, at 30.

Preparedness and planning measures are "strong determinants of whether a community will reduce its future vulnerability during a disaster," while the lack of preparation may increase the vulnerability of communities to a disaster. David A. McEntire et al., *A Comparison of Disaster Paradigms: The Search for a Holistic Policy Guide*, 62 Pub. Admin. Rev. 267, 274 (2002). Drought plans are the "foundation for improved drought management in the United States." *Improving Drought Management*, at 16. During the droughts of 1986 and 1988, fewer than half of the water utilities surveyed in the U.S. had a drought contingency plan in place; however, the suppliers that had a drought contingency plan in place improved the effectiveness of water demand management measures. *See* David H. Moreau & Keith Little, *Managing Public Water Supplies During Droughts: Experiences in the United States in 1986 and 1988* iii, Water Resources Institute Report No. 250, University of North Carolina (1989).

B. Required Drought Contingency Plans

Because drought is such a frequent event in Texas and because of population and water demand projections, drought contingency planning has become the norm for entities with water rights, entities supplying water to others, and local governments with jurisdiction over groundwater production. In the past, such planning was initiated solely as the result of policy decisions made by these entities. Now such planning is required by various statutory and regulatory schemes.

Additionally, as was illustrated by the executive director's decision in the LCRA's Lometa Reservoir request for an emergency order discussed above, the creation and enforcement of a drought contingency plan are objective standards by which the TCEQ can make a decision to provide equitable relief in a drought emergency. Essentially, the more severe the drought restrictions implemented, the more likely the entity will make its showing that relief is warranted.

1. The TCEQ Requires Drought Contingency Planning

Texas Water Code section 11.1272 requires, through the implementing rules adopted by the TCEQ, that all wholesale and retail public water suppliers and irrigation districts in Texas develop drought contingency plans. *See* Tex. Water Code § 11.1272. The heading and placement of section 11.1272 often leads to some confusion. It is located among various requirements for those applying for and holding water rights and is titled, "Additional Requirement: Drought Contingency Plans for Certain Applicants and Water Right Holders." However, the statute, and the implementing rules found in 30 Texas Administrative Code chapter 288, impose drought contingency plans on all described entities without reference to whether the entities are water right holders. The chapter 288 rules can also be somewhat confusing because they address both water conservation planning and drought contingency planning and do not consistently make a distinction between the two very different types of plans.

Be this as it may, wholesale and retail public water suppliers and irrigation water suppliers are required to submit drought contingency plans to the TCEQ, regardless of their source of water supply. *See* 30 Tex. Admin. Code ch. 288. Sections 288.20 and 288.22 mandate that the drought contingency plans for retail public water suppliers and wholesale water suppliers address public involvement, drought response triggering criteria, successive stages of response criteria, drought response management measures, enforcement, and plan adoption. *See* 30 Tex. Admin. Code §§ 288.20, 288.22; *see also* Tex. Water Code § 11.1272(b), (c). Section 288.21 requires that drought contingency plans for irrigation water suppliers address irrigation system user input, coordination with regional water planning groups, triggering criteria, allocation methods, procedures for use accounting, enforcement, and plan adoption. *See* 30 Tex. Admin. Code § 288.21.

Retail public water suppliers that provide water service to 3,300 or more connections, wholesale public water suppliers, and irrigation districts are required to submit to the TCEQ their drought contingency plans with their initial application for a water right, if any. All of these entities faced an initial deadline and are required to submit the plans to the TCEQ for review every five years thereafter. 30 Tex. Admin. Code § 288.30(5)–(7). After submitting their initial drought contingency plans to the TCEQ, retail public water suppliers with fewer than 3,300 connections are not required to submit their plans every five years but are required to make the plans available to the TCEQ if requested by the executive director. 30 Tex. Admin. Code § 288.30(5)(B).

2. Groundwater Conservation and Subsidence District Drought Contingency Plans

Texas groundwater conservation districts (GCDs) and subsidence districts are not subject to Texas Water Code section 11.1272 because they are not water suppliers; they are governmental entities responsible for managing groundwater use within their boundaries. *See* Tex. Water Code §§ 36.001(1), (15), 36.0015; Tex. Spec. Dist. Code tit. 6, subtit. H ("Districts Governing Groundwater").

GCDs must adopt a management plan that outlines their goals and the steps needed to reach those goals. One of the goals of a GCD management plan is to address drought conditions. *See* Tex. Water Code § 36.1071(a), (e); 31 Tex. Admin. Code § 356.52(a)(1)(F). Generally, GCDs adopt drought contingency plans to reach this management goal. These are sometimes found in their rules, and other times are adopted as stand-alone requirements. The drought contingency plans apply to well owners within the district. In districts that include municipalities or retail water suppliers, the drought contingency plans of the GCD and those entities may be inconsistent.

In addition, under Water Code section 36.113(c), a GCD may require an applicant for a groundwater production permit to have a drought contingency plan. *See* Tex. Water Code § 36.113(c)(7). Under this provision, some districts have adopted rules requiring various groundwater users within their jurisdiction to develop drought contingency plans. Often, this creates another overlap of drought contingency plan requirements, particularly for municipalities or other retail public water suppliers located in a GCD, because these entities have drought contingency plans required by Water Code section 11.1272.

The overlap of these various drought contingency plans—a districtwide plan, a plan included in permit requirements, and a plan developed under section 11.1272—can cause confusion when plans are mandated by both the state and the groundwater conservation district, particularly when the elements required by the different regulating entities are not identical. This could result in two separate drought contingency plans being developed for the same water system to meet dueling plan requirements. Therefore, the better practice would be for groundwater conservation districts to ensure that their drought contingency plan rules do not conflict with 30 Texas Administrative Code chapter 288 or to coordinate with retail water suppliers in their district. See Chapter 16 of this book regarding GCDs.

Similar situations arise within subsidence districts. Groundwater production permits issued by subsidence districts may impose a whole host of requirements on permittees relating to the protection of groundwater resources, including compliance with drought restrictions. *See* Tex. Spec. Dist. Code §§ 8801.158(d), 8834.209(d). See also Chapter 16 of this book regarding subsidence districts.

C. The TCEQ's Model Drought Planning Approach

In an effort to assist retail public water suppliers in Texas, which primarily supply water for municipal use, the TCEQ hired Turner Collie & Braden Inc. to develop a model drought contingency plan. *See* Texas Commission on Environmental Quality, *Drought Contingency Plan for a Retail Public Water Supplier* (rev. May 5, 2005), *available at* www.tceq.texas.gov/assets/public/permitting/watersupply/drought/20191.pdf. The model plan includes the quintessential components expected to be in an ideal drought contingency plan for retail suppliers of municipal water. These elements include public involvement, drought response triggering criteria, successive stages of response, drought response management measures, enforcement, and plan adoption.

The model plan was developed to serve as a tool to assist public administrators of retail public water suppliers in designing their required drought contingency plans to ensure that each component of the plan would meet the requirements of 30 Texas Administrative Code chapter 288. The water suppliers can use the model plan either to create their drought contingency plans or to develop a plan on their own. However, if a water supplier completes the model plan using the supplier's system-specific data, the plan would meet the requirements of chapter 288. *See* Tex. Water Code § 11.1272(e) (requiring the TCEQ and the TWDB to jointly develop model drought contingency programs and best management practices for different types of water suppliers for water use reductions achievable during periods of water shortages and drought).

After the model plan was developed, the water supply community was notified about the existence of the model via mail and a series of drought contingency planning workshops conducted by the TCEQ throughout Texas. The purpose of the workshops was to educate public administrators of water supply systems about the regulatory requirements of drought contingency plans and to instruct them on the use of the model plan. The workshops reached more than twelve hundred individuals representing approximately eight hundred retail public water suppliers in Texas. The workshops provided information about all elements of the plan. These elements are summarized in Table 1.

Table 1: Ideal Elements for a Municipal Drought Contingency Plan

Ideal Element	Source
Public Involvement • Public involvement in plan preparation • Notification to water users of plan initiation and termination • Program of continuing public education and information	**Campbell, Heather, and Robert Marshall.** 2000. Public involvement and planning: Looking beyond the one to the many. *International Planning Studies* 5, no. 3: 321–44. **Creighton, James L.** 1980. *Public involvement manual: Involving the public in water and power resources decisions.* U.S. Department of the Interior. **Glicken, Jessica.** 1999. Effective public involvement in public decisions. *Science Communication* 20, no. 3: 298–328. **King, Cheryl, and Camilla Stivers.** 1998. *Government is us: Public administration in an anti-government era.* Thousand Oaks, CA: Sage Publications. **McEntire, David A., Christopher Fuller, Chad W. Johnson, and Richard Weber.** 2002. A comparison of disaster paradigms: The search for a holistic policy guide. *Public Administration Review* 62, no. 3: 267–81. **Pierce, John C., and Harvey R. Doerksen.** 1976. *Water politics and public involvement.* Ann Arbor, MI: Ann Arbor Science Publishers. **Thomas, John C.** 1993. Public involvement and government effectiveness: A decision-making model for public managers. *Administration & Society* 24: 444–69. **Turner Collie & Braden Inc.** 1998. *Drought contingency planning survey and evaluation report of findings and recommendations: Report prepared for the Texas Commission on Environmental Quality.* **United States Army Corps of Engineers.** April 1, 1993. *Drought Contingency Plan*, ETL 1110-2-335. **Wilhite, Donald A.** 1991. Drought planning. *Water Resources Bulletin* 27, no. 1: 29–38.
Drought Response Triggering Criteria • Monitoring of drought indicators • Triggering criteria for the initiation of response stages • Triggering criteria for the termination of response stages	**McEntire, Fuller, Johnson & Weber** (2002) **Prasifka, David W.** 1988. *Current trends in water-supply planning.* New York: Van Nostrand Reinhold Company. **Turner Collie & Braden** (1998)
Successive Stages of Response • Reduction in available water supply • Production or distribution system limitations • Supply source contamination • System outage	**McEntire, Fuller, Johnson & Weber** (2002) **Turner Collie & Braden** (1998)

Ideal Element	Source
Drought Response Management Measures • Water supply management measures • Water demand management measures	**McEntire, Fuller, Johnson & Weber** (2002) **Prasifka** (1988) **Turner Collie & Braden** (1998)
Enforcement and Plan Adoption • Procedures for enforcement of any mandatory water use restrictions • Procedures for granting variances (exceptions) to the plan • Official adoption of the plan by the governing body	**Turner Collie & Braden** (1998) **Wilhite, Donald A.** 1997a. *Improving drought management in the West: The role of mitigation and preparedness.* Report to the Western Water Policy Review Advisory Commission, National Drought Mitigation Center.

IV. Conclusion

Every aspect of Texas water law and water regulation is designed with the next inevitable drought in mind. The laws and regulations managing water resources in the state contain both drought preparedness and drought response measures. Each method serves a unique function. Preparedness involves planning ahead to mitigate the negative effects of drought, while drought response includes measures to allow the government to intervene when planning measures have failed to prevent disaster. Each new drought will provide lessons and guidance on how to plan for the state's water needs and will renew the urgency to make more efficient use of the state's limited water resources.

CHAPTER 23

Water Conservation

Karen Guz[1]

I. Introduction

Texas has never been more serious about water conservation. The 2012 State Water Plan began with this clear message: "In serious drought conditions, Texas does not and will not have enough water . . . ." Texas Water Development Board, *Water for Texas 2012* iii (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/. The challenges outlined in the plan are not new: fast-growing population, declining water supplies, and higher water demand from new economic drivers. Unique to this state plan is strong urgency for Texans to act. Conservation is a priority strategy, accounting for 34 percent of new water supply by 2060. Conservation efforts should make more than 2 million acre-feet of water available for new growth, a yield higher than that expected from the plan's twenty-six new reservoirs. *See* 2012 State Water Plan, at 186.

On the heels of receiving the 2012 State Water Plan, the Texas legislature approved $2 billion from the Texas Rainy Day Fund to implement state water plans, stipulating that a minimum of 20 percent of the funding be used for conservation and reuse. See Chapter 37 of this book, which discusses financing water projects. At the peak of the 2011 drought, 99 percent of Texas was in extreme or exceptional drought conditions. *See* 2012 State Water Plan, at 14. As the drought lingered for years, it is not surprising that state legislators have placed enhanced requirements pertaining to implementation of conservation and drought contingency plans, have a sharper focus on water losses within water systems, and are now considering legislative action removing barriers to conservation improvements or drought enforcement.

Areas of Texas with high population growth are particularly motivated to plan carefully and to include conservation as a strategy. Robert Puente, CEO and President of San Antonio Water System, often states, "Twenty thousand people are coming to San Antonio each year, and not one of them is arriving with water." Personal Communication (Apr. 2015). Population shifts to urban settings mean that municipal water demand is growing. Municipal consumption currently accounts for only 9 percent of total water consumption but will account for up to 41 percent of water use by 2060. *See* 2012 State Water Plan, at 4. Reducing municipal per capita water usage will make the growth in this sector less problematic, but municipal water needs are still expected to grow by 8.4 million acre-feet. *See* 2012 State Water Plan, at 136.

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Agriculture is and will remain the largest water use sector in Texas. However, agricultural use is expected to shrink over time. By 2060, agricultural efficiency and reduced agricultural activity is expected to reduce agricultural water demand by 17 percent. *See* 2012 State Water Plan, at 141. Improving agricultural water efficiency is not just a goal for many regions but is a necessity. The Texas Panhandle has experienced precipitous drops in the Ogallala Aquifer during recent years that exceed the rate of recharge even in nondrought years. *See* 2012 State Water Plan, at 32.

A noteworthy driver of water conservation is the Endangered Species Act (ESA). In the large area of Texas underlain by the Edwards Aquifer, the ESA has been an impetus for water conservation. The Edwards Aquifer has become a highly regulated water source primarily because of the need to manage endangered species habitat in springs. See Chapter 32 of this book regarding the ESA. Because of such regulations, entities such as the San Antonio Water System have initiated extensive water conservation planning. *See* San Antonio Water System, *2012 Water Management Plan* (2012), *available at* www.saws.org/Your_Water/WaterResources/2012_WMP. Conservation priorities in the region could expand as a result of the Edwards Aquifer Recovery Implementation Program (EARIP), which has included regional water conservation as one of the near-term strategies for species protection. *See* Edwards Aquifer Authority, *Habitat Conservation Plan*, www.edwardsaquifer.org/legislation-and-rules/habitat-conservation-plan. See also Chapter 17 of this book.

Subsidence has spurred increased conservation programs as well, especially in the eastern Gulf coast area of the state. Groundwater withdrawals have resulted in the largest area of significant subsidence in the United States. *See* Devin Galloway et al., *Land Subsidence in the United States* 35–48, U.S. Geological Survey Circular 1182 (1999), *available at* http://pubs.usgs.gov/circ/circ1182/pdf/07Houston.pdf. Subsidence solutions depend on careful regulation of groundwater withdrawals. Because conversion to surface water supplies is expensive, subsidence regulators have encouraged water users to consider conservation as one strategy to decrease their dependence on groundwater. Lone Star Groundwater Conservation District, *Groundwater Management Plan* (readopted Nov. 12, 2013), *available at* www.twdb.texas.gov/groundwater/docs/GCD/lsgcd/lsgcd_mgmt_plan2013.pdf. See also Chapter 16 of this book for discussion of subsidence districts.

This chapter discusses water conservation progress in Texas, including statewide conservation planning and reporting requirements, and the distinction between conservation, efficiency, and drought management.

II. Water Conservation: Agriculture, Energy, and the Environment

Additional conservation drivers may emerge across Texas as existing supplies are used heavily during peak demand periods. Already the need for power, agricultural products, healthy ecosystems, and protection of endangered species has added to the urgency to conserve water. Adverse consequences of not meeting long-term conservation goals include lower quality of life, reduced economic output, agricultural production challenges, and reduced power capacity. *See* Susan Combs, Texas Comptroller of Public Accounts, *Liquid Assets: The State of Texas' Water Resources* 72, Publication #96-1360 (Feb. 4, 2009), *available at* http://comptroller.texas.gov/specialrpt/water/2009/PDF/96-1360-LiquidAssets.pdf.

A. Agriculture

Agriculture is a significant economic driver for Texas and the largest consumer of water. In many regions, agricultural production is not possible without supplemental irrigation. Nationwide agricultural consumption is declining with levels in 2010 reported as the lowest since 1965. *See* Molly A. Maupin et al., *Estimated Use of Water in the United States in 2010* 1, U.S. Geological Survey Circular 1405 (2014), *available at* http://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf.

Conservation of water and improved agricultural yields can be accomplished through changes in land management, crop selection, and irrigation scheduling. *See* Texas Water Development Board, *Agricultural Water Conservation, Irrigation Water Use Management, Best Management Practices* 8, *available at* www.twdb.texas.gov/publications/brochures/conservation/doc/AgBrochure2_irrigation.pdf [hereinafter *TWDB Agricultural Irrigation BMP*]. A recent analysis of the Texas High Plains suggests there could be a reduction in water demand of up to 14 percent and improved crop yields if evapotranspiration management for crops and irrigation improvements were further expanded. *See* P.D. Colaizzi et al., *Irrigation in the Texas High Plains: A Brief History and Potential Reductions in Demand* (2008), *available at* www.cprl.ars.usda.gov/wmru/pdfs/Colaizzi%20et%20al%20ICID%20Irrigation%20in%20the%20Texas%20High%20Plains.pdf. Technical information and funding assistance for changes in irrigation practices is available through programs administered by the TWDB, which has disbursed over $65 million in funding for agricultural conservation since 1985. See Chapter 37 of this book for a discussion of TWDB funding.

Despite progress, it is difficult to know the total impact of agricultural efficiency efforts, as water withdrawals are largely unmetered for agricultural uses and thus water usage volumes are estimates based on crop and weather data. This lack of reliable data can be addressed through continued financial assistance for installation of flow meters, well monitoring, and other technology that both assists in crop management and in tracking total consumption. *TWDB Agricultural Irrigation BMP*, at 6.

B. Energy

Water delivery and treatment of wastewater consume significant amounts of power and, conversely, production of power requires vast amounts of water. It is not uncommon for a water utility to be one of the largest consumers of power, and the electric utility supplying that power is often one of the largest consumers of water. The good news is that water withdrawals for power production are declining nationwide. The United States Geological Survey 2010 Water Use Report found a 20 percent reduction in water withdrawals used for thermoelectric power production since 2005. Maupin et al., at 1. Analyses of what is called the "water energy nexus" have suggested that additional data should be gathered on long-term energy needs of wastewater treatment and on the withdrawal needs of power production. *See* Ashlynn S. Stillwell et al., The University of Texas at Austin, Environmental Defense Fund, *Energy-Water Nexus in Texas* (Apr. 2009), *available at* www.edf.org/sites/default/files/Energy_Water_Nexus_in_Texas_1.pdf. As the state expands industrial opportunities and gains population, the growing need for power will lead to new analyses of using conservation to address related water needs.

Most significantly, synergy savings occur in both power and water use when either resource is conserved. As growing water and energy needs are analyzed, there will be more of an emphasis on these projections and connections. Already nine states have statutes that recognize the nexus between water and energy. *See* National Conference of State Legislatures, *Overview of the Water-Energy Nexus in the United States* (updated Feb. 19, 2014), www.ncsl.org/research/environment-and-natural-resources/overviewofthewaterenergynexusintheus.aspx. See also Chapter 40 of this book regarding the water-energy nexus.

C. The Environment

As water consumption has grown, stakeholders have increasingly demanded that ecosystems be allocated adequate water during the water planning and management processes. Ecosystem needs for water include spring flows, environmental flows in rivers, and freshwater supply to bays and estuaries. Of primary concern is how water is allocated during dry periods and drought in order to avoid excessive stress to aquatic ecosystems. Kevin Mays, *Texas, The State of Rivers, Introduction* 1 (July 2004). During the 2007 legislative session, the importance of maintaining healthy surface water ecosystems was codified in Senate Bill 3. *See* Act of June 16, 2007, 80th Leg., R.S., ch. 1430. Under S.B. 3, a series of scientific analyses and stakeholder recommendations have been implemented and environmental flow regulations have been adopted. See Chapter 11 of this book for a discussion of environmental flows and S.B. 3. The degree to which the environmental flows process will impact conservation efforts is unknown, but at a minimum it adds complexity to the challenge of allocating limited water resources during dry times.

III. Distinguishing between Conservation, Efficiency, and Drought Management

Conservation, efficiency, and drought management are all strategies to save water. Discussions about water may lead listeners to assume the terms are interchangeable, but using the words as if they are synonymous leads to confusion. Consider the statement, "There is a great need to conserve water during drought." Does the sentence reference the need for temporary water use regulations, the need to accelerate adoption of efficient plumbing fixtures, or the need to alter water-using behaviors? All three strategies could be implied, or only one.

A. Distinguishing Conservation from Drought Management

Conservation and drought management are distinguished in how state agencies view required "conservation plans" and required "drought plans." The Texas Commission on Environmental Quality (TCEQ) defines conservation plans as focusing on daily, permanent changes in usage patterns. Conservation is proactive and "can extend water supplies and potentially prevent the necessity of implementing a drought contingency plan." Texas Commission on Environmental Quality, *Handbook for Drought Contingency Planning for Retail Public Water Suppliers* 3 RG-424 (Apr. 2005), *available at* www.tceq.texas.gov/assets/public/comm_exec/pubs/archive/rg424.pdf. In contrast, drought management plans are defined as contingency plans intended to help communities cope with temporary shortages in water supply.

The difference between long-term efforts to extend water supplies and coping with temporary shortages influences the methods used for conservation and drought contingency planning. Drought management plans often focus on immediate reductions through regulations on usage. Long-term conservation endeavors use combinations of strategies that lead to permanent reductions in all water use sectors. In contrast, drought reductions are generally achieved through temporary regulations aimed at uses that can be temporarily reduced with no adverse consequences to health and human safety and minimal impact on economic prosperity.

The Texas Water Code and the Texas Administrative Code define conservation as practices "to increase the recycling and reuse of water so that a water supply is made available for future or alternative uses." Tex. Water Code § 11.002(8)(B); 30 Tex. Admin. Code § 288.1(4). Within conservation plans, efficiency may be one of the strategies used to save water. "At a fundamental level, water conservation involves managing existing water supplies to reduce demand and increase efficiency of use." Texas Water Development Board, 2 *Water for Texas 2007* 259 (2007), *available at* www.twdb.texas.gov/waterplanning/swp/2007/. Conservation denotes an actual reduction of water used over time, while efficiency refers to how water is used for a particular practice. See Chapter 22 of this book regarding drought management and planning.

B. What Is Efficiency?

The term "water efficiency" refers to practices that maximize water use per volumetric unit of water supplied. Thomas Chesnutt et al., *Water Efficiency Programs for Integrated Water Management* 7, AWWA Research Foundation (2007), *available at* www.waterrf.org/PublicReportLibrary/91149.pdf. Tremendous gains have been made in the past decade making plumbing fixtures and appliances more water efficient. Showerheads, faucets, urinals, washing machines, and dishwashers are all available in water-efficient designs. For example, older toilets use up to 5 gallons per flush while high-efficiency toilets remove waste using no more than 1.28 gallons per flush. Some of these designs have been documented as both water efficient and effective and have received a United States Environmental Protection Agency (EPA) WaterSense label. Additional information on the WaterSense partnership program can be found on the EPA's Web site at www.epa.gov/watersense/about_us/what_is_ws.html.

There is little doubt that efficiency efforts will be a critical component of meeting long-term conservation goals. Efficiency programs have been documented to save up to 39 percent on standard indoor home usage. *See* Aquacraft, Inc. & U.S Environmental Protection Agency, *Water and Energy Savings from High Efficiency Fixtures and Appliances in Single Family Homes* 3 (2005), *available at* www.allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/residential/showers/Aquacraft(2005)EPA-Single-Family-Retrofit-Studies-Combined-Report.pdf. Retrofits and changes in management to increase water use efficiency have likewise shown impressive reductions for commercial and industrial customers in case studies. The Pacific Institute estimates that industrial and commercial water consumption in California could be reduced by up to 39 percent with widespread implementation of currently existing practices and technologies. Peter H. Gleick et al., *Waste Not Want Not: The Potential for Urban Water Conservation in California* 2, Pacific Institute (Nov. 2003), *available at* www.pacinst.org/wp-content/uploads/sites/21/2013/02/waste_not_want_not_full_report3.pdf. This illustrates that there are opportunities for tremendous efficiency in all water-use sectors.

C. Distinguishing Efficiency from Conservation

Given how important efficiency strategies are to reducing water use, why does the distinction between water conservation and efficiency matter? The term *efficiency* implies that a reduction in consumption can be accomplished without apparent sacrifice. The term *conservation*, in contrast, may evoke a sense of doing without or giving something up. It is not surprising, then, that *efficiency* has become the more popular term. An American Rivers report includes this comparison of the two terms:

> Water efficiency is different from water conservation which, while also important, is generally more focused on changing behavior and habits like turning off the tap while brushing your teeth.
>
> Water efficiency does not mean doing less. Water efficiency isn't about asking citizens to shower once a week or plant a cactus in the front yard.

Jenny Hoffner, *The Hidden Reservoir: Why Water Efficiency Is the Best Solution for the Southeast* 10, American Rivers, Inc. (Oct. 2008), *available at* www.americanrivers.org/assets/pdfs/reports-and-publications/SE_Water_Efficiency_Oct_2008_opt3534.pdf?0658fa.

The challenge of using efficiency as the only path to save water becomes apparent when discretionary uses are analyzed. Automatic irrigation systems are efficient at applying water to landscapes, but this ease of application contributes to significantly higher consumption in homes with irrigation systems. Analysis of residential water use patterns illustrates that homes having automatic irrigation systems consume significantly higher volumes of water than homes that rely on manual methods of watering landscapes. *See* William B. DeOreo & Peter W. Mayer, *Residential End Uses of Water Study Update*, Water Research Foundation (forthcoming 2016). Even when using assumptions of best practices, efficient irrigation technology, and regionally appropriate plant material, calculated water budgets for home landscapes can be higher than all indoor water usage combined. *See* U.S. Environmental Protection Agency, *WaterSense Water Budget Approach and Tool* 4–5 (Nov. 20, 2008), *available at* www.allianceforwaterefficiency.org/WorkArea/DownloadAsset.aspx?id=2544.

The idea that efficient technology does not always prevent a resource from being overtaxed is not new. This phenomenon was first described by English economist William Stanley Jevons in 1866, who noted that steam engine efficiencies were resulting in a net increase in the total consumption of coal. The "Jevons paradox" has been applied to many environmental challenges to demonstrate that efficiency measures alone may not decrease the rate at which a resource is depleted. John M. Polimeni et al., *The Jevons Paradox and the Myth of Resource Efficiency Improvements* (Earthscan 2008). As illustrated above, practices can be highly efficient but still consume large amounts of water.

In contrast, water conservation includes "any beneficial reduction in water use or losses." Duane D. Baumann et al., *Water Conservation: The Struggle Over Definition*, 20 Water Resources Res., no. 4, Apr. 1984, at 428. By defining water conservation as including "reduction in water use or losses," it is clear that conservation programs should result in lowered water usage over time. Although this sounds similar to efficiency, the key distinction is that an efficiency program may not ultimately result in net lowered consumption. For example, newer showerheads apply water at a lower gallons-per-minute rate than older ones. Despite this, one study suggests that savings from low flow showerheads are in part diminished because those who use such showerheads take longer showers. *See* William B. DeOreo & Peter W. Mayer, *Residential End Uses of Water* 134, AWWA Research Foundation (1999), *available at* www.waterrf.org/publicreportlibrary/rfr90781_1999_241a.pdf [hereinafter DeOreo & Mayer 1999]. This example illustrates that while efficient technology and standards are important, they do not always guarantee a desired conservation result.

Outdoor water use is an area where both efficiency and conservation have a role in saving water. There is tremendous variability in outdoor consumption of water, even when lot sizes and landscape materials are taken into account. DeOreo & Mayer 1999, at 193. The choice to have extensive landscaping maintained in a continually lush state is one that consumes large amounts of discretionary water regardless of how efficiently the water is applied. An efficiency approach would seek to ensure that no water is wasted in the application of water but would not suggest changes in plant material, a reduction in the irrigated area, or applying water at a rate less than optimal for plant appearance. A conservation approach, however, would suggest changing expectations to include nonirrigated areas, selection of plants needing little or no supplemental water to survive, and watering at least some plants less than what is considered to be ideal. Irrigation audits offered at homes and businesses can identify both efficiency opportunities and conservation opportunities. It is rare that people will refuse efficiency opportunities, but not everyone is willing to embrace conservation options.

Regulatory efforts to save water encompass both conservation and efficiency. Conservation regulations address how water is used on a permanent basis such as requiring that new homes install no more than half of a landscape in grass. Efficiency regulations may require a cost-effective conservation technology such as air-cooled ice makers instead of water cooled.

Once water-efficient technology becomes comparable in price to more water-intensive options, it is not difficult to get stakeholders to transition permanently to the efficient technology. Obstacles to mandated use of efficient technology can in part be overcome by providing sufficiently long transition periods to allow stakeholders to prepare for the change. An example is a 2012 San Antonio ordinance mandating that only water-efficient washing machines be installed at common use locations by January 1, 2020. *See* San Antonio Code of Ordinances § 34-273(9). On the other hand, achieving community agreement on conservation regulations that overtly mandate a change in habit or limit a perceived freedom is generally more challenging. An example is a city of Austin ordinance that permanently limits use of spray irrigation on landscapes to no more than twice per week without regard to drought conditions. *See* Austin Code of Ordinances § 6-4.

D. Impact of Drought on Saving Water

Extended drought periods blur the lines of regulations that begin as temporary drought regulation measures but become permanent. As communities experience extended drought periods, it is logical that some rules will be dismissed as ineffective while others may be codified as year-round requirements once they are judged as reasonable. The Austin outdoor watering ordinance described above is one example. Similarly, several Dallas area communities codified early-stage drought restrictions as year-round, making it clear that spray irrigation may not be used more than twice per week. *See* Dallas Water Utilities, *Frequently Asked Questions*, http://savedallaswater.com/faq/. Drought regulations may also accelerate adoption of conservation choices. During the dire drought conditions of July 2014, the Metropolitan Water District of California reported receiving a record number of rebate applications seeking to replace a total of 7.2 million square feet of turf. *See* Association of California Water Agencies, *Turf Rebate Programs See a Surge of Interest*, www.acwa.com/content/water-supply-challenges/turf-rebate-programs-see-surge-interest. Drought may also expand attitudes from efficiency-only to embracing a conservation outlook. Until recently the California Landscape Contractors Association took the position that as long as plants were efficiently irrigated, it was acceptable for citizens to choose landscape styles requiring significant supplemental water. During a drought-themed webinar in April 2015, the organization announced its revised view and codified the new outlook in a policy statement that embraces "transformation to the new norm" including recognizing grass as a "high-water-use plant." California Landscape Contractors Association, *CLCA Statement on Landscape Water Conservation*, http://clca.org/clca/legislation/issuesWater.php.

The rest of this chapter is organized around the three water-savings strategies of conservation, efficiency, and drought management, describing mechanisms and legal considerations for each.

IV. State-Level Conservation Requirements

Conservation has been embraced at the state, municipal, and local levels. As mentioned at the beginning of this chapter, the 2012 State Water Plan has embraced conservation more strongly than any previous plans. The state has instituted other conservation management, planning, and implementation programs, as described below.

A. Conservation in the State Water Plan

The 2012 State Water Plan shows water planning groups in Texas doubling down on their commitment to use water conservation as a strategy to meet future water needs. While conservation saves water and thus reduces demand, it is considered a new water supply in the state's water planning process. In other words, a gallon of water conserved is a gallon of new water that increases the overall supply of water in the state. See Chapter 20 of this book for a discussion of state water planning.

The panhandle portion of Texas (Region A) expects that 86 percent of its new water needs in 2060 will be met by conservation. 2012 State Water Plan, at 34. In contrast, relatively water-rich East Texas (Region I) sets its conservation target at 7 percent of 2060 volumes. 2012 State Water Plan, at 80. The differences are not surprising because they reflect the geographical and economic diversity of Texas. When the conservation targets are totaled, they are expected to supply more water than would twenty-six planned new water reservoirs. 2012 State Water Plan, at 186. The amount of water demands expected to be met from water conservation has increased in each of the last three state water plans. While this focus on water conservation in planning is positive, it is clear that regions must be successful in reaching conservation goals, or there will be significant water shortfalls in future decades.

It is notable that many small communities represented within planning groups listed conservation as their primary water strategy. Some water utilities representing small communities have pressing water needs but modest budgets and few staff available to implement water conservation options. Additionally, widespread conservation can impact a water utility's revenue as customers stop using water even though the utility has the same costs to maintain its system. Growing suburban communities like Georgetown and Round Rock are particularly concerned that they address their water use patterns. Personal Communication from Jessica Woods, Water Conservation Program Coordinator, City of Round Rock, Texas, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2014).

Regional water providers have banded together to create planning groups to enhance their efforts. The first network formed was the Water Efficiency Network of North Texas (WENNT), which includes cities around the Dallas metroplex. (The name of this group illustrates that the distinction between efficiency and conservation discussed above is not always made.) WENNT helps to ensure standard conservation messaging in a large urban area divided by municipal jurisdictions. Personal Communication from Denise Hickey, Public Relations Coordinator, North Texas Municipal Water District, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2014). Two newer networks include the Central Texas Water Efficiency Network (CTWEN) and the Montgomery County/Gulf Coast Water Efficiency Network (GCWEN). The CTWEN has hosted five water conservation symposiums in the Central Texas region, and the GCWEN has hosted four water conservation symposiums in the Houston area. Information on events hosted by these two groups can be found at the Texas Living Water Web site, http://texaslivingwaters.org/conferences. The networks and workshops have been a cost-effective strategy to enhance the professional skills of water utility staff, a way to share ideas, and a catalyst for shared public education initiatives. Personal Communication from Nora Mullarkey Miller, Conservation Manager, Lower Colorado River Authority, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2014).

The 2012 State Water Plan includes an astounding amount of agricultural conservation accounting for new water in the future. Irrigation and other conservation strategies are expected to yield 1.5 million acre-feet per year.

B. Water Conservation Task Force

The Texas legislature has taken many steps to ensure that water conservation strategies are successful. A Water Conservation Implementation Task Force was created by Senate Bill 1094 in the 78th Legislature to create statewide guidelines for water conservation. *See* Texas Water Development Board, *Special Report, Water Conservation Implementation Task Force, Report to the 79th Legislature* (Nov. 2004), *available at* www.savetexaswater.org/about/doc/WCITF_Report_2004.pdf [hereinafter

Task Force Special Report]. The group, consisting of a wide array of water stakeholders, was convened in 2003. The Task Force also issued a "Water Conservation Best Management Practices Guide," which has been widely downloaded. *See* Texas Water Development Board, *Report 362, Water Conservation Implementation Task Force, Water Conservation Best Management Practice Guide* (Nov. 2004), *available at* www.savetexaswater.org/doc/wcitfbmpguide.pdf.

The Task Force Special Report also includes many recommendations for realizing stronger statewide gains from water conservation to meet the future water needs of Texas. Those recommendations include creating a Water Conservation Advisory Council, establishing required reporting by water providers, using water conservation success as a criterion for state water funding, supporting state conservation education programs, supporting a water conservation public education campaign, creating a standard methodology for calculation of gallons per capita per day (GPCD), and setting a goal of 140 GPCD across the state. Many of these recommendations have been implemented, while others are in progress.

C. Water Conservation Advisory Council

The Water Conservation Advisory Council (WCAC) was created in 2007 by the 80th Legislature as a permanent group of stakeholders who "serve as a select and expert resource to state government and the public on water conservation in Texas." Texas Water Conservation Advisory Council, *Organizational Charter* (Nov. 16, 2007), *available at* www.savetexaswater.org/about/doc/Charter.pdf [hereinafter WCAC Charter]. The WCAC has twenty-three members from diverse water stakeholder groups. They work with TWDB staff and report on water conservation issues in even-numbered years. The mission of the group is "[t]o establish a professional forum for the continuing development of water conservation resources, expertise, and progress evaluation of the highest quality for the benefit of Texas—its state leadership, regional and local governments, and general public." Save Texas Water, Water Conservation Advisory Council, *About Us, Council Mission Statement*, www.savetexaswater.org/about/index.htm.

D. State-Mandated Conservation Plans and Progress Reports

In addition to state water planning and the establishment of a state advisory group on conservation, there have been significant changes in state law, including required conservation planning, conservation progress reports, and water loss reports. Two state agencies are responsible for water conservation education and reporting: the TWDB and the TCEQ. Both agencies collect conservation planning and reporting information. The water loss reports, because they focus specifically on saving water through efficiency measures, are discussed later in this chapter. This section addresses the conservation plans and progress reports.

1. *Water Conservation Plans*

Pursuant to 30 Texas Administrative Code section 295.9, a water conservation plan is a requirement for all surface water right holders and must be submitted to and approved by the TCEQ as part of the permitting and permit amendment process. 30 Tex. Admin. Code § 295.9. Additionally, 30 Texas Administrative Code section 288.30 requires certain surface water right holders to submit conservation plans to the TCEQ in addition to the plan submitted with a water right application under 30 Texas Administrative Code section 295.9. *See* 30 Tex. Admin. Code § 288.30. These include municipal, industrial, and other nonirrigation water rights holders with rights to 1,000 acre-feet per year or more. 30 Tex. Admin. Code § 288.30(1). These categories of water rights holders must submit an updated water conservation plan meeting the requirements of chapter 288, subchapter A, every five years to coincide with the regional water plan. 30 Tex. Admin. Code § 288.30(1). Water rights holders for irrigation in the amount of 10,000 acre-feet or more per year must do the same. *See* 30 Tex. Admin. Code § 288.30(3). Only a fraction of the water suppliers and water users, however, hold water rights.

Retail public water suppliers, regardless of the source of their water supply, must submit conservation plans under several different regulatory programs. Every five years, a retail public water supplier providing water service to 3,300 or more connections must submit to the TCEQ a water conservation plan consistent with chapter 288, subchapter A. New retail public water suppliers in this category must submit a plan within 180 days of beginning operations. *See* 30 Tex. Admin. Code § 288.30(10)(A).

Many entities applying to the TWDB for financial assistance under the programs covered by 31 Texas Administrative Code chapter 363 must submit a water conservation plan with their application. *See* 31 Tex. Admin. Code § 363.15(a). Exceptions include (1) if the board determines an emergency exists; (2) the amount of financial assistance to be provided is $500,000 or less; (3) the board finds that a water conservation program "is not reasonably necessary"; or (4) the financing is required for flood control purposes under Texas Water Code chapter 17, subchapter G. *See* 31 Tex. Admin. Code § 363.15(c).

The content of conservation plans required by the TCEQ and TWDB is similar. In general, plans must include five-year and ten-year targets with specific and quantified water savings, an implementation schedule, anticipated methods and measures to be used, rate information, and a description of the authority by which the water supplier will enforce the plan. Texas Water Development Board, *Water Conservation Plan Guidance Checklist*, TWDB Form 1968 (rev. Jan. 8, 2013), *available at* www.twdb.texas.gov/conservation/municipal/plans/doc/WCPChecklist.pdf. Plans submitted to the TCEQ and TWDB must include a utility profile using TWDB form 1965-R or 1965-W. With regard to water conservation plans required for TWDB financing, the TWDB will accept water conservation plans determined by the TCEQ to satisfy requirements of 30 Texas Administrative Code chapter 288. *See* 31 Tex. Admin. Code § 363.15(e), (f). The reverse is true for municipal uses by public water suppliers; conservation plans that are prepared in accordance with section 363.15 and that substantially meet the requirements of section 288.2 are accepted by the TCEQ. *See* 30 Tex. Admin. Code § 288.2(b). Every entity required to submit a conservation plan to the TCEQ must also submit a copy to the TWDB. *See* 30 Tex. Admin. Code § 288.30(10)(B).

2. Water Conservation Progress Reports

An entity required to submit conservation plans to either the TCEQ or the TWDB must submit annual reports on the entity's conservation progress. *See* 30 Tex. Admin. Code § 288.30(10)(C). The TCEQ requires conservation implementation reports once every five years. *See* 30 Tex. Admin. Code § 288.30(1)–(4). The TWDB progress reports are required for entities covered by 30 Texas Administrative Code sections 288.30(1) and (3). The reports must include dates and descriptions of implemented conservation measures, data about whether conservation targets in the previous plan are being met, and if not, an explanation, and the actual amount of water saved. *See* 30 Tex. Admin. Code § 288.30(2), (4). The TWDB Water Conservation Plan Annual Report form specifies further required information about GPCD calculations, estimates of total water savings, and reports on specific conservation programs such as education, rebates, rate structure, and metering. Water losses are also calculated and reported, as described in section VI.A below. *See, e.g.*, Texas Water Development Board, *Water Conservation Plan Annual Report*, TWDB Form 1966 (rev. Jan. 23, 2015), *available at* www.twdb.texas.gov/conservation/municipal/plans/doc/RWS_1966.pdf. Annual reports may be submitted electronically. *See* Texas Water Development Board, *Water Conservation Plan Annual Reports*, www.twdb.texas.gov/conservation/municipal/plans/ARs.asp.

Conservation reporting gained prominence as a result of House Bill 3605, which directs the TWDB to evaluate the financial assistance applications of all utilities serving more than 3,300 connections to determine compliance with the board's best management practices for conservation and to issue a report to the utility detailing the results. No later than January 1 of each odd-numbered year, the TWDB must also submit a written summary to the legislature detailing the results of the conservation program evaluations conducted. *See* Act of May 27, 2013, 83d Leg., R.S., ch. 1139, § 2 (eff. Sept. 1, 2013).

The resolution of GPCD reporting concerns was addressed by Senate Bill 660. *See* Act of May 29, 2011, 82d Leg., R.S., ch. 1233, § 11. This legislation directed the TCEQ and TWDB to work with the WCAC to develop GPCD metric calculation guidelines by January 1, 2013. The TWDB Conservation Report now distinguishes portions of GPCD by water use categories such as residential, commercial, and water loss. Guidance is provided on how to manage temporary and service populations for the GPCD calculations for cities where this is a challenge.

V. Conservation at the Municipal Level

Conservation is the goal not only at the state level. Municipalities and other local governments are also encouraging, and in some cases mandating, conservation. As municipal populations grow and development expands to serve the new population, conservation is becoming a more common and widespread issue at these local levels of government.

A. Legal Authority for Municipal Water Conservation Programs[2]

Statewide water conservation regulations have been established by legislation and the TCEQ and TWDB implementing regulations, as discussed above. Adoption and implementation of conservation measures by municipalities are increasing as cities strive to manage water resources for their growing populations. The authority for such regulation derives from several sources.

Article XVI, section 59, of the Texas Constitution declares that the conservation, preservation, and development of the state's natural resources, including water, are public rights and duties, and directs the legislature to pass all such laws "as may be appropriate thereto." This amendment, adopted in 1917, is commonly known as the Conservation Amendment. However, the legislature's response to this mandate for most of the next century focused on "development" and left conservation and preservation to fend for themselves. The amendment became the constitutional basis for the creation of a wide variety of water control and improvement districts and their resulting issuance of debt for the construction of dams, levies, irrigation systems, drainage improvements, water distribution infrastructure, and wastewater collection and treatment systems. See Chapter 7 of this book for a discussion of water districts. Conservation of water was not a legislative priority.

With increasing public awareness of the limitations on our future water supplies, this mindset has slowly begun to change. In 2007, the legislature adopted Texas Local Government Code section

2. Section V.A was written by Steve Kosub. Mr. Kosub is Senior Water Resources Counsel for the San Antonio Water System. His work encompasses a diverse array of current Texas water law issues. He received his B.A. in Political Science from Texas A&M University in 1974 and his J.D. from the University of Texas School of Law in 1977. Mr. Kosub is certified in administrative law by the Texas Board of Legal Specialization. He is a past chair of the Environmental and Natural Resources Law Section of the State Bar of Texas and is a frequent writer and speaker on water law, regulatory takings, and development issues. The comments and opinions expressed in this section are solely those of the author and do not reflect any policy or position of the San Antonio Water System.

551.007, authorizing home-rule municipalities to adopt and enforce ordinances requiring water conservation in the municipality and by its customers in the extraterritorial jurisdiction (ETJ) of the municipality. It might be argued that this grant of authority was icing on the cake for home-rule cities, which derive the full power of local self-government from the constitution and look to the legislature only for a limitation on that authority. *City of Houston v. State ex rel. City of West University Place*, 176 S.W.2d 928, 929 (Tex. 1943). Additionally, home-rule authority over water conservation may be inferred from the language of Local Government Code section 552.017, which gives such cities the right to own, construct, operate, and regulate a water system and to take the necessary action to operate and maintain the system and to require water customers to pay charges imposed for the water furnished. At a minimum, the addition of section 551.007 facilitates enforcement of conservation measures in a city's ETJ.

Unlike a home-rule municipality, a general-law city in Texas has only the authority that it is specifically given by the legislature or that may be reasonably inferred from an existing statute. *Massengale v. City of Copperas Cove*, 520 S.W.2d 824 (Tex. Civ. App.—Austin 1975, writ ref'd n.r.e.). Thus attorneys for general-law cities must satisfy themselves regarding the authority of their clients to impose and enforce conservation programs. Local Government Code section 552.015 seems to offer a reasonable bridge from the Conservation Amendment to a local ordinance for at least some general-law cities. Section 552.015 provides that a Type-A general-law municipality may provide for a municipal water supply system and may establish and regulate public wells, pumps, cisterns, hydrants, and reservoirs located inside or outside the municipality for the convenience of its residents, for firefighting purposes, and for the prevention of unnecessary waste of water.

The question of a city's authority to make and enforce regulations for water conservation is most visible when considering the increasingly more common restrictions on landscape irrigation, as discussed in section V.E below.

B. Water Conservation-Oriented Rates

Water conservation-oriented rates (WCORS) are used by many water providers to provide an incentive to customers for changing their water usage patterns. The term *WCORS* applies to many different strategies being used across the United States. An example is the use of seasonal rates, which increase the price of water during peak summer months to discourage the higher usage patterns that may drive utility expenses higher. Another example of WCORS is the use of differential indoor and outdoor rates, which address the same challenge by charging less for indoor water and more for outdoor water. A variety of WCORS measures target the highest users of water, such as excess usage rates, inclining block rates, and sliding scale rates. Young-Doo Wang et al., *Water Conservation-Oriented Rates: Strategies to Extend Supply, Promote Equity and Meet Minimum Flow Levels* 9 (American Water Works Association 2005). Regardless of the structure, the theme is to set the price of water higher as consumption increases. Customers targeted by the higher prices have considered legal challenges to these rate structures by labeling them an illegal tax. Personal Communication from Dan Crowley, former Director of Financial Planning, San Antonio Water System, to Karen Guz, Director of Conservation, San Antonio Water System (June 2011). Other challenges have focused on whether the higher rates are discriminatory against a particular customer class or without merit based on cost-of-service models. *See* American Water Works Association, *Principles of Rates, Fees and Charges—Manual of Water Supply Practices* 284 (5th ed. 2000) [hereinafter AWWA manual]. See also Chapter 36 of this book for discussion of the economics of water.

A review of rate challenges completed by the AWWA concludes that in municipal rate-setting cases it is generally true that the burden of demonstrating that a rate is unreasonable or discriminatory rests with the party challenging the rate. *See generally* Wang et al. This does not mean that municipal rates cannot be successfully challenged. To be defended against a challenge, such rates must be supported by evidence, such as engineering and financial models, showing that costs of service are higher for high-usage customers or during times of drought. An example of a successful rate defense is *Brydon v. East Bay Municipal Utility District*, 24 Cal. App. 4th 178 (Cal. Ct. App. 1994). This California case is of particular interest in Texas because the inclining block rate was put in place during a drought to discourage excess usage. A homeowner challenged the rate, claiming that it was a "special tax" requiring voter approval. On review, the court determined that the rate was in response to a community need to reduce consumption and, further, that the large amount of use was found in only 11 percent of the households served, which were using 35 percent of the water. The court concluded that "[t]o the extent that certain consumers over-utilize the resource, they contribute disproportionately to the necessity for conservation and the requirement that the District acquire new resources for the supply of domestic water." *Brydon*, 24 Cal. App. 4th at 202. Based on this type of case, rate experts recommend that utilities and cities be prepared with a factual basis for their rates, such as a cost-of-service study, analysis of user patterns, and how conservation-oriented rates should provide benefits to ratepayers. AWWA manual, at 285.

C. Funding Conservation Programs

Conservation programs are funded using a variety of methods. One option is to fund such programs through a traditional budget process using general revenue funds. For many utilities, these funds may have to be approved through utility trustees or the city council. Another funding option, and one that may be more politically acceptable, is to set aside dedicated rate revenue for conservation efforts. This method has the advantage of providing steady financial support over time and allows the program to effect changes over the long term. Customers may see water conservation as a positive goal and the conservation programs as having potential direct benefits to them. The San Antonio Water System established a dedicated conservation revenue structure in 1994 and added a commercial conservation revenue structure in 1998.

Although the ability of municipally owned utilities to set fees for services or dedicate revenue to conservation has not been challenged, there is not complete confidence among water utility groups that the option is universally available to all water providers. Clarification of this authority may be necessary through legislative action to assure wholesale providers and municipal utility districts that they may elect this mechanism to fund conservation.

Funding conservation activities through use of capital funds is an option used by a small number of utilities. Notably, the Southern Nevada Water Authority uses capital funding for its "cash for grass" programs that have succeeded in permanently altering the landscapes of Las Vegas. An argument against use of capital dollars for conservation lies in accounting regulations that expect the bond holder to retain control of the asset being financed. Personal Communication from Mary Baily, Comptroller, San Antonio Water System, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2015).

D. Landscape and Irrigation Design; Property Owners Associations

The EPA estimates that one-quarter of nonagricultural water use across the nation is for home and business lawn and garden irrigation. Benjamin H. Grumbles, *WaterSense Makes Good Sense*, 100 Journal AWWA, no. 5, May 2008, at 34. In Texas, household water use that is dedicated to landscapes ranges from under 20 percent in some communities to more than 50 percent in others, with a statewide average of 31 percent. Sam Marie Hermitte & Robert Mace, Texas Water Development Board, *The Grass Is Always Greener . . . Outdoor Residential Water Use in Texas* 12, Technical Note 12-01 (Nov.

2012), *available at* www.twdb.texas.gov/publications/reports/technical_notes/doc/seasonalwateruserreport-final.pdf.

Drought periods of recent years have raised the profile of complaints coming from citizens that property owners associations (POAs) have strict regulations preventing installation of less water-needy plant material. In 2013, the Texas legislature passed Senate Bill 198, which provides that a POA may prohibit or restrict a property owner from installing drought-resistant landscaping or water-conserving natural turf. *See* Act of May 20, 2013, 83d Leg., R.S., ch. 736, § 1 (amending Tex. Prop. Code § 202.007). The concern raised by POAs that their ability to manage neighborhood aesthetics and therefore property value would be impacted was balanced by allowing the POA to require landscape designs for review to ensure aesthetic compatibility with other landscaping in the subdivision. *See* Tex. Prop. Code § 202.007(d)(8). While design may be required, the limits of this were tempered with the added provision that a POA may not unreasonably deny the approval of a proposed installation of drought-resistant landscaping or unreasonably determine that the proposed installation is aesthetically incompatible. *See* Tex. Prop. Code § 202.007(d-1).

E. Enforcement of Landscape Irrigation Regulations

Local governments also regulate the use of landscape irrigation to achieve conservation goals. This is done through a variety of local ordinances or contract rules that are aimed at reducing waste and discouraging excess use. For example, water waste is illegal in municipalities such as Austin (*see* Austin Code of Ordinances § 6-4-63); San Antonio (*see* San Antonio Code of Ordinances § 34-288); and San Angelo (*see* San Angelo Code of Ordinances § 11.05.002). In addition, some municipalities have standard irrigation schedules to discourage excess usage. *See, e.g.*, Austin Code of Ordinances § 6-4-63.

Not only do municipalities restrict the times and days of landscape irrigation, they may also restrict other aspects of landscape irrigation usage. For example, the total size of spray irrigation systems has been limited to curtail high use at larger properties. *See* San Antonio Code of Ordinances § 34-273(2).

Despite these measures, the individual owner's right to irrigate and the need for conservation are still often at odds. Even in communities with a strong conservation ethic, debates often ensue about whether the regulations are reasonable or will alienate parts of the community. Marty Toohey, *City to Tighten Spigot on Water Use, Austin American-Statesman*, May 5, 2010, *available at* www.statesman.com/news/local/city-to-tighten-spigot-on-water-use-673094.html.

Analysis of public water system pumping data leaves little room for doubt that mandatory landscape irrigation schedules reduce water usage. In 2009, Austin Water implemented mandatory landscape irrigation schedules that set limited days for landscape irrigation using either automatic systems or hose-end sprinklers. These rules resulted in a more level peak demand and reduced consumption for high-use properties. Austin Water, *Leading Us to Water, The Austin Water Environmental Leadership Report 2010* 2 (2010), *available at* www.ci.austin.tx.us/water/downloads/envleadershipreport.pdf. The San Antonio Water System has drought rules prohibiting landscape watering except during specific times and days. Pumping data for the prohibited irrigation days shows pumping decreases up to 30 million gallons per day and overall pumping is lower when restrictions are in effect. Karen Guz, San Antonio Water System, *San Antonio's Experience with Drought of Record: Education, Citations and Big Savings*, WaterSmart Innovations 2010 Conference (Oct. 2010), *available at* www.watersmartinnovations.com. These results have encouraged other utilities to consider setting limits on the times and number of days when landscape irrigation with automatic systems or hose-end sprinklers may be used.

Adoption of regulations on irrigation usage may be completed through municipal ordinance processes or through actions of municipal utility districts. Municipal utilities such as the San Antonio

Water System have worked with their municipal governments to set rules and enforcement policies. Likewise, San Angelo has an extensive water conservation enforcement program. The city issues municipal citations to violators on a regular basis, and San Angelo water conservation staff report that incidents of water waste from irrigation have dramatically reduced since the program was implemented. Personal Communication from Toni Fox, Water Conservation Manager, City of San Angelo, Texas, to Karen Guz, Director of Conservation, San Antonio Water System (Dec.2010) [hereinafter Fox Personal Communication]; *see also* City of San Angelo, Water Utilities Department, www.sanangelotexas.org.

The real challenge in water waste enforcement is not the adoption of water waste rules but how to react to noncompliance. For utilities where city ordinances make violating water use regulations a crime, certified peace officers may be authorized to issue citations. These citations may then be adjudicated in local courts. Fox Personal Communication. The enforcement of city criminal ordinances has benefits and drawbacks. The benefits include a built-in mechanism for citizens to resolve a citation by challenging it in court and clear consequences if citizens do not resolve their violation by paying the citation or appearing in court. Drawbacks include the level of paperwork that may be required, potentially long time periods between violations and court resolutions, and the inability to enforce rules on customers not within the territorial jurisdiction or extraterritorial jurisdiction of the municipality. Water utilities often provide service to customers who reside outside of these boundaries, which complicates enforcement by local criminal statutes. Personal Communication from Dana Nichols, Conservation Manager, San Antonio Water System, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2015).

Several Texas jurisdictions have recently adopted noncriminal financial penalties for violations of water use regulations. Austin, Pflugerville, Georgetown, and Cedar Park all use administrative fines on water bills to discourage violators. According to the staff of the City of Austin's municipal water utility, Austin Water, these fines are allowed under state law. For example, Texas Local Government Code section 551.007 provides that a home-rule municipality "may adopt and enforce ordinances requiring water conservation in the municipality." Tex. Loc. Gov't Code § 551.007. Also, Texas Local Government Code section 54.001 gives authority to home-rule cities to assess fines not exceeding specific amounts. *See* Tex. Loc. Gov't Code § 54.001. Austin has administrative processes for citizens wishing to dispute their fines for violating rules of use. Personal Communication from Drema Gross, Water Conservation Manager, City of Austin, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 28, 2015).

Municipal utility districts (MUDs), like other utilities, face the challenges of managing peak demand and minimizing waste. Some have passed water waste regulations for their customers through resolutions approved by their boards. Texas Water Code section 54.205 authorizes the adoption of reasonable rules and regulations. *See* Tex. Water Code § 54.205. Such rules may be adopted to prevent waste or unauthorized use provided there is a justification for the rules. Section 54.206 treats such rules adopted by MUDs as if they are penal ordinances adopted by a city. *See* Tex. Water Code § 54.206. In theory, violators may be subject to fines each day. However, there has not been a test case of water waste fines being assessed by a MUD. The details of how a MUD would prove a violation and address customer challenges to the fines have not been resolved. This is an area where clarification of authority and processes may evolve in the next few years.

VI. Texas Efficiency Measures

As a subset of its water conservation measures, Texas has established reporting requirements and efficiency standards for plumbing fixtures and landscape irrigation. As discussed above, efficiency measures are usually more palatable to stakeholders than true conservation measures that seek to change a stakeholder's habits or lifestyle. This section discusses water loss reports, plumbing efficiency standards, and landscape watering efficiency standards.

A. Water Loss Reports

The issue of water loss has become high profile during recent Texas legislative sessions. As investments in new water supplies are contemplated at great cost, state leaders are understandably concerned with just how much existing water is lost. Texas was one of the first states to require water loss audits from utilities. Water Loss Audit requirements were enhanced by House Bill 857 in 2013 by the 83rd Legislature. *See* Act of May 16, 2013, 83d Leg., R.S., ch. 278, § 1 (eff. Sept. 1, 2013). Since 2014, all retail public water utilities serving a population of more than 3,300 must submit water loss audits to the TWDB by May 1 of each year. 31 Tex. Admin. Code § 358.6. House Bill 3605 increased the importance of the audits by amending Texas Water Code section 16.021 to require that any retail utility providing potable water that receives board financial assistance to use a portion of that financial assistance to mitigate the utility's water loss if, based on an audit filed by the utility, the water loss exceeds the threshold established by board rule. *See* Act of May 24, 2013, 83d Leg., R.S., ch. 1139, § 1 (eff. Sept 1, 2013). The thresholds for water loss have been established by board rule for each category of retail public utility listed in Water Code section 16.0121. The thresholds are further explained in 31 Texas Administrative Code section 358.6. Thresholds differ by size of utility and are based on water loss audit metrics associated with real and apparent losses.

Water loss auditing is a relatively new activity in the realm of public water supply. An international water loss audit methodology has been developed by the AWWA. At the heart of the audit is determining what amount of water produced by a utility is not delivered to a user or is delivered with no associated revenue collection. The difference between total water produced and total billed water is *nonrevenue water*. When expected and authorized unbilled uses, like fire-fighting and line flushing, are subtracted from nonrevenue water, the remaining amount is called *lost water*. *See* American Water Works Association, *M36 Water Audits and Loss Control Programs* (3d ed. 2009). Water losses are then allocated to *apparent losses*, water that was used but not accurately metered and billed, and *real losses*, water that left the system before reaching a user. A term that has fallen out of favor is *unaccounted for water*. More precise terminology has been adopted because a water loss audit should account for all water produced, place a financial value on the lost water, and help utility managers assess how all losses might be reduced.

B. Plumbing Fixture Standards

During the 81st Legislature, through House Bill 2667, Texas became the second state to implement high-efficiency plumbing standards for fixtures. Section 372.002 of the Texas Health and Safety Code was amended to require sinks or lavatory faucets to have a maximum flow not to exceed 2.2 gallons per minute at a pressure of 60 pounds per square inch (psi). *See* Act of May 21, 2009, 81st Leg., R.S., ch. 1316, § 2 (amending Tex. Health & Safety Code § 372.002). Showerhead standards were updated: maximum flow may not exceed 2.5 gallons per minute at a constant pressure of 80 psi. Tex. Health & Safety Code § 372.002(b)(4), (6). Urinals sold after January 1, 2014, must meet a standard of maximum flush flow of 0.5 gallons per flush, while the maximum flow of a toilet sold after January 1, 2014, shall not exceed 1.28 gallons per flush. Tex. Health & Safety Code § 372.002. The TCEQ maintains a current list of plumbing fixtures that are certified by the manufacturer to meet these savings performance standards. *See* Water Conservation Advisory Council, *A Report on the Progress of Water Conservation in Texas, Report to the 82nd Texas Legislature* 70 (Dec. 2010), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/2010_wcac_special_report_82nd_legislature.pdf.

New water-efficient fixtures are steadily introduced in the market. The EPA WaterSense program evaluates water-efficient fixtures expected to use at least 20 percent less than standard ones. Earning a WaterSense label further requires that the fixtures pass rigorous performance testing. Indoor fixtures earning the WaterSense label include high efficiency toilets, urinals, showerheads, and prerinse spray valves. *See* U.S. Environmental Protection Agency, *Products*, www.epa.gov/WaterSense/products/. Because the WaterSense program maintains updated lists of fixtures meeting the efficiency criteria, the program can be easily referenced in ordinances as a standard for construction or retrofits.

Prerinse spray valves are devices used in commercial kitchen cleanup operations. The EPA WaterSense standard for prerinse spray valves is no more than 1.28 gallons per minute. *See* U.S. Environmental Protection Agency, *Pre-Rinse Spray Valves*, www.epa.gov/WaterSense/products/prsv.html. The federal standard requires installation of prerinse spray valves using no more than 1.6 gallons per minute. *See* 10 C.F.R. § 431.266. Texas has not yet adopted a prerinse spray valve efficiency standard.

C. Landscape Irrigation Efficiency

Application of water by irrigation systems is a significant driver of municipal water consumption in Texas. San Antonio homes with irrigation systems use 50 percent more water than homes without them. *See* San Antonio Water System, *2014 Conservation Plan*, Narrative Section, at 7. If irrigation systems are poorly designed or poorly maintained, must of the water used is wasted. The Texas state landscape irrigation licensing program provides a mechanism to set standards for quality of irrigation systems and for their proper operation.

Texas is one of only six states to have a state landscape irrigation licensing program. Personal Communication from Brian Vinchesi, Chair of SWAT Irrigation Association, to Karen Guz, Director of Conservation, San Antonio Water System (May 13, 2011). The irrigation industry in Texas is regulated by the TCEQ through statutory authority granted through Texas Occupations Code chapter 1903 and Texas Water Code chapter 37. TCEQ regulations implementing this authority are found at 30 Texas Administrative Code chapter 30, subchapters A and D, and chapter 344. The standards for obtaining an irrigation license through the TCEQ are high, requiring training, testing, and continuing education credits. The license may be revoked or suspended and irrigators may also be required to take additional training to correct deficiencies. Advice on the landscape irrigation license and enforcement program is provided to the TCEQ by the Irrigator Advisory Council (IAC), comprising seven irrigators and two additional public members. Members of the IAC are appointed by the TCEQ for three-year terms. *See* Tex. Occ. Code ch. 1903; 30 Tex. Admin. Code ch. 344.

There are many detailed regulations for irrigation work in Texas, including requiring the use of individual license numbers on advertisements and trucks and individual seals on all irrigation installation plans. These requirements assist in enforcement efforts to ensure that irrigation work is not completed by unlicensed individuals. Clear identification requirements also allow accountability for rigorous quality standards.

Occupations Code sections 1301.056 and 1903.002 allow licensed plumbers to perform all irrigation services without an irrigation license. *See* Tex. Occ. Code §§ 1301.056, 1903.002(b)(2). Licensed engineers, registered architects, or a registered landscape architect can perform irrigation services if the acts are incidental to the pursuit of the person's profession. *See* Tex. Occ. Code § 1903.002(b)(2). Additionally, a license is not required if—

- the work is performed by a property owner on his property;
- a maintenance employee performs incidental repairs on property owned by the employer;
- the work is performed by a railroad employee on the premises of a railroad;

- the work is performed by an employee of a political subdivision of the state on public property; and
- the work is performed by a member of a POA on property owned by the association or in common with the association if—
  - the property is less than one-half acre, and
  - the property is used for aesthetic or recreational purposes.

See Tex. Occ. Code § 1903.002(c). Although no license is required, there is no exemption from design or safety standards for these individuals. 30 Tex. Admin. Code § 344.30.

In 2007, landscape irrigation standards and licensing requirements were strengthened through legislative direction. House Bill 4 and Senate Bill 3 directed the TCEQ to adopt rules for connection of potable water to irrigation, to define water conservation requirements for irrigation, and to clarify the duties and responsibilities of licensed irrigators. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1352 (H.B. 4); Act of May 28, 2007, 80th Leg., R.S., ch. 1430 (S.B. 3). The implementing TCEQ regulations were vetted through the IAC and statewide stakeholder groups. TCEQ compliance staff and IAC members held statewide education workshops and conducted meetings with professional associations to inform professional irrigators and municipalities of changes that became effective January 1, 2009.

One of the most significant new requirements is that either a licensed irrigator or licensed technician must be on-site during installation, maintenance, alteration, repair, or service of an irrigation system. This additional regulation resulted in the creation of a new irrigation technician training program, technician exam, and continuing education program, effective January 1, 2010. Texas Commission on Environmental Quality, Compliance Support Division, *Landscape Irrigation Program: Implementation*, RG-466 (Jan. 2009), *available at* http://tceq.texas.gov/publications/rg/rg-466.html [hereinafter TCEQ RG-466]. Licensed irrigation technicians may install, maintain, alter, repair, and service irrigation systems as well as connect them to water supplies as long as they complete their work under the direction of a licensed irrigator. *See* 30 Tex. Admin. Code §§ 344.30, 344.36. Since 2009, licensed irrigators have responsibility for completion of the irrigation system, conducting a final walk-through, completing a maintenance checklist, placing a permanent sticker on the automatic controller, and supplying a copy of the design plan to the owner or owner's representative. TCEQ RG-466, at 16.

Also enacted in 2007, House Bill 1656 established a licensing program for irrigation inspectors. *See* Act of May 22, 2007, 80th Leg., R.S., ch. 874, § 1 (H.B. 1656). The intent of the inspection license is to create a class of license holders qualified to work for area governments in the role of inspecting plans and irrigation installations. Thus, requirements for holding an inspector license are higher than those for other irrigation. Municipalities and water districts may use a plumbing or irrigation inspector to inspect and enforce a landscape irrigation ordinance. A water district may also employ the water district's operator or another regulatory authority with jurisdiction over landscape irrigation.

H.B. 1656 directed all municipalities with populations of more than 20,000 to adopt ordinances relating to irrigation. The municipal landscape irrigation ordinances must be at least as stringent as the TCEQ rules; require landscape irrigation installers to be licensed; require a permit before installation of an irrigation system within the territorial limits or extraterritorial jurisdiction of the municipality; and include minimum standards and specifications for design, installation, and operation of irrigation systems. *See* Texas Commission on Environmental Quality, Chapter 344—Landscape Irrigation, Rule Project No. 2007-027-344-CE, *available at* www.tceq.state.tx.us/assets/public/legal/rules/rule_lib/adoptions/07027344_ado_clean.pdf. Water districts may also adopt and enforce irrigation rules, and both municipalities and districts may collect fees to cover costs of the licensing program. These requirements do not apply to on-site sewage disposal, irrigation for agriculture operations, or irrigation connected to groundwater wells operated for domestic use. TCEQ RG-466, at 2.

If all the landscape irrigation standards of Texas were rigorously followed, there would be significantly less water waste, and landscape irrigation would be highly efficient. The ongoing challenge is to achieve a high degree of compliance through reasonable enforcement at the municipal or water district level. The TCEQ may take action to sanction irrigators if there is evidence that they have not followed professional license standards. Such enforcement is administratively challenging because of limited state resources. With regard to increasing the efficiency of landscape irrigation systems to achieve conservation results, Texas uses strong state irrigation regulations coupled with state encouragement of local enforcement. In 2011, House Bill 2507 made an important advancement in strengthening irrigation licensing in Texas, making it a Class C misdemeanor to install irrigation without an irrigation license. *See* Act of May 21, 2011, 82d Leg., R.S., ch. 324, § 1 (codified at Tex. Occ. Code § 1903.256). Although exceptions still apply for homeowners and plumbers, this law makes it possible to enforce regulations across the state against unlicensed individuals who are installing irrigation systems. This bill took effect September 1, 2011, and allows peace officers to file cases in any Texas court or citizens to file cases in Justice of the Peace courts against individuals who conduct irrigation installations without irrigation licenses.

Municipalities have expanded on irrigation efficiency mandates through local regulation. Regulations requiring a maintenance check or audit of large irrigation systems help ensure that systems are better maintained. The San Antonio Water System compared the summer consumption of large commercial landscapes that complied with its irrigation checkup ordinance against those that did not. Sites that failed to comply used an average of 54,500 gallons more per month in the summer than those that documented their maintenance efforts. Personal Communication from Chad Cosper, Conservation Planner, San Antonio Water System, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2015). The city of Austin has taken its irrigation checkup requirement further by mandating that it be completed by a qualified third-party individual who holds a TCEQ irrigation inspector license and is preapproved by Austin Water. *See* Austin Water, *Commercial Facilities Assessments*, www.austintexas.gov/department/commercial-facility-assessments.

VII. Long-Term Conservation Efforts: Demand Hardening

"It is often said that Texas' weather can best be described as drought punctuated by floods." 2012 State Water Plan, at 233. Drought is so central to water in Texas that the stated purpose of the 2012 State Water Plan is "to meet the state's needs for water during times of drought." 2012 State Water Plan, at 1. Texas must prepare for meteorologic droughts with limited precipitation, agricultural droughts with poor crop performance, and hydrologic droughts resulting in low water supplies. Conditions in 2011 made it clear that all of these could occur at the same time and affect up to 99 percent of the state at once. While conservation and efficiency planning may help mitigate drought, drought contingency plans are critical to managing extended dry periods. For this reason, all water utilities in Texas are required to have drought contingency plans. Water providers serving more than 3,300 connections must submit drought contingency plans to the TCEQ every five years. *See* 30 Tex. Admin. Code § 288.30(5). See Chapter 22 of this book regarding drought and drought planning.

An emerging concern regarding drought contingency planning is whether long-term conservation efforts inhibit the ability of a water provider to achieve additional water use reductions during drought periods. This concept is referred to as *demand hardening*. The Alliance for Water Efficiency organized a collaboration of seven utilities to study the phenomena. The study report provides extensive insight regarding how drought management plans achieve savings and concludes that "little evidence suggests that ability to curtail demand during shortages lessens as per-capita demand becomes more efficient on account of conservation programs and rates." Alliance for Water Efficiency, *Draft: An Assessment of Increasing Water Use Efficiency on Demand Hardening* 43 (Feb. 16, 2015). While the study is encouraging in its conclusion that demand can be reduced as needed even in already conservation-oriented communities, it does not conclude that achieving reductions will be easy. Researchers emphasize the importance of understanding current customer demand patterns and opportunities for savings as well as the importance of communication with customers who will respond best if they understand the need for immediate savings results.

VIII. Conclusion: How Can We Save More Water?

Texas scored an A minus on a water efficiency and conservation scorecard created by the Alliance for Water Efficiency and the Environmental Law Institute. The scorecard was developed because "state level laws and policies represent a powerful means to reduce water consumption in the United States." *See* Alliance for Water Efficiency & Environmental Law Insitute, *The Water Efficiency and Conservation State Scorecard: An Assessment of Laws and Policies* (Sept. 2012), *available at* www.allianceforwaterefficiency.org/2012-state-information.aspx. Most states earned a grade of C on conservation activities and only California tied with Texas for an A minus grade. There are twelve categories for which points are awarded: state agency in charge of drinking water, required efficiency standards, water loss statutes, conservation planning, drought planning, frequency of planning, implementation requirements, state funding for conservation, technical assistance for conservation, required volumetric billing, percent of public utility connections metered, and available evapotranspiration data for state microclimates. Texas scored well on many of these, but the total Texas score was only 29 on a scale of 40.

Texas requirements pertaining to conservation and drought planning were noted as particularly detailed in the scoring process. A missing element is a system of rating the quality of these plans and any consequences for failure to implement them. Texas is also advanced compared to most states in requiring water loss audits, but could benefit from a system to ensure validity of the data in the reports. Texas encourages utilities to use conservation-oriented rate structures, but making the use of such rate structures a statutory obligation would be more impactful. A comparison to other states on these matters is helpful for future considerations in Texas.

California has conservation plan requirements and requires targets based on state standards for expected reductions over time. This is a controversial step that Texas has not yet taken. Texas conservation plan requirements are thorough and require documentation that the plans have been adopted by a water board or city council. The Texas statute also states that plans could be rejected for failure to be complete. However, there is not a clear mechanism for state experts to review, approve, or reject plans based on how effective they will be for significantly reducing water use. Similarly, the strength of conservation efforts and planning are not metrics considered when water providers apply for new water permits. Plans with low long-term conservation savings will be accepted as part of new permit applications if they are administratively complete with all required documentation in place, and no effort is made to evaluate them further. Personal Communication from Chris Loft, Resource Protection Manager, Texas Commission on Environmental Quality, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2015).

The closest Texas has come to setting a conservation goal for municipal water providers is the total GPCD target of 140 that was suggested by the Water Conservation Implementation Task Force in 2004. No guidance was provided regarding whether this pertained only to large urban communities with significant industrial and commercial uses or also to communities with little industrial usage, which makes a significant difference. Without this, comparing GPCD data is like comparing apples and oranges. Confusion over the 140 GPCD target remains and is reflected in a study of municipal water uses completed for the East Texas Regional Water Planning Group. The study concluded that "per capita water use is below conservation targets set by the WCITF and therefore do not support the need for development of specific conservation strategies and projections of water conservation savings in Region I." *See* East Texas Regional Water Planning Group, *2007–2009 Regional Water Planning Study No. 3* 13 (Apr. 2009), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0704830694_RegionI/SpecialStudyNo3.pdf.

The WCAC recently clarified that a total per capita target or benchmark is inappropriate for comparisons of conservation progress between communities because total per capita includes demands such as industrial and commercial water consumption, which are likely to vary between communities. *See* Water Conservation Advisory Council, *A Report on Progress of Water Conservation in Texas, Report to the 82nd Legislature* (Dec. 2010), *available at* www.savetexaswater.org/about/doc/WCAC_Report_2010.pdf. A better metric would be to compare residential per capita that reflects water consumption in homes and apartments. The TWDB has standardized reporting of residential GPCD and could now suggest targets and reductions. These could be based on metrics that could include market penetration of water efficient fixtures and percentage use of discretionary water. Clear state level residential per capita targets would alleviate confusion and the idea that conservation should not be pursued below a total 140 GPCD.

Texas water loss control statutes compare well to those of other states. It is commendable that the majority of Texas utilities must complete an annual water loss audit. A good next step would be to improve audit quality. There is no required third-party review of audit validity in Texas. The TWDB reviewed audits collected in 2005 and found that many were incorrectly completed and that the resulting numbers should not be used to draw conclusions. *See* Texas Water Development Board, *An Analysis of Water Loss as Reported by Public Water Suppliers in Texas* (Jan. 24, 2007), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0600010612_WaterLossinTexas.pdf.

Water loss auditing is a relatively new process and will be challenging as utilities struggle to gather valid data needed for the audit and to understand how to use it. Validity of total water produced data is particularly important. If total annual water production is underestimated, the water loss audit will incorrectly conclude that there is little water loss. Currently the TWDB has no authority to question water loss audit reports, even when they seem implausible. A next step in raising the level of audit reporting would be to require documentation to back the rating given to production numbers and other key inputs as part of audit completion or to require a qualified third-party review of the audit on a regular schedule. For utilities with reported losses lower than what seem likely to be accurate, a third-party analysis could either confirm efficiency or provide better audit results.

Tennessee and Georgia have a strong focus on validity of water loss audits. Tennessee law directs state staff to review the quality of water loss audit reports and validity of data and allows state revolving funds to be used for training and validation services. *See* 2007 Tenn. Pub. Act 243. Similarly, the Georgia Water Stewardship Act signed into law in 2010 includes a requirement in section 12-5-4.1 of the Georgia Code that the Georgia Environmental Protection Division establish minimum standards for monitoring and improving the efficiency and effectiveness of water use by public water systems. *See* Ga. Code Ann. § 12-5-4.1 (West 2010). In pursuit of this mandate, on July 15, 2015, the Georgia Department of Natural Resources adopted new rules "for public water systems to improve the efficiency of water supply through the development and improvement of water loss abatement programs and to implement the industry's best management practices for controlling water loss by achieving recommended standards." Ga. Comp. R. & Regs. 391-3-33-.01, Purpose of Rule, eff. Aug. 4, 2015. These regulations create the most rigorous state water loss control program in the United States. By March 1, 2016, water providers will be required to complete annual water loss audits that must be certified by qualified water loss auditors and then reviewed by the Georgia Environmental Protection Division. *See* Ga. Comp. R. & Regs. 391-3-33-.04, Water Loss Audits. By July 1, 2016, water providers will be required to set improvement targets for validity of data, apparent and real losses, and several other technical audit specific metrics. *See* Ga. Comp. R. & Regs. 391-3-33-.05(1)–(3), Water Supply Efficiency Improvement. Finally, new water supply permits may be denied if a review indicates that the utility has "fail[ed] to demonstrate progress toward improving water supply efficiency." Ga. Comp. R. & Regs. 391-3-33-.05(3)(c).

It would not be surprising if Georgia water utilities protest the review requirements and specific targets as being too costly. A pilot project in Georgia demonstrated that certified water loss auditor reviews greatly improved audit findings but cost $1,000 per utility to complete. *See* Natural Resources Defense Council, *Water Audits & Water Loss Control for Drinking Water Utilities: Costs and Benefits* (updated Apr. 2, 2015), *available at* http://docs.nrdc.org/water/files/wat_15040301a.pdf. This cost per utility may sound high, but the amount of Texas water utility water loss reported is a staggering amount of more than 274 billion gallons per year. If even a small quantity of this could be conserved through improvements in water loss management, the relative cost of quality audit review would be minor. *See* Water Conservation Advisory Council, *Summary of State Water Loss Audits, available at* www.savetexaswater.org/doc/131119.WCAC-WL.pdf.

Texas was an early adopter of water efficiency requirements for toilets, urinals, and showerheads but did not obtain the highest scorecard grade for efficiency statutes. Efficient prerinse spray valves were too new to the market to mandate an efficiency standard for them in 2009 when the Texas legislature contemplated efficiency standards. Several states including Colorado have now enacted prerinse spray valve standards of no more than 1.28 gallons per minute. Texas could consider an update to its efficiency standards to add this class of fixtures and reference the EPA WaterSense standards.

The conservation scorecard did not evaluate state efforts to educate the citizenry on water issues. Texas would get a mixed score if they had. A 2014 survey of Texan attitudes toward water revealed that motivation regarding water is high but understanding of water supplies is still low. Water conservation is now the top environmental concern of citizens. *See* Texas Water Foundation, *2014 Survey Fact Sheet*. Despite this, only 28 percent of Texans could confidently identify the source of their drinking water. This is problematic because market research for the Water IQ Campaign (a TWDB campaign designed to increase public awareness about water and conservation) found that people with little understanding of their local water supply were unlikely to take actions to save water. Personal Communication from Carole Baker, Executive Director, Texas Water Foundation, to Karen Guz, Director of Conservation, San Antonio Water System (Apr. 2015). Survey results suggest that Texas could accelerate the rate of water conservation by funding a statewide education campaign aimed at enhancing citizen awareness of water.

If there is a silver lining to recent extended drought conditions, it is that water awareness is growing. Texans may not understand their local water supply, but 73 percent voted for Proposition Six, amending the state constitution to authorize use of $2 billion from the Economic Stabilization Fund for implementation of the state water plan. *See* BallotPedia, *Texas State Water Fund Amendment, Proposition 6 (2013)*, http://ballotpedia.org/Texas_State_Water_Fund_Amendment,_Proposition_6_(2013). There is an old expression, "Let it not be said that we let a good crisis go to waste." Fortunately for most of Texas the continued drought has not risen to the status of crisis, but it has motivated action. During the past four years per capita consumption has dropped by 10 to 20 percent in communities that include Austin and San Antonio. *See* Austin 2014 TWDB Water Conservation Report; San Antonio Water System 2014 Water Conservation Plan (available through the TWDB, upon request). Restrictions on usage, increased awareness of water, and accelerated conservation adoption by the government and governmental entities have combined to change water use patterns. It remains to be seen if these changes are permanent or if usage patterns will return to predrought levels when more rains come.

CHAPTER 24

Water Reuse

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Water reuse has become a critical component of integrated water supply strategies for municipalities and water suppliers to provide reliable water resources for their service areas. In the simplest sense, water reuse is the practice of recycling water used for one purpose to use for another purpose. The water to be recycled is variously referred to as recycled water, reuse water, and reclaimed water. In the water rights context, it is called return flows. The purpose for which the water will be used and the method of delivery to the place of reuse—direct or indirect—dictates which legal and technical requirements apply. The legal requirements address water quality issues, and in some instances, water rights.

This chapter presents background information on the reuse of water derived from treated wastewater including regulatory requirements related to water quality (section I); provides a description of treatment technologies (section II); discusses technical and operational considerations (section III); provides examples of major water reuse projects throughout the state (section IV); and discusses water rights requirements established by the Texas Commission on Environmental Quality (TCEQ or commission) for indirect reuse (section V).

I. Overview of Water Reuse in Texas

Reclaimed water has been used by Texans since the 1800s and has become a major water resource for Texas in the last several decades. *See* San Antonio Water System, *History & Chronology*, www.saws.org/who_we_are/history/index.cfm. With the Texas population expected to double over the

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next fifty years, the Texas Water Development Board (TWDB) state water planning process has considered alternative water supplies. This is, in part, due to the difficulty and expense associated with developing new surface water and groundwater supplies. Water planners have identified a number of potential uses for reclaimed water, including power plant cooling water, agricultural and urban irrigation, river and streamflow enhancement, natural gas exploration activities, and augmentation of drinking water supplies. See Chapter 20 of this book for a discussion of state water planning.

A. Current State Water Plan

The most recent state water plan, *Water for Texas 2012*, predicts that water reuse provided about 580,000 acre-feet per year of water supply in 2010 and will provide more than 1.5 million acre-feet per year by the year 2060. *See* Texas Water Development Board, *Water for Texas 2012*, at 171, 189 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. In 2060, water reuse is predicted to comprise approximately 10 percent of all projected new water supplies. The regional planning area that includes the Dallas–Fort Worth metroplex (Region C) is expected to use more reclaimed water than any other region in the state. By 2060, the 2012 State Water Plan predicts, water reuse will provide about 11 percent of Region C's new water supplies, with most of these new supplies coming from use of reclaimed water to augment existing raw water supply reservoirs. *See* 2012 State Water Plan, at 44.

B. Water Quality Requirements

Each intended use of reclaimed water has unique water quality requirements, the primary goal of which is the protection of human health and the environment. Such regulations are typically structured based on the potential for public contact or environmental degradation. Regulatory requirements specifically addressing water reuse in general do not currently exist on the federal level. Reuse projects that either involve a discharge to waters of the United States or serve as a component of a drinking water supply, however, are regulated under federal law. See Chapter 33 of this book for a discussion of surface water quality standards for discharges to waters of the United States. For a discussion of drinking water supply legal requirements, see Chapter 30. In general, the applicability to reuse of specific Texas water quality regulations and guidelines varies, depending on whether the reuse is direct or indirect, as described below.

1. Direct Reuse

Direct reuse is defined as the use of reclaimed water that is piped directly from the wastewater treatment plan to the place where it is utilized. Direct nonpotable reuse projects are regulated by 30 Texas Administrative Code chapter 210. *See* 30 Tex. Admin. Code ch. 210. If an entity is producing reclaimed water, it must obtain an authorization under chapter 210 from the TCEQ as a producer of reclaimed water. If an entity is providing reclaimed water to an individual user, it must obtain a chapter 210 authorization as a provider of reclaimed water. An entity may be both a producer and provider under current regulatory practice. *See* 30 Tex. Admin. Code § 210.4.

Chapter 210 currently recognizes two classifications for reclaimed water, depending on water quality and type of use. Type 1 reclaimed water, which is intended for irrigation or other uses in areas where the public may come in contact with the reclaimed water, is subject to more stringent standards than Type 2 reclaimed water. *See* 30 Tex. Admin. Code § 210.33. Generally, Type 1 reclaimed water is required to have fewer indicator bacteria, lower biological oxygen demand (a surrogate measure of organic pollution remaining after treatment), and lower turbidity (a measure of cloudiness or the amount of particulates remaining after treatment) than Type 2 water. In addition to water quality criteria, 30 Texas Administrative Code chapters 210, 217, and 321 establish general design criteria and operational requirements for reclaimed water production and distribution.

As summarized, state regulations specifically address direct reuse for nonpotable applications. Because any project that produces water for a drinking water system (potable applications) is subject to the Safe Drinking Water Act (SDWA), direct reuse for potable applications is subject to its requirements. Title 30 Texas Administrative Code chapter 290 provides the regulatory framework for the TCEQ to implement the SDWA provisions applicable to direct potable reuse. A description of the SDWA is included in the following section.

2. *Indirect Reuse*

Indirect reuse is defined as the use of reclaimed water or return flows by discharging to a water supply source, such as surface water or groundwater, where it blends with the water supply and may be further purified before being removed for nonpotable or potable uses. This section addresses water quality issues for indirect reuse, while section V of this chapter addresses the water rights requirements related to indirect use.

The water quality requirements will vary depending on the intervening water body (surface water or groundwater) and purpose or use of the water source (potable or nonpotable supply).

Water quality regulations specifically addressing indirect reuse do not currently exist on the state or federal level; however, several regulations may impact the implementation of indirect reuse projects. The SDWA establishes the Environmental Protection Agency's (EPA's) authority to promulgate national primary drinking water standards. Public drinking water systems must comply with these standards, which are set for contaminants having adverse human health effects. A maximum contaminant level (MCL) is assigned for each of these contaminants. Currently, MCLs are assigned for more than ninety contaminants found in public drinking water systems. *See* Environmental Protection Agency, *Regulating Public Water Systems and Contaminants Under the Safe Drinking Water Act*, http://water.epa.gov/lawsregs/rulesregs/regulatingcontaminants/basicinformation.cfm [hereinafter Regulating Public Water Systems]. See Chapter 30 of this book for further discussion of these standards.

In terms of water quality permitting, water reuse projects involving a discharge to waters of the United States must comply with the federal requirements included in the Clean Water Act (CWA). See Chapter 34 of this book for a discussion of what makes up "waters of the United States." Two components of the CWA may impact an indirect reuse project: technology-based requirements for secondary wastewater treatment (as discussed in Chapter 34) and compliance with Texas water quality standards (as discussed in Chapter 33). The CWA defines designated uses of surface water bodies and applies water quality criteria designed to protect these uses. The criteria adopted by the state are included in the Texas Surface Water Quality Standards (TSWQS). Additionally, a component of the CWA, the National Pollutant Discharge Elimination System program (administered by the state as the Texas Pollutant Discharge Elimination System (TPDES)), is intended to control discharges to waters of the state, which includes discharge of treated water that may be reclaimed through downstream diversion. See Chapter 34 of this book for further discussion of the TPDES program.

Title 30 Texas Administrative Code chapter 307 includes general narrative criteria that apply to all waters of the state, an antidegradation policy for surface water, and specific numeric criteria. In addition to CWA regulations, the Texas Water Code allows criteria to be established for additional chemicals based on numerical criteria assigned by the EPA. The TCEQ divides the state's river basins, bays, and estuaries into segments and assigns TSWQS to each segment. Some surface waters in the state, known as unclassified waters, have not been assigned specific criteria. Unclassified waters are protected by general aquatic life standards, which apply to all surface waters in the state. See Chapter

33 of this book for further discussion of surface water quality standards. Indirect reuse projects may be affected by several use subcategories of the TSWQS: public water supply, aquatic life, and aquifer protection (for segments capable of recharging the Edwards Aquifer). Drinking water MCLs and toxic criteria may be assigned to these uses.

The CWA does not regulate groundwater; however, individual states may adopt water quality criteria and antidegradation policies for protection of groundwater. These water quality criteria and policies may impact reuse projects that have the potential to impact groundwater. Texas has adopted a statutory policy of nondegradation of groundwater. *See* Tex. Water Code § 26.401. Texas has also established local control of groundwater management through groundwater conservation districts (GCDs). See Chapters 16 and 17 of this book regarding GCDs and the Edwards Aquifer Authority. State law allows GCDs to adopt and implement management plans and rules, issue permits, and generally conserve, preserve, and protect groundwater and prevent degradation and waste of groundwater within their jurisdictions. *See* Tex. Water Code §§ 36.101(a), 36.116(a), 36.108(p). Different GCDs address groundwater quality in different ways. Thus, indirect reuse projects involving groundwater encounter this additional layer of regulation.

C. History of Reuse

Texans have used reclaimed water for more than a hundred years for a variety of applications. This section describes the history of water reuse in Texas.

1. Agricultural Use

The earliest known record of water reuse in Texas dates back to the late 1890s, when sewage was used for the irrigation of agricultural land south of San Antonio. In a 1901 contract, "the San Antonio Irrigation Company was granted exclusive use for irrigation of all sewage present and future, except for those quantities already contracted by the City of San Antonio." Texas Water Development Board, *History of Water Reuse in Texas* 15 (2011), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830937_waterreuseA.pdf. Since that time, the cities of Amarillo (1920s), Lubbock (1930s), Odessa (1940s), and Abilene (1960s) have provided treated effluent for agricultural uses. *See* Clark Harvey & Ronald Cantrell, Texas Technological College, *Use of Sewage Effluent for the Production of Agricultural Crops* 2–3 (Texas Water Development Board 1965), *available at* www.twdb.texas.gov/publications/reports/numbered_reports/doc/R9/R9.pdf; Debbie McReynolds, *Texas' Oldest Living Reuse System Tells All*, *in* Water Environment Federation Technical Exhibition and Conference, Session 51–60 (2006).

2. Industrial Use

The city of Big Spring provided reclaimed water to an oil refinery during World War II to supplement poor-quality well water. *See* Warden W. Mayes & W.E. Gibson, *Successes and Failures in Water Reuse at Cosden Oil and Chemical Company, Big Spring, Texas*, 63 Chemical Engineering Progress Symposium Series 167 (1967). During the 1950s, the city of Amarillo provided reclaimed water to an oil refinery and later expanded its industrial reuse program to include a cooling water application at Southwestern Public Service Company. Southwestern Public Service Company began purchasing additional reclaimed water from the city of Lubbock in 1971. The Southwestern Public Service Company sold its process water originating from Lubbock and Amarillo to farmers for irrigation. *See* Randolf C. Alfaro, Industrial Reuse of Municipal Wastewater: A Case Study of the Texas Highplains 47 (Aug. 1984) (unpublished M.A. thesis, Texas Tech University), *available at* http://repositories.tdl.org/ttu-ir/bitstream/handle/2346/20142/31295003687133.pdf?sequence=1. Other cities providing reclaimed water for industrial use include San Antonio (cooling water for power generation beginning in the 1960s), Denton (cooling water for power generation beginning in the 1970s), and Harlingen (textile bleaching and dyeing production in the 1990s). *See* Paul Jensen et al., *San Antonio's Cooling Lakes*, Stormwater (2003), *available at* http://foresternetwork.com/daily/water/san-antonios-cooling-lakes/; Wastewater Planning for Denton, paper presented at the City of Denton, Public Utility Board Meeting (Mar. 9, 2009), *available at* www.cityofdenton.com/home/showdocument?id=3026; Augusto Villalon et al., Brown & Root Engineering Co., Inc., *Wastewater Reclamation Technical Memorandum*, Trans-Texas Water Program, Southeast Area (1998), *available at* www.sra.dst.tx.us/srwmp/ttwp/br-docs/final/RECLAIM_REPORT.pdf.

3. *Municipal Use (Nonpotable)*

Reclaimed water or return flows have been used for nonpotable municipal uses such as irrigation of golf courses, parks, athletic fields, and other landscaped areas in El Paso and Lubbock since the 1960s. During the 1980s, the city of Odessa expanded its reuse program to provide reclaimed water for irrigation of landscaped areas, rights of way, golf courses, and a residential subdivision. The Trinity River Authority (in association with the Dallas County Utility Reclamation District) also began providing reclaimed water to the Las Colinas development in Irving for maintenance of water features and the irrigation of golf courses and landscaped areas. The city of Abilene began using Lake Kirby for reclaimed water storage before providing the water to municipal irrigation users. The San Antonio Water System (SAWS), the city of Austin, and the city of Fort Worth, among others, have extensive distribution systems for the delivery of reclaimed water to municipal users or wholesale customers in their service areas. Some of these reclaimed water uses are considered direct reuse, and others are indirect reuse.

4. *Indirect Potable Use*

Indirect potable reuse has occurred throughout Texas for many years simply by virtue of the practice of discharge of wastewater and the location of water diversions along Texas rivers and streams. Treated wastewater is typically discharged to a stream or lake. Any time water is diverted for a municipal potable water supply downstream of these discharges, indirect potable reuse has occurred. In more recent years, several planned indirect reuse projects have been implemented, primarily in the Dallas–Fort Worth metroplex. In the 1980s, water suppliers in the area began acquiring water rights to divert treated wastewater, which now exceeds 900,000 acre-feet per year. A brief history of these indirect potable reuse projects is included below in Table 1.

Table 1: History of Potable Water Reuse

1985	The North Texas Municipal Water District (NTMWD) implements an indirect potable reuse program in Lavon Lake. The city of El Paso begins injecting reclaimed water into ten wells for groundwater recharge.
1990s	The Tarrant Regional Water District (water provider for Fort Worth, Arlington, and surrounding communities) begins planning and research for an indirect reuse project using two wetlands to provide polished reclaimed water to increase the firm yield of Cedar Creek and Richland Chambers reservoirs. The Trinity River Authority acquires water rights for discharged effluent to augment supplies throughout its system.

2006	The Upper Trinity Regional Water District implements a project that uses discharged effluent in Lake Lewisville originating from the district's raw water supply in Chapman Lake.
2009	The NTMWD completes the construction of a second indirect reuse project using wetlands to provide polishing treatment of reclaimed water that is piped to Lavon Lake.
2015	The city of Abilene began delivering advanced treated reclaimed water to Lake Fort Phantom Hill from its Hamby Water Reclamation Facility to augment its raw water supplies.

5. *Direct Potable Use*

To date, two public water systems have implemented direct potable reuse projects. These include the Colorado River Municipal Water District and the city of Wichita Falls. Both projects use advanced treatment systems that include membrane filtration, reverse osmosis (RO), and ultraviolet irradiation before blending with raw water supplies and undergoing conventional water treatment. The Wichita Falls project was implemented as an emergency project as a result of drought conditions. The city plans to convert to indirect reuse, augmenting the supply in Lake Arrowhead when ongoing drought conditions subside.

II. Technologies

Wastewater treatment plants are designed to remove contaminants, such as solids, oxygen-demanding material, and nutrients to levels that comply with federal, state, and local regulations. Wastewater is treated using physical, chemical, and biological processes prior to its discharge into streams, lakes, or reuse systems as reclaimed water.

Treatment of wastewater for use as reclaimed water typically requires a three-phase treatment process. In primary treatment, the heavier solid particles settle to the bottom and lighter materials like plastic and grease float to the top and are removed by screening or other physical separation techniques. The remaining wastewater moves to the next phase of treatment, known as secondary treatment. In secondary treatment, microorganisms feed on dissolved organic material, clump together, and are removed or recycled into the treatment process. The third phase of treatment, tertiary treatment, involves the use of filters, disinfection chemicals, or ultraviolet light to ensure the water is free of bacteria and viruses. At this level of treatment, the reclaimed water is ready for beneficial reuse. A drawing representing this conventional level of treatment is shown in Figure 1. However, some reuse applications may require additional treatment, such as RO or ultraviolet light and hydrogen peroxide, to produce extremely high-quality water. Membrane bioreactors (MBR) may also be used to reduce the overall footprint of the facility. A drawing representing a typical MBR plant is shown in Figure 2. The following section describes specific constituents of concern in untreated wastewater, problems that can occur if these constituents are not removed prior to water reuse, and the logistics of constituent removal for water reuse.

Conventional Treatment Train

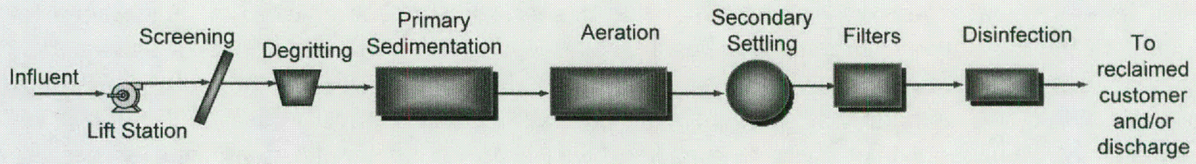

Figure 1. Conventional treatment process. Courtesy Alan Plummer Associates, Inc.

Membrane Bioreactor Treatment Train

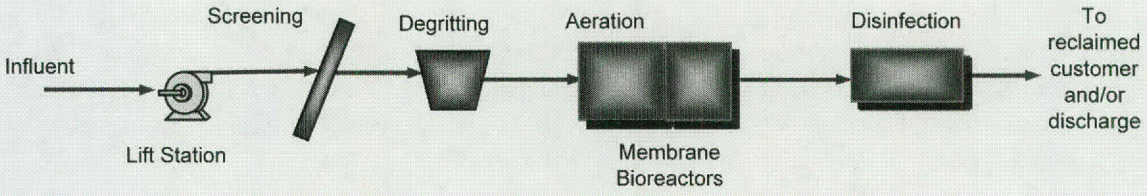

Figure 2. Typical MBR plant process. Courtesy Alan Plummer Associates, Inc.

A. Nutrients

The presence of nutrients, such as nitrogen and phosphorus, can create a variety of issues for reuse projects. In direct reuse projects, nutrients can promote algal growth in distribution and storage systems, which can cause maintenance issues and odor concerns. When used for landscape or agricultural irrigation, reclaimed water with high nutrient levels can be beneficial but may cause groundwater or surface water degradation. Eutrophication, a process that promotes algal and aquatic vegetation growth in surface waters, can cause low dissolved oxygen levels, an imbalance of aquatic species, aesthetic issues, and, during drinking water disinfection, the formation of organohalides. Depending on project-specific information, nutrient removal may be required for some reuse projects.

B. Pathogens

Pathogenic agents can transmit infectious diseases, such as typhoid fever, cholera, bacillary dysentery, and gastroenteritis. However, most of the bacteria associated with these diseases are eliminated during the disinfection process at a wastewater treatment plant. Texas regulations include limits for fecal coliforms, *Escherichia coli* or *Enterococci*, in order to demonstrate compliance with disinfection requirements.

C. Trace Metals

Trace metals found in municipal untreated wastewater can be greatly reduced through pretreatment programs and secondary treatment (utilizing adsorption mechanisms) at a wastewater treatment plant. A common source of metals in untreated wastewater is copper leaching in residential pipes. In cases of copper noncompliance in reclaimed water, pollution prevention strategies and plumbing code changes may further lower concentrations.

D. Salts

Salts are ionic compounds that contain the cations sodium, boron, calcium, magnesium, or potassium and the anions bicarbonate, carbonate, chloride, nitrate, phosphate, sulfate, or fluoride. The source of salts in untreated wastewater is typically the potable water source itself, the use of the water, or regeneration of automatic water softeners. In practice, salts are typically measured by electrical conductivity, which is then correlated to total dissolved solids. In reuse applications, salts can degrade surface water or groundwater quality or impact vegetation in irrigation applications. The impact of salts in a reuse application can be reduced through dilution or membrane treatment.

E. Organic Chemicals

Organic chemicals that can be found in reclaimed water include surfactants, industrial by-products, volatile organic compounds, pesticides, algal toxins, and disinfection by-products. The organic chemical content of water has historically been used as an indication for the potential risk of chronic human health effects. Many of these chemicals can be successfully removed from wastewater through pretreatment programs or traditional wastewater treatment processes.

F. Emerging Constituents

Chemicals known as emerging constituents may include pharmaceuticals, personal care products, pesticides that are currently in use, and industrial chemicals. As technology has advanced, improvements in water quality testing capabilities have enabled the identification of these chemicals in reclaimed water. Significant research has been performed in recent years on the potential health risks and treatability of these constituents. Removal of these constituents is most effective when a diversity of treatment processes is incorporated into the overall treatment scheme.

III. Technical and Operational Considerations

Several factors influence the successful implementation and operation of water reuse projects. Public acceptance and risk, cost of implementation, operational challenges, ecological issues, and energy and sustainability considerations are important components of the planning for any reuse project. Although water reuse has a proven track record of success, ongoing research and technological development are essential to ensuring the continued growth of reuse in Texas.

A. Public Acceptance and Risk

Public perceptions and opinions can influence the success of reuse projects for both nonpotable and potable applications. The development of a monitoring program, a risk analysis, a protection strategy that is appropriate for the intended use, and public outreach and education programs can all provide useful tools for promoting public acceptance of reuse projects.

1. Indicators and Monitoring

Monitoring is an important component of any reuse project, and the monitoring of many constituents is typically a regulatory requirement. Typical regulatory requirements include testing at the wastewater treatment plant prior to distribution. For a potable reuse project, additional monitoring may be required by regulations or implemented as a good management practice. For groundwater recharge or salt intrusion barrier reuse projects, monitoring using lysimeters, monitoring wells, or groundwater production wells may be a regulatory requirement. Typical monitored constituents include biochemical oxygen demand, turbidity, and pathogens or pathogen surrogates. Depending on the specific project and regulatory requirements, monitoring for other parameters may also be required or may be implemented as a good management practice.

2. *Risk Analysis*

For many projects involving potential public exposure, risk analysis is conducted to identify, assess, and prioritize potential risks. Once this is accomplished, coordinated and economical applications of resources can be used to minimize, monitor, and control the probability or impact of the risk. Risk analysis consists of four steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization. The EPA has developed risk assessment and exposure guidelines for regulation of contaminants. *See* Regulating Public Water Systems.

3. *Protection Strategy*

A multiple barrier approach, a plan that employs barriers between potential threats and the public, has historically been the cornerstone of the safe drinking water program. The basic barriers included in this approach are as follows: risk prevention, risk management, monitoring and compliance, and consumer awareness and participation. In potable reuse systems the following additional barriers may be used depending on the specific situation: industrial pretreatment, wastewater treatment, advanced water treatment, dilution, natural attenuation and time of reaction, storage, retention time underground or in a reservoir, drinking water treatment, and raw and treated water monitoring. A number of barriers are incorporated into state and federal regulations. For example, in the case of direct nonpotable reuse projects, in order to protect the public from unintended use, Texas requires purple pipe and signage for new reuse distribution systems.

4. *Public Outreach*

The development of proactive public outreach and awareness programs on local, regional, and statewide levels will be an imperative step in developing future reuse supplies. Programs that provide information on the need, value, and safety of reclaimed water will serve as a valuable tool to the public and policy makers.

B. Cost of Implementation

It is estimated that the total capital cost for all planned reuse water management strategies in the state of Texas is approximately \$3.6 billion. These capital costs are reported on a regional basis; the lowest regional estimate is \$0 per acre-foot in Region A (Texas Panhandle), and the highest regional estimates were for Region C (Dallas–Fort Worth area) and Region H (Houston area), both at approximately \$1.2 billion. *See* 2012 State Water Plan, app. A.2. These capital cost estimates include project-specific variables such as treatment requirements, land acquisition, conveyance system requirements, purchase cost of reclaimed water, and permitting requirements.

C. Operational Challenges

Challenges of operating a water reuse system include balancing demand with supply and meeting regulatory requirements. For direct reuse systems, the majority of the demand is generated by nonpotable uses, such as irrigation of parks and golf courses. These uses typically have a seasonal fluctuation that does not necessarily match the fluctuation in the volume of water treated at the wastewater treatment plant. In addition, some wastewater treatment plant discharges are regulated depending on the seasonal variation in the flow or volume of water in the receiving surface water body. These seasonal fluctuations may further challenge the operation of both nonpotable direct and potable direct water reuse systems. Successful reuse systems typically require careful planning to balance reclaimed water demand with the supply available at the wastewater treatment plant.

Indirect potable reuse systems also have significant operational challenges that include satisfying diversion limitations, addressing variable nutrient loads, producing finished water that satisfies drinking water requirements, and controlling nuisance conditions. Indirect reuse systems usually involve bed and banks transport permits associated with the diversion permits and discharge volumes from upstream wastewater plants. Operationally, all of the water rights permit provisions that may include seasonal diversion rates and seasonal instream flow requirements must be satisfied while maintaining a detailed accounting of discharges, instream flows, transport losses, and diversions to demonstrate compliance with the permit provisions. See section V of this chapter for a discussion of the water rights requirements for indirect reuse authorizations.

Nutrient loads can vary seasonally or relative to streamflow, and wastewaters also have higher dissolved solids concentrations than the originating water supplies. Variable nutrient loads and increased dissolved solids can impact the operation of both natural treatment and conventional treatment systems and affect the quality of water supplies and compliance with surface water quality standards. Successful operation of multiple barrier treatment approaches should be maintained to provide protection for drinking water supply systems.

Operations, maintenance, monitoring, and process control are extremely critical to successful implementation of direct potable reuse projects. Detailed operational plans should be developed that consider blending impacts, plans for disposal of water that does not meet water quality requirements, appropriate operator training, communication plans, standard operating procedures, and monitoring and process control plans.

D. Ecological Issues

As the population of Texas grows, efforts to balance the volume and quality of water required to support human and ecological uses will become increasingly important. Changes in the amount of wastewater discharged and diverted from streams, rivers, and lakes can impact aquatic ecosystems. Additionally, the water quality of reclaimed water can play an important role in the health of an ecosystem. Ongoing research and management of reclaimed water sources will provide a better understanding of ecosystem sensitivity and ensure the continued safe use of reclaimed water. See Chapter 11 of this book for a discussion of environmental flows.

E. Energy and Sustainability

Reuse applications are generally less susceptible to impacts from drought and climate change and may postpone the need for development of new water supplies, reduce the demands on current surface water and groundwater sources, and provide a locally available supply. However, as overall water demand increases, the associated energy required to supply the water typically increases. Although some reuse applications may be energy intensive, the energy required for reuse may be offset by the amount of energy that would otherwise be required to develop and maintain a new water supply. When considering the sustainability of reuse systems, water providers should also evaluate the following items as they relate to the water reclamation process:

- energy self-sufficiency;
- the use of the energy in wastewater treatment for water reuse production;
- energy use required for pumping and distribution;
- the use of external energy; and
- life cycle assessments (construction versus operations).

See Chapter 40 of this book for a discussion of the water-energy nexus.

F. Technology Gaps and Research Needs

Ongoing research and technology development are essential to ensuring the continued success of reuse projects in Texas. Areas for continued development include the following:

- continued evaluation of treatment wetland performance and operational strategies to increase wetland performance;
- further operational analyses to provide background for balancing water reuse with reclaimed water supply and regulations on treated water discharges;
- understanding the appropriate applications and effectiveness of environmental buffers for reclaimed water used for the augmentation of surface water and groundwater supplies;
- continued water quality monitoring, data interpretation, and inventory of reclaimed water;
- further development of information on the relative risks of using reclaimed water; this may include the continued identification of compounds that pose the greatest human and environmental health concerns for potable reuse and for reuse associated with environmental enhancements and mitigation;
- continued development of efficient and effective treatment strategies for potable reuse;
- continued development of technical resources and suggested protocols for implementation of direct potable reuse projects;
- providing support to ensure the successful planning of reuse projects for utilities in Texas; potential areas of support may include strategies for obtaining large-volume customers, identification of organizational models to aid in the effective planning and implementation of reuse programs that comply with regulatory requirements and water management activities, and the development of tools to assist utilities in making informed decisions during the planning phase of a reclaimed water system;
- continued development of scientific information to support regulations for water reuse;
- development of public awareness programs to promote the use of reclaimed water; and
- development of tools for quantifying the cost and social benefits of reclaimed water, further cost-benefit analyses to compare the implementation and long-term cost of water reuse with the cost of developing new water supplies, and identification of funding sources for water reuse treatment and infrastructure.

IV. Case Studies

Brief descriptions of several large reuse projects in Texas are included in this section. SAWS operates a direct nonpotable reuse system for surface water augmentation, irrigation, and industrial uses and an indirect nonpotable reuse system for power generation. El Paso Water Utilities operates a direct nonpotable reuse system to serve irrigation and industrial customers and an indirect potable reuse system that uses groundwater recharge. The Tarrant Regional Water District (TRWD) and the North Texas Municipal Water District (NTMWD), two water providers in the Dallas–Fort Worth area, operate large, indirect potable reuse systems that use constructed wetlands for polishing treatment prior to augmenting existing surface water supplies. Fort Worth operates a regional direct reuse system that serves several wholesale customers in the area, who in turn provide reclaimed water to irrigation, industrial, and gas industry users in their respective service areas. Colorado River Municipal Water District (CRMWD) began operation of the first direct potable reuse project in the United States in 2013. Each of these systems will be discussed in more detail in the following sections.

A. San Antonio Water System

SAWS operates three water recycling centers (Medio Creek, Leon Creek, and Dos Rios water recycling centers), which have a combined capacity of 233 million gallons per day (MGD). In 2000, SAWS completed a network of pipelines to deliver nonpotable reclaimed water to customers. The system has a capacity of 31.25 MGD. The system consists of an eastern leg that can deliver 11.6 MGD and a western leg that can deliver 19 MGD of reclaimed water. SAWS is planning to connect these two branches in the future. Current uses of the reclaimed water include maintaining flows on the famed Riverwalk area; maintaining ornamental lakes and fountains; irrigating golf courses, parks, and other landscaped areas; cooling tower makeup water; and other industrial and commercial uses.

Water from the SAWS water recycling centers also provides over 35 MGD of reclaimed water to San Antonio's City Public Service Board for generation of electric power. The City Public Service Board withdraws the reclaimed water from a pump station on the San Antonio River and diverts it to two cooling water lakes (Braunig Lake and Calaveras Lake). *See* Pablo Martinez, *Recycled Water Program Development—Lessons Learned* (2010).

B. El Paso Water Utilities

El Paso Water Utilities started its direct nonpotable reuse program in 1963 and its indirect potable groundwater injection project in 1985. The system now provides reclaimed water from four treatment plants: the Fred Hervey Water Reclamation Plant and the Haskell Street, Roberto Bustamante, and Northwest wastewater treatment plants. The wastewater treatment plants produce water for nonpotable reuse applications, such as industrial uses and landscape irrigation at parks, school grounds, golf courses, cemeteries, and other green spaces. The Fred Hervey Water Reclamation Plant produces water for the Hueco Bolson Recharge Project. Potable-quality reclaimed water produced at the plant is injected into the aquifer for indirect potable reuse. The entire reuse program currently provides about 8 MGD. Approximately 3.1 MGD is provided for potable reuse via groundwater injection and in-plant uses, and the remaining 5 MGD is provided to meet nonpotable demands. *See* El Paso Water Utilities, *Reclaimed Water*, www.epwu.org/reclaimed_water/.

C. North Central Texas Indirect Reuse Wetlands

Two large-scale man-made wetland systems have been constructed in north central Texas to provide a raw water supply for the growing population of the Dallas–Fort Worth metroplex. Constructed wetland systems provide energy-efficient treatment for many constituents, including suspended solids, nutrients, and wastewater-derived organic compounds. The wetland systems also provide multiple benefits to both human and wildlife populations. These benefits include enhanced habitat areas for outdoor recreational activities and public outreach and educational opportunities.

The TRWD provides a raw water supply to approximately 1.6 million customers in the western half of the Dallas–Fort Worth metroplex. The phased development of the George W. Shannon Wetlands Water Recycling Facility at Richland-Chambers Reservoir was implemented to research the financial aspects, operation and maintenance issues, and treatment performance, and to refine design criteria for a full-scale wetland system. The Richland-Chambers Wetland can augment yield from Richland-Chambers Reservoir by up to 63,000 acre-feet per year. A future sister wetland project, the Cedar Creek Wetland, will augment the yield of Cedar Creek Reservoir by 52,500 acre-feet per year.

In 2004, the NTMWD faced a critical raw water supply shortage. The rapidly growing service area of north and east Dallas indicated it would need a significant increase in raw water in the near future. The NTMWD responded to this problem by developing an indirect reuse project. The East Fork Raw Water Supply project represents the largest project in Texas using reclaimed water to augment a surface water supply source.

Construction of the NTMWD East Fork Raw Water Supply Project was completed in 2010. A diversion pump station on the East Fork of the Trinity River provides flow through a 1,840-acre wetted surface area of constructed wetland. A conveyance pump station then pumps the wetland-treated water through 43.5 miles of pipeline to Lavon Lake. The East Fork Raw Water Supply Project will provide the NTMWD with approximately 102,000 acre-feet of water per year, enough water to serve a half million people. *See* Region C Water Planning Group, *2011 Region C Water Plan* 6.32 (2010), *available at* www.regioncwater.org/Documents/2011RegionCWaterPlan/Chapter%206_Final.pdf.

D. City of Fort Worth

The city of Fort Worth constructed the Village Creek Reclaimed Water Delivery System (VCRWDS) in response to current and projected population increases and the associated increased demands on the existing water infrastructure. The use of reclaimed water helps defer the need for additional raw water supplies and potable water treatment and distribution facilities. The VCRWDS is the first component of the city's reclaimed water utility.

The VCRWDS is intended for direct nonpotable reuse and is used for general irrigation, golf course irrigation, cooling water, park irrigation, and natural gas industry use. Irrigation is the primary use at this time, and the system is expected to irrigate more than 1,000 acres in Fort Worth, Arlington, Euless, and the Dallas–Fort Worth International Airport (DFW). The three wholesale customers of the system are the cities of Arlington and Euless and the DFW. Each of these entities may provide water to users within their jurisdiction that complies with regulatory requirements. Future customers within the Fort Worth city limits may further increase the amount of potable water conserved through this project.

The delivery capacity of the VCRWDS distribution system is 16 MGD and will accommodate additional future demands. Current projections anticipate an ultimate annual average demand of 1,200 million gallons per year by 2022.

E. Colorado River Municipal Water District

In order to supplement its existing raw water sources, the CRMWD began blending advanced treated reclaimed water into its raw water system beginning in spring 2013. The source of the water is the city of Big Spring wastewater treatment plant. Treated effluent from the plant is pumped to the Raw Water Production Facility, an advanced treatment facility that uses membrane filtration, RO, and ultraviolet irradiation/advanced oxidation treatment processes. Following advanced treatment, the water is blended with other CRMWD raw water supplies and delivered to the district's customer cities where the blended raw water undergoes conventional water treatment before delivery to drinking water customers. The system currently can produce approximately 1.8 MGD of water to supplement other CRMWD supplies.

V. TCEQ Water Rights Authorizations for Indirect Reuse

The TCEQ often requires water rights and water quality authorizations to reuse water. The TCEQ issues water quality reuse authorizations for direct reuse under 30 Texas Administrative Code chapter 210, as discussed in section I.B above, and water right reuse authorizations under Texas Water Code chapter 11 for indirect reuse. The following discussion will address Water Code chapter 11 water rights permitting that applies to indirect reuse. The law relating to water right authorizations for reuse is still evolving as more reuse applications are considered by the TCEQ and the courts.

A. Introduction

Although "reuse" is not defined in the Texas Water Code, the TCEQ defines reuse in its water rights permitting rules as "[t]he authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water." 30 Tex. Admin. Code § 297.1(44). This definition includes both direct and indirect reuse, which are defined below with respect to water rights.

When water is reused but is not conveyed in a watercourse, such use is referred to as "direct reuse." Martin Hubert, *Senate Bill 1, The First Big and Bold Step Toward Meeting Texas's Future Water Needs,* 30 Tex. Tech L. Rev. 53, 62 (1999). For instance, direct reuse occurs when effluent is piped directly from a wastewater treatment plant to the user and is never discharged to a watercourse. The person who directly reuses the water does not need to obtain a water right authorization to allow the reuse. A surface water right holder may directly reuse and fully consume return flows as long as the holder's underlying water right, from which the effluent was derived, contains no provisions to the contrary and does not require amendment to change the place or purpose of use. Direct reuse does not require water rights authorizations from the TCEQ unless the water right is being changed (different use or place of use).

Indirect reuse is use of water after it has been discharged to a watercourse for transport to diversion for reuse elsewhere. This generally occurs when a wastewater treatment plant discharges treated water into a stream and either the discharger or another person diverts the water farther downstream to use again. Used water returned to a watercourse is often called "return flow." Water Code chapter 11 does not define this term, but the TCEQ rules define "return water or return flow" as "[t]hat portion of state water diverted from a water supply and beneficially used which is not consumed as a consequence of that use and returns to a watercourse. Return flow includes wastewater effluent." 30 Tex. Admin. Code § 297.1(43). Although this definition mentions only "state water," the

TCEQ also issues "bed and banks authorizations" for groundwater and groundwater-based return flow that is discharged to a watercourse. *See* Tex. Water Code § 11.042(b), (c). See the discussion below.

B. The Use of Bed and Banks to Convey Water for Downstream Reuse

Texas has developed policy and law allowing the use of the bed and banks of a watercourse to convey water for downstream reuse. In fact, reuse of return flows is a tool for stretching water resources and limiting costs. *See* Texas Water Development Board, 2 *Water for Texas 2007* 240 [hereinafter 2007 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2007/index.asp. Surface-water-based and groundwater-based reuse of return flows is a major water management strategy in the 2012 State Water Plan. *See* 2012 State Water Plan, at 194–95. There are, however, many questions about the statute regulating the use of the bed and banks of a watercourse to convey return flows, Tex. Water Code § 11.042. These include when the section applies, who can obtain a reuse authorization, and how the TCEQ should analyze such a request.

1. Background

The state gives a water right holder permission to divert and use an amount of surface water designated in the water right. *See* Tex. Water Code § 11.135. After the water is used, it is often treated and discharged back into a watercourse. This is common with municipal water right holders that divert an amount for use by their citizens, treat the used water in wastewater treatment plants, and discharge the treated water back into the watercourse. Industrial wastewater is also treated and returned to the watercourse. Entities also withdraw groundwater, use the water, and discharge the effluent into a watercourse.

As the population of the state has grown, water right holders have begun looking to their used water returned to the stream to fill water supply needs. As discussed below, Senate Bill 1 was enacted in 1997, amending section 11.042 of the Texas Water Code. *See* Act of June 1, 1997, 75th Leg., R.S., ch. 1010, § 2.06. This amendment addressed some reuse issues, such as providing that the TCEQ protect existing water rights and the environment in authorizing reuse. The amendment of section 11.042, however, led to new questions about how the TCEQ should authorize the use of a watercourse to transport water for reuse.

2. Law and Commission Practice Pre-Senate Bill 1

Since 1913, Texas water statutes have included a provision allowing an entity to use the bed and banks of a stream to convey water from a place of storage to the place of use or diversion. *See* Acts 1913, 33d Leg., R.S., ch. 171, § 51, p. 358. The commission required accounting for transportation losses and an authorization for this transport. The law concerning use of the watercourse for transporting return flows for reuse elsewhere, however, was unclear. Pre–Senate Bill 1 case law provided that when surface-water-based return flow enters a watercourse, it again becomes state water subject to appropriation by others. *See South Texas Water Co. v. Bieri*, 247 S.W.2d 268, 272–73 (Tex. Civ. App.—Galveston 1952, writ ref'd n.r.e.); *see also* Frank E. Skillern, 1 *Texas Water Law* 81 (Sterling Press 1988).

Before the enactment of S.B. 1 in 1997, there was no specific statute or case law allowing the transport in a watercourse of water returned to the watercourse for reuse. Nonetheless, the commission's predecessor agencies required an authorization to use the bed and banks of a stream for this purpose, similar to that required to convey water from a place of storage to the place of use. While this type of authorization generally involved the reuse of surface water, when the agency granted a bed and banks authorization to transport groundwater-based effluent, the agency's action was challenged. The challenge arose before the enactment of S.B. 1.

In *City of San Marcos v. Texas Commission on Environmental Quality*, 128 S.W.3d 264 (Tex. App.—Austin 2004, pet. denied), the court held that under the law before the enactment of S.B. 1 in 1997, when the city of San Marcos discharged its groundwater-based effluent into the river, the effluent became state water. Because it was state water, the city could not divert it downstream for reuse. Any diversion downstream would require an appropriative water right. Accordingly, the commission's attempt to grant a bed and banks authorization to the city for this purpose was vacated and the city's application was denied. *City of San Marcos*, 128 S.W.3d at 279.

The court in the *City of San Marcos* case discussed prior case law on transporting groundwater and determined that those cases did not support the agency's action because those cases did not concern groundwater-based effluent. *City of San Marcos*, 128 S.W.3d at 273. The court discussed the fact that water is a fungible commodity. The court found, however, that the city had not shown that the effluent in this case was fungible with the river water. The court held that the city's effluent was municipal waste under Texas Water Code chapter 26 and had been abandoned to the stream. Thus, the court determined that the city could not retain ownership of the groundwater after placing it into a watercourse because of "the city's inability to control it as it mixes and becomes indistinguishable from public waters." *City of San Marcos*, 128 S.W.3d at 278. The court further stated that it did not intend to say that all effluent would not be fungible with a stream. *City of San Marcos*, 128 S.W.3d at 275 n.14. And, the court stated, its opinion did not apply to bed and banks authorizations to convey groundwater after S.B. 1.

3. *Senate Bill 1 and Texas Water Code Section 11.042*

Senate Bill 1 in 1997 made major changes to Texas Water Code chapter 11, including section 11.042, the bed and banks authorization statute. The original text of the statute related only to transporting stored water to a place of diversion and use. S.B. 1 added subsection 11.042(b) authorizing the use of the bed and banks of a river to discharge and subsequently divert and reuse "existing return flows derived from privately owned groundwater." Also added was subsection 11.042(c) discussing the conveyance and subsequent diversion of "water" in a watercourse. Both subsections 11.042(b) and (c) require the TCEQ to protect existing water rights and the environment. The amendments did not apply to the then-pending *City of San Marcos* case because they did not apply to a reuse authorization granted by the commission before September 1, 1997. *See* Tex. Water Code § 11.042(d).

S.B. 1 also added subsection 11.046(c), which seems somewhat contrary to section 11.042. It provides that water can be used under the terms of a water right "prior to its release into a watercourse or stream." *See* Tex. Water Code § 11.042(c). "Once water has been diverted under a permit, certified filing, or certificate of adjudication and then returned to a watercourse or stream, however, it is considered surplus water and therefore subject to reservation for instream uses or beneficial inflows or to appropriation by others" unless the water right expressly states otherwise. *See* Tex. Water Code § 11.042(c). This statutory change led to the question: What is the effect, if any, of this amendment on reuse authorizations, either for groundwater-based or surface-water-based return flows? See the discussion below.

C. Unresolved Indirect Reuse Issues

Several issues relating to Texas Water Code Sections 11.042(b) and (c) are highlighted in the 2007 State Water Plan, Vol. I, at 2–25, which refers to the Texas Water Conservation Association's Reuse Committee Report, *Texas Water Rights and Wastewater Reuse*, *reprinted in* 2007 State Water

Plan, Vol. I, at 29–38. These documents recommend that the legislature develop a reuse policy that responds to five questions that remained unanswered after the amendment of section 11.042:

1. Under current law, is the use of wastewater effluent after discharge to a stream a use of "state water" subject to the laws of prior appropriation, or is it subject to a different regulatory scheme?

2. Does current law allow effluent derived from different sources of water to be treated differently for purposes of evaluating a request to reuse this effluent?

3. Does current law provide for different treatment of effluent derived from "future" and "existing" return flows, regardless of the source?

4. Who can obtain indirect reuse rights?

5. To what extent should protection be afforded to the environment in reuse permitting decisions?

Except as discussed at section V.D.1 below, no court has ruled on these issues, and no legislation addressing these issues was passed during the 80th, 81st, 82nd, 83rd, or 84th legislative sessions (2007–2015). Thus, these issues remain mostly unresolved and controversial. Since the enactment of Senate Bill 1, several applications to reuse return flows have been issued by the commission. However, many of the major reuse applications were settled by the parties, thus providing no clear guidance from the commission or the courts. *See, e.g.*, Tarrant Regional Water District's Permit No. 4976 (2000); Trinity River Authority's Certificate of Adjudication No. 08-4248 (2000); North Texas Municipal Water District's Permit No. 5003 (2005).

The questions the TCEQ faces related to indirect reuse fall into three general categories:

1. What are the differences in reuse for groundwater-based and surface-water-based return flows, and how should existing versus future return flows be obtained? (See section V.D below.)

2. Who can obtain an indirect reuse authorization, and when is an authorization required? (See section V.E below.)

3. How does the TCEQ analyze indirect reuse applications? (See section V.F below.)

Most of the issues identified above are being considered in the Brazos River Authority application. In 2011, and again in 2015 (after the commission remanded the application for a second hearing), the commission held a contested case hearing on an application for a system operation of reservoirs, an increased appropriation of water based on the system operation, and return flows filed by Brazos River Authority, Application for Permit No. 5851. *See* TCEQ Docket No. 2005-1490-WR; SOAH Docket No. 582-10-4184. The reuse issues in that case include who can obtain an authorization to reuse groundwater-based and surface-water-based return flows, what laws should be used for this reuse, and how both the request for surface-water-based and groundwater-based return flows should be analyzed. This application is still in the hearing process as of the publication date of this edition.

Regarding the Brazos River Authority, the TCEQ executive director argued that the indirect reuse of surface-water-based and groundwater-based return flows can be obtained only under Tex. Water Code section 11.042(b) and (c). He also argued that only the discharger can obtain groundwater-based return flows, and that surface-water-based return flows can be obtained only by someone with a connection to the discharges, like the water right holder, discharger, or contractor for the water. The Brazos River Authority argued that return flows for both groundwater-based and surface-water-based return flows could be appropriated under Texas Water Code section 11.121, the statute requiring a permit for a new appropriation of water, and section 11.046(c), discussed above. These issues will be discussed further below.

D. What Return Flows Can Be Reused?

Water Code section 11.042 authorizes the use of the bed and banks of a watercourse to transfer groundwater-based return flows and water. Under this provision, an applicant can obtain an indirect reuse authorization for return flows that have been discharged in the past as well as for return flows that will be discharged in the future. *See* Tex. Water Code § 11.042(b), (c).

1. Groundwater-Based Return Flows

Section 11.042(b) provides:

> A person who wishes to discharge and then subsequently divert and reuse the person's existing return flows derived from privately owned groundwater must obtain prior authorization from the commission for the diversion and the reuse of these return flows. The authorization may allow for the diversion and reuse by the discharger of existing return flows, less carriage losses, and shall be subject to special conditions if necessary to protect an existing water right that was granted based on the use or availability of these return flows. Special conditions may also be provided to help maintain instream uses and freshwater inflows to bays and estuaries. A person wishing to divert and reuse future increases of return flows derived from privately owned groundwater must obtain authorization to reuse increases in return flows before the increase.

Tex. Water Code § 11.042(b).

As discussed above, before the addition of subsection (b) to section 11.042 in 1997, the *City of San Marcos* court held that the privately owned groundwater effluent that was discharged into the river became state water and was thus subject to the jurisdiction of the state and available for appropriation. Subsection (b) clarifies that a person who wants to discharge privately owned groundwater to a river or stream, and then subsequently divert and reuse it, may do so after obtaining prior authorization from the commission for the diversion and the reuse of these return flows.

The commission's jurisdiction is generally to regulate "state water," and groundwater is not considered to be state water. See Chapter 1 of this book for a discussion of the legal difference between groundwater and state water. The grant of this specific authority to the commission over groundwater reuse raises new issues; for example, do such return flows continue to be "private water" after they are discharged into a watercourse? The *City of San Marcos* opinion did "not mean to conclude that, as a matter of law, effluent can never be fungible with the waters in a watercourse," but only that under the facts of that case, the city's effluent was not fungible with the naturally flowing waters of the San Marcos River. *City of San Marcos*, 128 S.W.3d at 276 n.14.

The legal status of groundwater that has entered a watercourse was determined to be state water by the Texas Supreme Court in *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (2012). The supreme court determined that the evidence in that case was sufficient to show that the groundwater that was flowing from a groundwater well into a watercourse and lake became state water, noting that groundwater was raw water with a constant uncontrolled flow into the watercourse, and the amount of water flowing from the well to the lake or the amount pumped from the lake into the irrigation system was not measured. *Day*, 369 S.W.3d at 823. The court distinguished these facts from groundwater-based return flows that are being transported in a watercourse pursuant to an authorization under section 11.042(b).

A recent district court decision has affirmed a TCEQ issuance of a permit for the reuse of groundwater-based return flows. *See Janes Gravel v. Texas Commission on Environmental Quality*, Cause No. D-1-GN-13-000150 (345th Dist. Ct., Travis County, Tex. Oct. 13, 2014). The TCEQ found that an applicant must obtain an authorization under section 11.042(b) to reuse groundwater-based return flows. *See* Order Granting the Application by City of Lubbock for Amendment to Water Use Permit No. 3985, TCEQ Docket No. 2010-0837-WR; SOAH Docket No. 582-11-3522, Conclusion of Law No. 6. Also, the administrative law judge decided that section 11.046(c) does not apply to groundwater. *See* Proposal for Decision, City of Lubbock's Application for Amendment to Water Use Permit No. 3985, TCEQ Docket No. 2010-0837-WR; SOAH Docket No. 582-11-3522 (May 25, 2012). The TCEQ did not mention the issue in its order issuing the permit.

2. Surface-Water-Based Effluent

Section 11.042 does not contain a provision specifically addressing return flows derived from surface water. Section 11.042(c) provides the following:

> Except as otherwise provided in Subsection (a) of this section, a person who wishes to convey and subsequently divert water in a watercourse or stream must obtain the prior approval of the commission through a bed and banks authorization. The authorization shall allow to be diverted only the amount of water put into a watercourse or stream, less carriage losses and subject to any special conditions that may address the impact of the discharge, conveyance, and diversion on existing permits, certified filings, or certificates of adjudication, instream uses, and freshwater inflows to bays and estuaries. Water discharged into a watercourse or stream under this chapter shall not cause a degradation of water quality to the extent that the stream segment's classification would be lowered. Authorizations under this section and water quality authorizations may be approved in a consolidated permit proceeding.

Tex. Water Code § 11.042(c). The commission has interpreted this section to apply to return flows derived from surface water. *See* Order, the Application of the City of Irving, TCEQ Docket No. 2003-1530-WR; SOAH Docket No. 582-04-8097 (Dec. 9, 2005). Some disagree and argue that surface-water-based effluent should be considered as a new appropriation and should be treated the same as any new appropriation of water. *See, e.g.*, Douglas Caroom, *Indirect Reuse of Municipal Effluent: Senior Appropriator's Perspective*, 67 Tex. B.J. 206 (Mar. 2004). In the 2007 State Water Plan, the TWDB, in discussing the contrasting views on this issue, stated that each view has good and bad consequences. Considering surface-water-based effluent under section 11.042(c) of the Code (1) may result in less stringent water availability reviews, (2) requires accounting to distinguish the reuse flows from other flows, (3) may result in less water in the stream, and (4) may extend the water supply available to the person receiving the authorization. Considering surface-water-based effluent as a new appropriation may result in (1) permits not being granted because the water is already appropriated, (2) water being granted at a junior priority date, which limits its usefulness, and (3) possibly more direct reuse with no protections. *See* 2007 State Water Plan, Vol. I, at 32–34.

3. Historically Discharged Return Flows and Future Return Flows

When return flows have been discharged to the watercourse over a significant period of time ("historically discharged"), other water rights may have been based on their existence in the stream and this water may have preserved or enhanced the stream environment. Historically discharged return flows are addressed in section 11.042. Under subsection 11.042(b), special conditions can be included in the bed and banks permit to protect water rights that were issued based on the use or availability of the groundwater-based return flows. *See* Tex. Water Code § 11.042(b). Subsection 11.042(c) provides that for "other water," special conditions may be included in the permit to address the impact of the discharge, conveyance, and diversion on other water rights or the environment. *See* Tex. Water Code § 11.042(c). Special conditions may include flow levels that must be met before water can be diverted and junior priority dates on the reuse diversion. The amount of water authorized for reuse could also be limited. *See generally* Tex. Water Code §§ 11.1351, 11.147.

In contrast, if the applicant is asking for return flows that will be discharged in the future, harm to other water rights or the environment is less likely. Subsection 11.042(b) specifically allows requests to reuse future discharges of return flows. Although subsection 11.042(c) does not specifically mention future return flows, nothing in subsection 11.042(c) precludes the authorization of future reuse.

E. Who Can Obtain an Indirect Reuse Authorization?

Who can obtain an authorization to reuse groundwater-based effluent under section 11.042(b)? It appears from the wording of the statute that only the owner of the groundwater can obtain an authorization to reuse the effluent derived from groundwater—"the person's existing return flows derived from privately owned groundwater." *See* Tex. Water Code § 11.042(b). The TCEQ has determined that surface-water-based effluent falls under Water Code section 11.042(c). Under that section, who can obtain an authorization to reuse surface-water-based return flows? Subsection (c) provides that "a person who wishes to convey and subsequently divert water in a watercourse or stream" can obtain approval for reuse. *See* Tex. Water Code § 11.042(c). Does this mean that any person may obtain authorization to reuse anyone's return flows, or can it be limited? The same questions can be asked about who can obtain an authorization to reuse future return flows.

F. The TCEQ's Analysis of Reuse Applications

As the preceding discussion suggests, many water rights legal questions remain unanswered about the indirect reuse of return flows. The TCEQ's position on such issues is reflected in its analysis of reuse applications.

1. Must a Reuse Applicant Comply with Other Provisions of Water Code Chapter 11?

Is section 11.042 a stand-alone statute, or does an applicant under section 11.042(b) or (c) have to meet the other requirements of chapter 11 of the Texas Water Code? An application for a new appropriation of water must meet the procedural requirements, and there must be unappropriated water available for the application. *See* Tex. Water Code § 11.134(b)(1), (2). Also, the commission must find that the "appropriation" will be beneficially used, will not impair existing water rights or vested riparian rights, is not detrimental to the public welfare, meets the environmental statutes, and is consistent with the state or regional water plans. *See* Tex. Water Code § 11.134(b)(3).

The application for a new water right must additionally show that the applicant "has provided evidence that reasonable diligence will be used to avoid waste and achieve water conservation" as defined in chapter 11. Tex. Water Code § 11.134(b)(4); *see also* 30 Tex. Admin. Code § 295.9. Wholesale and retail public water suppliers and irrigation districts must develop drought contingency plans consistent with the approved regional water plan. *See* Tex. Water Code § 11.1272.

Concerning surface-water-based effluent, if section 11.042(c) governs bed and banks transport of surface-water-based effluent, is an application to reuse surface-water-based effluent a new water right appropriation or something different? At an August 15, 2005, work session on reuse, the commission determined that an authorization to reuse surface-water-based effluent would be considered a new appropriation of water. *See* Texas Commission on Environmental Quality, *Marked Agenda* 22–23

(Aug. 12, 2005), *available at* http://tceq.state.tx.us/assets/public/comm_exec/agendas/worksess/marked/2005/050812.pdf. However, the issue was clouded by the fact that the commission did not determine what type of water availability analysis should be performed on the application.

The issue becomes even more interesting when applied to groundwater-based reuse, because groundwater is not state water. Do the requirements in sections 11.134, 11.1271, and 11.1272 apply to an application to reuse groundwater-based effluent? Is groundwater-based effluent in a watercourse "state water," a "new or amended water right," or an "appropriation"? Can the commission still require conservation plans for an authorization to reuse groundwater-based effluent? On December 13, 2006, when considering an application for reuse of groundwater-based effluent under section 11.042(b), the commission decided that groundwater-based effluent that had been historically discharged to the stream was not state water and therefore all requirements of chapter 11 did not have to be met. *See* Order Concerning the Motions to Overturn Filed by the Cities of Bryan and College Station, TCEQ Docket Nos. 2006-1831-WR and 2006-1832-W (Dec. 13, 2006). Specifically, the commission determined that the applicant could not be required to provide a conservation plan or comply with any of the statutes that govern state water. *See also* Order Granting the Application by City of Lubbock for Amendment to Water Use Permit No. 3985, TCEQ Docket No. 2010-0837-WR; SOAH Docket No. 582-11-3522, Conclusion of Law No. 10 (finding that the applicant did not have to prove all the elements of section 11.134 to amend its permit to add a bed and banks authorization to reuse existing and future groundwater-based effluent), which is discussed at section V.D.1 above.

2. What Type of Water Availability Analysis Should Be Done for Reuse Applications?

Indirect reuse applications may cover groundwater-based effluent, surface-water-based effluent, future discharges of effluent, or historically discharged effluent. How should the commission determine how much of the effluent water to authorize for reuse in each of these situations? Should it be the total amount discharged minus evaporation or channel losses? How does the commission protect water rights that may have relied on historically discharged return flows? How does the commission analyze future return flows? Should surface-water-based and groundwater-based effluent be analyzed differently?

In 2005 the commission did not reach a conclusion on what type of water availability analysis should be performed for reuse bed and banks authorizations under section 11.042 (see discussion above) because of the commission's later decision concerning the applications filed by the cities of Bryan and College Station for reuse of groundwater-based effluent (*see* Order Concerning the Motions to Overturn Filed by the Cities of Bryan and College Station, TCEQ Docket Nos. 2006-1831-WR and 2006-1832-W (Dec. 13, 2006)); however, it is likely that the commission would rule that groundwater-based effluent does not require the same full water availability determination that a new appropriation requires. There was a settlement in the cities of Bryan and College Station application case; therefore, this question was never presented to the commission or a court.

If the request is for return flows that have not yet been discharged to the river, or discharged for a short time, there can usually be no harm to other water right holders from diversion of the flows once they are discharged. That is, other water right holders have not come to rely on the return flows. The commission determined in the groundwater-based reuse authorization application of the City of Lubbock that no water rights had been issued in the basin in reliance on Lubbock's return flows and therefore there would be no harm to other water rights from the amendment. *See* Order Granting the Application by City of Lubbock for Amendment to Water Use Permit No. 3985, TCEQ Docket No. 2010-0837-WR; SOAH Docket No. 582-11-3522, Finding of Fact No. 64, discussed at section V.D.1 above. Could an authorization to reuse future effluent ever impair other water rights, since the discharges have not been in the river? It appears unlikely, although there could be situations in which there could be impairment based on the provisions of other water rights. For instance, if a water right was based on future flows in the river, this would have to be considered by the commission.

If return flows have been historically discharged, however, water right holders may have relied on those return flows being in the stream. Under section 11.042(b) and (c), the commission must protect these water right holders. How does the commission determine whether a person's water right was granted based on the use or availability of return flows? Does a water right have to indicate on the face of the document that it was granted based on certain return flows being in the river? Is the assumption made that it was granted based on the presence of return flows if, at the time of the issuance of the water right, the effluent was being discharged to the river?

In the last several years, the commission has not included return flows in its assessment of whether unappropriated water is available for appropriation in new water rights or amendments to water rights requesting an increased appropriation. *See* Texas Commission on Environmental Quality, *Evaluation of Naturalized Streamflow Methodologies* 5 (Oct. 13, 1997), *available at* www.tceq.state.tx.us/assets/public/permitting/watersupply/water_rights/tp1.pdf. However, for many years before the updated water availability models mandated by Senate Bill 1, enacted at Texas Water Code section 16.012(g) and (h), the commission sometimes included return flows in a water availability analysis. See Chapter 12 of this book regarding the determination of surface water availability.

If water rights have or could have relied on the requested return flows, there are several options for protecting these water rights and determining how much water the applicant for a bed and banks authorization for reuse can divert. The method of determining whether water is available for diversion under these permits can be either a full water availability analysis, as is done for a new appropriation of water, or a less extensive "no injury" analysis in which the commission examines only whether other water rights may be impaired and then whether to protect those impaired water rights in some way.

Additionally, if a full water availability analysis is not required, the commission can either include existing return flows or include only the return flows that the applicant is requesting in the amount of water commission staff determines to be in the stream. If the commission finds that water right holders may be impaired by the diversion of return flows, the commission can cut back the amount of water that the applicant can divert, require that certain stream flows exist in the river before the applicant could divert the return flows, or place a junior priority date on the diversion of these return flows. A junior priority date would allow the water right holders in the stream with a more senior (earlier) priority date to take any water before the junior water right holder. The commission has not ruled on this issue.

Thus, the commission has yet to rule on many aspects of how to protect existing water rights holders through either requiring a water availability analysis or imposing a junior priority date on reuse authorizations.

3. How Should the Commission Protect the Environment?

The commission, in its review of what special conditions are required to protect the environment, must determine whether the water has been historically discharged to the river long enough to affect the environment. This is largely a judgment call, but TCEQ staff will review any relevant literature or studies to aid in making this determination. If allowing diversion of return flows will have a negative impact on the environment, the commission will place stream flow restrictions on the authorization to require that a certain level of stream flow exist before the applicant may divert the return flows. *See* Tex. Water Code § 11.042(c). If environmental flow standards have been established for a river basin under Texas Water Code section 11.1471, the commission will probably use those standards for protection from reuse of historically discharged flows. See Chapter 11 of this book for a discussion of environmental flow standards under Senate Bill 3, enacted in 2007.

CHAPTER 25

Desalination

Jorge Arroyo,[1] Mary K. Sahs,[2] and Van Kelley[3]

I. Introduction

Desalination is the process by which salt and other minerals are removed from salty water to make that water usable for various purposes, including potable water supply. The original water source may be groundwater, surface water, or seawater. Desalination is a well-established source of water supply around the world. The International Desalination Association reports that desalination was practiced in 150 countries in 2013. More than 17,000 facilities have been constructed with installed capacity of approximately 80 million cubic meters per day (m^3/day), or approximately 24 million acre-feet per year (AFY). The United States has approximately 8.5 percent of the world's desalination production capacity. Although desalination accounts for less than 1 percent of worldwide water consumption, reliance on desalination in some water-scarce countries is substantially higher. In the United Arab Emirates, for example, almost all domestic and industrial water supplies come from desalination. *See* Global Water Intelligence, www.globalwaterintel.com.

Texas benefits from diverse freshwater resources that historically were sufficient to meet the state's water needs. Consequently, the state was slow to embrace desalination. Current installed desalination capacity in Texas is a relatively modest 137,800 AFY. *See* Texas Water Development Board, *Desalination Facts*, www.twdb.texas.gov/innovativewater/desal/facts.asp. However, Texas is experiencing explosive population growth, ongoing drought, and new restrictions on freshwater availability. As water demands grow and available freshwater supplies decline, the promise of a new and plentiful supply of water from desalination is increasingly more attractive.

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2. Mary K. Sahs practices law under the firm name Mary K. Sahs, P.C. She has practiced environmental and water law in Texas for nearly thirty years. She has represented numerous groundwater conservation districts throughout the state as well as other groundwater and surface water stakeholders and is a frequent speaker and author on various Texas water law issues.

3. Van Kelley has thirty-one years' experience in the area of groundwater science focused on the development and application of groundwater flow and transport models and other quantitative decision support tools to evaluate water resource, environmental, and waste isolation management strategies. For the last fourteen years, he has applied his expertise to the characterization of regional aquifer systems and the development of regional and local-scale groundwater flow models to support water resources planning and management efforts throughout Texas and the U.S. Mr. Kelley has a B.S. in petroleum geology from Mississippi State University (1982) and an M.S. in geology (with a hydrogeology emphasis) from Texas A&M University (1985). He is currently a Senior Vice President with INTERA Inc., based in Austin, and he is responsible for overall management of the company's water resources services business unit.

Texas is ideally suited to desalination. It has more than 360 miles of coastline along the Gulf of Mexico with access to a seemingly endless supply of seawater. Moreover, approximately two-thirds of all Texans live within 150 miles of the coast. Inland, more than thirty aquifers are spread across the state, each containing an ample supply of brackish groundwater. According to a 2003 estimate, this inland ocean of brackish groundwater totals more than 2.7 billion acre-feet. *See* LBG-Guyton Associates, *Brackish Groundwater Manual for Texas Regional Water Planning Groups* (Texas Water Development Board 2003) [hereinafter Brackish Groundwater Manual], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/2001483395.pdf. Brackish groundwater is generally found in deeper and more confined portions of aquifers and formations. Like any confined aquifer system, only a relatively small percent of groundwater in storage can be produced economically and without significant declines in groundwater levels. However, in many areas of the state, volumes that can be produced are still very significant compared to the state's water needs.

This chapter provides a brief overview of the history of desalination in Texas; planning projections for future desalination supplies; the current status of desalination in the state; water desalination treatment technology; and challenges to implementing desalination. The chapter also highlights some major seawater and brackish groundwater desalination facilities now being used or developed in Texas.

II. History of Desalination in Texas

Texas's interest in desalination is not new; in 1961, one of the first seawater desalination demonstration plants to be built in the United States was installed at the Dow Chemical Complex in Freeport, Texas. *See Seawater Conversion Plant Will Make History*, *Dow Texan* (Dow Chemical Co. 1960); Ian Lomax, *Experiences of Dow in the Field of Seawater Reverse Osmosis*, 224 Desalination 111 (2008). Also in 1961, four years after its creation, the Texas Water Development Board (TWDB) stated the need to study desalination to develop the lowest possible cost and most practical methods for use in areas where conventional water supplies are not available. *See* Texas Board of Water Engineers, *A Plan for Meeting the 1980 Water Requirements of Texas* 185 (1961), *available at* www.twdb.texas.gov/publications/State_Water_Plan/1961/1961.pdf.

In 1966, the TWDB completed a comprehensive study of the potential contribution of desalination to provide municipal water supplies. The study considered all Texas cities with populations greater than 1,000; identified eleven cities as potential candidates for desalination; and developed production cost estimates for desalination systems ranging from 20,000 gallons per day to 10 million gallons per day (MGD). *See* Southwest Research Institute et al., *The Potential Contribution of Desalting to Future Water Supply in Texas*, Research and Development Progress Report No. 250 (U.S. Dept. of the Interior 1966) [hereinafter Southwest Research Institute et al.], *available at* http://digital.library.unt.edu/ark:/67531/metadc11688/m1/1/.

In 1981, Haciendas del Norte, a small subdivision outside of El Paso, became the first public water system in the state to provide drinking water through desalination. *See* Jean-Phillipe Nicot et al., Bureau of Economic Geology, *A Desalination Database for Texas* (Texas Water Development Board 2005), *available at* www.beg.utexas.edu/environqlty/desalination/Final%20Report_R1_1.pdf. The 23,000-gallons-per-day facility relied on membrane desalination and disposed of the concentrate by means of evaporation ponds and land disposal. The facility ceased to operate in 2009. The subdivision now receives water from the El Paso Water Utilities system.

By 1990, there were eight desalination facilities in Texas with production capacities greater than 25,000 gallons per day; today there are forty-six. The cumulative production capacity of these plants is nearly 123 MGD. El Paso currently leads this list with the 27.5-MGD Kay Bailey Hutchison Brackish Groundwater Desalination Plant. *See* Saqib Shirazi & Jorge Arroyo, *Desalination Database Updates*

3.3 (Texas Water Development Board 2011), *available at* www.twdb.texas.gov/innovativewater/desal/doc/2011_03_desaldb_whitepaper.pdf [hereinafter Shirazi & Arroyo, *Desalination Database Updates*]; Texas Water Development Board, *General FAQs*, www.twdb.texas.gov/innovativewater/desal/faq.asp.

III. Planning Projections

The 2012 State Water Plan recommended that 307,082 AFY of new water supplies be developed from desalination by 2060. Approximately 59 percent, or 181,568 AFY, of these new supplies would be developed from brackish groundwater and 41 percent, or 125,514 AFY, from seawater. *See* Texas Water Development Board, *Water for Texas 2012* 189 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/.

Five regional water planning groups (E, F, L, M, and O) identify brackish groundwater desalination as one of the water management strategies in the 2012 State Water Plan. These strategies would produce 181,568 AFY of new water supplies by 2060, representing 2 percent of all the new supplies in the state. Groundwater desalination represents about 21 percent of the management strategy volumes in Region E. 2012 State Water Plan, at 56. In Region F, a maximum of 16,050 AFY of water in 2060 would be provided by groundwater desalination. 2012 State Water Plan, at 64. Region L recommended three brackish groundwater desalination projects using water from the Wilcox aquifer. These are projected to produce up to 42,220 AFY. 2012 State Water Plan, at 102. The largest volume was proposed by Region M: up to 92,212 AFY of water in 2060. 2012 State Water Plan, at 108. While Region O did not include desalination as a management strategy, it did recommend evaluation of water supplies and the cost of desalination of water from the Dockum aquifer. 2012 State Water Plan, at 120.

Four regional water planning groups identified seawater projects. The Freeport Seawater Desalination Project is recommended by Region H. To be in operation in approximately 2050, it would provide 33,600 AFY by 2060. As planned, it would provide desalinated water to wholesale water suppliers such as the Brazosport Water Authority and the Gulf Coast Water Authority. Its location has access to seawater, as well as raw water from the Brazos River. *See* Texas Water Development Board, *Region H: Freeport Seawater Desalination Project*, www.twdb.texas.gov/innovativewater/desal/seaprojects/regionH/.

Region L recommended the San Antonio Water System Seawater Desalination Project. As proposed, it would come into operation in 2060 and provide 84,021 AFY of desalinated water. It would include a desalination water treatment plant on the Texas coast near Seadrift on San Antonio Bay. To transfer the potable water to meet major municipal demand of the South Central Texas Region, planned infrastructure would include a 126-mile pipeline. San Antonio Bay is part of the estuary of the San Antonio and Guadalupe Rivers. *See* Texas Water Development Board, *Region L: San Antonio Water System Seawater Desalination Project*, www.twdb.texas.gov/innovativewater/desal/seaprojects/regionL/index.asp.

Two seawater desalination projects are recommended as water management strategies by Region M: the Brownsville and the Laguna Madre and Laguna Vista Seawater Desalination Projects. As proposed, the Brownsville project, with a start-up date around 2040, will provide 7,013 AFY by 2060. The 2.5 MGD demonstration scale seawater desalination plant will be expanded to 25 MGD at full development. *See* Texas Water Development Board, *Region M: Laguna Madre and Laguna Vista Seawater Desalination Project*, www.twdb.texas.gov/innovativewater/desal/seaprojects/regionM/index.asp.

The 2010 feasibility analysis for the second seawater project in Region M is expected to provide 1,120 AFY of water by 2060. The recommended site will use Gulf water as its raw water source and be located on the north side of South Padre Island. *See* Texas Water Development Board, *Region M:*

Laguna Madre and Laguna Vista Seawater Desalination Project, www.twdb.texas.gov/innovativewater/desal/seaprojects/regionM/index.asp.

Finally, Region N recommended the Corpus Christi Seawater Desalination Project, which is discussed in more detail below. The facility would begin production in 2040 and have the capacity to produce 28,000 AFY of desalinated water by 2060 to meet the city's municipal demand. *See* Texas Water Development Board, *Region N: Corpus Christi Seawater Desalination Project*, www.twdb.texas.gov/innovativewater/desal/seaprojects/regionN/index.asp.

The magnitude of these supply numbers, like other supply numbers in the 2012 State Water Plan, should not be minimized. As reflected in this chapter, desalination projects face regulatory and financial challenges that may not fully be anticipated when the projects are used as placeholders in the state planning process. Each recommended project that does not come to fruition will create a water supply shortfall that cannot be quickly satisfied with other, more conventional supplies. To make these projects a reality, the state of Texas must encourage their development with a thoughtful regulatory regime suitable to the resource and development risks.

IV. Current Status of Desalination in Texas

A. Sources

There are three sources of saline water in Texas: brackish surface water, brackish groundwater, and seawater from the Gulf of Mexico. The salinity of water is generally described in terms of the amount of total dissolved solids (TDS) in milligrams per liter (mg/L). Tom Pankratz & John Tonner, *Desalination.com: An Environmental Primer* 115 (Lone Oak Pub. 2003). TDS can be made up of a variety of constituents. In general, freshwater has a TDS concentration range from zero to 1,000 mg/L. Water with concentrations of TDS between 1,000 and 10,000 mg/l, whether surface water or groundwater, is considered to be brackish water. Seawater salinity is typically on the order of 30,000 to 35,000 mg/l, although runoff and freshwater discharges may lower the salinity level of coastal sources. The TDS concentration of brine is generally greater than 35,000 mg/L. Brine contains dissolved minerals and other contaminants that are removed during desalination. *See* Texas Water Development Board, *Brackish FAQs*, www.twdb.texas.gov/innovativewater/desal/faqbrackish.asp.

To make saline water acceptable for drinking purposes, the dissolved solids have to be removed. Environmental Protection Agency drinking water standards suggest that TDS in potable water should be limited to 500 mg/l, but higher levels may be acceptable. U.S. Bureau of Reclamation, *Desalting Handbook for Planners* 36 (3d ed. 2003) [hereinafter Desalting Handbook]. In Texas, secondary drinking water standards set a limit of 1,000 mg/l for TDS. Texas Commission on Environmental Quality (TCEQ) rules stipulate that—

> [t]he requirements for secondary constituents apply to all public water systems. Water that does not meet the secondary constituent levels may not be used for public drinking water without written approval from the executive director [of the TCEQ]. When drinking water that does not meet the secondary constituent levels is accepted for use by the executive director, such acceptance is valid only until such time as water of acceptable chemical quality can be made available at reasonable cost to the area(s) in question.

30 Tex. Admin. Code § 290.118(a). See Chapter 30 of this book for a more detailed discussion of drinking water standards. Desalination of water for industrial purposes may not require the same level of TDS removal.

According to the TWDB desalination plant database, current brackish desalination systems report source water salinities ranging between 1,000 and 3,000 mg/l, which is commonly considered at the lower end of the brackish water quality range. *See* Texas Water Development Board, *Desalination Plants*, http://www2.twdb.texas.gov/apps/desal/default.aspx.

B. Current Capacity

All of the existing desalination production capacity in the state is based on brackish water—as opposed to very saline seawater—sources. Of the 123 MGD of installed capacity, 42 percent (50 MGD) is based on brackish surface sources and 59 percent (73 MGD) is based on brackish groundwater sources. *See* Shirazi & Arroyo, *Desalination Database Updates*, at 3.3.

The Kay Bailey Hutchison Desalination Plant located in El Paso, Texas, is the largest inland desalination facility in the United States. The facility is located on a military reservation and operated in cooperation with the United States Department of Defense. It has a design capacity of 27.5 MGD. Water from the Hueco Bolson Aquifer is fed to the facility from sixteen production wells and sixteen blend wells. Reverse osmosis (RO) is used in a two-stage configuration. Concentrate is pumped 22 miles to be disposed by deep well injection. *See* Texas Water Development Board, *Worth Its Salt: El Paso Water Utilities, Kay Bailey Hutchison Desalination Plant, available at* www.twdb.texas.gov/innovativewater/desal/worthitssalt/doc/Worth_Its_Salt_Jan2014_KBH.pdf.

The San Antonio Water System (SAWS) is developing a brackish groundwater desalination project that will be operational in 2016. The project has a goal of producing 33,600 AFY of desalinated water by 2026. This represents 15 percent of the current SAWS water supply. Significantly, the project's location in Bexar County is not within the applicable jurisdiction of a groundwater conservation district (GCD). This will allow SAWS to proceed without the planning, management, and permitting restrictions associated with production within GCDs, as discussed below.

The Southmost Regional Water Authority regional desalination plant is located in the Lower Rio Grande Valley. The plant uses RO technology. Initially, it provided 7.5 MGD of new potable water, which was more than 40 percent of the annual needs of participating entities, and was designed with oversized components to allow for expansion. Joseph W. Norris, *Southmost Regional Water Authority Regional Desalination Plant, in The Future of Desalination in Texas*, Volume II: Technical Papers, Case Studies and Desalination Technology Resources (Texas Water Development Board 2004), *available at* www.twdb.texas.gov/publications/reports/numbered_reports/doc/R363/Report363.asp; *see also* Texas Water Development Board, *Worth Its Salt: Southmost Regional Water Authority Brackish Groundwater Treatment Facility, available at* www.twdb.texas.gov/innovativewater/desal/worthitssalt/doc/Worth%20Its%20Salt_Fall%202014_SWRA.pdf.

The North Alamo Water Supply Corporation began operating its Victoria Road Reverse Osmosis Plant No. 5 brackish groundwater desalination facility near Donna, Texas, in 2012. The plant has a capacity of 2 MGD that can be expanded to 4 MGD. The two wells produce feed water from the Gulf Coast Aquifer. Concentrate is blended with raw water to reduce the TDS concentration, allowing it to be discharged into a drainage ditch that flows into Laguna Madre. *See* Texas Water Development Board, *Worth Its Salt: North Alamo Water Supply Corporation Victoria Road Reverse Osmosis Plant No. 5, available at* www.twdb.texas.gov/innovativewater/desal/worthitssalt/doc/Worth_Its_Salt_VictoriaRoad.pdf.

In 2007, the North Cameron Regional Water Supply Corporation finished construction of a RO desalination facility in northern Cameron County, Texas, as a cooperative venture between the city of Primera, the North Alamo Water Supply Corporation, and the East Rio Hondo Water Supply Corporation. *See* NRS Consulting Engineers, *Guidance Manual for Brackish Groundwater Desalination in Texas* 5 (Texas Water Development Board 2008) [hereinafter Guidance Manual for BGD], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0604830581_BrackishDesal.pdf. The project has a desalination capacity of 2.0 MGD and a total production capacity of 2.25 MGD with blending. The desalination plant serves both municipal and industrial users and was designed to readily accommodate future expansion up to 4.5 MGD production. Guidance Manual for BGD, at 6. The source of the water is brackish groundwater from the Gulf Coast Aquifer.

Although Texas currently lacks seawater desalination plants, this may soon change. Since 2002, the TWDB and entities including the Brownsville Public Utilities Board, Laguna Madre Water District, city of Corpus Christi, the Brazos River Authority, and Dow Chemical have completed seawater desalination feasibility studies for four different sites and conducted comprehensive plant studies at two sites. Since then, the Brownsville Public Utilities Board sought funding for increasingly smaller seawater desalination projects without success. In May 2011, the Laguna Madre Water District secured voters' authorization to issue bonds to fund a 1 MGD facility on South Padre Island; however, the district is currently focused on developing water reuse supplies.

In collaboration with the Bureau of Reclamation, the city of Corpus Christi is currently implementing a desalination demonstration project that includes a twelve-to-eighteen-month pilot test. *See* Texas Water Development Board, *2014 Biennial Report on Seawater Desalination—The Future of Desalination in Texas* 8 (2014) [hereinafter 2014 Biennial Report], *available at* www.twdb.texas.gov/innovativewater/desal/doc/2014_TheFutureofDesalinationinTexas_Final.pdf. At the time the 2014 Biennial Report was published, it was expected that the preliminary sites for the demonstration plant would be selected and technology testing would be completed in the first quarter of 2015, which would include water quality sampling at a maximum of five locations. It was anticipated that the site would be selected and an eighteen-month pilot study for a 200,000 gallon-per-day plant would begin in the second quarter of 2015. This would include testing various desalination technologies. The TWDB was participating in this project as a partner. The city of Corpus Christi has obtained a $400,000 grant from the Bureau of Reclamation through its Desalination and Water Purification Research program for the pilot component of the project. 2014 Biennial Report, at 8.

The Guadalupe-Blanco River Authority is conducting a feasibility study for an integrated water-power project along the Texas Gulf Coast. The planned project would include a seawater desalination plant colocated with a power plant. The study area for the project extends from Freeport to Corpus Christi along the Gulf Coast, encompassing over thirty counties, five major rivers, and seven smaller streams that drain to the Gulf of Mexico and all or portions of six regional water planning areas. Possible site locations have been identified in San Patricio, Calhoun, Matagorda, and Brazos counties. 2014 Biennial Report, at 12–13.

M&G Resins USA, LLC, is building a seawater desalination plant colocated with a manufacturing facility between Nueces Bay and the Viola Channel. The desalination plant will supply 6 MGD and recover 2 MGD of treated water from the facility's internal process. It will use 15 MGD of raw seawater from the Viola Channel and discharge 9 MGD of brine back into the channel. The seawater desalination plant is being designed for a maximum production capacity of 22 MGD. The plant will become operational in 2016. 2014 Biennial Report, at 13–15; Flavio Assis, M&G Resins USA, LLC, presentation to the TWDB (Jan. 29, 2015).

C. Concentrate Disposal

Water desalination generates the product water, which is drinking water for consumption, and the concentrate, or brine, for disposal. The volume and salinity of desalination concentrate streams is a function of the source water salinity and of the recovery rate (percentage of product water extracted from the source water). For example, a 1-MGD brackish desalination system with source water salinity of 2,000 mg/l and a recovery rate of 80 percent may produce a concentrate stream of 250,000 gallons per day having a salinity of 13,000 mg/l.

The disposal of concentrate, along with any water treatment by-products, requires a Texas Pollutant Discharge Elimination System (TPDES) permit from the TCEQ. *See* Guidance Manual for

BGD, at 51. Most of the systems in the TWDB desalination plant database discharge concentrate to surface water bodies. Fifteen systems discharge directly to surface water bodies and fourteen do so indirectly through sewerage systems and wastewater treatment plant discharges. Eight plants dispose of the concentrate through irrigation systems, five use land application, seven use evaporation ponds, one uses underground injection, and one reuses the concentrate stream for industrial purposes. *See* Shirazi & Arroyo, *Desalination Database Updates*, at 3.9, fig. 3–9.

D. Cost of Desalination

A 2009 study reviewed recently completed brackish groundwater desalination projects and proposed seawater desalination projects to estimate the production cost of desalination in Texas. *See* Saqib Shirazi & Jorge Arroyo, *Cost of Water Desalination in Texas* (Texas Water Development Board 2012) [hereinafter Shirazi & Arroyo, *Cost of Water Desalination*], *available at* www.twdb.texas.gov/innovativewater/desal/doc/Cost_of_Desalination_in_Texas_rev.pdf. Included in the total production cost of desalinated water was the cost of capital debt service as well as operation and maintenance costs, with debt service costs being a function of the total capital cost of the project, the interest on the capital, and the loan payback period, and operation and maintenance costs being a function of chemical, power, equipment replacement, and labor costs. Shirazi & Arroyo, *Cost of Water Desalination*, at 2.

The total production cost of desalinated brackish groundwater for the sample of projects ranged from $410 per acre-foot (North Alamo Water Supply Corporation plant at Lasara) to $847 per acre-foot (Southmost Regional Water Authority plant). The projects ranged in size from 1.2 to 27.5 MGD. The estimating procedure normalized the cost to 2009 dollars and capital costs amortized over a twenty-year period and 6 percent interest. Shirazi & Arroyo, *Cost of Water Desalination*, at 5.

SAWS now estimates the cost of water from phase one of its brackish groundwater desalination facility at $1,177 per acre-foot. Esther Harrah, P.E., San Antonio Water System, Desalination Program Update to SAWS Board of Trustees (Apr. 20, 2015). The cost of water from the Kay Bailey Hutchison Desalination Plant in El Paso is difficult to determine because it is located on a military reservation and operated in cooperation with the federal government.

The review examined projected (planning level) production costs of two proposed seawater desalination projects. The projected cost of producing desalinated water from seawater ranged from $1,168 per acre-foot (treatment cost of a proposed 100-MGD facility to supply Bexar County) to $1,881 per acre-foot (proposed 2.5-MGD facility in the Lower Rio Grande Valley). Shirazi & Arroyo, *Cost of Water Desalination*, at 5.

V. Desalination Technologies

Desalination technologies can be broadly classified as thermal or membrane filtration. Thermal desalination is an energy-intensive method of separating salts from water. Although thermal-based technologies have an important and growing presence in the Middle East, where energy is less expensive, the great majority of the newer facilities—worldwide and in Texas—rely on RO membrane filtration. *See* International Desalination Association, *IDA Desalination Yearbook 2010–2011* 5 (2010) [hereinafter IDA Desalination Yearbook].

Unlike Texas, where 100 percent of desalination production is from brackish sources, globally the majority of installed desalination capacity is from ocean sources. *See* IDA Desalination Yearbook, at 4. Although the basic principles—separation of salts by use of semipermeable membranes—are the same for brackish as for seawater desalination, there are some differences that differentiate brackish from seawater desalination pertaining to the manner in which the source water is captured, the conditioning of the water before the actual desalination step, and the energy requirements.

Desalination plants, regardless of the source of saline water, consist of five main processes: intakes, pretreatment, salt separation, concentrate disposal, and the post-treatment process. To some extent, a desalination treatment plant is like a conventional treatment plant plus the desalination step. Depending on the source, there are some differences in the desalination process and, where relevant, those differences are discussed below.

A. Intake Process

Intake facilities are needed to obtain and transport the source water to the point of treatment. Brackish groundwater desalination systems, in their simplest form, may consist of a well or well field and transmission lines to transport the water—usually a short distance—to the desalination plant. In more complex cases, such as surface brackish or seawater desalination, these facilities may encompass open intakes, screens, and canal structures.

A brackish groundwater desalination project typically involves a study of the aquifer formation where source water is to be extracted to ensure that sufficient and sustainable water is available for the desalination plant. The wells are designed and constructed to eliminate the potential contamination of fresh groundwater sources as a result of the extraction of saline water. Often, particularly for smaller projects, the brackish groundwater wells and the desalination plant are located in relative proximity. This avoids the need for long transmission lines and, consequently, lowers the capital and operating costs of the facility. Intakes for brackish surface water desalination are the same as those required for fresh surface water projects and typically consist of concrete structures and screens and pipes on the side of a reservoir, river, or channel.

The ocean is a more complex and dynamic source; consequently, "the design, modeling, monitoring, and permitting activities that surround them, may represent as much as 20% of the capital cost of the entire facility, and it is possible that intake-related issues may ultimately determine the feasibility and performance of the desalination plant itself." Tom Pankratz, *An Overview of Seawater Intake Facilities for Seawater Desalination, in The Future of Desalination in Texas*, Volume II: Technical Papers, Case Studies and Desalination Technology Resources (Texas Water Development Board 2004), *available at* www.twdb.texas.gov/publications/reports/numbered_reports/doc/R363/Report363.asp.

A major concern in the design, construction, and operation of seawater intake facilities is the potential trapping of marine organisms in the screens of the intake structure or the suction and destruction of these organisms in the desalination process. These issues, referred to as entrainment and impingement in the desalination literature, often dictate the type of intake facility that can be used. Impingement occurs when fish are trapped or pinned by the force of intake flow, which can result in high mortality. Entrainment occurs when fish or macro invertebrate eggs or larvae are taken into the intake and exposed to processing, which typically approaches 100 percent mortality. *See Ecological Modeling for Resource Management* (Virginia H. Dale, ed., 2002).

Subsurface ocean intakes, such as beach wells or infiltration galleries, minimize entrainment and impingement. *See* West Basin Municipal Water District, *Ocean Water Desalination*, www.westbasin.org/water-reliability-2020/ocean-water-desalination/west-basins-approach. Open intakes are designed to minimize the velocity of the water at the intake point to limit the draw of marine organisms; also, open intakes are fitted with screens or deterring mechanisms to discourage fish from approaching the intake points. The seawater desalination facilities currently under consideration in Texas all involve open intakes.

B. Pretreatment

A desalination plant is a conventional plant with one more step added to remove the TDS. The purpose of the conventional plant or pretreatment portion of a desalination facility is to remove suspended and organic matter from the source water. Failures in the pretreatment process may cause problems with the RO membranes, such as excessive soiling or fouling of the membrane; in severe cases, this may require a premature replacement of the membranes, which adds to the production cost of a desalination facility.

In the case of brackish groundwater desalination, the source water is typically clean, with low organic contaminant and turbidity levels. For these cases, all that is required is screening of small particles (sand or silt) that may have been drawn into the water stream by the well pumps. Removal of these particles is accomplished by use of cartridge or bag filters; however, brackish groundwater may contain other contaminants or substances, such as iron, that may precipitate and foul the membranes. Most groundwater desalination facilities address these issues by chemical or physical means during the pretreatment process. Common examples of these chemical additions include the use of iron or manganese reduction systems or pH control using acid. *See* Guidance Manual for BGD, at 61.

The pretreatment for a surface brackish and ocean sources plant is generally similar to that required for a conventional fresh surface water source: removal of suspended solids by flocculation and sedimentation followed by sand and anthracite media filtration or, in some cases, micro or ultramembrane filtration. Surface water sources are more prone to seasonal changes in the quality of the water, and pretreatment designs need to account for that variability. This need is commonly addressed by performing pilot plant studies at the site of proposed large-scale facilities. The pilot plant studies provide data on the seasonal variability of the source water and inform the design of the pretreatment.

C. Salt Separation by Reverse Osmosis Membranes

Osmosis is a natural process that occurs when two aqueous solutions of differing concentrations are separated by a permeable membrane. In these situations, water will flow from the solution of lower concentration, through the membrane, to dilute the solution of higher concentration. Thomas M. Messimer, *Water Supply Development, Aquifer Storage, and Concentrate Disposal for Membrane Water Facilities* 44 (Schlumberger Water Services, 2009). RO is a process that relies on pressure to reverse the osmotic tendency of water to flow in the direction of higher concentration and forces water across a semipermeable membrane while impeding the passage of salt across the membrane. Guidance Manual for BGD, at 18, fig. 13.

The pressure required to desalinate water in a RO process is a function of the salinity of the source or feed water; the greater the salinity, the greater the pressure required—and consequently, the higher the energy needs and cost to desalinate water. For brackish desalination systems, the pressure requirements are in the order of 50 to 600 pounds per square inch, and 800 to 1,200 pounds per square inch for seawater desalination. *See* R.W. Beck, Inc., *Guidance Manual for Permitting Requirements in Texas for Desalination Facilities Using Reverse Osmosis Processes* 4-3, tbl. 4-1 (Texas Water Development Board 2004) [hereinafter Guidance Manual for PR], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/2003483509.pdf.

Generating the needed pressures to accomplish RO filtration requires energy. For seawater desalination, the specific energy usage is typically about 3 to 7 kilowatt-hours per cubic meter of water produced. Brackish water desalination uses 0.5 to 3 kilowatt-hours per cubic meter of water produced. National Research Council, *Desalination: A National Perspective* 77 (National Academies Press 2008).

RO membranes are nearly impermeable to the passage of salts; however, as salts are deposited on the feed side of the membrane, a small portion, typically less than 1 percent, will move across the membrane and comingle with the product water, which is also referred to as permeate. RO systems are designed and operated to produce permeate with salinities below the 500 mg/l regulatory threshold.

Some of the rejected salts and particles settle on the feed side of the membranes and may obstruct the passage of water. This process is referred to as fouling of the membranes and, if not handled appropriately, could lead to irreversible failure of the membranes. Chemical additives to lessen the rate of precipitation of salts, periodic cleaning, and higher cross-flow velocities on the feed side of the membrane are mechanisms for reducing fouling potential.

D. Concentrate Disposal

The salts rejected in the RO process accumulate in the unfiltered portion of the feed stream for disposal. The desalination process does not add impurities already present in the source but, in addition to the original dissolved solids and matter, the reject stream may contain chemicals added in the process to prevent chemical or biological fouling of the membranes. *See* Guidance Manual for BGD. Other pollutants of concern include metals, such as arsenic. These elements are often present in the raw water and may be concentrated by up to a factor of four in the waste stream of the desalination process.

The disposal of desalination concentrate is regulated to ensure the safe disposal of concentrate and to protect the quality of receiving waters. The design and evaluation of alternatives typically employ modeling of the contents and impacts of brine discharges on ecological resources. Ibrahim Alameddine & Mutasem El-Fadel, *Brine Discharge from Desalination Plants: A Modeling Approach to an Optimized Outfall Design*, 214 Desalination 241 (2006). The following is a brief discussion of the more common concentrate disposal options and the specific regulations that apply to their permitting.

Surface water discharge is the most frequent disposal method for brackish plants, and it is the disposal method for nearly all seawater plants. Desalting Handbook, at 170. This type of discharge includes the direct disposal of undiluted concentrate to a surface water body and a comingling of the concentrate with other discharge streams such as power plant cooling water or treated municipal wastewater effluent. Discharging the concentrate to surface waters requires an industrial TPDES permit from the TCEQ. Guidance Manual for BGD, at 51.

Concentrate disposal by evaporation ponds works well in some areas of Texas where land is available at a relatively low cost and evaporation rates are high. However, the lining requirements for these types of facilities are costly and limit their use to smaller-scale systems. Use of evaporation ponds requires a TCEQ permit for Land Application of Water Treatment Sludge. Guidance Manual for BGD, at 51.

Underground injection of concentrate is an important option for inland systems in Texas. Injection wells in Texas are classified into five different categories, depending on the type of waste to be disposed of in the well. Section 27.002 of the Texas Water Code defines an injection well as—

> an artificial excavation or opening in the ground made by digging, boring, drilling, jetting, driving, or some other method, and used to inject, transmit, or dispose of industrial and municipal waste or oil and gas waste into a subsurface stratum; or a well initially drilled to produce oil and gas, which is used to transmit, inject, or dispose of industrial and municipal waste or oil and gas waste into a subsurface stratum; or a well used for the injection of any other fluid.

Tex. Water Code § 27.002(11). Some types are regulated by the TCEQ and others by the Texas Railroad Commission. *See* Guidance Manual for BGD, at 51.

Of the five classes of injection wells, Class I wells are perhaps the most pertinent to the disposal of concentrate. Class I wells are the more conservative of the injection wells in terms of structural and operational monitoring safeguards. To a lesser extent, Class V wells can also be used for concentrate disposal but are not as common. Class II injection wells have never been used for the disposal of concentrates from desalination operations and are authorized only for the disposal of fluids resulting from oil and gas operations. Some wells in Texas are dually permitted as Class I and Class II wells. *See* Robert E. Mace et al., *Please Pass the Salt: Using Oil Fields for the Disposal of Concentrate from Desalination Plants, in The Future of Desalination in Texas*, Volume II: Technical Papers, Case Studies and Desalination Technology Resources (Texas Water Development Board 2004), *available at* www.twdb.texas.gov/publications/reports/numbered_reports/doc/R363/Report363.asp.

Desalination concentrate may also be reused in a beneficial manner, for example, by injecting the brine in flooding operations for enhanced oil recovery processes via Class II wells. *See* Guidance Manual for PR, at 4-14. However, the lack of continuity of a typical flooding operation presents a practical limitation for the use of this disposal method for municipal desalination facilities. Municipal facilities require a disposal method that will be available throughout the entire service life of the desalination facility.

Pursuant to authorization granted by the legislature in 2007, the TCEQ has adopted rules for issuance of a general permit streamlining the permitting of Class I wells and clarifying the dual permitting of Class II disposal wells as Class I wells for desalination concentrate. *See* Tex. Water Code § 27.025; 30 Tex. Admin. Code ch. 331, subch. L. The permit allows for desalination concentrate injection into active Class II enhanced recovery wells through a Class II permit amendment process at the Texas Railroad Commission. *See* CDM Smith, *Manual for Permitting Process—Guidance Manual for Permitting Class I and Class II Wells for the Injection and Disposal of Desalination Concentrate* (Texas Water Development Board 2014), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/1004831106_injectionwells.pdf. The 84th Legislature added section 27.026 to the Water Code to allow the TCEQ to authorize a Class V injection well for the injection of nonhazardous brine from a desalination operation or nonhazardous drinking water treatment residuals into a Class II injection well that is also permitted by the Railroad Commission. *See* Act of May 20, 2015, 84th Leg., R.S., ch. 297, § 1, eff. Sept. 1, 2015 (H.B. 2230).

Other beneficial uses of concentrate include solar ponds, irrigation, zero liquid discharge, salt separation processes, aquaculture, and creating or restoring wetlands. These methods are still being developed or researched and are not a feasible means for large-scale disposal of concentrate. *See Beneficial and Nontraditional Uses of Concentrate* (Water Reuse Foundation 2006).

E. Post-treatment

The end product of RO filtration is water nearly devoid of minerals. This level of purity is problematic and needs to be addressed before the water is delivered to a distribution system.

Product water from membrane desalination can range from 25 to 500 mg/l of TDS. Low concentration of calcium and bicarbonate results in water that is unstable. If not treated, the water will attempt to stabilize itself by dissolving materials it comes in contact with, such as pipelines or existing sediment in old distribution systems. Adding calcium and bicarbonate and adjusting the acidity of the water is required to avoid corrosion of pipes, storage systems, and even pipes of the end customer. Desalting Handbook, at 126.

VI. Challenges to Implementing Desalination

In general, the greatest perceived challenge to developing desalination in Texas is its relatively high cost, particularly when compared to water supplies that are already developed. As lower-cost water options become unavailable or insufficient, more and more desalination supplies will be developed. There are, however, other challenges to desalination in addition to the perceived high cost: the lack of a regulatory precedent, in the case of seawater desalination; the relatively high energy requirements of RO desalination; the disposal of concentrate, particularly in the case of inland facilities; and, specific to brackish groundwater desalination, the current lack of data about the brackish portion of the aquifers of Texas.

A. Regulatory Issues

Development of a seawater desalination plant, with or without a colocated power plant, requires numerous federal, state, and local permits and must comply with a variety of federal, state, and local laws, many of which are designed for environmental protection. The permitting and other regulatory considerations for such a plant include the following.

- Permits from the U.S. Army Corps of Engineers under Clean Water Act sections 10 (regulates construction activities in navigable waters) and 404 (regulates discharge of dredged and fill material into waters of the United States). *See* 33 U.S.C. §§ 1251–1387; *see also* NRS Consulting Engineers, Inc., *Texas Desal Project: Final Report to the Texas Water Development Board* (Sept. 2011), at app. F, *Draft Seawater Desalination Permitting Report: Brownsville Public Utilities Board* (TRC Environmental Corp. 2010) and *Draft Seawater Desalination Permitting Report: Laguna Madre Water District* (TRC Environmental Corp. 2010) [hereinafter TRC Seawater Permitting Reports], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830972_TexasDesalProject.pdf.
- Compliance with National Environmental Policy Act section 102, which requires federal agencies to perform environmental and interdisciplinary studies and assessments of a proposed project. *See* 42 U.S.C. § 4332; TRC Seawater Permitting Reports.
- Compliance with Endangered Species Act section 7(a), which requires consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to determine possible adverse effects on threatened or endangered species. *See* 16 U.S.C. § 1536(a). Such consultation could result in the need to obtain an incidental take permit. *See* TRC Seawater Permitting Reports.
- Notification of the Federal Aviation Administration under certain defined circumstances that may impact nearby aviation activities. *See* TRC Seawater Permitting Reports.
- Compliance with Texas Water Code chapter 27 underground injection control requirements if concentrate is disposed of by deep well injection. *See* Tex. Water Code § 27.021. Nonhazardous brine produced by a desalination plant can be disposed of under a TCEQ general permit for injection into a Class I injection well. *See* TRC Seawater Permitting Reports.
- Certification by the TCEQ under its section 401 water quality certification process required for all individual Clean Water Act section 404 permit applications to ensure that any proposed discharge will comply with state water quality standards. *See* Tex. Water Code § 26.0136; *see also* 30 Tex. Admin. Code ch. 279; TRC Seawater Permitting Reports.
- TPDES industrial wastewater permit and Texas Land Application Permit from the TCEQ under Texas Water Code chapter 26 and Clean Water Act section 402, which is required for all

point source discharges of pollutants into waters of the United States or adjacent to waters of the state by irrigation, evaporation, or subsurface drainage. *See* Tex. Water Code ch. 26; 33 U.S.C. § 1342; TRC Seawater Permitting Reports. See also Chapters 33 and 34 of this book.

- Compliance with the TCEQ General Permit (TXG670000) for discharges resulting from the hydrostatic testing of pipelines, tanks, and other containers into water in the state, including regularly scheduled water quality sampling of the discharge. *See* TRC Seawater Permitting Reports.
- Compliance with the TCEQ Construction General Permit (TXR150000) for stormwater controls applicable to construction projects, including developing and implementing a Storm Water Pollution Prevention Plan. *See* TRC Seawater Permitting Reports; *see also* Lauren Kalisek, 45 Texas Practice Series, *Texas Environmental Law* ch. 6, Water Quality (2013).
- Compliance with the TCEQ Land Application for Water Treatment Plant Sludge registration requirements, which include submittal of sludge and soil analysis reports. *See* TRC Seawater Permitting Reports; *see also* Paul G. Gosselink & Jeffrey S. Reed, 45 Texas Practice Series, *Texas Environmental Law* ch. 10, Solid Waste (2013).
- Texas Water Code chapter 11 water rights permit from the TCEQ to authorize diversion of seawater to be used as source water in the desalination process. *See* TRC Seawater Permitting Reports.
- Compliance with Safe Drinking Water Act standards under the Texas Health and Safety Code chapter 341 public water system review, which includes a TCEQ review of plans and specifications and business plans, and monitoring and reporting water quality to the TCEQ. *See* Safe Drinking Water Act, 42 U.S.C. §§ 300f–300j-26; Tex. Health & Safety Code ch. 341; TRC Seawater Permitting Reports. See also Chapter 30 of this book and the discussion at section III above.
- Registration of any petroleum storage tanks, either aboveground or underground, and compliance with TCEQ regulations. *See* TRC Seawater Permitting Reports; *see also* Mary Simmons Mendoza, 45 Texas Practice Series, *Texas Environmental Law* ch. 12, Storage Tanks (2013).
- Compliance with the Clean Air Act and Texas Health and Safety Code chapter 382, with regard to air emissions. This generally will require compliance with a permit by rule. *See* TRC Seawater Permitting Reports; *see also* Jim Braddock & Whit Swift, 45 Texas Practice Series, *Texas Environmental Law* ch. 5, Air Quality (2013).
- Consultation with the Texas Parks and Wildlife Department regarding the potential impacts of the project on any state-listed threatened or endangered species. *See* TRC Seawater Permitting Reports.
- A Texas Parks and Wildlife Department sand and gravel permit for activities that will "disturb or take marl, sand of commercial value, and all gravel, shell, and mudshell located within tidewater limits or freshwater areas of the state, and on islands within those limits and areas." TRC Seawater Permitting Reports, app. F, *Draft Seawater Desalination Permitting Report: Brownsville Public Utilities Board*, at 15. Either a general or individual permit would be required.
- An antiquities permit from the Texas Historical Commission if the project will use public land under defined circumstances, and consultation with the agency under National Historic Preservation Act section 106, if activities have federal involvement. *See* TRC Seawater Permitting Reports.

- Review by the Coastal Coordination Council for consistency with the goals and policies of the Texas Coastal Management Program in protecting coastal natural resources. *See* TRC Seawater Permitting Reports.
- Easements from the General Land Office "on both coastal submerged lands and state-owned uplands for projects which require a right-of-way on, across, under, or over state-owned lands, pursuant to Texas Natural Resources Code § 51.291." TRC Seawater Permitting Reports, app. F, *Draft Seawater Desalination Permitting Report: Brownsville Public Utilities Board*, at 17.
- Approval of a Texas Department of Transportation utility line request for installation of pipelines in its right-of-way. *See* TRC Seawater Permitting Reports.
- Various county or city permits and other requirements such as zoning, conditional use, building, and local road construction permits as well as compliance with floodplain management requirements. *See* TRC Seawater Permitting Reports.
- Permits and coordination with navigation or other special purpose districts. *See* TRC Seawater Permitting Reports.
- Approval from railroad companies for any pipelines that cross rail lines. *See* TRC Seawater Permitting Reports.

Thus, seawater desalination plants will be highly regulated. The 84th Legislature passed House Bill 2031, which added chapter 18 to the Texas Water Code to specifically address regulation of marine seawater desalination projects. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 756, § 10. Chapter 18 is intended to consolidate and streamline permitting and regulatory requirements applicable to such projects. Among other provisions, the new chapter directs the Parks and Wildlife Department and the General Land Office to jointly conduct studies and submit a report to the TCEQ to identify zones in the Gulf of Mexico that are appropriate for the diversion of seawater and also to identify zones that are appropriate for the discharge of waste resulting from the desalination of marine seawater. *See* Tex. Water Code § 18.002(i). The new chapter also authorizes bed and banks conveyance of certain treated marine seawater. *See* Tex. Water Code § 18.004.

The 84th Legislature also passed House Bill 4097, which added new section 11.1405 to the Water Code to authorize and provide conditions for diversion of state water from the Gulf of Mexico or a bay or arm of the Gulf of Mexico for desalination and use for industrial purposes. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 829, § 4. H.B. 4097 also amends Texas Utilities Code chapter 39 to require the Public Utility Commission to undertake studies regarding the adequacy of existing infrastructure for seawater desalination projects and the potential for such projects to participate in the Electric Reliability Council of Texas market. *See* Tex. Util. Code §§ 39.203, 39.9055.

As more desalination systems are built, it will be easier to navigate the permitting and funding processes. This is one of the key challenges to seawater desalination; the lack of a precedent makes it more difficult, more risky, and more costly to implement. The TWDB has taken the position that the role of state government is to continue providing leadership and support to advance seawater desalination in Texas. This includes facilitating an efficient permitting process for seawater desalination through the TCEQ. *See* 2014 Biennial Report.

Development of brackish groundwater is subject to the same Safe Drinking Water Act standards discussed above. Achieving those standards, however, is easier and less expensive than for seawater desalination, in the sense that brackish groundwater has much lower TDS concentrations than does seawater. Therefore, it takes less energy to remove the salts, and such removal results in a smaller volume of concentrate needing disposal.

Depending on its location and design, a brackish groundwater desalination project may also be subject to many of the other federal, state, and local requirements summarized above for seawater desalination. However, the most daunting regulatory hurdle arises from local GCDs. See Chapter 16 of this book for a discussion of GCDs and subsidence districts.

All groundwater in Texas, including brackish groundwater, is privately owned by the owner of the overlying surface estate. *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012); Tex. Water Code § 36.002. To acquire source water for a brackish groundwater desalination project, a project sponsor must obtain access to land and groundwater from which that source water can be produced. Groundwater production may be highly regulated by a patchwork of nearly one hundred local GCDs that often have different rules for aquifers in hydraulic connection. The amount of land and associated water rights that must be obtained by a project sponsor will depend on the regulatory restrictions of any GCD with jurisdiction over the project.

Nearly all areas of the state underlain by usable quantities of fresh groundwater are within the jurisdiction of a GCD. Because brackish groundwater resources are frequently within the major and minor aquifer boundaries as defined by the TWDB, they are also generally considered to be hydrologically connected to freshwater aquifers. As a result, many of the economically viable brackish groundwater sources fall within the regulatory purview of GCDs.

The current regulatory framework for withdrawals of feed water or source water for a brackish groundwater desalination facility is summarized as follows. Most GCDs are created by special legislation initiated by landowners or some entity within an area to be regulated. They are governed by appointed or elected boards of directors of various sizes. Some are financed through property taxes while others rely solely on fees charged for drilling or producing water from a well.

Most GCDs are coterminous with the county in which they are located. Some are multicounty, and a few follow roughly the contours of an underlying aquifer. Some major municipalities are located outside of a GCD, for example, El Paso and Austin. Some counties are partly within a GCD. Parts of some counties are in different GCDs.

Each GCD must manage the groundwater resources within the district, although some GCDs are restricted to managing a particular aquifer located within their boundaries. GCDs have many tools to accomplish this duty. The primary ones are their management plans; rules; well registration, permitting, and production limits; regulation of export; well drilling, completion, and plugging requirements; well spacing; enforcement; and groundwater management area (GMA) joint planning. Within the constraints of its enabling legislation and Texas Water Code chapter 36, a GCD uses these tools to manage the resource. As a result, nearly one hundred different GCDs use these tools in nearly one hundred different ways. Most GCDs issue separate permits for groundwater production and transportation of groundwater outside of the district. Although there are a few exceptions, groundwater production permits are generally issued for terms of one to five years, after which they must be renewed by the GCD. *See* Texas Alliance of Groundwater Districts, *Groundwater Conservation District Index*, www.texasgroundwater.org/resources/gcdi.html. The uncertainty of permit renewal after infrastructure is complete poses enormous risk to groundwater project developers and their lenders who must generally finance these projects with long-term debt secured by project revenue or utility rates based on the sale of water that may or may not be available after just a few years. This risk is enhanced by the additional costs associated with development of brackish groundwater.

A planning process was established by the state in part in an attempt to regionalize groundwater management across aquifers, or at least to make it consistent from GCD to GCD within an area roughly defined along aquifer boundaries. See Chapter 21 of this book. This process is referred to as the GMA joint planning process. In very general terms, the goal of the process is to develop a policy statement about how the aquifers in the area will be managed over a fifty-year period. This policy statement is updated at least every five years. This statement is the desired future condition (DFC). Based on that management goal and using groundwater availability models, the TWDB calculates the amount of groundwater that can be produced over time while achieving the DFC and provides that information to each GCD for use in its groundwater management strategies. This is called the modeled available groundwater (MAG).

Each GCD must set management goals and strategies designed to achieve the DFC within its boundaries. Those strategies necessarily include rules regulating groundwater production. However, GCD rules must strike a balance between reasonable regulation and respect for the legal premise that groundwater is a vested property right of the landowner. See Chapters 4 and 38 of this book for discussions of landowners' rights in groundwater beneath their property and constitutional limitations on government's authority to regulate that property without compensating the landowner.

Concerns about freshwater regulation are now extending to brackish groundwater. With increasing attention to the value of brackish groundwater as feed water for desalination facilities, there are an increasing number of questions arising about (1) GCD jurisdiction over withdrawal of brackish water; (2) the extent, if at all, to which brackish groundwater should be regulated in a manner different from surface water; and (3) a surface owner's property rights in brackish groundwater beneath his property.

As interest in brackish groundwater desalination has increased, so has interest in modifying existing law related to GCD authority over production of brackish source water. However, proponents of change have thus far met with little success. A Joint Interim Committee to Study Water Desalination was established by the speaker of the Texas House of Representatives in 2014. *See* Press Release, Texas House of Representatives, *Straus Makes Appointments to Four Water Committees* (Mar. 28, 2014), www.house.state.tx.us/news/press-releases/?id=4863. The Interim Committee Charges for the House Committee on Natural Resources, Charge No. 2, also included the study of brackish groundwater. The committee was charged with the following tasks:

> Evaluate the availability, management, and development of groundwater in the state. Consider the economic, environmental, and social impacts of groundwater usage and production in the agricultural, municipal, and energy sectors. In particular, examine methods to facilitate further development of brackish groundwater resources and to improve the consistency and certainty of permitting by groundwater districts without undercutting reasonable regional and local regulation of groundwater.

Speaker Joe Straus, *Interim Committee Charges, Texas House of Representatives, 83rd Legislature* 32 (Jan. 2014), *available at* www.house.state.tx.us/_media/pdf/interim-charges-83rd.pdf.

No significant legislation affecting brackish groundwater regulation was adopted by the 84th Legislature.

B. Energy Requirements

In addition to the treatment provided to freshwater sources, desalination requires one more step: the removal of TDS. This additional step requires more energy than what is required for treating freshwater sources. From a water purveyor's perspective, more energy means higher costs and increased exposure to potential upward swings in the pricing of energy.

The response of the desalination industry to this challenge has been a multipronged approach to lower the energy requirements of RO desalination. These efforts have resulted in increasingly more efficient membranes, energy-recovery devices, more efficient pumps and piping arrangements, and a disciplined focus on energy optimization of the desalination process. These efforts and the outlook for the future were summarized thus:

> The energy required to desalinate seawater has reduced by a factor of three in the last two decades. Future process improvements are not expected to yield significant additional specific-energy reductions. Significant opportunities for cost reduction are found in optimizing plant design and operation to utilize variable water-recovery, attain higher reliability through fail-safe design and modularity, and minimize periodic and costly unplanned maintenance.

Richard L. Stover, *Evolution of Energy Consumption in Seawater Reverse Osmosis*, 19 Desalination & Water Reuse Quarterly 27 (2009).

In Texas, the TWDB funded a project with the Affordable Desalination Collaboration to evaluate RO brackish groundwater desalination and demonstrate practical energy-saving strategies. Preliminary results of this project are encouraging. The use of energy-recovery devices in conjunction with a staged membrane filtration process may save up to 24 percent of the energy required in a nonoptimized system. The life-cycle cost implications of this approach were examined and are discussed in the final report of this project. *See* John P. MacHarg, Affordable Desalination Collaboration, *Energy Optimization of Brackish Groundwater Reverse Osmosis Desalination* (Texas Water Development Board 2011), *available at* www.twdb.texas.gov/innovativewater/desal/projects/adc/doc/2011_09_adc_final_rpt.pdf.

C. Concentrate Disposal

Inland concentrate management could become increasingly challenging on a regional basis in the future. As more and more facilities are installed, the cumulative impact of concentrate streams will need to be considered. In the near future and at a local level, managing the concentrate from inland desalination facilities can be challenging in several respects.

First, as the size of facilities increases, the volumes of concentrate also increase and simpler and less costly disposal alternatives, such as evaporation ponds, become unfeasible or impractical. The challenge is addressed by implementing concentrate disposal options that may be appropriate for larger discharge volumes. For example, the 27.5-MGD brackish desalination plant in El Paso required development of an injection well field approximately twenty-two miles away from the facility and some 5,000 feet deep.

Another concern pertains to the presence of substances such as arsenic in the source water. Arsenic is rejected by RO membranes, and this means that it will accumulate in the concentrate stream as much as four times the original concentration. In some cases, the concentration of arsenic could reach hazardous levels and would require more involved and costly management of the concentrate.

Research into beneficial uses of concentrate is ongoing and may provide cost-effective management options in the future. For example, researchers at the University of Texas at El Paso are exploring a promising approach to discriminately separate salts from a concentrate stream; some of these salts have an economic value that would help offset the extra cost. Other research studies focus on increasing the recovery rate of desalination systems, which in turn increases the volume of product water and reduces the volume of concentrate for disposal. An example of this particular approach was evaluated and tested in a TWDB-funded demonstration project with the University of Texas at Austin. Information about this project may be obtained via the TWDB Web site at www.twdb.texas.gov/innovativewater/desal/projects/utexas/index.asp.

D. Resource Characterization

One of the more challenging issues—and a potential roadblock to the more widespread development of brackish groundwater desalination in Texas—is the lack of detailed information on brackish aquifers, which is needed before water supply development decisions can be made. To help fill this gap, the TWDB requested and received funding from the 81st Legislature to implement a Brackish Resource Aquifers Characterization program. *See* Texas Water Development Board, *Legislative Priorities Report, 81st Legislative Session* (2009), *available at* www.twdb.texas.gov/publications/reports/administrative/doc/81stLegislativePrioritiesReport.pdf.

The 2003 TWDB reconnaissance-level study that resulted in the publication *Brackish Groundwater Manual for Texas Regional Water Planning Groups* laid the foundation for estimating brackish groundwater volumes in aquifers on a regional scale. *See* Brackish Groundwater Manual. Important as this study was to the identification of the enormous volume of brackish groundwater available in the state, it was by design regional in scope, limited to aquifer boundaries delineated by the TWDB and, in its assessment of groundwater quality, to evaluation of TDS only. The information was developed to help regional water planning groups assess brackish groundwater as a water management strategy. Currently, the relative lack of detailed information on brackish aquifers makes it difficult to determine their viability and long-term reliability.

Most brackish aquifer characterization to date has focused on defining brackish aquifer zones and estimating brackish groundwater in storage. As the use of brackish groundwater resources increases in the state, characterization will have to move toward defining brackish production zones. Brackish production zones will require more detailed characterization than is done in traditional freshwater aquifer development. A brackish groundwater production zone requires quantification of (1) aquifer properties and production potential; (2) aquifer lithology, aquifer availability, which may be defined by regulation, isolation from freshwater aquifer zones and other groundwater users, and aquifer dynamics; and (3) specific water quality analyses with target constituents and parameters. Both aquifer transmissivity and storativity will require determination through the use of long-term aquifer monitor wells to provide accurate estimates of aquifer storativity and to encounter hydraulic boundaries. Because brackish groundwater generally is found in deeper parts of aquifer systems, aquifer storativity will likely be much lower than in shallower portions of the aquifer. As a result, water level declines from production will generally propagate over larger distances. Accurate estimates of storativity will better define potential impacts from brackish zone production.

Brackish zones are complicated in that they often exist in close proximity to fresh groundwater zones. Because water quality in aquifers can vary over relatively short vertical and sometimes horizontal distances, variability in water quality, and the factors controlling this variability, must be characterized and understood. Many times the controls on water quality distribution are also important to water level responses as a result of production. Hydrophysical logging techniques can assist in determining the variability of groundwater quality in long sections of test boreholes and can ultimately provide information to optimize production well screen location for productivity and the desired water quality.

The need for designation of brackish groundwater production zones was recognized and partially addressed with the adoption of House Bill 30 during the 2015 legislative session. *See* Act of May 26, 2015, 84th Leg., R.S., ch. 990, eff. Sept. 1, 2015 (amending Tex. Water Code § 16.060). The TWDB currently prepares a biennial progress report on the implementation of seawater desalination activities in the state for the benefit of the governor, lieutenant governor, and speaker of the house. The report includes:

1. results of the TWDB's studies and activities relative to seawater desalination during the preceding biennium;

2. identification and evaluation of research, regulatory, technical, and financial impediments to the implementation of seawater desalination projects;

3. evaluation of the role the state should play in furthering the development of large-scale seawater desalination projects in the state; and

4. the anticipated appropriation from general revenues necessary to continue investigating water desalination activities in the state during the next biennium.

2014 Biennial Report, at 4.

After September 1, 2015, this report will be expanded to encompass brackish groundwater desalination projects and activities. *See* Tex. Water Code § 16.060(b). More importantly, the expanded report will include identification and designation of certain local or regional brackish groundwater production zones in areas of the state with moderate to high availability and productivity of brackish groundwater that can be used to reduce the use of fresh groundwater. *See* Tex. Water Code § 16.060(b)(5). These zones must be separated by hydrologic barriers sufficient to prevent significant impacts to water availability or water quality in any area of the same or other aquifers, subdivisions of aquifers, or geologic strata that have an average TDS level of 1,000 mg/l or less at the time of designation of the zones. *See* Tex. Water Code § 16.060(b)(5)(A). The zones may not be located within certain areas of the Edwards Aquifer, the Harris-Galveston Subsidence District, or the Fort Bend Subsidence District. *See* Tex. Water Code § 16.060(b)(5)(B)(i), (ii). The zones may not be located in an aquifer, subdivision of an aquifer, or geologic stratum that (1) has an average TDS level of more than 1,000 mg/l, and (2) is serving as a significant source of water supply for municipal, domestic, or agricultural purposes at the time of designation of the zones. Tex. Water Code § 16.060(b)(5)(B)(iii). Finally, the zones may not be located in an area of a geologic stratum that is designated or used for wastewater injection through the use of injection wells or disposal wells permitted under Texas Water Code chapter 27. Tex. Water Code § 16.060(b)(5)(B)(iv).

The TWDB must work together with GCDs and stakeholders and shall consider the *Brackish Groundwater Manual for Texas Regional Water Planning Groups* and other relevant scientific data or findings when identifying and designating the brackish groundwater production zones. *See* Tex. Water Code § 16.060(d).

In designating a zone, the TWDB must determine the amount of brackish groundwater that the zone is capable of producing over a thirty-year period and a fifty-year period without causing a significant impact to water availability or water quality of related freshwater aquifers. *See* Tex. Water Code § 16.060(e)(1). The TWDB must also include in the designation description (1) the amounts of brackish groundwater that the zone is capable of producing during the thirty- and fifty-year periods and (2) recommendations regarding reasonable monitoring to observe the effects of brackish groundwater production within the zone. *See* Tex. Water Code § 16.060(e)(2).

The Brackish Resource Aquifers Characterization program is being implemented to build on and extend the 2003 study by characterizing the brackish aquifers in greater detail; building replicable numerical groundwater flow models to estimate aquifer productivity; and developing a parameter-screening tool to help communities assess the viability of brackish groundwater desalination supplies. Information about this program may be obtained via the TWDB Web site at www.twdb.texas.gov/innovativewater/bracs/index.asp.

E. Time

The time required to build a seawater desalination plant, from the permit phase to the final construction phase, is specific to each project and depends on the size and complexity of the plant. Whether it is to be built from scratch and whether it can use existing water intake structures also affects how long it will take. The TWDB opines that at a minimum it would take five years. That estimate is based on the time it took for El Paso to develop the Kay Bailey Hutchison Desalination Plant, which produces 27.5 MGD of desalinated water annually from brackish groundwater. *See* Texas Water Development Board, *Seawater FAQs*, www.twdb.texas.gov/innovativewater/desal/faqseawater.asp. However, some of the seawater projects initiated in Texas demonstrate that five years may be a very optimistic estimate. SAWS's experience with its new brackish groundwater desalination facility is generally consistent with that of El Paso. However, both the El Paso and San Antonio projects are located outside the jurisdiction of a GCD. The need to acquire extensive blocks of real property or groundwater rights to comply with rules of a local GCD could add significantly to these time requirements.

VII. Conclusion

Desalination is now a proven technology with the potential to become a key component of the state's future water supply. However, there are many challenges to be overcome before that potential can be realized. A desalination project is energy-intensive and expensive by comparison with development of freshwater supplies. Development of seawater is more expensive than development of brackish groundwater. The high cost of developing either seawater or brackish groundwater and disposing of concentrate will be substantially increased by the additional expense of conveying the treated water across long distances if such conveyance is necessary.

High cost alone is unlikely to be a deterrent for the state's large municipal water utilities as they develop critical new water supplies for urban populations. However, current regulatory uncertainty surrounding development of both seawater and groundwater desalination projects serves as a substantial disincentive for the large financial investment required. The additional cost of conveying treated seawater long distances from the Gulf of Mexico to urban centers at higher elevations in the west will make that an alternative of last resort for noncoastal cities. These challenges can be solved by creative minds and strong leadership, but they should not be minimized or ignored if Texas hopes to meet its future water needs. Every year that desalination is delayed brings more pressure on development of the state's remaining freshwater supplies.

CHAPTER 26

Aquifer Storage and Recovery

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5. Van Kelley has thirty-one years' experience in the area of groundwater science focused on the development and application of groundwater flow and transport models and other quantitative decision support tools to evaluate water resource, environmental, and waste isolation management strategies. For the last fourteen years, he has applied his expertise to the characterization of regional aquifer systems and the development of regional and local-scale groundwater flow models to support water resources planning and management efforts throughout Texas and the U.S. Mr. Kelley has a B.S. in petroleum geology from Mississippi State University (1982) and an M.S. in geology (with a hydrology emphasis) from Texas A&M University (1985). He is currently a Senior Vice President with INTERA Inc., based in Austin, and he is responsible for overall management of the company's water resources services business unit.

I. Introduction

Storage capacity is an important consideration for many water utilities across the state, particularly where water availability varies and conjunctive use is being considered. *See* Fred M. Blumberg, *The State of Aquifer Storage and Recovery in Texas*, Presentation at the Texas Innovative Water 2010 Conference (Texas Water Development Board Oct. 11, 2010) [hereinafter Blumberg]. See also Chapter 5 of this book. Aquifer storage and recovery (ASR) has proven to be an efficient and cost-effective means of storing available water for future use in fifteen foreign countries, the United States, and in Texas, as evidenced by the large number of new projects in operation. This chapter presents background information on ASR as a water management strategy, the documented benefits of the technology in Texas, the major physical and regulatory limitations of the technology, and selected case studies of ASR projects in the state.

II. Description of Aquifer Storage and Recovery

Projects that recharge aquifers to prevent saltwater intrusion, reduce subsidence, or maintain baseflow in streams have been around for decades. However, the use of an aquifer as a means to store excess water during times of plenty and to draw on when water shortages occur is a relatively new concept. Earnest discussion of ASR in Texas began in the 1980s when the El Paso Water Utilities began injecting treated wastewater effluent into the underlying aquifer rather than discharging it into the Rio Grande. Around the same time, the Upper Guadalupe River Authority (UGRA) filed a permit application with the Texas Commission on Environmental Quality (TCEQ) to store surface water in an aquifer for retrieval at a later date. The permit application contemplated use of an injection well for storage of water in a confined aquifer. After years of deliberation by the agency and the courts, and a court of appeals decision in 1995, *Texas Rivers Protection Ass'n v. Texas Natural Resource Conservation Commission*, 910 S.W.2d 147 (Tex. App.—Austin 1995, writ denied), the legislature passed House Bill 1989, which provides the legal basis for ASR in Texas. *See* Act of May 18, 1995, 74th Leg., R.S., ch. 309 (codified as amended at Tex. Water Code §§ 11.153–.155). The bill also encouraged pilot projects and required compliance and cooperation with affected groundwater conservation districts (GCDs).

A. Definition of Aquifer Storage and Recovery

From a regulatory perspective, the term *ASR* has a very specific meaning in Texas. As discussed in TCEQ rules, ASR involves the injection of water into an aquifer through a Texas Water Code chapter 27 Class V injection well and then the retrieval of that water for beneficial use when needed. *See* 30 Tex. Admin. Code § 297.1(5). The water may be recovered using the ASR injection well (a dual purpose well) or a different well. The definition developed by David Pyne in the first textbook on ASR is "the storage of water in a suitable aquifer through a well during times when water is available, and recovery of the water from the same well during times when the water is needed." R. David G. Pyne, *Aquifer Storage Recovery: A Guide to Groundwater Recharge Through Wells* (ASR Press 2d ed. 2005) [hereinafter Pyne].

With ASR, the aquifer essentially acts as an underground reservoir to be filled up when water is plentiful and drawn on during times of drought or any time available water falls short of demand. The source of the stored water may be surface water from a local stream or river; groundwater from another aquifer; or treated wastewater effluent. To prevent potential contamination of the aquifer and to be in compliance with current regulations, the water must be treated to drinking water standards before injection. In fact, water from just about any source can legally be used in an ASR system providing it meets water quality standards. See Chapter 30 of this book for a discussion of drinking water standards.

Using the definition of ASR as described in TCEQ rules, there are only three ASR facilities in operation in Texas: the San Antonio Water System (SAWS) Twin Oaks ASR Facility south of San Antonio; the UGRA project in Kerrville; and the El Paso Water Utilities project, which delivers treated wastewater to the Hueco Bolson Aquifer through both wells and recharge basins. Some argue that the El Paso Water Utilities project is not strictly an ASR system because the wells being used for injection are not production wells—recovered water is not being produced from the same location at which it was injected—and because the project also involves the use of spreading basins for aquifer recharge. In other parts of Texas, such as in the Wintergarden GCD in the Rio Grande Valley, stormwater runoff is captured in impoundments and allowed to percolate to the aquifer for subsequent extraction using nearby production wells. The Wintergarden project is not considered to be ASR under TCEQ rules or the Pyne definition. *See* Wintergarden Groundwater Conversation District, *Official Rules and Regulations* Rule 6.12 (Mar. 29, 2007), *available at* www.beg.utexas.edu/cswr/aquiferstudy/mgmtplans/WINTERGARDEN_GCD_RULES.pdf.

B. Aquifer Storage and Recovery Requirements

In a general sense, ASR has basically four requirements: a demand for water, access to an adequate volume and quality of source water for storage, surface acreage sufficient to support infrastructure and to control access to the aquifer, and an aquifer of suitable hydraulic and chemical characteristics to allow storage. Mike Dudding et al., *Developing Aquifer Storage and Recovery (ASR) Opportunities in Melbourne* (The Commonwealth Scientific and Industrial Research Organisation 2006). In addition to these four requirements, the project must be economically viable. Implicit in these four requirements are the need for a defined regulatory framework and the need for the ASR system to deliver the required water supply at the appropriate time at a lower cost than alternative water supply strategies. However, it can be challenging to compare the true cost of ASR to other water supply strategies. For example, it is difficult to develop a traditional dollars per acre-foot per year unit cost for ASR because water may be stored for years in an ASR wellfield before it is needed to meet water demand during drought conditions (an ASR application known as "water banking"). Although ASR has been successfully used for long-term storage, for water supply purposes ASR tends to work best when the storage and recovery of water is seasonal and of nearly equal temporal extent between cycles. *See* R. David G. Pyne, ASR Systems LLC, St. Johns River Water Management District Special Publication SJ2005-SP12, *Aquifer Storage and Recovery Issues and Concepts* (2005) [hereinafter SJRWMD], *available at* www.sjrwmd.com/technicalreports/pdfs/SP/SJ2005-SP12.pdf. Some of the physical requirements for ASR will be discussed in the following sections.

C. The Need for Aquifer Storage and Recovery in Texas

The hydrology of Texas has often been characterized as a long drought punctuated by extreme but short-lived flooding events. Many dams have been built to protect communities from flooding during these hydrologic extremes. In fact, the state has 188 major water supply reservoirs with capacity of 5,000 acre-feet or more and more than 2,000 smaller reservoirs. *See* Texas Water Development Board, *Water For Texas 2012* 159 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/2012/index.asp. The impoundments behind many flood control dams also serve to provide water supply and recreation benefits. Some of the newer reservoirs in Texas were built with water supply as their primary purpose. See Chapter 27 of this book regarding reservoirs. As the demand for water increases and the number of suitable reservoir sites diminishes, water resource planners are faced with the challenge of finding suitable alternatives for storing periodic excesses of water. Off-channel storage is one option, where large ring dikes are built or tributaries are dammed near the river, and flood flows are diverted and stored for later use. Another option is ASR, where excess water is stored in underground aquifers to be withdrawn when needed. A hypothetical example of an ASR well is shown in Figure 1.

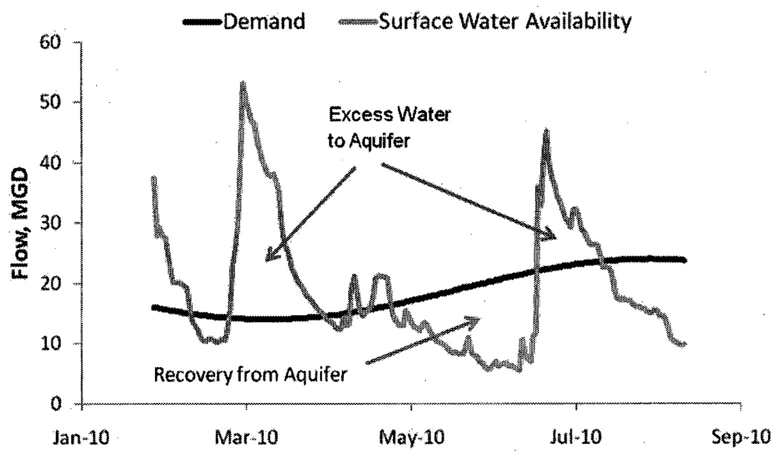

Figure 1. Using aquifer storage and recovery to take advantage of periodic surpluses of surface water. Courtesy Texas Water Development Board.

Nationwide, the use of ASR is increasing not only because its impacts to the land surface are minimal compared to surface reservoirs but also because it can be easily developed in phases or increments, and it is well suited to supplement combined groundwater and surface water systems. In 1969, there was one ASR well in the United States, located in New Jersey. Currently, there are approximately two hundred functioning ASR well fields and more than seven hundred individual ASR wells operating in twenty-three states. The number of ASR wells and wellfields has more than quadrupled since 1969. R. David G. Pyne et al., Presentation at the Texas Water Conservation Association 2014 Fall Conference: *The Current Status of ASR Technology: Firming Up Victoria's Water Supply* (Oct. 16, 2014) (updated by Pyne, on file with the authors) [hereinafter Current Status of ASR Technology].

Despite its advantages, use of ASR in Texas has been slow to develop. ASR projects described in the 2012 State Water Plan are not scheduled to come online until the fifth decade of the fifty-year planning horizon; however, some regional water planning groups do include ASR projects as nearer-term water management strategies in the more recent round of planning. Currently there are at least four ongoing ASR feasibility studies, with several of these proposed projects moving into the Phase 2 demonstration program.

One clear advantage of ASR over surface water reservoirs is that evaporation is virtually eliminated. Reservoirs in central Texas have an average net loss of about twenty inches of water per year because of evaporation, and west Texas reservoirs can have significantly greater loss. Lake Travis, which has a surface area of 18,600 acres when full, loses a net volume of about 31,000 acre-feet to evaporation in a normal year. In a drought year, net evaporation rates can be much higher. ASR projects typically cost much less and are less environmentally intrusive than reservoirs; however, there are still significant permit requirements, and not all underground geology is conducive to efficiently storing and recovering large quantities of water.

III. Technologies

From a design and an operational standpoint, ASR projects are site specific; therefore, each requires site-specific solutions to technical and institutional problems. Even given their variability, the basic technologies employed are injection and recovery wells and typically some type of water treatment system. Pipeline, pumping, and ancillary storage technologies are employed at the typical site, but they are features of most water supply strategies; therefore, they will not be discussed here.

A. Recharge and Recovery Wells

The basic requirement of an ASR well is its ability to recharge (inject) and to recover water at the design rates without significant well losses (pressure loss between the well and the aquifer). In addition, the prototypical ASR well needs to be capable of both injection and extraction. There are many texts and standards defined for designing and developing groundwater wells. *See, e.g.*, Fletcher G. Driscoll, *Groundwater and Wells* (Johnson Filtration Systems, Inc., 2d ed. 1986). However, the design of an ASR well must also give special consideration to a number of additional factors, primarily because the wells are often designed to operate in nonpotable aquifers for storage. Such design considerations can include well screen and well casing specifications, which could potentially allow corrosion and clogging. In addition, ASR wells are typically designed so that they can be backflushed on a regular basis.

The purpose of the injection process is to create a reservoir of recoverable water and a volume of "buffer zone" water that is not recovered. Figure 2 describes the basic elements of an ASR project for a well completed in a confined aquifer. See Chapter 1 of this book for a discussion of confined and unconfined aquifers. In this example, the injection well also serves as the recovery well. When water is injected under pressure, it displaces the native groundwater within a target storage radius, typically several hundred feet to as much as a thousand feet from each well. The concept behind ASR is to develop a reservoir of stored water within the target aquifer. The standard approach is to develop a "bubble" of stored water and to also establish a buffer zone that separates the native groundwater from the stored water. The stored water is available for recovery; however, the buffer zone water remains underground and is not recovered. Obviously, if one were injecting water into an aquifer with similar water quality, there would be no need for a buffer zone; however, this situation is uncommon. The Target Storage Volume (TSV) is defined as the stored water volume plus the buffer zone volume.

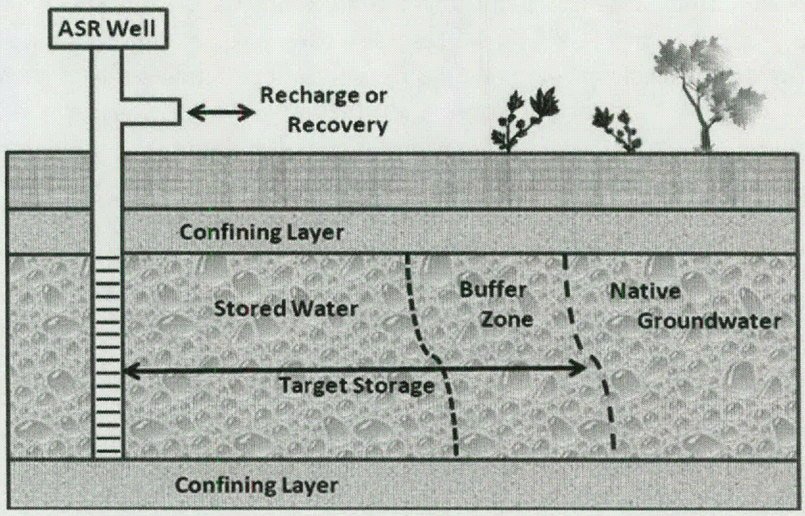

Figure 2. Physical characteristics of an aquifer storage and recovery well in a confined aquifer. Courtesy Alan Plummer Associates, Inc.

The buffer zone is typically formed one time during development of the ASR well and before beginning full ASR operations. Recovery efficiency can be defined as the volume of water recovered divided by the volume of water recharged for an operation cycle of injection and recovery. *See* Robert G. Maliva & Thomas M. Missimer, *Aquifer Storage and Recovery: Developing Sustainable Water Supplies*, 2 IDA Journal 74 (International Desalination Ass'n 2010), *available at* www.slb.com/~/media/Files/water/industry_articles/q2_2010_ida_journal.ashx; Herman Bouwer, *Groundwater Hydrology* (McGraw-Hill 1978); Michael L. Merritt, *A Review of Factors Affecting Recovery of Freshwater Stored in Saline Aquifers*, *in Artificial Recharge of Ground Water Symposium* (American Society of Civil Engineers 1988). Current research has shown that the efficiency of an ASR system can be greatly improved through initial development of the TSV immediately after well construction. *See* SJRWMD; Pyne. Long-term recovery efficiency is also improved through evaluation during the feasibility phase of storage locations, and by appropriate well design. With an adequate buffer zone, close to 100 percent efficiency is typically attained. Although it is desirable to reach 100 percent efficiency, this level of efficiency is generally not required for an ASR project to be feasible. Just as a surface reservoir loses water through seepage and evapotranspiration, some loss of stored water can be tolerated in ASR projects. This is particularly true when water is stored for many years in an aquifer that experiences lateral movement of groundwater, under the influence of a regional gradient in the aquifer water levels.

ASR wells can also be developed in unconfined aquifers, but the design is more complex. In addition, water chemistry issues can be exacerbated in an unconfined aquifer situation. Because storage volume in an unconfined aquifer is dependent on the physical mounding of groundwater, a deep vadose zone (or region of aeration above the water table) is desirable.

B. Surface Recharge Basins

Though not strictly ASR under the TCEQ's definition and common practice, groundwater is often added to an unconfined formation through surface recharge basins or structures. This is typical of high-permeability alluvial deposits in arid intermontane (between mountains or mountain ranges) regions. This approach basically reproduces a natural process of recharge through surface infiltration. Because the recharging water is focused in a closed basin or impoundment, however, infiltration is enhanced. This works well where there is a dependable source of water, where there is a lack of evapotranspiration and vadose zone redistribution, and when saturated conditions can be maintained under the impoundment (increased hydraulic conductivity of the vadose zone).

The El Paso Water Utilities (EPWU) successfully uses six spreading basins as part of its ASR project. Based on a 2003 American Water Works Research Foundation study entitled *Comparison of Alternative Methods for Recharge of a Deep Aquifer*, the EPWU constructed spreading basins in lieu of drilling additional ASR wells. Two pairs of one-acre basins were originally installed, achieving infiltration rates of about nine feet per day. Evaporation loss from the basins is estimated to be about eight feet per year. Travel time from the basin floor to the water table is about thirteen days. Infiltration basins are now the preferred method for aquifer recharge at El Paso because of the conducive surface geology. Malcolm Pirnie, Inc. (now ARCADIS-US) et al., *An Assessment of Aquifer Storage and Recovery in Texas* (Texas Water Development Board 2011), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830940_AquiferStorage.pdf [hereinafter Assessment of Aquifer Storage and Recovery].

The Central Arizona Project lacked sufficient land for surface infiltration; consequently, vadose-zone wells are used for infiltration. A vadose-zone well is similar to a traditional well, but it is not completed through to the saturated zone. As a result, the stored water is diverted into the well and infiltrates through part of the vadose zone before accreting to the water table aquifer. Methods have been developed to estimate recharge flux from a vadose-zone well, assuming one knows the hydraulic conductivity of the vadose zone and the height of the infiltrating water. *See* Bouwer. The concepts of TSV and buffer zone may not be strictly applicable for the case of surface infiltration or vadose-zone wells.

C. Treatment

Many ASR projects involve the use of surface water as the main or sole supply. To prevent potential degradation of the aquifer and plugging of the ASR well, and to be in compliance with regulations, the water is treated to drinking water standards before injection. The water treatment plant, often located close to the ASR project, has generally been a conventional treatment plant using coagulation/flocculation, filtration, pH stabilization, and disinfection processes. There is no reason why membrane treatment processes cannot be used before ASR recharge. See Chapter 25 of this book regarding desalination.

In addition to treating the source water before injection to meet regulations, it may need treatment, such as pH adjustment, to make it more compatible with the native water in the aquifer. The SAWS Twin Oaks ASR project is an interesting example of this requirement, although the source water is groundwater rather than surface water. The Edwards Aquifer, which is the source water, has a higher pH than the receiving Carrizo Aquifer, which is typically higher in iron and manganese. *See* Gregg Eckhardt, The Edwards Aquifer Website, *Aquifer Storage and Recovery*, www.edwardsaquifer.net/asr.html. As part of its ASR project, SAWS constructed a treatment plant at the Twin Oaks ASR Facility for two purposes: (1) to treat native Carrizo Aquifer water that it produces from groundwater wells on the site and (2) in case SAWS needs to treat water inadvertently recovered from the buffer zone around each of the ASR wells. To date, SAWS has needed to treat recovered buffer zone water only once since the project went into operation in 2004. Typically, the only treatment needed for water recovered from ASR storage is disinfecting the Edwards Aquifer water with chlorine before injection and during recovery.

The extent of the treatment needed before injection and upon recovery is site specific. Generally, water quality issues and treatment needs can be determined through the feasibility study and pilot testing phases before final design and construction. In most cases, proper formation and maintenance of the buffer zone reduces or eliminates the need for supplemental treatment of the recharged or recovered water from ASR wells.

D. Monitoring and Well Configuration

Because the subsurface is difficult to characterize fully, especially during the feasibility study phase, it is critical to monitor water levels and water quality around the ASR well and to meter the flow rates and volumes of water injected and recovered. Metering provides assurances that the volume of recovered water is not greater than the volume that was injected. This assures the local groundwater district that no native groundwater is being pumped and that there are no negative impacts on nearby well owners. In some cases detailed numerical groundwater models and sophisticated accounting systems are necessary to optimize performance and to confirm that there are no negative impacts on surrounding groundwater users.

Existing ASR wells vary in depth from 30 to 2,700 feet and use aquifers whose storage thickness is anywhere between 20 and 400 feet. *See* Blumberg. Although some stand-alone ASR wells exist, it is more common to see ASR well fields, where sometimes as many as thirty ASR wells exist within the same aquifer. The use of multiple wells allows for operational redundancy, improves hydraulic control, and also allows operators to inject large volumes at manageable rates and injection pressures. In properly designed wellfields, it is common for the storage bubbles to coalesce, thereby improving the recovery efficiency.

IV. Requirements for Success

As discussed earlier, basic ASR requirements include available land for surface facilities, subsurface pressurization and a suitable storage location, and the physical suitability of the aquifer and native groundwater. ASR wells should ideally be located near treatment plants, pumping and storage stations, high-capacity distribution pipelines, and demand centers where the wells can provide the most benefit to the water utility with the least capital cost. The greatest benefit is most often found where the water is needed the most.

This section focuses on hydrogeologic characteristics and the physical requirements as they relate to the aquifer and on the regulatory requirements. Costs and obstacles to implementation are also discussed.

A. Physical Requirements

The success of ASR is based on the concept of recovering a high percentage of the injected water at the desired flow rate and time and at a suitable water quality. These factors are largely controlled by the physical aspects of the aquifer and native groundwater that must be considered by the designer of the ASR system. While many physical constraints can be accommodated in the design process, the desirable aspects for ASR include the following:

- high aquifer transmissivity and hydraulic conductivity;
- sufficient aquifer storage capacity;
- native water chemistry and aquifer matrix mineralogy that limits geochemical reactions with injected water;
- aquifer gradients that preclude rapid migration of stored water;
- acceptable density contrasts between injected and natives waters;
- overlying and underlying aquitards (a bed of low permeability adjacent to an aquifer) in confined aquifers; and
- in the case of unconfined aquifers, deep water tables (*see* Dudding et al.).

These seven characteristics are discussed below.

The aquifer must have sufficient transmissivity and hydraulic conductivity to accept injected fluids at the injection pressure design rates (including hydraulic losses). Some of this information can be gathered and analyzed during the feasibility study, but addressing these issues often involves aquifer testing to estimate transmissivity, wellbore geophysical logging to estimate porosity and the transmissivity intervals (heterogeneity in productivity), and in some cases, hydrogeophysical logging to physically define the vertical distribution of transmissivity and native groundwater quality.

A second and related aquifer physical aspect is storage potential. Storage potential is a product of porosity and rock and water compressibility in confined aquifers. The best ways to characterize these properties are through physical sampling (coring), geophysical logging, and aquifer testing. Because storativity (or specific yield) cannot be determined from a single-well aquifer test, this will require aquifer testing with observation well responses (interference testing). Once these physical aquifer properties are determined, the analyst has the information needed, from a hydraulics perspective, for designing the well.

In Texas, the regional aquifers that have high transmissivity and storage potential in an unconfined setting tend to be in the western portions of the state (Ogallala and the West Texas Bolson aquifers). Typically, however, there is not a ready source of surface water in these regions for ASR. The regional aquifers that have high potential for confined ASR in the state include the Trinity Aquifer in parts of the state and the Tertiary Coastal Plain aquifers, which include the Carrizo-Wilcox Aquifer, the Queen City and Sparta aquifers, and the Gulf Coast Aquifer. The Yegua-Jackson Aquifer may be a candidate in some places, but it is typically a lower transmissivity aquifer than those described above and has very poor water quality in the confined sections.

A third physical aspect that is desired for a successful ASR project is native water chemistry and aquifer matrix mineralogy that minimize geochemical reactions with injected water. A significant difference in water quality between the injected and native water can pose challenges unless a sufficient buffer zone is maintained. *See* SJRWMD; Pyne; *see also* Maliva & Missimer; Bouwer; Merritt. Although about one-third of the world's ASR projects store water in brackish or saline aquifers (generally defined as aquifers having more than 1,000 milligrams per liter (mg/l) of total dissolved solids (TDS)), using an aquifer containing water with a high concentration of TDS has a higher potential for geochemical complications and can increase the presence of trace elements/ions in the recovered water unless a sufficient buffer zone is maintained. Even though water injected through a Class V well must meet drinking water standards, as discussed previously, well clogging can still occur due to particle rearrangement, air entrainment, or biological growth. Likewise, unwanted geochemical reactions between the aquifer matrix and the source water can occur. ASR projects in other parts of the world have been abandoned or have become significantly more expensive as a result of having to treat the recovered water for fluoride, arsenic, manganese, nickel, cobalt, or other heavy metals that may increase in concentration as a result of the geochemical reactions between injected water, aquifer water, and the aquifer mineralogy. Again, maintaining an adequate buffer zone can reduce problems associated with the assimilation of these constituents.

If the injected water is treated before injection into aerobic aquifers, disinfection by-products, such as trihalomethanes and haloacetic acids in the recovered water, can also compromise an ASR project, as witnessed in Lancaster, California. However, most ASR storage zones are in deep, anaerobic aquifers that cause natural attenuation of these disinfection by-products.

Relatively flat natural groundwater gradients are desirable because they increase the likelihood of recovering the highest percentage of water at an acceptable water quality (recovery efficiency). If natural hydraulic gradients are steep, some injected water could be lost to migration between cycles of injection and recovery. Stored-water migration is primarily an issue for ASR programs designed for long-term water banking (for example, storage to meet demands during a repeat of the drought of record).

Minimizing density contrasts between injected and native waters is desirable for ASR. Injection of fluids into native fluids of high contrasting density increases the buffer zone (mixing zone) and generally, though not in all cases, decreases recovery efficiencies. *See* Merritt; James D. Ward et al., *Integrated Assessment of Lateral Flow, Density Effects and Dispersion in Aquifer Storage and Recovery*, 370 J. Hydrology 83 (2009). A higher density difference increases the likelihood that density stratification will occur. This problem becomes worse if the aquifer permeability is high (inherently desirable) because it can lead to higher velocities, higher dispersivity, and increased likelihood of stratification. Fortunately, almost all ASR well fields are developed in aquifers where the difference in TDS concentration between the injected water and the native groundwater is less than 5,000 mg/l. With this differential or less, density stratification is typically not an issue. High TDS is not an insurmountable problem. As stated above, there are a large number of successful ASR projects worldwide that store water in brackish or saline aquifers.

When stratification occurs, the lighter-density injected water floats to the top of the formation and spreads out horizontally, rather than evenly displacing the brackish or saline water. The net result is decreased recovery efficiency. Existing successful ASR projects have used aquifers with storage zone TDS anywhere from 30 mg/l to 39,000 mg/l, the top end of that range being more saline than ocean water. When using a brackish or saline aquifer, the efficiency typically increases with the number of injection-recovery cycles and with initial formation of a suitable buffer zone.

In unconfined aquifer settings, it is important to have a relatively deep water table. The depth to the water table basically provides a direct indication of the potential storage volume available given that the bulk of the water will be stored in what was the vadose zone. A second aspect of a deep water table is that it provides some assurance that injection will not raise the water table to near the surface. Developing a shallow water table would improve the chance of impacting surficial structures and will enhance the potential evaporative flux off the water table in arid environments.

In confined aquifer settings it is desirable to define a storage horizon that has good aquitards both underlying and overlying the target storage horizon. This allows for improved storage volumes because of the ability to isolate higher pressures, and it also isolates the storage horizon hydraulically, preventing the potential for impacting other portions of the aquifer system over the life of the facility.

Because of the many complex and sometimes interrelated physical factors that can impact the potential for a successful ASR design, it is critical to determine the physical characteristics of the system outlined above during a first-phase feasibility study and a second-phase demonstration test program. In addition, because site-specific conditions are so important to success, modeling studies are sometimes needed to estimate the TSV, the buffer zone requirement, recovery efficiency, potential migration, and potential geochemical reactions. Many ASR studies are documented, providing an insight into successful methods for modeling and also providing information that can be used as guidance in assessing the potential performance of ASR systems. *See, e.g.*, Ward et al.; Christopher S. Lowry & Mary P. Anderson, *An Assessment of Aquifer Storage and Recovery Using Ground Water Flow Models*, 44 Ground Water 661 (2006).

B. Legal and Policy Issues

To increase public understanding of the benefits of ASR, the Texas Water Development Board (TWDB) funded the Assessment of Aquifer Storage and Recovery study cited in section III.B above to look into, in part, why ASR is not being implemented to a greater extent in Texas and what unique features have made it more attractive in other areas of the United States and internationally. Although some key technical challenges exist in some areas, most of those can be overcome if the system design appropriately addresses the physical and chemical characteristics. One of the key findings of the TWDB study is that the principal challenges for ASR in Texas are related to institutional factors and the evolving legal and regulatory framework.

Recent legislation, discussed below, has resolved some of the challenges identified in the TWDB study. These changes should facilitate the development of additional ASR projects in the state.

In summary, a developer of an ASR project in Texas must have the legal right (1) to use the water to be placed in storage (water rights); (2) to use the real property in which the water will be stored (property rights); and (3) to inject the water into the ground for storage without contaminating native groundwater (underground injection control rights). The following section outlines some issues related to these legal rights.

1. Water Rights

Before 1995, the use of surface water for storage in an ASR project was not clearly established in Texas law. In that year, the legislature added provisions to the Texas Water Code authorizing a two-step process for obtaining authorization for the storage and recovery of appropriated surface water in an ASR project. *See* Act of May 18, 1995, 74th Leg. R.S., ch. 309, § 2. Under the legislation, a project developer first had to conduct a pilot project to demonstrate the feasibility of the project and obtain a temporary or term water right from the TCEQ. If the developer could demonstrate that water could be stored without degrading the native groundwater and that it could be successfully harvested for beneficial use, the TCEQ could issue a permanent water right or amendment to a water right. The legislation also made projects in the jurisdiction of a GCD subject to additional regulation by the district, including permitting, well spacing, production limits, and water quality requirements. *See, e.g.*, Evergreen Underground Water Conservation District, *Rules of the Evergreen Underground Water Conservation District* Rule 6.6 (Jan. 23, 2009), *available at* www.evergreenuwcd.org/files/Evergreen%20rules%20Adopted%201-23-09.pdf.

In 2015, the legislature passed House Bill 655, which repealed the two-phase permitting process. *See* Act of May 21, 2015, 84th Leg., R.S., ch. 505, § 5, eff. Sept. 1, 2015 (repealing Tex. Water Code § 11.154). Under H.B. 655, no additional water rights authorization is required to store surface water in an ASR project. *See* Tex. Water Code § 11.153. A water right holder, or a person who has contracted for use of water under a contract that does not prohibit the use of the water in an ASR project, may store surface water in an ASR project as long as the water right holder complies with the terms of its water right and if the ASR project has obtained authorizations for injection described below under Texas Water Code chapter 27. *See* Tex. Water Code § 11.153(b). This change recognizes that storage of surface water in an ASR project is essentially no different (from a water rights perspective) than storing surface water in an off-channel reservoir.

The legislation also clarifies that new or amended water rights associated with an ASR project do not have to be based on the continuous availability of historic normal stream flow. *See* Tex. Water Code § 11.153(c). This clarification allows the TCEQ to permit diversion amounts in new or amended water rights that exceed the amounts that would otherwise be allowed based on an analysis of the availability of unappropriated water. Specifically, this change authorizes the TCEQ to issue water rights when water is available only during wetter years with higher river flows, which allows greater efficiencies in the use of surface water. Again, this change allows the TCEQ to treat storage in ASR projects in a manner similar to the way the TCEQ treats storage in off-channel reservoirs.

The legislation also clarifies the role of GCDs in the regulation of ASR projects. Groundwater to be produced at one location and stored in an ASR project must be produced in accordance with Texas law. If the source well is located inside a GCD, the well must be drilled and operated in compliance with the rules of the district that apply to other groundwater production.

2. Property Rights

The developer of an ASR project should ensure that it has acquired the legal right to use the property in which the injected water will be stored. While the law in Texas is not completely settled on the issue, the developer should obtain authorization from the owner of the surface estate over the areal extent of where the injected water is expected to be stored, as well as from the owner of the groundwater rights, if the groundwater right has been severed from the surface estate. One area of uncertainty in the law is the determination of who owns the subterranean pore space where the injected water will be stored—the owner of the surface estate or the groundwater estate (if severed), or even the mineral estate. As part of these rights, the developer should also obtain an agreement from the owner of the groundwater rights that the owner will not pump any of the water stored by the developer.

Obtaining the legal rights to the surface and groundwater estates for the entire geographic area may not be entirely necessary but will substantially reduce the developer's risk. One significant concern is that the migration of injected water across a property line could be considered a trespass. The legal remedies for a trespass include an injunction against the continuance of the trespass and damages. The Texas Supreme Court has held that some activities, such as water flooding as part of a permitted secondary recovery operation, do not constitute a trespass, even if the injected fluid crosses lease lines. *See Railroad Commission of Texas v. Manziel*, 361 S.W.2d 560 (Tex. 1962). This same immunity from tort liability, however, has not been extended to the injection of fluids under the underground injection control (UIC) program of Texas Water Code chapter 27. In 2006, the supreme court made it clear that compliance with a UIC permit does not insulate the operator of the injection well from tort liability, including liability for trespass. *See FPL Farming Ltd. v. Environmental Processing Systems, L.C.*, 351 S.W.3d 306 (Tex. 2011). In 2015, the court clarified its position somewhat by holding that consent by a neighboring landowner precludes liability for trespass. *See Environmental Processing Systems, L.C. v. FPL Farming Ltd.*, 457 S.W.3d 414 (Tex. 2015). In the 2015 opinion, however, the court did not decide whether the migration of materials injected as authorized by a UIC permit would constitute trespass or would give rise to injunctive relief or damages.

Another significant concern is the risk that third parties will access and produce the water stored in the ASR project. Currently, there is no clear legal barrier preventing a landowner from lawfully producing water stored beneath his land, even if that water was injected by another. The best way to prevent the production of stored water by others is through contracts with all landowners potentially capable of accessing the stored water.

Additional protections will be needed in areas with active oil and gas exploration or production. If a mineral estate has previously been severed from the surface estate within the footprint of the ASR project, the mineral estate has the right to use as much of the surface, subsurface, and adjacent airspace of the property as reasonably necessary to enjoy the mineral estate, with "due regard" to the rights of the surface estate. *See Getty Oil Co. v. Jones*, 470 S.W.2d 618, 621 (Tex. 1971). In the absence of any express reservation to the surface estate owner, the mineral estate owner may use surface water or groundwater to the extent essential to the enjoyment of the grant of the mineral estate. *See Guffey v. Stroud*, 16 S.W.2d 527, 528 (Tex. 1929). Under this legal doctrine, the operator of an ASR project needs be concerned both with oil and gas wells being drilled through its stored water and with the oil and gas operator using the water stored in the ASR project, or in the buffer zone, because such use is reasonably necessary to enjoy the mineral estate. The ASR developer needs to thoroughly research ownership of mineral rights within the project area and obtain the consent of the mineral owner as part of the development process.

3. *Underground Injection Control Rights*

The federal Safe Drinking Water Act (SDWA), Pub. L. No. 93-523, 88 Stat. 1660 (1974) (codified at 42 U.S.C. §§ 300f–300j-26), regulates injection activities that could endanger underground sources of drinking water. *See* 42 U.S.C. § 300h. Under the SDWA, states apply to the United States Environmental Protection Agency (EPA) for authorization of primary enforcement and permitting authority (primacy) over injection wells within the state (the "UIC program"). *See* 42 U.S.C. § 300h-1. An ASR injection well is classified as a Class V well under the EPA's and the TCEQ's UIC rules. *See* 40 C.F.R. §§ 144.80(e), 144.81; 30 Tex. Admin. Code § 331.131. This classification is for wells that inject nonhazardous fluids underground. *See* Tex. Water Code ch. 27; 30 Tex. Admin. Code ch. 331.

The TCEQ is currently charged with administering the UIC program for Class I, III, IV, and V wells. The Texas Railroad Commission administers other injection activity relating to oil and gas activities in Texas. See 47 Fed. Reg. 618 (Jan. 6, 1982); see also 40 C.F.R. § 147.2200.

Before 2015, an ASR developer could obtain UIC authorization by complying with TCEQ standards at 30 Texas Administrative Code sections 331.9(b) and 331.131 (and the requirements of GCDs, if applicable) or by obtaining an individual permit from the TCEQ. With the passage of H.B. 655 in 2015, the TCEQ has exclusive jurisdiction over the regulation and permitting of ASR injection wells. Tex. Water Code § 27.152. The new legislation is generally applicable statewide. The changes adopted by the legislature do not affect the regulation of an aquifer recharge project authorized by the Edwards Aquifer Authority or the Barton Springs–Edwards Aquifer Conservation District or the regulation of ASR wells by the Harris-Galveston Subsidence District, the Fort Bend Subsidence District, or the Corpus Christi ASR Conservation District. *See* Tex. Water Code § 27.157(a).

The TCEQ is required to adopt technical standards governing the approval of the use of ASR injection wells by May 1, 2016. *See* Tex. Water Code § 27.154; H.B. 655, § 6. These technical standards must detail, among other things, how the TCEQ will determine limits on the volume of water that may be recovered by the project so that the volume recovered does not exceed the amount of water injected, less any loss into the aquifer as determined by the TCEQ. *See* Tex. Water Code § 27.154(b). If the TCEQ determines that the proposed injection of water will result in a loss of injected water or native groundwater, and the injection well is located in a GCD, the TCEQ shall impose additional restrictions on the amount of water that may be recovered to account for the loss. *See* Tex. Water Code § 27.154(b). Also, the TCEQ must develop construction and completion standards and metering and reporting requirements for ASR injection and recovery wells. *See* Tex. Water Code § 27.154(c). The TCEQ may not, however, adopt or enforce groundwater quality protection standards for the quality of water injected by an ASR injection well that are more stringent than applicable federal standards. Tex. Water Code § 27.154(d).

The TCEQ may authorize an ASR injection well by rule, under an individual permit, or under a general permit. Tex. Water Code § 27.153(a). All wells associated with the ASR project must be located within a continuous perimeter boundary of one parcel of land or two or more adjacent parcels of land under common ownership, lease, joint operating agreement, or contract. Tex. Water Code § 27.153(c). To obtain a permit for a Class V ASR injection well, the developer must provide notice of the application by first-class mail to any GCD in which the proposed wells will be located and by publishing notice in a newspaper of general circulation in the county in which the wells will be located. *See* Tex. Water Code § 27.153(d).

In issuing a permit for a Class V ASR injection well, the TCEQ shall consider—

- whether the injection of water will comply with SDWA standards;
- the extent to which the cumulative volume of water injected for storage in the aquifer can be successfully recovered from the aquifer for beneficial use, taking into account that injected water may be commingled with native groundwater;
- the effect of the ASR project on existing water wells; and
- whether the introduction of water into the receiving geologic formation will alter the physical, chemical, or biological quality of the native groundwater to a degree that would render the groundwater harmful or detrimental to people, animals, vegetation, or property or require an unreasonably higher level of treatment to render the groundwater suitable for beneficial use.

See Tex. Water Code § 27.153(b).

ASR injection and recovery wells are subject to the following metering and reporting requirements:

- each ASR injection and recovery well must be metered (*see* Tex. Water Code § 27.155(a));
- monthly reports must be provided to the TCEQ showing the volume of water injected and recovered (*see* Tex. Water Code § 27.155(b));

- annual testing must be performed of the quality of the water injected and recovered (*see* Tex. Water Code § 27.156(a)); and
- annual reports of water quality testing must be provided to the TCEQ (*see* Tex. Water Code § 27.156(b)).

If an ASR project is located in the boundaries of a GCD, the following additional requirements apply:

- register ASR injection and recovery wells with the district (*see* Tex. Water Code § 36.453(a)(1));
- provide the district with copies of monthly volume reports and annual water quality reports (*see* Tex. Water Code § 36.453(a)(2), (3)); and
- report any volume of water recovered in excess of the volume authorized to be recovered (*see* Tex. Water Code § 36.453(b)).

ASR wells do not need a separate permit from the GCD (nor do they need to comply with district spacing and production requirements) for either injection or recovery unless the amount of water recovered from the wells exceeds the volume authorized to be recovered. *See* Tex. Water Code § 36.454.

4. Authority of Groundwater Conservation Districts

Before September 1, 2015, GCDs in Texas could regulate the injection and recovery of water in ASR projects irrespective of the source of the water. This authority came from both chapters 11 and 36 of the Texas Water Code. *See* Act of May 18, 1995, 74th Leg., R.S., ch. 309; *see also* Tex. Water Code § 36.101. Not all GCDs had rules related to ASR projects, but more than twenty districts had some form of aquifer storage rules. *See* Assessment of Aquifer Storage and Recovery. Some districts, such as the Evergreen Underground Water Conservation District, had express rules governing the permitting of ASR projects. *See* Evergreen Underground Water Conservation District, *Rules of the Evergreen Underground Water Conservation District* Rule 6.6 (Jan. 23, 2009). Other districts, such as the Live Oak Underground Water Conservation District, specifically prohibited ASR projects. *See* Live Oak Underground Water Conservation District, *Rules of the Live Oak Underground Water Conservation District* Rule 17 (June 11, 1998) (repealed 2011). To obtain authorization, an ASR developer would have to comply with the individual GCD rules, which were subject to change. Only the ASR project in Kerrville is located within the boundaries of a GCD.

After the passage of H.B. 655 in 2015, the role of GCDs in the regulation of ASR injection and recovery wells is greatly diminished. All ASR injection and recovery wells located within a district must be registered with the district. *See* Tex. Water Code § 36.453(a)(1). The ASR project operator must also send to the district copies of the reports filed with the TCEQ regarding injection and recovery amounts. *See* Tex. Water Code § 36.453(a)(2), (3). Beyond those requirements, GCDs have little authority over an ASR project as long as the amount of water recovered by the by the project does not exceed the volume of water authorized by the TCEQ to be recovered by the project. *See* Tex. Water Code § 36.454(b). Unless production exceeds authorized amounts, a GCD may not require a permit for the drilling, equipping, operation, or completion of an ASR injection well or an ASR recovery well that is authorized by the TCEQ. Additionally, ASR recovery wells are not subject to the spacing and production requirements of a GCD unless the amount of groundwater recovered from the wells exceeds the volume authorized by the TCEQ to be recovered under the project. *See* Tex. Water Code § 36.454(b).

The statute is not clear as to the time period to be used for determining whether the amount recovered exceeds the volume authorized—whether it is on a monthly, annual, or cumulative basis.

Because ASR projects are typically designed such that recovery of water may occur months or years after being placed into storage, the timeframe used to determine compliance should reflect the intended use. The TCEQ is expected to clarify in its rulemaking that this trigger is based on the cumulative amount of water placed into storage over the entire life of the project, and not on a shorter basis. Nevertheless, an ASR project developer needs to keep this requirement in mind when evaluating a project. Because spacing becomes an issue when a project reaches the production threshold, it should be a consideration at the outset, as it would be difficult to retrofit a project after construction to satisfy spacing requirements.

Additionally, a district may assess well registration or other administrative fees, but a district may not assess production, transportation, or export fees for groundwater recovered by an ASR recovery well unless the amount of water recovered exceeds the amount authorized to be recovered. *See* Tex. Water Code § 36.455.

C. Costs Compared to Other Water Management Strategies

It can be challenging to evaluate the cost of ASR in relation to other water supply strategies. As stated above, it is often inappropriate to compare projects on a unit cost basis (for example, dollars per acre-foot per year) because water may be stored for years in an ASR wellfield before it is needed to meet water demand during a drought of record. Ultimately, the cost of an ASR project depends on factors such as source water quality, characteristics of the storage aquifer, native groundwater quality and potential geochemical reactions, treatment required to meet regulatory standards, and the ability to use existing infrastructure such as treated-water pipelines and storage.

The true cost of delivered water from operational ASR projects is also difficult to determine from recent literature. In a 2006 review of fifty ASR projects across the United States and in other countries, costs ranged from $1.29 to $35.11 per cubic meter ($1,590 to $43,300 per acre-foot or $4.88 to $133.00 per thousand gallons) of water recovered. *See* Christopher J. Brown et al., *Lessons Learned from a Review of 50 ASR Projects from the United States, England, Australia, India, and Africa, in Universities Council on Water Resources Conference* (2006), *available at* http://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1040&context=ucowrconfs_2006. A recent analysis of ASR project economics in the United States indicated an average capital cost of $1.14 per gallon per day of recovery capacity, within a range of about $0.50 to $2.00. *See* Current Status of ASR Technology. So, for example, the capital cost of an ASR project with 1 million gallons per day (MGD) recovery capacity averages $1.14 million. The same analysis noted that ASR capital costs were typically less than half the capital costs of other water supply alternatives.

Favorable project economics have been the principal driver for ASR development in the United States during the past thirty years. In many instances, there are two primary reasons why ASR is often more affordable than other water management strategies:

- ASR projects can be implemented using a phased or incremental approach rather than having to build all the facilities at one time. For example, ASR wells can be added as needed, whereas a reservoir dam has to be constructed at one time even though all the stored water may not be needed for many years.
- The costs of source water treatment are typically just the marginal or incremental expenses. For example, with the ability to store excess water in an ASR wellfield, a water utility can run its treatment plant at the most efficient constant rate. The only additional treatment costs for the stored water are variable expenses such as chemicals, power, and residuals handling. All the fixed costs (for example, debt service, labor, insurance) remain unchanged.

V. Case Studies

As discussed in previous sections, there are currently three operating ASR projects in Texas. Two of these projects are described in sections V.A and V.B below. Two other ASR projects are no longer in operation but were successful for a number of years. They are discussed in sections V.C and V.D below. Finally, the Corpus Christi Aquifer Storage and Recovery District is discussed in section V.E.

A. City of Kerrville Aquifer Storage and Recovery Project

The city of Kerrville inherited a first-phase ASR project from the UGRA in 1998. The initial project had two ASR wells. The project was to be expanded, and a third ASR well (Well R-3) was to be constructed. However, there were technical problems with the third well that have yet to be resolved, and the city is currently in litigation with the contractor. The recovery capacity of the initial project is 2.6 MGD; Well R-3 would have increased that capacity to 3.6 MGD. *See* Assessment of Aquifer Storage and Recovery, at 29. The source water is periodic excess flows in the Guadalupe River, and the storage aquifer is the Lower Trinity (Hosston and Sligo Formations).

As of January 8, 2015, there were 590 million gallons (1,810 acre-feet) of water in storage and available for recovery from the ASR wells. Personal Communication, Stuart Barron, Director of Public Works, City of Kerrville, Jan. 2015.

Before filing its permit request, the UGRA considered building a surface water reservoir to meet its future water supply needs. Despite the delays and court costs associated with its ASR permit application, the ASR project took much less time to implement and cost substantially less—by almost an order of magnitude ($3 million versus an estimated $30 million)—than the reservoir project would have, while still meeting the community's anticipated future water supply needs.

B. San Antonio Water System Twin Oaks Project

Another successful but larger-scale ASR project can be found in southern Bexar County, just south of San Antonio. With a capacity of 60 MGD, the SAWS Twin Oaks ASR Facility is an important part of the SAWS long-term water resources plan. The SAWS ASR system is now one of the largest in the U.S., with only the Las Vegas Water District system in Nevada being larger and the Calleguas Municipal Water District system in California being comparable in size.

The source of water is the Edwards Aquifer and the storage location is the Carrizo Aquifer. The SAWS concept is to store Edwards Aquifer water when allowed under its permits and the regulations of the Edwards Aquifer Authority (EAA) and to recover water from storage during times of need. There are currently twenty-nine Class V wells in the Twin Oaks ASR Facility, and the total available ASR storage volume is estimated to be at least 100,000 acre-feet. *See* San Antonio Water System, *Twin Oaks—Aquifer Storage & Recovery*, www.saws.org/your_water/waterresources/projects/asr.cfm. Some thirty miles of sixty-inch steel pipe and ten miles of forty-two-inch steel pipe connect the facility to the existing SAWS distribution system. The ASR wellfield can produce up to 60 MGD, which was critical to meeting customer demands during the ongoing drought. During 2014, SAWS recovered approximately 20,000 acre-feet of water from the Twin Oaks facility. This water allowed SAWS to meet its customer demands despite Edwards Aquifer reduction requirements of 35 percent under the EAA's Critical Period Management Rules. As of January 7, 2015, SAWS still had about 70,000 acre-feet of water in ASR storage. Personal Communication, Chuck Ahrens, Vice President–Water Resources and Conservation, San Antonio Water System, Jan. 2015.

In the last two years, the SAWS ASR program has also become one of the cornerstone mitigation measures of the Edwards Aquifer Habitat Conservation Plan (EAHCP), a federally approved plan to protect endangered species in the Comal and San Marcos Springs. The EAHCP will be implemented in two phases. *See* RECON Environmental, Inc., et al., *Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan* (Nov. 2012), *available at* www.eahcp.org/files/uploads/Final%20HCP%20November%202012.pdf. The SAWS ASR program is one of the flow protection measures in Phase 1. Those measures are designed to maintain continuous minimum springflow in the springs to protect endangered species during a repeat of the 1950s drought of record. Under the EAHCP, SAWS will store Edwards Aquifer water that has been leased by the EAA. When the Edwards Aquifer level declines to triggers documented in the EAHCP, SAWS will use water previously stored in the ASR facilities to serve as a baseload water supply in its service area near the springs.

The total cost of the ASR project (both phases combined) is estimated at $255 million; a significant portion of that cost was for the thirty-mile transmission pipeline and the 30 MGD water treatment plant.

There are two other ASR project that are no longer in operation, but were successful for a number of years. These are described below.

C. City of Midland

The city of Midland operated an ASR system for several years, but the system has not been in operation since at least 2002. The system used untreated groundwater from the Ogallala Aquifer as the source of supply. The water was chlorinated and then injected into a local regional aquifer near the city. The local aquifer was a depleted portion of the Ogallala Aquifer. Water was recovered to meet peak water demands in the summer months. *See* Assessment of Aquifer Storage and Recovery, at 43–44.

The city stopped the ASR operation for two primary reasons:

- there is no groundwater district in the county, and the city did not feel that it had sufficient legal control of the water it had stored; and
- perchlorate was found in the local well field, and the city decided to stop producing water from the aquifer even though the EPA had not made a final regulatory determination on the chemical.

See Assessment of Aquifer Storage and Recovery, at 44.

D. Colorado River Municipal Water District

The Colorado River Municipal Water District (CRMWD) operated an ASR system from 1963 to 1970. In 1963, the CRMWD began to take surplus untreated surface water from J. B. Thomas Reservoir during the winter months, inject it into the Ogallala Aquifer at the district's Martin County Well Field, and recover the water during the summer months to meet peak demands of the city of Odessa. In its 1964 annual operating report, the district estimated that at least 95 percent of the injected water had been recovered. At the end of calendar year 1966, the district had 414.3 million gallons (about 1,300 acre-feet) in storage. *See* Assessment of Aquifer Storage and Recovery, at 44–45.

In the spring of 1969, the CRMWD completed construction of the E. V. Spence Reservoir, which included a new pipeline that balanced the flow capacity into and out of the Martin County Pump Station. With the construction of the reservoir, there was no excess capacity in the pump station or the pipeline to Odessa, and thus the ASR project was abandoned. All the injected water had been recovered by the end of August 1970. *See* Assessment of Aquifer Storage and Recovery, at 45.

E. Corpus Christi Aquifer Storage and Recovery Conservation District

The first special purpose district created to promote the use of ASR in Texas was the Corpus Christi Aquifer Storage and Recovery Conservation District (CCASRCD) in 2005 by S.B. 1831 of the 79th Legislature pursuant to article XVI, section 59, of the Texas Constitution. The CCASRCD's mission states that the district is—

> committed to manage and protect the groundwater resources of the district, including those injected into the ground for storage and later use. The district is committed to maintaining a sustainable, adequate, reliable, cost effective and high quality source of groundwater to promote the vitality, economy and environment of the district.

City of Corpus Christi, *District's Mission*, www.cctexas.com/government/water/general-info-water-qualitysupply/supply-and-planning/cc-aquiferstorage-and-recovery/index.

The CCASRCD has all the rights, responsibilities, and authorities of a GCD created under Texas Water Code chapter 36, although it is not a groundwater district. *See* Tex. Spec. Dist. Code § 8811.004. The district's enabling legislation also prescribes that "the district may not allow more water to be recovered from a municipal aquifer storage area in San Patricio County than the amount of water stored by the district at the municipal aquifer storage area." Tex. Spec. Dist. Code § 8811.052.

Implementing ASR is an express power of the CCASRCD. The district does not currently operate any ASR facilities; however it has been involved in studies related to the technology. *See* Assessment of Aquifer Storage and Recovery, at 45–46.

VI. Conclusion

Texas has lagged behind other states and nations in the adoption of ASR as a water management strategy. The physical and chemical conditions necessary for the successful development of ASR wells are present in many parts of the state, and new regulations related to the injection and recovery of water should make ASR a more attractive water supply option for many of the water providers in their medium- to long-range water plans. Examples of operational ASR systems are described in this chapter, and it is expected that many more will be developed over the years to come.

CHAPTER 27

Reservoirs

Lyn Clancy[1] and Greg Graml[2]

Although most of Texas's water supplies in the earlier part of its history came from groundwater and unregulated river flows, devastating floods and the historic 1950s drought made many realize that significant reservoir construction was needed to ensure a safer and more reliable water supply for the growing Texas population. Indeed, it was during and soon after this 1950s drought that many of the state's reservoirs were constructed.

This chapter provides a general overview of the water rights permitting requirements and exemptions specific to reservoirs, including potential opportunities and considerations relevant to reservoir operations. It also identifies other permitting and legal considerations that may apply to a reservoir project in Texas. This chapter's focus is on the use of reservoirs for water supply purposes. The use of reservoirs in controlling floods, and the liability associated with flood management, as well as dam safety regulations are fully discussed elsewhere in this book; see Chapter 39.

I. Nonexempt Reservoirs

A. Water Rights Permit Application Requirements

With the exception of the circumstances described in the following section, a water rights permit must be obtained prior to impounding any state water in a reservoir or to impounding private water in a reservoir located on a state watercourse. *See* Tex. Water Code § 11.121; 30 Tex. Admin. Code § 297.11; *see also* Tex. Water Code § 11.144 (requiring approval prior to making alterations to a reservoir or dam). Chapter 9 of this book discusses the general requirements for water rights applications. Additional information is required in permit applications involving reservoirs. Such applications must include descriptions of the locations of dams or off-channel reservoirs and plats or maps showing the area of all reservoirs intended for use under the permit. *See* Tex. Water Code § 11.125; 30 Tex. Admin. Code § 295.7. Furthermore, the applications shall include, inter alia, an

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overall plan of the dam, a topographic map, and plan and profile drawings of the dam and spillways. *See* 30 Tex. Admin. Code § 295.124.

The Texas Commission on Environmental Quality (TCEQ) may also require that plans and specifications be prepared by a registered professional engineer and submitted to the TCEQ executive director for approval. Tex. Water Code § 11.126(c); 30 Tex. Admin. Code § 295.41. Additional provisions specifically related to dam safety are discussed in Chapter 39 of this book.

Reservoir projects also require additional notice and specific application fees. Notice of proposed reservoir construction must be provided to county and municipal officials for each county and municipality in which the reservoir, or any part of the reservoir, will be located. Tex. Water Code § 11.124(f); 30 Tex. Admin. Code § 295.42. Fees include an application filing fee and a one-time use fee. Both fees are based on the amount of water to be impounded, with the application filing fee limited to $2,000. *See* 30 Tex. Admin. Code § 295.132(a). The one-time use fee of $0.50 per acre-foot of stored water (or $1.00 per acre-foot if used for in-place recreational use) is limited to $50,000. *See* Tex. Water Code § 5.701(i), (k); 30 Tex. Admin. Code §§ 295.133, 295.134.

B. Water Availability and Reservoir Operations

As discussed in Chapter 9 of this book, the TCEQ will grant an application only if unappropriated water is available for a sufficient amount of time such that the proposed project is viable and makes a beneficial use of water without waste. Tex. Water Code § 11.134; 30 Tex. Admin. Code § 297.42(a). For a proposed on-channel reservoir project for domestic or municipal purposes, the amount of water available for appropriation is normally limited to the project's firm yield. 30 Tex. Admin. Code § 297.42(e). The "firm yield" is generally the amount of water that the reservoir could have produced annually during a repeat of the worst hydrologic drought on record. 30 Tex. Admin. Code § 297.1(20). However, when there is a drought management plan or alternative sources of water such as groundwater or system reservoirs, annual diversions may be authorized in amounts greater than the firm yield. *See* 30 Tex. Admin. Code § 297.42(e).

Most newer reservoirs were issued permits based on hydrologic modeling such that the authorized diversion amounts are close to the firm yields from recent water availability studies similar to the diversion amount that would be authorized using the analysis required by 30 Texas Administrative Code section 297.42(e). For older reservoirs, however, the authorized diversion amount often exceeds the firm yield. See Chapter 12 of this book for a discussion of hydrologic modeling. Furthermore, once reservoirs are constructed, they begin to accumulate sediment, which, over time, reduces the storage volume and reliable supply from the reservoir. The TWDB has an ongoing program to evaluate sedimentation in water supply reservoirs in Texas. *See* Texas Water Development Board, *Hydrographic Survey Program*, www.twdb.texas.gov/surfacewater/surveys/.

When an entity owns or controls several supplies of water, it may seek to operate them together as a system. This system operation or conjunctive use of multiple water supplies may afford a greater overall yield than the sum of the yields from the individual water supplies. If a permit for state water is to be used as part of such a system, TCEQ rules recognize that the individual permit need not meet the reliability requirements that would otherwise apply if the permit were operated on a stand-alone basis. *See* 30 Tex. Admin. Code § 297.42. Some water rights explicitly authorize system use, with limits on the annual diversions from the system or on the diversions from a reservoir over a multiyear period. Alternatively, where water rights authorize diversions in excess of the firm yield, the reservoir owner may overdraft one reservoir and subsequently rely on alternative supplies in critical periods. In any event, a water rights permit that allows a system operation approach often contains a requirement that the permittee develop and implement an accounting plan that details how the water will be used in conjunction with other water supplies and ensures that permit conditions, environmental flow requirements, and senior water rights are respected.

While firm yield is the primary basis of determining water available for permitting, some reservoirs are operated based on a *safe yield* approach. Under this approach, reservoir diversions are limited to the amount of water that could be diverted on an annual basis such that in a repeat of the drought of record, the reservoir would maintain a minimum storage amount equal to one year's diversion.

In the permit evaluation process, although a proposed reservoir may be able to produce a known firm yield, the TCEQ will issue water rights consistent only with water supply needs reflected in the state water plan and an approved regional plan (unless the TCEQ determines that conditions warrant a waiver). *See* Tex. Water Code § 11.134(b); see also Chapter 20 of this book. To assist in the optimum development of reservoir projects, the TCEQ may issue permits for the storage of water where demands may not warrant such a volume, and later convert them to permits for beneficial use. *See* Tex. Water Code § 11.140.

C. Acquisition of Land to Be Used for a Reservoir

To construct a reservoir, it must be demonstrated that one has rights to the property on which the dam and reservoir would be located. In instances in which an applicant is not relying on condemnation powers and proposes to inundate or place facilities on the lands of another, the application must include evidence of a written agreement between the applicant and the landowner, such as a copy of a written easement, consent, license, or lease. 30 Tex. Admin. Code § 295.10. An application to use an existing reservoir inundating land owned by multiple parties must be joined by all landowners, or the application must include a suitable agreement from the landowners that do not join the application. *See* 30 Tex. Admin. Code § 295.11. If the applicant seeks to appropriate water in another party's existing reservoir, a document acknowledging consent of the reservoir owner must be provided with the application. *See* 30 Tex. Admin. Code §§ 295.12, 297.22.

The holder of an authorization to construct a dam or reservoir is granted the necessary right-of-way over any public school land, university land, or asylum land, with the compensation for such lands to be determined by the TCEQ. Tex. Water Code § 11.034. If a public road, highway, or bridge is located on the site necessary for a dam, reservoir, or lake, the county commissioners court shall relocate the road, highway, or bridge, and the party constructing the dam, reservoir, or lake shall pay the expense of the relocation. Tex. Water Code § 11.044. For projects planned on private lands, condemnation may be used, if necessary, to obtain rights-of-way and land necessary for reservoirs and associated facilities. Tex. Water Code § 11.035(a). When the party seeking to condemn private property is not a corporation, district, city, or town, the party must apply to the TCEQ for condemnation. Tex. Water Code § 11.035(c). The TCEQ must give notice to the landowner and hold a hearing, and, if the TCEQ determines that condemnation is necessary, the executive director may institute condemnation proceedings. Tex. Water Code § 11.035(d), (e).

For condemnation proceedings in which the petition is filed on or after February 1, 2008, the Landowner's Bill of Rights Act is applicable. See Tex. Gov't Code § 402.031; Tex. Prop. Code ch. 21. The entity with eminent domain authority must provide the property owner with a copy of the Landowner's Bill of Rights no later than the seventh day before the entity makes a final offer to the property owner. Tex. Prop. Code § 21.0112(a). In addition, the entity must provide the Landowner's Bill of Rights before or at the same time as the entity first represents in any manner to the landowner that it possesses eminent domain authority. Tex. Prop. Code § 21.0112(a). This document, prepared by the attorney general, must notify the property owner of the right to (1) notice of the proposed acquisition; (2) a bona fide, good-faith effort to negotiate by the entity proposing to acquire; (3) an assessment of damages that will result from the taking; (4) a hearing; and (5) an appeal of a judgment. *See* Tex. Gov't Code § 402.031(a), (b). The Landowner's Bill of Rights is available at the Texas

Attorney General's Web site at www.texasattorneygeneral.gov/agency/landowners-bill-of-rights. See also Chapter 38 of this book.

In 1997, the Texas legislature passed Senate Bill 1, which amended the Water Code to implement a state water plan addressing drought and water conservation, development, and management. Tex. Water Code § 16.051. As part of state water planning, Senate Bill 1 authorized the legislature to designate river or stream segments of unique ecological value and sites of unique value for the construction of a reservoir. Tex. Water Code § 16.051(f), (g). Further amendments have specified that the designation of unique ecological value prohibits a political body from financing the actual construction of a reservoir in a designated river or stream segment. Tex. Water Code § 16.051(f). Designation of unique value for the construction of a reservoir prohibits a political body from obtaining a fee title or an easement that would significantly prevent the construction of a reservoir on a designated site. *See* Tex. Water Code § 16.051(g). However, if the fee title or easement is acquired for the purpose of providing retail utility service to the property in the reservoir site or allowing a property owner to improve property, such an acquisition may not be considered a significant impairment that prevents the future construction of a reservoir on a designated site. *See* Tex. Water Code § 16.051(i).

Sites are designated to have unique value for construction of a reservoir if the development is recommended as a specific water management strategy or as a unique reservoir site in an adopted regional water plan. 31 Tex. Admin. Code § 358.2(7). Sites are also designated if the location, hydrologic, geologic, topographic, water availability, water quality, environmental, cultural, and current development characteristics, or other pertinent factors, make the site uniquely suited for reservoir development to provide water supply for the current planning period, or where a reservoir might reasonably be needed to meet needs beyond the fifty-year planning period. 31 Tex. Admin. Code § 358.2(7). The sites are identified by the Texas Water Development Board (TWBD) in coordination with the Texas Parks and Wildlife Department and the TCEQ or identified in an approved regional water plan. 31 Tex. Admin. Code § 358.2(7). The TWDB is to include stream segments or reservoir sites in the state plan that it will recommend to the legislature for protection. *See* Tex. Water Code § 16.051(e). The recommendations require legislative action to take effect. Tex. Water Code § 16.051(f), (g).

In 2007, the Texas legislature designated as sites of unique value for the construction of a reservoir all nineteen sites recommended for such designation in the 2007 state water plan. *See* Tex. Water Code § 16.051(g-1); *see also* Texas Water Development Board, *Water for Texas 2007* 266 (2007), *available at* www.twdb.texas.gov/waterplanning/swp/2007/index.asp. The 2012 state water plan included three additional sites recommended for designation as unique reservoir sites. Texas Water Development Board, *Water for Texas 2012* 236 (2012), *available at* www.twdb.state.tx.us/waterplanning/swp/2012/index.asp. However, the legislature did not address the recommendations as part of its 83rd regular session in 2013. For sites designated in 2007, the designation terminates on September 1, 2015, unless, before that date, there is an affirmative vote by a proposed project sponsor to make expenditures necessary to construct or file permit applications as required under federal or state law. Tex. Water Code § 16.051(g-1). In 2015, the legislature redesignated one of the sites designated in 2007, the Ringgold Reservoir in the Red River basin. Many other sites are expected to maintain their designations as the result of actions taken by project sponsors.

Supporters of the 2007 legislation argued that reservoir construction is a necessary part of the state's water future and pointed to long-term planning through the designation as a solution to future water needs. Senate Commission on Natural Resources, Bill Analysis 19, Tex. S.B. 3, 80th Leg., R.S. (2007) [hereinafter S.B. 3 Bill Analysis]. Although the designation does not require that a reservoir be constructed on the site, the designation was seen as a significant step against federal action that might otherwise impede future reservoir construction, such as a federal designation of the site as a National Wildlife Refuge. S.B. 3 Bill Analysis, at 19. The legislation was controversial, however, with landowners arguing that the designation would create a cloud of title on the land. S.B. 3 Bill Analysis, at 20–21. They argued unsuccessfully that landowners should be compensated for the loss of value of their land through the designation. S.B. 3 Bill Analysis, at 20–21. Additional opponents stated that reservoirs are outdated methods of water storage, and state efforts should be focused elsewhere, such as on conservation or desalination. S.B. 3 Bill Analysis, at 20–21. The expiration of the designation in 2015, in the absence of actions by proposed project sponsors, was intended to address some of these concerns.

One of the nineteen sites designated in 2007 in Texas Water Code section 16.051(g-1) is the Fastrill reservoir site. This designation as a site of unique value for construction of a reservoir was particularly controversial because the site was already affected by the U.S. Fish and Wildlife Service's (FWS) designation of the Neches River National Wildlife Refuge just a year earlier, an action the TWBD and the City of Dallas challenged in federal court.

The FWS proposed a designation of the site as a refuge to protect a wintering habitat for migrating waterfowl, first in 1985 and then again in 2003. *See City of Dallas v. Hall*, 562 F.3d 712, 715 (5th Cir. 2009), *cert. denied*, 559 U.S. 935 (2010). Before designating the site as a wildlife refuge on June 11, 2006, the FWS prepared an Environmental Assessment (EA), as required under the National Environmental Policy Act (NEPA). *Hall*, 562 F.3d at 716. The EA resulted in a "Finding of No Significant Impact," which meant that the FWS was not required to perform an Environmental Impact Statement (EIS) under NEPA. 562 F.3d at 716.

In January 2007, the City of Dallas and the TWBD filed suit against the FWS, hoping to reverse the refuge designation. 562 F.3d at 716. The plaintiffs claimed that the FWS performed an ineffective EA by failing to consider alternatives, failing to consider the impact of the designation, relying on old data, and utilizing an unacceptable decision-making process. The Fifth Circuit affirmed that the EA prepared by the FWS was sufficient; the decision-making process engaged in by the FWS was not arbitrary and capricious; and an EIS was not required under NEPA. 562 F.3d at 724.

Regarding alternatives, the court held that the EA sufficiently considered alternatives to the refuge designation by considering the alternatives of no refuge, a small refuge, and a large refuge. 562 F.3d at 718. The TWDB and the city argued the EA should have considered the alternative of both the refuge and the reservoir coexisting, but the court held that the FWS's stated inability to evaluate a dual proposal was reasonable. 562 F.3d at 718. The FWS had noted in the EA that plans for the reservoir were speculative in the short term and beyond the planning horizon for the refuge proposal. 562 F.3d at 718. Further, each of the other alternatives envisioned building the reservoir, thus destroying vegetation in that region, which was contrary to the FWS's goal of preserving the bottomlands and wetlands of the Upper Neches. 562 F.3d at 718.

The court also rejected the argument that the EA was ineffective for failing "to analyze the effect of establishing the refuge on the city's water supply and urban planning process, given projected population growth" as part of their impact study. 562 F.3d at 719. The court held that, because of "the uncertainty over whether the reservoir will be constructed and its impact on water supplies, and the long timeframe for the project, the effects of establishing the refuge on water supplies [were] not concrete enough, nor closely enough related to the federal action, to require that they be included in the EA." 562 F.3d at 719–20. The court concluded that the TWDB and the city could not demonstrate that this analysis was required on a site that was only a proposed water source, as opposed to an existing one. 562 F.3d at 719. Moreover, the city's plans were not complete, it had not yet determined the role of the reservoir in the city's long-term water plans, and it had not planned to tap the reservoir until 2060. 562 F.3d at 719. The court stated that a "but for causal relationship" is not enough to determine agency responsibility for impacts; the city needed and failed to show the refuge designation was the proximate cause for effects on planning, water supply, and population. 562 F.3d at 719–20.

The Fifth Circuit also rejected the argument that the data relied on was too old to support a reasoned decision. 562 F.3d at 720. Although the data was from 1988, it was not unreasonable for use in an EA, which is by definition a "rough cut, low budget" assessment. 562 F.3d at 720 (citing *Sabine River Authority v. U.S. Department of Interior*, 951 F.2d 699, 677 (5th Cir. 1992)). Newer data showing clearing of much of the habitat did not preclude the FWS from determining the site should be protected and could support the migrating waterfowl. 562 F.3d at 720. However, the court noted that had a plaintiff shown the site could not support migrating waterfowl even if protected, such a showing might have rendered the decision arbitrary. 562 F.3d at 720.

The court also did not agree with the TWDB and the city that a twenty-year planning horizon was an arbitrary and capricious timeframe for the FWS's evaluations of impacts of a refuge designation and, considering FWS's engagement with the public and local officials, and efforts to find an alternative site, found the FWS's decision-making process was acceptable. 562 F.3d at 720–21.

The Fifth Circuit also affirmed that an EIS was not required under NEPA. 562 F.3d at 721. The TWDB and the city argued that the FWS's NEPA guidelines include determining the adverse effects on water supply or water quality as criteria for determining whether an EIS is needed. 562 F.3d at 721. The court held that these guidelines have no binding force and are meant only to assist in EIS determinations, not dictate them. 562 F.3d at 721. The court found the NEPA regulations issued by the Department of the Interior, which normally require an EIS when the action involves substantive conflicts over state and local land use or significant controversy over the environmental effects of the proposal, did not require an EIS. 562 F.3d at 722. Because the dispute was over a potential future use and not existing state or local use, the court found the controversy highly speculative with uncertain effects that could not be considered "significant." 562 F.3d at 722. The land had not yet been put to use, so federal action of setting a boundary for the refuge would have no significant effects on the use or character of the land, and thus no EIS was required. 562 F.3d at 723.

This case has obvious significance for the future of reservoir development in East Texas to serve the needs of the greater Dallas metropolitan area. The Fastrill Reservoir, as originally conceived, will not proceed unless the federal government, through an act of Congress, abandons the Neches River National Wildlife Refuge.

In 2012, the Texas Supreme Court issued another decision related to one of the unique reservoir sites, the Marvin Nichols Reservoir Site. Hearts Bluff Game Ranch purchased land in 2003 and 2004 within the site of the proposed Marvin Nichols Reservoir and sought a permit from the U.S. Army Corps of Engineers (USACE) for a wetlands mitigation bank. *Hearts Bluff Game Ranch, Inc. v. State*, 381 S.W.3d 468 (Tex. 2012), *cert. denied*, 133 S. Ct. 1999 (2013). The site of the proposed Marvin Nichols Reservoir has been included in state water plans for decades but was only designated by the Texas legislature as a unique reservoir site in 2007. 381 S.W.3d at 474–75. USACE denied the permit application, because if Texas were to construct the reservoir the mitigation bank would not be perpetual. 381 S.W.3d at 475. Hearts Bluff alleged that the designation as a unique reservoir site was the factual cause of the denial and claimed that the designation was a government action that caused a taking of its property. 381 S.W.3d at 479.

In the federal claim against the USACE, the Court of Appeals for the Federal Circuit applied a two-step test for determining whether the action constituted a taking. *Hearts Bluff Game Ranch, Inc. v. United States*, 669 F.3d 1326, 1329 (Fed. Cir. 2012), *cert. denied*, 132 S. Ct. 2780 (2012). Under the first step, the court found that there was no property interest in obtaining a mitigation permit. 669 F.3d at 1331. Thus, the court did not need to address whether the interest was taken. 669 F.3d at 1329.

In the state claim, the Texas court considered the *Penn Central* factors: the economic impact of the regulation; the character of the governmental action; and the extent of interference with investment-backed expectations. *Hearts Bluff Game Ranch, Inc.*, 381 S.W.3d at 477–78. The court noted that an action could be an unconstitutional taking if it does not serve a public purpose, but in this case, water management was a legitimate governmental interest. 381 S.W.3d at 478. With respect to the character of the governmental action, the court noted repeatedly that it was the USACE and not the state that had the authority to issue or deny the mitigation bank permit. 381 S.W.3d at 472–74, 476, 480–89, 491. The court found that there was no direct governmental action by the state and that the state was not the proximate cause of the harm; therefore, the state's action in recommending against the issuance of the USACE mitigation bank permit was not an unconstitutional taking by the state. 381 S.W.3d at 484, 491.

The proposed Marvin Nichols Reservoir has also been the subject of recent litigation regarding interregional conflicts between regional water supply plans. The reservoir was identified as a water supply strategy in the 2011 Region C (Dallas–Forth Worth area) water plan, while Region D (northeast Texas), in which the reservoir would be located, opposed the reservoir in its plan and asserted that it gave rise to an interregional conflict because of its potential impacts on timber, agricultural, environmental, and other natural resources. *Texas Water Development Board v. Ward Timber, Ltd.*, 411 S.W.3d 554, 556 (Tex. App.—Eastland 2013, no pet.). The TWDB may approve a regional water plan only after it has determined that all interregional conflicts involving that planning area have been resolved. Tex. Water Code § 16.053(h)(7)(A). The TWDB asserted that, for purposes of the state water plan, an interregional conflict under section 16.053(h) of the Water Code exists only when two regions are seeking the same source of water. 411 S.W.3d at 556 (citing TWDB's rules in effect at the time, 31 Tex. Admin Code § 357.10(15) (2012)). The court acknowledged the deference generally afforded to administrative agencies in interpreting statutes that they implement; however, it found that the legislature intended that concerns be addressed early in the water development process—and not simply be put off until later in the permitting phase, when bureaucratic inertia may have taken hold. 411 S.W.3d at 572, 574. The Water Code provides that the TWDB may approve a regional water plan only if, inter alia, "the plan is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources." Tex. Water Code § 16.053(h)(7)(C). The court found that impacts of a project on such resources could be the subject of interregional conflicts and as such should be addressed through the process for resolving such conflicts called for under section 16.053(h)(6). 411 S.W.3d at 573, 576.

Following the ruling, the TWDB began the process for resolving the Region C and Region D interregional conflict in 2013 with an unsuccessful attempt to negotiate a resolution through a facilitated mediation for the Region C and D regional water planning groups. *See* Order concerning the interregional conflict between the 2011 North Central Texas Regional Planning Area Regional Water Plan and the 2011 North East Texas Regional Planning Area Regional Water Plan in accordance with Tex. Water Code § 16.053, Findings 7 and 8 (Texas Water Development Board, Jan. 8, 2015) [hereinafter TWDB Order]. The matter was ultimately decided by the TWDB in January 2015, with a decision that the Marvin Nichols Reservoir Project be included in the Region C plan. *See* TWDB Order, Ordering Provision 1. The board noted the significant timber industry in Region D and also included findings that the reservoir would impact 5.2 percent of the wetlands, 2.4 percent of the bottomland hardwoods, 1.6 percent of the total timberland, and 0.76 percent of the prime farmland in Region D. *See* TWDB Order, Findings 30, 37, 47, and 48. However, the board also found that a new reservoir could stimulate the economy of the area through new recreational business and local improvements. TWDB Order, Finding 31. The board also noted the estimated annual economic value associated with Region C potential water shortages in year 2060 of more than $50 billion. TWDB Order, Finding 32. The TWDB concluded that the Region C 2011 Regional Water Plan, along with the additional analysis and quantification of impacts of the project on agricultural and natural resources of Region D provided by Region C, satisfied the statutory requirements. TWDB Order, Conclusion of Law 7.

D. Passing Inflows and Habitat Mitigation

1. *Passing Inflows to Meet Downstream Uses and Environmental Needs*

As with run-of-river water rights (those water rights that allow for the diversion but not the storage of stream flows), permits for reservoirs may include conditions requiring the passage of minimum stream flows to satisfy downstream domestic and livestock users, senior water rights, instream flow requirements, and estuarine requirements. *See* Tex. Water Code §§ 11.1351, 11.147; 30

Tex. Admin. Code §§ 297.44, 297.45, 297.55, 297.56, 297.59. In the event that the passage of all reservoir inflows does not meet downstream use and flow requirements, in general, no releases from water previously stored in the reservoir are required. *See, e.g.*, 30 Tex. Admin. Code § 304.21(c)(2), (3) (requiring that reservoir owners pass inflows but silent regarding stored water); Tex. Water Code § 11.053(b)(6); 30 Tex. Admin. Code § 36.5(b)(6) (prescribing that an emergency order under section 11.053 shall not require the release of water stored in a reservoir).

The owner of a dam is required to maintain a suitable outlet to ensure the passage of water the owner is not entitled to divert or impound. Tex. Water Code § 11.330. *See also* 30 Tex. Admin. Code § 295.186 (providing that the TCEQ may order the installation of a low-flow outlet in an existing dam); 30 Tex. Admin. Code § 297.59(b) (requiring outlets in proposed dams).

The TCEQ must also consider the need for fresh water inflows to Texas's estuaries for any permits within two hundred river miles of the coast. *See* Tex. Water Code § 11.147(b); 30 Tex. Admin. Code § 297.55. Furthermore, for reservoir projects within two hundred river miles of the coast on which construction began on or after September 1, 1985, and that are constructed with state financial participation, at least 5 percent of the annual firm yield is to be appropriated to the Texas Parks and Wildlife Department for releases to bays and estuaries and for instream uses. Tex. Water Code § 16.1331(a); 30 Tex. Admin. Code § 297.55(c). However, where the 5 percent value is not sufficient to meet the instream or bay and estuary needs, the commission may impose permit conditions with a greater impact on firm yield to meet those needs. 30 Tex. Admin. Code § 297.55(c). The TCEQ's process for determining appropriate environmental flow conditions for water rights permits is more fully discussed in Chapter 11 of this book.

2. *Habitat Mitigation*

In addition to the instream flow and estuarine needs, the TCEQ must review permit applications to impound or divert more than 5,000 acre-feet of state water per year for potential impacts on fish and wildlife habitats at the project site as well as upstream and downstream of the site and may require mitigation of adverse impacts. *See* Tex. Water Code § 11.152; 30 Tex. Admin. Code § 297.53(a), (c). An applicant may be required to mitigate unavoidable wetland loss to achieve "no net loss" of wetlands' functions including aquatic and wildlife habitat, water quality protection, flood control, erosion control, and groundwater recharge. 30 Tex. Admin. Code § 297.53(e). Mitigation for habitat loss is generally required to be on site and in-kind whenever possible. 30 Tex. Admin. Code § 297.53(f)(2), (4). Where on-site, in-kind habitat replacement is not possible, TCEQ rules require the mitigation to be in the same watershed and ecoregion. 30 Tex. Admin. Code § 297.53(f)(4). Habitat mitigation plans and agreements must be in the form of binding legal contracts, permit provisions, and detailed management plans, and the mitigation habitat must be managed in perpetuity by a party approved by the TCEQ. 30 Tex. Admin. Code § 297.53(f)(7).

E. Time Limits for Construction, Forfeiture, and Cancellation

A water rights permit that allows construction, modification, or repair of a reservoir must contain a condition setting a deadline by which construction must begin, which cannot exceed two years after the date the permit is issued. Tex. Water Code § 11.145(b); 30 Tex. Admin. Code § 297.51. The TCEQ may grant an extension of time upon payment of the required fees and a demonstration that reasonable diligence has been exercised toward commencement or completion of the project or there is other reasonable cause for delay or other reason why the permit should not be forfeited. Tex. Water Code § 11.145(b); 30 Tex. Admin. Code § 295.72. *See also* 30 Tex. Admin. Code § 295.138 (fees for extension); 30 Tex. Admin. Code § 295.159 (notice of application to extend). Reasonable diligence does not require unusual or extraordinary effort; however, it does require the showing of a good-faith attempt to proceed with the permitting process. 30 Tex. Admin. Code § 295.72(b). Reasonable causes for delay include legal proceedings or other causes that were not within the reasonable control of the permittee and that were reasonably unforeseeable at the time the water right was granted by the commission. 30 Tex. Admin. Code § 295.72(b). Generally speaking, financial hardship is not, by itself, sufficient to support a request for an extension. 30 Tex. Admin. Code § 295.72(b).

Generally, if construction is not begun within the time frame required by the permit and no extension is granted, a permit is subject to forfeiture. *See* Tex. Water Code § 11.146(a); 30 Tex. Admin. Code §§ 297.51, 297.74(a). However, a permit for construction of a reservoir designed for storage of more than 50,000 acre-feet of water is not subject to forfeiture for failure to timely commence or complete construction. Tex. Water Code § 11.146(g); 30 Tex. Admin. Code § 297.74(d).

Water rights are generally subject to cancellation if all or part of the water authorized is not put to beneficial use during a ten-year period and the water rights holder has not used reasonable diligence or is otherwise unjustified in the nonuse. *See* Tex. Water Code §§ 11.173(a), 11.177(a); 30 Tex. Admin. Code § 297.71. However, cancellation does not apply to water rights obtained as the result of the construction of a reservoir funded by the water right holder as part of the holder's long-term water planning. Tex. Water Code § 11.173(b)(4); 30 Tex. Admin. Code § 297.71(b)(6). In the event of a cancellation of diversion rights for nonuse, the TCEQ may allow the holder of the water right to retain the impoundment for domestic, livestock, or recreation purposes. *See* Tex. Water Code § 11.183. In any event, cancellation of water rights is rare.

II. Exempt Reservoirs

As mentioned at the beginning of this chapter, certain categories of reservoirs are exempt from obtaining a water rights permit. This section discusses exemptions for domestic and livestock ponds, wildlife management, sediment control related to surface-mining operations, spreader dams, and contouring and terracing and concludes with a discussion of the use of exempt reservoirs for nonexempt purposes.

A. Domestic and Livestock Ponds

As discussed in Chapter 3 of this book, the use of state water for domestic and livestock purposes is generally exempt from state water rights administration—specifically, permitting. With regard to reservoirs, the Texas legislature has specifically exempted reservoirs used for these purposes (and other related but limited purposes, discussed below).

1. Storage Capacity

A person may construct on his own property a dam or reservoir with up to two hundred acre-feet of normal storage and use that reservoir for domestic and livestock purposes without obtaining a permit from the TCEQ. Tex. Water Code § 11.142(a); 30 Tex. Admin. Code § 297.21(b). For purposes of this exemption, "normal storage" means the *conservation storage* of the reservoir—that is, the amount of water the reservoir can hold before water is released uncontrolled through a spillway or into a standpipe. 30 Tex. Admin. Code § 297.21(b). A person may temporarily store more than two hundred acre-feet of water in a reservoir that has a normal storage of more than two hundred acre-feet without triggering the permit requirement if the person can demonstrate through records maintained by the owner that the person has not stored in the reservoir more than two hundred acre-feet of state water on average in any twelve-month cycle. 30 Tex. Admin. Code § 297.21(b).

2. *Rights to Divert and Location*

Texas courts interpreted a prior version of the domestic and livestock exemption statute to allow a person not only to construct a reservoir or dam but also to divert and use the stored water for domestic and livestock purposes without obtaining a permit. In *City of Anson v. Arnett*, 250 S.W.2d 450, 452–53 (Tex. Civ. App.—Eastland 1952, writ ref'd n.r.e.), the court found that, although the statute did not specify that the water impounded could be used (i.e., diverted from the reservoir) without a permit, the legislature intended for the impounded water to be used and not simply impounded in the reservoir. This is reflected in the TCEQ rules. *See* 30 Tex. Admin. Code § 297.21(a).

Under TCEQ regulations, exempt domestic and livestock reservoirs may be on-channel, adjacent to the stream, or on a contiguous piece of property through which flows the stream from which the water is diverted. 30 Tex. Admin. Code § 297.21(b). Thus, a person may divert water from an adjacent watercourse to fill an exempt impoundment, and the diversion is also exempt from permitting. Whether this rule simply codifies Arnett or expands the statutory exemption beyond the legislature's intent is an unsettled question.

However, this exemption from permitting does not apply to a reservoir built on a navigable stream. *See* 30 Tex. Admin. Code § 297.21(c). "Navigable stream" is defined in a separate code as "a stream which retains an average width of 30 feet from the mouth up." Tex. Nat. Res. Code § 21.001(3).

In *Garrison v. Bexar-Medina-Atascosa Counties Water Improvement District No. 1*, 404 S.W.2d 376, 377 (Tex. Civ. App.—Austin 1966, writ ref'd n.r.e.), the court held that a landowner's dam and impoundment of water on the west prong of the Medina River did not fall within the provisions of the predecessor to section 11.142. The court held that all titles to riverbeds vesting in individual grantees are subject to the rights reserved by the state in the beds of statutory navigable streams or watercourses under the public policy and laws of the state. 404 S.W.2d at 380 (citing *State v. Bradford*, 50 S.W.2d 1065, 1076 (Tex. 1932)). The Medina River was a navigable stream; thus, its bed and banks did not constitute the landowner's "own property" on which he could construct a reservoir. 404 S.W.2d at 377. A landowner who constructs a dam on a navigable stream, even if such dam enables him to divert water into his exempt off-channel reservoir, is thus not exempt from permitting requirements for the on-channel dam.

3. *Uses*

Domestic and livestock exempt reservoirs cannot be used for a commercial operation, and the use of land for livestock purposes is not a commercial operation. 30 Tex. Admin. Code § 297.21(b). Thus, a livestock operation, even when undertaken for commercial purposes, enjoys the benefit of the domestic and livestock reservoir exemption. Furthermore, the use of a domestic and livestock reservoir by free-ranging wild game and fur-bearing animals that may be harvested by hunters and trappers who pay a fee or other compensation to hunt or trap on the property will not result in a loss of exempt status. 30 Tex. Admin. Code § 297.21(d). Additionally, the water may be used in making products from a family garden or orchard that are traded with a neighbor or used in a local bake sale or potluck dinner without risk of losing the exemption. 30 Tex. Admin. Code § 297.21(d).

Finally, to protect the availability of water for municipal purposes, under certain circumstances, the domestic and livestock exemption is not available for lands located within 5,000 feet of where the shoreline of a lake would be if filled to its storage capacity. *See* Tex. Loc. Gov't Code § 272.001(h); 30 Tex. Admin. Code § 297.21(b).

4. Comparison to Riparian and Adjudicated Rights

Important differences exist between the common-law riparian right, discussed in Chapter 3 of this book, and the exempt domestic and livestock storage right. Whereas riparian rights originated in court decisions, exempt reservoirs are a statutory creation. The earliest statutory measure authorizing the construction of storage reservoirs for domestic use is found in the 1889 Irrigation Act, further refined in the 1895 Act. Act of Mar. 26, 1889, 21st Leg., R.S., ch. 88, § 10; Act of Mar. 9, 1895, 24th Leg., R.S., ch. 21, § 10. Since that time, the Texas legislature has amended the statutory exemption numerous times, changing the allowed amount of storage from fifty to as much as five hundred acre-feet. *See, e.g.*, Timothy L. Brown, *A Review of the Development of Texas Water Law*, F-15-16, CLE International Conference on Texas Water Law, Austin, Texas (Oct. 15–16, 2001) (detailing multiple amendments concerning the storage right).

As a general matter, TCEQ rules nowhere indicate that an exempt domestic and livestock reservoir owner has any right, vested or otherwise, to force an upstream adjudicated right holder or riparian user to pass flows downstream so that the exempt user can fill his reservoir. *See generally* 30 Tex. Admin. Code § 304.21. By contrast, when available flow is insufficient to meet the demands for riparian domestic and livestock purposes, a watermaster or a court may order persons with exempt domestic and livestock reservoirs or certificated or permitted water rights to pass flows for the benefit of the downstream riparian domestic and livestock users. 30 Tex. Admin. Code § 304.21(c)(3). Domestic and livestock reservoirs in place prior to the state's first permitting scheme established in 1913 *may* be similar in character to common-law riparian rights and have some right that is, indeed, superior to formally adjudicated water rights. Such right could be limited to the capacity and under the terms specifically allowed under either the 1889 or 1895 statutes, depending on when the reservoir was constructed. For all other exempt reservoirs, however, one can argue that the domestic and livestock storage exemption is not a superior right. Rather, most of these users are simply exempt from the filing, reporting, and permitting requirements imposed through the water rights adjudication process.

Even if exempt domestic and livestock reservoir owners cannot call on upstream users to pass inflows, they clearly have special rights. For instance, they can store or use water regardless of the impacts on downstream adjudicated water right holders. *See* Tex. Water Code § 11.142(a) (containing no requirements for passing water through the exempt reservoir to honor downstream appropriative (senior) water rights). The TCEQ's watermaster rules do require an exempt domestic and livestock reservoir to pass flows to downstream riparian domestic and livestock users but are notably silent as to the exempt domestic and livestock reservoir owner's obligation to pass flows to downstream appropriative rights holders or permit holders. *See* 30 Tex. Admin. Code § 304.21(c)(3); *see also* 25 Tex. Reg. 8971 (2000) (acknowledging that section 11.142 does not require reasonable use or the passage of inflows).

Unlike the riparian domestic and livestock user, the exempt domestic and livestock reservoir users are nowhere limited by statute or rule to use only the normal and ordinary flow of the river. Rather, one could argue that this exemption allows a person to store any "state water" on his property, even floodwaters. *See* Tex. Water Code § 11.021(a) (stating that "[t]he water of any ordinary flow, underflow and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state is the property of the state"). Furthermore, section 11.142 lacks any specific time limitations during which one must exercise the right, so termination of the exemption for nonuse is not an issue. *See* Tex. Water Code § 11.142(a).

5. Domestic and Livestock Use from Unsponsored and Storage-Limited Projects

In some cases, a person may divert water for domestic and livestock purposes from storage-limited reservoirs that were constructed by the federal government but for which no permit has been issued or for which the permit allows storage only. *See* 30 Tex. Admin. Code § 295.81; *see also* Tex. Water Code § 12.051. Any TCEQ commissioner may issue a letter authorizing the diversion of water for such use. 30 Tex. Admin. Code § 295.182(a). This letter may contain conditions for diversion, and the authorization to divert may be revoked for failure to comply with the conditions, or when water becomes reasonably available from a water supply system. 30 Tex. Admin. Code § 295.182(b).

Although not entirely exempt from permitting requirements, no use fees are required for permit applications under these provisions. *See* 30 Tex. Admin. Code § 295.137. Moreover, permitting of such use is not subject to the same contested case hearing requirements that generally are applicable to water rights applications. *See* 30 Tex. Admin. Code § 295.174; *see also* 30 Tex. Admin. Code § 295.153(e) (notice is as deemed appropriate by the commission). Rather, in such case, the TCEQ may conduct such hearings as it deems appropriate. 30 Tex. Admin. Code § 295.174. The TCEQ will deny a request for domestic use from an unsponsored or unpermitted reservoir if the TCEQ determines that an existing water supply is reasonably available to the property. 30 Tex. Admin. Code § 297.32.

B. Wildlife Management

In 2001, the Texas legislature expanded the reservoir exemption to include the use of a reservoir with normal storage of up to two hundred acre-feet per year for certain wildlife and fish management purposes. *See* Tex. Water Code § 11.142(b); 30 Tex. Admin. Code § 297.21(e). The TCEQ defines "normal storage" for purposes of this exemption as "the *conservation storage* of the reservoir, i.e., the amount of water the reservoir may hold before water is released uncontrolled through a spillway or into a standpipe." 30 Tex. Admin. Code § 297.21(e).

In fact, the legislature actually enacted two statutes on the subject, which provide that—

> [w]ithout obtaining a permit, a person may construct on the person's property a dam or reservoir with normal storage of not more than 200 acre-feet of water for fish and wildlife purposes if the property on which the dam or reservoir will be constructed is qualified open-space land, as defined by Section 23.51, Tax Code. This exemption does not apply to a commercial operation.

Tex. Water Code § 11.142(b) (as added by Act of May 27, 2001, 77th Leg., R.S., ch. 966, § 2.09); and that—

> [w]ithout obtaining a permit, a person may construct on the person's property in an unincorporated area a dam or reservoir with normal storage of not more than 200 acre-feet of water for commercial or noncommercial wildlife management, including fishing, but not including fish farming.

Tex. Water Code § 11.142(b) (as added by Act of May 28, 2001, 77th Leg., R.S., ch. 1427, § 1). The TCEQ promulgated rules that attempt to reconcile these differences. Thus, to claim an exemption, TCEQ rules require that—

1. the reservoir be used for either: (a) wildlife management, as that term is defined in Tax Code section 23.51(7), or (b) fish management purposes, excluding aquaculture or fish farming;

2. the property must qualify as open-space land, as defined by Tax Code section 23.51; and

3. the reservoir not be used for a "commercial operation," defined by rule as "use of land for industrial facilities, industrial parks, aquaculture facilities, fish farming facilities, or housing developments."

30 Tex. Admin. Code § 297.21(e).

As to the first requirement, Texas Tax Code section 23.51(7) defines "wildlife management" as—

> actively using land that at the time the wildlife-management use began was appraised as qualified open-space land . . . in at least three of the following ways to propagate a sustaining breeding, migrating, or wintering population of indigenous wild animals for human use, including food, medicine, or recreation:
>
> i. habitat control;
>
> ii. erosion control;
>
> iii. predator control;
>
> iv. providing supplemental supplies of water;
>
> v. providing supplemental supplies of food;
>
> vi. providing shelters; and
>
> vii. making of census counts to determine population
>
> . . . .

Tex. Tax Code § 23.51(7). For land to be "qualified open-space land," it must currently be devoted principally to agricultural use (which, for purposes of the statute, includes use for wildlife management) to the degree of intensity generally accepted in the area, and it must have been devoted principally to agricultural use or to the production of timber or forest products for five of the preceding seven years. *See* Tex. Tax Code § 23.51(1), (2).

Finally, TCEQ rules provide that the incidental use of the reservoir in a manner that does not remove the land from the definition of "qualified open-spaced land" will not require a permit. *See* 30 Tex. Admin. Code § 297.21(e) (noting that using a photograph of the reservoir in advertising does not convert an otherwise exempt reservoir into a reservoir requiring a permit).

Some have argued that the TCEQ's reconciliation of the legislation has limited the scope and availability of the exemption more than was intended by lawmakers. In one suit, a property owners association sought to claim that the exemption applied to an existing previously exempt domestic and livestock reservoir that was now located within a ranch-turned-residential subdivision where the property on which the pond is located was owned by the property owners association. *Spring Lake Owners' Ass'n, Inc. v. Texas Natural Resource Conservation Commission*, Cause No. 53,727-A in Randall County, Texas (filed Nov. 7, 2003). In settlement of this dispute, the association agreed to obtain a water rights permit without admitting that such permit was legally required. *See* Water Rights Permit No. 5845 (available at TCEQ Central Records). To date, therefore, whether the wildlife management exemption provides a loophole for land developers to obtain free aesthetic enhancement of their commercial and residential developments remains unresolved.

C. Sediment Control: Mining

Another limited exemption applies to reservoirs constructed or maintained for sediment control as part of a surface coal mining operation under the Texas Surface Coal Mining and Reclamation Act (codified at Texas Natural Resources Code chapter 134). *See* Tex. Water Code § 11.142(d); 30 Tex. Admin. Code § 297.27(b) (also exempting use for fire and dust suppression).

D. Spreader Dams, Contouring, and Terracing

Although not expressly exempt by the water rights statutes, certain agricultural practices that are primarily aimed at capturing diffuse surface water and controlling erosion are exempt from water rights permitting by TCEQ rules. Specifically, the rules exempt contouring, terraces, spreader dams, and other such practices designed to maximize the beneficial use of diffused surface water and overbank flooding and to implement any generally accepted conservation practices necessary to prevent or reduce erosion on one's own property. *See* 30 Tex. Admin. Code § 297.23.

E. Use of Exempt Reservoir for Nonexempt Purposes

The owner of a reservoir that is exempt under Texas Water Code section 11.142(a) or (b) may apply for a regular, seasonal, or term permit from the TCEQ to use the stored water for purposes other than the exempt uses. *See* Tex. Water Code § 11.143(a), (b); *see also* 30 Tex. Admin. Code §§ 295.51, 295.126, 297.15. The owner may elect to obtain the permit under section 11.143 or under the other provisions of chapter 11, such as section 11.124, which are discussed in more detail in Chapter 9 of this book, which addresses surface water rights permitting. Tex. Water Code § 11.143(a). A permit requested under section 11.143 must comply with notice and hearing processes and pay fees. *See* Tex. Water Code § 11.143(d)–(h); 30 Tex. Admin. Code § 295.153(c), (d). The TCEQ may act on the application without holding a public hearing only if certain public notice requirements are satisfied and no hearing is requested. *See* Tex. Water Code § 11.143(d).

The TCEQ may approve an application under section 11.143 only if it determines that—

1. there is unappropriated water in the source of supply;
2. the applicant has met the application and notice requirements of section 11.143;
3. the water is to be used for a beneficial purpose;
4. the proposed use is not detrimental to the public welfare or to the welfare of the locality; and
5. the proposed use will not impair existing water rights.

See Tex. Water Code § 11.143(i).

III. Selected Issues

In addition to the permitting requirements to store or divert water discussed above, additional TCEQ requirements apply when water is used at a location not specified in the permit. This section provides an overview of those requirements. This section also addresses littoral claims to water in a reservoir, limitations on hydropower generation, issues associated with storage of groundwater in reservoirs, and a new requirement for the sale of lakefront property. See also Chapter 9 of this book.

A. Bed and Banks Transport from Reservoirs

Subject to TCEQ rules, a reservoir owner may use the bank and bed of any flowing natural stream in Texas to convey water from the reservoir to the place of use or to the diversion point downstream. *See* Tex. Water Code § 11.042(a); 30 Tex. Admin. Code § 297.91. This authorization may be obtained as part of the initial permitting of the reservoir or as a separate authorization. See Chapter 9 of this book.

TCEQ rules require the seller or purchaser of conveyed stored water to file with the TCEQ a copy of the purchase contract and a written statement of the intended transit of the water, giving the details of the proposed transport and use of the water. *See* 30 Tex. Admin. Code § 295.111(a). The statement must include, inter alia, the method for measuring and accounting for the water released and subsequently diverted such that only the water being released is diverted at the point of delivery, less the amount of water lost to transportation, evaporation, seepage, channel, or other associated carriage losses from the point of release to the point of delivery. *See* 30 Tex. Admin. Code § 295.111(a). Exceptions to these requirements are made only in an emergency or if a separate TCEQ order exists. *See* 30 Tex. Admin. Code §§ 295.111(b), 297.91.

Water that is released from storage for delivery downstream is protected to its intended diversion location against the willful taking, diversion, appropriation, or interference by others. Tex. Water Code § 11.091; 30 Tex. Admin. Code § 297.94. To ensure this, once a bed and banks application is granted, the TCEQ sends notice to each diverter of record on the watercourse between the origin and terminus of the transit. 30 Tex. Admin. Code § 295.160.

Typically, delivery of water from a reservoir using the bed and banks of a watercourse is sought pursuant to a contract between the reservoir owner and a downstream customer. The TCEQ may require the alteration or amendment of any such contract for the transportation of water if it finds the change is necessary to protect vested rights or prevent the undue loss of water. 30 Tex. Admin. Code § 297.92. Furthermore, a reservoir owner who is releasing water for downstream customers may not allow the water to overflow the banks of any stream, nor may he interfere with those who have a lawful right to the use of that rate of flow of the stream that would prevail in the absence of the water in transit. 30 Tex. Admin. Code § 297.93. The order issued by TCEQ authorizing the transport must include a flow rate of delivery to be determined by the TCEQ, and all interested parties must be notified of the rate. *See* 30 Tex. Admin. Code § 297.92–.93. Furthermore, the water released for downstream use must be of a quality that will not affect adversely or harmfully the quality of water in the stream or in storage below. 30 Tex. Admin. Code § 297.93.

B. Downstream Water Sales from Reservoirs

A reservoir owner who contracts to sell water from a reservoir to a downstream user must make releases of water to the extent of the purchaser's downstream diversions within the limits of the supplier's water rights or the contract. 30 Tex. Admin. Code § 297.103(a). However, a seller is not required to release water to satisfy contractual obligations when such release would aggravate existing flooding conditions; but the purchaser may divert water during such conditions pursuant to the contract. 30 Tex. Admin. Code § 297.103(a)(1). The conditions under which this could occur may be included in any contractual permit issued by the TCEQ. 30 Tex. Admin. Code § 297.103(a)(2).

Generally speaking, contracts for downstream water sales should include provisions for water transportation and evapotranspiration losses from the reservoir to the downstream point of diversion. If a contract is silent on this issue, and it is a contract that must be filed with the TCEQ, the supplier must bear such losses. 30 Tex. Admin. Code § 297.103(c). See Chapter 31 of this book for a discussion of wholesale water suppliers.

C. Upstream Water Sales from Reservoirs

A supplier may also contract with a user upstream of the reservoir to allow the user to divert water upstream of a supplier's storage reservoir in a manner that would impair the supplier's water rights. In such cases, the purchaser or supplier must obtain a permit (or permit amendment) from the TCEQ to the extent of the purchaser's maximum annual diversions of water for the term of the contract. *See* 30 Tex. Admin. Code § 297.104. In considering an application for a permit based on an upstream water sale, the TCEQ may include conditions in the permit to address the impacts of the proposed sale on instream flows or water rights holders.

D. Littoral Rights and Artificial Reservoirs

As experienced by owners of large water supply reservoirs, many landowners around artificial reservoirs mistakenly believe that their land ownership entitles them to divert and use water from the reservoir. In fact, such landowners are unlikely to have any legal right to use water from the reservoir unless the landowner has a contract for water from the person or entity that holds the water rights to the reservoir. For a lakefront property owner to establish that his land is vested with rights to divert and use the water for his own domestic and livestock purposes, he must (1) be able to trace his title back to a grant from the sovereign between 1823 and 1895 or present a certificate of adjudication from the state and (2) establish that his land, as granted in the deed, borders a natural lake with a "normal flow" of water. *Cummins v. Travis County Water Control & Improvement District No. 17*, 175 S.W.3d 34, 45 (Tex. App.—Austin 2005, pet. denied). In *Cummins*, the court held that the landowners had no riparian or littoral right to place a dock over the lake (or use the water for domestic purposes) because their title failed to originate before 1895, and the waters filling Lake Travis were not "normal flow" but were instead floodwaters.

E. Limitations on Hydroelectric Generation

In some instances, the Texas legislature has limited the use of reservoirs for hydroelectric generation. For example, the Lower Colorado River Authority's enabling statute expressly subordinates the authority's rights to impound waters of the Colorado River and its tributaries for the generation of hydroelectric power to the rights of certain municipalities and other political subdivisions to build dams or impound floodwaters for municipal or domestic purposes. *See* Tex. Spec. Dist. Code § 8503.005(b). Furthermore, some water rights restrict water rights holders from making releases solely for hydroelectric generation purposes except under emergency or other very limited conditions.

F. Groundwater and Reservoirs

A discussion of reservoirs is incomplete without some mention of the role groundwater may play. As discussed in Chapter 4 of this book, the use of groundwater is governed either by chapter 36 of the Texas Water Code and local groundwater conservation districts (GCDs) or by the common-law principles, such as the rule of capture and other court decisions. The storage of groundwater in reservoirs can trigger local regulation by a GCD and also, in the case of on-channel reservoirs, require state water rights permitting under section 11.042 of the Texas Water Code. In basins where no state water is available for appropriation, the TCEQ will require a permittee who wishes to maintain an on-channel reservoir for nonconsumptive purposes (e.g., recreation or aesthetic enhancement of a housing subdivision) to pass all inflows and make up for evaporative losses with another source of supply. Often, permittees will turn to groundwater as their alternative source of supply to keep the reservoir full. Whether the use of groundwater to make up for evaporative losses can be authorized under local GCD rules will be determined on a case-by-case basis in accordance with the specific rules of each district. See Chapter 16 of this book.

G. Disclosure Requirement for Sale of Lakefront Property

In 2015, the legislature added a new requirement that the seller of lakefront property on a reservoir impounding at least 5,000 acre-feet disclose to a potential buyer that the lake level fluctuates as a result of the use of the water stored in the reservoir or drought or flood conditions. Tex. Prop. Code § 5.019.

IV. Federal Considerations for Reservoirs

Although the focus of this book is on Texas state water rights law, this chapter identifies a few of the more significant federal regulatory requirements that may be triggered as a result of a reservoir project. The discussion makes no attempt to provide the level of detail that would be required to comply with these requirements. Rather, the intent is to provide the reader with a general understanding of these requirements. Additional discussion of many of these considerations is found in other chapters in this book, as referenced below.

Section 404 permitting by the U.S. Army Corps of Engineers applies to any project that will discharge dredge or fill material into waters regulated by the Clean Water Act and thus is often triggered by reservoir construction. Section 404 permitting is discussed generally in the context of a water supply project in Chapter 2 and in further detail in Chapter 35.

Section 401 of the Clean Water Act requires that any project that may cause a discharge into waters of the United States and seeking a federal permit, whether for construction or operation, must first obtain state certification that the project will comply with all effluent limitations and water quality standards imposed by the state in which the discharge will occur. The Supreme Court has made clear that section 401 certification requirements apply to dams and reservoirs. *See S.D. Warren Co. v. Maine Board of Environmental Protection*, 547 U.S. 370 (2006). Section 401 is discussed generally in the context of water supply projects in Chapter 2 and in greater detail in Chapter 34.

Any reservoir project that involves a federal permit will likely trigger the requirements of the National Environmental Policy Act (NEPA). Section 102 of NEPA requires all federal agencies to assess and quantify in a systematic, interdisciplinary manner the environmental impact of any proposed federal action (e.g., issuance of a permit) that has the potential to significantly affect the quality of the human environment. NEPA is discussed in more detail in Chapter 2.

If a reservoir project is to be "authorized, funded, or carried out" by any federal agency, under section 7 of the Endangered Species Act (ESA), the federal agency must consult with the U.S. Fish and Wildlife Service to ensure that the action is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. *See* 16 U.S.C. § 1536(a)(2). The ESA also requires that any project that will "take" an endangered species must obtain an incidental take permit. *See* 16 U.S.C. § 1539(a)(1)(B). "Take" is defined broadly to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19). The ESA is discussed in greater detail in Chapter 32.

V. FERC Jurisdiction

If the dam to be constructed as part of the reservoir project will include hydroelectric facilities, one must determine whether jurisdiction under the Federal Energy Regulatory Commission (FERC) is triggered. FERC has authority under the Federal Power Act (FPA) to license and relicense certain hydroelectric facilities. *See* 16 U.S.C. §§ 791a–823d, as amended by the Electric Consumers Protection Act of 1986, Pub. L. No. 99-495 (1986), and the Energy Policy Act of 1992, Pub. L. No. 102-486 (1992). FERC may issue a license to operate a hydroelectric facility upon satisfaction of certain criteria. *See generally* 16 U.S.C. § 797(e) (FPA § 4(e)). The license is valid for up to fifty years. *See* 16 U.S.C. § 799 (FPA § 6). Upon expiration of the license, one of several things can happen: the licensee can apply for relicense, another entity can apply for a license to operate the facility, FERC itself may take over operations, FERC may issue a "non-power" license, or FERC may decommission the facility. *See* 16 U.S.C. §§ 807, 808 (FPA §§ 14, 15) (decommissioning is considered in detail in FERC Docket No. RM93-23.000: Policy Statement—Project Decommissioning and Relicensing, 60 Fed. Reg. 339 (Jan. 4, 1995)).

The Hydropower Regulatory Efficiency Act of 2013, Pub. L. No. 113-23, 127 Stat. 493, recognized that only three percent of the 80,000 dams in the United States generate electricity and directed FERC to investigate the feasibility of issuance of hydropower licenses at nonpowered dams and closed loop pump storage projects in a two-year period. In seeking a pilot project, FERC identified the following minimum criteria, inter alia, for projects that may be appropriate for this licensing process: the project must cause little to no change to existing surface water and groundwater flows and uses; the project must not adversely affect federally listed threatened and endangered species; and, if located at a federal dam, the request must include a letter from the dam owner stating that the plan is feasible. Press Release, Federal Energy Regulatory Commission, Notice Soliciting Pilot Projects to Test a Two-Year Licensing Process (Jan. 6, 2014), *available at* www.ferc.gov/media/news-releases/2014/2014-1/AD13-9-000.pdf. A pilot project is underway for a proposed five megawatt project in Kentucky. Press Release, Federal Energy Regulatory Commission, FERC Approves Pilot Project to Test Two-Year Hydropower Licensing Process (Aug. 5, 2014), *available at* www.ferc.gov/media/news-releases/2014/2014-3/08-05-14.asp#.VLa13s7nYZE.

Of specific interest with regard to state water rights is FERC's authority to impose conditions related to environmental considerations, because this authority has the potential to conflict with the TCEQ's determinations on this subject. The FPA mandates FERC to give environmental concerns equal consideration to developmental concerns. It also specifically requires FERC to issue licenses with environmental protection conditions, although FERC has some discretion in how it will protect and mitigate the environmental concerns. It is not uncommon for FERC conditions to impose water quality conditions, including minimum stream flow requirements.

Specifically, the FPA mandates FERC to consider environmental concerns in evaluating license applications:

> In deciding whether to issue any license under [the FPA] for any project, the Commission, in addition to the power and development purposes for which licenses are issued, shall give *equal consideration* to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and

> habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.

16 U.S.C. § 797(e) (FPA § 4(e)) (emphasis added); *see also PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700, 722 (1994); *Platte River Whooping Crane Critical Habitat Maintenance Trust (I) v. FERC*, 876 F.2d 109, 118 (D.C. Cir. 1989) ("[Section 4(e)] is important because it is intended that FERC give these nondevelopmental values the same level of reflection as it does to power and other developmental objectives."). Thus, through the FPA, Congress has declared that protecting habitat is an important priority in issuing licenses.

The FPA mandates FERC to impose conditions to protect fish and wildlife. These conditions may be based on recommendations from the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Services (NMFS), and state fish and wildlife agencies as conditions on the license. 16 U.S.C. § 803(j) (FPA § 10(j)). To comply with section 10(j), FERC accepts recommendations from the relevant agencies during the application process. *See* Federal Energy Regulatory Commission, *Handbook For Hydroelectric Project Licensing* 3.2.6 (2004). If FERC decides not to impose the recommendations and instead to impose its own conditions, it must show that the agency recommendation is inconsistent with the FPA or other applicable law and that the FERC conditions adequately protect fish and wildlife. 18 C.F.R. § 4.34(e). Thus, FERC is not obligated to incorporate every recommendation proposed by the relevant agencies. *See American Rivers v. FERC*, 201 F.3d 1186, 1202–03 (9th Cir. 2000); *National Wildlife Federation v. FERC*, 912 F.2d 1471, 1480 (D.C. Cir. 1990). FERC must publish findings explaining its rejection of section 10(j) recommendations, and FERC must afford "*significant* deference" to the agencies' recommendations. *See American Rivers*, 201 F.3d at 1205 (citing *Kelley v. FERC*, 96 F.3d 1482, 1486 (D.C. Cir. 1996)).

Section 10(j) also provides authority for FERC to impose water quality conditions as part of the licensing process. *See, e.g., Platte River Whooping Crane Critical Habitat Maintenance Trust (II) v. FERC*, 962 F.2d 27 (D.C. Cir. 1992) (upholding FERC condition imposing minimum and maximum flow conditions to maintain whooping crane habitat); *United States Department of Interior v. FERC*, 952 F.2d 538 (D.C. Cir. 1992) (upholding FERC conditions imposing minimum dissolved oxygen levels and other conditions to protect water quality and fish habitat); *Platte River Whooping Crane Critical Habitat Maintenance Trust (I)*, 876 F.2d 109 (ordering FERC to consider release schedule or other possible conditions for annual license to protect whooping crane habitat).

FERC has broad discretion to impose conditions on licenses. 16 U.S.C. § 803(g) (FPA § 10(g)). "Congress intended by Section 10(g) 'to give the Commission wide latitude and discretion in the performance of its licensing and regulatory functions.'" *Pennsylvania Department of Environmental Resources v. FERC*, 868 F.2d 592, 597–98 (citing *Metropolitan Edison Co. v. F.P.C.*, 169 F.2d 719 (3d Cir. 1948)).

FERC also must "require the construction, maintenance, and operation by a licensee at its own expense of . . . such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate." 16 U.S.C. § 811 (FPA § 18). Items that qualify as fishways "are limited to physical structures, facilities, or devices necessary to maintain all life stages" of migrating fish. Energy Policy Act of 1992, Pub. L. No. 102-486, § 1701(b), 106 Stat. 3008 (amending the Federal Power Act to add environmental protection and other provisions). FERC has no discretion to reject fishway conditions imposed by the secretaries. *See Escondido Mutual Water Co. v. La Jolla Band of Mission Indians*, 466 U.S. 765, 779 n.21 (1984) ("The ultimate decision whether to issue the license belongs to the Commission, but the Secretary [of the Interior]'s proposed conditions must be included if the license issues. Any conflict between the Commission and the Secretary with respect to whether the conditions are consistent with the state must be resolved initially by the courts of appeals, not the Commission."); *see also American Rivers*, 201 F.3d 1186.

As with the Clean Water Act, the FPA expressly states that it does not affect state water allocation. 16 U.S.C § 821 (FPA § 27). The U.S. Supreme Court, however, has upheld conditions that impose minimum flow rates, concluding that these fall *outside* of the state water allocation jurisdiction. *See California v. FERC*, 495 U.S. 490 (1990); *First Iowa Hydro-Electric Cooperative v. Federal Power Commission*, 328 U.S. 152 (1946). In *First Iowa*, the Supreme Court held that the FPA essentially preempts state law with respect to hydroelectric facilities. Although section 27 preserves state control over appropriation, control, and diversion of water, this is a limited reservation that applies only to proprietary rights. *First Iowa*, 328 U.S. at 176. In *California*, the Court further narrowed state jurisdiction by holding that section 27 does not retain for states paramount authority to set minimum flow rates. The Court held that "California's minimum stream flow requirements neither reflect nor establish 'proprietary rights' or 'rights of the same nature as those relating to the use of water in irrigation or for municipal purpose.'" *California*, 495 U.S. at 498 (quoting *First Iowa*, 328 U.S. at 176).

CHAPTER 29

Drinking Water Supply Issues: Water Utilities—CCNs and Rates

Leonard H. Dougal[1] and Cassandra Quinn[2]

Drinking water in Texas is supplied by a variety of retail public utilities. Although these entities have a similar purpose—to provide retail water service—their structures and powers differ. This chapter begins with a description of the types of retail public utilities that provide water service. The chapter next discusses certificates of public convenience and necessity, which delineate the service territory of a retail public utility and are required for some, but not all, retail public utilities. Also included is a discussion of the rates and fees that different retail public utilities use to support water service and the level at which these rates and fees are supervised. The various methodologies for developing the rates and fees are beyond the scope of this chapter. Further, as discussed in section I.B below, it should be noted that much of the regulatory authority described in this chapter was transferred from the Texas Commission on Environmental Quality (TCEQ) to the Public Utility Commission (PUC) on September 1, 2014.

I. Types of Utilities

A. Historical Background of Water Utility Regulation in Texas

Comprehensive regulation of water utilities in Texas began in 1975 with the passage of the Public Utility Regulatory Act (PURA). *See* Act of June 2, 1975, 64th Leg., R.S., ch. 721 (codified at Tex. Util. Code §§ 11.001–66.016). Enactment of PURA was based on the legislature's recognition that public utilities are by definition monopolies in the areas they serve, necessitating state regulation of their rates and service policies. PURA created the PUC and charged it with implementing regulations for electric, gas, telephone, water, and sewer utilities. Jurisdiction over retail public utilities providing

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water supply and sewer services was later transferred from the PUC to the Texas Water Commission (a predecessor agency of the TCEQ). Act of May 25, 1985, 69th Leg., R.S., ch. 795. Texas Water Code chapter 13 was enacted to regulate retail public water utilities. Chapter 13's primary purpose is to "establish a comprehensive regulatory system that is adequate to the task of regulating retail public utilities to assure rates, operations, and services that are just and reasonable to the consumers and to the retail public utilities." Tex. Water Code § 13.001(c).

B. Transfer of Utility Oversight from TCEQ to PUC

During the 83rd legislative session in 2013, the Texas legislature enacted two bills to transfer certain duties of the TCEQ to the PUC, including oversight of water and wastewater rates, regulation of certificates of public convenience and necessity (CCNs), and review of certain transactions concerning water and wastewater systems. Act of May 14, 2013, 83d Leg., R.S., ch. 171 (S.B. 567); Act of May 14, 2013, 83d Leg., R.S., ch. 170 (H.B. 1600). The responsibility for ensuring safe drinking water remains with the TCEQ, as well as oversight of activities of water districts, including bond approvals and reviews of impact fees and standby fees. Much of the transfer was accomplished by amending chapter 13 of the Water Code to replace the term "commission," which refers to the TCEQ, with the newly defined term "utility commission," which refers to the PUC.

The impetus for the transfer was a recommendation by the Sunset Advisory Commission that the state could benefit from transferring regulatory functions related to water and wastewater utilities to the PUC. The Sunset Advisory Commission found that the PUC is well structured for utility oversight and ratemaking and that the benefits of the transfer included allowing the TCEQ to better focus on its core mission. In addition, consumer assistance would improve because with the transfer, authority to participate in water and wastewater utility cases would be given to the Office of Public Utility Counsel, an independent state agency that represents the interests of residential and small commercial consumers in PUC proceedings.

The transfer occurred on September 1, 2014. Before that date, the TCEQ and the PUC entered into a memorandum of understanding addressing the transfer. *See Memorandum of Understanding between the Texas Commission on Environmental Quality (TCEQ) and the Public Utility Commission (PUC)* (July 31, 2014), *available at* www.tceq.state.tx.us/assets/public/agency/puc-tceq-mou.pdf. To implement its newly acquired statutory authority, the PUC adopted the TCEQ's existing rules with minor changes. 39 Tex. Reg. 5920 (Aug. 1, 2014). Additional changes are expected as the PUC interprets the governing statutes and regulations and amends the rules applicable to water and wastewater utilities. *See* 40 Tex. Reg. 1607 (Mar. 20, 2015).

C. Types of Retail Public Utilities

Chapter 13 of the Texas Water Code establishes the authority of the PUC over various types of retail water providers in Texas. Because of the similarity and multiplicity of terms used in chapter 13, a practitioner must first master the definitions of the different types of water utilities to understand how the various provisions apply. The terms "water and sewer utility," "public utility," and "utility" are used interchangeably throughout chapter 13. They refer to what is commonly known as an investor-owned utility (an entity operated for profit), but the terms expressly exclude municipal corporations, political subdivisions of the state, and water supply and sewer service corporations. *See* Tex. Water Code § 13.002(23). The term "retail public utility" is much more expansive than the terms "water and sewer utility," "public utility," and "utility" and includes "any person, corporation, public utility, water supply or sewer service corporation, municipality, political subdivision or agency operating, maintaining, or controlling in this state facilities for providing potable water service or sewer service, or both, for compensation" without any limitation. Tex. Water Code § 13.002(19).

1. Municipalities

The definitions have important consequences for municipalities. A municipality is a "retail public utility," but not a "water and sewer utility," "public utility," or "utility." As a result, whether a provision of chapter 13 applies to a municipality depends on whether the provision applies to a "utility" or to a "retail public utility." For instance, Water Code section 13.242 requires a "utility" to obtain a CCN. Because a municipality is not a "utility," no CCN is required. *See* Tex. Water Code § 13.242.

Municipalities have broad statutory authority to provide water service inside and outside of their corporate limits. *See* Tex. Loc. Gov't Code § 402.001. The services provided by municipalities are subject to limited state oversight. In general, municipalities are not subject to the PUC's regulations regarding quality of service or customer service and protection, and they are not required to file their rates with the PUC. However, as with all public water systems, municipalities must comply with minimum health and sanitation requirements promulgated by the TCEQ under the authority of Texas Health & Safety Code chapter 341, subchapter C. *See generally* 30 Tex. Admin. Code ch. 290. See Chapter 30 of this book for a discussion of health and sanitation requirements for water suppliers.

As mentioned above, municipalities are not required to hold a CCN as a condition for providing or extending service unless the municipality extends service into an area currently served by another retail public utility. If a municipality chooses to obtain a CCN, the PUC's regulations pertaining to quality of service will apply. *See* 16 Tex. Admin. Code § 24.91. There is also limited state oversight of the rates and fees charged by a municipality. The PUC has no jurisdiction—not even appellate jurisdiction—over the rates charged by a municipally owned utility within the municipality's corporate boundaries. The PUC does have appellate jurisdiction over rates charged by a municipally owned utility outside of the municipality's corporate boundaries and the rates charged by an investor-owned utility operating within the municipality's boundaries. *See* Tex. Water Code § 13.043(b)(2), (3). Municipalities are authorized to assess impact fees but must comply with the provisions of Texas Local Government Code chapter 395, including the development of a capital improvements plan, the development of land use assumptions, and public hearings before the adoption or amendment of impact fees. *See* Tex. Loc. Gov't Code ch. 395, subch. C. The land use assumptions and capital improvements plan must be updated at least every five years thereafter. Tex. Loc. Gov't Code § 395.052. Municipalities are not authorized to assess standby fees. *See Graham v. City of Lakewood Village*, 796 S.W.2d 800, 804 (Tex. App.—Fort Worth 1990, writ denied).

If a municipality that provides retail water or sewer service to customers outside its boundaries changes its rates, it must provide individual written notice within sixty days after the final decision on the rate change to each affected ratepayer that is eligible to appeal who resides outside the municipality's boundaries. Tex. Water Code § 13.043(i). The notice must include, at a minimum, the effective date of the new rates, the new rates, and the location where additional information on rates can be obtained. 16 Tex. Admin. Code § 24.22(b). An appeal must be initiated by filing a petition with the PUC and the municipality within ninety days after the date of the municipality's final decision and must be signed by the lesser of 10,000 or 10 percent of the affected ratepayers. Tex. Water Code § 13.043(c).

If a ratepayer is a customer of a municipally owned utility and is within the corporate boundaries of the municipality, the person's initial recourse is to complain to elected council members. If dissatisfied by that response, the ratepayer has no recourse to the PUC and may seek to challenge the municipality's services or rates by a lawsuit in district court. However, the courts have determined that they play a limited oversight role. In one case where a ratepayer challenged a city's rates as discriminatory, the court concluded that determining whether differences in rates between classes of customers are to be made and, if so, the amount of the differences are legislative questions rather than judicial questions and are for the determination of the governing bodies of municipalities. *Gillam v. City of Fort Worth*, 287 S.W.2d 494, 497 (Tex. Civ. App.—Fort Worth 1956, writ ref'd n.r.e.). The presumption is in favor of the legality of the rates established by the rate-making authority, and courts may interfere only in cases of illegality. *Gillam*, 287 S.W.2d at 497.

a. Legislative Compromise in Enacting PURA

Today, the broad authority of municipalities within their corporate limits is a remnant of the larger regulatory function they historically performed. Before the enactment of PURA, municipalities played a major role in public utility regulation in Texas. *City of Sherman v. Public Utility Commission*, 643 S.W.2d 681, 683 (Tex. 1983). When statewide regulation was proposed, many municipalities were concerned that they could lose their power to franchise and regulate utilities and that municipally owned utilities could become state regulated. *City of Sherman*, 643 S.W.2d at 683 (citing Jack Hopper, *A Legislative History of the Texas Public Utility Regulatory Act of 1975*, 28 Baylor L. Rev. 777 (1976)). As a compromise, PURA retained municipal regulation of investor-owned utilities within the territorial boundaries of municipalities and exempted municipally owned utilities from most of PURA's regulatory provisions. *City of Sherman*, 643 S.W. 2d at 683. In *City of Sherman*, which was decided before jurisdiction over retail public utilities providing water and sewer services was transferred from the PUC to the predecessor of the TCEQ, the Texas Supreme Court concluded that the PUC had no jurisdiction to regulate the operations or services of municipally owned utilities. The court observed that the legislature clearly intended to exclude municipally owned utilities from PURA's jurisdictional requirements. *City of Sherman*, 643 S.W.2d at 684–88.

b. Municipal Regulation of Utilities Operating within Municipal Boundaries

Municipalities have broad authority to regulate investor-owned utilities that provide services within their boundaries. They possess exclusive original jurisdiction over the rates, operations, and services of "water and sewer utilities" operating within their corporate limits. Tex. Water Code § 13.042(a). Municipalities may yield their jurisdiction to the PUC, but they rarely do. If a municipality does not surrender its jurisdiction, local utility service within the boundaries of the municipality is exempt from the PUC regulations applicable to local service. *See* Tex. Water Code § 13.082. For service within its boundaries, a municipality has the right to exercise the same regulatory powers under the same standards and rules as the PUC or other standards and rules that are not inconsistent with them. A municipality may adopt its own rules relating to service and responses to requests for services for utilities that operate within its corporate limits, but if it does not do so, then the PUC's rules apply. A municipality exercising its jurisdiction over water and sewer utilities must require from those utilities all the data that are necessary to make a reasonable determination of rate base, expenses, investment, and rate of return within the municipal boundaries. Tex. Water Code § 13.083.

Often the governing body of a municipality will set the rates of an investor-owned utility at a level the utility believes is insufficient to recover its costs. In such a case, the utility (or any other party) may appeal the rate decision to the PUC, which will hear the appeal de novo. Tex. Water Code § 13.043(a). In addition, the ratepayers of an investor-owned utility who are located inside the corporate limits of the municipality and are under the municipality's jurisdiction may appeal decisions affecting their water, drainage, or sewer rates to the PUC. Tex. Water Code § 13.043(b)(2).

Municipalities also play a role in regulating general and special law districts that provide retail water utility services within their boundaries. In general, no district may provide services or facilities to serve areas outside the district that are also within the corporate limits of a municipality without securing a resolution or ordinance of the municipality granting consent for the district to serve the area within the municipality. Tex. Water Code § 49.215(a). If the resolution, ordinance, or agreement requires the district to purchase water or sewer service from the municipality, the district may appeal to the PUC the rates the municipality charges. The burden of proof is on the municipality to establish that the rates are just and reasonable. If the PUC must establish just and reasonable rates, then the municipality may not increase those rates without the agency's approval. 16 Tex. Admin. Code § 24.45.

For a special utility district (SUD) that operates within a municipality's corporate limits or extraterritorial jurisdiction, a municipality has authority to set construction standards for water system facilities to be built by the SUD. *See* Tex. Water Code § 65.016.

2. Districts and Other Political Subdivisions

Another common form of retail public utility is a political subdivision. Chapter 13 does not define "political subdivision"; however, throughout the Water Code a "political subdivision" typically includes a district or authority created under Texas Constitution article III, section 52, or article XVI, section 59. Although certain statutory schemes include nonprofit water supply and sewer service corporations (WSCs) in the broader definition of "political subdivisions" along with districts (*see, e.g.*, Tex. Water Code §§ 15.001(5), 16.001(7), 17.921(3), 36.001(15)), WSCs generally are not considered political subdivisions. Tex. Att'y Gen. Op. No. GA-0111 (2003).

a. Types of Districts

Texas has many types of districts. The most common ones that provide retail water service to residential customers include municipal utility districts (MUDs), water control and improvement districts (WCIDs), fresh water supply districts (FWSDs), special utility districts (SUDs), and river authorities such as the Lower Colorado River Authority and the Guadalupe-Blanco River Authority. See Chapter 7 of this book for a discussion of water districts.

Many districts are created by developers as financing vehicles to facilitate the development of land for various purposes, most commonly residential and commercial, including financing the construction of utility facilities for retail water services. *See* Anthony S. Corbett, *The Role of Water Districts in Extending Water Utilities*, *in Changing Face of Water Rights in Texas* (State Bar of Texas 2007). Creation of such districts commences with a developer selecting a suitable tract of land, preparing a feasibility study, surveying metes and bounds for the district's boundaries, and creating the district by approval of a county authority, by petition to the TCEQ, or by special act of the legislature. Once created, the district may be authorized to sell bonds to reimburse the developer for the costs of creating the district and the design and construction of, among other items, water and sewer infrastructure. In this regard, the developer is the major force behind the initial creation and organization of the district. The statutory provisions for automatic disqualification of directors in Texas Water Code section 49.052 recognize the relationship between developers and districts created to finance the developers' enterprises. Over time, a developer-created district becomes more like a conventional homeowners' association as residences are constructed and occupied and those residents begin to participate and vote in district elections.

Some districts are created for existing residential development, often by special act of the legislature. The creation of West Cedar Creek Municipal Utility District is an example, combining a number of small systems into a district to facilitate financing for the series of dilapidated utilities that were incorporated into the district. Additionally, SUDs are created from existing, member-owned and member-controlled WSCs. *See* Tex. Water Code § 65.014. See Chapter 7 of this book.

b. District Rates, Fees, and Charges

There is limited agency oversight of the policies and rates for services provided by districts. As with municipalities, the PUC's customer service policies and rate-filing policies do not apply to districts.

There is also limited agency oversight of the rates and fees charged by a district. The PUC does not have original jurisdiction over a district's rates; however, it does have appellate jurisdiction if the requisite number of customers (the lesser of 10,000 or 10 percent) formally protest the rate within ninety days after the effective date of the rate change. Tex. Water Code § 13.043(b)(4), (c). For purposes of determining the affected ratepayers, customers who reside outside the district's boundaries are considered a separate class because these customers do not participate in elections of the district's governing body.

Oversight of certain water district fees was retained by the TCEQ and not transferred to the PUC. In many cases, TCEQ approval is required before a district may charge certain types of fees, including impact fees and standby fees. *See* Tex. Water Code §§ 49.212, 49.231. An impact fee is—

> a charge or assessment imposed by a political subdivision against new development in order to generate revenue for funding or recouping the costs of capital improvements or facility expansions necessitated by and attributable to the new development. The term includes amortized charges, lump-sum charges, capital recovery fees, contributions in aid of construction, and any other fee that functions as described by this definition.

Tex. Loc. Gov't Code § 395.001(4). Certain charges are expressly excepted from the need for TCEQ approval, however, including charges that might otherwise be considered an impact fee, such as a charge that (1) does not exceed three times the actual costs to the district for a tap or connection; (2) is made by a taxing district to a nontaxable entity for retail or wholesale service, which does not exceed the actual costs for the facilities to provide service; and (3) is made by a district for retail or wholesale service to land that at the time of platting was not being provided with water, wastewater, drainage, or stormwater detention or retention service by the district. Tex. Water Code § 49.212(d); 30 Tex. Admin. Code § 293.171(1). Some districts, especially those with large geographic reach, have found the TCEQ impact fee approval process to be cumbersome, especially the requirement to mail individual notice to landowners.

As an alternative to the TCEQ approval process, a district may follow the requirements of Local Government Code chapter 395, which allows the board of directors to adopt impact fees in the same manner that a municipality would adopt such fees. The chapter 395 process requires the development of a capital improvements plan, development of land use assumptions, creation of an advisory committee, and public hearings before the adoption or amendment of impact fees. The land use assumptions and the capital improvements plan must be updated at least every five years thereafter. Tex. Loc. Gov't Code § 395.052.

A standby fee is "a charge, other than a tax, imposed on undeveloped property for the availability of water, wastewater, or drainage facilities and services." Tex. Water Code § 49.231(a). A standby fee is not an impact fee, tap fee, or connection fee. 30 Tex. Admin. Code § 293.141(b). The intent of a standby fee is to distribute a fair portion of the cost burden for operating and maintaining the facilities and for financing the capital costs of the facilities to owners of property who have not constructed improvements but who have potable water, sewer, or drainage capacity available. Tex. Water Code § 49.231(b). Accordingly, standby fees may be used for only two purposes: (1) to pay debt service payments for water, wastewater, or drainage facilities that have been financed by the district, and (2) to pay operation and maintenance costs associated with maintaining the facilities (regardless of whether the facilities were financed by the district). *See* 30 Tex. Admin. Code § 293.141(d), (e).

3. Nonprofit Water Supply Corporations

Rural areas of the state are often served by a "water supply or sewer service corporation" ("water supply corporation," WSC). A WSC is a nonprofit, member-owned, and member- controlled corporation organized and operating under Texas Water Code chapter 67 that provides potable water service or sewer service for compensation. Tex. Water Code § 13.002(24).

Water supply corporations historically used low-cost federal financing for water utility system construction and improvements in rural areas where no other provider was willing to supply service. First authorized in 1933 by the 43rd Texas Legislature, WSCs were often initially financed with borrowed money from a federal agency and incorporated by local community representatives. *See* Act of Oct. 25, 1933, 43d Leg., 1st C.S., ch. 76. The federal program providing the financing is typically the U.S. Department of Agriculture, Rural Development (USDA RD) (formerly the Farmers Home Administration (FmHA)). USDA regulations provide this funding to rural communities served by a city or political subdivision, such as a special utility district, or by "an organization operated on a not-for-profit basis, such as an association, cooperative, or private corporation" that has "a broadly based ownership by or membership of people of the local community." 7 C.F.R. § 1780.7(a)(2).

In contrast to incorporating a municipality or creating a district, a WSC is relatively easy to create by filing a certificate of formation under the Texas Non-Profit Corporation Law and complying with Texas Water Code chapter 67. *See* Tex. Water Code § 67.003. The requirement under chapter 13 that a WSC be "member-owned and member-controlled" satisfies USDA RD financing requirements. *See* Tex. Water Code § 13.002(11), (24). The USDA regulations for entities that qualify for assistance are contained in title 7 of the Code of Federal Regulations part 1780.

WSCs are required to obtain a CCN before providing retail water utility service. *See* Tex. Water Code § 13.242(a). With certain exceptions, a WSC must apply for an amendment to its CCN before providing service beyond its existing CCN boundaries. *See* Tex. Water Code § 13.243. Many of the PUC's rules under 16 Texas Administrative Code chapter 24, subchapter E, governing customer service requirements do not apply to WSCs. This level of supervision in part reflects that WSCs operate on a nonprofit basis. More fundamentally, however, it reflects that WSCs must be governed by boards of directors elected by member customers. *See* Tex. Water Code § 13.002(11), (24). Importantly, WSC's are expressly authorized to acquire land or interests in land by condemnation. Tex. Water Code § 49.222.

Ratepayers of a WSC may appeal decisions of a WSC's board of directors that affect their water, drainage, or sewer rates to the PUC. Tex. Water Code § 13.043(b)(1). An appeal is initiated by filing a petition for review with both the PUC and the WSC within ninety days of the effective date of the rate change. The petition must be signed by the lesser of 10,000 or 10 percent of those ratepayers whose rates have been changed and who are eligible to appeal. Tex. Water Code § 13.043(c).

The PUC may also hear appeals of certain fees charged by WSCs. For instance, an applicant for service from a WSC may appeal to the PUC a decision affecting the amount to be paid to obtain service other than the regular membership or tap fees. Tex. Water Code § 13.043(g); 16 Tex. Admin. Code § 24.41(g). A membership fee is presumed to be "regular" as long as the fee does not exceed twelve times the WSC's monthly base charge and does not include any charges for meter installation or capital improvement fees. *See* 16 Tex. Admin. Code § 24.3(25). An appeal of a fee must be filed within ninety days after the date written notice of the WSC's decision is provided to the applicant. If the PUC finds the amount charged to be "clearly unreasonable," it must establish the fee to be paid by the applicant. The agency's determination is binding on all similarly situated applicants for service.

In addition, a customer of a WSC may file an appeal with the PUC of a water conservation penalty imposed by the WSC. The PUC will uphold the penalty if (1) the penalty is clearly stated in the tariff, (2) the penalty is reasonable and does not exceed six times the minimum monthly bill in the WSC's current tariff, and (3) the WSC has deposited the penalty in a separate account dedicated to enhancing the water supply for the benefit of all of its customers. Tex. Water Code § 67.011(b); 16 Tex. Admin. Code § 24.41(j).

Although the PUC generally has only appellate jurisdiction over a WSC's rates, the agency may obtain original jurisdiction if it finds that the WSC is failing to conduct annual or special meetings in compliance with Texas Water Code section 67.007 or is operating in a manner that does not comply with the requirements for classification as a WSC prescribed by Texas Water Code section 13.002(11) and (24). *See* Tex. Water Code § 13.004. If the PUC obtains original jurisdiction over a WSC, then the PUC regulations pertaining to a "water and sewer utility" apply. 16 Tex. Admin. Code § 24.35(a). Water and sewer utilities, also referred to simply as "utilities," are the most highly regulated category of retail water service providers.

While under the PUC's jurisdiction, the WSC may request that the "cash needs method" for setting rates be used. The cash needs method allows a utility to recover reasonable and prudently incurred debt service, a reasonable cash reserve account, and other expenses not allowed under standard methods of establishing rates. 16 Tex. Admin. Code § 24.34(d). This method may be used by a utility that is a nonprofit corporation controlled by individuals who are customers and who represent a majority of the customers.

The PUC's original jurisdiction over a WSC ends if the WSC voluntarily converts to a special utility district, the PUC's order expires, or the WSC demonstrates that for the past twenty-four consecutive months it has conducted annual meetings as required and has operated in a manner that complies with the membership and nonprofit organization requirements for WSCs. 16 Tex. Admin. Code § 24.35(b).

WSCs must file tariffs with the PUC showing all rates that are subject to the appellate jurisdiction of the commission and that are in effect for any utility service, product, or commodity offered. Tex. Water Code § 13.136(c); 16 Tex. Admin. Code § 24.21(j). The tariffs must include all rules and regulations relating to or affecting the rates, utility service, product, or commodity furnished. For WSCs, the filing of a tariff is for informational purposes only.

WSCs that elect to be exempt from ad valorem taxes under Texas Tax Code section 11.30 fall within the definition of a "governmental body" under both the Public Information Act and the Open Meetings Act. As such, they must comply with the requirements of both acts. *See* Tex. Gov't Code §§ 551.001(3)(K), 552.003(1)(A)(ix).

4. Counties

As political subdivisions of the state, counties that provide retail water or sewer service fall within the Water Code chapter 13 definition of a "retail public utility." *See* Tex. Water Code § 13.002(19). The more limited definitions for a "water and sewer utility," "public utility," and "utility" exclude political subdivisions except for "an affected county." *See* Tex. Water Code § 13.002(23). Thus, whether a particular provision of chapter 13 is applicable to a county depends on (1) whether the provision applies to a "retail public utility" or simply a "utility" and (2) whether the county is an "affected county."

An "affected county" is defined as a county to which Local Government Code chapter 232, subchapter B, applies. Tex. Water Code § 13.002(26). Subchapter B applies only to a county located (1) within fifty miles of an international border or (2) within between fifty and one hundred miles of an international border that contains the majority of the area of a municipality with a population of more than 250,000. Tex. Loc. Gov't Code § 232.022(a). The Texas Legislature enacted subchapter B after finding that economically distressed subdivisions commonly called *colonias* were found throughout these affected counties and that the vast majority of housing units in these *colonias* lacked an adequate potable water supply and concomitant wastewater or sewer services, creating serious and unacceptable health hazards. *See* Act of May 28, 1995, 74th Leg., R.S., ch. 979, § 4.

Affected counties are subject to greater regulation under chapter 13 than other counties. The PUC has appellate jurisdiction over the water, drainage, and sewer rate decisions of affected counties if the ratepayers are actually or may be adversely affected. Tex. Water Code § 13.043(b)(5). Also, as with WSCs, the PUC may hear an appeal of an affected county's decision that involves the amount to be paid to obtain service other than for a tap fee. Tex. Water Code § 13.043(g); 16 Tex. Admin. Code § 24.41(g).

A utility operated by an affected county must obtain a CCN before in any way rendering retail water or sewer utility service directly or indirectly to the public. Tex. Water Code § 13.242(a). The PUC can revoke the CCN if it finds that the cost of providing service is so prohibitively expensive as to constitute denial of service. *See* Tex. Water Code § 13.254(a)(2).

D. "Public Utilities"

Except for affected counties, all of the entities discussed thus far have been "retail public utilities" but not "utilities." So what is a "utility"? The definition includes any person, corporation, cooperative corporation, affected county, or any combination of these persons or entities owning or operating for compensation facilities to provide potable water or sewer service to the public, but specifically excluding municipal corporations, WSCs, and political subdivisions (such as districts). By far the most common form of "utility" is a for-profit "investor-owned utility" (IOU). However, the term also includes nonprofit corporations, such as homeowners associations, that are not organized under Texas Water Code chapter 67 and that do not qualify as member-owned and member-controlled as required for water supply corporations.

1. *Rates and Tariffs*

The rates a utility may charge are highly regulated. A utility may not charge, collect, or receive any rate for utility service or impose any rule or regulation other than as provided by Texas Water Code chapter 13. Tex. Water Code § 13.135. For most utilities, the PUC has oversight of their rates. However, for utilities located within a municipality's corporate boundaries, the governing body of the municipality may provide oversight. To cover both of these scenarios, chapter 13 uses the term "regulatory authority" to refer to the PUC or a municipality depending on the context. *See* Tex. Water Code § 13.002(18).

The regulatory authority may fix and regulate rates of utilities, including rules and regulations for classifying customers and services and for determining the applicability of rates. Tex. Water Code § 13.181(b). The regulatory authority must ensure that every rate made, demanded, or received by any utility or any two utilities jointly is just and reasonable. Tex. Water Code § 13.182(a). Rates may not be unreasonably preferential, prejudicial, or discriminatory. The state of Texas may recover from an IOU, for refund to customers, charges collected in excess of the charges approved by the PUC. *See Texas Natural Resource Conservation Commission v. Lakeshore Utility Co.*, 164 S.W.3d 368 (Tex. 2005).

In 2013, the Texas legislature established new utility classifications for IOUs based on connection count. Act of May 14, 2013, 83d Leg., R.S., ch. 171, § 8 (S.B. 567); Act of May 14, 2013, 83d Leg., R.S., ch. 170, § 2.08 (H.B. 1600). Class A utilities are IOUs with 10,000 or more connections; Class B utilities are IOUs with 500 or more, but fewer than 10,000 connections; and Class C utilities are IOUs with fewer than 500 connections. *See* Tex. Water Code § 13.002(4-a)–(4-c). These classifications were created to end the one-size-fits-all treatment of IOUs for rate-setting purposes, with Class B and Class C utilities being authorized to use abbreviated, less burdensome procedures for changing rates.

When the PUC fixes the rates of a utility, the agency must fix overall revenues at a level that will provide the utility a reasonable opportunity to earn a reasonable return on its invested capital and that will preserve the financial integrity of the utility. 16 Tex. Admin. Code § 24.32(a). The rates must be designed to take into account conservation—utilities cannot employ rate structures that offer discounts or encourage increased usage within any customer class. To provide funds for necessary capital improvements and for debt repayments and associated costs, the PUC may permit the utility to collect additional revenues from customers. The PUC may use an alternative rate method for establishing rates to ensure that retail customers receive higher quality, more affordable, or more reliable service; to encourage regionalization; or to maintain financially stable and technically sound utilities. Tex. Water Code § 13.183(c); 16 Tex. Admin. Code § 24.34(a).

Rates are based on a utility's cost of rendering service. 16 Tex. Admin. Code § 24.31. The two components of cost of service are allowable expenses and return on invested capital. Allowable expenses include only those expenses that are reasonable and necessary to provide service to the ratepayers. Return on invested capital is calculated by multiplying a reasonable rate of return by invested capital. For a detailed analysis of water and wastewater rate design considerations, see American Water Works Association, *Principles of Water Rates, Fees, and Charges (M1)* (6th ed. 2012); and Water Environment Federation, *Financing and Charges for Wastewater Systems (MOP 27)* (2005).

Every utility must file with each regulatory authority tariffs showing all rates that are subject to the original or appellate jurisdiction of the regulatory authority and that are in effect for any utility service, product, or commodity offered. Tex. Water Code § 13.136(a). The tariffs must include all rules and regulations that relate to or affect the rates, utility service, product, or commodity furnished. *See* 16 Tex. Admin. Code § 24.21. Utilities also must keep and render to the appropriate regulatory authority in the manner and form prescribed by the PUC uniform accounts of all business transacted. Tex. Water Code § 13.131(a).

2. Elements of a Rate Case

A Class A or B utility may not make changes in its rates except by delivering a statement of intent to each ratepayer and with the regulatory authority that has original jurisdiction at least thirty-five days before the effective date of the proposed change. Tex. Water Code §§ 13.187(a-1), 13.1871(b). Generally, a utility may not file a notice of intent to increase rates more than once in a twelve-month period. Tex. Water Code §§ 13.187(p), 13.1871(w). When the statement of intent is delivered, the utility must also file with the regulatory authority an application to change rates. Tex. Water Code §§ 13.187(c), 13.1871(d).

The PUC may conduct a public hearing on any rate change application. For Class A utilities, the PUC is required to hold a hearing within thirty days after the affective date of the change to determine the propriety of the change. Tex. Water Code § 13.187(f). For Class B utilities, a hearing is not required unless the regulatory authority receives a complaint within ninety days after the rate has become effective from any affected municipality or from a certain number of ratepayers. *See* Tex. Water Code § 13.1871(i). If the PUC does not receive sufficient customer complaints or if the PUC staff does not request a hearing within 120 days after the effective date of the rates, the utility's proposed tariff will be approved as long as it complies with the Texas Water Code and the PUC's rules. 16 Tex. Admin. Code § 24.28(3).

If a hearing is held and the regulatory authority finds that the rates currently being charged or those proposed to be charged are unreasonable or in violation of law, the regulatory authority will determine and order the rates to be charged by the utility. Tex. Water Code §§ 13.187(h), 13.1871(o); 16 Tex. Admin. Code § 24.28(1).

A more streamlined process that does not require a hearing is available for Class C utilities. A Class C utility may change its rates by filing an application with the PUC for a rate adjustment and providing notice at least thirty days before the effective date of the proposed change. *See* Tex. Water Code § 13.1872(c)(1). The proposed rate adjustment must be based on changes in a price index specified by the PUC. *See* Tex. Water Code § 13.1872(b), (e). Alternatively, a Class C utility may adjust its rates by complying with the rate change procedures for Class B utilities. Tex. Water Code § 13.1872(c)(2). A Class C utility may not use the rate adjustment process more than once each year and not more than four times between proceedings using the Class B utility rate change process. Tex. Water Code § 13.1872(f).

3. Customer Service Policies and Complaint Process

In addition to regulating a utility's rates, services, and fees, the PUC regulates a utility's customer service policies. *See* 16 Tex. Admin. Code §§ 24.80–.90. The PUC's regulations address grounds for refusal to serve, use of deposits, responses to requests for service, water and sewer service connections, billing, discontinuance of service, meter requirements, readings, tests, and service interruptions. The specific policies and rules of a utility are contained in its tariff, which must be filed with, and approved by, the PUC. A utility's tariff may not be changed or amended except with approval of the PUC. *See* 16 Tex. Admin. Code § 24.21(b).

Any customer or service applicant who requests the opportunity to dispute any action or determination of a utility under the utility's customer service rules must be given an opportunity for a review by the utility. 16 Tex. Admin. Code § 24.82(a). Upon receipt of a complaint, the utility must promptly conduct an investigation and report its findings to the complainant. In the event the complainant is dissatisfied with the utility's report, the utility must advise the complainant of recourse through the PUC's complaint process. If the utility receives a complaint from the PUC on behalf of a customer or service applicant, the utility must make an initial response to the PUC within fifteen days. The PUC may require the utility to provide a written response to the complainant, the commission, or both. Pending resolution of a complaint, continuation or restoration of service may be required. 16 Tex. Admin. Code § 24.81(b).

II. Certificates of Public Convenience and Necessity

Certain retail public utilities are required to obtain a CCN before they may provide retail water or sewer service. A CCN is a permit issued by the PUC that authorizes and obligates a retail public utility to furnish, make available, render, or extend continuous and adequate retail water or sewer utility service to a specified geographic area. 16 Tex. Admin. Code § 24.3(10). Entities that are not required to obtain CCNs may choose to do so in order to protect their service areas from encroachment by other retail public utilities.

A. Types of CCNs

CCNs are issued to water and sewer utilities for various types of service areas. The most common CCN is a "bounded area" or "geographic" CCN, which is issued for a specific enclosed geographic area described by known physical boundaries such as property lines, roads, creeks, railroad tracks, or political boundaries.

Occasionally, however, utilities have obtained a "facilities only" CCN, which is much more limited in scope and purpose. A facilities only CCN is issued for a "point of use" service area that covers only the customer connections at the time the CCN was granted and typically corresponds to the location of a utility's distribution lines in the ground. Use of facilities only CCNs is currently restricted to small systems or small areas of larger CCNs.

A variation on the facilities only CCN includes not only the facilities but also a buffer of a specified number of feet, usually two hundred feet (a "facilities plus 200 feet CCN"). The lines typically correspond to distribution lines or facilities in the ground and normally follow along roads.

Both facilities only CCNs and facilities plus two hundred feet CCNs are in disfavor and rarely used today for new or amended CCNs. In the past, the holders of these types of CCNs had more flexibility to extend service outside their certificated areas; however, they are now explicitly excepted from doing so. *See* 16 Tex. Admin. Code § 24.103(a)(1).

B. Dual Certification

Typically, a retail public utility with a CCN is the sole, monopoly water or sewer service provider in the territory covered by the CCN. In some instances, however, the service areas of two CCNs may overlap, allowing two utilities to serve the same territory (known as "dual certification"). The PUC's rules expressly provide that the agency may grant additional certification to any other retail public utility of all or any part of a previously certificated area if the PUC finds that the public convenience and necessity require the additional certification. *See* 16 Tex. Admin. Code § 24.116. Typically, however, the PUC does not grant dual certification unless both retail public utilities consent.

It is unclear whether chapter 13 allows dual certification in the absence of the consent of both retail public utilities. The legislature has determined that retail public utilities are, by definition, monopolies in the areas they serve. Tex. Water Code § 13.001(b)(1). A "duopoly" is, by definition, not a "monopoly." The only reference to dual certification in the Water Code is found at section 13.255(a), which provides for dual certification between an annexing municipality and an annexed retail utility by agreement—which, if by agreement, is consistent with the concept that otherwise retail utilities are "by definition, monopolies." *See* Tex. Water Code § 13.255(a).

C. Applying for a CCN

To obtain a CCN, a retail public utility must file an application with the PUC that contains the items listed in 16 Texas Administrative Code section 24.105. These items include the PUC's application form, which is available on its Web site; a map and description of the proposed service area; a description of any requests for service; any evidence required by the PUC to show that the applicant has received the necessary consent, franchise, permit, or license from the proper municipality or other public authority; and an explanation of the applicant's reasons for contending that the requested certificate is necessary for the service, accommodation, convenience, or safety of the public. *See* 16 Tex. Admin. Code § 24.105.

Notice of the application and the opportunity to request a hearing must be provided. *See* 16 Tex. Admin. Code § 24.106. If no hearing is requested, the executive director of the PUC may, but is not required to, grant the proposed CCN without a hearing. *See* 16 Tex. Admin. Code § 24.107. If a hearing is requested, then any person affected by the application may intervene at the hearing. Tex. Water Code § 13.246(a). "Affected persons" include current customers of the utility, if any; landowners whose property is within the area to be certificated; and any retail public utility that would be affected by the PUC's actions, such as adjacent or competing utilities. *See* Tex. Water Code § 13.002(1).

The burden of proof at the hearing is on the entity seeking the CCN. *See* 16 Tex. Admin. Code § 24.12.

In determining whether to grant or amend a CCN, the PUC must ensure that the applicant possesses the financial, managerial, and technical capability to provide continuous and adequate service. Tex. Water Code § 13.241(a); 16 Tex. Admin. Code § 24.102(a). For water utility service, the applicant must have access to an adequate supply of water and must be capable of providing drinking water that meets the requirements of both Texas Health and Safety Code chapter 341 and the Water Code. Tex. Water Code § 13.241(b); 16 Tex. Admin. Code § 24.102(a)(1). It is not required that the applicant itself own the facilities; it is sufficient that the applicant demonstrate that it has the capability to provide water service through contracts and interlocal agreements. *Bexar Metropolitan Water District v. Texas Commission on Environmental Quality*, 185 S.W.3d 546 (Tex. App.—Austin 2006, pet. denied).

If granting a new CCN for an area would require constructing a physically separate water or sewer system, the applicant must demonstrate that regionalization or consolidation with another retail public utility is not economically feasible. Tex. Water Code § 13.241(d). The PUC may grant or amend a CCN only after finding that the CCN or amendment is necessary for the service, accommodation, convenience, or safety of the public. 16 Tex. Admin. Code § 24.102(c).

If a CCN application is uncontested or if all protests are withdrawn at the end of the thirty-day notice period, the PUC may act on the application. 16 Tex. Admin. Code § 24.107(c). An applicant or other person who wishes to overturn the PUC's decision must file a motion for rehearing within twenty days after receiving notice of the PUC's decision. *See* Tex. Gov't Code § 2001.146(a); 16 Tex. Admin. Code § 22.264.

If the CCN application is protested, it is sent to the State Office of Administrative Hearings (SOAH) for a preliminary hearing conducted by an administrative law judge. If the parties cannot reach an agreement at the preliminary hearing, the judge holds an evidentiary hearing. At the conclusion of the evidentiary hearing, the judge issues a proposal for decision that is submitted to the PUC commissioners for formal consideration. The PUC commissioners then approve, deny, or modify the proposal for decision. A party that is unsatisfied with the commissioners' decision may file a motion for rehearing with the agency. If the motion is granted, the application may be returned to SOAH to take additional evidence. If the motion is not granted, the decision may be appealed to district court.

D. Decertification of CCNs

Acquiring a CCN does not protect the CCN holder from later decertification of all or part of the territory covered by the CCN. Challenges to a CCN can come from various directions: the PUC may revoke or amend a CCN under certain circumstances; developers of large tracts of property can petition to have their property removed from a CCN; and cities that annex part of the territory in a CCN may take that area for themselves, with or without the consent of the incumbent utility, but must pay certain compensation to the CCN holder.

1. Revocation or Amendment of CCN

The PUC can revoke or amend a CCN if it makes one of the following four findings:

1. The CCN holder is not providing continuous and adequate service to all or part of the area covered by the CCN, as required by Texas Water Code section 13.250.

2. In counties with certain economically distressed areas, the cost of providing service by the

CCN holder is so prohibitively expensive as to constitute denial of service.

3. The CCN holder has agreed in writing to allow another retail public utility to provide service within its service area, except for an interim period, without amending its CCN.

4. The CCN holder has failed to file a cease and desist action within 180 days of becoming aware that another retail public utility was providing service within its service area.

Tex. Water Code § 13.254(a).

The PUC may make findings relevant to decertification on its own motion; however, decertification is most often used by other retail public utilities seeking to obtain a CCN for territory that is already certificated to another retail public utility. If a CCN is revoked or amended, the PUC may require one or more retail public utilities with their consent to provide service to the area in question. Tex. Water Code § 13.254(c). The retail public utility taking over the service area must provide compensation to the decertified retail public utility for any property that the PUC determines is rendered useless or valueless because of the decertification. Tex. Water Code § 13.254(d).

2. Petitions by Developers of Large Tracts ("Expedited Release")

The territory covered by a CCN may also be affected by the petitions of certain landowners. In 2005, the Texas Legislature established an "expedited release" process authorizing certain landowners of tracts of fifty acres or more to petition the TCEQ, and now the PUC, to have their property removed from the existing retail water provider's CCN. *See* Tex. Water Code § 13.254(a-1). In 2011, the legislature created an alternative expedited release process that applies to tracts of twenty-five acres and greater. *See* Tex. Water Code § 13.254(a-5).

a. Expedited Release of Tracts of Fifty Acres or More under Section 13.254(a-1)

A landowner with at least fifty acres that is not in a platted subdivision and not actually receiving water or sewer service may petition the PUC for expedited release of the land from one retail public utility's CCN area so that the land may receive service from another retail public utility. Tex. Water Code § 13.254(a-1); 16 Tex. Admin. Code § 24.113(b). To use this process, the landowner must first make a request for service to the incumbent utility, which then has ninety days in which to respond. The incumbent utility's response allows the landowner to file a petition for expedited release if the utility (1) refuses to provide service; (2) is not capable of providing adequate service within the time frame, at the level, at the approximate cost that the alternative provider is capable of providing for a comparable level of service, or in the manner reasonably requested by the landowner; or (3) conditions the provision of service on a payment of costs not properly allocable to the petitioner's service request. The petitioner must demonstrate that the alternative retail public utility from which the petitioner will be requesting service possesses the financial, managerial, and technical capability to provide continuous and adequate service within the time frame, at the level, at the cost, and in the manner reasonably needed or requested by current and projected service demands in the area. *See* Tex. Water Code § 13.254(a-1).

In most counties, if a CCN holder has never made service available through planning, design, construction of facilities, or contractual obligations to serve the area a petitioner seeks to have released under section 13.254(a-1), the PUC is not required to find that the proposed alternative provider is capable of providing better service than the CCN holder, but only that the proposed alternative provider is capable of providing the requested service. *See* Tex. Water Code § 13.254(a-8). However, counties meeting certain population and location parameters are excluded from this requirement. *See* Tex. Water Code § 13.254(a-9)–(a-11). The initially excluded counties are Cameron, Fannin, Grayson, Guadalupe, Hidalgo, Willacy, and Wilson. *See* 16 Tex. Admin. Code § 24.113(u).

After a petition for expedited release is deemed administratively complete, the PUC must grant the petition within sixty days unless it finds that the petitioner has failed to satisfy the elements required by statute. If a petition is granted, the process then moves to valuation and compensation, if any, to the incumbent utility. *See* Tex. Water Code § 13.254(a-3). A party aggrieved by the decision of the PUC on an expedited release petition filed under section 13.254(a-1) (whether the landowner or the incumbent utility) only has a right to seek reconsideration of the action within the agency but may not appeal the decision to district court. *See* Tex. Water Code § 13.254(a-4).

A successful petition for expedited release was filed by Jona Acquisition, Inc., on May 7, 2008, seeking decertification of approximately 1,960 acres from the CCN of the Creedmoor-Maha Water Supply Corporation. *Petition from Jona Acquisition, Inc. for an Expedited Release from Water Certificate of Convenience and Necessity (CCN) No. 11029 of Creedmoor-Maha Water Supply Corporation (WSC) in Travis County, Texas;* Application No. 36051-D (TCEQ Order Issued Aug. 5, 2008). Jona had requested water service from Creedmoor sufficient to serve 10,300 living unit equivalents, but according to Jona's petition, Creedmoor did not have sufficient existing capacity to meet Jona's needs and had no binding commitments to secure new water supplies. The City of Austin was available nearby as an alternative water provider. The Executive Director of the TCEQ granted Jona's petition for expedited release, and the proceeding advanced to the valuation stage. The Executive Director's decision was subsequently upheld on appeal. *Creedmoor-Maha Water Supply Corp. v. Texas Commission on Environmental Quality*, 307 S.W.3d 505 (Tex. App.—Austin 2010, no pet.). For a discussion of expedited release cases and practice tips, see Leonard H. Dougal & Mallory Beck, *Current Water Utility CCN Decertification Issues at the Public Utility Commission of Texas, in Advanced Real Estate Strategies* (State Bar of Texas 2014).

b. Expedited Release of Tracts of Twenty-Five Acres or More under Section 13.254(a-5)

As an alternative to the original expedited release process, the owner of a tract of land that is at least twenty-five acres and that is not receiving water or sewer service may petition for expedited release of the area from a CCN and is entitled to that release if the landowner's property is located in a county that falls within certain population parameters. *See* Tex. Water Code § 13.254(a-5). The initial affected counties are Atascosa, Bandera, Bastrop, Bexar, Blanco, Brazoria, Burnet, Caldwell, Chambers, Collin, Comal, Dallas, Denton, Ellis, Fort Bend, Galveston, Guadalupe, Harris, Hays, Johnson, Kaufman, Kendall, Liberty, Montgomery, Parker, Rockwall, Smith, Tarrant, Travis, Waller, Williamson, Wilson, and Wise.

To obtain expedited release, the landowner must show that the property is "not receiving water or sewer service." Tex. Water Code § 13.254(a-5). The Austin court of appeals examined this phrase in *Texas General Land Office v. Crystal Clear Water Supply Corp.*, 449 S.W.3d 130 (Tex. App.—Austin 2014, pet. filed). There, the General Land Office (GLO) sought a streamlined expedited release for five contiguous tracts, each more than twenty-five acres, that did not contain any active meters, lines, or other facilities serving those tracts. The GLO did not seek decertification of approximately 151 acres from five additional contiguous tracts that did have certain facilities. The CCN holder argued that (1) the GLO could not choose to decertify only a portion of its contiguous property and (2) the property was, in fact, "receiving water service." *Crystal Clear*, 449 S.W.3d at 134. The court agreed with the TCEQ that nothing in section 13.254(a-5) prohibited the GLO from selecting only a portion of its property for the decertification request. The court also found, based in part on the broad definition of "service" in Water Code chapter 13, that the determination of whether a tract is receiving water service is—

> a fact-based inquiry requiring the Commission to consider whether the retail public utility has facilities or lines committed to providing water *to the particular tract* or has performed acts or supplied anything *to the particular tract* in furtherance of its obligation to provide water to that tract pursuant to its CCN.

Crystal Clear, 449 S.W.3d at 140. Ultimately, the court upheld the TCEQ's decision that the property was not "receiving water service" under the substantial evidence standard. *Crystal Clear*, 449 S.W.3d at 142.

The PUC must grant a petition filed pursuant to this process not later than the sixtieth day after the date the landowner files the petition. *See* Tex. Water Code § 13.254(a-6). The PUC may require an award of compensation by the petitioner to a decertified retail public utility. Tex. Water Code § 13.254(a-6).

As of the publication date of this edition, 119 applications seeking streamlined expedited release had been filed with the TCEQ and then subsequently with the PUC. Of those applications, sixty-eight were approved, fifteen were dismissed, six were returned, nine were withdrawn, and twenty-one are pending. These petitions varied greatly in form, ranging from a simple letter explaining the elements of decertification and enclosing documents to verify acreage and property ownership to more traditional petitions including affidavits averring to the statutory elements.

c. Terms Applicable to Both Types of Expedited Release

Expedited release from a retail public utility's existing CCN is not available to landowners whose property is (1) within the boundaries of a municipality or the extraterritorial jurisdiction of a municipality with a population of more than 500,000 where the municipality or a municipally owned utility is the CCN holder, or (2) in a platted subdivision that actually receives water or sewer service. However, owners of property that fall within either of these categories are eligible to contest the inclusion of their property within a new CCN. Tex. Water Code § 13.254(a-2). Under either process, the PUC requires specific mapping information complying with the requirements found in 16 Texas Administrative Code section 24.105 showing the location of the property subject to the expedited release petition.

A CCN holder that has land removed from its certificated service area may not be required, after the land is removed, to provide service to the removed land for any reason, including the violation of law or PUC rules by a water or sewer system of another person. Tex. Water Code § 13.254(h).

3. *Municipal Annexations*

A municipality's annexation of land within the CCN of another retail public utility does not automatically affect the authority of the retail public utility to continue providing service to the area. *See* Tex. Water Code § 13.247. However, if a municipality incorporates or annexes territory that is currently certificated to a water supply and sewer service corporation, a special utility district, or a fresh water supply district, then the municipality has a couple of alternatives if it wants to provide retail water or sewer service to the area. One option is to enter into an agreement with the incumbent utility to determine which entity will provide service to the annexed territory—the incumbent utility, a municipally owned utility, or a retail public utility that has been granted a franchise by the municipality (a "franchised utility"). *See* Tex. Water Code § 13.255(a); 16 Tex. Admin. Code § 24.120(a). The agreement may grant the exclusive right for one of these entities to serve all or part of the area ("single certification") or may permit more than one entity to serve all or part of the area ("dual certification").

The agreement also may provide for the purchase of facilities or property. The executed agreement must be filed with the PUC, which will incorporate the terms of the agreement into the respective CCNs of the parties. No notice or hearing is required.

If an agreement cannot be reached, a mechanism similar to condemnation exists that allows a municipality to purchase the right to serve the annexed territory without the incumbent utility's consent. Prior to providing service to the area, the municipality must file an application with the PUC seeking single certification of the area to a municipally owned utility or a franchised utility. Tex. Water Code § 13.255(b); 16 Tex. Admin. Code § 24.120(b). The application may include a request to transfer specified property of the incumbent utility to the municipality. While the application is pending, the municipality may begin serving the area without a CCN if the area is not served and if the municipality meets the requirements of 16 Texas Administrative Code section 24.103(c). The PUC must grant the application for single certification unless the municipality fails to demonstrate compliance with the TCEQ's minimum requirements for public drinking water systems. *See* Tex. Water Code § 13.255(c), (m). The municipality must pay adequate and just compensation, as determined by the PUC, to the incumbent utility for any property that is rendered useless or valueless or that will be transferred to the municipality. Tex. Water Code § 13.255(c). Any party that is aggrieved by the PUC's final order may file an appeal in a Travis County district court. Tex. Water Code § 13.255(e).

Municipal annexations typically occur as areas that were once rural become more urban. For a discussion of the considerations in extending water utilities to rural areas from a municipal perspective and a rural perspective, see Emily W. Rogers, *Extending Water Utilities to Rural Areas: The Municipal Perspective, in Changing Face of Water Rights in Texas* (State Bar of Texas 2007); Kenneth L. Petersen, Jr., *Extending Water Utilities to Rural Areas: The Rural Perspective, in Changing Face of Water Rights in Texas* (State Bar of Texas 2007).

4. Compensation Following Decertification

For both decertification and single certification under sections 13.254 and 13.255, compensation must be paid to the retail public utility that is losing territory. *See* Tex. Water Code §§ 13.254(d), 13.255(c). Under section 13.254, a retail public utility may not render retail water or sewer service in an area that has been decertified without providing compensation for any property that is rendered useless or valueless to the decertified utility as a result of the decertification. Tex. Water Code § 13.254(d). The amount of compensation, if any, must be determined at the time another retail public utility seeks to provide service in the previously decertified area and before service is actually provided. Tex. Water Code § 13.254(c). Under section 13.255, the PUC must determine whether single certification would result in property of a retail public utility being rendered useless or valueless to the retail public utility, and must determine in its order the monetary amount that is adequate and just to compensate the retail public utility for such property. If the municipality in its application for single certification requested the transfer of specified property of the retail public utility to the municipality or to a franchised utility, the PUC must also determine in its order the adequate and just compensation to be paid for such property, including an award for damages to property that remains in the ownership of the retail public utility after single certification. *See* Tex. Water Code § 13.255(c).

The method for determining compensation is similar for both sections 13.254 and 13.255. The value of real property owned and used by the retail public utility for its facilities is determined using the standards that govern actions in eminent domain; the value of personal property is determined by analyzing, at a minimum, certain factors listed in the statutes. *See* Tex. Water Code §§ 13.254(g), 13.255(g). The factors include the amount of debt allocable to the lost service area; the value of service facilities in the area; the amount expended by the affected retail utility on planning, design, and construction preparatory to service to the area; the amount of any contractual obligations, such as take-or-pay contracts, allocable to the area; any impairment of services or increase in cost to remaining customers; the loss of future revenues from existing customers that are transferred to the acquiring retail utility; and legal and other professional fees incurred by the affected retail utility. In the case of section 13.255, additional factors relevant to maintaining the current financial integrity of the affected retail utility are included. The factors under section 13.255(g) are considered to be the minimum components of compensation; by contrast, the factors under section 13.254(g) are not thus qualified.

Despite these provisions, the PUC will not order compensation to a decertificated retail public utility if service to its entire service area is transferred to another retail public utility pursuant to Texas Water Code section 13.2551. *See* 16 Tex. Admin. Code § 24.113(p).

5. "Federal Debt Protection"

Many rural water systems, including water supply corporations and special utility districts, as well as some small cities, are indebted to the U.S. Department of Agriculture, Rural Development (USDA RD) through loans made pursuant to 7 U.S.C. § 1926. The service areas of these federally indebted utilities, along with most other assets of the utility, are subject to a federal lien imposed to ensure repayment of the debt. The effect of the lien is to accord federal protection to the service area from encroachment by competing utilities. *See* 7 U.S.C. § 1926(b). This federal protection is sometimes at odds with Texas Water Code provisions, such as section 13.255, which would otherwise permit a municipality to annex an area, pay compensation to the existing water provider, and acquire single certification of the area.

The courts have recognized that federal debt protection under section 1926(b) serves two congressional purposes: (1) to encourage rural water development by expanding the number of potential users of such systems, thereby decreasing per-user cost, and (2) to safeguard the viability and financial security of such rural water providers to ensure repayment of USDA RD loans. *City of Madison, Mississippi v. Bear Creek Water Ass'n*, 816 F.2d 1057, 1060 (5th Cir. 1987). Accordingly, local governments may not encroach on services provided by a water association indebted to USDA RD, be that encroachment in the form of competing franchises, new or additional permit requirements, or similar means, such as condemnation of the association's facilities or CCN. *City of Madison*, 816 F.2d at 1059. Recognizing the economic incentives at play with new subdivisions located at a city's edge, the Fifth Circuit Court of Appeals noted that Congress did not intend to allow expanding municipalities to "skim the cream" by expanding into the service area of a federally indebted rural utility. 816 F.2d at 1060.

In the encroachment cases, federal preemption of state law occurs, and federal courts have uniformly applied section 1926(b) to preclude the application of state law from usurping a federally indebted rural utility's certificated service area or otherwise curtailing the utility's water service rights. The language of the statute is clear and unambiguous on the protection afforded the federally indebted utility. Title 7 U.S.C. section 1926(b) states, in part:

> The service provided or made available through any such association shall not be curtailed or limited by inclusion of the area served by such association within the boundaries of any municipal corporation or other public body, or by the granting of any private franchise for similar service within such area during the term of such loan . . . .

7 U.S.C. § 1926(b).

The Fifth Circuit has proclaimed the sanctity of the service area of a federally indebted utility, as follows:

> The service area of a federally indebted water association is sacrosanct. Every federal court to have interpreted Section 1926(b) has concluded that the statute should be liberally interpreted to protect FmHA indebted rural water associations from municipal encroachment.

North Alamo Water Supply Corp. v. City of San Juan, 90 F.3d 910, 915 (5th Cir. 1995), *cert. denied*, 519 U.S. 1029 (1996).

The sanctity of a federally indebted retail utility's service area is premised on the "availability" of service. Disputes involving section 1926(b) typically involve the issue of whether the utility has "made service available" to the area in question. Because a CCN obligates a utility in Texas to render continuous and adequate service to every customer within the CCN area, the Fifth Circuit held in *North Alamo* that this state law duty is the legal equivalent of "making service available." 90 F.3d at 916. In that case, however, the court also had ample evidence of the WSC's actual ability to extend service to the area because the WSC provided water service to adjacent areas, had lines and adequate facilities to provide service, and had not refused any requests for service. Based on "the strength of these alternative legal and factual determinations," the court concluded that the WSC had made service available. 90 F.3d at 916.

Relying on authority from other federal courts, a Texas appellate court concluded that *North Alamo* does not mean that a federally indebted utility need only show a legal right to serve the area. *See Creedmoor-Maha Water Supply Corp. v. Texas Commission on Environmental Quality*, 307 S.W.3d 505, 522 (Tex. App.—Austin 2010, no pet.). Rather, the utility must also show "that it either presently was serving the area or at least presently had the physical means to do so." 307 S.W.3d at 522. This interpretation is consistent with many cases outside of Texas, where the issue of whether service is "available" frequently includes a factual determination that considers whether the utility has "pipes in the ground" or the ability to serve the subject area within a reasonable period of time.

Any decertification by the PUC based on inadequate service brings into question whether service is being made available in satisfaction of section 1926(b). In the case of an annexation, if a municipality seeks to invoke the transfer of the CCN by the PUC under Texas Water Code section 13.255(b), the transfer is mandatory, without any determination by the state agency of the affected retail utility's ability to provide service or make service available. Accordingly, it may be assumed that CCN transfers under section 13.255(b) are prohibited by federal law in the event of indebtedness to the USDA, in contrast to agency-initiated transfers that are preceded by an agency determination that service is inadequate.

Recent urbanization in the state has witnessed conflicts between municipalities and rural retail water systems. *See* Emily W. Rogers, *Water and Sewer Certificates of Convenience and Necessity: When and How They Apply to Cities*, *Texas City Attorneys Newsletter* (Spring 2004). Specific concern has been raised that the protection of section 1926(b) for rural water systems prevents municipalities from extending fire protection service to high-density developments. TCEQ regulations do not require fireflow, and rural water systems typically do not provide fireflow to the purely rural areas of their systems, though many systems do provide fireflow to higher density urbanizing areas. Monte Akers, *Water Utility Issues: Conflicts Between Urban and Rural Water Suppliers*, *The Urban Perspective*, Texas Water Law Institute (2003); *see generally* Scott Hounsel, *Water Associations and Federal Protection Under 7 U.S.C. § 1926(b): A Proposal to Repeal Monopoly Status*, 80 Texas L. Rev. 155 (2001). Fireflow is discussed in greater detail in section II.E.7 below.

E. Special Matters Involving CCNs

1. *Providing Retail Water Utility Service outside the Boundaries of a CCN*

Certain entities, including IOUs and WSCs, cannot render retail water or sewer utility service in any way unless they obtain a CCN. *See* Tex. Water Code § 13.242(a). After a CCN has been obtained, however, these entities may extend service outside their CCN to territory contiguous to that already served, as long as the point of ultimate use is within one-quarter mile of the CCN area and does not receive similar service from another retail public utility. Tex. Water Code § 13.243(1). Municipalities and districts generally are not required to obtain a CCN, although they may choose to do so to protect their service areas and investment in facilities and customers. Regardless of whether a retail public utility is required to obtain a CCN for service, all retail public utilities, with few exceptions, must obtain a CCN in order to provide service to an area where another retail public utility is already lawfully furnishing service. *See* Tex. Water Code § 13.242(a).

The absence of CCN protection can be significant. If a retail public utility that is not required to obtain a CCN chooses not to do so, it does not benefit from the protections a CCN can afford. For instance, a municipality or district that serves outside its corporate limits without a CCN could lose customers due to competition from other nearby retail public utilities. Special utility districts (SUDs) especially should carefully consider whether to provide service without obtaining a CCN. Unlike a municipal utility district, which generally must be annexed by a municipality as a whole, a SUD may be annexed piecemeal. *See* Tex. Loc. Gov't Code § 43.071(e)(3). As a result, a SUD without a CCN is particularly vulnerable to a neighboring municipality chipping away at its service territory and associated customers.

2. *Contractual Agreements*

The territory covered by a CCN may be altered through contractual agreement. Retail public utilities are authorized to enter into contracts with each other to designate the areas and customers they will serve. Such contracts, when approved by the PUC, are valid and enforceable and are incorporated into the appropriate areas of public convenience and necessity. Tex. Water Code § 13.248. To obtain PUC approval, the retail public utilities must file a written request that includes the items listed in 16 Texas Administrative Code section 24.117(b), and the agency will issue notice of the agreement before taking action to approve the terms.

3. *Transfers and Cancellations of CCNs*

Methods also exist for transferring or canceling a CCN. One way a retail public utility can transfer all or part of a CCN is by entering into a contractual agreement with another retail public utility pursuant to Texas Water Code section 13.248. In addition, utilities and water supply corporations may sell, assign, or lease their CCNs or any rights obtained under their CCNs; however, the PUC must first determine that the purchaser, assignee, or lessee is capable of rendering adequate and continuous service to every consumer within the certified area. *See* Tex. Water Code § 13.251. Any sale, assignment, or lease of a CCN must be on the conditions prescribed by the PUC. Tex. Water Code § 13.251. If a retail public utility agrees in writing to allow another retail public utility to provide service within its service area (except for an interim period) without amending its CCN, the PUC may amend or revoke the CCN. Tex. Water Code § 13.254(a)(3).

A utility or WSC is required to notify the PUC at least 120 days before the date of a proposed sale, acquisition, lease, rental, or merger of a water or sewer system. A transaction that is subject to this notice requirement and that is not completed pursuant to the provisions of the Water Code is void. *See* Tex. Water Code § 13.301; 16 Tex. Admin. Code § 24.109(i). The PUC has an application process for such transactions, known as sale, transfer, merger (STM) applications, that involves public notice, unless waived by the executive director of the PUC for good cause shown. A person purchasing or acquiring a water or sewer system must demonstrate adequate financial, managerial, and technical capability for providing continuous and adequate service to both the requested area and any areas currently certificated to the entity. If the person cannot, the PUC may require that a bond or other financial assurance be provided. The PUC is required to investigate the proposed transaction to determine whether it will serve the public interest. Any STM transaction that is not completed in accordance with these provisions is void. *See* Tex. Water Code § 13.301(h); 16 Tex. Admin. Code

§ 24.109(i). Section 13.301 does not apply to a transaction under section 13.255 concerning the transfer of the service area for annexed territory to a municipality. Likewise, a utility may not purchase voting stock in another utility doing business in Texas, and a person may not acquire a controlling interest in such a utility unless the person or utility files a written application with the PUC at least sixty-one days before the date of the proposed transaction. Tex. Water Code § 13.302(a); 16 Tex. Admin. Code § 24.111(a). A "controlling interest" is defined as a person or a combination of a person and other family members who possess at least 50 percent of the voting stock of the utility or a person who controls at least 30 percent of the stock and is the largest stockholder. 16 Tex. Admin. Code § 24.111(a). A purchase or acquisition of stock that is not completed in accordance with these provisions is void. *See* Tex. Water Code § 13.302(f); 16 Tex. Admin. Code § 24.111(g).

A CCN transfer also takes place when a WSC converts into a SUD. *See* Tex. Water Code §§ 65.014–.015. Advantages of converting to a SUD include the ability to issue tax-exempt bonds for financing debt, certain tort claims protection, and exemption from certain taxes. SUD conversions occur in one of two ways—by a special act of the Texas legislature or by filing a petition with the TCEQ pursuant to Texas Water Code chapter 65. An application to the TCEQ must include a legal description of the WSC's service area as that service area appears in the CCN held by the WSC. *See* 30 Tex. Admin. Code § 293.11(h). Any area of the WSC that overlaps another entity's CCN must be excluded from the SUD unless the other entity consents in writing to the inclusion of its dually certified area. 30 Tex. Admin. Code § 293.106(h)(2).

4. Cease and Desist Orders

A retail public utility may seek a cease and desist order from the PUC to protect its infrastructure and service area from competing retail public utilities. Specifically, the PUC may issue a cease and desist order if—

> a retail public utility in constructing or extending a line, plant, or system interferes or attempts to interfere with the operation of a line, plant, or system of any other retail public utility, or furnishes, makes available, renders, or extends retail water or sewer utility service to any portion of the service area of another retail public utility that has been granted or is not required to possess a [CCN].

Tex. Water Code § 13.252. A cease and desist order may prohibit the construction, extension, or provision of service or may prescribe terms and conditions for providing service or for locating the line, plant, or system affected. A request for a cease and desist order must include the items listed in 16 Texas Administrative Code section 24.118.

In some circumstances, a CCN holder is required to seek a cease and desist order to protect its service area. If a CCN holder becomes aware that another retail public utility is providing service within its service area, the CCN holder has 180 days in which to seek a cease and desist order from the PUC or else it risks the amendment or revocation of its CCN. *See* Tex. Water Code § 13.254(a)(4).

5. Economically Distressed Areas Program

Financial assistance is available to certain providers of water supply and sewer services to "economically distressed areas" through the Economically Distressed Areas Program (EDAP) administered by the Texas Water Development Board (TWDB). See Chapter 37 of this book for a discussion of the EDAP. *See* Tex. Water Code § 17.922. An economically distressed area is an area in which (1) water supply or wastewater systems are inadequate to meet minimal state standards, (2) financial resources are inadequate to provide services to meet those needs, and (3) an established residential subdivision was located on June 1, 2005. Tex. Water Code § 17.921(1). Assistance to these areas is available only in counties that are located in whole or in part within one hundred miles of an international border and that contain the majority of the area of a municipality with a population of more than 250,000. Tex. Water Code § 17.923(c). All political subdivisions, including cities, counties, water districts, and nonprofit water supply corporations, may apply.

The PUC can revoke or amend a CCN in a county that has an economically distressed area with a median household income that is not greater than 75 percent of the median state household income if the cost of providing service by the CCN holder is so prohibitively expensive as to constitute denial of service. *See* Tex. Water Code § 13.254(a)(2).

6. Regionalization

To obtain a CCN for an area that would require the construction of a physically separate water and sewer system, an applicant must first demonstrate that regionalization is not economically feasible. Tex. Water Code § 13.241(d). Regionalization is the consolidation of the operations or physical systems of two or more existing or proposed water or domestic wastewater systems to achieve the best service at rates that will ensure that the system is maintained for the long term. Texas Health and Safety Code section 341.0315 requires the TCEQ to encourage and promote the development and use of regional and areawide drinking water supply systems. Tex. Health & Safety Code § 341.0315(b).

The PUC requires all applicants for new CCNs and for CCN amendments to provide notice to all cities and neighboring retail public utilities that provide the same utility service within five miles of the proposed CCN boundary for a new CCN and within two miles of the proposed boundary for a CCN amendment. *See* 16 Tex. Admin. Code § 24.106(b). In addition, the applicant must list all the public drinking water systems within a two-mile radius, submit copies of written requests for service and the responses, and explain why connecting to neighboring facilities is not economically feasible. *See* 16 Tex. Admin. Code § 24.102(b). Even if an entity is not required to obtain a CCN, it is still required to satisfy the TCEQ's regionalization requirements in order to operate as a public water system. *See* 30 Tex. Admin. Code § 290.39(c).

As part of the agencies' memorandum of understanding, the PUC and the TCEQ agreed to cooperate regarding demonstrating the economic feasibility of regionalization. The TCEQ's policy is that regionalization is feasible unless (1) no other systems are reasonably close to the proposed system, (2) requests for service from neighboring systems have been denied, or (3) an exception applies based on costs, affordable rates, and financial, managerial, and technical capabilities of the existing system. *See* Texas Commission on Environmental Quality, *The Feasibility of Regionalizing Water and Wastewater Utilities: A TCEQ Policy Statement* (Jan. 2003), www.tecq.state.tx.us/publications/rg/rg-357.html.

7. Role of "Fireflow" Capabilities

As rural areas have become increasingly urbanized, a growing concern has been the provision of water service of sufficient quantity and pressure to adequately fight fires, known as "fireflow." Texas Water Code chapter 13 does not mandate fireflow as a condition for holding a CCN. Retail water service is defined merely as "potable water service . . . provided by a retail public utility to the ultimate consumer for compensation." Tex. Water Code § 13.002(20). This definition does not encompass fireflow, as the TCEQ made clear in its rulemaking following House Bill 2876: "The commission does not have statutory authority to require CCN holders to have the ability to provide fireflows." 30 Tex. Reg. 8966 (2005). This rulemaking concerned factors to be evaluated in deciding whether to grant a CCN in the first instance. In contrast, an incumbent utility's inability or refusal to provide capacity sufficient for fireflows appears to be a basis for filing a petition for expedited release from the incumbent utility's CCN. *See* Tex. Water Code § 13.254(a-1)(1)(E). In 2013, the Texas legislature authorized municipalities to adopt by ordinance certain fireflow standards that will be established by the TCEQ and apply those standards to utilities and WSCs. Act of May 20, 2013, 83d Leg., R.S., ch. 332 (H.B. 1973) (codified at Texas Health & Safety Code § 341.0359). However, such an ordinance may not require a utility or WSC to build, retrofit, or improve infrastructure in existence at the time the ordinance is adopted.

III. Conclusion

Retail water service is provided by a variety of retail public utilities. As discussed in this chapter, the differences among retail public utilities are driven by differences in the larger purposes for which the utilities are created and to some degree by the profile of the customer population. The level of state supervision varies widely depending on the structure of the retail public utility and has evolved since the inception of state regulation in response to ongoing legislative attention to the need for and cost of providing retail water service.

CHAPTER 30

Water Utilities: Protection of Public Health

Angela K. Moorman[1]

I. Introduction: Roles and Responsibilities of Water Utilities to Protect Public Health

The average person in the United States uses approximately 90 gallons of water per day in the home, and the average residence uses approximately 107,000 gallons of water annually. *See* U.S. Environmental Protection Agency, Office of Water, *Water on Tap: What You Need to Know* 10 (EPA 816-K-09-002 Dec. 2009), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/P1008ZP0.PDF?Dockey=P1008ZP0.PDF. As a group, Americans drink more than 1 billion glasses of tap water each day. *See* U.S. Environmental Protection Agency, Office of Water, *Water Facts* 1 (EPA 816-F-04-036, June 2004), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/3000667W.PDF?Dockey=3000667W.PDF. There are many potential threats to the quality of drinking water. Drinking water that is not properly treated and disinfected poses a health risk to consumers, as does drinking water that is transported through improperly maintained distribution infrastructure. Potential contamination of source water also poses a health risk to consumers. Laws and regulations have been promulgated at both the federal and state levels to address these threats to drinking water.

As described more fully below, the basis for federal regulation is the Safe Drinking Water Act (SDWA). *See* 42 U.S.C. §§ 300f–300j-26. Under the SDWA, the U.S. Environmental Protection Agency (EPA) has adopted primary and secondary drinking water regulations to ensure the quality of drinking water provided by the almost 160,000 public water systems serving over 319 million users throughout the United States. *See* U.S. Environmental Protection Agency, Water: Public Water Systems, *Public Drinking Water Systems: Facts and Figures* (last updated Apr. 2, 2012), http://water.epa.gov/infrastructure/drinkingwater/pws/factoids.cfm.

The SDWA contemplates that states will be the primary authorities for enforcing the drinking water standards. The SDWA identifies how states may receive "primacy" under the statute. Texas has received primacy, and thus the Texas Commission on Environmental Quality (TCEQ) is the primary authority for regulating drinking water quality in Texas. *See* Tex. Health & Safety Code ch. 341, subch. C. The TCEQ has adopted detailed regulations to incorporate and implement the EPA's drinking water regulations. *See* 30 Tex. Admin. Code ch. 290, subchs. D, F.

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In addition, both the EPA and the TCEQ have adopted regulations recognizing the inherent relationship between drinking water quality and drinking water system supply and delivery capacities. Although the federal and state regulatory authorities address the issue in different manners, their goal is the same: to ensure that public water systems have adequate water source capacity to provide high-quality drinking water to their customers.

The following discussion addresses the history and implementation of drinking water regulation in the United States and Texas.

II. Water Quality under the Federal Safe Drinking Water Act

The first federal regulation of drinking water quality dates back to 1914, when the U.S. Public Health Service established standards for certain microbes linked to disease. *See* U.S. Department of Health, Education & Welfare, *Public Health Service Drinking Water Standards 1962* v (rev. 1962); *see also* Stig E. Regli et al., *Control of Drinking Water Pathogens and Disinfection Byproducts*, *in Drinking Water Regulation & Health* 277, 278 (Frederick W. Pontius ed., 2003). Contemporary regulation of drinking water quality began sixty years later with passage of the SDWA in 1974. *See* Safe Drinking Water Act, Pub. L. No. 93-523, 88 Stat. 1660 (1974) (codified at 42 U.S.C. §§ 300f–300j-26). The SDWA was enacted to protect public health by "reclaim[ing] and ensur[ing] the purity of the water" consumed in the United States by regulating the quality of the public drinking water supply. *See* James L. Agee, *Protecting America's Drinking Water: Our Responsibilities Under the Safe Drinking Water Act*, EPA J. (Mar. 1975), *available at* www2.epa.gov/aboutepa/protecting-americas-drinking-water-our-responsibilities-under-safe-drinking-water-act. The requirements of the 1974 SDWA focused on treating raw water as the means of providing the safest drinking water to consumers through the development of federally established primary and secondary drinking water standards that must be met by public water systems. *See* Press Release, U.S. Environmental Protection Agency, *EPA Voices Support for Safe Drinking Water Act* (Mar. 8, 1973), www2.epa.gov/aboutepa/epa-voices-support-safe-drinking-water-act [hereinafter 1973 Press Release]; *see also* U.S. Environmental Protection Agency, Office of Water, *Drinking Water Monitoring, Compliance, and Enforcement* 1 (EPA 816-F-04-031, June 2004), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/3000667Q.PDF?Dockey=3000667Q.PDF [hereinafter Drinking Water Monitoring].

The SDWA was amended in 1986 and 1996 to expand the protection of drinking water quality. *See* Safe Drinking Water Act Amendments of 1986, Pub. L. No. 99-339, 100 Stat. 642 (1986) (codified at 42 U.S.C. §§ 300f–300j-26); Safe Drinking Water Act Amendments of 1996, Pub. L. No. 104-182, 110 Stat. 1613 (1996) (codified at 42 U.S.C. §§ 300f–300j-26); *see also* Press Release, U.S. Environmental Protection Agency, *President Signs Safe Drinking Water Act Amendments* (June 20, 1986), www2.epa.gov/aboutepa/president-signs-safe-drinking-water-act-amendments [hereinafter 1986 Press Release]; Press Release, U.S. Environmental Protection Agency, *President Clinton Signs Legislation to Ensure Americans Safe Drinking Water* (Aug. 6, 1996), www2.epa.gov/aboutepa/president-clinton-signs-legislation-ensure-americans-safe-drinking-water#fact [hereinafter 1996 Press Release]. The 1986 amendments "greatly increase[d] EPA's responsibilities for protecting the nation's drinking water," requiring the development of drinking water standards for more than eighty then unregulated contaminants and calling for the EPA to impose new monitoring requirements on public water systems. 1986 Press Release. The 1986 amendments also required states to develop programs for protecting areas around wells that supply public drinking water systems. *See* 1986 Press Release.

The 1996 amendments recognized additional methods of ensuring drinking water quality, such as source water protection, operator training, funding for water system improvements, and public information. *See* 1996 Press Release; *see* also U.S. Environmental Protection Agency, Fact Sheet, *Safe Drinking Water Act Will Provide Stronger Protections for Communities* (Aug. 6, 1996), www2.epa.gov/aboutepa/president-clinton-signs-legislation-ensure-americans-safe-drinking-water#fact [hereinafter Fact Sheet].

A. General Requirements of the SDWA and Regulations

The SDWA applies to every public water system (PWS) in the United States. A PWS is a "system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves at least twenty-five individuals." 42 U.S.C. § 300f(4)(A). A PWS includes (1) any collection, treatment, storage, and distribution facilities under the control of the operator of such system and used primarily in connection with the system, and (2) any collection or pretreatment storage facilities not under such control that are used primarily in connection with the system. *See* 42 U.S.C. § 300f(4)(A). Although all PWSs are regulated, the regulations apply differently depending on the type and size of the PWS. *See* U.S. Environmental Protection Agency, Office of Water, *Understanding the Safe Drinking Water Act* 1 (EPA 816-F-04-030, June 2004), *available at* www.epa.gov/sites/production/files/2015-04/documents/epa816f04030.pdf [hereinafter Understanding SDWA]. The following terms are important to the applicability of SDWA regulations:

- Community water system: A public water system that supplies drinking water to at least fifteen service connections used by year-round residents of the area served by the system or regularly serves at least twenty-five year-round residents. 42 U.S.C. § 300f(15); *see also* 40 C.F.R. § 141.2.
- Non-community water system: A public water system that serves the public but does not serve the same people year round. *See* 42 U.S.C. § 300f(16); *see also* 40 C.F.R. § 141.2; Understanding SDWA, at 1. There are two types of non-community water systems:
    - Non-transient non-community water system (NTNCWS): A non-community water system that regularly serves at least twenty-five of the same people over six months per year, but not year round (e.g., a school with its own water supply). *See* 40 C.F.R. § 141.2.
    - Transient non-community water system (TWS): A non-community water system that serves the public but does not regularly serve at least twenty-five of the same people over six months per year (e.g., a campground with its own water supply). *See* 40 C.F.R. § 141.2.

B. Primary and Secondary Drinking Water Regulations

Pursuant to the SDWA, the EPA established national primary drinking water regulations (Primary Standards) that—

1. apply to all PWSs;
2. specify contaminants that may have an adverse effect on human health;
3. specify a maximum contaminant level (MCL) for each contaminant if, "in the judgment of the Administrator, it is economically and technologically feasible to ascertain the level of such contaminant in water in public water systems," or if not, a treatment technique that leads to an adequate reduction in the level of such contaminant; and
4. contain criteria and procedures to assure a supply of drinking water "which dependably com-

> plies with such maximum contaminant levels; including accepted methods for quality control and testing procedures to insure compliance with such levels and to insure proper operation and maintenance of the system."

42 U.S.C. § 300f(1). The SDWA, as amended, directed the administrator of the EPA to publish a maximum contaminant level goal (MCLG) and promulgate by rule a Primary Standard, or MCL, for those contaminants for which a national primary drinking water regulation had been promulgated as of August 6, 1996, if the administrator of the EPA determined that—

1. the contaminant might have an adverse effect on the health of persons;

2. the contaminant was known to occur or there was a substantial likelihood that the contaminant would occur in PWSs with a frequency and at levels of public health concern; and

3. in the judgment of the administrator, regulation of such contaminant presented a meaningful opportunity for reducing the health risk for persons served by PWSs.

42 U.S.C. § 300g-1(b)(1)(A). The Primary Standards are established to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

To establish Primary Standards, the EPA first determines an MCLG for regulated contaminants. The EPA is to set the MCLG for a contaminant "at the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety." 42 U.S.C. § 300g-1(b)(4)(A). The MCLG is based on health risks, including risks to the most sensitive consumers, like the elderly and infants. *See* Understanding SDWA, at 3. Available technology is not considered when setting MCLGs. *See* U.S. Environmental Protection Agency, Office of Water, *Drinking Water Standards & Health Effects* 2 (EPA 816-F-04-037, June 2004), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/3000667U.PDF?Dockey=3000667U.PDF [hereinafter Drinking Water Standards].

The EPA then sets an MCL, "the maximum permissible level of a contaminant in water which is delivered to any user of a public water system." 42 U.S.C. § 300f(3); *see also* Understanding SDWA, at 3. The MCL is an enforceable standard that is set as close to the MCLG as feasible. *See* 42 U.S.C. § 300g-1(b)(4)(B). The term "feasible" is defined in the SDWA, for purposes of establishing an MCL, as "feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration)." 42 U.S.C. § 300g-1(b)(4)(D).

After initially determining a proposed MCL or treatment technique (TT) that is as close to the MCLG as feasible based on affordable technology, the EPA must complete an economic analysis to determine whether the benefits of that standard justify the costs. "If not, [the] EPA may adjust the MCL for a particular class or group of systems to a level that 'maximizes health risk reduction benefits at a cost that is justified by the benefits.' [The] EPA may not adjust the MCL if the benefits justify the costs to large systems and small systems that are unlikely to receive variances." Drinking Water Standards, at 2.

When it is not economically or technically feasible to promulgate an MCL for a particular contaminant or when the EPA determines that there is no reliable or economic method to detect a certain contaminant in the water at very low levels, the EPA is still required to take steps to ensure the safety of the water supply with regard to that contaminant. In that case, instead of setting an MCL, the EPA is required to establish a TT that identifies a particular way to treat the water to remove contaminants. *See* 42 U.S.C. § 300g-1(b)(7)(A). The SDWA specifically requires the EPA to adopt Primary Standards specifying certain TTs. For example, the EPA is required to adopt Primary Standards that specify criteria under which filtration (including coagulation and sedimentation) would be required as a TT for PWSs supplied by surface water sources. *See* 42 U.S.C. § 300g-1(b)(7)(C)(i). Amendments to the SDWA also specifically require the EPA to promulgate a Primary Standard requiring disinfection as a TT for all PWSs, including both surface water systems and, as necessary, groundwater systems. *See* 42 U.S.C. § 300g-1(b)(8).

The EPA has established Primary Standards for more than ninety contaminants, including microbiological, chemical, radiological, and physical contaminants that can be found in drinking water. *See* U.S. Environmental Protection Agency, Water: Regulation Development, *Regulating Public Water Systems and Contaminants Under the Safe Drinking Water Act* (last updated Sept. 11, 2013), http://water.epa.gov/lawsregs/rulesregs/regulatingcontaminants/basicinformation.cfm. The Primary Standards are not applicable to the following PWSs:

1. those PWSs that consist of only distribution and storage facilities (and do not have collection and treatment facilities);

2. those PWSs that obtain all their water from, but are not owned or operated by, a PWS to which the Primary Standards apply;

3. those PWSs that do not sell water to any person; and

4. those PWSs that are not carriers that convey passengers in interstate commerce.

42 U.S.C. § 300g. Where the Primary Standards are applicable, the PWSs must test for levels of contaminants in their treated drinking water, comparing those levels of contaminants to the MCLs or TTs to ensure that the regulatory requirements are met. *See generally* 42 U.S.C. § 300g-7.

The SDWA outlines the procedures for the EPA to ensure a constant evaluation of the possible effects of other contaminants on PWSs. Every five years the EPA is required to consult with the scientific community and then publish a list of contaminants that are not currently subject to regulation but are known or are anticipated to occur in PWSs. 42 U.S.C. § 300g-1(b)(1)(B)(i)(I). The contaminants on that list are evaluated for possible future regulation through Primary Standards. 42 U.S.C. § 300g-1(b)(1)(B)(ii).

The EPA also establishes secondary drinking water regulations (Secondary Standards). 42 U.S.C. § 300g-1(c). Although the Secondary Standards also apply to PWSs, they are not enforceable standards. Instead, they specify maximum contaminant levels that, "in the judgment of the Administrator, are requisite to protect the public welfare." *See* 42 U.S.C. § 300f(2). Secondary Standards may apply to a contaminant in drinking water "(A) which may adversely affect the odor or appearance of such water and consequently may cause a substantial number of the persons served by the public water system providing such water to discontinue its use, or (B) which may otherwise adversely affect the public welfare." 42 U.S.C. § 300f(2). Secondary Standards may vary based on geographic region and other site-specific circumstances. 42 U.S.C. § 300f(2). In other words, Secondary Standards are criteria for contaminants that may cause cosmetic or aesthetic effects. Public water systems are not required to meet the Secondary Standards under federal regulations, but states may choose to adopt and enforce the Secondary Standards. *See* Drinking Water Standards, at 1.

C. Monitoring and Reporting Requirements

Regulated PWSs are required to monitor drinking water quality to verify that the drinking water they provide meets all federal and state standards. The EPA has adopted regulations that specify the methods that must be used to analyze drinking water samples. *See* 40 C.F.R. pt. 141, subpt. C. Monitoring and sampling requirements vary depending on the contaminant group, whether the PWS uses groundwater or surface water, and the number of people served by the PWS. *See generally* 40 C.F.R. pt. 141, subpt. C. Certain water systems must also test for particular contaminants that are not currently regulated by the EPA. These data are used to determine which contaminants should be regulated by new standards. *See* Drinking Water Monitoring, at 1.

Information regarding drinking water quality must be made available to the public pursuant to the SDWA. *See generally* 42 U.S.C. § 300g-3(c)(3). The 1996 amendments to the SDWA included provisions regarding consumer access to drinking water quality information. *See* Fact Sheet. There are several methods through which consumers can obtain information regarding drinking water quality. Each community water system is required to prepare a water quality report, or a consumer confidence report, annually. *See* 42 U.S.C. § 300g-3(c)(4). Every customer of a community water system must have access to the annual report, which provides information on the source of the drinking water supply, the levels of regulated contaminants detected in the drinking water, the health effects of any contaminants that are detected above federal health-based standards, and information on the water system's compliance with applicable regulations. *See* 42 U.S.C. § 300g-3(c)(4)(B).

In addition, each state with primacy under the SDWA is required to produce an annual report identifying whether PWSs within the state met drinking water standards during the previous year. *See* 42 U.S.C. § 300g-3(c)(3)(A). The EPA collects information on all PWSs, making much of it available to the public. *See* 42 U.S.C. § 300g-3(c)(3)(B); *see also* U.S. Environmental Protection Agency, Office of Water, *Public Access to Information & Public Involvement* 1 (EPA 816-F-04-039, June 2004), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/30006610.PDF?Dockey=30006610.PDF.

In addition to annual reports, PWSs are required to provide public notification when there is an emergency with the drinking water supply. The SDWA requires each PWS to notify its customers promptly, using various forms of media, if there is an immediate threat to health due to a violation of a drinking water standard. *See* 42 U.S.C. § 300g-3(c)(1), (2).

D. Other SDWA Requirements

An important addition to the SDWA, which occurred with the passage of the 1996 amendments, was the new requirement that all states perform source water assessments. *See* 42 U.S.C. § 300j-13. The first step of this new program was for each state to have its Source Water Assessment Program (SWAP) reviewed and approved by the EPA. *See* 42 U.S.C. § 300j-13(a)(3). After approval, each state was to conduct an assessment of each PWS and make those source water assessments available to the public. The SWAPs for various states differ, but each assessment program must address four major elements:

1. delineate or map the source water protection areas;
2. conduct an inventory of potential sources of contamination in those areas;
3. determine the susceptibility of PWSs to those contamination sources; and
4. release the results of the determinations to the public.

See 42 U.S.C. § 300j-13(a)(2), (7). Source water protection is not mandated by the SDWA amendments, but the EPA encourages states and communities to use the information obtained from the source water assessments to safeguard source water protection areas from identified sources of contaminants. *See* U.S. Environmental Protection Agency, Office of Water, *Protecting Drinking Water Sources* 2 (EPA 816-F-04-032, June 2004), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/3000667S.PDF?Dockey=3000667S.PDF.

E. Texas "Primacy" under the SDWA

Pursuant to the SDWA, states may receive primary regulatory and enforcement authority—that is, the authority to implement the SDWA within their jurisdiction or "primacy." *See* 42 U.S.C. § 300g-2(a). In fact, the 1974 enactment of the SDWA intended for states to be the primary authorities under the SDWA: "The bill provides that the States shall have primary enforcement authority with regard to the drinking water standards and that EPA will monitor activities of the States and public water systems only to the extent necessary to determine if there is an adequate program to enforce the primary standards." 1973 Press Release. To receive primacy under the SDWA, states must meet certain requirements, including adopting regulations that are at least as stringent as those established by the EPA. *See* 42 U.S.C. § 300g-2(a)(1). In addition, to receive primacy, states are required to demonstrate that they have formal enforcement authority and the authority to assess administrative penalties. *See* 42 U.S.C. § 300g-2(a)(2), (6). Texas has received primacy. *See, e.g.*, 31 Tex. Admin. Code § 354.3(c); *see also* U.S. Environmental Protection Agency, EPA's Region 6 Office, *Region 6 South Central—Drinking Water Enforcement* (last updated Sept. 8, 2014), www.epa.gov/aboutepa/epa-region-6-south-central.

III. Texas Law and Rules for Drinking Water Quality

Texas Health and Safety Code chapter 341, subchapter C, prescribes the duties of the TCEQ with regard to the regulation and control of drinking water systems. *See* Tex. Health & Safety Code ch. 341, subch. C; *see also* 30 Tex. Admin. Code § 290.39. Texas law authorizes the TCEQ to implement the federal SDWA and requires that the TCEQ ensure that PWSs (1) supply safe drinking water in adequate quantities, (2) are financially stable and technically sound, (3) promote the use of regional and area-wide drinking water systems, and (4) review completed plans and specifications and business plans for certain PWSs. *See* 30 Tex. Admin. Code § 290.39(a); *see also* Tex. Health & Safety Code §§ 341.031(a), 341.0315(a).

Texas law provides that public drinking water must be "free from deleterious matter and must comply with the standards established" by the TCEQ or the EPA. Tex. Health & Safety Code § 341.031(a). The TCEQ has adopted drinking water standards that govern the quality of drinking water produced by PWSs and establish reporting requirements for PWSs. *See* 30 Tex. Admin. Code ch. 290, subch. F. The TCEQ's chapter 290 rules "are written to comply with the requirements of the Federal 'Safe Drinking Water Act,' . . . and the 'Primary Drinking Water Regulations' which have been promulgated by the [EPA]." 30 Tex. Admin. Code § 290.101.

The TCEQ's chapter 290 rules include the same four applicability exceptions discussed above with regard to the federal rules. For example, like the federal rules, the TCEQ's rules do not apply to a PWS that consists only of distribution and storage facilities. *See* 30 Tex. Admin. Code § 290.102(a)(1). In addition to the four applicability exceptions identified in the federal rules, the TCEQ's rules except from the chapter 290 requirements those PWSs that are subject to plumbing restrictions and inspections by the PWS that provides the water. *See* 30 Tex. Admin. Code § 290.102(a)(5).

The chapter 290 rules were amended in January 2008 to implement revisions to federal regulations related to the safety of drinking water from groundwater and surface water sources. *See* 33 Tex. Reg. 198 (Jan. 4, 2008); 32 Tex. Reg. 4876 (Aug. 10, 2007). Specifically, the 2008 rule amendments were promulgated in response to the EPA's Stage 2 Disinfectants and Disinfection Byproducts Rule, Long Term 2 Enhanced Surface Water Treatment Rule, Ground Water Rule, and Public Notification Rule. *See* 33 Tex. Reg. 198, 198 (Jan. 4, 2008). Promulgation of these new rules was required for Texas to maintain primacy for regulating PWSs. The chapter 290 rules were amended in May 2011 to implement federal regulations addressing levels of lead and copper in drinking water.

See 36 Tex. Reg. 2860 (May 6, 2011). The 2011 rule amendments adopted the EPA's regulations for lead and copper—the National Primary Drinking Water Regulations for Lead and Copper: Short Term Regulatory Revisions and Clarifications ("LCSTR")—again, in order to retain primacy for the SDWA and its amendments. *See* 36 Tex. Reg. 2860. The TCEQ again amended the chapter 290 rules in November 2012. *See* 37 Tex. Reg. 8849 (Nov. 2, 2012). The 2012 amendments were adopted to achieve consistency with the federal total organic carbon (TOC) rule, the federal groundwater rule, and the EPA's requirements related to continuous chlorine residual analyzers. The 2012 amendments also adopted an expanded definition of groundwater under the direct influence of surface water to bring it into conformity with agency practice and federal rules. *See* 37 Tex. Reg. 8849. The TCEQ most recently amended the chapter 290 rules in September 2013, February 2014, and September 2014 to reflect various legislative changes from the 2011 and 2013 sessions of the Texas legislature. *See* 38 Tex. Reg. 5,801, 5,880 (Sept. 6, 2013); 39 Tex. Reg. 813, 994 (Feb. 14, 2014); 39 Tex. Reg. 6,943, 7,145 (Sept. 5, 2014). These amendments addressed such issues as rainwater harvesting systems, sufficient fireflow for certain PWSs, and water supply availability reporting.

A. Summary and Description: Primary Standards—Maximum Contaminant Levels, Maximum Residual Disinfectant Levels, Treatment Techniques, and Action Levels

In compliance with the SDWA and the federal Primary Standards, the TCEQ has adopted MCLs, maximum residual disinfectant levels (MRDLs), TTs, and action levels for a number of drinking water contaminants. *See* 30 Tex. Admin. Code § 290.104(a). The TCEQ has adopted standards for a broad range of contaminants, including inorganic compounds, organic compounds, radionuclides, microbial contaminants, disinfectant residual, total organic carbon, disinfection by-products, and metals. See generally 30 Tex. Admin Code ch. 290, subch. F.

1. Inorganic Compounds

All PWSs are subject to the regulatory requirements applicable to inorganic compounds, although the "level" of applicability differs based on the type of PWS. *See* 30 Tex. Admin. Code § 290.106. Community water systems and NTNCWSs must comply with the monitoring and reporting requirements and MCLs for all inorganic contaminants identified in TCEQ regulations. *See* 30 Tex. Admin. Code § 290.106(a)(1). TWSs must comply with the monitoring and reporting requirements and MCLs for nitrate, nitrite, and total nitrate and nitrite. *See* 30 Tex. Admin. Code § 290.106(a)(2), (b). PWSs that use groundwater under the direct influence of surface water must meet the inorganic sampling requirements identified for surface water systems. *See* 30 Tex. Admin. Code § 290.106(a)(3). The TCEQ has established the following MCLs for inorganic compounds:

Contaminant	**MCL (mg/L unless otherwise noted)**
Antimony	0.006
Arsenic	0.010
Asbestos	7 million fibers/liter (longer than 10 μm)
Barium	2
Beryllium	0.004

Cadmium	0.005
Chromium	0.1
Cyanide	0.2 (as free Cyanide)
Fluoride	4.0
Mercury	0.002
Nitrate	10 (as Nitrogen)
Nitrite	1 (as Nitrogen)
Nitrate and nitrite (total)	10 (as Nitrogen)
Selenium	0.05
Thallium	0.002

Source: 30 Tex. Admin. Code § 290.106(b).

The TCEQ has adopted detailed monitoring requirements for inorganic compounds. *See* 30 Tex. Admin. Code § 290.106(c). PWSs are required to monitor at locations identified in the systems' approved monitoring plans. *See* 30 Tex. Admin. Code § 290.106(c). For example, all inorganic compounds, except asbestos, must be monitored at each entry point to the distribution system. *See* 30 Tex. Admin. Code § 290.106(c)(1). If a PWS draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point that is representative of all sources and during periods of normal operating conditions. *See* 30 Tex. Admin. Code § 290.106(c)(1)(A). The executive director of the TCEQ may approve the use of composite samples where such composite sampling meets the requirements established in the TCEQ's rules. *See* 30 Tex. Admin. Code § 290.106(c)(1)(C).

In addition, each PWS is required to monitor at the time designated during each compliance period. *See* 30 Tex. Admin. Code § 290.106(c). A PWS is required to routinely monitor for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, and thallium. *See* 30 Tex. Admin. Code § 290.106(c)(4)(A). For example, each surface water entry point must be sampled annually and each groundwater entry point must be sampled once every three years. *See* 30 Tex. Admin. Code § 290.106(c)(4)(A)(i), (ii). In addition, the executive director can require either reduced or increased monitoring based on the specific situation of the PWS. *See* 30 Tex. Admin. Code § 290.106(c)(4)(B), (C).

There are specific monitoring requirements for asbestos and nitrates and nitrites. *See* 30 Tex. Admin. Code § 290.106(c)(2), (5)–(7). For example, the asbestos sampling requirements provide that a system that is vulnerable to asbestos contamination due to its source of water is required to sample at the entry point to the distribution system, while a system that is vulnerable to asbestos contamination due to corrosion of asbestos-cement pipe is required to sample at a tap served by asbestos-cement pipe under conditions where asbestos contamination is most likely to occur. *See* 30 Tex. Admin. Code § 290.106(c)(2)(A), (B). A system vulnerable to asbestos contamination due to both its source water supply and corrosion of asbestos-cement pipe must sample at a tap served by asbestos-cement pipe under conditions where asbestos contamination is most likely to occur. *See* 30 Tex. Admin. Code § 290.106(c)(2)(C). The executive director may require sampling for asbestos at additional locations based on the size, length, age, and location of asbestos-cement pipe in the distribution system. *See* 30 Tex. Admin. Code § 290.106(c)(2)(D).

Small system compliance technologies (SSCTs) have been established for arsenic. *See* 30 Tex. Admin. Code § 290.106(i). The SSCTs that are set out in Code of Federal Regulations title 40, section 141.62(d), may be used with TCEQ approval. Where a point-of-use or point-of-entry device is used for compliance, the PWS must develop a program for long-term operation, maintenance, and monitoring of the devices to ensure adequate performance. *See* 30 Tex. Admin. Code § 290.106(i).

2. Organic Compounds

All community water systems and NTNCWSs must comply with the TCEQ's regulatory requirements for organic contaminants. *See* 30 Tex. Admin. Code § 290.107(a). PWSs that use groundwater under the direct influence of surface water must meet the organic sampling requirements given for surface water. *See* 30 Tex. Admin. Code § 290.107(a). The TCEQ has adopted MCLs for thirty synthetic organic chemical (SOC) contaminants and twenty-one volatile organic chemical (VOC) contaminants, as follows:

Synthetic Organic Chemical Contaminants	
Contaminant	**MCL (mg/L)**
2,3,7,8-TCDD (Dioxin)	3 × 10–8
2,4,5-TP	0.05
2,4-D	0.07
Alachlor	0.002
Atrazine	0.003
Benzopyrene	0.0002
Carbofuran	0.04
Chlordane	0.002
Dalapon	0.2
Dibromochloropropane	0.0002
Di(2-ethylhexyl)adipate	0.4
Di(2-ethylhexyl)phthalate	0.006
Dinoseb	0.007
Diquat	0.02
Endothall	0.1
Endrin	0.002
Ethylene dibromide	0.00005
Glyphosate	0.7
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.04

Oxamyl (Vydate)	0.2
Pentachlorophenol	0.001
Picloram	0.5
Polychlorinated biphenyls (PCBs)	0.0005
Simazine	0.004
Toxaphene	0.003

Source: 30 Tex. Admin. Code § 290.107(b)(1).

Volatile Organic Chemical Contaminants	
Contaminant	**MCL (mg/L)**
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
1,2-Dichloroethane	0.005
1,2-Dichloropropane	0.005
1,2,4-Trichlorobenzene	0.07
Benzene	0.005
Carbon tetrachloride	0.005
cis-1,2-Dichloroethylene	0.07
Dichloromethane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
o-Dichlorobenzene	0.6
para-Dichlorobenzene	0.075
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
trans-1,2-Dichloroethylene	0.1
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (total)	10

Source: 30 Tex. Admin. Code § 290.107(b)(2).

As with inorganic compounds, the TCEQ has established detailed monitoring requirements for SOC contaminants and VOC contaminants. *See* 30 Tex. Admin. Code § 290.107(c). All monitoring for SOC contaminants and VOC contaminants must be conducted at sites designated in the PWS's monitoring plan. *See* 30 Tex. Admin. Code § 290.107(c). For SOC monitoring, systems must routinely sample at sample sites representative of each entry point to the distribution system. *See* 30 Tex. Admin. Code § 290.107(c)(1)(A)(i). Each PWS must monitor at the time designated by the executive director within the compliance period. *See* 30 Tex. Admin. Code § 290.107(c)(1)(C)(iv). Community water systems and NTNCWSs are required to take four consecutive quarterly samples for each TCEQ-regulated SOC contaminant during each compliance period beginning with the initial compliance period, although in certain circumstances sampling frequency may be reduced. *See* 30 Tex. Admin. Code § 290.107(c)(1)(C)(i)–(iii). The executive director may require increased SOC monitoring or may waive SOC monitoring. *See* 30 Tex. Admin. Code § 290.107(c)(1)(D), (E).

PWSs are also required to routinely sample for VOC contaminants at sample sites representative of each entry point to the distribution system. *See* 30 Tex. Admin. Code § 290.107(c)(2)(A)(i). For routine monitoring, community water systems and NTNCWSs are required to take four consecutive quarterly samples for each TCEQ-regulated VOC contaminant during each compliance period beginning with the initial compliance period, although in certain circumstances sampling frequency may be reduced. *See* 30 Tex. Admin. Code § 290.107(c)(2)(C)(i), (ii). As with other required monitoring, the executive director can grant waivers from monitoring or require increased monitoring. *See* 30 Tex. Admin. Code §§ 290.107(c)(2)(C)(iv), 290.107(c)(2)(D), (E).

3. *Radionuclides*

Radionuclides, other than radon, must be monitored by community water systems. *See* 30 Tex. Admin. Code § 290.108(a). PWSs that treat groundwater under the direct influence of surface water must comply with the radionuclide requirements for surface water systems. *See* 30 Tex. Admin. Code § 290.108(a).

Maximum contaminant levels have been established for naturally occurring radionuclides as follows:

- 5 picoCuries per liter (pCi/L) for combined radium-226 and radium-228, as calculated by the summation of the results for radium-226 and radium-228.
- 15 pCi/L for gross alpha particle activity (including radium-226 but excluding radon and uranium).
- 30 micrograms per liter (µg/L) for uranium.

See 30 Tex. Admin. Code § 290.108(b)(1). Pursuant to TCEQ rules, the MCLs for beta particle and photon radioactivity from man-made radionuclides in drinking water for community water systems are equivalent to the MCLs established in Code of Federal Regulations title 40, section 141.66(d). *See* 30 Tex. Admin. Code § 290.108(b)(2).

PWSs are required to measure the concentration of radionuclides at locations and frequencies specified in the system's monitoring plan. *See* 30 Tex. Admin. Code § 290.108(c). Required monitoring frequencies are specified for both naturally occurring radionuclides and man-made radionuclides. *See* 30 Tex. Admin. Code § 290.108(c)(1), (2). Compliance must be routinely monitored at sampling points representing each entry point to the distribution system. *See* 30 Tex. Admin. Code § 290.108(c)(3)(B). If results from an entry point exceed one-half the MCL, the executive director may require the system to sample all water sources that provide water to that entry point. *See* 30 Tex. Admin. Code § 290.108(c)(3)(B).

Small system compliance technologies have been established for radionuclides. The SSCTs for radionuclides are identified in Code of Federal Regulations title 40, section 141.66(h), and may be used with TCEQ approval. 30 Tex. Admin. Code § 290.108(i). Where a point-of-use or a point-of-entry device is used for compliance, the water system must develop a program for the long-term operation, maintenance, and monitoring of the devices to ensure adequate performance. *See* 30 Tex. Admin. Code § 290.108(i).

4. *Microbial Contaminants*

All PWSs must comply with the TCEQ's regulatory requirements for microbial contaminants. *See* 30 Tex. Admin. Code § 290.109(a). The TTs and MCL requirements for microbial contaminants are based on the detection of those contaminants or fecal indicator organisms and are established as follows:

- For a system that collects at least forty routine distribution samples per month, the MCL is defined as being when more than 5.0 percent of samples collected during the month are coliform positive.
- For a system that collects fewer than forty routine distribution samples per month, the MCL is defined as being when more than one sample is coliform positive.
- The acute MCL is defined as being when a repeat sample is fecal coliform or *Escherichia coli (E. coli)* positive, or a total coliform positive repeat sample follows a fecal coliform or *E. coli* positive routine sample.

30 Tex. Admin. Code § 290.109(b)(1).

For systems required to collect raw groundwater samples, the regulatory standard is "no detection of fecal indicators in a raw groundwater samples [sic]." 30 Tex. Admin. Code § 290.109(b)(2).

To comply with the microbial contaminants monitoring requirements, PWSs must collect samples for total coliform, fecal coliform, *E. coli*, or other fecal indicator organisms. *See* 30 Tex. Admin. Code § 290.109(c). As with other contaminants, the TCEQ's rules specify the locations and frequency of monitoring for microbial contaminants. For example, PWSs are to collect routine distribution coliform samples at active service connections that are representative of water quality throughout the distribution system. *See* 30 Tex. Admin. Code § 290.109(c)(1)(A). Other sampling sites may be used if they are located adjacent to active service connections. *See* 30 Tex. Admin. Code § 290.109(c)(1)(A). The monitoring locations must be identified in the system's monitoring plan. *See* 30 Tex. Admin. Code § 290.109(c)(1)(B).

The minimum sampling frequency for community and non-community PWSs is based on the population served and the source of the water provided. *See* 30 Tex. Admin. Code § 290.109(c)(2)(A); *see also* 30 Tex. Admin. Code § 290.109(c)(2)(B)–(D). Based on the population, the rules specify the number of samples to be taken per month. *See* 30 Tex. Admin. Code § 290.109(c)(2)(A)(iii). Repeat sampling is required if one or more routine samples is found to contain coliform organisms. *See* 30 Tex. Admin. Code § 290.109(c)(3). The SDWA does not allow small systems to obtain variances from the regulatory requirements applicable to microbial contaminants. *See* Drinking Water Standards, at 2.

5. *Disinfectant Residuals*

All PWSs are required to properly disinfect the water before it is distributed to any customers. In addition, PWSs are required to maintain acceptable disinfectant residuals within the distribution system. *See* 30 Tex. Admin. Code § 290.110(a). Both the minimum residual disinfectant concentration and the MRDL apply to PWSs. *See* 30 Tex. Admin. Code § 290.104(f). The MRDL is not to be exceeded. 30 Tex. Admin. Code § 290.110(b). In addition, the disinfection process at a PWS that treats surface water or groundwater under the direct influence of surface water must meet minimum disinfection requirements before the water is supplied to any consumer. *See* 30 Tex. Admin. Code § 290.110(b); *see also* 30 Tex. Admin. Code § 290.111(d). The following standards are set out in the TCEQ rules:

- The minimum residual disinfectant concentration in the water entering the distribution system is 0.2 milligram per liter (mg/L) free chlorine or 0.5 mg/L chloramine. *See* 30 Tex. Admin. Code § 290.104(f)(1).
- The minimum residual disinfectant concentration in the water within the distribution system is 0.2 mg/L free chlorine or 0.5 mg/L chloramine. *See* 30 Tex. Admin. Code § 290.104(f)(2).
- The MRDL of chlorine dioxide in the water entering the distribution system is 0.8 mg/L. *See* 30 Tex. Admin. Code § 290.104(f)(3).
- The MRDL of free chlorine or chloramine in the water within the distribution system is 4.0 mg/L based on a running annual average. *See* 30 Tex. Admin. Code § 290.104(f)(4); *see also* 30 Tex. Admin. Code § 290.110(b)(5).
- The disinfection process used by a PWS that treats surface water or groundwater under the direct influence of surface water must achieve minimum microbial inactivation levels as identified in the following table:

Microbial Inactivation Requirements

	Filter Technology Used			
	Conventional Filters[1]		**Membrane Filters and Cartridge Filters[2]**	
Pretreatment Provided	***Giardia***	**Virus**	***Giardia*[3]**	**Virus**
No coagulation	NA[4]	NA[4]	0.0-log	4.0-log
Coagulation and flocculation	1.0-log	3.0-log	0.0-log	3.0-log
Coagulation, flocculation, and clarification	0.5-log	2.0-log	0.0-log	2.0-log

1. Filters in which water passes through a porous granular media and which use depth filtration processes.
2. Filters in which particulate matter larger than 1 micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism.
3. The executive director will determine the required *Giardia* inactivation on a case-by-case basis.
4. NA = Not Allowed. Conventional filtration with no coagulation is not allowed to receive *Giardia* or viral treatment credit.

Source: 30 Tex. Admin. Code § 290.111(d)(1).

PWSs are required to monitor the performance of their disinfection facilities to ensure that appropriate disinfectant levels are maintained. *See* 30 Tex. Admin. Code § 290.110(c). Monitoring is to be conducted at sites designated in the PWS's monitoring plan. *See* 30 Tex. Admin. Code § 290.110(c).

6. *Total Organic Carbon*

All community water systems and NTNCWSs that treat surface water or groundwater under the direct influence of surface water and use coagulation, flocculation, sedimentation or clarification, or filtration facilities as part of the treatment process must meet specific TCEQ rules applicable to total organic carbon (TOC). *See* 30 Tex. Admin. Code § 290.112(a). Systems must "achieve the Step 1 removal requirements in paragraph (1) of this subsection, meet one of the alternative compliance criteria described in paragraph (2) of this subsection, or apply for the alternative Step 2 removal requirements described in paragraph (3) of this subsection." 30 Tex. Admin. Code § 290.112(b).

For Step 1, section 290.112(b)(1), a water treatment plant's TOC required percent removal is based on the plant's source-water TOC and alkalinity. 30 Tex. Admin. Code § 290.112(b)(1). For example, if the source-water TOC is greater than or equal to 8.0 mg/L and the source water alkalinity is between zero and 60 mg/L as calcium carbonate (CaCO3), then 50 percent removal is required. 30 Tex. Admin. Code § 290.112(b)(1).

The alternative compliance criteria described in section 290.112(b)(2)—that is, paragraph (2)—include eight different criteria, alternative compliance criteria numbers 1 through 8, that a system may meet. *See* 30 Tex. Admin. Code § 290.112(b)(2). For example:

- A system meets alternative compliance criteria number 1 if the system's source-water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average. *See* 30 Tex. Admin. Code § 290.112(b)(2)(A).
- A system meets alternative compliance criteria number 2 if the system's treated-water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average. *See* 30 Tex. Admin. Code § 290.112(b)(2)(B); *see also* 30 Tex. Admin. Code § 290.112(b)(2)(C)–(H).

If a PWS does not meet the Step 1 TOC removal requirements and does not meet one of the eight alternative compliance criteria, then the system must apply for executive director approval of alternative Step 2 removal requirements. 30 Tex. Admin. Code § 290.112(b)(3).

Systems are required to conduct TOC monitoring during normal operating conditions at sites and at the frequency designated in the system's monitoring plan. 30 Tex. Admin. Code § 290.112(c).

7. *Disinfection By-Products*

Disinfection by-products (DBPs) are "[c]hemical compounds formed by the reaction of a disinfectant with the natural organic matter present in water." *See* 30 Tex. Admin. Code § 290.103(8). All community water systems and NTNCWSs are required to meet MCLs for certain regulated DBPs, as addressed below.

a. TTHM and HAA5

The DBPs total trihalomethanes (TTHM) and haloacetic acids (group of five) (HAA5) are regulated by the TCEQ. *See* 30 Tex. Admin. Code § 290.113(b). The running annual average concentrations of TTHM and HAA5 are not to exceed the following MCLs:

- 0.080 mg/L for TTHM
- 0.060 mg/L for HAA5

30 Tex. Admin. Code § 290.113(b). All TTHM and HAA5 samples must be taken during normal operation conditions, and monitoring must be done at locations and at frequencies identified in the system's monitoring plan. 30 Tex. Admin. Code § 290.113(c). TCEQ rules include detailed tables defining routine monitoring frequencies and locations and reduced monitoring frequencies and locations for TTHM and HAA5 based on the type of PWS. *See* 30 Tex. Admin. Code § 290.113(c)(3), (4).

b. Chlorite and Bromate

All public water systems that use chlorine dioxide must comply with an MCL for chlorite of 1.0 mg/L. *See* 30 Tex. Admin. Code § 290.114(a)(1). Monitoring for chlorite concentrations is to be done at locations and intervals specified in the system's monitoring plan. All samples must be collected during normal operating hours. 30 Tex. Admin. Code § 290.114(a)(2). The chlorite concentration of water entering the distribution system must be measured at least once each day. 30 Tex. Admin. Code § 290.114(a)(2)(A). A "three-sample set" must be collected on the same day at the following locations: (1) near the first customer of a plant using chlorine dioxide, (2) at a location representative of the average residence time in the distribution system, and (3) at a location reflecting maximum residence time in the distribution system. 30 Tex. Admin. Code § 290.114(a)(2)(B).

All community water systems and NTNCWSs that use ozone must meet the MCL for bromate of 0.010 mg/L. *See* 30 Tex. Admin. Code § 290.114(b)(1). Bromate concentrations in the water entering the distribution system must be measured at least once each month. *See* 30 Tex. Admin. Code § 290.114(b)(2). Samples are to be collected when the ozonation system is operating under normal conditions and at locations and intervals specified in the system's monitoring plan. *See* 30 Tex. Admin. Code § 290.114(b)(2).

8. Metals

The TCEQ has established regulatory requirements for lead and copper that apply to community water systems and NTNCWSs, requiring them to control the levels of lead and copper in drinking water by controlling the corrosivity of the water. *See* 30 Tex. Admin. Code § 290.117(a). The TCEQ rules address monitoring, reporting, corrosion control studies and treatment, source water treatment, lead service line replacement, and public education. New PWSs are required to meet the lead and copper requirements when notified by the executive director. 30 Tex. Admin. Code § 290.117(a).

Public water systems must meet action levels for lead and copper in drinking water. 30 Tex. Admin. Code § 290.117(b). The action level for lead is 0.015 mg/L, and it "is exceeded if the '90th percentile' lead level exceeds 0.015 mg/L in any monitoring period. The 90th percentile lead level is exceeded when more than 10% of tap water samples have a concentration over the action level." 30 Tex. Admin. Code § 290.117(b)(1)(A). The action level for copper is 1.3 mg/L. 30 Tex. Admin. Code § 290.117(a)(3). The action level for copper "is exceeded if the concentration of copper is more than 10% of tap water samples collected during any monitoring period is greater than 1.3 mg/L." 30 Tex. Admin. Code § 290.117(b)(1)(B).

Community water systems and NTNCWSs are required to sample at sites and at frequencies approved by the TCEQ executive director of and documented in the systems' monitoring plans. *See* 30 Tex. Admin. Code § 290.117(c). Prior to conducting required tap sample monitoring, each PWS must complete a materials survey of its distribution system to identify a pool of tap sampling sites that meet specified requirements. *See* 30 Tex. Admin. Code § 290.117(c)(1)(C)(i). Sample sites are to be representative of the distribution system and must specifically represent areas of the system most vulnerable to corrosion of lead and copper into the water. 30 Tex. Admin. Code § 290.117(c)(1)(C). The material survey is to be submitted to the executive director for review and approval. 30 Tex. Admin. Code § 290.117(c)(1)(C)(i). After completing sample site selection, the system is to submit the Lead and Copper Sample Site Selection form to the executive director for approval. 30 Tex. Admin. Code § 290.117(c)(1)(C)(ii).

The Lead and Copper Rule, a TT established by the EPA, requires optimized corrosion control. See 40 C.F.R. pt. 141, subpt. I. TCEQ rules provide that systems may be required to perform corrosion control studies to determine whether treatment is necessary to reduce the corrosivity of the water. *See*

30 Tex. Admin. Code § 290.117(f). Based on the results of the corrosion control study, the system is to recommend to the executive director an optimal water quality parameter (OWQP) range based on normal system operating conditions. 30 Tex. Admin. Code § 290.117(f)(2). The executive director then reviews the corrosion control study and designates OWQPs. 30 Tex. Admin. Code § 290.117(f)(2). In addition, a system that exceeds the action level for lead or copper based on the 90th percentile level is required to submit recommendations for optimal corrosion control treatment equipment within six months after the end of the monitoring period during which the exceedance occurred. 30 Tex. Admin. Code § 290.117(f)(3). The executive director is then required to designate the optimal corrosion control treatment method. 30 Tex. Admin. Code § 290.117(f)(3).

Also pursuant to TCEQ rules, all PWSs that serve populations greater than 50,000 are required to conduct monitoring for water quality parameters (WQPs). *See* 30 Tex. Admin. Code § 290.117(e). All systems that serve 50,000 or fewer people that exceed the lead or copper action level are also required to conduct WQP monitoring. 30 Tex. Admin. Code § 290.117(e). WQP monitoring is to be conducted every six months for the following parameters: pH, alkalinity, calcium, conductivity, temperature, orthophosphate, and silica. *See* 30 Tex. Admin. Code § 290.117(e)(2). WQP monitoring must be conducted at all entry points and at a number of distribution points, based on the size of the PWS. *See* 30 Tex. Admin. Code § 290.117(e)(2).

Unlike other regulatory requirements discussed above, the TCEQ Lead and Copper Rule includes public education requirements. *See* 30 Tex. Admin. Code § 290.117(k). Public water systems that exceed the lead action level at the ninetieth percentile tap sample are required to deliver public education materials to the public and the executive director. *See* 30 Tex. Admin. Code § 290.117(k); *see also* 40 C.F.R. § 141.85(a). Detailed requirements for public education and notification are set out in the TCEQ's rules. *See* 30 Tex. Admin. Code § 290.117(k).

9. Surface Water Treatment and Turbidity Treatment Technique Requirements

PWSs that treat surface water or groundwater under the direct influence of surface water must comply with applicable TCEQ rules, including the TCEQ-adopted turbidity TT requirements. *See* 30 Tex. Admin. Code § 290.104(g). The filtration technique used by PWSs must ensure that the system meets the specified TT requirements and performance criteria. Treatment plants that use conventional media filtration must achieve the following turbidity levels. The turbidity level of the combined filter effluent must never exceed 1.0 Nephelometric Turbidity Unit (NTU), and the turbidity level of the combined filter effluent must be 0.3 NTU or less in at least 95 percent of the samples tested each month. 30 Tex. Admin. Code § 290.104(g)(1); *see also* 30 Tex. Admin. Code § 290.111(e)(1). The TCEQ has also established performance criteria for individual filter effluent. The filtration techniques must ensure the PWS meet the following performance criteria:

> (A) The turbidity from each individual filter effluent should never exceed 1.0 NTU.
>
> (B) At a public water system that serves 10,000 people or more, the turbidity from each individual filter effluent should not exceed 0.5 NTU at four hours after the individual filter is returned to service after backwash or shutdown.

30 Tex. Admin. Code § 290.111(e)(2). A PWS that utilizes unconventional filtration technologies, such as membrane filters or cartridge filters, must meet site-specific TT requirements approved by the executive director. *See* 30 Tex. Admin. Code § 290.111(f)(1).

In addition, a PWS that treats surface water or groundwater under the direct influence of surface water must conduct at least two rounds of special raw surface water monitoring at all surface water intakes and at all wells producing groundwater under the direct influence of surface water. *See* 30 Tex. Admin. Code § 290.111(b). The purpose of such monitoring is to establish minimum TT requirements for *Cryptosporidium* and other pathogens. *See* 30 Tex. Admin. Code § 290.111(b). This monitoring can be waived by the executive director if certain requirements are met. *See* 30 Tex. Admin. Code § 290.111(b).

B. Summary and Description: Secondary Standards

The TCEQ has adopted Secondary Standards, or secondary constituent levels, that apply to all PWSs. *See* 30 Tex. Admin. Code § 290.118(a). The TCEQ has established the following maximum secondary constituent levels:

Constituent	Level (mg/L unless otherwise noted)
Aluminum	0.05 to 0.2
Chloride	300
Color	15 color units
Copper	1.0
Corrosivity	Noncorrosive
Fluoride	2.0
Foaming agents	0.5
Hydrogen sulfide	0.05
Iron	0.3
Manganese	0.05
Odor	3 Threshold Odor Number
pH	>7.0
Silver	0.1
Sulfate	300
Total dissolved solids	1000
Zinc	5.0

Source: 30 Tex. Admin. Code § 290.118(b).

If water does not meet the established secondary constituent levels, it cannot be used for public drinking water without written approval from the executive director. 30 Tex. Admin. Code § 290.118(a). Approval by the executive director of drinking water that does not meet the secondary constituent levels is valid only until such time as drinking water of acceptable chemical quality can be made available at "reasonable cost" to the area in question. 30 Tex. Admin. Code § 290.118(a).

Required monitoring for secondary constituent levels is dependent on the source water. For example, each groundwater source must be sampled once every three years at the entry point to the distribution system. 30 Tex. Admin. Code § 290.118(c)(1). Each surface water source must be sampled annually at the entry point to the distribution system. 30 Tex. Admin. Code § 290.118(c)(2).

C. Analytical Procedures

All samples that are collected to show compliance with the TCEQ's chapter 290 MCLs, samples that are used to determine compliance with action level requirements and raw groundwater source monitoring requirements, and samples for microbial contaminants must be analyzed at a laboratory accredited by the executive director in accordance with Texas Administrative Code title 30, chapter 25. 30 Tex. Admin. Code § 290.119(a)(1). Samples used to demonstrate compliance with the TT requirements and MRDLs set out in chapter 290 must be analyzed by a laboratory approved by the executive director. 30 Tex. Admin. Code § 290.119(a)(2). The methods of analysis that must be used are specified in the Code of Federal Regulations and have been adopted by reference by the TCEQ. *See* 30 Tex. Admin. Code § 290.119(b); *see also* 40 C.F.R. pt. 141, subpt. C. In addition, there are circumstances where TCEQ rules specify analytical methods. For example, with regard to the Primary Standard for disinfectant residuals, TCEQ rules specify the methods to be used to measure and analyze free chlorine or chloramine residual and chlorine dioxide residual. *See* 30 Tex. Admin. Code § 290.110(d). An alternative analytical technique can be specified by the executive director and approved by the administrator of the EPA. 30 Tex. Admin. Code § 290.119(b).

D. Monitoring Plans

TCEQ rules specify that all monitoring is to be conducted in the manner and on the schedule approved by the executive director. *See* 30 Tex. Admin. Code § 290.102(e). All PWSs are required to maintain an up-to-date chemical and microbiological monitoring plan that is subject to the review and approval of the executive director. 30 Tex. Admin. Code § 290.121(a). The monitoring plan must identify—

- all sampling locations,
- the sampling frequency,
- the analytical procedures, and
- the laboratories to be used for analysis.

See 30 Tex. Admin. Code § 290.121(b)(1)–(4). The monitoring plan is also required to include a description of the methods used to calculate compliance with all MCLs, MRDLs, and TTs that apply to the system. 30 Tex. Admin. Code § 290.121(b)(5).

The monitoring plan is required to be very detailed. For example, the monitoring plan must specify—

- the location of each sampling site at a treatment plant or pump station, the origin of any flow stream that is recycled at the treatment plant, any pretreatment that occurs before the recycle stream is returned to the primary treatment process, and the location where the recycle stream is reintroduced to the primary treatment process. 30 Tex. Admin. Code § 290.121(b)(1)(A);
- each entry point to the distribution system. 30 Tex. Admin. Code § 290.121(b)(1)(B); and
- the address of each sampling site in the distribution system. 30 Tex. Admin. Code § 290.121(b)(1)(C).

In addition, the monitoring plan must include a written description of sampling frequency and schedule. 30 Tex. Admin. Code § 290.121(b)(2).

When one PWS supplies treated water to one or more other PWSs, the executive director may modify the monitoring requirements imposed by chapter 290 to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. 30 Tex. Admin. Code § 290.102(f).

All PWSs are required to maintain a copy of the current monitoring plan at each treatment plant and at a central location. 30 Tex. Admin. Code § 290.121(c). The monitoring plan must be updated when the PWS's sampling requirements or protocols change. 30 Tex. Admin. Code § 290.121(c).

E. Public Notification

The TCEQ's rules identify various required levels of public notification based on different types, or degrees, of violations, including—

- violations of MCLs, MRDLs, or TTs or other situations that pose an acute threat to public health. 30 Tex. Admin. Code § 290.122(a);
- violations of any MCL, MRDL, or TT other than those violations that pose an acute violation or any violation that involves a variance or exemption requirement. 30 Tex. Admin. Code § 290.122(b); and
- violations such as failure to perform required monitoring or comply with required testing procedures. 30 Tex. Admin. Code § 290.122(c).

Situations that pose an acute threat to public health include—

- a violation of the acute MCL for microbial contaminants,
- an acute turbidity issue at a treatment plant that is treating surface water or groundwater under the direct influence of surface water,
- a violation of the MCL for nitrate or nitrite,
- a violation of the acute MRDL for chlorine dioxide,
- occurrence of a waterborne disease outbreak,
- detection of *E. coli* or other fecal indicators in source water samples as specified, which requires a public notice to be issued within twenty-four hours of notification of the positive sample, and
- other situations deemed by the executive director to pose an acute risk to human health.

30 Tex. Admin. Code § 290.122(a)(1).

The initial notice for an acute violation—or the initial acute public notice and boil-water notice—must be issued as soon as possible, but no later than twenty-four hours after the violation is identified. 30 Tex. Admin. Code § 290.122(a)(2). The initial acute violation notice for a community water system must be provided to radio and television stations serving the area that is served by the PWS and must be published in a daily newspaper of general circulation in the area served by the PWS, or if the area is not served by such a daily newspaper, notice must be issued by direct delivery, by continuous posting in conspicuous places within the area served by the system, by electronic delivery, or by alert systems (e.g., reverse 911). 30 Tex. Admin. Code § 290.122(a)(2)(B), (C). The owner or operator of a non-community water system is to issue a notice of acute violation by direct delivery or by continuously posting the notice in conspicuous places within the area served by the water system, by electronic delivery, or by alert systems. 30 Tex. Admin. Code § 290.122(a)(2)(D). TCEQ-adopted rules also include requirements for additional notices for as long as the violation exists. *See* 30 Tex. Admin. Code § 290.122(a)(3). A notice must also be published when the PWS has corrected the acute violation. 30 Tex. Admin. Code § 290.122(a)(4). The other levels, or degrees, of violations require public notice, but generally those notices are not required to be issued as immediately or as broadly. *See* 30 Tex. Admin. Code § 290.122(b), (c).

The public notice must contain—

- a clear and readily understandable explanation of the violation, significant deficiency, or situation that led to the notification;
- if for a specific event or significant deficiency, when the event occurred or the date the significant deficiency was identified by the executive director of the TCEQ;

- for particular violations, the potential adverse health effects;
- a statement of the actions taken by the water system to correct the violation or situation and when the water system expects to return to compliance;
- whether alternative drinking water sources should be used and what other actions should be taken by consumers; and
- the name, business address, and telephone number where consumers can contact the owner, operator, or designee of the public water system.

30 Tex. Admin. Code § 290.122(d)(1)–(6). In addition, PWSs must notify customers at sampled taps of the results of any required lead or copper analyses and certify to the executive director that the required notice was provided. 30 Tex. Admin. Code § 290.122(d)(10). Where appropriate, the public notice must be multilingual. 30 Tex. Admin. Code § 290.122(d)(7). Proof of public notice must be provided to the executive director within ten days of its distribution. 30 Tex. Admin. Code § 290.122(f). Failure to certify that appropriate notice was provided is a violation. *See, e.g.*, 30 Tex. Admin. Code § 290.106(f)(8).

If a PWS has a distribution system separate from other parts of the distribution system with no interconnections, the executive director may allow the PWS to give public notice to only that portion of the system that is out of compliance. *See, e.g.*, 30 Tex. Admin. Code § 290.107(g). A PWS that is required to notify its customers must also provide a copy of the notification to any PWSs that purchase or otherwise receive water from it in the same manner in which it informed its customers. 30 Tex. Admin. Code § 290.122(g).

F. Variances and Exemptions

States can grant variances to PWSs that serve 3,301 to 10,000 people with approval from the EPA. 42 U.S.C. § 300g-4(e)(1)(B). To obtain a variance, the PWS must establish that (1) it cannot meet an MCL, even while using the best available treatment method, because of the characteristics of the raw water; and (2) the variance will not create an unreasonable risk to public health. *See generally* 42 U.S.C. § 300g-4. States may also grant variances from standards for a PWS that serves up to 3,300 people if the system cannot afford to comply with a rule and the PWS installs EPA-approved variance technology. *See generally* 42 U.S.C. § 300g-4.

Exemptions from standards may be granted to allow extra time to seek other compliance options or financial assistance. *See* 42 U.S.C. § 300g-5. To obtain an exemption, the PWS must demonstrate that (1) there are compelling reasons (including economic factors) why it cannot meet the MCL or TT, (2) it was in operation on the effective date of the MCL or TT, and (3) the exemption will not create an unreasonable risk to public health. *See generally* 42 U.S.C. § 300g-5. In granting an exemption, the state must establish a schedule under which the PWS will come into compliance with the MCL or TT. *See generally* 42 U.S.C. § 300g-5.

Pursuant to TCEQ rules, the executive director cannot approve a variance or an exemption from—

1. the MCL for total coliforms, nitrate, nitrite, or total nitrate and nitrite;
2. the MRDL for chlorine dioxide; or
3. the TT requirements for filtration and disinfection.

30 Tex. Admin. Code § 290.102(b).

G. Compliance and Enforcement

Each of the TCEQ's rules establishing Primary Standards includes provisions to be used in determining whether a PWS is in compliance with the regulatory requirements. *See, e.g.*, 30 Tex. Admin. Code § 290.106(f). For example, the TCEQ's rule for inorganic compounds provides a number of factors to evaluate when determining compliance. These factors include such criteria as the following:

- A PWS that exceeds the level for nitrate, nitrite, or the sum of nitrate and nitrite specified in the TCEQ's rule commits an acute MCL violation. Compliance is to be based on the results of a single sample. If a confirmation sample is collected, compliance is to be based on the average result of the original and confirmation samples. 30 Tex. Admin. Code § 290.106(f)(2).
- A PWS that exceeds the MCL for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, selenium, or thallium as established in TCEQ rules at any sampling point commits an MCL violation. 30 Tex. Admin. Code § 290.106(f)(3). The frequency of sampling is used to determine whether the violation has occurred. *See* 30 Tex. Admin. Code § 290.106(f)(3).

The other Primary Standards include similar provisions that identify how to determine whether a violation has occurred. *See, e.g.*, 30 Tex. Admin. Code §§ 290.107(f), 290.109(f), 290.110(f), 290.112(f).

Texas statutes establish standards for the enforcement of the applicable drinking water statutes and rules. *See* Tex. Health & Safety Code §§ 341.047–.049. Section 341.049 of the Health and Safety Code provides that the TCEQ may assess an administrative penalty "[i]f a person causes, suffers, allows, or permits a violation" of the applicable statutes, the chapter 290 rules, or a TCEQ order. Tex. Health & Safety Code § 341.049(a). The penalty is defined as not less than $50 or more than $1,000 for each violation. Tex. Health & Safety Code § 341.049(a). In determining the amount of an administrative penalty for a violation of the drinking water standards, the TCEQ is to consider—

(1) the nature of the circumstances and the extent, duration, and gravity of the prohibited acts or omissions;

(2) with respect to the alleged violator:

(A) the history and extent of previous violations;

(B) the degree of culpability, including whether the violation was attributable to mechanical or electrical failures and whether the violation could have been reasonably anticipated and avoided;

(C) the person's demonstrated good faith, including actions taken by the person to correct the cause of the violation;

(D) any economic benefit gained through the violation; and

(E) the amount necessary to deter future violation; and

(4) any other matters that justice requires.

Tex. Health & Safety Code § 341.049(b).

In evaluating the need for an administrative enforcement action against a PWS, the TCEQ relies on its Enforcement Response Policy (ERP), as required by the EPA. *See* Memorandum from Linda

Brookins, Director, Water Supply Division, Texas Commission on Environmental Quality, to Drinking Water Advisory Work Group (June 10, 2011), *available at* www.tceq.texas.gov/assets/public/permitting/watersupply/pdw/enforcement/ERPAnnouncement_FINAL.pdf [hereinafter Brookins Memorandum]. The purpose of the ERP is to identify PWSs "with violations that rise to the level of significant non-compliance by focusing on those systems with health-based violations and those that show a history of violations across multiple rules." Brookins Memorandum, at 1. The ERP utilizes an Enforcement Targeting Tool (ETT) to prioritize PWSs "by assigning each violation a 'weight' or number of points based on the assigned threat to public health." Brookins Memorandum, at 1. The points for each violation are added to provide a total score for that PWS. Unaddressed violations with a score greater than or equal to eleven points will result in a formal enforcement action within six months of the ranking. Brookins Memorandum, at 1. The TCEQ will use the ETT to identify water systems with the highest total noncompliance across all rules, thus allowing the TCEQ to focus its resources to address those water systems with the highest priority problems.

Section 341.048 of the Health and Safety Code addresses civil enforcement, stating that a "person may not cause, suffer, allow, or permit a violation" of the applicable statutes, the chapter 290 rules, or a TCEQ order. Tex. Health & Safety Code § 341.048(a). The civil penalty is to be no less than $50 or more than $1,000 per violation. Tex. Health & Safety Code § 341.048(a). Each day of a continuing violation is considered a separate violation. *See* Tex. Health & Safety Code § 341.048(b). Section 341.048 authorizes the TCEQ, a county, or a municipality to institute a civil suit in district court for injunctive relief or the assessment and recovery of a civil penalty. *See* Tex. Health & Safety Code § 341.048(c). The TCEQ is a necessary and indispensable party if the suit is brought by a county or a municipality. *See* Tex. Health & Safety Code § 341.048(d). The civil suit must be brought in (1) Travis County, (2) the county in which the defendant resides, or (3) the county in which the violation or threat of violation occurs. Tex. Health & Safety Code § 341.048(f).

Health and Safety Code section 341.047 defines the criminal offenses associated with violation of chapter 341. *See* Tex. Health & Safety Code § 341.047. The following are examples of violations of chapter 341:

- violation of a provision of section 341.031 relating to public drinking water,
- construction of a drinking water supply system without submitting completed plans and specifications, and
- beginning construction of a drinking water supply system without the approval of the TCEQ.

Tex. Health & Safety Code § 341.047(a)(1), (4), (5). All the offenses identified in section 341.047 are Class C misdemeanors. Tex. Health & Safety Code § 341.047(b).

IV. Addressing "Capacity" to Ensure Drinking Water Quality

Ensuring the adequacy of the quantity of the water supply, as well as the adequacy of infrastructure and technical capacity of a PWS, is intrinsically related to the protection of public health and sanitation. This has been recognized, in different ways, at both federal and state levels.

A. Federal Programs

At the federal level, the 1996 amendments to the SDWA created a program that focuses on maintaining adequate financial, managerial, and technical (FMT) capacity, or ability, for a PWS to meet specified quality levels on a dependable basis. *See* 42 U.S.C. § 300g-9. This capacity development program requires that the EPA publish guidance "describing legal authorities and other means to ensure that all new community water systems and new nontransient, noncommunity water systems demonstrate technical, managerial, and financial capacity with respect to national primary drinking water regulations." 42 U.S.C. § 300g-9(d)(4).

As described by the EPA, "capacity development" is "the process through which water systems acquire and maintain adequate technical, managerial, and financial capabilities to enable them to consistently provide safe drinking water." U.S. Environmental Protection Agency, Water: Small Systems and Capacity Development, *Basic Information*, water.epa.gov/type/drink/pws/smallsystems/basicinformation.cfm [hereinafter Basic Information]. Technical capacity includes source water adequacy, infrastructure adequacy (including source, treatment, storage, and distribution), and the ability of personnel to implement requisite technical knowledge. *See* Basic Information.

Capacity development under the 1996 SDWA amendments has three major components:

1. Under penalty of losing Drinking Water State Revolving Fund (DWSRF) monies, states must have a program established to "ensure that all new community water systems and NTNCWSs commencing operations after October 1, 1999 demonstrate technical, managerial, and financial capacity with respect to each national primary drinking water regulation in effect, or likely to be in effect, on the date of commencement of operations."

2. Under penalty of losing DWSRF monies, states must develop and implement a "strategy to assist public water systems in acquiring and maintaining technical, managerial, and financial capacity."

3. States may not provide DWSRF loan assistance to systems that lack the technical, managerial, and financial capability to ensure compliance or systems that are in significant noncompliance with any drinking water standard or variance. States may provide assistance if the use of such assistance will ensure compliance and the system has agreed to make the necessary changes in operation to ensure that it has the technical, managerial, and financial capacity to comply over the long term.

U.S. Environmental Protection Agency, Water: Small Systems and Capacity Development, *State Guidance*, http://water.epa.gov/type/drink/pws/smallsystems/state_guidance.cfm; *see also* 42 U.S.C. §§ 300g-9, 300j-12.

States are required to develop state capacity development programs that include two primary elements: (1) the legal authority to ensure that new PWSs have sufficient technical, managerial, and financial capacity to meet Primary Standards; and (2) a strategy to identify and assist existing PWSs that need to improve managerial, technical, or financial capacity or that need assistance in complying with Primary Standards. *See* 42 U.S.C. § 300g-9(a), (c). The development and implementation of these state programs are directly related to a state's ability to receive funds under the state revolving fund loan program. *See* 42 U.S.C. § 300g-9(a), (c). The EPA has addressed the meaning of the terms "technical capacity," "managerial capacity," and "financial capacity":

- Technical capacity refers to the physical infrastructure of the water system, including but not limited to the adequacy of the source water, infrastructure (source, treatment, storage, and distribution), and the ability of system personnel to implement the requisite technical knowledge.
- Managerial capacity refers to the management structure of the water system, including but not limited to ownership accountability, staffing and organization, and effective linkages to customers and regulatory agencies.
- Financial capacity refers to the financial resources of the water system, including but not limited to revenue sufficiency, creditworthiness, and fiscal controls.

See U.S. Environmental Protection Agency, Office of Water, *Guidance on Implementing the Capacity Development Provisions of the Safe Drinking Water Act Amendments of 1996* 11–13 (EPA 816-R-98-006, July 1998), *available at* http://nepis.epa.gov/Exe/ZyPDF.cgi/20002747.PDF?Dockey=20002747.PDF.

To address the capacity-related requirements of the SDWA, Texas law requires the TCEQ to ensure that PWSs supply adequate quantities of safe drinking water and that PWSs are financially stable and technically sound. *See* Tex. Health & Safety Code § 341.0315(a).

B. Texas Program

As discussed above, Texas Health and Safety Code chapter 341, subchapter C, prescribes the duties of the TCEQ with regard to the regulation and control of drinking water systems. *See* Tex. Health & Safety Code ch. 341, subch. C; *see also* 30 Tex. Admin. Code § 290.39. To fully comply with the 1996 amendments to the SDWA, Texas amended both Texas Health and Safety Code chapter 341 and Texas Water Code chapter 13 to incorporate, as appropriate, the phrase "financial, managerial, and technical capacity." *See generally* Act of June 1, 1997, 75th Leg., R.S., ch. 1010 (also known as Senate Bill 1). While the federal SDWA focuses on the capacity to treat and maintain a safe water supply for users, the capacity to maintain a sufficient supply of water to ensure delivery of treated drinking water to the public on a continuous and adequate basis is a Texas initiative. Sufficiency of supply is particularly important in Texas because of climate, and the related likelihood of droughts, and the growing population that strains the limited supply of water. Pursuant to TCEQ rules, sources of water supply—both groundwater sources and surface water sources—are to have a "safe yield capable of supplying the maximum daily demands of the distribution system during extended periods of peak usage and critical hydrologic conditions." 30 Tex. Admin. Code § 290.41(b). To ensure water delivery, the infrastructure, such as pipelines and pumping capacities, to treatment plants or distribution systems must be adequate. *See* 30 Tex. Admin. Code § 290.41(b).

With regard to capacity, TCEQ rules provide that the total capacity of the PWS's treatment facilities must always be greater than the anticipated maximum daily demand. 30 Tex. Admin. Code § 290.42(a)(1). TCEQ rules also specify very detailed minimum water system capacity requirements. Specifically, Texas Administrative Code title 30, section 290.45, identifies certain minimum PWS capacity requirements, including standards for minimum well capacity, pumping capacity, total storage capacity, and treatment capacity for various types of retail water systems and wholesale water providers, and for both surface water and groundwater supplies. *See* 30 Tex. Admin. Code § 290.45.

The importance of sufficient water supply and capacity is further emphasized through enforcement in Texas. The TCEQ's Enforcement Initiation Criteria (EIC) identify certain failures by a community water system to meet minimum water system capacity requirements as Category A violations that require an immediate enforcement action. *See* Texas Commission on Environmental Quality, *Enforcement Initiation Criteria* (Rev. 14, eff. Dec. 1, 2012), *available at* www.tceq.texas.gov/assets/public/agency/eic-rev-14-120112.pdf.

Texas has also addressed additional sources of water such as rainwater harvesting. State law requires the TCEQ to establish recommended standards relating to the domestic use of rainwater, "including health and safety standards for treatment and collection methods for harvested rainwater intended for drinking, cooking, or bathing." Tex. Health & Safety Code § 341.042(a). If a rainwater harvesting structure is connected to a PWS, then it is required to have appropriate cross-connection safeguards. Tex. Health & Safety Code § 341.042(b). The TCEQ has adopted rules regarding the installation and maintenance of privately owned rainwater harvesting systems. *See* 30 Tex. Admin. Code § 290.44(j). For example, any person who intends to connect a rainwater harvesting system to a PWS must give written notice of that intention to the owner of the PWS. 30 Tex. Admin. Code § 290.44(j)(3). Where rainwater harvesting systems are used at residences for potable purposes and there is a connection to a PWS, the PWS must ensure that the rainwater harvesting system is installed by a licensed master plumber or licensed journeyman plumber. 30 Tex. Admin. Code § 290.44(j)(2). In addition, a privately owned rainwater harvesting system with a capacity of more than five hundred gallons that is connected to the PWS is required to have a backflow prevention assembly or an air gap installed at the storage facility to ensure physical separation between the PWS and the rainwater harvesting system. 30 Tex. Admin. Code § 290.44(j)(1). The owner or operator of a PWS may not be held liable for any adverse health effects allegedly caused by the consumption of water collected by a rainwater harvesting system that is connected to the PWS and is used for potable purposes, if the PWS is in compliance with the applicable drinking water standards. Tex. Health & Safety Code § 341.042(b-4).

The TCEQ has also promulgated detailed rules related to source water types, including groundwater sources, springs, and surface water sources, to ensure that all source water is protected from potential contamination. *See* 30 Tex. Admin. Code § 290.41(c)–(e). For example, the rules applicable to groundwater sources and development specify that—

> [g]roundwater sources shall be located so that there will be no danger of pollution from flooding or from unsanitary surroundings, such as privies, sewage, sewage treatment plants, livestock and animal pens, solid waste disposal sites or underground petroleum and chemical storage tanks and liquid transmission pipelines, or abandoned and improperly sealed wells.

30 Tex. Admin. Code § 290.41(c)(1). To ensure compliance with this standard, TCEQ rules restrict the locations of water wells in relationship to possible contaminant sources and define construction standards for such wells. *See* 30 Tex. Admin. Code § 290.41(c)(1)–(3). Similar restrictions are in place for spring water sources and surface water sources. *See* 30 Tex. Admin. Code § 290.41(d), (e).

V. Conclusion

As identified above, although contemporary regulation of drinking water quality has been evolving for more than thirty years, both federal and state regulatory authorities continue to strive to ensure that there are adequate and appropriate regulations to protect drinking water quality and public health. As demonstrated with the 1996 amendments to the SDWA, appropriate treatment standards and technologies are not the only regulatory tool. Both the EPA and the TCEQ continue to take steps to consider source water protection and capacity development as new methods to ensure drinking water quality. With the pressures of increased population and aging infrastructure, all these regulatory tools will be necessary to protect drinking water quality and ensure protection of public health in the future.

CHAPTER 31

Wholesale Water Suppliers

Stephen C. Dickman[1]

I. Introduction

Although "wholesale water supplier" is not defined in the relevant portions of the Texas Water Code (chapters 11, 12, or 13), here the generally accepted definition is used: any person or entity who provides raw or treated water as a commodity to another person or entity who is not the ultimate consumer of the water. *But see* 31 Tex. Admin. Code § 357.10(30) (defining the term "wholesale water provider" in relation to state water planning). Under Texas law, supplying water on a wholesale basis is distinguished from the conveyance or other transfer of an appropriative water right, which is addressed in Chapters 15 and 18 of this book. The other important distinction is between supplying water on a wholesale basis and supplying potable water to residential or other ultimate consumers on a retail water basis, which is discussed in Chapters 29 and 30.

While supplying potable water to retail customers is strictly regulated to ensure that good quality water is delivered to consumers at a fair and reasonable price, supplying water on a wholesale basis is much less regulated. The trend has been for the state to defer to the right of wholesale water suppliers and customers to freely contract between themselves concerning the terms and conditions under which water will be supplied. As discussed below, the Public Utility Commission of Texas (PUC) and the Texas Commission on Environmental Quality (TCEQ) will undertake to set wholesale water rates only if they have first determined that the rate contracted for between the wholesale water seller and buyer is not in the public interest.

Here are common examples of wholesale water transactions:

- a contract by a home rule city to supply raw or treated water to nearby smaller cities, industries, or water districts;
- a contract by a river authority to supply raw water to a city, industrial user, or water district;
- a contract by a water district to provide raw water to a rural water supply corporation; and
- a contract by an irrigation company to provide water to agricultural irrigators.

This chapter first discusses wholesale water supply contracts in general and highlights issues commonly encountered in wholesale water supply contracting. This discussion includes a brief discussion of the historical context out of which wholesale water contracting arose and citations to key statutory authority and significant case law (although most of the case law on wholesale water

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contracting concerns irrigation cases that are no longer of much relevance). Following is a discussion of the PUC and the TCEQ wholesale rate-setting process and rules governing wholesale contract amendments. Next, the TCEQ requirements for water conservation and drought contingency planning as they affect wholesale water contracting are reviewed. The chapter concludes with a brief overview of the typical components of a wholesale water contract.

II. Wholesale Water Contracting in General

A. Historical Background

The most significant statutory authorities dealing with wholesale water supply issues are Texas Water Code sections 11.036–.041 and 12.013. The provisions in chapters 11 and 12 have antecedents going back to 1913, when the Texas legislature repealed earlier water laws and adopted a new uniform system of water laws for the entire state, including the creation of the TCEQ's original predecessor agency, the Texas Board of Water Engineers, to administer a water rights permitting system. *See Texas Water Rights Commission v. City of Dallas*, 591 S.W.2d 609, 613 (Tex. Civ. App.—Austin 1979, writ ref'd n.r.e.). In that era, the courts commonly dealt with wholesale water supply cases involving the rights, obligations, and liabilities of irrigation companies and their agricultural irrigator customers. Accordingly, the statutory scheme adopted in 1913 was oriented in structure and phraseology to address the irrigation water supply issues common in that era. See Chapter 3 of this book for a discussion of these early laws. That structure and phraseology are still reflected in sections 11.036–.041 and 12.013. Modern case law dealing with wholesale water supply issues has largely clarified how these sections apply to current wholesale water supply transactions.

B. Parties to a Wholesale Water Contract

In Texas, any person who has a conserved or stored supply of water may contract to supply the water on a wholesale basis to any other legal entity. *See* Tex. Water Code § 11.036(a). In addition, anyone who has a possessory interest in land adjoining a constructed water facility (e.g., a canal, ditch, flume, lateral, dam, reservoir, or lake) and who has secured a right to use water from the facility for any agricultural, industrial, or mining purpose is entitled to be supplied with water in accordance with the terms of the contract. *See* Tex. Water Code § 11.038(a).

The early twentieth century version of Texas Water Code section 11.038(a) generated case law that defined the rights and obligations of irrigation companies and their customers. The principle developed that an irrigation company was a quasi-public corporation that owed a duty, regardless of the existence of a contract, to furnish water that had not been contracted to others and that was needed for the irrigation of crops on land adjoining the irrigation company's canals; failure to meet this duty made the irrigation company liable for resulting damages and subject to mandamus relief. *See, e.g., Lastinger v. Toyah Valley Irrigation Co.*, 167 S.W. 788 (Tex. Civ. App.—El Paso 1914, no writ); *Dunbar v. Texas Irrigation Co.*, 195 S.W. 614 (Tex. Civ. App.—Galveston 1912, no writ). Such irrigation water was required to be supplied in accordance with the terms of the contract or, if there was no contract, on reasonable terms and conditions. *See American Rio Grande Land & Irrigation Co. v. Mercedes Plantation Co.*, 208 S.W. 904 (Tex. Comm'n App. 1919, judgm't adopted).

C. The Price of Water under a Wholesale Water Contract

The price and terms of a wholesale water supply contract must be "just and reasonable and without discrimination," and such contract terms are subject to revision and control as set forth in the rate-setting portions of the Texas Water Code. *See* Tex. Water Code § 11.036(b). However, if a person uses the stored or conserved water without first entering into a contract with the person who stored or conserved it, the user is obligated to pay for the use at a just and reasonable rate determined by the TCEQ. *See* Tex. Water Code § 11.036(d). Similarly, for landowners or tenants adjoining a canal or other surface water supply facility, if the parties cannot agree on a price for the water, then the water facility owner must furnish the needed water at a reasonable and nondiscriminatory price to the extent there is water that has not been contracted to others. *See* Tex. Water Code § 11.038.

Consistent with the above statutory provisions, the holder of a permanent water right (generally, a perpetual contractual right to receive water from a canal adjoining a piece of land; see the discussion of this topic in Chapter 3 of this book) is entitled to use water according to the terms of any contract, but if there is no contract, the water right owner is entitled to use water at a just, reasonable, and nondiscriminatory price. *See* Tex. Water Code § 11.040(c). These concepts were upheld and applied in various irrigation company cases after 1913. *See, e.g., Ball v. Rio Grande Canal Co.*, 256 S.W. 678 (Tex. Civ. App.—San Antonio 1923, writ ref'd) (recorded contract under which irrigation company was required to furnish water for irrigation purposes to land had effect of granting easement in favor of land against irrigation company subject to obligation on part of landowner and his successors to pay yearly water charges; such easement was enforceable either as covenant running with the land or, in equity, against subsequent purchasers).

D. Other Wholesale Contract Terms

Generally, a water supplier must make and publish reasonable rules regarding the method of supply, the use and distribution of water, and the procedure for applying and paying for the water. *See* Tex. Water Code § 11.037. If a wholesale contract contains "explicit expiration provisions," no continuation of the service obligation will be implied. *See* Tex. Water Code § 11.036(b); *see also* Tex. Gov't Code § 791.026(e). Conversely, however, if a wholesale contract does not contain an explicit expiration provision, a continuing obligation to provide water to the buyer may be implied under the contract. This can result in a determination that a wholesale water rate is being charged "pursuant to a contract," which is a dispositive issue in determining whether the PUC or the TCEQ must first hold a public interest hearing before adjudicating a contested wholesale water rate. See the discussion of this issue in section IV below. Also of note, the terms of a wholesale water contract may expressly require the purchaser to develop alternative or replacement water supplies before the contract expires, and such terms may be enforced by court order. *See* Tex. Water Code § 11.036(c); *see also* Tex. Gov't Code § 791.026(d). Finally, if the delivery method for water supplied on a wholesale basis is through water released down a river or stream channel, a "bed and banks" permit may be required from the TCEQ to authorize such delivery. See the discussion of bed and banks permits in Chapter 9 of this book.

E. Distribution of Water during a Shortage

During water shortages due to drought, accident, or any other cause, water must be divided pro rata among all customers based on the amount each customer is entitled to "so that preference is given to no one and everyone suffers alike." *See* Tex. Water Code § 11.039(a). This section applies only to wholesale customers who are not covered by a TCEQ or a Texas Water Development Board (TWDB) water conservation plan. *See* Tex. Water Code § 11.039(a). For wholesale water suppliers operating under a water conservation plan prepared in compliance with TCEQ or TWDB rules, the wholesale provider may base the pro rata distribution of water in times of shortage on the amount of water to which each customer is entitled, less the amount of water the customer would have saved if the customer had operated its water system in compliance with a state-approved water conservation plan. *See* Tex. Water Code § 11.039(b). In any case, however, the wholesale water provider is not precluded from supplying water to any person who has a prior vested right to the water. *See* Tex. Water Code § 11.039(c).

F. Transfer of Wholesale Water Ratemaking Jurisdiction from the TCEQ to the PUC

During the 83rd legislative session in 2013, the Texas legislature enacted two bills to transfer the water utility ratemaking authority of the TCEQ to the PUC, including the TCEQ's jurisdiction over wholesale raw or treated water rates as described in section 12.013 of the Texas Water Code. *See* Act of May 14, 2013, 83d Leg., R.S., ch. 170, § 2.07 (H.B. 1600); Act of May 14, 2013, 83d Leg., R.S., ch. 171, § 7 (S.B. 567). The transfer of jurisdiction over wholesale water rates was accomplished by amending sections 12.013 and 13.043 of the Water Code to replace the term "commission," which refers to the TCEQ, with the newly defined term "utility commission," which refers to the PUC. The TCEQ will continue to have jurisdiction over denial-of-water complaints under sections 11.036 through 11.041 of the Water Code, although the PUC is now given express authority to participate in the hearing on a denial-of-water complaint "if necessary to present evidence on the price or rental demanded for the available water." Tex. Water Code § 11.041(f).

The impetus for the transfer of wholesale water ratemaking jurisdiction was a recommendation by the Texas Sunset Advisory Commission that the state could benefit from transferring regulatory functions related to water and wastewater utilities to the PUC. As required by the implementing legislation, on July 31, 2014, the PUC and the TCEQ entered into a memorandum of understanding (MOU) detailing the final plan for transitioning the jurisdiction transfer. The actual transfer of wholesale water ratemaking jurisdiction occurred on September 1, 2014. The TCEQ and the PUC were also directed to adopt rules to implement the statutory changes by September 1, 2015. The TCEQ's existing rules and forms related to water utility ratemaking were adopted by the PUC on an interim basis until the PUC could adopt its own rules by the statutory deadline of September 1, 2015. Therefore, all wholesale ratemaking filings made on or after September 1, 2014, must follow the PUC's procedural rules and the PUC's wholesale water or sewer service rules (codified at 16 Tex. Admin. Code ch. 24, subch. I, which are essentially the same as those rules adopted by the TCEQ and codified at 30 Tex. Admin. Code ch. 297, subch. J). Moreover, because of the transfer of wholesale ratemaking jurisdiction from the TCEQ to the PUC, the court cases discussed in this chapter that deal with the TCEQ as the regulatory agency may also appropriately be considered to apply to the PUC as the regulatory agency as of September 1, 2014.

G. Wholesale Water Contract Price Disputes

Sections 11.041 and 12.013 of the Texas Water Code are the key statutes under which wholesale water supply rates and service issues are regulated in modern-day cases. Under section 11.041, a person who is entitled to use a surface water supply can petition the TCEQ to order the person who owns or controls the water supply to sell water to the petitioner at a just and reasonable price if there is water available and not contracted to others. *See* Tex. Water Code § 11.041(a). If the TCEQ executive director determines that probable grounds exist to support the complaint, a hearing is held and the TCEQ sets a just and reasonable wholesale water rate. As mentioned above, under the 2013 statutory amendments transferring water utility ratemaking authority from the TCEQ to the PUC, the PUC is now authorized to participate in the hearing if necessary to present evidence on the price or rental demanded for the water. *See* Tex. Water Code § 11.041(c), (f).

Although section 11.041(a) requires the complainant to show that it is "entitled to receive or use the water," a concept originally arising from the rights of landowners adjoining irrigation canals, the courts have not strictly applied that requirement in modern-day wholesale rate cases. When a city supplies water for a number of years without a written contract and is paid for the service, an implied obligation to supply water arises. *See City of Dallas v. Brown*, 150 S.W.2d 129 (Tex. Civ. App.—Dallas 1941, writ dism'd). Moreover, in *Texas Water Rights Commission v. City of Dallas*, 591 S.W.2d 609 (Tex. Civ. App.—Austin 1979, writ ref'd n.r.e.), the court concluded that even though section 11.041 was originally established as part of the early Texas irrigation laws, the legislature intended for section 11.041 and the other water laws rewritten in 1913 to apply to water supplied for purposes other than irrigation. *Texas Water Rights Commission*, 591 S.W.2d at 613. The court held that the complainant city of Farmers Branch had a right to be provided with wholesale water from the city of Dallas because Dallas had, over a long period of time, obtained water rights that were so extensive as to afford Dallas control of substantially all municipal water in Dallas County. 591 S.W.2d at 614. Thus, Dallas enjoyed "a substantial monopoly closely resembling that of canal and irrigation entities occupying a monopolistic position." 591 S.W.2d at 614. Moreover, in the Texas Water Rights Commission hearings on its application for its water rights, Dallas had represented that it would use the water to supply water to municipalities in Dallas County. 591 S.W.2d at 611. In support of its ruling, the court cited *City of San Antonio v. Texas Water Commission*, 407 S.W.2d 752, 768 (Tex. 1966), in which the Texas Supreme Court declared that a river authority cannot legally refuse to sell municipal water to any particular municipality because the river authority is under a duty to serve the public without discrimination. Thus, the requirement that a wholesale water rate complainant show that it is "entitled to receive or use the water" can be satisfied by showing a history of being supplied by the seller or by showing some degree of monopoly control by the seller over the source of water supply.

The PUC is given general statutory authority to fix reasonable rates for supplying raw or treated water for any purpose mentioned in chapter 11 or 12. *See* Tex. Water Code § 12.013(a). In reviewing and setting wholesale water rates, the PUC may use any reasonable rate-setting methodology, although the PUC may not set a rate for a political subdivision that is insufficient to meet the debt service and bond coverage requirements of the political subdivision's outstanding debt. *See* Tex. Water Code § 12.013(c). The PUC may establish interim wholesale rates, compel continuing service during the pendency of the wholesale rate case, and order a refund or assess additional charges to make up any difference between the rate charged and the rate ultimately set by the PUC. *See* Tex. Water Code § 12.013(e), (f).

The PUC's rate fixing power under section 12.013 is not limited to instances in which the water supplier appropriates state water as its source of supply, nor is it limited to complaints filed by water purchasers, but rather section 12.013 may also be invoked by wholesale water suppliers who sell water under a contract rate that the seller alleges to be not fair or reasonable. *See Texas Water Commission v. Brushy Creek Municipal Utility District*, 917 S.W.2d 19, 22–23 (Tex. 1996). Moreover, once the PUC's wholesale rate-setting jurisdiction under section 12.013 is invoked, the PUC may set reasonable rates that will apply in future years unless and until the rates are later changed by contract between the seller and buyer, or by the PUC pursuant to a subsequent wholesale rate case. *Texas Water Commission v. Boyt Realty Co.*, 10 S.W.3d 334, 340 (Tex. App.—Austin 1993, no writ).

The remaining statutory authority under which the PUC exercises jurisdiction over wholesale rates is Texas Water Code section 13.043(f). This section applies only in cases in which a retail public utility wishes to appeal a water service rate decision (i.e., a rate increase) by another retail public utility or political subdivision. *See* Tex. Water Code § 13.043(f). Another distinction between wholesale contract regulation under section 13.043(f) and wholesale contract regulation under Texas Water Code chapters 11 and 12 is that jurisdiction under chapters 11 and 12 is relevant only to wholesale supplies of surface water; if a wholesale water dispute concerns groundwater supplies, it may be considered by the PUC only under section 13.043(f).

The water purchaser must initiate an appeal under section 13.043(f) by filing a petition with the PUC within ninety days after the date the water purchaser receives notice of the rate change. In such an appeal of a wholesale rate increase, the PUC must ensure that the rate is just and reasonable and not discriminatory. *See* Tex. Water Code § 13.043(j). For wholesale rate disputes between two municipalities, the PUC is required to consider the terms of any wholesale water service agreement. Notwithstanding that the term "wholesale water service" is defined for purposes of Texas Water Code chapter 13 as including only sales of potable water service (*see* Tex. Water Code § 13.002(25)), a wholesale rate case under section 13.043(f) may be brought whether the wholesale rate is being charged for potable or for raw water, and the PUC would accept and process appeals of both potable and raw water rates under section 13.043(f). *See* Susan G. Zachos, *Wholesale Water Rate Cases—Viable or Not?*, *in* Texas Water Law Conference, CLE International, Austin (2004).

The most significant case decided under section 13.043(f) is *Texas Water Commission v. City of Fort Worth*, 875 S.W.2d 332 (Tex. App.—Austin 1994, writ denied). In that case, the Austin court of appeals established the public interest test as a jurisdictional prerequisite in a wholesale rate case. As adopted from prior federal and state natural gas utility cases, the public interest test means that before the PUC or the TCEQ may constitutionally abrogate a contracted wholesale water rate, it must first find that the rate adversely affects the public interest by being unreasonably preferential, prejudicial, or discriminatory. *Texas Water Commission*, 875 S.W.2d at 336. Indeed, the court emphatically ruled that the public interest test is jurisdictional and that the TCEQ (the wholesale rate-setting agency at that time) may not avoid making the public interest finding even if all parties request that it do so. 875 S.W.2d at 337. The PUC has adopted detailed rules (modeled on those originally promulgated by the TCEQ) that describe the wholesale rate-setting process and how the public interest test is applied in that process. *See* 16 Tex. Admin. Code §§ 24.128–.138. See the discussion in section IV.A below.

III. Wholesale Supply of Potable Water

Chapter 13 of the Texas Water Code contains various provisions that generally relate to wholesale water service by or to cities, water districts, water supply corporations, and retail public utilities. Because the definition of "wholesale water service" in chapter 13 means potable water service (not raw or untreated water service), the chapter 13 provisions dealing with wholesale water supply issues are generally limited to cases that involve the wholesale supply of potable water, except as discussed above with respect to section 13.043(f).

A. Wholesale Water Sales to a Water District

A city that sells wholesale water to a water district or other special district must determine wholesale water rates on the same basis as for any other of the city's similarly situated wholesale water purchasers. *See* Tex. Water Code § 13.086(a). Thus any differences in wholesale rates charged by a city to a water district must be justified by facts showing that the district is not "similarly situated" to the city's other wholesale customers.

B. Notice to the TCEQ of a Wholesale Water Supply Contract

Any person or entity that provides wholesale water service to a retail public utility must file a certified copy of the contract with the PUC and the TCEQ within thirty days following contract execution. *See* Tex. Water Code § 13.144. This filing must include the amount of water being supplied, the term of the contract, the consideration being given for the water, the purpose of the water use, the location of the water use, the source of supply, the point of delivery, any limitations on the reuse of water, a disclosure of any affiliated interest between the contracting parties, and any other condition or agreement relating to the wholesale contract. *See* Tex. Water Code § 13.144. The TCEQ's implementing rules are at 30 Texas Administrative Code section 295.101. In addition, the TCEQ has promulgated detailed rules describing particular types of contracts for which an amendment of the water supplier's underlying water right is required. *See* 30 Tex. Admin. Code §§ 297.101–.108. See the discussion in section V below.

C. Prohibition on Requiring a Wholesale Purchaser to Obtain a CCN

A water service provider is prohibited from requiring a purchaser to obtain a certificate of convenience and necessity (CCN) if the purchaser is not otherwise required by chapter 13 to obtain the CCN. Tex. Water Code § 13.242(d). As discussed in Chapter 29 of this book, a public utility and a nonprofit water supply corporation must obtain a CCN to provide retail water service, but cities, municipal corporations, water districts, and political subdivisions are excluded from the definition of public utility in section 13.002(23). Therefore, these types of entities are not legally required to obtain a CCN to provide retail water service. Under section 13.242(d), a wholesale water supplier cannot contractually obligate such entities to acquire a CCN as a condition of providing wholesale water service.

D. TCEQ-Ordered Improvements in Service

The TCEQ or the PUC, after notice and hearing, may order a public utility or water supply corporation that is unable to provide continuous and adequate potable water service to obtain alternative service on a wholesale basis from another consenting utility service provider. *See* Tex. Water Code § 13.253(a)(3).

E. Wholesale Water Contracts between Affiliated Interests

A retail utility service provider is prohibited from obtaining its wholesale source of water supply from an affiliated entity except when (1) the wholesale service is provided for not more than ninety days to remedy an emergency condition or (2) the PUC determines that the retail service utility cannot obtain wholesale water service from another source at a lower cost than from the affiliate. Tex. Water Code § 13.343(a). Furthermore, the retail service utility is prohibited from purchasing groundwater if the groundwater source is within a priority groundwater management area and a wholesale supply of surface water is available. Tex. Water Code § 13.343(b).

F. Water Conservation Plans

The TCEQ and the TWDB are generally authorized to jointly identify quantified target goals for water conservation and develop model water conservation programs that water suppliers may use as guidelines in preparing water conservation plans. *See* Tex. Water Code § 11.1271(a)–(d). The water conservation programs developed jointly by the TCEQ and the TWDB are to suggest best management practices for achieving the highest practicable levels of water conservation and efficiency achievable for each specific type of water supplier. *See* Tex. Water Code § 11.1271(e). Pursuant to section 11.1271(f), the TCEQ has adopted rules establishing water conservation plan and drought contingency plan requirements specifically for wholesale water suppliers. *See* 30 Tex. Admin. Code §§ 288.5, 288.22. See the discussion in section VI below.

IV. Wholesale Rate-Setting Process at the PUC and the TCEQ

A. The Two-Tier Hearing Process: The Public Interest Hearing and the Cost-of-Service Wholesale Rate-Setting Hearing

The PUC's and the TCEQ's rules for wholesale rate disputes attempt to strike a balance between protecting the freedom of contract between buyer and seller and protecting the public interest in preventing abuse of monopoly power by the seller. In originally adopting these "public interest" rules, the TCEQ's predecessor agency noted that "the adoption of these rules marks the end of the past policy where the commission essentially automatically cancelled the rate set by contract and set a rate based on cost of service." *See* 19 Tex. Reg. 6229 (1994) (rule adoption preamble). Allowing the parties to freely contract for the terms and conditions of wholesale water service and to rely on those contracts is essential for the types of capital budgeting and facilities planning necessary to secure long-term, dependable sources of water supply. On the other hand, when a seller substantially controls the source of water supply and sets prices and price increases for the water without significant input by the buyer, the potential arises for abuse of monopoly power and harm to the public interest. *See* 19 Tex. Reg. 6227–28 (1994) (rule adoption preamble).

To balance these two competing interests, the PUC rules at 16 Texas Administrative Code sections 24.128–.138 and the TCEQ rules at 30 Texas Administrative Code sections 297.128–.138 establish a two-tier hearing process: (1) the public interest inquiry and (2) the wholesale rate determination based on the supplier's cost of service. These two phases of the wholesale rate-setting process are described in more detail below. It should be noted that the 2013 statutory amendments transferring water utility ratemaking authority from the TCEQ to the PUC left jurisdiction over wholesale rate cases arising under Texas Water Code sections 11.036–.041 with the TCEQ while transferring jurisdiction over wholesale rate cases arising under Texas Water Code sections 12.013 and 13.043 to the PUC. Thus, there is now a distinction that needs to be recognized between these two types of statutory jurisdiction over wholesale rate cases, notwithstanding that, historically, wholesale rate cases were handled by the TCEQ under the joint authority of sections 11.041 and 12.013. Moreover, section 12.013 authorizes the PUC to fix wholesale rates for any purpose mentioned in chapter 11, whereas the TCEQ remains the agency with authority to handle cases arising under section 11.041. This apparent statutory contradiction should mean that the TCEQ's wholesale rate rules will continue to apply to cases arising under section 11.041, and the PUC's wholesale rate rules will apply to cases arising under sections 12.013 and 13.043(f). It may be necessary for the TCEQ–PUC MOU to be amended to address this issue, or else a court decision may resolve the apparent split in wholesale rate jurisdiction at some point in the future. Because the PUC and the TCEQ rules currently have identical requirements, the following discussion of wholesale rate case procedures will refer to both PUC cases brought under Texas Water Code sections 12.013 and 13.043(f) and TCEQ cases brought under Texas Water Code section 11.041.

For wholesale rate cases brought at the PUC under section 12.013 or 13.043(f), or at the TCEQ under section 11.041, on receipt of a petition to set wholesale water rates (typically by the wholesale water purchaser), the PUC or the TCEQ executive director makes a preliminary investigation. *See* 16 Tex. Admin. Code § 24.131; 30 Tex. Admin. Code § 291.131. If the PUC or the TCEQ executive director determines that the petition meets the requirements as set forth in 16 Texas Administrative Code section 24.130 and 30 Texas Administrative Code section 291.130, the case is forwarded to the State Office of Administrative Hearings (SOAH) for an evidentiary hearing. If the petition is filed as an appeal of a wholesale rate increase under section 13.043(f), the petition must be filed within ninety days of receiving notice of the rate increase.

In a PUC or a TCEQ review of a wholesale rate that is charged pursuant to a written contract, SOAH conducts an evidentiary hearing on the public interest that involves issues relating to the existence and abuse of monopoly power by the seller (as described in more detail below). *See* 16 Tex. Admin. Code § 24.131(b); 30 Tex. Admin. Code § 291.131(b). It is only if the PUC or the TCEQ determines that the charged wholesale rate is not in the public interest that the dispute can continue to a cost-of-service hearing to determine the appropriate wholesale water rate. However, the parties may agree to consolidate the evidentiary hearing on the public interest and the hearing on the cost of service. *See* 16 Tex. Admin. Code § 24.132(d); 30 Tex. Admin. Code § 291.132(d).

In those (relatively few) wholesale rate petitions or appeals that involve a disputed rate *not* charged pursuant to a written contract, there is no public interest hearing, and the SOAH hearing is a cost-of-service rate-setting hearing inquiring into rate issues typically associated with retail utility rate cases, such as cost of service, rate design, and the setting of a final rate. *See* 16 Tex. Admin. Code § 24.131(c); 30 Tex. Admin. Code § 291.131(c). In those cases where the buyer and seller cannot agree on whether the wholesale rate is charged pursuant to a written contract, the administrative law judge must abate the proceedings so that this issue can be resolved by a court. *See* 16 Tex. Admin. Code § 24.131(d); 30 Tex. Admin. Code § 291.131(d).

1. The Public Interest Hearing

As described above, a public interest hearing is held when the disputed wholesale water rate is charged pursuant to a contract. The purpose of a public interest hearing is to determine whether the protested wholesale rate adversely affects the public interest. 16 Tex. Admin. Code § 24.132(a); 30 Tex. Admin. Code § 291.132(a). In a public interest hearing, discovery and evidence are strictly limited to public interest issues. 16 Tex. Admin. Code § 24.132(b); 30 Tex. Admin. Code § 291.132(b). The hearing does not include a cost-of-service inquiry. The PUC or the TCEQ must find that the public interest is adversely affected if any one of the following four public interest criteria has been violated:

1. The protested rate impairs the seller's ability to continue to provide service based on the seller's financial integrity and operational capability.

2. The protested rate impairs the purchaser's ability to provide service to its retail customers based on the purchaser's financial integrity and operational capability.

3. The protested rate evidences the seller's abuse of monopoly power in its provision of water to the purchaser.

4. The protested rate is unreasonably preferential, prejudicial, or discriminatory compared to the wholesale rates the seller charges other wholesale customers.

16 Tex. Admin. Code § 24.133(a); 30 Tex. Admin. Code § 291.133(a).

The PUC or the TCEQ must weigh all relevant factors, including—

- the disparate bargaining power of the parties (including the purchaser's alternative means and costs, environmental impact, regulatory issues, and problems of obtaining alternative water service);
- any failure by the seller to reasonably demonstrate the changed conditions that are the basis for a change in rates;
- the seller's change in ratemaking methodology;
- other valuable consideration received by a party under a rate established by contract;
- incentives necessary to encourage regional projects or water conservation measures;
- the seller's obligation to meet federal or state drinking water standards or wastewater standards;
- the rates charged in Texas by other wholesale water suppliers; and
- the seller's rates charged to its retail customers compared to the retail rates the purchaser charges its retail customers resulting from the wholesale rate demanded by the seller in the present rate case.

16 Tex. Admin. Code § 24.133(a)(3); 30 Tex. Admin. Code § 291.133(a)(3). The PUC and TCEQ rules make clear that a public interest determination may not be based on an analysis of the seller's cost of service. *See* 16 Tex. Admin. Code § 24.133(b); 30 Tex. Admin. Code § 291.133(b).

The wholesale rate petitioner bears the burden of proof in the public interest hearing. 16 Tex. Admin. Code § 24.136; 30 Tex. Admin. Code § 291.136. Following receipt of all evidence and closing arguments, the SOAH judge forwards a proposal for decision to the PUC or the TCEQ recommending a decision on whether the protested rate adversely affects the public interest. 16 Tex. Admin. Code § 24.132(c); 30 Tex. Admin. Code § 291.132(c). If the PUC or the TCEQ determines that the public interest has not been adversely affected, it denies the protest petition and affirms the rate demanded by the seller. 16 Tex. Admin. Code § 24.134(a); 30 Tex. Admin. Code § 291.134(a).

2. *Cost-of-Service Rate Hearing*

If the PUC or the TCEQ determines that the public interest is adversely affected by the protested rate, the agency issues a remand order, not subject to judicial review, referring the case to SOAH for an evidentiary hearing to determine a just and reasonable wholesale rate. *See* 16 Tex. Admin. Code § 24.134(b); 30 Tex. Admin. Code § 291.134(b). Within ninety days of such referral of the case to SOAH, the seller must file its cost-of-service rate study and other information supporting the protested rate. 16 Tex. Admin. Code § 24.134(c); 30 Tex. Admin. Code § 291.134(c). The seller bears the burden of proof in the cost-of-service rate hearing. 16 Tex. Admin. Code § 24.136; 30 Tex. Admin. Code § 291.136.

After the evidentiary hearing, the SOAH judge prepares a proposal for decision and forwards it to the PUC or the TCEQ. The PUC determines a cost of service and fixes a rate consistent with the ratemaking mandates of Texas Water Code chapters 12 and 13. 16 Tex. Admin. Code § 24.134(e). The TCEQ determines a cost of service and fixes a rate consistent with the ratemaking mandates of Texas Water Code chapters 11, 12, and 13. 30 Tex. Admin. Code § 291.134(e). The PUC or the TCEQ must use any reasonable method set by contract that identifies the costs of providing service or allocates such costs in calculating the cost of service. 16 Tex. Admin. Code § 24.135(a); 30 Tex. Admin. Code § 291.135(a). A change by the seller from one ratemaking method to another must be shown to have a reasonable basis, or the PUC or the TCEQ may calculate the cost of service using the former method. If the protested rate is based in part on a change in ratemaking methods, the seller must show in the hearing the calculation of the revenue requirements using both the new and the former methods. When revenue requirements are computed using a new method, the PUC or the TCEQ may allow adjustments for past payments. 16 Tex. Admin. Code § 24.135(b); 30 Tex. Admin. Code § 291.135(b).

In those cases in which the PUC or the TCEQ has determined that a particular contract rate adversely affects the public interest and has set rates, any rate dispute arising under that contract within three years after the end of the test year period of the initial rate case goes immediately to a cost-of-service rate hearing without a public interest hearing. *See* 16 Tex. Admin. Code § 24.137; 30 Tex. Admin. Code § 291.137.

B. Issues Arising under the Wholesale Rate-Setting Process

Although not many wholesale rate cases have been filed at the TCEQ since the adoption of the TCEQ's public interest rules in 1994, one such case highlights several issues under the wholesale rate-setting rules that have yet to be fully resolved. In *Petition of Canyon Regional Water Authority and Bexar Metropolitan Water District to Appeal the Wholesale Water Rate Increase of Guadalupe-Blanco River Authority* (TCEQ Docket No. 2002-1400-UCR; SOAH Docket No. 582-03-1991), two water districts protested the wholesale rate increase charged by the Guadalupe-Blanco River Authority (GBRA) for 2002 under a water purchase contract containing a provision allowing the GBRA to adjust the firm water rate "at any time and from time to time." Because the wholesale customers who protested the rate disagreed that the rate was charged pursuant to a written contract, the administrative law judge abated the rate case pending at SOAH, as required by TCEQ rules. The parties petitioned the district court of Travis County to make that determination. *GBRA v. Canyon Regional Water Authority, Bexar Metropolitan Water District & the Texas Commission on Environmental Quality*, No. GN400105 (353d Dist. Ct., Travis County, Tex. Aug. 11, 2006). In district court, the rate protestants also raised other issues, such as (1) whether a contract provision authorizing the parties to "apply by appropriate means to [TCEQ] . . . to establish a just and reasonable adjustment or charge" prevents the parties from using the TCEQ's public interest determination process; (2) whether the GBRA, as a political subdivision of the state, has a contractually protected interest in its wholesale rates; and (3) whether sales of state-owned water are subject to the public interest hearing requirements. The district court ruled on cross-motions for summary judgment that the rate was charged pursuant to a written contract and upheld the TCEQ's public interest rules, which make no exception for rate cases involving state-owned water.

On appeal, the Corpus Christi court of appeals upheld the district court's decision in *Canyon Regional Water Authority v. Guadalupe-Blanco River Authority*, 286 S.W.3d 397 (Tex. App.—Corpus Christi 2008, no pet.). The most significant aspect of the court's decision is its holding that the GBRA water rate was "charged pursuant to a written contract" and thus was subject to the requirement for an initial public interest hearing, notwithstanding the fact that no fixed price for the water was established in the contract. *Canyon Regional*, 286 S.W.3d at 403–04. Under the GBRA's wholesale contract with Canyon Regional Water Authority, the contract price was based on the GBRA's firm water rate charged to all of the GBRA's other customers and such rate could be reset at any time upon sixty days' advance notice. 286 S.W.3d at 401. The court reasoned that such "open term price" provisions were commonly used in business transactions and that Texas courts had specifically upheld the validity of open term price contracts by gasoline refiners. 286 S.W.3d at 403. In rejecting Canyon Regional's claim that the TCEQ's public interest rules effectively establish an unfair and improper barrier to the TCEQ's obligation to set just and reasonable wholesale water rates, the appellate court expressly upheld the validity of the TCEQ's public interest hearing requirement for wholesale water rates. 286 S.W.3d at 406. The *Canyon Regional* case is important not only because it expressly upholds the TCEQ's public interest hearing requirement for wholesale water ratesetting petitions, but also because it means that a fixed contract price for water does not need to be specifically stated in a contract for the PUC or the TCEQ to determine that the wholesale water rate is charged pursuant to a written contract.

A 2010 wholesale rate appeal case addressed the question of what constitutes an abuse of monopoly power by a wholesale water provider. In *In re Appeal of Multi-County Water Supply Corporation to Review the Wholesale Water Rate Increase Imposed by the City of Hamilton* (TCEQ Docket No. 2009-0048-UCR; SOAH Docket No. 582-09-2557), the Multi-County Water Supply Corporation (MCWSC) appealed a $0.14 per thousand gallon rate increase imposed by its wholesale supplier, the city of Hamilton, although the city had merely passed through the same rate increase it was charged by its wholesale supplier, the Upper Leon River Municipal Water District. After a SOAH evidentiary hearing concerning whether the protested rate adversely affects the public interest, the administrative law judge (ALJ) ruled, and the TCEQ agreed, that the city of Hamilton did have monopoly power over MCWSC, but that the city did not abuse that monopoly power. The monopoly power existed because of the forty-year wholesale water supply contract that gave the city the right to unilaterally adjust the rates charged and also limited MCWSC's right to obtain water from a different supplier. However, there was no abuse of that monopoly power under four of the TCEQ criteria: (1) there was no disparate bargaining power between the two contracting entities (instead of entering into the contract, MCWSC could have obtained water from a number of different sources); (2) the rate increase resulted from changed conditions (the rate increase was imposed as a pass-through increase charged by the city's water supplier); (3) the city's rate methodology did not change (the increase was merely a change in one of the city's ratemaking component factors, but not a change in the methodology itself); and (4) there was no other valuable consideration received by the city as wholesale supplier.

In a 2011 wholesale-rate-setting case, the ALJ ruled that a section 13.043(f) appeal was not valid since it was filed by an associational group of wholesale ratepayers rather than by the ratepayers themselves. *See In re Appeal of Navarro County Wholesale Ratepayers to Review the Wholesale Rate Increase Imposed by the City of Corsicana* (TCEQ Docket No. 2009-1925-UCR; SOAH Docket No. 582-10-1944). In that case, the ALJ also determined that all evidence received at the hearing from the remaining ratepayers concerning cost-of-service was irrelevant in the public interest hearing phase of the wholesale rate appeal process. On the main substantive issue, the ALJ determined, and the TCEQ agreed, that the city of Corsicana had not abused whatever monopoly power it possessed in the setting of its wholesale water rates. The primary factors relied on by the ALJ in making this determination were (1) the standard form wholesale water supply contract used by the city of Corsicana was negotiated by an attorney for the city and an attorney who acted in the interests of the wholesale ratepayers, and it was adopted following a public hearing participated in by the wholesale customers; (2) the "sole source" provision of the contract did allow for some degree of choice by the wholesale water customers in obtaining a different supply source; (3) the contracts did have features beneficial to the wholesale water purchasers; and (4) the city's adoption of an inclining block volumetric rate structure for the first time was a change in rate methodology, but the change was not abusive.

V. Wholesale Water Supply Contractual Amendments and Annual Reporting

To better monitor the use of appropriated state water, the TCEQ has promulgated rules requiring a raw or treated water supplier that possesses a state water right to obtain a TCEQ-approved amendment of that water right before the supplier makes any delivery of water under a new contract. *See* 30 Tex. Admin. Code §§ 297.101–.108. If the contractual water right permit amendment is not obtained as required by TCEQ rules, the TCEQ will not consider the contracted amount of water to be "in perfection" of the supplier's water right (i.e., the water will not be considered to have been beneficially used). *See* 30 Tex. Admin. Code § 297.106(a). The purpose of the water right amendment is to have the water right reflect the contractual arrangements with the buyer. Generally, no contractual water right amendment is needed if the water is sold and used for the purpose and in the place of use stated in the water right. *See* 30 Tex. Admin. Code § 297.101(b).

An applicant for such a water right amendment must file the application information specified in 30 Texas Administrative Code section 295.101 as well as a copy of the contract. If the water supplier is not also the holder of the underlying appropriative water right, the holder of the appropriative right must file the application to amend the water right, either alone or as a coapplicant with the supplier. *See* 30 Tex. Admin. Code § 297.102(c). Sales of up to three years of up to ten acre-feet per year of untreated water from the perimeter of a reservoir for purposes stated in the water right are not required to obtain a contractual water right amendment. *See* 30 Tex. Admin. Code § 297.101(b).

If a contract obligates the supplier to release water from storage (e.g., a reservoir) to a downstream buyer who takes water only from the releases, the supplier is not obligated to make releases when doing so would aggravate existing flooding conditions, and the TCEQ may establish stream flood stages in the permit amendment as limits on such releases. *See* 30 Tex. Admin. Code § 297.103(a). If the contract authorizes the buyer to take purchased water from existing stream flows (i.e., water other than that released from the upstream storage) and neither the seller nor the buyer has a water right authorizing such diversions, then either the buyer or the seller must obtain a regular, term, or temporary permit to appropriate water up to the maximum annual diversions not released from storage. *See* 30 Tex. Admin. Code § 297.103(b). The supplier must bear the transportation and evapotranspiration water losses for water released from an upstream source of supply unless the contract specifies otherwise. *See* 30 Tex. Admin. Code § 297.103(c). If a contract provides for a buyer diverting water upstream of the stored source in a manner that could impair the seller's underlying water right, then either the buyer or the seller must obtain a permit to appropriate water up to the maximum annual diversions of upstream water for the term of the contract. *See* 30 Tex. Admin. Code § 297.104.

Finally, TCEQ rules on annual reporting of state water use require that both the seller and the buyer of state water file annual reports. The buyer must report the amount of water diverted on a weekly and monthly basis, while the seller must report the amount of water used each month and the total amount released downstream each week to each purchaser. *See* 30 Tex. Admin. Code § 295.202(d)(1), (2).

VI. Wholesale Water Supply Conservation and Drought Contingency Planning Requirements

Pursuant to Texas Water Code section 11.1271, the TCEQ rules in 30 Texas Administrative Code sections 288.1–.30 establish the water conservation and drought contingency planning requirements for various types of water users, including wholesale water suppliers. As described in more detail below, all wholesale water suppliers must prepare and keep updated a water conservation plan and a drought contingency plan. The TCEQ rules contain a definition of the term "wholesale public water supplier":

> An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

30 Tex. Admin. Code § 288.1(24). Although the defined term "wholesale *public* water supplier" appears to be limited to wholesale water resold for public consumption (i.e., potable water), the TCEQ rules at 30 Texas Administrative Code section 288.5 are addressed to "wholesale water suppliers" without limiting applicability to potable water wholesalers. Therefore it is reasonable to conclude that the water conservation planning requirements in section 288.5 apply generally to all wholesale water suppliers, not just potable water resold on a wholesale basis for public consumption.

A. Water Conservation Plans for Wholesale Water Suppliers

A water conservation plan for a wholesale water supplier must at a minimum include the following elements:

- a description of the wholesaler's service area, including population and customer data, water use data, and wastewater data;
- specific, quantified five-year and ten-year targets for water savings, including target goals for public water supplies in gallons per capita per day for the wholesaler's service area, maximum acceptable unaccounted-for water, and the basis for development of these goals;
- a description of how the amount of water diverted from the source of supply will be measured and accounted for;
- a monitoring and records management program for determining water sales, deliveries, and losses;
- a metering, leak detection, and repair program for the wholesaler's water storage, delivery, and distribution system;
- a requirement in all water supply contracts that each successive wholesale customer develop and implement a water conservation plan under the TCEQ rules;
- if applicable, a reservoir systems operations plan providing for optimized use of water supplies from all reservoirs;
- a means for implementation and enforcement; and
- documentation that the water conservation plans and goals are consistent with the approved regional water plan.

See 30 Tex. Admin. Code § 288.5(1). See Chapter 20 of this book for a discussion of regional water plans.

The wholesale water supplier can elect to adopt, or the TCEQ can require adoption of, additional water conservation strategies, such as conservation-oriented water rates and water rate structures (e.g., uniform or increasing block rate schedules, seasonal rates), a program to assist agricultural customers in water conservation activities, and a wastewater reuse and recycling program. *See* 30 Tex. Admin. Code § 288.5(2). The wholesale water supplier's conservation plan must be updated every five years to coincide with the supplier's regional water planning group. 30 Tex. Admin. Code § 288.5(3). See Chapter 20 of this book for a discussion of regional water planning groups. See also Chapters 2, 9, and 23 for further discussion of water conservation plans.

B. Drought Contingency Plans for Wholesale Water Suppliers

A drought contingency plan for a wholesale water supplier must at a minimum include the following elements:

- provisions to actively obtain public input on preparation of the plan and for informing wholesale customers about the plan (e.g., a noticed public meeting and opportunity to submit comments);
- coordination with regional water planning groups for the service area of the wholesale public water supplier;
- specific criteria for the initiation and termination of drought response stages with an explanation of the rationale or basis for such triggering criteria;
- a minimum of three drought or emergency response stages providing for the implementation of measures for a repeat of the drought of record;
- notification of wholesale customers and other procedures for initiating or terminating drought response stages;
- specific, quantified targets for water use reductions during periods of water shortage and drought;
- specific water supply or water demand management measures to be implemented during each stage of the plan, including (1) pro rata curtailment of water deliveries to wholesale water customers in accordance with section 11.039 of the Texas Water Code, and (2) utilization of alternative water sources (e.g., interconnection with another water system, temporary use of a nonmunicipal water supply, use of reclaimed water for nonpotable purposes);
- a requirement that every wholesale water contract provide for pro rata curtailments in times of drought;
- procedures for granting variances to the plan; and
- procedures for enforcing any mandatory water use restrictions, including specification of penalties (e.g., liquidated damages, water rate surcharges, discontinuation of service) for violations of such restrictions.

See 30 Tex. Admin. Code § 288.22(a).

The wholesale public water supplier must notify the TCEQ executive director within five business days of the implementation of any mandatory provisions of the drought contingency plan. 30 Tex. Admin. Code § 288.22(b). The wholesale public water supplier must also review and update the drought contingency plan at least every five years based on any new or updated information. 30 Tex. Admin. Code § 288.22(c). See Chapter 22 of this book for further discussion of drought contingency planning.

VII. Wholesale Water Supply Contract Provisions

Wholesale water supply contracts are typically entered into between holders of large state-appropriative water rights and customers such as cities, water districts, nonprofit water supply corporations, industries, and agricultural users. The largest holders of water rights in Texas are generally the major river authorities, large cities, and large municipal water districts. These wholesale water suppliers have tended to develop standard form wholesale contracts for one or more types of their customers or types of water use requested by the customer. Because wholesale water supply contracts and buyer-seller relationships are largely unregulated, however, and because most wholesale contracts deal with a set of facts unique to each wholesale supplier, wide variations exist among the various wholesale water supply contracts utilized in Texas. There is a good summary of the similarities and differences among the wholesale water supply contracts of the various river authorities in Texas in

Sushma Krishnamurthi, Water Supply Aspects of River Authorities in Texas (2006) (unpublished M.A. thesis, Texas A&M University), available online at http://repository.tamu.edu/handle/1969.1/4443 [hereinafter Krishnamurthi]. Nevertheless, some contract provisions are common to most wholesale contracts. The most significant of these provisions include:

- *Term of agreement:* Most wholesale water contracts are intended to help meet the buyer's need for a long-term, dependable source of water supply. Typically, a wholesale contract specifies an initial term of ten to fifty years, with the potential for renewal.
- *"Take-or-pay" volume provision:* Most wholesale contracts specify that the volume of water subject to the contract is supplied on a "take-or-pay" basis so that the buyer is required to pay for a minimum volume of water at a set price regardless of whether the buyer actually takes delivery of the minimum volume. The advantage of a take-or-pay provision in wholesale water contracts is that the buyer is assured of a steady supply at a set price, and the seller is assured of a steady revenue stream while minimizing the risk of future declines in demand. In those cases in which a contract allows a buyer to take more water than the minimum, a price premium on the extra water may be charged by the seller. A good discussion of the authority granted to local governments and state agencies by the Interlocal Co-operative Act (Texas Government Code chapter 791) to enter into take-or-pay contracts for water supply and wastewater treatment can be found in *City of The Colony v. North Texas Municipal Water District*, 272 S.W.3d 699 (Tex. App.—Fort Worth 2008, pet. dism'd).
- *Diversion point:* A diversion point at which a buyer takes delivery of wholesale water is typically specified in a map or diagram showing the diversion point. The diversion point should be defined with precision to establish the dividing point between seller and buyer concerning liabilities and risk of loss, and also for water rights permitting purposes.
- *Metering of water taken:* Typically the buyer bears the cost of installing, operating, and maintaining a meter to accurately measure the amount of water taken. The seller has the right to take meter readings, inspect and test the meter, and require adjustments in the amounts paid in the event any significant meter inaccuracies are discovered. Most wholesale contracts also prescribe a maximum rate of delivery and may require that water flows be mechanically regulated so that the maximum rate is not exceeded. A wholesale water contract also typically provides that any other facilities required by the buyer to divert water and connect to the seller's system must be approved in advance by the seller.
- *Purpose and place of use:* To ensure that the provision of water is consistent with the seller's underlying water right, a wholesale contract may limit the buyer to a particular use and place of use of the water.
- *Water quality:* A wholesale contract for raw or untreated water typically contains only limited commitments by the seller about the quality of the water, or the contract may contain an outright disclaimer of any warranties of fitness for a particular purpose. A contract for the sale of treated water specifies the degree of treatment being provided by the seller.
- *Water conservation and drought management:* As discussed above, Texas law requires a wholesale water supplier not only to have a water conservation and drought contingency plan but also to contractually require its water buyers to have the TCEQ-compliant water conservation and drought contingency plans that the buyer in turn is required to impose on its retail consumers.
- *Price and price adjustments:* The pricing provisions of a wholesale water contract are typically very detailed and usually include complex formulas for determining price adjustments under various circumstances. A different base water rate may be set for different uses (munici-

pal/domestic, industrial, or agricultural) and for such water provided on a "firm" basis (uninterruptible even in times of drought) or a "non-firm" basis (interruptible in times of drought). A base water rate charged in a wholesale contract may consist of various components such as a raw water charge, a pumping and transmission charge, a treatment charge, a maximum day (peak) demand charge, or a service charge to cover some portion of the seller's administrative costs. A wholesale contract typically provides for future increases in the base water rate, or components thereof, based on future increases in the seller's cost of providing the water, costs that may or may not be required to be justified by the seller. Some wholesale water sellers providing municipal use water may charge a fee for each new retail customer connection made by the buyer (i.e., a "system access fee" or impact fee). Similarly, some wholesale water sellers may charge a "capital buy-in" fee to help defray the seller's water system capital costs. Different circumstances affect each individual water supplier. These include regional differences in water availability and customer demand, differences in costs that each water supplier attempts to recover in wholesale rates, differences in the legal authority of political subdivisions that act as wholesale water providers (e.g., river authorities, cities, and water districts), and differences in political considerations and economic philosophies among the governing boards of the major water suppliers. One researcher who conducted a survey of wholesale water rates charged by river authorities in Texas found that the per-acre-foot price in 2004 for municipal use water ranged from \$25.48 to \$140, the per-acre-foot price of industrial use water ranged from \$25.48 to \$106.50, and the per-acre-foot price of agricultural use water ranged from \$9 to \$105. Krishnamurthi, at 65–66.

VIII. Conclusion

Wholesale water supply contracting plays a vital role in the Texas water market because it allows for the transfer of large volumes of untreated or treated water to those entities that have retail customers needing a long-term, dependable source of water. Unlike retail sales of water to end users, which is a highly regulated process, the supply of water on a wholesale basis is largely determined by freely negotiated contracts between the wholesale water supplier and the wholesale water purchaser. The most significant legal controls over wholesale water supply are the PUC's and the TCEQ's wholesale water rate-setting process, which is intended to prevent the abuse of monopoly power by wholesale water suppliers over water purchasers. Wholesale water purchasers can be expected to use the PUC's and the TCEQ's wholesale water rate-setting process more frequently as the relatively fixed supply of water available in Texas must meet the ever-increasing demands of the growing Texas economy.

CHAPTER 32

The Endangered Species Act and the Texas Law of Water Resources

Laura Evans[1]

I. Introduction

The Endangered Species Act of 1973 (ESA) continues to have a profound effect on water rights and state water resources. *See* 16 U.S.C. §§ 1531–1544. It has been suggested that the ESA "appears to be having a larger impact on state water laws and private rights than any other piece of federal legislation." Roderick E. Walston, *Water Law Symposium: Keynote Address*, 12 Hastings W. Nw. J. Envtl. L. & Pol'y 125 (2006). The ESA makes no accommodations for state sovereignty, and its application has often resulted in federal or judicial mandates to allocate existing water resources—or tailor or forgo altogether the development of new water supply resources or delivery systems—for the benefit of aquatic species that are listed as endangered or threatened.

Due to a persistent drought and increasing population, Texas is joining the other western states and beginning to experience the uncertainty caused by the collision of the ESA and allocated water resources. This chapter will explore the nature and function of the ESA, and then consider the ESA in the context of groundwater and surface water resources based on the statute's application in Texas and instructive examples from other parts of the country.

II. Overview of the ESA in the Context of Water Resources

The ESA is considered to be one of the most potent federal environmental laws, revered by many for its protection of nonhuman species at all costs, and reviled by many others for exactly the same reason. For the most part, however, the ESA is like many other environmental laws—it demands that humans take into account the effects of economic and social activities on the environment and adjust accordingly. The devil, as always, is in the details of the adjustment: how much, by whom, when, where, and for how long? The purpose of this chapter is to place the ESA in the context of water resources, where it has had profound impacts, and to guide the reader through the salient details of the statute's administration and enforcement.

The ESA is a modern-day extension of wildlife management law dating back to feudal England, when lords restricted hunting and the "take" of game species from their royal forest estates. *See*

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Michael J. Bean & Melanie J. Rowland, *The Evolution of National Wildlife Law* (Greenwood Press 3d ed. 1997) (discussing the ESA's roots). Feudal lords granted franchises for hunting rights, which eventually grew so numerous that Parliament limited further franchising in the Magna Carta and charged the crown with the duty of protecting wildlife as part of the "public trust." Gradually, legislative statutes, not royal decrees, became the mechanism that regulated hunting, based largely on land and wealth as the necessary entitlements to hunt. This system was imported to the colonies and endorsed in *Martin v. Waddell*, 41 U.S. (16 Pet.) 367 (1842), in which Chief Justice Roger Taney ruled that the public trust theory survived the Revolution and that the states (in place of the king) had title to navigable waters, submerged lands, and their wildlife resources.

The public trust theory of wildlife management sank deep into our nation's legal foundation. Its apex came in *Geer v. Connecticut*, 161 U.S. 519, 530 (1896), in which the Supreme Court held that state ownership of wildlife gave the states "an absolute right to control and regulate the killing of game." For decades after that, Congress, being an institution of constitutionally enumerated powers, did not even attempt to compete with the states' background police power over wildlife management, passing virtually no federal legislation of any importance in the field. The notable exceptions were the Lacy Act of 1900, codified at 18 U.S.C. section 42, which prohibited interstate transportation of animals killed in violation of state law, and the Migratory Bird Treaty Act of 1918 (MBTA), codified at 16 U.S.C. sections 703–711, which, as its name suggests, was intended to restrict the trade and hunting of migratory birds. Both of these laws rest on what today would be narrow views of congressional power—the commerce power in the case of the Lacey Act and the treaty power in the case of the MBTA.

Over time, however, theories evolved to support a more expansive reach of federal authority, in particular through the commerce power. Interpreting that power to include not only the modes of interstate commerce and articles moving in interstate commerce but also any activity that substantially affects interstate commerce, the Supreme Court opened the door in the 1960s to a more active federal role in wildlife management. Through cases involving federal regulation of civil rights and economic activity, it became clear that the federal government had power to wield with respect to national interests in wildlife management. Congress stuck its toe in these waters with the Endangered Species Protection Act of 1966, Pub. L. No. 89-669, 80 Stat. 926 (repealed 1973), which gave the Secretary of the Interior (Secretary) limited power to conserve wildlife and assist states. The Endangered Species Conservation Act of 1969, Pub. L. No. 91-135 sections 1–5, 83 Stat. 275 (repealed 1973), restricted the importation of endangered species and authorized the Secretary to compile a list of species threatened with extinction. Although these two laws may have been the necessary baby steps, by comparison to what was yet to come they were timid.

The dam holding back the exercise of federal environmental power burst in the early 1970s, with the ESA riding the crest of the two major pollution control laws—the Clean Air Act and the Clean Water Act. By comparison the ESA was short, and perhaps for that reason its power initially was underestimated. Fittingly for purposes of this chapter, the true impact of the ESA was revealed in 1978 in a case involving water. In *Tennessee Valley Authority v. Hill*, 437 U.S. 153 (1978), the Supreme Court described the statute as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation" and ruled that the Tennessee Valley Authority could not complete a dam that was believed at the time to threaten the continued existence of a small fish, the snail darter. The case is reported to have surprised and irritated many of the legislators involved in the passage of the ESA, who proclaimed having thought the statute was about protecting so-called charismatic species such as the bald eagle. The decision also led to amendments to the ESA in 1978 that were designed in limited cases to provide an "exemption" from the strict interpretation the court gave the law. This exemption process has turned out to be of mainly symbolic importance and has been implemented very few times.

Indeed, the ESA survived amendments in 1978, 1979, 1982, and 1988 relatively intact. The basic regulatory structure of the law remains divided into five programs administered by the U.S. Fish and

Wildlife Service (Service) for terrestrial and freshwater species and the National Marine Fisheries Service (NMFS) for marine and anadromous species:

- *Species listing:* Section 4 authorizes the Service and NMFS to identify "endangered" and "threatened" species, known as the "listing" function, and then to designate "critical habitat" and develop "recovery plans" for the species.
- *Federal agency consultations:* Section 7 requires all federal agencies to consult with the Service and NMFS to ensure that actions they carry out, fund, or authorize do not "jeopardize" the continued existence of listed species or "adversely modify" their critical habitat.
- *Take prohibition:* Section 9 and its implementing regulations require that all persons, including all private and public entities subject to federal jurisdiction, avoid committing "take" of listed species of fish and wildlife.
- *Incidental take authorizations:* Sections 7 (for federal actions) and 10 (for actions not subject to section 7) establish a procedure and criteria for the Service and NMFS to approve "incidental take" of listed species.
- *Enforcement:* Section 11 establishes enforcement authorities, including a citizen suits provision.

This section of this chapter explores each of these programs in more detail. Section III then focuses on the intersection of the ESA and groundwater resources, and section IV does the same for surface water resources. Indeed, the intersections of the ESA and water have been substantial. Of the 683 animal species with habitat in the United States currently listed as endangered or threatened, 35 are amphibians, 162 are fish, 88 are clams, 46 are snails, and 25 are crustaceans. *See* U.S. Fish and Wildlife Service, *Summary of Listed Species Populations and Recovery Plans*, http://ecos.fws.gov/tess_public/pub/boxScore.jsp. In other words, fully half of all listed animal species live in water, and for many terrestrial species, water significantly affects their habitat or other essential behavioral functions. Moreover, many species that have been designated by the Service as candidates for listing under the ESA live in water or count water among their essential habitat requirements. Hence, given the substantial regulatory impact, no discussion of water resources law should proceed without attention to the ESA.

A. Purpose and Key Terms

In 1973, Congress determined that plants and wildlife are of great value to the nation and its people and enacted the ESA, with the stated purpose to "provide a means whereby the ecosystems upon which endangered . . . and threatened species depend may be conserved." 16 U.S.C. § 1531(b). By enacting the ESA, Congress passed perhaps "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Tennessee Valley Authority*, 437 U.S. at 180. In 1978, the Supreme Court found that every section of the ESA makes it plain that the "intent of Congress in enacting [the] statute was to halt and reverse the trend toward species extinction, whatever the cost." 437 U.S. at 184. In short, the ESA lays out strict prohibitions against "taking" certain species and stiff penalties for individuals who violate its mandates. Though several substantive amendments and various court decisions have tempered somewhat the severity of the ESA, it remains a strong mechanism for protecting and conserving endangered and threatened wildlife and their habitats.

To fully understand the ESA, it is necessary to be familiar with some of its commonly used terms. For example, section 4 of the ESA mandates that the Secretary list qualified species as either endangered or threatened. *See* 16 U.S.C. § 1533(c)(1). The term "species" is defined to include any "species or any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16). A species is endangered if it is "in danger of extinction throughout all or a significant portion of its range." 16 U.S.C. § 1532(6). A species is threatened if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20). The actual list of endangered and threatened species is recorded in the Code of Federal Regulations. *See* 50 C.F.R. §§ 17.11 (fish and wildlife), 17.12 (plants). Hence, threatened and endangered species that appear on the aforementioned list are sometimes collectively referred to as "listed species." Once placed on the list as endangered, species enjoy the full spectrum of protection afforded by the ESA. By contrast, species listed as "threatened" are not automatically afforded protection pursuant to the "take" prohibition found in ESA section 9. Rather, in order for the take prohibition to apply to a threatened species, the Service must extend the take prohibition to that species through a rulemaking process under ESA section 4(d). 16 U.S.C. § 1533(d). By regulation, however, the Service has extended the take prohibition to all species listed as threatened, unless a "special" rule otherwise applies. 50 C.F.R. § 17.31.

Section 9 of the ESA and its implementing regulations prohibit any activity that has the potential to "take" a listed species. "Take" is broadly defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." 16 U.S.C. § 1532(19). Though these words may seem straightforward on their face, each has a distinct meaning. The term "harm," for example, is defined by Service regulations as "an act which actually kills or injures wildlife . . . [and] may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." 50 C.F.R. § 17.3. The definition of "harass" extends further protection by covering intentional and negligent acts or omissions that create the likelihood of injury to listed species by annoying the species to such an extent that normal behavioral patterns—such as breeding, feeding, or sheltering—are disrupted. *See* 50 C.F.R. § 17.3. In addition to "taking" an endangered species in the above manner, it is unlawful to engage in the import or export of endangered species; to possess, sell, deliver, transport, or ship, in the course of any commercial activity, any endangered species unlawfully taken; or to engage in any activity involving interstate or foreign commerce in endangered species. *See* 16 U.S.C. § 1538(a)(1). Thus, using the foregoing terms as examples, it is easy to see that the ESA can, and often does, have an impact on development and other activities relating to water, especially if that activity could potentially affect the habitat of listed species.

B. Listing and Critical Habitat

As described above, section 4 of the ESA includes specific procedures for listing threatened and endangered species and their critical habitat. The Act authorizes the Secretary of the Interior, in the case of freshwater fish and wildlife, and the Secretary of Commerce, in the case of marine and anadromous species (collectively, the Secretary), to designate species as threatened and endangered when their continued existence is at risk by virtually any natural or man-made factor. ESA implementing regulations provide further guidance for determining whether a species should be listed as threatened or endangered. The regulations require that the agency use the "best scientific and commercial data available" while examining five criteria for determining whether to list a species: (1) the present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; and (5) other natural or man-made factors affecting the species' continued existence. 16 U.S.C. § 1533(a)(1). Conversely, a species may be delisted if the best scientific and commercial data available confirm that the species is extinct or has recovered, or that the original data used for listing that species were in error. *See* 50 C.F.R. § 424.11(d).

Once a species is listed, several important duties and prohibitions arise. First, the Secretary must, to the maximum extent practicable, designate critical habitat for the newly listed species. *See* 16 U.S.C. § 1533(a)(3). As defined by the ESA, "critical habitat" consists of the "specific areas within the geographical area occupied by the species" that are "essential to the conservation of the species and . . . which may require special management considerations or protection" at the time a species is listed. 16 U.S.C. § 1532(5)(A)(i). Areas outside the geographic area currently occupied by the species can also be included as critical habitat, but only if such areas are "essential for the conservation of the species." 16 U.S.C. § 1532(5)(A)(ii). Once designated, critical habitat must be delineated on a map. *See* 50 C.F.R. §§ 424.12(c), 424.18. Notably, areas that fit the basic definition of critical habitat can be denied designation if designating those areas is not necessary to prevent extinction and the benefits of excluding those areas outweigh the benefits of designation. *See* 16 U.S.C. § 1533(b)(2). Thus, although economic impacts cannot be considered in the listing process, such impacts can be considered in determining whether to designate a particular area as critical habitat.

Service implementation of the listing process changed in September 2011, when the D.C. District Court approved two listing settlement agreements that the Service reached with the Center for Biological Diversity and WildEarth Guardians. *See In re Endangered Species Act Section 4 Deadline Litigation*, No. 1:10-mc-00377-EGS (MDL No. 2165, D.D.C. Sept. 9, 2011). The environmental groups agreed to reduce ESA listing litigation and petitions, and in exchange the Service agreed to a five-year work plan to complete various section 4 review processes with ESA-mandated deadlines. The Service also agreed to make final "list" or "no list" decisions on 251 species that the Service had previously determined were candidates for listing pursuant to ESA section 4(b)(3)(B). *See* U.S. Fish and Wildlife Service, *Listing Workplan*, www.fws.gov/endangered/improving_esa/listing_workplan.html.

C. Species Take (Section 9)

Perhaps the most contested duty arising under the ESA applies not only to federal agencies but to all persons and entities, both private and public: the duty to comply with section 9 of the ESA and its prohibition of "take." As mentioned above, section 9 of the ESA broadly prohibits the take of endangered species (*see* 16 U.S.C. § 1538(a)(1)), and defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." 16 U.S.C. § 1532(19). Service regulations define "harm" within the "take" definition to encompass not only intentional harm to a listed species, but also the destruction or modification of a species' habitat. *See* 50 C.F.R. § 17.3. For listed fish and wildlife, this sweeping prohibition applies to "any person" equally on federal, state, and tribal lands, at sea, and even on private lands. *See* 16 U.S.C. § 1538(a)(1). Section 4 gives the Secretary the discretion to apply to threatened species the full spectrum of prohibitions applicable to endangered species in section 9. *See* 16 U.S.C. § 1533(d). Pursuant to the discretion granted in the ESA, unless a species is subject to an individual "4(d) rule," the Secretary may exercise discretion and extend the full range of section 9 protections to threatened species. *See* 50 C.F.R. § 17.31(a). The term "4(d) rule" refers to ESA section 4(d), which grants the Secretary discretion in applying protective measures to threatened species. *See* 16 U.S.C. § 1533(d).

While the ESA provides for the listing of threatened and endangered plants, listed plants are not afforded as much protection as listed wildlife because the section 9(a)(1)(C) "take" prohibition applies only to wildlife. *See* 16 U.S.C. § 1538(a)(2)(A). Instead, the ESA makes it unlawful to remove and possess endangered plants from federal lands; to "maliciously" damage or destroy such plants; or to remove, cut, dig up, damage, or destroy any such plant in knowing violation of state law or regulation, or in the course of any violation of state criminal trespass law. 16 U.S.C. § 1538(a)(2)(B). Endangered plants are protected in the same way as endangered animals in regard to import, export, and almost any other act involving interstate or foreign commerce. *See* 16 U.S.C. § 1538(a)(2)(A), (C)–(E). Notably, whereas the mere possession of an endangered animal taken in violation of section 9 is unlawful, it is not unlawful to simply possess an endangered plant, even if that plant was illegally obtained. *See* 16 U.S.C. § 1538(a)(2)(C). Unlike the sweeping extension of protection to threatened animals under the 4(d) rule, threatened plants are not protected by the ESA unless provided for in a special regulation regarding a particular threatened plant species.

The breadth of the section 9 take prohibition has created significant controversy and has even merited review by the Supreme Court. The debate often centers on the extent to which the regulatory definition of "harm" applies to habitat modification. The Service's regulatory definition of "harm" states:

> Harm in the definition of "take" in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

50 C.F.R. § 17.3.

In 1995 the Supreme Court gave credence to the Service's inclusion of habitat modification in its regulatory "harm" definition. *See Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687 (1995) [hereinafter *Sweet Home*] (using the 1981 amendments to the "harm" definition, which is identical to current regulations). In *Sweet Home*, the Court held that Congress's intent was "reasonably construed" by the Service's regulations, which defined "harm" to include "significant habitat modification or degradation that actually kills or injures wildlife." 515 U.S. at 696. The Court relied not only on the common dictionary definition of "harm," which does not require the application of direct force, but also on the comprehensive nature of the ESA, on Congress's statement in the ESA that the ESA was to conserve the "*ecosystems* upon which endangered and threatened species depend," on the 1982 ESA amendments that added section 10(a)(1)(B) authorizing incidental take permits, and on the ESA's legislative history in which Congress gave examples of prohibited *indirect* harm. 515 U.S. at 700–06 (emphasis added). The Court acknowledged that application of the harm definition, and proximate causation in particular, would depend on individual fact patterns best left to the determination of the lower courts. 515 U.S. at 713 (O'Connor, J., concurring).

Both before and after the *Sweet Home* decision, various courts weighed in on whether particular cases involving indirect harm constitute take of listed species. For example, the Fifth Circuit Court of Appeals held that the U.S. Forest Service's "even-aged" management practices, which permitted clear cutting within two hundred feet of "cavity trees" for an endangered woodpecker, impaired the woodpecker's essential behavioral patterns, including sheltering; resulted in take; and were likely to jeopardize the woodpecker's continued existence. *See Sierra Club v. Yeutter*, 926 F.2d 429, 438–39 (5th Cir. 1991). The First Circuit Court of Appeals held that state licensing of fishing and lobstering equipment constituted harm when the equipment led to the entanglement of endangered northern right whales. *See Strahan v. Coxe*, 127 F.3d 155, 164–65 (1st Cir. 1997), *cert. denied*, 525 U.S. 830 (1998).

D. Section 7 Consultation

Section 7 of the ESA offers protection to listed species by placing on federal agencies the affirmative duty to use their authorities to conserve listed species. *See* 16 U.S.C. § 1536(a)(2). This duty translates into both a substantive and a procedural directive to agencies to engage in "consultation" with either the Service or the NMFS. Procedurally, federal agencies are required to consult with the Service on any action that is likely to adversely affect an endangered or threatened species. Substantively, federal agencies must avoid jeopardizing listed species and destroying or adversely modifying their critical habitat. Below is a brief overview of the key provisions of section 7 of the ESA.

1. Interagency Consultation

Section 7(a)(2) requires that each federal agency—

> in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical habitat].

16 U.S.C. § 1536(a)(2); *see also* 50 C.F.R. § 402.01. The term "action" is read broadly by courts and implementing agencies and includes issuance of licenses and permits, actions intended to conserve listed species or their habitat, promulgation of regulations, and federal funding, among other things. *See* 50 C.F.R. § 402.02. Thus, whenever federal agencies engage in an action that may affect a listed species, the agencies must both consult with the Service or the NMFS and avoid jeopardizing listed species or destroying or adversely modifying their critical habitat.

For the purposes of section 7(a)(2), "action" includes nonfederal activities that require certain authorization or assistance from one or more federal agencies as a prerequisite to engaging in those activities. *See* 50 C.F.R. § 402.02. Thus, otherwise private activities can be, and often are, subject to consultation under the ESA. For example, if the U.S. Army Corps of Engineers (Corps) were considering issuing a Clean Water Act section 404 permit to a state or local agency constructing a water supply project and the proposed construction activities might affect a listed species, then the Corps would be required to consult with the Service before issuing the permit.

Once an agency determines that an activity is an "action" for section 7 purposes, the agency must determine whether the action "may affect" listed species or designated critical habitat. 50 C.F.R. § 402.14(a). Consultation is not required for federal agency actions that have no effect on listed species. *Marin Audubon Society v. Seidman*, No. 91-2029 (N.D. Cal. Nov. 21, 1991), *aff'd*, 999 F.2d 543 (9th Cir. 1993).

Consultation can begin as "informal consultation," involving meetings, telephone calls, or other forms of communication between Service personnel and the action agency, or it can begin as "formal consultation." *See* 50 C.F.R. § 402.02. In informal consultation, project modifications can be suggested to avoid the likelihood of adverse effects. *See* 50 C.F.R. § 402.13(b). To determine the likelihood of adverse effects, the action agency prepares a biological assessment (BA), which evaluates the potential and likelihood of adverse effects of the proposed action on listed or proposed species and designated or proposed critical habitat. *See* 50 C.F.R. § 402.12. The action agency, through the BA, will make one of three calls: (1) the proposed action will have no effect on listed or proposed species or designated or proposed critical habitat; (2) the proposed action may affect, but is not likely to adversely affect, listed or proposed species or designated or proposed critical habitat; or (3) the proposed action is likely to adversely affect listed or proposed species or designated or proposed critical habitat. If the action agency determines the proposed action will have no effect on listed species or critical habitat, the agency has no further obligation under section 7. *See* 50 C.F.R. § 402.12(k). If the action agency decides that the proposed action may affect, but is not likely to adversely affect, a listed species or its critical habitat, and the Service concurs in that determination, informal consultation is concluded and formal consultation is not necessary. *See* 50 C.F.R. § 402.14(b). If the Service does not concur with a not likely to adversely affect determination made by the action agency, or if the BA determines that the proposed action is likely to adversely affect listed species or critical habitat, formal consultation is required. *See* 50 C.F.R. § 402.14(a).

Formal consultation begins when the action agency makes a written request to engage in formal consultation with the Service. *See* 16 U.S.C. § 1536(c)(1); 50 C.F.R. § 402.14(c). Once formal consultation begins, it must proceed in the detailed manner set forth in the ESA and section 7 implementing regulations. *See* 50 C.F.R. § 402.14; *see also* U.S. Fish and Wildlife Service, *Endangered Species Consultation Handbook*, at 4-4–4-7 (1998), *available at* www.fws.gov/

endangered/esa-library/pdf/esa_section7_handbook.pdf [hereinafter Consultation Handbook]. Formal consultation must be completed within ninety days of its initiation, unless the Service and the action agency agree to an extension. *See* 16 U.S.C. § 1536(b)(1)(A); 50 C.F.R. § 402.14(e). At the end of the formal consultation process, a biological opinion (BO) is issued by the Service. The BO "states the opinion of the Service as to whether or not the . . . action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat." 50 C.F.R. § 402.02. If the Service finds in the BO that the action is likely to jeopardize the continued existence of listed species or the destruction or adverse modification of their critical habitat, then the Service must suggest reasonable and prudent alternatives (RPAs) to the proposed action. An RPA must be consistent with the intended purpose of the action, within the authority and jurisdiction of the action agency, economically and technologically feasible, and avoid jeopardy or adverse modification or destruction of critical habitat. *See* 50 C.F.R. § 402.02. The action agency may select any RPA that meets the section 7 directive to avoid jeopardy to listed species or destruction or adverse modification to critical habitat. *See* Consultation Handbook, at 4-43. If the BO concludes that the action is likely to result in jeopardy of the species or adverse modification of critical habitat and no RPAs exist, then any incidental take resulting from the proposed action is prohibited. *See* Consultation Handbook, at 4-52.

If the proposed action will take listed species but will not cause jeopardy or adverse modification of critical habitat, then the BO will include an "incidental take statement," which specifies the amount or extent of such incidental taking (the "impacts"); specifies reasonable and prudent measures (RPMs) that are necessary to minimize those impacts; sets forth terms and conditions that must be complied with by the action agency or applicant; and specifies procedures to use in the handling or disposal of individuals of species actually taken. *See* 16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14(i). "Incidental take" means "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." 50 C.F.R. § 402.02. RPMs cannot serve a general mitigation purpose but must minimize the amount or extent of anticipated take. Consultation Handbook, at 4-50. Even though RPMs involve only "minor changes" to the action (those that do not change the action's basic design, location, scope, duration, or timing), if the RPMs are not implemented, any incidental take occurring pursuant to the action is unlawful. *See* 16 U.S.C. § 1536(o); 50 C.F.R. § 402.14(i)(2).

2. *Section 7(a)(1) Duty to Conserve*

Section 7(a)(1) imposes on federal agencies the affirmative duty to conserve endangered and threatened species "in consultation with and with the assistance of the Secretary." 16 U.S.C. § 1536(a)(1). Although the duty placed on federal agencies to conserve listed species seems broad, the obligation is poorly defined. No federal agency has promulgated its own rules addressing section 7(a)(1), although the Corps recently published a guidance document regarding ESA section 7. *See* U.S. Army Corps of Engineers, *ESA Guidance* (June 11, 2013), *available at* http://planning.usace.army.mil/toolbox/library/MemosandLetters/13Jun11-ESA.pdf. Courts have held that section 7(a)(1) creates an affirmative duty not only to protect listed species but also to help the species recover to the point where it no longer requires the protections of the ESA. *See Carson-Truckee Water Conservancy District v. Clark*, 741 F.2d 257, 261–62 (9th Cir. 1984), *cert. denied*, 470 U.S. 1083 (1985). For example, the Fifth Circuit Court of Appeals not only affirmed that federal agencies have an affirmative duty to conserve listed species but went even further, requiring the U.S. Department of Agriculture (USDA) to adopt or develop conservation programs for listed Edwards Aquifer species. *Sierra Club v. Glickman*, 156 F.3d 606, 616–18 (5th Cir. 1998). In that case, the USDA had not implemented any measures whatever for the conservation of listed species. 156 F.3d at 616. Other courts have held that ESA section 7(a)(1) imposes no particular mandatory measures on federal agencies. *See Strahan v. Linnon*, 967 F. Supp. 581 (D. Mass. 1997), *aff'd*, 187 F.3d 623 (1st Cir. 1998); *see also Hawskbill Sea Turtle v.*

FEMA, 11 F. Supp. 2d 529 (D. V.I. 1998). However, in those cases, the defendant agencies had taken some measures to fulfill their section 7(a)(1) duties, and thus the issue was whether the agencies' conservation actions were sufficient. *Strahan*, 967 F. Supp. at 596; *Hawksbill Sea Turtle*, 11 F. Supp. 2d at 542–43.

E. Section 10 Habitat Conservation Plans, Safe Harbors, and Candidate Conservation Agreements

As originally enacted, section 10 authorized exemption from the section 9 take prohibitions only for "scientific purposes or to enhance the propagation or survival of the affected species." Pub. L. No. 93-205, 87 Stat. 896 (1973). In 1982, Congress amended the ESA to include section 10(a)(1)(B)), which authorizes the Service to issue a permit for otherwise prohibited taking of listed species (an "incidental take permit") "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Pub. L. No. 97-304, 96 Stat. 1422 (1982) (codified at 16 U.S.C. § 1539(a)(1)(B)). This amendment was made to resolve the "concerns of private landowners who [were] faced with having otherwise lawful activities . . . prevented by [ESA] Section 9 prohibitions against taking." H.R. Conf. Rep. No. 97-835, at 29 (1982), *reprinted in* 1982 U.S.C.C.A.N. 2860, 2870. The purpose of authorizing incidental take permits was not only to allay the fears and concerns of landowners but also to promote the conservation of species by encouraging partnerships between public and private sectors and providing "long-term assurances" to participating landowners. H.R. Conf. Rep. No. 97-835, at 30 (1982), *reprinted in* 1982 U.S.C.C.A.N. 2860, 2871. Today section 10 incidental take permits are a tool often used by landowners to provide for the needs of listed species while at the same time allowing the landowners to engage in land-use activities that would otherwise be prohibited under the ESA.

1. Habitat Conservation Plans and the "No Surprises" Policy

Formulating a habitat conservation plan (HCP) is a mandatory prerequisite for individuals seeking an incidental take permit. *See* 16 U.S.C. § 1539(a)(2)(A). For an incidental take permit to be issued, the applicant must submit a conservation plan that includes the following:

- the impact that is likely to result from the taking;
- steps the applicant will take to "minimize and mitigate" the impact and the funding that will be available to implement those steps;
- alternatives to the taking the applicant considered and the reasons the alternatives are not being used; and
- other measures the Secretary may require of the applicant as being necessary or appropriate for purposes of the plan.

16 U.S.C. § 1539(a)(2)(A)(i)–(iv).

After the Service receives the permit application along with an HCP that meets the above criteria, and after there has been opportunity for public comment, the Secretary must issue the permit if he finds that (1) the proposed taking will be incidental; (2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (3) the applicant will ensure that adequate funding for the HCP will be provided; (4) the taking will not "appreciably reduce the likelihood of the survival and recovery of the species in the wild"; and (5) the measures, if any, required by the Secretary of the Interior will be met. 16 U.S.C. § 1539(a)(2)(B)(i)–(v).

The applicant must choose which species to address in the HCP so it is covered for take of those species under the incidental take permit. An HCP may address many different species, or it may focus on specific habitat types and address all species within certain habitat types included in the plan area, but at a minimum it should include all listed species of animals and plants that could be incidentally taken during the life of the project. U.S. Fish and Wildlife Service, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* 3-8 (1996) [hereinafter HCP Handbook], *available at* www.fws.gov/endangered/esa-library/pdf/hcpbktoc.pdf (stating that, although plants are not the subject of an incidental take permit because section 9 take prohibitions apply only to wildlife, the Service cannot approve an incidental take permit for an action that would result in jeopardy to a listed species, including a listed plant). If an applicant fails to include a listed species in its HCP and that species is subsequently taken, failure to include that species may result in project shutdowns and delays. HCP Handbook, at 3-7. An applicant is also advised to include unlisted species in its HCP, such as species that are proposed or are candidates for listing and are likely to be listed in the foreseeable future or within the life of the permit. This will protect the applicant from later delays should a species not listed at the time the HCP was approved become subsequently listed. HCP Handbook, at 3-7. The protection afforded by an HCP that includes unlisted species is known as the "no surprises" policy. HCP Handbook, at 3-7.

The "no surprises" policy was formally implemented in February 1998, and its purpose is to provide regulatory, long-term assurances to the holder of an incidental take permit such that—

> no additional land use restrictions or financial compensation will be required of the permit holder with respect to species covered by the permit, even if unforeseen circumstances arise after the permit is issued indicating that additional mitigation is needed for a given species covered by the permit.

63 Fed. Reg. 8859 (Feb. 23, 1998), codified at 50 C.F.R. pt. 17. Thus, for species covered by the permit, if additional mitigation measures are later deemed necessary to provide for the conservation of the species that were otherwise adequately covered under the terms of a properly functioning HCP, then the obligation for such measures is not imposed on the permittee. HCP Handbook, at 3-29.

The "no surprises" policy applies only for the life of the particular incidental take permit and only with respect to species "adequately covered" by it. *See* 50 C.F.R. §§ 17.22(b)(5), 17.32(b)(5), 222.307(g). For a listed species to be "adequately covered" by the permit, the HCP must satisfy the ESA section 10(a)(2)(B) permit issuance criteria described above. HCP Handbook, at 3-30. For unlisted species to be considered "adequately covered" by the HCP, the HCP must address those species "*as if* they were listed pursuant to section 4 of the ESA, and in which HCP conditions for that species would satisfy permit issuance criteria under section 10(a)(2)(B) of the ESA if the species were listed." HCP Handbook, at 3-30. As long as a permittee is adequately implementing or has implemented an approved HCP, the Service will not require additional lands, funds, or restrictions on lands or other natural resources released for development or use under that HCP unless the permittee consents to such additional measures. *See* 50 C.F.R. § 17.22(b)(5)(ii), (iii); HCP Handbook, at 3-29–3-31. Simply put, barring "unforeseen circumstances," if the species is covered by a permittee's approved HCP, and the permittee is implementing or has implemented that HCP in good faith, nothing further will be required of the permittee. *See* 50 C.F.R. § 17.22(b)(5)(iii)(C); HCP Handbook, at 3-29–3-31.

The ESA implementing regulations and the HCP Handbook include several criteria that the Service will consider in determining whether and when unforeseen circumstances exist. *See* 50 C.F.R. § 17.22(b)(5)(iii)(C); HCP Handbook, at 3-31. If unforeseen circumstances are found to exist, and the Service deems it necessary to respond to those circumstances by requiring additional conservation measures, any such measures must be limited to modifications within the "conserved habitat areas," if any, or to the HCP's operating conservation program for the affected species. Additionally, the terms of the original HCP must be maintained to the maximum extent practicable. *See* 50 C.F.R. § 17.22(b)(5)(iii)(C); HCP Handbook, at 3-31. Service regulations continue to give credence to the broad purpose of the ESA to conserve species by providing that the "no surprises" policy should not be read to limit or constrain any governmental entity, including the Service, from taking action at its own expense to protect or conserve a species included in an HCP. *See* 50 C.F.R. § 17.22(b)(6).

2. "Safe Harbor" Permits

ESA section 10(a)(1)(A) permits otherwise prohibited acts when those acts are carried out for the purpose of enhancing the propagation or survival of a listed species. *See* 16 U.S.C. § 1539(a)(1)(A). In 1999, the Service promulgated new regulations formalizing the use of the "safe harbor agreement" (SHA). *See* 64 Fed. Reg. 32,706 (June 17, 1999), codified at 50 C.F.R. pts. 13, 17. The SHA is a device developed and used in connection with a section 10(a)(1)(A) "enhancement of survival permit" in which a landowner proposes activities that could restore, enhance, or maintain habitat for listed species, thereby potentially increasing numbers of the species on the landowner's property. The SHA thus allows the landowner to provide net conservation benefits to listed species in exchange for the Service's assurance that any future incidental take of a covered species, back to the baseline population level or habitat condition, will not result in liability for an unlawful taking. SHA-based permits are transferable, and any transferee may avail himself fully of permit protections as long as he is otherwise qualified to hold a permit and provides adequate written assurances that he will fund and implement the permit's terms. *See* 50 C.F.R. § 13.25(b).

An applicant seeking an SHA-based enhancement of survival permit must submit a permit application, which includes the common and scientific names of the listed species to be covered by the permit, a description of the land use or water management activity for which the permit is sought, and an SHA that complies with the SHA policy. *See* 50 C.F.R. §§ 17.22(c)(1)(i)–(iii), 17.32(c)(1)(i)–(iii). According to the Joint Safe Harbor Policy, the Service will work with prospective applicants to establish the "baseline condition" of the property proposed to be covered by the SHA. 64 Fed. Reg. 32,706, 32,722. "Baseline condition" means the "population estimates and distribution and/or habitat characteristics and determined area of the enrolled property that sustain seasonal or permanent use by the covered species at the time the [SHA] is executed between the Service and the property owner." 64 Fed. Reg. 32,706, 32,722. Once a baseline condition is established, the parties identify certain measures that, when undertaken, will accomplish a "net conservation benefit" relative to the baseline conditions that will contribute to the recovery of the listed species included in the permit and SHA. *See* 50 C.F.R. §§ 17.22(c)(2)(ii), 17.32(c)(1)(i)–(iii); U.S. Fish and Wildlife Service, *Safe Harbor Agreements for Private Landowners* (2011), *available at* www.fws.gov/endangered/esa-library/pdf/harborqa.pdf. Once the SHA has been developed and the permittee meets the terms of the agreement, the Service authorizes the incidental take of covered species at a level that allows the permittee to ultimately return the covered property back to the agreed-on baseline conditions. *See* 50 C.F.R. §§ 17.22(c)(2)(ii), 17.32(c)(1)(i)–(iii). The "no surprises" policy applies to SHAs, and thus, once the permit is issued, no additional commitments of land, water, or financial resources will be required. 64 Fed. Reg. 32,717 (June 17, 1999).

3. Candidate Conservation Agreements with Assurances

When the Service promulgated regulations formalizing the use of SHAs, it also established standards and procedures for conserving proposed and candidate species through the development of Candidate Conservation Agreements with Assurances (CCAAs). 64 Fed. Reg. 32,726 (June 17, 1999). CCAAs are formal agreements between the Service and one or more landowners to address the conservation needs of proposed or candidate species or species likely to become candidates for listing in the future. The purpose of CCAAs is to provide landowners an incentive to engage in proactive conservation management, with the ultimate goal being the removal of enough threats to species covered by CCAAs to preclude the need to list those species as threatened or endangered in the future.

64 Fed. Reg. 32,726, 32,733. Specifically, the Service provides assurances through the CCAA program that, in the event a species covered by the CCAA is listed as endangered or threatened, the Service will not require additional land, water, or other resource use restrictions above those the landowner voluntarily committed to in the CCAA. 64 Fed. Reg. 32,726, 32,734. Thus, as long as the CCAA is being properly implemented by the landowner, the landowner is responsible only for implementing and maintaining the conservation or management measures agreed to in the CCAA.

F. Enforcement

Section 11 imposes stiff penalties for violations of the ESA's take prohibitions in section 9. A person who knowingly violates any section 9 prohibition or implementing regulation with respect to an endangered animal or plant may be faced with a civil penalty of up to $25,000 per violation and a criminal penalty of up to $50,000 per violation and up to one year in prison. *See* 16 U.S.C. § 1540(a)(1), (b)(1). A person who knowingly violates any other regulation with respect to a threatened animal or plant is subject to a civil penalty of up to $12,000, a criminal penalty of up to $25,000, and up to six months in prison. *See* 16 U.S.C. § 1540(a)(1), (b)(1). In order to be criminally liable under the ESA, a person must knowingly violate the act. 16 U.S.C. § 1540(b)(1). However, it is no defense that the accused lacked a specific intent to take a listed species. For example, the Fifth Circuit Court of Appeals upheld the conviction of a defendant charged with violating the ESA by possessing a threatened species of turtle. The court held that whether the defendant knew that possessing the turtle was illegal was irrelevant, that it was enough that the defendant knew he was in possession of a turtle, and the government did not need to prove that the defendant knew the turtle was a threatened species or that it was illegal to transport or import it. *United States v. Nguyen*, 916 F.2d 1016, 1018–20 (5th Cir. 1990). Likewise, the Ninth Circuit Court of Appeals held that a defendant who thought he was shooting a wild dog was guilty of violating section 9 when that wild dog turned out to be an endangered wolf. *United States v. McKittrick*, 142 F.3d 1170, 1177 (9th Cir. 1998), *cert. denied*, 525 U.S. 1072 (1999). The court pointed out that the relevant fact was the defendant knew he was shooting an animal. *McKittrick*, 142 F.3d at 1177.

The ESA also authorizes citizen suits for enjoining persons from violating the ESA or its implementing regulations. *See* 16 U.S.C. § 1540(g)(1)(A). Under the citizen suit provision, citizens may sue federal agencies, state and local governments, and even private individuals, *see* 16 U.S.C. § 1540(g)(1)(A), upon sixty days' written notice to the violator and to the Service. *See* 16 U.S.C. § 1540(g)(2)(A), (B), (C). Upon receiving notice, the Secretary may take over the suit, *see* 16 U.S.C. § 1540(g)(2)(A), (B), and if the United States is not a party, then the attorney general may intervene as a matter of right. *See* 16 U.S.C. § 1540(g)(3)(B). Citizen suits may be brought in the judicial district where the violation occurs, *see* 16 U.S.C. § 1540(g)(3)(A), and if the defendant is a federal agency, the plaintiff may choose to bring suit in the district court for the District of Columbia or the district in which the agency's regional headquarters is located. *See* 16 U.S.C. § 1536(n); 28 U.S.C. § 1391(b). The ESA allows courts to award the costs of litigation to any party if the court deems it appropriate. *See* 16 U.S.C. § 1540(g)(4). If a plaintiff in a citizen suit prevails, the court may issue an injunction, and the court may award reasonable costs of the litigation, including attorney's and expert witness fees, to the prevailing party. *See* 16 U.S.C. § 1540(g)(1), (4).

In cases in which federal agencies are defendants, judicial review of citizen suits falls under section 702 of the Administrative Procedure Act (APA). *See* 5 U.S.C. § 702. Under the APA, the court must find that the agency action is unlawful and set such action aside if the court concludes that the action is in violation of one or more of six enumerated standards. *See* 5 U.S.C. § 706. When ESA citizen suits allege that an agency's decision is "factually wrong, or mistaken as a matter of policy or logic," courts review those actions under the APA's "arbitrary and capricious standard," which asks whether the agency's action, findings, or conclusions were "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law." *Endangered Species Act: Law, Policy and Perspective* 432 (Donald C. Baur & Wm. Robert Irvin eds., American Bar Association 2002); 5 U.S.C. § 706(2)(A).

III. The ESA and Groundwater

A. Generally

Historically, the most visible clashes between the ESA and the allocation and development of water supplies have occurred in connection with surface water rights and supply projects in western states. In Texas, however, a unique dependence on groundwater has resulted in a clash that has changed the course of water policy and usage in some portions of the state.

Debate surrounding the allocation of water from the Edwards Aquifer, one of the major sources of water for the City of San Antonio and also habitat for listed species, has continued for more than thirty years. The litigation has directly resulted in an end to the rule of capture for a large area in central Texas, the creation of the first significant regulations on groundwater withdrawals in the area, and the adoption of a large-scale habitat conservation plan aimed at protecting listed species dependent in some way on the water in the Edwards Aquifer.

B. Description of the Edwards Aquifer

The Edwards Aquifer flows east from the Texas and Mexico border to San Antonio, and then northeast through Austin, to Mills County northwest of Salado. *See* Todd H. Votteler, *The Little Fish That Roared: The Endangered Species Act, State Groundwater Law, and Private Property Rights Collide Over the Texas Edwards Aquifer*, 28 Envtl. L. 847 (1998), *available at* www.edwardsaquifer.net/pdf/the-little-fish-ssrn.pdf [hereinafter *Roared*]. See also Chapter 17 of this book. For many centuries it was the only source of water for San Antonio and its surrounding areas, serving more than two million people. Water from the aquifer is pumped from the ground for agricultural, industrial, and municipal use, but for the purposes of the ESA, the aquifer's vital importance is manifest in two large springs that emerge from the limestone formations that form the aquifer. Comal Springs and San Marcos Springs are two of the largest springs in the United States and make up what is considered one of the most diverse aquifer ecosystems in the world. *See* Todd H. Votteler, *Raiders of the Lost Aquifer? Or, the Beginning of the End to Fifty Years of Conflict over the Texas Edwards Aquifer*, 15 Tul. Envtl. L.J. 257, 261 (2002, rev. Aug. 2004), *available at* www.edwardsaquifer.net/pdf/raidersofthelostaquifer.pdf [hereinafter *Raiders*]; *Roared*, at 851. These two springs are home to seven endangered and one threatened species, all of which depend on continuous flows from the springs for their survival.

In average years, rainwater drains into the limestone karst formations and recharges the aquifer, enabling the springs to flow continuously. But in dry periods the aquifer is not recharged and pumping from the aquifer also increases; thus flow from the springs can quickly diminish to "critical levels." *Roared*, at 852. Decreased flow alters the aquatic habitat and has been alleged to cause take of the listed species; "[e]xtremely low or nonexistent flow from the springs places the species in 'jeopardy.'" *Roared*, at 852. In addition to potentially affecting listed species living in the springs themselves, reduced flow from the springs affects the water level in the Guadalupe River, which at its mouth is within the wintering range of the endangered whooping crane. *See Aransas Project v. Shaw* discussion in section IV below. For all of these reasons, the ESA has been front and center in the debate over how to allocate the sensitive Edwards Aquifer water supply.

C. ESA Litigation in the Edwards Aquifer Shapes Groundwater Policy

1. Court-Mandated Plan to Protect Minimum Spring Flows and Aquifer Levels

Since the early 1900s, groundwater in Texas has been subject to the rule of capture, or what is often called "the law of the biggest pump." *See Houston & T.C. Ry. Co. v. East*, 81 S.W. 279 (Tex. 1904); *see also Friendswood Development Co. v. Smith-Southwest Industries, Inc.*, 576 S.W.2d 21, 25–26 (Tex. 1978). The rule provides landowners and lessees with the right to pump any groundwater beneath their property, with the only limitations being that the water use cannot be "negligent, willfully wasteful, or for the purpose of malicious injury." *Friendswood*, 576 S.W.2d at 30.

In fact, landowners can use percolating groundwater emerging at springs, while landowners historically benefitting from and using downstream flows from springs have no remedy. *Pecos County Water Control & Improvement District No. 1 v. Williams*, 271 S.W.2d 503 (Tex. Civ. App.—El Paso 1954, writ ref'd n.r.e.). See Chapter 4 of this book for a more detailed discussion of the *Pecos County* case. The Texas Supreme Court recently held that landowners "have a constitutionally compensable interest in groundwater" because they have a vested right in the groundwater beneath their property in place. *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814, 838 (Tex. 2012). The implications of this decision on Texas ESA issues remain to be seen, but it may cause difficulties with endangered species planning and management in the future.

In 1980, the Service listed the San Marcos salamander as a threatened species and the San Marcos gambusia as a threatened species, while also designating San Marcos Springs as critical habitat for the San Marcos salamander, San Marcos gambusia, Texas wild rice, and the fountain darter. *See* 45 Fed. Reg. 47,355 (July 14, 1980). A decade later, in May 1991, the Sierra Club and others filed suit against the Service to challenge what it described as unchecked pumping that posed a threat to listed species and designated critical habitat. *Sierra Club v. Lujan*, No. MO-91-CA-069, 1993 WL 151353, at *6 (W.D. Tex. Feb. 1, 1993). The plaintiffs claimed that by failing to adopt and implement recovery plans for the various endangered species living in Comal and San Marcos Springs, the Service was not adequately protecting the species. *See Lujan*, 1993 WL 151353, at *6. The court ruled in favor of the plaintiffs and required the state to prepare a plan that would protect minimum continuous spring flows and aquifer levels by limiting withdrawals. *See Lujan*, 1993 WL 151353, at *34.

2. Senate Bill 1477, Ending the Rule of Capture in the Aquifer Zone

In response to the court's ruling in *Sierra Club v. Lujan*, the Texas legislature passed Senate Bill 1477 on May 30, 1993, which "established a conservation and reclamation district, the Edwards Aquifer Authority (EAA), to regulate groundwater withdrawals and manage the Aquifer." This bill effectively ended the rule of capture in relation to five counties, and portions of three others, in the Edwards Aquifer area. *Raiders*, at 270.

S.B. 1477 also resulted in the first significant caps on water withdrawal from the aquifer. The bill created a permit system whereby pumping was reduced to 450,000 acre-feet per year before December 31, 2007, and limited to 400,000 acre-feet thereafter. *See* EAA Enabling Act, 73d Leg., R.S., ch. 626, § 1.14(b), (c), See Chapter 17 of this book regarding the Edwards Aquifer Authority for a discussion on the current cap of 572,000 acre-feet. The bill also allowed for more stringent controls to be set in times of drought. Under its system, users were given permits based on historical use, with each user allowed to withdraw "an amount of water equal to the user's maximum beneficial use of water without waste during one calendar year of the historical period." EAA Enabling Act, ch. 626, § 1.16(e). If the aggregate total of that historical use exceeds the cap, however, the EAA may adjust the amount of water each user can withdraw until the cap is met, as long as each user is given at least two acre-feet per year for each acre of land actually irrigated during the historical period. *Raiders*, at 292 (quoting

Bragg v. Edwards Aquifer Authority, 71 S.W.3d 729, 731 (Tex. 2002)); *see also* S.B. 1477 art. 1, § 1.21, 73d Leg., R.S. See also Chapter 17 of this book.

3. Birth of the EAA and More ESA Litigation

The ESA controversies at Comal and San Marcos Springs were not easily solved, however, and the EAA was the subject of several rounds of intense litigation. An initial challenge to the enactment of Senate Bill 1477 under the Voting Rights Act required then-Governor George W. Bush to replace the appointed board of the EAA with a body of ten elected and two appointed officials. *See Roared*, at 860; *see also* Act of May 28, 1995, 74th Leg., R.S., ch. 261 (H.B. 3189 creating a new governing board in compliance with the Voting Rights Act). While that debate was still being resolved, the summer of 1994 brought a dry spell during which flows at Comal Springs decreased so dramatically that the Sierra Club requested, and the court ordered, the preparation of an emergency plan to reduce pumping from the aquifer. *Sierra Club v. Babbitt*, No. MO-910-CA-069, slip op. at 7–8 (W.D. Tex. Jun. 3, 1994) (order on motion for additional relief). Fall rains and the end of heavy summer pumping eased the drought, and the emergency withdrawal reduction plan was never put into action.

When a more serious drought hit the region in May 1996, debate over the application of the ESA once again stepped to the forefront. In June of that year, the head of the Service's field office in Austin stated that the Service would not take action against pumpers to reduce withdrawals from the aquifer. *See* Jerry Needham, *Wildlife Agency Doesn't Plan Suits*, *San Antonio Express-News*, June 7, 1996, at 1C. The Sierra Club subsequently filed a citizen suit under section 9 of the ESA alleging that aquifer users were causing the take of endangered species. *Sierra Club v. San Antonio*, No. MO-96-CA-097, slip op. at 1 (W.D. Tex. Aug. 16, 1996). Although the flow of Comal and San Marcos Springs continued at levels below potential "jeopardy" thresholds, the EAA board declined to declare a water use emergency. *Roared*, at 869. The district judge again ordered that an emergency withdrawal reduction plan be prepared, but the need for the plan was once again eased by fall rains, and the plan was later vacated by the Fifth Circuit Court of Appeals because the *Burford* abstention doctrine requires federal courts to abstain from certain controversies involving comprehensive state regulatory schemes. *Sierra Club v. City of San Antonio*, 112 F.3d 789, 791–92 (5th Cir. 1997), *cert. denied*, 118 U.S. 879 (1998); *see also Burford v. Sun Oil Co.*, 319 U.S. 315 (1943).

Nevertheless, the continued specter of ESA litigation and regulation had a significant impact on changing water policy in the region. In early 1997, the EAA implemented the Irrigation Suspension Program, which paid farmers not to irrigate in times of drought. Keith Keplinger et al., *The 1997 Irrigation Suspension Program for the Edwards Aquifer: Evaluation and Alternatives* 5, Texas Water Resources Institute, Report TR-178 (1998), *available at* http://twri.tamu.edu/reports/1998/178/tr178.pdf. By late April 1997, the drought had passed, due largely to heavy winter and spring rains, but the program demonstrated once again just how powerful the ESA can be in shaping the policy, economics, and use of groundwater.

With passage of Senate Bill 3 in 2007, the Texas legislature directed the EAA to, among other things, develop the Edwards Aquifer Recovery Implementation Program (EARIP) to manage the Edwards Aquifer and protect listed species dependent on the aquifer, with participation from the Service, all "interested stakeholders," and relevant state agencies. *See* Act of June 16, 2007, 80th Leg., R.S., ch. 1430, § 12.06. The legislature required that preparation of the plan must be approved and signed by the EAA, the Service, the Texas Commission on Environmental Quality (TCEQ), the Texas Parks and Wildlife Department, the Department of Agriculture, and the Texas Water Development Board by September 1, 2012. *See* Act of June 16, 2007, 80th Leg., R.S., ch. 1430, § 12.06. The EARIP process included a stakeholder committee and various subcommittees devoted to developing an HCP for the Edwards Aquifer. The EARIP process culminated with the submittal of the Edwards Aquifer Habitat Conservation Plan (EAHCP) to the Service as part of the application for an incidental take permit covering take of the eight listed species within the Edwards Aquifer system. The Service approved the EAHCP on February 15, 2013, and issued a fifteen-year incidental take permit to the copermittees, which include the EAA, the City of San Marcos, the City of New Braunfels, the San Antonio Water System, and Texas State University. *See* 78 Fed. Reg. 11,218 (Feb. 15, 2013). The copermittees are now implementing the EAHCP. For more information, see the Edwards Aquifer Habitat Conservation Plan Web site at www.eahcp.org/. See also Chapter 17 of this book.

D. Effects beyond the Edwards Aquifer Zone, the Move from Exportation to Importation

The Edwards Aquifer litigation is a prime example of how the ESA can not only affect the laws and policies of the waters in which listed species live but also shape the policies, economics, and usage of areas well beyond the habitat of these species. For example, Senate Bill 1477, in addition to creating the EAA and implementing a permit program, placed limitations on the export of Edwards Aquifer water across county lines. *See* EAA Enabling Act, ch. 626, § 1.28(b).

Furthermore, the litigation surrounding the Edwards Aquifer, with its discussion of historic droughts and the potential for future catastrophe, illuminated the uncertainty associated with having only one drought-prone source of water for more than two million people. In response, the City of San Antonio began entering into contracts to import surface water from other areas. *See* the Edwards Aquifer Web site, *Alternatives to the Edwards Aquifer*, www.edwardsaquifer.net/alternatives.html. The City of San Antonio now obtains its water from seven sources and is planning additional water supply projects, including brackish groundwater desalination. *See* San Antonio Water System, *Current Water Supply Projects*, www.saws.org/Your_Water/WaterResources/projects/.

IV. The ESA and Surface Water

A. Generally

The United States contains more than 3.5 million miles of rivers and streams, 41 million surface acres of lakes, and approximately 110 million acres of wetlands in the contiguous states. As with groundwater, there is plenty of surface water in our nation; the problem is that it is not always in the right place, at the right time, in the right amount, and of the right quality to meet the often competing demands of human and wildlife use. From the Klamath River Basin in southern Oregon, where the ESA forced a clash between farm irrigation supplies and the needs of endangered fish, to the Apalachicola River in Florida, which has been the focus of a battle between Florida and Georgia over water supplies needed to benefit endangered mussels, rivers and lakes have become the ESA chessboard between water resource users and endangered species advocates.

B. The ESA and Surface Water in Texas

In Texas, as elsewhere, protection of endangered and threatened species and their habitat, and development of water resources and use of water rights, often conflict under the requirements of the ESA and its implementing regulations.

One early significant example of how ESA consultation and permitting requirements affect the development of new surface water resource projects was the O. H. Ivie Reservoir, which was created by the construction of the Stacy Dam near Big Spring. After the hurdles posed by nearly a decade of water rights litigation and legislative struggles were cleared, construction of the dam was held up by a creature that was seemingly much less formidable—the federally listed Concho water snake, which the Service delisted in 2011. *See* 51 Fed. Reg. 51,412 (Sept. 3, 1986); *see also* 76 Fed. Reg. 66,780 (Oct. 27, 2011).

The Colorado River Municipal Water District (CRMWD) could not build the dam without a permit issued by the Corps, and the Corps could not grant a permit until it concluded consultation with the Service under section 7 of the ESA. In August 1986, the Service agreed that it would not object to the dam if the CRMWD built habitat for the Concho water snake. For its part, the CRMWD agreed to spend nearly $4 million on artificial habitat. In April 1987, the Corps issued a permit for the construction of Stacy Dam.

A more recent and far-reaching example of the clash between surface water rights and the ESA is the *Aransas Project v. Shaw* whooping crane litigation. The Aransas Project (TAP) is an organization focused on water management of the Guadalupe River Basin, and in March 2010 it sued the TCEQ, alleging that the TCEQ had violated, and continued to violate, section 9 of the ESA by overallocating water from the Guadalupe and San Antonio River systems, which caused the unpermitted take of the endangered whooping crane. The U.S. District Court for the Southern District of Texas agreed with TAP and ruled that the TCEQ proximately caused an unlawful take of the whooping crane. *See Aransas Project v. Shaw*, 930 F. Supp. 2d 716 (S.D. Tex. 2013), *rev'd*, 756 F.3d 801 (5th Cir. 2014), *opinion amended and superseded*, 775 F.3d 641 (5th Cir. 2014). Specifically, the court held that TAP demonstrated through expert testimony that the TCEQ regulates surface freshwater diversion and use within the State of Texas through its permit system and other regulatory powers. 930 F. Supp. 2d at 744–48. Because there was a severe drought during the 2008–09 winter, there was a reduction in the amount of freshwater inflows to the Aransas National Wildlife Refuge. 930 F. Supp. 2d at 744–48. According to the court, the reduction of freshwater inflows from the drought was exacerbated by the TCEQ's water management practices, which did not consider the needs of the whooping cranes. 930 F. Supp. 2d at 744–48. Less water increased the salinity of the San Antonio Bay, which adversely affected the abundance of blue crabs and wolfberries, the whooping cranes' primary food sources. 930 F. Supp. 2d at 752–54. The whooping cranes became emaciated, exhibited stress behavior, and some left their site territories, which exposed them to increased predation. 930 F. Supp. 2d at 755–56. Out of the approximately 270 individuals that composed the only self-sustaining wild whooping crane population in 2008, at least 23 died at the Refuge and an additional 34 left in the spring but did not return in the fall. 930 F. Supp. 2d at 756–59. The court enjoined the TCEQ from approving or granting new water permits affecting the Guadalupe or San Antonio Rivers until the court is assured that such permits will not take whooping cranes. 930 F. Supp. 2d at 789. The court also ordered the TCEQ to seek an HCP that may lead to an incidental take permit. 930 F. Supp. 2d at 789.

The Fifth Circuit granted the Texas Attorney General's motion for emergency stay of final judgment pending appeal and ordered an expedited appeal. *See Aransas Project v. Shaw*, No. 13-40317 (5th Cir. Mar. 26, 2013). The following year, the Fifth Circuit reversed the district court's ruling and held that the TCEQ was not liable for take of the whooping cranes becasue proximate cause and foreseeability between TCEQ permitting and crane deaths are "lacking as a matter of law." *Aransas Project v. Shaw*, 775 F.3d 641, 660 (5th Cir. 2014). The Fifth Circuit reasoned that "there is a long chain of causation here between the TCEQ's issuance of permits to take water from the rivers and cranes' mortality." 775 F.3d at 660. The court cited other uncontrollable factors that contributed to the deaths of the whooping cranes, including severe drought, rising salinity levels, and the fact that blue crabs had declined due to overfishing. 775 F.3d at 662.

TAP petitioned for a rehearing en banc, which the Fifth Circuit denied by an 11-4 vote. *See Aransas Project v. Shaw*, 774 F.3d 324, 325 (5th Cir. 2014). Three judges issued a strongly worded dissent disagreeing with the panel's opinion because it "independently weighs facts to render judgment in violation of fundamental principles of federal law." 774 F.3d at 325. TAP filed a petition for writ of certiorari with the U.S. Supreme Court that was denied in *Aransas Project v. Shaw*, 135 S. Ct. 2859

(2015). Although the TAP case is now over, it remains significant because it had the potential to establish diversion or supply limits that would create conflicts between existing and future water rights.

The Service recently listed the sharpnose shiner and smalleye shiner, two minnows once found throughout the Brazos River and several of its major tributaries, as endangered. *See* 79 Fed. Reg. 45,274 (Aug. 4, 2014). The Service determined that "the two primary factors affecting the current and future conditions of these shiners are river fragmentation by impoundments and alterations of the natural streamflow regime (by impoundments, drought, groundwater withdrawal, and saltcedar encroachment) within their range." 79 Fed. Reg. 45,274, 45,275. The Service also designated critical habitat for the shiners, which includes 1,002 river kilometers (623 river miles) of the upper Brazos River basin and the upland areas extending beyond the bankfull river channel by 30 meters (98 feet) on each side. *See* 79 Fed. Reg. 45,274, 45,242 (Aug. 4, 2014). The effects of this listing and designation of critical habitat remain to be seen, but it is possible that water diversions that deplete stream flows in the Brazos River could cause take of the shiners.

C. The Potential Impact of Climate Change Claims in ESA Litigation on Water Resources

One recent issue in ESA litigation is the impact of climate change on listed species. At least to date, similar claims have not been brought in a case involving ESA-protected species in Texas. However, a decision from California offers some indication about how these claims may play out in the context of water resources.

In 2007, a federal district court ruled that a BO issued by the Service, which addressed the effects on a fish population of water diversion operations, was in violation of the APA because it failed to consider the effects of climate change. *See Natural Resources Defense Council v. Kempthorne*, 506 F. Supp. 2d 322 (E.D. Cal. 2007). The case dealt with the Central Valley Project and the State Water Project, which divert large volumes of water from the Sacramento–San Joaquin Delta to central and southern California. *Kempthorne*, 506 F. Supp. 2d at 328. A BO issued by the Service in 2005 concluded that project operations would not jeopardize the continued existence of the delta smelt even though the smelt's population has declined significantly in recent years. 506 F. Supp. 2d at 328.

A coalition of environmental plaintiffs challenged the BO, alleging that it had violated the APA by assuming that the hydrology of the water bodies affected would follow historical meteorological and hydrologic conditions, and by ignoring data about global climate change that could adversely affect the delta smelt population. 506 F. Supp. 2d at 328–29, 367. The defendants acknowledged that current climate models predict warming scenarios for California, but they argued that "there is no similar consensus regarding the impact of warming on future precipitation." 506 F. Supp. 2d at 369 (internal cites omitted). Nonetheless the court determined that because the BO included no meaningful discussion of climate change at all, it was impossible to determine whether the information was properly discounted or arbitrarily ignored. 506 F. Supp. 2d at 369. The court stated, "At the very least, these studies suggest that climate change will be an important aspect of the problem meriting analysis in the [BO]." 506 F. Supp. 2d at 369 (internal cites omitted). It was therefore held that the Service's conclusion was arbitrary and capricious and that the BO should have included a discussion of how to deal with climate change. 506 F. Supp. 2d at 370.

The Service is increasingly citing climate change as one of the threats to species in its listing process decisions for aquatic species in Texas. For example, in 2011 the Service determined that listing five species of Texas freshwater mussels is warranted and cited climate change as one of the major threats to each species. *See* 76 Fed. Reg. 62,165 (Oct. 6, 2011). The Service will not make a final listing decision with respect to the freshwater mussels until at least 2017, but along with the TAP litigation described in this section it has the potential to impact the Texas water rights system.

The Service also listed the Jollyville Plateau salamander and the Austin blind salamander as endangered species and designated approximately 4,451 acres of critical habitat for both species. *See* 79 Fed. Reg. 51,278, 51,328 (Aug. 20, 2013). The Service states that increased urbanization in Central Texas is the main threat to the salamanders, but it also cites climate change as a threat to their conservation status. In 2014, the Service listed two other aquatic salamanders, the Salado and Georgetown salamanders, as threatened. *See* 79 Fed. Reg. 10,236 (Feb. 24, 2014). On the same day, the Service published a proposed 4(d) rule for the Georgetown salamander, which would allow development activities that are conducted in accordance with the Edwards Aquifer Recharge Zone Water Quality Ordinance (Ordinance) to proceed without resulting in take of the species. *See* 79 Fed. Reg. 10,077 (Feb. 24, 2014). The City Council of Georgetown passed the Ordinance on December 20, 2013. *See* Ordinance No. 2013-59, *available at* www.fws.gov/southwest/es/Documents/R2ES/4TX_Sal_pLpCH_City_of_Georgetown_Ordinance_2013_59.pdf. The Service has not issued a final determination regarding the Georgetown salamander 4(d) rule. Because the four Central Texas salamanders are fully aquatic and depend on various sources of groundwater, mainly the Edwards Aquifer, their listings will likely bring about changes in Central Texas development regulations and management of groundwater resources in the near future.

V. Conclusion

The collision of global climate change, increased legislative oversight on natural resources, and the continued use of ESA citizen suits will, no doubt, continue to have a real and lasting impact on the use of water resources not only in Texas but also nationwide. Although Texas has, in the past, been largely spared federal regulation with respect to its nonfederal water resources, this may not continue to be the case. Current and pending lawsuits, legislation, and new species listings have the potential to complicate and sometimes confound Texas's laws and regulations regarding water resources.

CHAPTER 33

Integrating Water Quality Standards into Water Management Programs

Sara Burgin,[1] Carlos Romo,[2] and Amber Weigl[3]

I. Introduction

Water supply and water quality affect each other in significant ways. Federal law, state law, water law, and environmental law all interact at the intersection of water supply and water quality. It is important for water suppliers and wastewater dischargers alike to understand their rights and obligations at this legally and scientifically complex intersection.

Surface water quality standards are relevant to water supply projects in several respects. First, water quality standards may affect whether a surface water source is suitable for the use to which water from the project can be put. Second, water supply projects may affect whether, or how difficult it is, to attain the surface water quality standards in an affected stream. For example, water supply projects may affect flow in a watercourse, which may, in turn, affect the capacity of the stream to absorb pollutant loads in existing and future point source discharges and nonpoint sources. Reduced stream flow may, therefore, affect whether a watercourse attains the applicable water quality standards and how stringent the effluent limitations on point source discharges must be to attain the applicable water quality standard. Third, if a water supply project requires a federal license or permit, the state must certify under section 401 of the federal Clean Water Act (CWA) that the project will not interfere with attaining the state's surface water quality standards. As part of its certification, the state may impose conditions on the water supply project to ensure that the applicable water quality standard is met.

Pursuant to both the CWA and chapter 26 of the Texas Water Code, the Texas Commission on Environmental Quality (TCEQ) has the primary obligation and authority to establish and implement surface water quality standards in Texas. *See* 33 U.S.C. § 1313(a), (d); Tex. Water Code § 26.023. Thus, both federal and state laws and regulations are cited in this chapter.

This chapter describes how the TCEQ establishes and implements surface water quality standards in Texas. The general background is necessary for understanding how surface water quality standards enter into both the Texas Pollutant Discharge Elimination System (TPDES) and water rights

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permitting for water supply projects, which is discussed in Chapter 34 of this book. Section II below therefore covers how the TCEQ establishes and implements surface water quality standards under section 303(a) of the CWA and chapter 26 of the Texas Water Code. Section III discusses how the TCEQ translates these standards into total maximum daily loads (TMDLs) for watercourses that do not attain the applicable standard pursuant to section 303(d) of the CWA.

II. Water Quality Standards

This section discusses how the TCEQ establishes and implements surface water quality standards. Section 303(a) of the CWA requires each state to develop surface water quality standards for each body of water in the state. *See* 33 U.S.C. § 1313(a). Surface water quality standards consist of three components: (1) the designated uses of a water body, (2) the water quality criteria needed to protect the designated uses, and (3) an antidegradation policy, which requires that discharges not interfere with the attainment or maintenance of surface water quality standards. *See* 33 U.S.C. §§ 1313(a), (c)(2)(A), (d)(4)(B), 1342(o); Tex. Water Code § 26.003; 40 C.F.R. § 131.12; 30 Tex. Admin. Code § 307.5.

A. Designated Uses

Under the CWA and its implementing regulations, each state must identify the existing uses of its water bodies, defined as the uses actually in existence on or after November 28, 1975. *See* 33 U.S.C. § 1313(a); 40 C.F.R. § 131.3(e). The water quality necessary to support the existing uses as of 1975 must, at a minimum, be maintained, subject to narrow exceptions. *See* 40 C.F.R. § 131.10(h). Designated uses are those uses specified in water quality standards for each water body whether or not they are attained. Designated uses should allow for the protection and propagation of aquatic life and recreation in and on the water, commonly referred to as the "fishable/swimmable" standard. *See* 40 C.F.R. § 131.2. If the fishable/swimmable standard is attainable, it applies regardless of the 1975 existing use, unless the state demonstrates to the Environmental Protection Agency (EPA) that attainment of such use is not feasible. *See* 40 C.F.R. §§ 131.2, 131.10(g).

The Texas Surface Water Quality Standards (the Standards) define the following use categories:

- recreation: primary contact (PCR), secondary contact 1 (SCR1), secondary contact 2 (SCR2), or noncontact (NCR), *see* 30 Tex. Admin. Code §§ 307.3(a)(38), (47), (53), (54), 307.7(b)(1);
- domestic water supply: public water supply (PS), sole-source surface drinking water supply and protection zone, or aquifer protection (AP) (i.e., capable of recharging the Edwards Aquifer), *see* 30 Tex. Admin. Code §§ 307.3(a)(49), (59), 307.7(b)(2);
- aquatic life: exceptional (E), high (H), intermediate (I), limited (L), and minimal (M), *see* 30 Tex. Admin. Code § 307.7(b)(3); and
- additional uses: such as navigation (N), agricultural water supply, industrial water supply (IS), wetland water quality functions, and seagrass propagation, *see* 30 Tex. Admin. Code § 307.7(b)(5).

This list reflects changes made in 2010 by the TCEQ that have been approved by the EPA for use in federal permitting and other CWA actions. *See* 35 Tex. Reg. 6294 (July 16, 2010). The 2010 revisions included a change to the recreational use designations. Previously the agency had used two recreational use designations including "contact" and "noncontact." TCEQ adopted the new four-tiered classification system to better characterize the different levels of water recreation activities in Texas. 35 Tex. Reg. 6294, 6308.

Together with the revised recreational use designations, the agency adopted new indicator bacteria criteria levels associated with the four use designations. The new *Escherichia coli (E. coli)* bacteria levels retained the geometric mean criterion for "primary contact recreation" of 126 per 100 ml for Standards attainment and the single-sample criterion of 399 per 100 ml for swimmer safety notification programs. *See* 30 Tex. Admin. Code §§ 307.7(b)(1), 307.9(e). The TCEQ provides updated information on TCEQ-adopted revisions to the Standards and status of EPA approval at www.tceq.texas.gov/waterquality/standards/eq_swqs.html/#revise.

The criteria that apply to each of these use categories are discussed in section II.B below.

The surface water bodies in the state fall into one or more of five general categories: (1) classified segments listed in Appendix A of the Standards; (2) bodies of water classified as sole-source surface drinking water supplies by the TCEQ Drinking Water Protection Team; (3) unclassified segments for which site-specific uses and criteria have been set, listed in Appendix D of the Standards; (4) unclassified segments for which recreational uses and criteria have been set, listed in Appendix G of the Standards; and (5) other unclassified segments to which only the state's general criteria apply.

The first category of "classified" water bodies includes the major surface waters of the state, which are classified in Appendix A of the Standards by segment or the purpose of water quality management and designation of site-specific standards. *See* 30 Tex. Admin. Code §§ 307.2(c), 307.10 app. A. The geographic extent of each classified segment is described in Appendix C of the Standards. *See* 30 Tex. Admin. Code § 307.10 app. C. For example, Grapevine Lake in the Trinity River Basin, the Houston Ship Channel in the San Jacinto River Basin, and the Upper San Marcos River in the Guadalupe River Basin are listed in Appendix A as classified segments with the following designated uses:

		Uses			
Segment No.	**Segment Name**	**Recreation**	**Aquatic Life**	**Domestic Water Supply**	**Other**
0826	Grapevine Lake	PCR	H	PS	
1006	Houston Ship Channel Tidal				N/IS
1007	Houston Ship Channel/ Buffalo Bayou Tidal				N/IS
1814	Upper San Marcos River	PCR	E	AP	

30 Tex. Admin. Code § 307.10 app. A.

The second group of water bodies includes those surface bodies designated as "sole-source surface drinking water supplies" in compliance with Texas Water Code section 26.0386. *See* Tex. Water Code § 26.0286. The TCEQ Drinking Water Protection Team identified the water bodies to be included in the classification. The following table provides three examples of water bodies designated as sole-source surface drinking water supplies in Appendix B.

Water Body Names	County	Segment No.
Lake Texoma	Grayson	0203
Lake Palestine	Smith	0605
Pedernales River	Blanco	1414

30 Tex. Admin. Code § 307.10 app. B.

The third category consists of certain unclassified segments for which site-specific receiving water assessments have been done, allowing an aquatic life use (ALU) designation to be made. These site-specific, ALU designations (see below) are listed in Appendix D of the Standards. *See* 30 Tex. Admin. Code § 307.10 app. D. Here are three examples of the site-specific, designated uses for Appendix D unclassified segments:

Segment No.	County	Water Body	ALU	Dissolved Oxygen	Description
0826	Denton	Trail Creek	H	5.0	Perennial stream from the confluence with Denton Creek upstream to 2.1 km upstream of SH 156 in the City of Justin
1006	Harris	Halls Bayou	I	4.0	Perennial stream from the confluence with Greens Bayou up to US 59
1007	Harris	Brays Bayou above Tidal	L	3.0	Perennial stream from 11.5 km upstream from the confluence of the Houston Ship Channel up to SH 6

30 Tex. Admin. Code § 307.10 app. D.

The fourth category consists of certain unclassified segments for which site-specific receiving water assessments have been done, allowing a recreational use designation to be made. There are currently three water bodies with this designation, and these site-specific, recreational use designations (see below) are listed in Appendix G of the Standards. *See* 30 Tex. Admin. Code § 307.10 app. G. The three site-specific, recreational use designations on unclassified segments are listed below:

Segment No.	County	Water Body	Use	Geometric Mean Colonies/ 100ml	Description
1017	Harris	Brickhouse Gully/Bayou	SCR1	630	From the confluence with Whiteoak Bayou above Tidal upstream to its headwaters 1.1 km upstream of Gessner Road
1017	Harris	Unnamed tributary of Whiteoak Bayou	SCR1	630	From the confluence with Whiteoak Bayou above Tidal upstream to its headwaters 1.1 km upstream of Gessner Road
1017	Harris	Unnamed tributary of Whiteoak Bayou	SCR1	630	From the confluence with Whiteoak Bayou above Tidal, near W. 11th Street, upstream to a point immediately upstream of W. 26th Street, south of Loop 610W in Harris County

30 Tex. Admin. Code § 307.10 app. G.

The fifth category includes the rest of the surface water bodies in the state (i.e., those not listed in Appendixes A, B, D, or G). These other water bodies are unclassified, and no site-specific receiving water assessment has been made. For unclassified segments, the general water quality criteria discussed below generally apply, subject to certain exceptions discussed later in this chapter. *See* 30 Tex. Admin. Code § 307.10.

B. Water Quality Criteria

The second component of a water quality standard is the water quality criteria. Water quality criteria are descriptions of the quality necessary to support existing or designated uses in waters of the state. Water quality criteria may be numeric (e.g., milligrams per liter (mg/L)) or narrative (e.g., "free of floating debris and suspended solids"). *See, e.g.*, 30 Tex. Admin. Code § 307.4(b) (providing narrative criteria for aesthetic parameters); 30 Tex. Admin. Code § 307.6 (providing concentrations for toxic materials). Water quality criteria may be general or site-specific. 30 Tex. Admin. Code § 307.4 (general); 30 Tex. Admin. Code § 307.10 (site-specific). The TCEQ reviews the water quality standards every three years. Every three years, therefore, the Standards are subject to modification—including (and especially) the site-specific criteria—subject to the antidegradation component of the Standards, discussed in section II.C below.

The ecological integrity of a stream or river and its adjacent riparian corridor is a function of both stream flow and water quality. Water quality, however, often dominates aquatic life processes when the water body receives significant pollutant loads from point or nonpoint sources, or both. Dissolved oxygen (DO) is a key water quality parameter for aquatic life processes. As water temperature rises, the solubility of oxygen in water decreases. Therefore, the level of DO is particularly important in Texas, where the maintenance of adequate DO for aquatic life is made difficult by the naturally occurring low oxygen levels that occur in warm, slow-flowing (sometimes intermittent) streams and rivers, especially during the summer months. *See* David Maidment, Water Quality and Bioassessment in Texas Streams and Rivers (Apr. 2004) (unpublished paper, The University of Texas) [hereinafter Maidment (2004)]. Because water supply projects often involve the impoundment or diversion of surface water, or both, these projects affect stream flow and can also affect the quality of downstream surface water, e.g., total dissolved solids, nutrients, and particularly the concentration of DO available for aquatic life processes. The discussion of water quality criteria below will occasionally focus on the DO criteria.

1. General Criteria

The general criteria apply to all surface water bodies in the state, subject to certain exceptions discussed later in this chapter and subject to being superseded by site-specific criteria on classified segments. *See* 30 Tex. Admin. Code § 307.4; see also sections II.B.2 and II.B.3 below. These general criteria include aesthetic parameters (e.g., taste, odor, appearance, suspended solids, turbidity); nutrient limitations (to prevent overgrowth of undesirable vegetation); temperature; salinity; DO to support aquatic life uses; and pH levels. *See* 30 Tex. Admin. Code § 307.4(b)–(h).

For example, the TCEQ has established the following numeric criteria for DO concentrations necessary to support aquatic life:

Aquatic Life Use Subcategory	**Dissolved Oxygen Criteria (mg/L)**		
	Freshwater mean/minimum	**Freshwater in Spring mean/minimum**	**Saltwater mean/minimum**
Exceptional	6.0 / 4.0	6.0 / 5.0	5.0 / 4.0
High	5.0 / 3.0	5.5 / 4.5	4.0 / 3.0

Intermediate	4.0 / 3.0	5.5 / 4.5	3.0 / 2.0
Limited	3.0 / 2.0	4.0 / 3.0	—
Minimal	2.0 / 1.5	—	—

30 Tex. Admin. Code § 307.7(b)(3)(A)(i) tbl. 3.

The general criteria for dissolved oxygen or any other parameter apply only to substances attributed to waste discharges or otherwise to human activities. They do not apply to surface water that does not meet the general criteria because of natural phenomena. *See* 30 Tex. Admin. Code § 307.4(a).

As part of the July 2010 revisions to the Standards, the TCEQ revised several of the toxic materials numeric criteria that apply generally to the surface waters in the state, including criteria for protection of aquatic life and of human health. *See* 30 Tex. Admin. Code § 307.6(c), (d). The EPA approved for use in federal permitting or other CWA actions all the TCEQ's July 2010 revisions to the criteria for protection of aquatic life and those for protection of human health except for mercury.

2. *Site-Specific Criteria*

Site-specific water quality criteria supersede the general criteria for classified segments (i.e., with respect to segments and criteria listed in Appendix A). 30 Tex. Admin. Code § 307.4(a). For example, in section II.A above, four classified segments are listed along with their designated uses. The site-specific criteria necessary to protect the designated uses in these four segments are shown here:

Segment No.	Segment Name	Cl^{-1} (mg/L)	SO_4^{-2} (mg/L)	TDS (mg/L)	DO (mg/L)	pH Range (S.U.)	Indicator Bacteria #/100 mL	Temp. (°F)
0826	Grapevine Lake	80	60	500	5.0	6.5–9.0	126	93
1006	Houston Ship Channel Tidal				2.0	6.5–9.0	168	95
1007	Houston Ship Channel/Buffalo Bayou Tidal				1.0	6.5–9.0	168	95
1814	Upper San Marcos River	50	50	400	6.0	6.5–9.0	126	80

30 Tex. Admin. Code § 307.10 app. A.

The site-specific criteria for these four segments and all other segments listed in Appendix A supersede the general criteria for surface water. *See* 30 Tex. Admin. Code § 307.4(a). Thus, for example, the general criteria for perennial rivers like the Houston Ship Channel would ordinarily presume a "high aquatic life use and corresponding DO criterion," for which the DO criteria (in saltwater) are 4.0 mg/L mean and 3.0 mg/L minimum. *See* 30 Tex. Admin. Code §§ 307.4(h)(3), 307.7(b)(3). However, the Standards establish a site-specific DO criterion for Segments 1006 and 1007. See section II.A above. This site-specific criterion replaces the "high aquatic life use" presumption and sets the DO criteria at 2.0 and 1.0 mg/L (24-hour minimum) for Segments 1006 and 1007, respectively, of the Houston Ship Channel.

In addition, for some of the water bodies in the five categories discussed above (classified, sole-source surface drinking water supplies unclassified with site-specific, unclassified with site-specific recreational uses, and unclassified), permitted dischargers have undertaken special studies and initiated site-specific procedures to justify, based on local conditions in the vicinity of the discharge, different criteria than the general criteria or criteria for classified water bodies established by the TCEQ. These water bodies and their modified criteria are set out in Appendix E of the Standards. 30 Tex. Admin. Code §§ 307.2(d), 307.10 app. E.

As part of the July 2010 revisions of the Standards, TCEQ adopted site-specific numeric nutrient criteria related to chlorophyll *a* for seventy-five reservoirs listed in the Standards at Appendix F. *See* 30 Tex. Admin. Code § 307.10 app. F. By letter dated July 2, 2013, the EPA approved chlorophyll *a* criteria for thirty-nine of the reservoirs and disapproved the rest. The TCEQ prepared a document to indicate approved and disapproved nutrient critera, which is available at www.tceq.texas.gov/assets/public/waterquality/standards/TSWQS2010/Highlighted_rule_language.pdf.

3. *Exceptions to Applicability*

There are exceptions to when the water quality criteria—both general and site-specific—apply in surface waters of the state. Several of these exceptions are potentially relevant to the intersection of water quality and water supply.

Several of the criteria established in the Standards do not apply when stream flow conditions are less than "critical low-flow conditions." The following criteria apply only at and above critical low-flow conditions, not below them:

- numerical criteria for dissolved oxygen;
- numerical criteria for temperature and pH;
- maximum temperature differentials;
- numerical criteria for bacteriological indicators;
- numerical criteria to protect aquatic life from acute toxicity (which apply at and above one-fourth of the seven-day, two-year low-flow (7Q2) condition, discussed below);
- numerical criteria to protect aquatic life from chronic toxicity;
- requirements to preclude total chronic toxicity; and
- dissolved oxygen criteria for unclassified waters.

See 30 Tex. Admin. Code § 307.8(a); Texas Commission on Environmental Quality, *Procedures to Implement the Texas Surface Water Quality Standards* (June 2010), at 77–78, *available at* www.tceq.state.tx.us/assets/public/permitting/waterquality/standards/docs/june_2010_ip.pdf [hereinafter RG-194]. In addition to the low-flow exemptions, there are exemptions from the water quality standards within the mixing zones of point source discharges. Site-specific criteria do not apply in the mixing zones of point source discharges. *See* 30 Tex. Admin. Code § 307.8(b). Also as with low-flow conditions, the general criteria continue to apply in the mixing zones, unless specifically exempt under the rules. 30 Tex. Admin. Code § 307.4(a). The mixing-zone exemptions available to point source discharges potentially affected by water resource projects that reduce stream flow include dissolved oxygen, recreation, aquatic life, and temperature criteria. *See* 30 Tex. Admin. Code § 307.8(b)(1)(A)–(H).

As the exemptions discussed above indicate, many of the water quality standards most likely to be affected by water supply projects apply only above the critical low-flow conditions (and only outside of mixing zones in some streams). The critical low-flow conditions for most of the Texas criteria are determined, in the absence of site-specific information, based on the 7Q2 flow, which is defined as "[t]he lowest average stream flow for seven consecutive days with a recurrence interval of two years, as statistically determined from historical data," or through the use of alternative low-flow calculations for spring-fed streams. 30 Tex. Admin. Code § 307.3(a)(15), (57).

"Harmonic mean flow" is used to define the average instream dilution that is applicable to wastewater permits when applying specific human health concentration criteria for toxics in waters of the state that have sustainable fisheries or are designated for use as a public drinking water supply. *See* 30 Tex. Admin. Code § 307.6(d)(5), 307.8(a)(4). The harmonic mean flow is calculated by "summing the reciprocals of the individual flow measurements, dividing this sum by the number of measurements, and then calculating the reciprocal of the resulting number." 30 Tex. Admin. Code § 307.3(a)(28). Harmonic mean flows are usually, but not always, greater than the 7Q2 flow. RG-194, at 80. The current 7Q2 and harmonic mean flows are published in RG-194, but the published values are guidelines only and are subject to recalculation as new data become available. *See* 30 Tex. Admin. Code § 307.8(a)(8); RG-194, at 218.

The low-flow criteria in RG-194 are solely for the purpose of defining the flow conditions under which water quality standards apply to a given water body. They are not intended for the purpose of regulating flows in water bodies in any manner or requiring that minimum flows be maintained in classified segments. 30 Tex. Admin. Code § 307.8(a)(5). The Standards, therefore, define standards for the maintenance of aquatic life and human health, but the Standards do not provide a remedy by which stream flows can be increased to correct a water quality problem.

Both the 7Q2 and the harmonic mean flow are calculated from approximately thirty years of flow data at U.S. Geological Survey gauges. Thus, gradually, over time, as the thirty-year, 7Q2, and harmonic mean flows are recalculated by the TCEQ, the diversion of increasing amounts of surface water from a water body may decrease the critical low-flow volume above which the surface water quality standards must be met. Moreover, the TCEQ will calculate the critical low-flow volume based on a shorter period of record use if the thirty-year period of record is unavailable or inappropriate. For example, if a major, permanent hydrologic alteration has occurred, such as upstream reservoir construction, then only the flows recorded after the alteration are used to calculate the 7Q2 and the harmonic mean. *See* RG-194, at 76. Thus, water resource projects that reduce stream flows could cause the critical low-flow condition to decrease. It should be noted, however, that many streams will eventually have environmental flow standards established for them, which could affect the critical low-flow conditions as discussed in Chapter 34 of this book.

The critical low-flow condition is important to dischargers of wastewater in two related ways. First, as discussed above, the critical low-flow condition is the flow above which the Standards must be met. Thus, it is the flow based on which attainment of the Standards will be determined. As this flow decreases, more segments of water bodies may threaten to exceed the standard and require development of TMDLs, as discussed in more detail in section III below. Second, the applicable critical low-flow condition is the condition on which the TCEQ bases water-quality-based effluent limitations (WQBELs) for permits issued under the TPDES. *See* 30 Tex. Admin. Code § 307.3(a)(15); RG-194, at 74. If the stream flow in a receiving water body decreases over time, more stringent WQBELs may have to be established during renewal cycles in order to attain or maintain water quality standards, as discussed in more detail in Chapter 34 of this book.

C. Antidegradation

The third component of a water quality standard is an antidegradation policy. The EPA's regulations implementing section 303(a) of the CWA require each state to establish an antidegradation policy as part of its water quality standards. *See* 40 C.F.R. § 131.12; *see also* 33 U.S.C. § 1313(a). The Standards achieve this federal requirement by establishing three antidegradation evaluation tiers:

- Tier 1: Existing uses and water quality sufficient to protect those existing uses will be maintained. Categories of existing uses are the same as for designated uses, as discussed in sections II.A and II.B.2 above (relating to site-specific uses and criteria).

- Tier 2: No activities subject to regulatory action that would cause degradation of waters that exceed fishable/swimmable quality will be allowed unless it can be shown to the TCEQ's satisfaction that the lowering of water quality is necessary for important economic or social development. Degradation is defined as a lowering of water quality by more than a de minimis extent, but not to the extent that an existing use is impaired. Water quality sufficient to protect existing uses will be maintained. Fishable/swimmable waters are defined as waters that have quality sufficient to support the propagation of indigenous fish, shellfish, and wildlife, and recreation in and on the water.
- Tier 3: Outstanding national resource waters (ONRWs) are defined as high-quality waters within or adjacent to national parks and wildlife refuges, state parks, wild and scenic rivers designated by law, and other designated areas of exceptional recreational or ecological significance. The quality of ONRWs will be maintained and protected. (Currently there are no designated ONRWs in Texas.)

See 30 Tex. Admin. Code § 307.5(b)(1)–(3).

For Tier 1 waters, existing uses are maintained by ensuring that TPDES permits for discharges to water bodies listed pursuant to CWA section 303(d) (i.e., water bodies that do not attain the water quality standard) will not allow an increase in the loading of a listed pollutant that will cause or contribute to the violation of water quality standards. RG-194, at 58. For Tier 2 waters, fishable/swimmable waters are protected by TPDES permits that are subject to antidegradation reviews ensuring that, where water quality exceeds the normal range of fishable/swimmable criteria, such water quality will be maintained unless lowering it is necessary for important economic or social development. RG-194, at 63. When degradation is anticipated, the TCEQ reviews the preliminary determination of potential degradation, the evaluation of alternatives, and economic and social justification. The TCEQ then determines whether a lowering of water quality is expected from the proposed discharge. If it is, the TCEQ determines whether the lowering of water quality is necessary for important economic or social development and whether reasonable alternatives to the lowering of water quality are unavailable. The TCEQ may also refer questions concerning an antidegradation review to the State Office of Administrative Hearings for an administrative hearing. Any proposed TPDES permit that allows degradation is subject to EPA review and approval. RG-194, at 69.

For Tier 3 waters, the quality of ONRWs is maintained and protected by ensuring that no increase in pollution that could cause degradation of water quality is allowed into ONRWs. Such waters must be specifically designated under section 307.5 of the Standards. Currently there are no designated ONRWs in Texas. *See* 30 Tex. Admin. Code § 307.4; RG-194, at 69.

The significance of the antidegradation policy to the intersection of water quality and water supply is that, for Tier 1 and 2 waters, as more surface water is impounded or diverted to meet the water needs of Texas's growing population, there may be less water in the water bodies to absorb pollutant loads in new discharges. More stringent WQBELs may, therefore, be necessary to protect existing uses and attain the fishable/swimmable standard.

III. Total Maximum Daily Load

For water bodies where a Standard is not being attained, pollutant loads can be decreased through the TMDL assessment, planning, and implementation process. This section discusses TMDLs and the TMDL process for impaired waters, and highlights how the public may be affected and how it can participate in the process.

A. List of Impaired Water Bodies under CWA Section 303(d)

TMDLs are part of state water quality management plans that the TCEQ is required by statute to prepare. *See* Tex. Water Code §§ 26.036, 26.0136, 26.127. The TCEQ executive director prepares, and the commission approves, a comprehensive plan for controlling water quality in the state. *See* Tex. Water Code § 26.012. The list of impaired segments, waste load allocations, and implementation plans that make up a completed TMDL are all tools in water quality planning.

These state requirements dovetail with CWA section 303(d), which requires each state to identify water bodies within its boundaries for which technology-based effluent limitations are or threaten to become insufficient to achieve the water quality standard for a given water body. *See* 33 U.S.C. § 1313(d). This list is known as the "303(d) list."

The development of a TMDL for a water segment begins with the initial investigation into the water quality of the segment for the 303(d) list and continues through the integration and potential challenge of TMDL limits in TPDES permits. The development of the 303(d) list is the first step at which the public can be involved by submitting information and data on a particular water body. The EPA requires states to outline their process for developing 303(d) lists in "integrated reports," and states must submit these reports to the EPA under CWA section 305(b) every two years. 33 U.S.C. § 1315(b). The integrated report describes the water quality of all jurisdictional waters in the state and discusses the status and strategies for attaining the ultimate fishable/swimmable goal under the CWA.

The TCEQ's Integrated Report Guidance [hereinafter Guidance] details the TCEQ's methodology for listing a water body and provides details related to the requirements for data submittals. According to the Guidance, any person can petition TCEQ to list a segment on the state's 303(d) list as long as there is adequate supporting water quality data or other information. All comments, data, and information must be submitted during the formal public comment period in written form. Federal and state rules for developing the 303(d) list require integrated reports to include a summary of all public comments and requests along with an agency's response to those comments and requests.

Although listing a water body on the state 303(d) list can trigger the development of a TMDL ultimately affecting a permittee's pollutant loading into the listed water, the TCEQ does not consider the development of the Texas 303(d) list a rulemaking. State agency rulemakings must follow particular processes outlined in the state's administrative procedure act, and final rulemakings are subject to declaratory judgment actions in Travis County district court. *See* Tex. Gov't Code § 2001.038. The TCEQ's position that the 303(d) list is not a rulemaking aligns with the few state courts that have considered this issue. *See Missouri Soybean Ass'n v. Missouri Clean Water Commission*, 102 S.W.3d 10, 25 (Mo. 2003) (holding that court did not have jurisdiction over 303(d) list because it was not a rule); *Monongahela Power Co. v. Chief, Office of Water Resources, Division of Environmental Protection*, 567 S.E.2d 629, 638–39 (W. Va. 2002) (holding that court did not have jurisdiction to review the state 303(d) list or TMDLs); *see also City of Dover v. United States Environmental Protection Agency*, 36 F. Supp. 3d 103 (D.D.C. 2014) (holding that cities could not sue the EPA for placement of water on 303(d) list because specific limits had not been set yet and therefore the issue was not ripe for judicial review). However, shortly after the Missouri Supreme Court concluded that 303(d) lists are merely an "inventory" of impaired waters that do not trigger subject-matter jurisdiction over alleged procedural deficiencies, the Missouri legislature amended state law and expressly determined that a 303(d) list is a rule, subject to the attendant rulemaking procedures and challenges. *See* Mo. Rev. Stat. § 644.036(5).

States are required to submit 303(d) lists and TMDLs to the EPA for approval. The EPA requires documentation to support state decisions related to the reliance on particular data and information and decisions to list or not list water segments. *See* 40 C.F.R. § 130.7(b)(6). A decision to remove a water body from a list must also be fully supported. The EPA has thirty days to approve or disapprove the state's submission. *See* 33 U.S.C. § 1313(d)(2). If the EPA disapproves a state's list or TMDL, the EPA is allowed to identify listed water bodies and establish TMDLs. The EPA is required to propose its approval or disapproval and any additions it may have to the 303(d) list in the Federal Register for additional public comment. The EPA's approval or disapproval of a 303(d) list and TMDL constitutes a final agency action that is appealable in federal district court through a CWA citizen suit and potentially under the Administrative Procedures Act. *See* 33 U.S.C. § 1365(a); 5 U.S.C. § 706 (allowing court enforcement for agency action unlawfully withheld or unreasonably delayed). Once approved, a state must also add TMDLs to its continuous planning process, which is also periodically reviewed by the EPA. *See* 33 U.S.C. § 1313(e).

The most recent EPA-approved 303(d) list for Texas is contained in the 2012 integrated report, but the TCEQ recently announced the Draft 2014 Texas Integrated Report, available at www.tceq.texas.gov/waterquality/assessment/public_comment, and solicited public comment on the draft. In most circumstances the period of record for water quality data and information used in preparing the integrated report is the most recent seven years. In 2012 the TCEQ and cooperating local, state, and federal agencies evaluated 1,214 water bodies in Texas. A total of 568 impairments were identified. (The number of impairments is greater than the number of impaired water bodies because some water bodies have more than one pollutant for which they do not meet a water quality standard. Each impairment is evaluated and counted.) Nearly half (45 percent) of the impairments in 2012 were listed for nonsupport of contact recreation use, caused by elevated bacteria, and one-sixth of the impairments were listed for nonsupport of the aquatic life use, due to low dissolved oxygen.

B. TMDL Development

In compiling a biennial integrated report, the TCEQ assigns each assessed water body to one of five categories that indicates the status of the water body. Water bodies in Category 5 constitute the 303(d) list and require action by the state. Category 5 water bodies are further divided into 5a (a TMDL is underway, scheduled, or will be scheduled), 5b (a review of the water quality standards for the water body will be documented before a TMDL is scheduled), or 5c (additional data and information will be collected before a TMDL is scheduled).

Even though a water body may be listed as 5a on the state 303(d) list, there is no set timeline for the state to develop a TMDL. Thus, the first step is the establishment of a schedule to develop the TMDL. Some courts have concluded that a state's failure to submit a TMDL schedule may constitute a "constructive submission" that can be challenged in federal district court. *See Scott v. City of Hammond*, 741 F.2d 992 (7th Cir. 1984). However, the more recent trend appears to be a recognition that small steps taken by states on TMDLs are sufficient to prevent court mandates. *See San Francisco BayKeeper v. Whitman*, 297 F.3d 877, 882 (9th Cir. 2002); *Hayes v. Whitman*, 264 F.3d 1017, 1024 (10th Cir. 2001) (declining to apply constructive submission theory where Oklahoma had begun developing TMDLs).

1. Load Allocation

Once a TMDL schedule is set, states must begin the process of estimating the TMDL of "pollutants" that an impaired water body can receive and still attain its designated uses. *See* 33 U.S.C. § 1313(d). A separate load allocation is prepared for each pollutant causing a water body to be impaired based on an allocation report. This report uses a scientific model to pinpoint the allowable load to point and nonpoint sources of pollution in the watershed. A TMDL—

- determines the maximum amount (or "load") of a particular pollutant that can be added to a water body from all sources, including natural background sources, each day that still permits the water body to both attain and maintain its water quality standards;

- identifies the sources that contribute to the load of the pollutant; and
- allocates the allowable load, and the necessary reductions in it, to the sources in the watershed.

TMDLs must allow for seasonal variations, anticipate future growth, and include a margin of safety to cover uncertainties in the analysis. *See* 33 U.S.C. § 1313(d)(1)(C); 40 C.F.R. § 130.2(e)–(i).

A TMDL has two components: a wasteload allocation (WLA) and a load allocation (LA). The WLA is the portion of a TMDL that is allocated to existing and future point sources. 40 C.F.R. § 130.2(h). The LA is the portion of a TMDL that is allocated to existing and future nonpoint sources, including natural background sources (possibly including atmospheric deposition, according to the EPA). 40 C.F.R. § 130.2(g). Where possible, the LA must distinguish between loadings from natural and nonpoint sources. 40 C.F.R. § 130.2(g); 65 Fed. Reg. 43,586, 43,662 (July 13, 2000), *effective date delayed for reconsideration*, 66 Fed. Reg. 41,817 (2001); Environmental Protection Agency, *National Clarifying Guidance for 1998 State and Territory Clean Water Act Section 303(d) Listing Decisions*, at 5 (Aug. 17, 1997), *available at* www.epa.gov/owow/tmdl/lisgid.html [hereinafter TMDL Guidance (EPA 1998)]. In short, reduced to its simplest form, a TMDL is the sum of the WLAs and LAs, plus a margin of safety and consideration of seasonal variations. *See* 40 C.F.R. § 130.2(i).

Texas emphasizes the inclusion of stakeholder groups in developing the actual TMDL. The TCEQ allows stakeholders to provide public comment on the allocation report, and the TCEQ and the EPA must approve the report. Although the TCEQ does not treat TMDLs as rules in Texas, at least one state supreme court has concluded that the final adoption of a TMDL is a final rule that must meet the notice, public comment, and other procedural requirements for a formal rulemaking. *See Asarco Inc. v. State*, 69 P.3d 139, 142 (Idaho 2003).

2. "Pollutant" versus "Pollution"

It is important with respect to water supply projects to emphasize that the term "pollutant" is used in CWA section 303(d), rather than "pollution." A "pollutant" subject to the requirement to develop and implement a TMDL is defined as any one of a number of contaminants (e.g., dredged spoil, solid waste, chemical waste, biological materials, and industrial, municipal, and agricultural waste) that is "discharged into water." *See* 33 U.S.C. § 1362(6); 40 C.F.R. § 122.2. The definition of "pollution" is broader. It means any "man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water." 33 U.S.C. § 1362(19); 40 C.F.R. § 130.2(c).

Because CWA section 303(d) requires TMDLs only for waters impaired by "pollutants," TMDLs are not required for waters impaired by, for example, flow alterations, habitat alterations, or channelization, since those problems might arguably constitute "pollution" but are not associated with a specific "pollutant." *See* 65 Fed. Reg. 43,586, 43,592–93 (July 13, 2000); 64 Fed. Reg. 46,012, 46,021 (Aug. 23, 1999); *see also Virginia Department of Transportation v. U.S. Environmental Protection Agency*, No. 1:12-CV-775, 2013 WL 53741, at *2, 5 (E.D. Va. Jan. 3, 2013) (rejecting EPA's classification of stormwater, as a carrier of sediment, and holding that "[s]tormwater runoff is not a pollutant."). Thus, a state may, subject to its own statutory authorities, promulgate a TMDL for waters impaired by flow alterations and the like, but it is not required to do so by CWA section 303(d). *See* 65 Fed. Reg. 43,586, 43,592–93 (July 13, 2000); 64 Fed. Reg. 46,012, 46,021 (Aug. 23, 1999). The TCEQ adopted such a TMDL for DO applicable to Lake Austin on the Colorado River immediately downstream of the Mansfield Dam. The low DO level was determined to be the result of cold waters released from the bottom of Lake Travis and not the result of the discharge of pollutants. Accordingly, the EPA declined to take action on the TCEQ-approved TMDL.

The distinction between "pollutant" and "pollution" does not restrict the state to limitations on the discharge of "pollutants" when fashioning conditions on the state's CWA section 401 certification for a federally permitted project. The state may also impose flow limitations if necessary to comply with water quality standards. *See PUD No. 1 of Jefferson County v. Washington Department of*

Ecology, 511 U.S. 700, 717–20, 723 (1994). Certifications under CWA section 401 for federally permitted projects are discussed in more detail in Chapter 34 of this book.

3. TMDL Implementation Plan

Once a state has set a TMDL, the state must develop an implementation plan for the TMDL that describes the regulatory and voluntary actions necessary to achieve the water quality standard. *See* Texas Commission on Environmental Quality, *Clean Water for Texas* (GI-284), at 10 (Aug. 2002), *available at* www.tceq.texas.gov/publications/gi/gi-284.html/at_download/file; TMDL Guidance (EPA 1998). The TMDL implementation plan is developed with further public comment and TCEQ approval. According to the EPA, if a state wants to allocate loads among nonpoint as well as point sources, there must be "reasonable assurances that nonpoint source reduction will in fact be achieved." Environmental Protection Agency, *Guidance for Water Quality-Based Decisions: The TMDL Process* (Apr. 1991), www.epa.gov/owow/tmdl/decisions [hereinafter TMDL Process (EPA 1991)]. According to the EPA, "[w]here there are not reasonable assurances, under the CWA, the entire load reduction must be assigned to point sources." TMDL Process (EPA 1991). Thus, it is easier for states to impose the pollutant discharge reductions necessary to meet water quality standards on point sources than on nonpoint sources.

4. Integration of TMDLs into Permits

Final TMDLs must be integrated into TPDES permits. The TCEQ can initiate amendments to existing permits to impose new limits, or it can impose new limits during routine renewals and amendments. Since permitted loads may be substantially reduced at existing facilities as a result of a TMDL, it is critical for permitted facilities on impaired waters to be vigilant throughout the TMDL development process and not just when the TMDL is finalized and integrated into a permit. One Texas court of appeals has concluded that even while a TMDL is pending development or approval, both existing permittees and those seeking new permits on the impaired watershed could face limits related to the pollutant causing impairment. *See City of Waco v. Texas Natural Resource Conservation Commission*, 83 S.W.3d 169 (Tex. App.—Austin 2002, pet. denied) (concluding that issue of whether loads could be established in permits before a final TMDL was developed was ripe for review). The permit and application process integrating TMDLs into permits is also subject to the TCEQ contested case hearing process. *See* Tex. Gov't Code ch. 2003; 30 Tex. Admin. Code ch. 80.

C. Texas TMDL Status

To date, the TCEQ has adopted and the EPA has approved 237 TMDLs for 152 waterbody segments. The majority of the completed TMDLs address bacteria or legacy pollutants. The TCEQ has also completed TMDLs on DO; nutrients; certain metals; chloride, sulfates and total dissolved solids; and chlorinated organics. *See* Texas Commission on Environmental Quality, *Summary Table of Completed TMDLs and Implementation Plans*, www.tceq.state.tx.us/implementation/water/tmdl/tmdlcompletedsummary.html.

IV. Conclusion

In summary, Standards require the attainment and maintenance of designated uses and water quality criteria. The Standards do not, however, provide for regulating stream flows to maintain water quality, only for reducing pollutant loads to attain the water quality standards through WQBELs in wastewater discharge permits and TMDLs. Water supply projects, therefore, may have an impact on the stream flow in ways that can affect water quality and cause a ratcheting-down of WQBELs in TPDES permits.

CHAPTER 34

Impacts of Water Quality Requirements on Water Supply Projects

Howard S. Slobodin[1] and Stacie M. Dowell[2]

I. Introduction

Water quality considerations may arise in the permitting of water supply projects in a number of respects. Some water supply projects may result in the discharge of pollutants into state waters. Such discharges are prohibited, except where authorized by a discharge permit issued by the Texas Commission on Environmental Quality (TCEQ). *See* Tex. Water Code §§ 26.027, 26.121; 33 U.S.C. §§ 1311(a), 1342. Some water supply projects may, accordingly, require a discharge permit, particularly for the construction phase or if an ongoing effluent discharge is involved. This discharge permit is commonly referred to as a Texas Pollutant Discharge Elimination System (TPDES) permit. *See* 30 Tex. Admin. Code § 305.1(b). Other projects, such as water transfers and dams, do not currently require a TPDES permit, but those exceptions remain in controversy. The applicability or inapplicability of the TPDES permit requirement is discussed in section II below.

If a water supply project requires the TCEQ's approval of new or amended water rights under Texas Water Code chapter 11, the TCEQ's review will consider water quality impacts. The permit may contain effluent limitations, which may be technology based or water-quality based, or both, as well as other conditions on the concentration, volume, rate, and circumstances of discharges. Effluent limitations are discussed in section III. Protection of water quality is sometimes achieved through instream or environmental flow requirements in diversion permits, which are covered in section IV.

Finally, a water supply project may require a federal permit or license, which may necessitate the state's certification as to impacts on water quality under section 401 of the federal Clean Water Act (CWA). *See* 33 U.S.C. § 1342. The statutory and regulatory background of the CWA 401 certification program is provided in section V. Section VI covers 401 certification of dams, and section VII explains the 401 certification process.

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II. TPDES Applicability to Water Supply Projects

The U.S. Environmental Protection Agency (EPA) has delegated its authority over federal CWA permitting and enforcement for the TPDES program to the TCEQ for most Texas dischargers other than oil and gas activities. The TCEQ, therefore, implements and enforces both the federal and state water quality laws and regulations, and both federal and state water quality laws are relevant to this chapter. The TCEQ's authority to issue TPDES permits is subject to the EPA's right to review and comment on such permits and the TCEQ's obligation to address the EPA's comments. If the TCEQ fails to resolve the EPA's concerns on a permit, the EPA may elect to take over the permitting process for that discharger. *See* Memorandum of Agreement Between Texas Natural Resource Conservation Commission and U.S. Environmental Protection Agency Region 6 pt. IV.C.3 (Sept. 14, 1998).

Texas and federal laws prohibit the discharge of pollutants to "water in the state" and "waters of the U.S.," respectively, except as authorized under a TPDES permit issued by the TCEQ. *See* Tex. Water Code §§ 26.027, 26.121; 33 U.S.C. §§ 1311(a), 1342. Some water supply projects may discharge pollutants to water in the state during the construction phase or on an ongoing basis if project operations require an effluent discharge. This section discusses whether and what type of TPDES permit is required, if any, for discharges from water resource projects, including construction stormwater discharges and discharges from water transfers and dams.

A. Construction Stormwater Discharges

Many water supply projects involve the construction of dams, water intake structures, water transport pipelines, and similar activities. If a water supply project by itself disturbs one acre or more of land area, or if it is part of a common plan of development or sale (such as a subdivision or other "common plan") that does so, the project requires a TPDES permit for stormwater discharges from construction activities. *See* 30 Tex. Admin. Code § 281.25 (adopting 40 C.F.R. § 122.26 including subparts (b)(14)–(15)).

A TPDES Construction General Permit covers discharges of stormwater from construction activities, construction support activities (such as concrete and asphalt batch plants), and specified nonstormwater discharges associated with construction activities. *See* TCEQ General Permit Number TXR150000 Relating to Discharges from Construction Activities (eff. Mar. 5, 2013) pt. II.A, *available at* www.tceq.state.tx.us/assets/public/permitting/stormwater/TXR150000_CGP.pdf [hereinafter TXR150000 (2013)]. If the project will disturb five or more acres of land area (or is part of a common plan that will do so), the project is considered a large construction activity. *See* TXR150000 (2013) pt. I. If the project or common plan disturbs one to five acres, it is considered a small construction activity. *See* TXR150000 (2013) pt. I.

To obtain coverage under the permit, both the owner and operator of a large construction activity must submit notices of intent (NOIs) to the TCEQ seven days before commencing construction or taking over operational control. *See* TXR150000 (2013) pt. II.E.3. As permitted by EPA's rules, however, the TCEQ does not require an NOI for small construction sites. *See* TXR150000 (2013) pt. II.E.2; *see also* 40 C.F.R. § 122.28(b)(2)(5) (allowing states to forgo NOIs). Small construction sites are automatically authorized by the Construction General Permit provided the site owners and operators prepare and implement a Storm Water Pollution Prevention Plan (SWP3), give notice to the operator of the municipal separate storm sewer system (MS4) in the location where the construction occurs, and meet certain signage and other minor requirements set out in the permit. *See* TXR150000 (2013) pt. II.E.2. In counties listed in appendix A of the general permit, the SWP3 and NOI requirements are waived for construction that occurs entirely during specified low-erosion periods (although any associated concrete or asphalt batch plant must then be separately authorized). *See* TXR150000 (2013) pt. II.E.1 & app. A.

Discharges that would cause or contribute to a violation of water quality standards, or that would jeopardize or degrade existing designated uses of receiving waters, are not authorized under the Construction General Permit. TXR150000 (2013) pt. II.C.3. In addition, construction projects that would discharge constituents of concern (e.g., total suspended solids) to impaired waters that are on the state's 303(d) list are not authorized under the Construction General Permit unless there is a completed total maximum daily load (TMDL) for the receiving water body and the project complies with the waste load allocation and implementation plans for that TMDL. TXR150000 (2013) pt. II.C.4. See Chapter 33 of this book for a discussion of section 303(d) and TMDLs. The TCEQ may deny or suspend coverage under the Construction General Permit and require ineligible projects to obtain individual permit coverage. *See* TXR150000 (2013) pts. II.C.3, II.H.2.

Conditions of coverage under the Construction General Permit include preparation and implementation of a SWP3 and best management practices (BMPs), as well as related inspections and recordkeeping. Local governments may impose more stringent requirements than those in the Construction General Permit, with which the permittee must also comply. TXR150000 (2013) pt. II.C.7. A notice of termination (NOT) must be submitted upon final stabilization or transfer of operational control. TXR150000 (2013) pt. II.F.

Discharges that occur after construction activities have been completed are not eligible for coverage under the Construction General Permit. TXR150000 (2013) pt. II.C.1. Owners and operators of water resource projects must, therefore, consider whether TPDES permit coverage is required for any discharges that might occur after the project is complete, such as discharges from water transfer projects and dams. These discharges are covered in the next two sections below.

B. Water Transfers

Texas law does not currently require discharge permits for discharges of transferred water, whether within or between river basins. Such transfers have been exempted from NPDES/TPDES permitting pursuant to the EPA's Water Transfers Rule. *See* 40 C.F.R. § 122.3(i) [hereinafter the Water Transfers Rule]. That rule took effect in August 2008. 73 Fed. Reg. 33,697 (June 13, 2008) (codified at 40 C.F.R. § 122.3(i)). The CWA's treatment of water transfers and the Water Transfers Rule have given rise to significant litigation nationwide for more than a decade.

See, e.g., Friends of the Everglades v. South Florida Water Management District, 570 F.3d 1210 (11th Cir. 2009); *ONRC Action v. U.S. Bureau of Reclamation*, No. 97-3090-CL, 2012 WL 3526833 (D. Or. Jan. 17, 2012), *rec. adopted*, 2012 WL 3526828 (D. Or. Aug. 14, 2012). Most recently, in 2014, a federal district court for the Southern District of New York found the Water Transfers Rule arbitrary and capricious under a *Chevron* deference analysis. *Catskill Mountains Chapter of Trout Unlimited, Inc. v. U.S. Environmental Protection Agency*, 8 F. Supp. 3d 500, 547–50 (S.D.N.Y. 2014). The fate of the Water Transfers Rule is unclear at this time. Because water transfers are a significant source of both current and future supply for Texas, the fate of the Water Transfers Rule should be of interest to those concerned with water supply planning. *See generally* Jack E. Stowe, Jr., *Socioeconomic Analysis of Selected Interbasin Transfers in Texas, Final Report*, prepared for the Texas Water Development Board (Oct. 2007), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0604830618_SocioeconomicAnalysisofIBT.pdf.

1. Definition of "Discharge of a Pollutant"

The CWA requires an NPDES permit for the "discharge of any pollutant" to the waters of the United States. 33 U.S.C. §§ 1311(a), 1342(a). The phrase "discharge of a pollutant" is defined to mean "any addition of any pollutant to navigable waters from any point source." 33 U.S.C. § 1362(12). The word "addition" is not defined in the CWA. The word "pollutant" means "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, . . . and industrial, municipal, and agricultural waste discharged into water." 33 U.S.C. § 1362(6). The phrase "point source" means "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, [or] well . . . from which pollutants are or may be discharged." 33 U.S.C. § 1362(14).

The Texas Water Code contains essentially similar requirements. The Code requires a permit for the "discharge [of] sewage, municipal waste, recreational waste, agricultural waste, . . . industrial waste . . . [or] other waste into or adjacent to any water in the state." Tex. Water Code § 26.121(1), (2) (prohibiting these discharges); *see* Tex. Water Code § 26.027 (authorizing the TCEQ to issue permits for the "discharge of waste or pollutants"). The more stringent of federal or state law will control in a given situation, but the Texas Water Code defines the "waste" discharges it prohibits broadly enough to make coverage under the Texas law effectively coextensive with coverage under the CWA. *See* Tex. Water Code § 26.001(12) (defining "other waste" to include "garbage, refuse, decayed wood, sawdust, shavings, bark, sand, lime, cinders, ashes, offal, oil, tar, dyestuffs, acids, *chemicals*, salt water, or *any other substance*" (emphasis added)).

2. Pre-Water Transfers Rule Litigation

Before the EPA's adoption of the Water Transfers Rule, the CWA definition of "discharge of a pollutant" and the absence of a definition of "addition" left open the question of whether a project that merely transfers water from a polluted source water to a receiving water, but does not itself "add" pollutants to the water transferred, is a "discharge" of pollutants requiring an NPDES permit. This was the "precise question" on which the U.S. Supreme Court granted certiorari in *South Florida Water Management District v. Miccosukee Tribe of Indians*, 541 U.S. 95, 104–05 (2004) [hereinafter *Miccosukee*].

In *Miccosukee*, the Miccosukee Tribe (the Tribe) and various environmental groups sued the South Florida Water Management District (the District) for failure to have an NPDES permit to authorize the District's transfers from a canal to Lake Okeechobee. The district court held that a permit was required, based on the assumption that the canal and the lake were two distinct bodies of water. The Eleventh Circuit Court of Appeals affirmed, holding that a permit was required for this water transfer because the transfer of water from the flood control canal into the lake would not have occurred without the operation of the District's pump. *Miccosukee*, 280 F.3d 1364, 1368–69 (11th Cir. 2002).

The District petitioned the Supreme Court for review, and the Court granted the petition on the "precise question" of "[w]hether the pumping of water . . . that adds nothing to the water being pumped constitutes an 'addition' of a pollutant 'from' a point source triggering the need for a [NPDES]" permit. *Miccosukee*, 541 U.S. at 103–04. The EPA participated in the Supreme Court appeal as amicus curiae in support of the position that a permit was not required.

In a relatively narrow holding, the Supreme Court found in *Miccosukee* that the definition of "discharge" "includes within its reach point sources that do not themselves generate pollutants." *Miccosukee*, 541 U.S. at 105. The Court held that the CWA definition of point source "makes plain that a point source need not be the original source of the pollutant; it need only convey the pollutant to 'navigable waters,' which are, in turn, defined as 'the waters of the United States.'" *Miccosukee*, 541 U.S. at 105. The Court remanded the matter for further proceedings as to whether the two bodies of water in question were "meaningfully distinct," so as to trigger the permit requirement, and also to address the validity of the EPA's "unitary waters" theory. Under that theory, the CWA's definition of a "discharge" as "any addition of any pollutant to navigable waters from any point source" effectively exempts all or most transfers from the permit requirement. *Miccosukee*, 541 U.S. at 106. That argument turned on the omission of the word "any" from that definition, i.e., the CWA does not prohibit discharges to *any* "navigable waters" but instead discharges to "navigable waters" as a whole. *Miccosukee*, 541 U.S. at 106. Because *Miccosukee*'s holding was narrow and factually dependent, significant litigation continued in other venues as to whether particular transfers should be subjected to NPDES permitting. *See, e.g., Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York*, 451 F.3d 77 (2d Cir. 2006).

3. Post-Water Transfers Rule Litigation

The Water Transfers Rule defines a "water transfer" as "an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use." 40 C.F.R. § 122.3(i). The rule explicitly provides that the permit exemption "does not apply to pollutants introduced by the water transfer activity itself to the water being transferred." 40 C.F.R. § 122.3(i). Under the plain language of the new rule, a transfer conveying "contaminated" water, as in the case of the phosphorus content in *Miccosukee*, to a "cleaner" water source would not require an NPDES permit. An NPDES permit is required only if that water is put to an intervening use or is contaminated by the transfer activity itself.

The Water Transfers Rule found its first judicial application in *Friends of the Everglades v. South Florida Water Management District*, 570 F.3d 1210 (11th Cir. 2009) [hereinafter *Friends*]. *Friends* began with a 2002 request by the Friends of the Everglades for an injunction to force the South Florida Water Management District to obtain a permit to transfer water from the Everglades Agricultural Area into Lake Okeechobee. *Friends*, 570 F.3d at 1214. After a two-month bench trial, the district court enjoined the defendant to apply for an NPDES permit. *Friends*, 570 F.3d at 1214–15. On appeal, the Eleventh Circuit recognized that the parties' dispute over the unitary waters theory advanced in *Miccosukee* was not dispositive in light of the EPA's new rule. *Friends*, 570 F.3d at 1217. Instead, the court narrowed its focus to the new rule and whether it was entitled to deference. That required the court to determine only whether "the EPA's regulation . . . [was] a reasonable interpretation of an ambiguous statute." *Friends*, 570 F.3d at 1219. If so, it would be entitled deference and dispose of the issue presented, i.e., the necessity of an NPDES permit for the challenged transfer.

After an extensive analysis of the CWA's language, context, and the CWA as a whole, the Eleventh Circuit concluded that the CWA's definition of "discharge of a pollutant" was ambiguous. *Friends*, 570 F.3d at 1227. It found that there were two reasonable ways to interpret "any addition of any pollutant to navigable waters from any point source": (1) that "it means 'any addition . . . to [any] navigable waters';" or (2) that it means "'any addition to navigable waters [as a whole].'" *Friends*, 570 F.3d at 1227 (citing 33 U.S.C. § 1362(12)). Having found the phrase ambiguous, the court further found that the Water Transfers Rule and its use of the unitary waters theory as justification was one of two reasonable interpretations available to EPA. The court reversed the district court's finding that the water transfer operations of the District without NPDES permits violated the CWA. The Eleventh Circuit subsequently denied rehearing en banc of the panel's decision. *Friends of the Everglades v. South Florida Water Management District*, 605 F.3d 962 (11th Cir. 2010).

Given the significant nationwide interest and history of water transfers and the Water Transfers Rule, it came as some surprise that the U.S. Supreme Court denied review of the Eleventh Circuit's decision. *Friends of the Everglades v. South Florida Water Management District*, 131 S. Ct. 643 (2010). The Supreme Court's refusal to hear the appeal did not dispose of several pending rule challenges to the Water Transfers Rule, which are addressed below.

4. *Challenges to Water Transfers Rule*

The EPA's adoption of the Water Transfers Rule was met with rule challenges in both the federal district courts and courts of appeal due to uncertainty over jurisdiction. *See, e.g., Friends of the Everglades v. U.S. Environmental Protection Agency*, 699 F.3d 1280, 1288 (11th Cir. 2012) (consolidating rule challenges initiated in the Second and Eleventh Circuits in the Eleventh Circuit); *Catskill Mountains Chapter of Trout Unlimited, Inc. v. U.S. Environmental Protection Agency*, 630 F. Supp. 2d 295, 303 (S.D.N.Y. 2009) (collecting district court and appellate challenges to Water Transfers Rule). In the multidistrict proceeding in the Eleventh Circuit, the court found that it lacked original jurisdiction and dismissed that proceeding. 699 F.3d at 1289. Proceedings stayed in Florida and New York district courts resumed but were subsequently voluntarily dismissed. *Friends of the Everglades v. United States*, No. 08-21785-CIV (S.D. Fla. Nov. 13, 2012) (joint notice of voluntary dismissal).

An independent challenge to the validity of the Water Transfers Rule was initiated in the United States District Court for the Southern District of New York in 2008 in *Catskill*, 630 F. Supp. 2d 295. That proceeding was stayed to allow the subject to be addressed by proceedings in the Eleventh Circuit. *Catskill*, 630 F. Supp. 2d at 308. When the Eleventh Circuit rule challenge was dismissed, the EPA filed a motion to dismiss in the *Catskill* district court proceeding in New York, claiming the Eleventh Circuit's dismissal was in error and that proper jurisdiction was in the circuit courts of appeal. *Catskill Mountains Chapter of Trout Unlimited, Inc. v. U.S. Environmental Protection Agency*, 8 F. Supp. 3d 500, 516–17 (S.D.N.Y. 2014). The *Catskill* plaintiffs responded with a motion for summary judgment asserting that the EPA's promulgation of the Water Transfers Rule was arbitrary and capricious and a clear abuse of discretion in conflict with the law. *Catskill*, 8 F. Supp. 3d at 517. Upon the resumption of proceedings, multiple states were granted intervenor status in the proceeding, including Texas. *Catskill*, 8 F. Supp. 3d at 516.

In 2014, the *Catskill* court found the Water Transfers Rule to be an arbitrary and capricious exercise of rulemaking authority under a *Chevron* analysis. *Catskill*, 8 F. Supp. 3d at 567. The court agreed that the text of the CWA did not expressly or impliedly answer "the precise question whether a transfer of water and any pollutants contained therein is an 'addition' of those pollutants 'to navigable waters,'" satisfying the ambiguity requirement of the analysis established in *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). *Catskill*, 8 F. Supp. 3d at 519, 524–25, 532. But the court ultimately vacated and remanded the rule to the EPA on a finding that the EPA's interpretations underlying were not supported by a reasoned explanation, and that the EPA's focus on the CWA's deferral to state water management over other statutory goals was arbitrary and capricious. *Catskill*, 8 F. Supp. 3d at 546–48. The court remanded the rule to the EPA to provide a reasoned explanation but vacated the rule to the extent that it was inconsistent with the CWA (particularly with the statutory phrase "navigable waters"). *Catskill*, 8 F. Supp. 3d at 567. The district court's decision is pending review by the Second Circuit. *Catskill Mountains Chapter of Trout Unlimited, Inc. v. U.S. Environmental Protection Agency*, 8 F. Supp. 3d 500, 516–17 (S.D.N.Y. 2014), *appeal docketed*, Nos. 14-1823-(L), 14-1909-(con), 14-1991-(con), 14-1997-(con), 14-2003-(con) (2d Cir. Jun. 2, 2014).

5. *Effect of Water Transfers Rule on TCEQ Permitting*

Texas and a number of other western states supported the EPA's adoption of the Water Transfers Rule. *See, e.g.*, Letter from Glenn Shankle, TCEQ Executive Director, to EPA Water Docket (Aug. 7, 2006) (supporting the EPA's proposed rule), *available at* www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2006-0141-1372. The TCEQ is not currently requiring TPDES permits in connection with water transfers that fall within scope of the Water Transfers Rule.

C. Dams

Discharges due to releases of impounded water from dams are not required to obtain a TPDES permit. Although this long-standing interpretation has been criticized by some commentators and also by several courts, the EPA has successfully defended it in two circuits, as discussed in more detail below. *See, e.g., National Wildlife Federation v. Gorsuch*, 693 F.2d 156, 171–74 (D.C. Cir. 1982).

The EPA has long held the view that, although dam releases may result in "pollution," they are not considered "discharges of a pollutant" required to obtain an NPDES permit under CWA section 402 for two reasons. First, the water quality impacts of dams such as low concentrations of dissolved oxygen and dissolved minerals and nutrients, water temperature changes, sediment release, release of entrained fish, and supersaturation, when not caused by the discharge of a listed "pollutant" (such as industrial or municipal waste), are not themselves "pollutants" subject to section 402, according to the EPA. *See National Wildlife Federation v. Consumers Power Co.*, 862 F.2d 580 (6th Cir. 1988); *Gorsuch*, 693 F.2d at 171–74. Second, releases from dams do not constitute the requisite "addition of any pollutant to navigable water" necessary to give rise to an NPDES permit requirement under section 402. *See* 33 U.S.C. §§ 1342(a), 1362(12). According to the EPA in the *Consumers Power* and *Gorsuch* cases (collectively, the "dams cases"), an "addition from a point source occurs only if the point source itself physically introduces a pollutant into water from the outside world." *Consumers Power*, 862 F.2d at 583; *Gorsuch*, 693 F.2d at 175. In the EPA's view, therefore, "the point or nonpoint character of pollution is established when the pollutant first enters navigable water, and does not change when the polluted water later passes through the dam from one body of navigable water (the reservoir) to another (the downstream river)." *Gorsuch*, 693 F.2d at 175.

The U.S. courts of appeal have twice deferred to the EPA's interpretation in the dams cases. *See Consumers Power*, 862 F.2d at 590; *Gorsuch*, 693 F.2d at 181–82. Some commentators and courts of appeal, in dicta, have criticized the EPA's interpretation and suggested that it should be reconsidered in light of more modern standards of agency deference. *See Greenfield Mills, Inc. v. Macklin*, 361 F.3d 934, 949–50 (7th Cir. 2004); *Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York*, 273 F.3d 481, 489–90 (2d Cir. 2001); M. Rhead Enion, *Rethinking* National Wildlife Federation v. Gorsuch: *The Case for NPDES Regulation of Dam Discharge*, 38 Ecology L.Q. 797 (2011); Alison M. Dornsife, Comment, *From a Nonpollutant Into a Pollutant: Revising EPA's Interpretation of the Phrase "Discharge of Any Pollutant" in the Context of NPDES Permits*, 35 Envtl. L. 175, 192 (2005). Nevertheless, it remains the EPA's interpretation that dam releases are not subject to NPDES permitting requirements, and this long-standing interpretation has not been directly contradicted by any federal appellate court.

III. TPDES Water Quality Considerations—Effluent Limitations

Some types of water supply projects may result in the discharge of pollutants to water in the state, such as projects involving the discharge of desalination concentrate or treated wastewater effluent.

If a TPDES permit is required for a water supply project, the permit will likely contain effluent limitations, which may be technology based or water quality based, or both, as well as other conditions on the concentration, volume, rate, and circumstances of the discharge. Effluent limitations, as they would be applied to any discharger (including a water supply project if a permit is required), are the subject of sections III.A and III.B below.

A. Technology-Based Effluent Limitations

Most of the focus under the CWA in the past thirty years has been on promulgating and implementing technology-based limitations on point sources. All TPDES permits contain technology-based effluent limitations. *See* 33 U.S.C. § 1342(a)(1) (referring to 33 U.S.C. § 1311, which requires the EPA to establish effluent limitation guidelines); *see also* 30 Tex. Admin. Code § 305.531(4) (adopting by reference 40 C.F.R. § 122.44). The technology-based effluent limitations in TPDES permits are based on the EPA's national effluent limitations guidelines, which the TCEQ adopts by reference, or on an individual TCEQ permit writer's facility-specific best professional judgment (BPJ), in the event that an effluent limitation guideline has not yet been promulgated. *See* 30 Tex. Admin. Code § 305.541. Technology-based limits reflect what level of control is technologically and economically possible through the use of existing technology and do not consider impacts of the discharge on the receiving stream. *See generally Weyerhaeuser Co. v. Costle*, 590 F. 2d 1011, 1041–42 (D.C. Cir. 1978).

The EPA's technology-based limitations have a variety of acronyms, such as BPT (best practicable control technology currently available), which is the baseline level of control applicable in all circumstances; BAT (best available technology economically achievable), applicable to toxic or nonconventional pollutants by existing sources; NSPS (new source performance standards), applicable to new sources; and a variety of other effluent limitation standards. *See* 33 U.S.C. §§ 1314(b)(1), (b)(2), 1316(b). All permits must comply with a technology-based limit, whether the limit is based on an EPA nationwide effluent limitation guideline or on an individual TCEQ permit writer's facility-specific BPJ, in the event that an effluent limitation guideline has not yet been promulgated.

Technology-based limits are technology-forcing limits, meaning that they are not based on what is required to protect the quality of the receiving water but on the availability, cost, and effectiveness of wastewater treatment technologies. Technology-based limits may achieve greater than or less than the degree of control necessary to protect the quality of the receiving water body.

B. Water-Quality-Based Effluent Limitations

After the TCEQ has applied technology-based limits to a discharge, it must evaluate whether the pollution allowed by the TPDES permit will result in a violation of water quality criteria for the receiving water. 30 Tex. Admin. Code § 305.531 (adopting by reference 40 C.F.R. § 122.44); *see also* U.S. Environmental Protection Agency, *NPDES Permit Writers' Manual* (EPA-833-K-10-001) (Sept. 2010), at 6-1 ("[A] permit writer must consider the impact of the proposed discharge on the quality of the receiving water."), *available at* http://water.epa.gov/polwaste/npdes/basics/upload/pwm_2010.pdf. All TPDES applications are reviewed "to ensure that permitted effluent limits will maintain instream criteria for dissolved oxygen and other parameters such as bacteria, phosphorus, nitrogen, turbidity, dissolved solids, temperature, and toxic pollutants." Texas Commission on Environmental Quality, *Procedures to Implement the Texas Surface Water Quality Standards* (RG-194) (Jun. 2010), at 20, *available at* www.tceq.texas.gov/assets/public/permitting/waterquality/standards/docs/june_2010_ip.pdf [hereinafter RG-194]. These water-quality-based effluent limits are known by the acronym WQBEL. See Chapter 33 of this book for a detailed discussion of Texas Surface Water Quality Standards. As of the publication date of this edition, a Draft 2012 *Procedures to Implement the Texas Surface Water Quality Standards* is pending approval by the TCEQ and the EPA. *See* Texas Commission on Environmental Quality, *Implementing the Surface Water Quality Standards in Permitting*, www.tceq.texas.gov/waterquality/standards/WQ_stds.

The Texas Surface Water Quality Standards [hereinafter Standards] dictate WQBELs for classified surface water in Texas and are described in 30 Texas Administrative Code chapter 307. Classified waters are designated as segments in appendix A of the Standards. Classified segments have designated uses (such as recreation, aquatic life, and water supply) and associated limits (such as dissolved minerals, dissolved oxygen, pH, bacteria, and temperature). *See* RG-194, at 14. The designated uses and associated criteria are used by the TCEQ to evaluate wastewater permit applications. *See* RG-194, at 14. Unclassified waters are evaluated using site-specific information. As noted in Chapter 33 of this book, the concentration of dissolved oxygen is particularly sensitive to flow conditions and temperature.

IV. Water Rights Permitting and Instream Flow Restrictions

A. Pre-S.B. 3 Approach

Chapter 11 of the Texas Water Code requires that a person obtain a water rights permit before appropriating any state water or beginning construction of any work designed for storing, taking, or diverting water, with only limited exceptions. Tex. Water Code § 11.121. In issuing new water rights permits or permit amendments to increase appropriated amounts, the TCEQ must assess the effects of the issuance of the permit on the following parameters:

- bays and estuaries;
- existing instream uses;
- fish and wildlife habitats;
- water quality; and
- groundwater or groundwater recharge.

See Tex. Water Code §§ 11.147(b)–(e), 11.150–.152; 30 Tex. Admin. Code §§ 297.53–.56. Based on these assessments, the TCEQ must include in the permit, "to the extent practicable when considering all public interests," conditions necessary to maintain water quality and other parameters listed above in the stream or river to which the application applies, subject to defined exemptions (e.g., more than two hundred miles from the coast for estuarine considerations; less than 5,000 acre-feet per year for habitat mitigation). *See* Tex. Water Code §§ 11.147(b)–(d), 11.150; 30 Tex. Admin. Code §§ 297.53–.56.

The substance and procedure for water rights permitting are discussed more fully in Chapter 9 of this book. This section addresses the water quality aspects of the Texas water rights permitting process. One such consideration is the amount of water necessary to support downstream aquatic life and aquatic life in bays and estuaries. The regulation of such flows is the subject of ongoing regulatory development in the form of environmental flow standards. The creation of such standards, on a basin-by-basin basis, is required by Senate Bill 3, enacted in 2007 by the 80th Texas Legislature. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.07 (codified at Tex. Water Code § 11.02362(c)) [hereinafter S.B. 3]. Environmental flows are covered more fully in Chapter 11 of this book.

All the parameters considered by the TCEQ in water rights permitting may be affected to some extent by water quality. With respect to water quality in particular, however, the TCEQ is required to "assess the effects, if any, of the granting of the application on water quality . . . and the need for all existing instream flows to be passed up to that amount necessary to maintain the water quality standards [under chapter 307] for the affected stream." 30 Tex. Admin. Code § 297.54(a); *see also* Tex. Water Code § 11.150 (relating specifically to water quality).

The TCEQ assesses the instream flows necessary to maintain water quality and the other parameters listed above during its technical review of a water rights permit application, in a process known as an "environmental assessment." The TCEQ conducts an environmental assessment on applications for new permits, amendments requesting an increase in the total appropriative amount, significant upstream new or additional diversion points, a change in the diversion rate, or a significant change in place of use (such as on an application involving an interbasin transfer). *See* Bruce Moulton, *TCEQ Environmental Flows and Water Rights Permitting* (2004), *available at* www.tceq.state.tx.us/assets/public/comm_exec/igr/sa_comm/water_rights_perm.ppt [hereinafter Moulton (2004)]. Environmental assessments of amendments requesting merely a "change in purpose of use" are controversial. The TCEQ's "four corners doctrine" is discussed in more detail in Chapter 9 of this book.

When available, the TCEQ uses S.B. 3 flow limits or site-specific studies, but in the absence of adopted standards or site-specific data, applications that require an environmental assessment may still undergo a desktop review. *See* Moulton (2004). A desktop review relies on the permit application and related information, such as—

- the stream description and photographs;
- U.S. Geological Survey (USGS) topographic maps;
- geographic information system (GIS) coverages;
- USGS stream gauge data;
- TCEQ water quality inventory report prepared under CWA section 305(b), as mentioned in section III.A of Chapter 33 of this book;
- TCEQ list of impaired and threatened segments under section 303(d), as discussed in more detail in section III.A of Chapter 33; and
- data from other Texas and federal government agencies.

Following the desktop review, the TCEQ next evaluates whether the permit or amendment should have an instream flow restriction and, if so, at what instream flow velocity. In developing its instream flow recommendations, in the absence of values established by rule under S.B. 3 or site-specific information, TCEQ staff apply the Lyons method to calculate the minimum recommended flows on perennially flowing waters to protect the aquatic environment and other environmental values the agency must consider. The Lyons method uses 60 percent of the median flow during the warm months (March through September) and 40 percent of the median flow during cool months (October through February). *See* Moulton (2004). The 60 percent values were chosen to provide higher margins of protection during the critical spring and summer months. *See* David Maidment, Water Quality and Bioassessment in Texas Streams and Rivers (Apr. 2004), at 13 (unpublished paper, The University of Texas) [hereinafter Maidment (2004)]. Where the 7Q2 value (i.e., "[t]he lowest average stream flow for seven consecutive days with a recurrence interval of two years") produces a stream flow that is greater than the Lyons method, the 7Q2 is used to set the minimum stream flow, in order to preserve the critical low-flow condition on which TPDES water quality standards attainment and permitted effluent limitations are based. *See* Moulton (2004); see also section II.B.3 of Chapter 33 (relating to water quality standards) and section III.B above (relating to WQBELs).

The desktop review approach will be largely replaced through the implementation of S.B. 3 as described below, and future permits may provide for diversions below the 7Q2 flow or the Lyons flow. The TCEQ has adopted environmental flow standards for seven major basin and bay systems. *See* 30 Tex. Admin. Code §§ 298.200–.540.

The TCEQ's water rights permitting approach does not completely address the potential, discussed previously, for increases in diversions and impoundments to give rise to more stringent WQBELs in new and renewed wastewater discharge permits for a variety of reasons. There is no environmental review for the mere increased use of existing, permitted water rights, some of which are not subject to instream flow restrictions because their issuance predated the imposition of such restrictions. Therefore, water supply projects that decrease flow could affect the ability of a water body to absorb pollutant loads, in point and nonpoint source discharges. In addition, unlike water quality permits, which are subject to renewal every five years, water rights permits are permanent and not subject to modification by the TCEQ except upon amendment, so there may be no opportunity to impose new instream flow restrictions in existing permits in the absence of a triggering permit amendment. Thus, downstream point source dischargers may see a ratcheting-down of WQBELs when their wastewater discharge permits are issued or amended or renewed every five years.

B. Post-S.B. 3 Approach

S.B. 3 will affect the TCEQ's approach to instream flow requirements in river basins in which the TCEQ has adopted environmental flow standards by rule. S.B. 3, enacted in 2007, requires the TCEQ to adopt environmental flow standards for Texas river basins and bays, beginning with seven priority river basins and associated bays listed in the statute. *See* Act of May 28, 2007, 80th Leg., R.S., ch. 1430, § 1.07 (codified at Tex. Water Code § 11.02362(b), (c), (e)). The TCEQ has adopted S.B. 3 flow standards for those seven basin and bay systems. *See* 30 Tex. Admin Code §§ 298.200–.540. S.B. 3 and environmental flows are discussed in detail in Chapter 11 of this book. The summary below focuses on those aspects of S.B. 3 that may affect the TCEQ's current environmental review process for water rights permits, particularly as that process relates to water quality considerations.

S.B. 3 established a stakeholder-centered process to determine environmental flows or needs for all the major river basins in Texas. The process involved local stakeholders, experts, and the TCEQ. A full exposition on the process is addressed in Chapter 11 of this book. As a first step in the process, S.B. 3 called for the stakeholders and other participants to develop an "environmental flow regime," defined as "a schedule of flow quantities that reflects seasonal and yearly fluctuations that typically would vary geographically, by specific location in a watershed, and that are shown to be adequate to support a sound ecological environment." Tex. Water Code § 11.002(16). Based on regime recommendations, the TCEQ adopted basin-specific "environmental flow standards," which constitute "a schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location in a river basin and bay system." Tex. Water Code § 11.1471(c). New permits or permits that increase the authorized diversions must be consistent with established environmental flow standards. Adopted environmental flow standards will not restrict an amendment to an existing water right that does not increase the amount of water authorized to be stored, diverted, or impounded. *See* Tex. Water Code §§ 11.023, 11.1471. Thus, an amendment to change the purpose or place of use should not be subject to an environmental flow standard.

V. The Statutory and Regulatory Background of CWA Section 401 Certification

Federal law gives state governments a role in protecting state water quality from potentially adverse impacts of federally permitted activities. Section 401 of the CWA requires certification by the state of any activity conducted under a federal license or permit (or renewal) that "may result in any discharge into the navigable waters" (also known as "waters of the U.S."). *See* 33 U.S.C. §§ 1341(a)(1), 1362(7). This certification is commonly referred to as a "401 Certification." 30 Tex. Admin. Code § 279.3(1).

Examples of federal permits that require 401 Certification include—

- permits issued by the U.S. Army Corps of Engineers (Corps) for construction of a bridge, causeway, dam, or dike over or in a port, roadstead, haven, harbor, canal, navigable river, or other navigable water under section 9 of the Rivers and Harbors Act of 1899, now codified at 33 U.S.C. § 1341;
- permits issued by the Corps for certain work obstructing or modifying the course or capacity of waters of the U.S. under section 10 of the Rivers and Harbors Act of 1899, now codified at 33 U.S.C. § 1343;
- permits issued by the Corps for discharges of dredged or fill materials into waters of the U.S. under section 404 of the CWA, 33 U.S.C. § 1344 (discussed in more detail in Chapter 35 of this book);
- permits issued by the U.S. Fish and Wildlife Service to "take" an endangered species under section 10 of the Endangered Species Act, 16 U.S.C. § 1539 (discussed in more detail in Chapter 32 of this book);
- permits issued by the Federal Energy Regulatory Commission (FERC) to construct and operate facilities, including hydropower dams or plants on existing dams, for the development, transmission, or sale of power under the Federal Power Act, 16 U.S.C. § 797(e); 18 C.F.R. § 4.34(b)(5)(i); and
- permits issued by the EPA for the discharge of pollutants into waters of the United States under section 402 of the CWA, 33 U.S.C. § 1342 (in Texas, the TCEQ rather than the EPA issues most permits required under section 402 of the CWA, but the EPA still retains authority to issue NPDES permits for wastewater discharges from oil and gas activities regulated by the Texas Railroad Commission, which unlike the TCEQ has not been delegated NPDES authority by the EPA). Discussion of wastewater discharges from oil and gas activities is beyond the scope of this volume.

Before a federal agency may issue a permit resulting in discharges to waters of the United States, Texas must certify to the federal authority that the discharge will comply with the applicable provisions of sections 301 and 302 of the CWA, relating to effluent limitations; section 303 of the Act, relating to water quality standards; section 306, relating to new source performance standards; and section 307, relating to toxics. *See* 33 U.S.C. § 1341(a). If the state denies a 401 Certification on an application for a federal permit, the federal licensing or permitting authority cannot issue the requested license or permit. *See* 33 U.S.C. § 1341(a)(1).

Within the state, the TCEQ administers the Section 401 water quality certification review process with the exception of oil and gas exploration, which is regulated by the Texas Railroad Commission. *See* Texas Commission on Environmental Quality, *401 Certification Reviews*, www.tceq.texas.gov/permitting/water_quality/wq_assessment/401certification/401certification_definition.html.

Section 401(d) of the CWA allows states to impose effluent limitations as part of a 401 Certification if necessary to comply with sections 301 and 302 (relating to effluent limitations) and sections 306 and 307 (relating to new source performance standards and pretreatment standards), as follows:

> Any certification provided under this section shall set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that any applicant for a Federal license or permit will comply with any applicable effluent limitations under section [301] or [302] of this title, standard of performance under section [306] of this title, or prohibition, effluent standard, or pretreatment standard under section [307] of this title, and with any other appropriate requirement of State law set forth in such certification, and shall

> become a condition on any Federal license or permit subject to the provisions of this section.

33 U.S.C. § 1341(d).

Notably missing from section 401(d), quoted above, is an express mention of any authority to impose conditions other than effluent limitations—for example, flow restrictions to ensure compliance with the state's water quality standards established under section 303 of the CWA, 33 U.S.C. § 1313. The U.S. Supreme Court has held, however, that the states are not limited to imposing effluent limitations in a 401 Certification. States may also impose other limitations, specifically minimum stream flows, as long as the purpose of the limitation is to ensure compliance with a water quality standard (composed of a designated use, criteria, and antidegradation policy). In *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, 511 U.S. 700 (1994), the Court rejected the dam operator's argument that section 401 is "only concerned with water 'quality,' and does not allow the regulation of water 'quantity.'" 511 U.S. at 719. The Court found the dam operator's argument to be based on an "artificial distinction" because "water quantity is closely related to water quality" such that "a sufficient lowering of the water quantity . . . could destroy all of its designated uses." 511 U.S. at 719. Thus, the department could impose flow restrictions in its 401 Certification.

VI. Special CWA Section 401 Applicability Considerations for Dams

The release of water through a dam is enough to make it subject to CWA section 401 Certification, if a federal permit or license is otherwise required. Construction of a dam may require a permit under section 9 or 10 of the Rivers and Harbors Act of 1899, a permit under section 404 of the CWA, or a permit to "take" an endangered species under section 10 of the Endangered Species Act, among others. If such a federal license or permit is required, and if the activity being licensed "may result in any discharge," then 401 Certification is required from the TCEQ. *See* 33 U.S.C. § 1341(a). Not all licensed activities associated with a dam necessarily result in the discharge of a pollutant, however, and until 2006, it was unclear whether the mere pass-through of water through a dam was a "discharge" sufficient to trigger the 401 Certification requirement. In 2006, however, the U.S. Supreme Court confirmed that dams require 401 Certification because they "may result in a discharge" within the meaning of section 401 of the CWA. *S.D. Warren Co. v. Maine Board of Environmental Protection*, 547 U.S. 370, 386 (2006). This is the case regardless of whether a dam "discharges any pollutant" within the meaning of section 402, thereby requiring an NPDES permit (which, as discussed in section II.C above, the federal courts have held they do not).

Although two circuit courts have held that a TPDES permit under CWA section 402 is not required for releases from a dam, the Supreme Court in *S.D. Warren* held that water quality certification under CWA section 401 is required (if the construction or operation of a dam requires a federal permit or license), because while releases from a dam do not constitute the "addition of any pollutant" within the meaning of CWA section 402, they do constitute "discharges" within the meaning of CWA section 401. If a dam otherwise requires a permit or license, then 401 Certification is required.

In August 2003, FERC issued new hydroelectric licensing procedures requiring an integrated review process and consultation and submittal of water quality certification applications by FERC applicants. *See* 18 C.F.R. pt. 2. This establishes a clear process to ensure water quality certifications are successfully integrated into FERC licensing.

VII. TCEQ 401 Certification Process

When 401 Certification is required for a federally licensed activity in Texas, the TCEQ is responsible for making that certification. *See* Tex. Water Code § 26.0136. The TCEQ's rules set out a general procedure applicable to all 401 Certifications and specific procedures applicable to three categories of federal permits: (1) permits issued by the Corps; (2) permits issued by the EPA (no longer widely applicable, since the TCEQ now issues TPDES permits except for oil and gas activities); and (3) other permits. *See* 30 Tex. Admin. Code §§ 279.1–.12. The specific procedures applicable to permits issued by the Corps are directly applicable to many water resource projects and are representative of all three categories of permits. The balance of this section will, therefore, focus on the substance of the TCEQ's review and the TCEQ's general and specific procedures as applied to permits issued by the Corps. See chapter 279 of the TCEQ's rules for specific procedures applicable to other types of permits.

A. Substance of Review

The general policy behind the TCEQ's 401 Certification is to ensure that any federally permitted project that "may result in any discharge into the navigable waters" maintains the chemical, physical, and biological integrity of the state's waters and does not cause an overall net loss of the existing wetlands resource base with respect to Texas wetlands functions and values. *See* 33 U.S.C. § 1341; 30 Tex. Admin. Code §§ 279.2, 279.9. The general purposes of certification review are to determine whether a federally permitted project will—

- result in any discharge;
- result in any violation of CWA section 301 or 302 (effluent limitations), 303 (water quality standards), 306 (new source performance standards), or 307 (toxics);
- result in any violation of applicable water quality standards; or
- result in any violation of any other appropriate requirements of state law.

The TCEQ collects the information necessary to complete this review from the underlying applications and from questionnaires given to applicants to complete specifically for 401 Certification review. *See* Texas Commission on Environmental Quality, *Form Letter to Applicants, State Water Quality Certification of Section 404 Permits* (Apr. 12, 2004) [hereinafter TCEQ 401/404 Letter (2004)], *available at* http://tceq.state.tx.us/assets/public/permitting/waterquality/attachments/401certification/401cov.pdf.

Another purpose of the 401 Certification is to support state and federal efforts to achieve no net loss of existing wetlands resource base with respect to wetlands functions and values. *See* 30 Tex. Admin. Code § 279.2. As a result, "[a]ll activities under the jurisdiction of the [TCEQ] that require a federal license or permit and that may result in any discharge to waters of the United States are subject to review for consistency with the federal CWA and Texas Water Quality Standards." 30 Tex. Admin. Code § 279.2(b).

After certification review, the TCEQ executive director may do one of four things:

- *grant certification* for any activity that will not result in any discharge in violation of water quality standards or any other appropriate requirements as set out above;
- *grant conditional certification* subject to the conditions necessary to prevent any activity that will result in a discharge from violating water quality standards or any other appropriate requirements as set out above;

- *deny certification* for any activity that will result in a discharge in violation of water quality standards or any other appropriate requirements as set out above; or
- *waive certification*, which may be conditioned on the applicant's agreement to include and comply with specific water-quality-related conditions in the applicant's federal permit.

See 30 Tex. Admin. Code § 279.2(b). The TCEQ generally has sixty days from the date it receives the request for 401 Certification to issue a final determination, unless a public meeting is held necessitating an extension. *See* 30 Tex. Admin. Code §§ 279.7(b), 279.10(a), 279.11(a).

B. General Procedures

The 401 Certification process is initiated either by the federal agency (specifically, the district engineer in the case of the Corps) or by the applicant submitting a request for 401 Certification to the TCEQ, along with the underlying application for the federal permit, a project description, and a list of adjacent landowners (or a copy of the federal agency's joint public notice with the TCEQ). *See, e.g.*, 30 Tex. Admin. Code § 279.4.

Section 401 of the CWA requires state agencies to establish procedures for public notice in the case of all applications for certification by the state agency and, to the extent the state agency deems appropriate, procedures for public hearings in connection with specific applications. *See* 33 U.S.C. § 1341. The TCEQ's rules require mailed notice of the request for 401 Certification (preferably jointly with the public notice of the relevant federal agency) to—

- adjacent landowners;
- mayor and health authorities of the city or town in which the activity is or will be located;
- county judge and health authorities of the county in which the facility is located;
- Texas Parks and Wildlife Department;
- U.S. Fish and Wildlife Service;
- Texas Water Development Board;
- National Marine Fisheries Service;
- EPA Region 6;
- Texas General Land Office;
- Coastal Coordination Council; and
- applicant.

30 Tex. Admin. Code § 279.5(b).

Persons receiving notice are given at least thirty days to submit comments. 30 Tex. Admin. Code § 279.5(c). The TCEQ must consider all comments related to the impacts of the proposed activity. 30 Tex. Admin. Code § 279.6. Depending on the level of interest in the certification, the TCEQ executive director may, but is not required to, conduct a public meeting (unless requested by a TCEQ commissioner, in which case the meeting is mandatory). 30 Tex. Admin. Code § 279.7(a). A decision to hold a public meeting will prompt a request to the Corps for an extension of the sixty-day deadline for the certification decision. 30 Tex. Admin. Code § 279.7(b).

C. Specific Procedures for Corps Permits

1. *Avoidance, Minimization, and Compensation Criteria*

Section 279.11 of the TCEQ's certification rules sets out procedures specific to permits issued by the Corps. *See* 30 Tex. Admin. Code § 279.11. These regulatory procedures are consistent with the general process described above, but contain specific criteria applicable only to 401 Certification reviews of Corps permits. Specifically with respect to section 404 permits issued by the Corps (and only section 404 permits), the TCEQ's rules state:

- No discharge shall be certified if there is a practicable alternative that would have less of an adverse impact on the aquatic ecosystem, so long as the alternative does not have other more significant adverse environmental consequences. Activities that are not water dependent are presumed to have a practicable alternative, unless the applicant demonstrates otherwise. For the purposes of this section, compensatory mitigation is not considered an alternative.
- No discharge of dredged or fill material will be certified unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.
- Certification requires appropriate and practicable compensatory mitigation for all unavoidable adverse impacts that remain after all practicable avoidance and minimization have been completed. Compensatory mitigation requirements will provide for a replacement of impacted functions and values.

30 Tex. Admin. Code § 279.11(c)(1)–(3). These certification criteria for section 404 permits are consistent with the EPA's 404(b)(1) guidelines, the functional effect of which is to encourage avoidance, then minimization, and, as necessary, compensation for wetlands mitigation, as discussed in Chapter 35 of this book. The TCEQ can deny certification of a section 404 permit if the impacts of the project are so significant that the proposed compensatory mitigation would not accomplish the purpose and policy of Texas Administrative Code chapter 279 of protecting water quality and wetlands values and functions, discussed in section IV above.

2. *Tier I and Tier II Reviews*

Other than the 401/404 criteria discussed above, many of the specific procedures relevant to the TCEQ's certification of section 404 permits are contained in guidance documents and a memorandum of agreement between the TCEQ and the Corps. *See, e.g.*, TCEQ 401/404 Letter (2004); Memorandum of Agreement Between the U.S. Army Corps of Engineers and the Texas Natural Resource Conservation Commission on Section 401 Certification Procedures (Aug. 17, 2000), *available at* www.tceq.texas.gov/assets/public/permitting/assess/401cert/MOA2.pdf. All the discussion below comes from one or both of these guidance documents unless otherwise indicated.

The TCEQ and the Corps have developed a tiered system of review for individual section 404 permit applications. Projects fall into one of two tiers based on the size of the project and the amount of state water affected. The extent of 401 Certification review varies depending on the tier into which the project falls and the type of wetland affected. On Tier I projects, the TCEQ waives certification, and a request for certification as well as public notice, opportunity for comment, and public meeting are not required. *See* 30 Tex. Admin. Code §§ 279.5(d), (e), 279.6. Tier II projects are subject to individual certification review by the TCEQ, and the general procedures apply, requiring public notice, opportunity for comment, and a possible public meeting, as discussed in section VII.B above.

a. Tier I Waivers

Tier I projects are those that will result in a direct impact to three acres or less of water in the state (including wetlands) or 1,500 linear feet or less of streams. To be eligible for a Tier I waiver, the applicant must complete a Tier I checklist designating the erosion control BMPs the applicant will implement. The checklist is available on the TCEQ Web site at www.tceq.state.tx.us/assets/public/permitting/waterquality/forms/20228.pdf. The applicant must also sign a statement agreeing to incorporate these BMPs into its section 404 permit. If the applicant does not complete the checklist and return the signed agreement to the Corps and the TCEQ before the Corps issues the permit decision document, the project will be considered a Tier II project, and the Corps will request individual certification review by the TCEQ.

Some projects are not eligible for a Tier I waiver. If a project has a combination of impacts that exceeds the three-acre or 1,500-foot threshold or that is submitted after the fact (i.e., after the water in the state has been disturbed), the project does not qualify as a Tier I project. In addition, projects in certain rare or ecologically significant areas identified by the Corps in its nationwide permits are not eligible for Tier I coverage. Currently the areas ineligible for Tier I coverage in Texas include pitcher plant bogs, swamps dominated by bald cypress and tupelo gum tree species, the area of Caddo Lake within Texas that is designated as a Ramsar Wetland of International Importance, mangrove marshes, and coastal dune swales.

b. Tier II Review

A Tier II project is any project that does not qualify for a Tier I review, or for which the applicant elects not to incorporate Tier I criteria or prefers to use alternatives to the BMPs in the Tier I checklist. The Tier II applicant completes a Tier II 401 Certification Questionnaire and Alternatives Analysis Checklist, which the applicant receives from the Corps attached to the TCEQ 401/404 Letter (2004). The checklist is available on the TCEQ Web site at www.tceq.state.tx.gov/assets/public/permitting/waterquality/forms/20229.pdf. The TCEQ then undertakes the individual certification review described generally in section VII.B above.

The Tier II process requires early and significant coordination between the Corps and the EPA. The TCEQ participates in the Corps' pre-application and comment process, and the TCEQ and the Corps share pertinent information with each other throughout the process. The TCEQ and the Corps issue a joint public notice on the permit application and 401 Certification process. The Corps prepares its final permit decision document and gives it to the TCEQ after the close of the public comment process.

Within ten days of receiving the Corps' final decision document, the TCEQ must deny, grant, or conditionally grant the 401 Certification or request an extension of time for certification review. Otherwise, the certification review is presumed waived under the Corps' waiver rules. *See* 33 C.F.R. § 325.2(b). The Corps (i.e., the district engineer) determines the merit of any time extension requested by the TCEQ and the length of the extension based on the Corps' waiver rules and notifies the TCEQ of its intended decision. The TCEQ has ten days after receipt of this notice to complete its certification review or have it be presumed waived.

D. Specific Procedures for Nationwide and General Permits

Nationwide and general permits are available to cover some activities that require a CWA section 404 permit, as discussed in Chapter 35 of this book. Nationwide and general permits are subject to 401 Certification review by the TCEQ when they are issued by the responsible federal agency, not at the time of each coverage authorization decision. *See* 30 Tex. Admin. Code § 279.12(a)(1), (b)(1). When a federal licensing or permitting agency proposes a nationwide permit for an activity that may result in a discharge or proposes a general permit for an activity that may result in a discharge, the TCEQ mails interagency notice only to the Texas Parks and Wildlife Department, the Texas Water Development Board, and the Texas General Land Office. 30 Tex. Admin. Code § 279.12(a)(2), (b)(2). After considering the comments it receives in response to these notices, the TCEQ may deny, grant, conditionally grant (via "regional conditions"), or waive certification review in the same manner as discussed above. 30 Tex. Admin. Code § 297.12(a)(3), (b)(3). As noted in section III.A above, if the TCEQ denies certification or imposes regional conditions not acceptable to the issuing agency, the permit cannot become effective in Texas. *See* 33 U.S.C. § 1341(a)(1).

For nationwide or general permits on which a state has denied 401 Certification, the federal agency can issue provisional nationwide permits (NWPs). However, the applicant must obtain individual 401 Certification from the appropriate state agency before proceeding with work under a provisional NWP. If the federal agency will not issue a provisional NWP, the applicant may have to obtain individual permit coverage (and 401 Certification review) for activities otherwise covered by the nationwide or general permit. The TCEQ is required to maintain a list of all applicable nationwide and general permits and its certification action on each one. 30 Tex. Admin. Code § 279.12(a)(4), (b)(4). This list is available from the TCEQ's 401 Certification coordinator, as well as from the relevant federal agency.

VIII. Conclusion

Water quality considerations come into play in state-permitted water supply projects through the TCEQ's review of applications for TPDES permits and water rights permits. Water quality considerations come into play in federally permitted projects in 401 Certifications made by the TCEQ to the relevant federal permitting authority that the project satisfies applicable effluent limitations and water quality standards.

Parties involved in individual CWA section 404 permits should refer to Chapter 35 of this book, and those involved in actions requiring National Environmental Policy Act documentation should refer to Chapters 2 and 27.

CHAPTER 35

Dredge and Fill Permits under CWA Section 404

Janet McQuaid[1]

I. Introduction

This chapter covers permits required for the discharge of dredge or fill material into navigable waters pursuant to section 404 of the Clean Water Act (CWA). *See* 33 U.S.C. § 1344. The U.S. Army Corps of Engineers (Corps) issues these permits after notice and opportunity for public hearings. Fill sites must be selected in accordance with guidelines developed by the Environmental Protection Agency (EPA) in conjunction with the Corps known as the "404(b)(1) guidelines." Because water supply projects are by their nature aquatic based, these projects often require a section 404 permit. Examples of projects likely to require a section 404 permit if constructed in waters of the United States include the construction of docks, marinas, retaining walls, water intake and control structures, and dams. The discharge of pollutants other than dredge or fill material into waters of the United States is regulated under section 402 of the CWA, discussed in Chapter 34 of this book.

Some water supply projects may also require a permit under section 9 or 10 of the Rivers and Harbors Act of 1899, in addition to or instead of a section 404 permit. A permit is required, subject to certain exceptions, under section 9 of the Rivers and Harbors Act, 33 U.S.C. § 401, for the construction of any bridge, causeway, dam, or dike over or in any port, roadstead, haven, harbor, canal, navigable river, or other navigable water of the United States. A permit is also required under section 10 of the Rivers and Harbors Act, 33 U.S.C. § 403, for the construction, excavation, or deposition of materials in, over, or under navigable waters of the United States, or any work that would affect the course, location, condition, or capacity of such waters. Between sections 9 and 10 of the Rivers and Harbors Act, section 10 is the more frequently used authority.

The geographic extent of the Corps' jurisdiction under section 404 of the CWA is significantly broader than its jurisdiction under sections 9 and 10 of the Rivers and Harbors Act. The phrase "navigable waters" as used in section 404 of the CWA is defined in 33 U.S.C. § 1362(7) to include "waters of the United States, including the territorial seas." The phrase "navigable waters" as used in sections 9 and 10 of the Rivers and Harbors Act is limited to "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce." The Corps and the EPA have historically taken the position that their jurisdiction under CWA section 404 encompasses section 10 waters plus their

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tributaries and adjacent wetlands as well as isolated waters where the use, degradation, or destruction of such waters could affect interstate or foreign commerce. *See* Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 45 Fed. Reg. 85,336 (Dec. 24, 1980) (adopting 40 C.F.R. § 230.3(s)(3) and (7), defining "waters of the United States" for the EPA); Final Rule for Regulatory Programs of the Corps of Engineers, 51 Fed. Reg. 41,206 (Nov. 13, 1986) (adopting 40 C.F.R. § 328.3(a)(3) and (7) for the Corps).

Because the geographic reach of section 404 of the CWA is broader than the reach of sections 9 and 10 of the Rivers and Harbors Act, many more water supply projects will require section 404 permit coverage than will require coverage under section 9 or 10 of the Rivers and Harbors Act. Although a project proponent should not ignore the possible need for a permit under the Rivers and Harbors Act, further discussion of these permits is beyond the scope of this chapter. The balance of this chapter will focus on permits for the discharge of dredge and fill materials under section 404 of the CWA.

II. Overview of Section 404

Section 404 of the CWA requires that anyone depositing dredge or fill material into waters of the United States at specified disposal sites, including wetlands, must receive authorization from the Corps. *See* 33 U.S.C. § 1344. The Corps' headquarters is located in Washington, DC. The Corps is divided into eight U.S. divisions, and within each division there are several districts. Regulatory program management and administration are focused at the district office level, and policy oversight is focused at higher levels. In Texas, the CWA section 404 program is administered and enforced by the Corps. The four Corps district regulatory offices covering Texas are the Galveston District, the Fort Worth District, the Tulsa District, and the Albuquerque District. The Corps' Web site, www.swf.usace.army.mil/, lists the Texas counties within each district office.

A. Activities

Typical activities that are regulated under section 404 include site improvement fill for residential, commercial, or recreational development; construction of breakwaters, levees, dams, and dikes; and placement of fill material for roads, airports, or buildings. Activities exempted from section 404 regulation include maintenance of currently serviceable structures; construction in non-navigable waters of temporary sedimentation basins on a construction site; and certain farming and forestry activities. *See* 33 U.S.C. § 1344(f). Persons intending to operate under a permit exemption should take care to ensure that all relevant conditions are met.

B. Agency Roles

1. U.S. Army Corps of Engineers

The Corps is charged with administering the section 404 permit program, processing applications in accordance with applicable regulatory standards, and issuing permits, where appropriate, after notice and an opportunity for public comment and hearing. Both the EPA and the Corps have enforcement responsibility, and the Corps routinely coordinates its review of section 404 permit applications with the EPA to ensure that permit decisions are made in a timely manner, while providing effective protection for human health and environmental quality. *See* 33 U.S.C. § 1344.

The policies and procedures for the Corps' program are found in title 33 Code of Federal Regulations, parts 320–332. Division and district engineers are authorized to issue individual permits (including standard permits and letters of permission) and general permits (such as regional, nationwide, or programmatic permits). *See* 33 C.F.R. § 325.5. Corps engineers also have the power to modify, suspend, or revoke these permits. *See* 33 C.F.R. § 325.7.

2. EPA

Although the Corps is solely responsible for permit decisions under CWA section 404, the EPA plays a significant role in the decision making. The EPA may provide comments to the Corps regarding compliance with the section 404(b)(1) guidelines. See the Clean Water Act Section 404(q) Memorandum of Agreement, Part I [hereinafter 1992 section 404(q) MOA], on the EPA Web site at http://water.epa.gov/lawsregs/guidance/wetlands/upload/1992_MOA_404q.pdf, as supplemented by the EPA's internal memoranda dated October 30, 2006, and May 1, 2008, describing the MOA's field level procedures for EPA personnel. The memoranda are available on the EPA Web site at http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/index.cfm. If the Corps proceeds with a permit over the EPA's 404(q) objections, the EPA can invoke its veto power over the proposed permit. *See* 33 U.S.C. § 1344(c). Section 404(q) requires, however, that the EPA and the Corps enter into an agreement assuring that delays in the process are minimized, and the 1992 section 404(q) MOA fulfills that requirement by outlining the process for resolving disputes between the EPA and the Corps during the permitting process. The 404(q) process is as follows:

- EPA "may affect" letter: To object during the comment period for the public notice, the EPA regional office must notify the Corps district engineer that the project *may* result in substantial and unacceptable impacts to aquatic resources of national importance (ARNIs).
- EPA "will affect" letter: If the "may affect" letter remains unresolved after the end of the comment period for the public notice, the EPA region may issue a letter signed by the regional administrator within twenty-five days of the end of the comment period stating that the project *will* have substantial and unacceptable impacts to an ARNI.
- Notice of intent to proceed: Within five days before the issuance of a disputed permit, the Corps district engineer must notify the EPA regional administrator if the Corps intends to issue the permit contrary to the "will affect" letter.
- Case elevation: Within fifteen days of receipt of the notice of intent to proceed, the EPA regional administrator must decide whether to elevate review to the Corps headquarters, and subsequently notify the Corps district of this decision.
- Review of Corps decision: Within twenty days of elevation, the EPA assistant administrator must decide whether to seek higher level review of the district's permit decision by the Assistant Secretary of the Army, Civil Works (ASACW).
- Army review: Within thirty days of the EPA assistant administrator's request for review, the ASACW reviews the decision and makes a determination to proceed with the permit, proceed with guidance, or deny the permit. The ASACW notifies the EPA assistant administrator immediately.
- Section 404(c) "veto process": Within ten days from the ASACW's decision, if the Corps proceeds with issuance, the EPA must decide whether to initiate a section 404(c) "veto" action.

See 1992 section 404(q) MOA.

Fullblown "elevation" to the headquarters level under section 404(q) has occurred fewer than twenty times since the 1992 MOA was signed. The EPA can, however, exert considerable influence over Corps permits by taking only the first step (or the first two steps) in this process, which until recently could be taken at the discretion of EPA regional staff. A negative "may affect" or "will affect" letter from EPA regional staff can influence an applicant to reconsider or withdraw a project, even if the Corps may not agree with the EPA's views. To make the EPA's role in the 404 permitting process "more consistent and effective," the EPA required its regional offices to clear "may affect" and "will affect" letters with EPA headquarters before sending these letters to the Corps. *See* Environmental Protection Agency, Memorandum for the Field, U.S. Environmental Protection Agency (EPA) coordination between Regional offices and Headquarters on Clean Water Act (CWA) Section 404(q) actions (Oct. 30, 2006). The EPA subsequently eliminated that requirement in 2008 for regions that had submitted at least three "may affect" or "will affect" letters to EPA headquarters. The EPA's memoranda are available at http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/index.cfm.

The EPA has finalized a veto under section 404(c) only thirteen times since 1972, with a fourteenth currently under consideration for a copper mine in Bristol Bay, Alaska. *See* Environmental Protection Agency, *Bristol Bay*, http://www2.epa.gov/bristolbay. Notably, the EPA cannot exercise its veto authority to withdraw a previously finalized Corps permit. The EPA attempted to exercise its veto authority under Clean Water Act section 404(c) on January 13, 2011, when the EPA withdrew its previous specification of certain waters of the United States as disposal sites for discharges of dredged or fill material in connection with the construction, operation, and reclamation of a surface coal mine. In this case, the Corps permit was issued in 2007, several years before the EPA action under section 404(c). *See* U.S. Army Corps of Engineers Permit No. 199800436-3. The Notice of EPA's "Final Determination of the Assistant Administrator for Water Pursuant to Section 404(c) of the Clean Water Act Concerning the Spruce No. 1 Mine, Logan County, WV" was published in the January 19, 2011, Federal Register at 76 Fed. Reg. 3126. After the EPA issued its final determination, the Mingo Logan Coal Company challenged the EPA's veto of its previously issued permit in the U.S. District Court for the District of Columbia. In March 2012, the D.C. District Court granted summary judgment to the Mingo Logan Coal Company and concluded that the EPA did not have the authority to invalidate an existing section 404 permit. *See Mingo Logan Coal Co. Inc. v. U.S. Environmental Protection Agency*, 850 F. Supp. 2d 133 (D.D.C. 2012). The EPA appealed to the D.C. Circuit Court of Appeals, which, in April 2013, reversed the district court and ruled that the EPA does possess post-permit withdrawal authority. *See Mingo Logan Coal Co. v. U.S. Environmental Protection Agency*, 714 F.3d 608 (D.C. Cir. 2013), *cert. denied*, 134 S. Ct. 1540 (2014).

3. *Other Agencies*

Federal agencies other than the EPA play advisory and regulatory roles but do not have statutory veto authority over section 404 permit issuance. These include the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and the Natural Resources Conservation Service (NRCS). The FWS and the NMFS are granted the opportunity to comment on all individual and some general section 404 permits. *See* 33 U.S.C. § 1344(m), (q). The NRCS administers the "Swampbuster" program, which is designed to discourage the conversion of wetlands for agricultural purposes. *See* 16 U.S.C. §§ 3801–3862.

4. *States*

States can assume complete responsibility for the administration of the section 404 permitting program for some state waters, and New Jersey and Michigan have done so. *See* 33 U.S.C. § 1344(g). Texas has not applied for the authority to administer its own section 404 permitting program, which could include responsibility for wetlands permitting regulation from the Corps. However, other avenues are open for states to play a role in the permitting process. Despite the prominence of federal law and federal agencies in wetland regulation, state participation can be substantial, particularly through the certification requirements in which federal regulators must obtain state approval under section 401 of the CWA, discussed in section IV below, as well as under the Coastal Zone Management Act (16 U.S.C. §§ 1451–1466).

III. Threshold Jurisdictional Issues

Federal jurisdiction over wetlands has undergone significant expansion through the section 404 permitting program since the passage of the CWA. Jurisdiction that formerly extended only to "navigable waters" under section 10 of the Rivers and Harbors Act of 1899 was broadened in 1972 when the CWA interpreted that term to mean "waters of the United States, including the territorial seas." *See* 33 U.S.C. § 1362(7). Early steps for any party seeking to discharge dredge or fill material, therefore, are to determine, first, whether the discharge site is a "wetland"; second, whether the federal government has jurisdiction over the discharge area as a "navigable water" under section 404; and, third, whether a regulable "discharge" of dredge or fill material will occur. This three-part inquiry is sometimes referred to as a jurisdictional determination (JD).

Because the JD is the threshold to wetland regulation, much controversy has surrounded the test for wetland delineation, the standard for "navigable waters," and the question of whether "incidental fallback" of dredge material is a regulable "discharge." Each of these issues is discussed in more detail below.

A. Determination of Wetland Status

Wetlands are defined by the Corps and the EPA as areas that are "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." 33 C.F.R. § 328.3(b).

Three characteristics are required when making wetland determinations: hydrophytic vegetation, hydric soil, and wetland hydrology. Unless an area has been altered or is a rare natural situation, wetland indicators of all three characteristics must be present during some portion of the growing season for an area to be a wetland. U.S. Army Corps of Engineers, Wetlands Delineation Manual pt. II, § 26 (Environmental Laboratory 1987) [hereinafter Delineation Manual], *available at* http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf. Recognizing the importance of developing regional revisions to the Delineation Manual, the Corps has developed region-specific, supplemental procedural guidance for delineating wetlands. In Texas, practitioners should refer to Regional Supplements for the Arid West, the Great Plains, or the Atlantic and Gulf Coastal Plains, according to the geographic location of the project. These Regional Supplements may replace or supersede the contents of the Delineation Manual, as they provide the latest updated guidance for wetland delineation.

1. Vegetation Indicators

The vegetation characteristic is fulfilled by the presence, as judged by the Corps, of hydrophytic plants (e.g., cattails, bulrushes, cordgrass, sphagnum moss, bald cypress, and willows). Absent specific identification of hydrophytic plants, some readily visible situations indicate a strong possibility that an area is a wetland. These include the presence of trees with shallow root systems, swollen trunks, or roots found growing from the trunk above the soil surface. *See* Delineation Manual pt. III, §§ 29–35, for a discussion on hydrophytic vegetation.

Approximately 5,200 plant types may occur in wetlands in the United States. A "National List of Plant Species that Occur in Wetlands" was published by the FWS in 1988, and it has been used extensively in wetland delineations and related projects as the National Wetland Plant List. In 2006, the administration of the National Wetland Plant List was transferred from the FWS to the Corps, and the Corps began a collaborative and ongoing process to update the list. The Corps' current National Wetland Plant List is available on the Corps' Web site at http://rsgisias.crrel.usace.army.mil/NWPL/.

2. Soil Indicators

The soil characteristic is fulfilled by the presence, as judged by the Corps, of hydric soil. The NRCS maintains a list of hydric soils occurring in the United States, which is available by state. *See* U.S. Department of Agriculture, Natural Resources Conservation Service, *Hydric Soils*, www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/. The Delineation Manual discusses hydric soils in pt. III, §§ 36–45, and it notes the importance of referring to other reference materials in making these determinations.

3. Hydrology Indicators

The wetland hydrology characteristic is fulfilled when water is present at or above the soil surface for a sufficient period of time during the growing season. Although the best evidence of wetland hydrology may be provided by a gauging station or groundwater well data, indicators available to the untrained eye can provide some evidence. These include standing or flowing water during some portion of the growing season; waterlogged soil during the growing season; or water marks, drift lines, flood debris, or sedimentary deposits on leaves or other objects. *See* Delineation Manual pt. III, §§ 46-49.

B. Navigable Waters

The EPA and the Corps interpret the term "navigable water" in section 404 to include "waters of the United States." The jurisdictional inquiry, therefore, becomes whether the discharge site, whether it be a wetland as defined above or another type of surface water, qualifies as a "water of the United States." The definition of this phrase has been litigated extensively and is the subject of a recent significant rulemaking by the EPA and the Corps as well as legislative action, as discussed in more detail in the next section below.

1. "Waters of the US" Old Rule

The EPA and the Corps have interpreted the term "waters of the United States" by regulation to include not only waters susceptible to use in interstate commerce—the traditional understanding of the phrase "navigable waters of the United States"—but also tributaries of those waters, including intermittent and ephemeral streams, as well as wetlands adjacent to those waters or their tributaries. *See* Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 45 Fed. Reg. 85,336 (Dec. 24, 1980) (adopting 40 C.F.R. § 230.3(s)(7), defining "waters of the United States" for the EPA); Final Rule for Regulatory Programs of the Corps of Engineers, 51 Fed. Reg. 41,206 (Nov. 13, 1986) (adopting 40 C.F.R. § 328.3(a)(7) for the Corps). The EPA and the Corps have also interpreted the term "waters of the United States" by regulation to include generally:

> All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natu-

ral ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

(ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(iii) Which are used or could be used for industrial purposes by industries in interstate commerce.

45 Fed. Reg. 85,336 (adopting 40 C.F.R. § 230.3(s)(3) for the EPA); 51 Fed. Reg. 41,206 (adopting 40 C.F.R. § 328.3(a)(3) for the Corps).

This expansive regulatory definition has been the subject of a great deal of litigation since its promulgation in the 1980s. In part in response to this litigation, the EPA and the Corps recently finalized a rule that modifies the regulatory definition of "waters of the United States." Clean Water Rule: Definition of "Waters of the United States," 80 Fed. Reg. 37,054, 37,054 (June 29, 2015) (finalizing new definitions to be codified at 33 C.F.R. § 328.3(a) for the Corps and 40 C.F.R. § 230.3(o) (EPA CWA section 404 rules) and finalizing identical new definitions for 40 C.F.R. pts. 110, 112, 116, 117, 122, 232, 300, 301, and 402 for the EPA). The EPA and the Corps refer to the modifications as the "Clean Water Rule," and this chapter will also use that name for the new rule.

Congress is considering changes to the Clean Water Act to disapprove parts of the Clean Water Rule, and a bill requiring the EPA and the Corps to withdraw the Clean Water Rule passed the House on May 12, 2015. *See* H.R. 1732, 114th Cong. (2015). In addition, judicial challenges to the rule in the D.C. Circuit are likely. Nevertheless, the Clean Water Rule will become effective on August 28, 2015, unless stayed by the court during any appeal. Moreover, the EPA and the Corps assert that the rule merely "clarifies the scope of 'waters of the United States' consistent with the [CWA], Supreme Court precedent, and science." 80 Fed. Reg. 37,054, 37,054. If the Clean Water Rule is a mere clarification, it arguably sets out the EPA's and the Corps' current position on the scope of their authority under the CWA. The discussion in this chapter therefore focuses on the definition of "waters of the United States" as finalized in the Clean Water Rule. Some aspects of the new rule are controversial, however, and practitioners are cautioned to monitor the subsequent history of the rule and pending legislation.

2. *Case Law*

As mentioned above, the EPA and the Corps intend the Clean Water Rule to respond to the Supreme Court's decisions in *United States v. Riverside Bayview Homes*, 474 U.S. 121 (1985); *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*, 531 U.S. 159 (2001) (*SWANCC*); and *Rapanos v. United States*, 547 U.S. 715 (2006). *See* 80 Fed. Reg. 37,054, 37,054. It is useful, before turning to the new rule, to discuss these decisions, along with the split among the circuit courts that developed after their issuance.

a. *Riverside Bayview Homes*

Riverside Bayview Homes involved "80 acres of low-lying, marshy land near the shores of Lake St. Clair in Macomb County, Michigan." *Riverside*, 474 U.S. at 124. The Supreme Court deferred to the Corps' "conclusion that adjacent wetlands are inseparably bound up with the 'waters' of the United States—based as it [was] on the Corps' and EPA's technical expertise." 474 U.S. at 134. The Court therefore found that the "Corps has acted reasonably in interpreting the Act to require permits for the discharge of fill material into wetlands adjacent to the 'waters of the United States.'" 474 U.S. at 139. The Court's decision in *Riverside* was unanimous.

b. *SWANCC*

SWANCC involved a five-hundred-acre abandoned sand and gravel pit that a group of municipalities proposed to use as a solid waste disposal site. *See SWANCC*, 531 U.S. at 162. Because migratory birds had been observed at the property, the Corps refused to issue a section 404 permit. 531 U.S. at 165. At the time of the activity at issue in *SWANCC*, the EPA had issued guidance, referred to as the "migratory bird rule," interpreting section 230.3(s)(3) of the EPA's rules. The migratory bird rule, which the Corps adopted in connection with section 328.3(a)(3) of its rules, was guidance that extended section 404 to intrastate waters—

a. Which are or would be used as habitat by birds protected by Migratory Bird Treaties; or

b. Which are or would be used as habitat by other migratory birds which cross state lines; or

c. Which are or would be used as habitat for endangered species; or

d. Used to irrigate crops sold in interstate commerce.

51 Fed. Reg. 41,206, 41,250 (adopting the EPA's interpretation); *see also SWANCC*, 531 U.S. at 165 (quoting this guidance). The Court held that the use by migratory birds was not a sufficient basis for the exercise of federal regulatory authority under the CWA. 531 U.S. at 168–69. The Court stated that it was the "significant nexus between the wetlands and 'navigable waters' that informed [the Court's] reading of the CWA in *Riverside Bayview Homes*," and that "the text of the statute [would] not allow" the Court to extend section 404 jurisdiction to "wetlands that are not adjacent to bodies of open water." 531 U.S. at 167. Four justices dissented from the majority opinion in *SWANCC*.

c. *Rapanos*

In the consolidated cases, *Rapanos v. United States* and *Carabell v. U.S. Army Corps of Engineers*, the Supreme Court attempted to define "waters of the United States" under the CWA. The cases involved four Michigan wetlands that were located near ditches or man-made drains that eventually emptied into traditional navigable waters. *See Rapanos*, 547 U.S. at 729.

There was no majority opinion in *Rapanos*. Four justices led by Justice Scalia (plurality opinion) would sharply limit federal jurisdiction with a two-element test that examines relative permanence of flow and a continuous surface connection with a navigable water; four justices led by Justice Stevens (dissenting opinion) would uphold the Corps' expansive interpretation of its jurisdiction. Justice Kennedy (concurring opinion), who stood alone in the middle, would require a showing of a "significant nexus" of the wetland in question to navigable waters.

Before the Supreme Court's decision in *Rapanos*, the Sixth Circuit Court of Appeals, consistent with the Fourth, Seventh, and Ninth Circuits, upheld the government's assertion of jurisdiction based on a "hydrological connection" to traditionally navigable waters through intermittent, natural, and man-made channels. *United States v. Rapanos*, 376 F.3d 629, 643 (6th Cir. 2004), *vacated and remanded*, 547 U.S. 715 (2006); *Carabell v. U.S. Army Corps of Engineers*, 391 F.3d 704, 710 (6th Cir. 2004), *vacated and remanded sub nom. Rapanos v. United States*, 547 U.S. 715 (2006). In contrast, the Fifth Circuit (which includes Texas, Louisiana, and Mississippi) took a much narrower view of CWA jurisdiction, requiring that, to be jurisdictional, the waters in question must be "truly adjacent to navigable waters," or at least have a "significant measure of proximity." *Rapanos*, 376 F.3d at 638 (citing *In re Needham*, 354 F.3d 340, 345–46, 347 n.12 (5th Cir. 2003); *see Rice v. Harken Exploration Co.*, 250 F.3d 264, 269 (5th Cir. 2001)).

d. Post-*Rapanos* Case Law

Commentators and the courts continue to debate whether the split decision in *Rapanos* establishes a legal standard that binds the lower courts because it is difficult to discern common elements on which the plurality and the concurring opinions in *Rapanos* agree.

To date, more than two hundred cases have cited *Rapanos*, and courts that have attempted to apply the decision have not done so in a uniform manner. The Seventh, Ninth, and Eleventh Circuits have held that Justice Kennedy's opinion contains the controlling standard. *See United States v. Gerke Excavating, Inc.*, 464 F.3d 723, 725 (7th Cir. 2006) (Kennedy's test "must govern the further stages of this litigation"); *Northern California River Watch v. City of Healdsburg*, 496 F.3d 993, 995 (9th Cir. 2007) ("In a 4-4-1 decision, the controlling opinion is that of Justice Kennedy who said that to qualify as a regulable water under the CWA the body of water itself need not be continuously flowing, but that there must be a 'significant nexus' to a waterway that is in fact navigable."); *United States v. Robison*, 505 F.3d 1208, 1221 (11th Cir. 2007) ("We join the Seventh and the Ninth Circuits' conclusion that Justice Kennedy's 'significant nexus' test provides the governing rule of *Rapanos*."). The First, Third, and Eighth Circuits have held that there is jurisdiction as long as either Justice Kennedy's or the plurality's test is satisfied. *See United States v. Johnson*, 467 F.3d 56, 60 (1st Cir. 2006) ("We conclude that the United States may assert jurisdiction over the target sites if it meets either Justice Kennedy's legal standard or that of the plurality."); *United States v. Donovan*, 661 F.3d 174, 184 (3d Cir. 2011) ("We hold that federal jurisdiction to regulate wetlands under the CWA exists if the wetlands meet either the plurality's test or Justice Kennedy's test from *Rapanos*."); *United States v. Bailey*, 571 F.3d 791, 799 (8th Cir. 2009) ("We join the First Circuit in holding that the Corps has jurisdiction over wetlands that satisfy either the plurality or Justice Kennedy's test."). The Sixth Circuit has avoided the question by holding that evidence presented at trial was sufficient to satisfy either test. *See United States v. Cundiff*, 555 F.3d 200, 210 (6th Cir. 2009) ("Jurisdiction is proper here under both Justice Kennedy's and the plurality's tests, so we leave ultimate resolution of the *Marks-meets-Rapanos* debate to a future case that turns on which test in fact controls.")

The Second, Fourth, and Fifth Circuits have not taken a firm position on which legal standard is controlling for the jurisdictional inquiry. The Second Circuit has not ruled on which *Rapanos* standard is controlling, and Second Circuit district courts have not selected a binding standard. *See, e.g., Catskill Mountains Chapter of Trout Unlimited, Inc. v. U.S. Environmental Protection Agency*, 8 F. Supp. 3d 500, 565–66 (S.D.N.Y. 2014) (finding that the definition of "navigable waters" in *Rapanos* "is binding on this Court and the EPA[,]" but using all three *Rapanos* tests to evaluate the term "navigable waters").

Although the Fourth Circuit has not taken a firm position on which *Rapanos* standard is controlling, several cases have mentioned the possibility of using either the plurality's standard or Justice Kennedy's standard to define "waters of the United States." *See Precon Development Corp. v. U.S. Army Corps of Engineers*, 633 F.3d 278, 288 (4th Cir. 2011) (noting that because the parties agreed that the Kennedy "significant nexus" test would apply, the court did "not address the issue of whether the plurality's 'continuous surface connection' test provides an alternate ground upon which CWA jurisdiction can be established").

For Texas Projects, the binding effect of *Rapanos* or lack thereof is of particular interest in the Fifth Circuit, where the court had, before *Rapanos*, generally followed a standard analogous to the *Rapanos* plurality opinion written by Justice Scalia. Post-*Rapanos* cases in the Fifth Circuit have not taken a discernible position on the current legal standard for these jurisdictional issues, with the issuance of opinions that hold that evidence presented at trial was sufficient to satisfy either test, or by mentioning *Rapanos* in passing, without taking a position on the applicable legal standard. *See Gulf Restoration Network v. McCarthy*, 783 F.3d 227, 230 n.3 (5th Cir. 2015) (noting in dicta that "[t]he outer limit of the phrase 'waters of the United States' remains fuzzy"); *United States v. Lucas*, 516 F.3d 316, 327 (5th Cir. 2008) ("[T]he evidence presented at trial supports all three of the *Rapanos* standards."); *compare United States v. Chevron Pipe Line Co.*, 437 F. Supp. 2d 605, 614–25 (N.D. Tex. 2006) (reasoning that *Rapanos* did not establish binding legal precedent to hold that the government did not have jurisdiction over an oil spill to an intermittent tributary), *with Smith v. The Abandoned Vessel*, 610 F. Supp. 2d 739, 749 (S.D. Tex. 2009) (noting that navigable waters include those waters that meet the *Rapanos* plurality's two-element test).

Finally, the Tenth Circuit Court of Appeals has never addressed this issue.

Unfortunately, as illustrated above, the lack of a clear controlling opinion in *Rapanos* caused confusion and failed to reduce uncertainty over the scope of CWA jurisdiction. The EPA issued guidance attempting to clarify the scope of "waters of the United States" in 2008 and 2011, as briefly described below.

3. Post-*Rapanos* Guidance

a. 2007 Procedural Guidance

The EPA and the Corps addressed their coordination procedures in light of *Rapanos* in a guidance issued on June 5, 2007. *See* Environmental Protection Agency and U.S. Army Corps of Engineers, Memorandum for Director of Civil Works and U.S. EPA Regional Administrators (June 5, 2007), *available at* www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/rapanos_moa_06-05-07.pdf. Its continued utility is unclear following promulgation of the Clean Water Rule, which renders obsolete many of the regulatory cross-references and types of "waters of the United States" mentioned in the 2007 procedural guidance.

b. 2008 Jurisdictional Guidance

On December 2, 2008, the Corps and the EPA issued joint guidance on *Rapanos*'s jurisdictional issue entitled "Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States & Carabell v. United States*" [hereinafter 2008 Guidance]. The 2008 Guidance is still available on the Corps' Web site at www.usace.army.mil/Portals/2/docs/civilworks/regulatory/cwa_guide/cwa_juris_2dec08.pdf. The 2008 Guidance supplemented an earlier joint memorandum issued by the Corps and the EPA, which rescinded the migratory bird rule in January 2003. *See* Advance Notice of Proposed Rulemaking on the Clean Water Act Regulatory Definition of "Waters of the United States," 68 Fed. Reg. 1991, 1995 app. A (Jan. 15, 2003) (reprinting prior guidance superseding the migratory bird rule in light of the Supreme Court's decision in *SWANNC*, 531 U.S. 159 (2011)).

c. 2011 Proposed Jurisdictional Guidance

In May 2011, the Corps and the EPA announced the availability of new proposed guidance that described how the agencies would identify waters protected by the CWA and implement the Supreme Court's decisions on this topic. *See* U.S. Environmental Protection Agency, *Draft Guidance on Identifying Waters Protected by the Clean Water Act*, *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/wous_guidance_4-2011.pdf. The Federal Register notice stated that the agencies expected the number of waters identified as protected by the CWA under the proposed guidance to increase. *See* 76 Fed. Reg. 24,479 (May 2, 2011). The agencies were criticized by Congress and representatives of both industry and environmental groups for issuing guidance instead of a rule. In September 2013, the agencies sent a draft rule to the Office of Management and Budget for review and simultaneously withdrew the proposed May 2011 jurisdictional guidance.

4. 2015 Clean Water Rule

On June 29, 2015, the EPA and the Corps published a final rule in the Federal Register that aims to clarify the scope of waters protected under the CWA by revising the definition of "waters of the United States." *See* 80 Fed. Reg. 37,054, 37,055 (June 29, 2015), *available at* www.gpo.gov/fdsys/pkg/FR-2015-06-29/pdf/2015-13435.pdf. The agencies refer to the rule as the Clean Water Rule. The final rule revises the definition of "waters of the United States" identically in the various definition sections throughout the CWA regulations, including 33 C.F.R. pt. 328 (Corps permits under section 404), 40 C.F.R. pt. 230 (EPA guidelines for specified disposal sites under section 404), and 40 C.F.R. pt. 232 (EPA section 404 exemptions), as well as the EPA's regulations at 40 C.F.R. pt. 110 (discharge of oil), pt. 112 (oil pollution prevention), pt. 116 (designation of hazardous substances under the CWA), pt. 117 (reportable quantities under the CWA), pt. 122 (NPDES permits), pt. 300 (CERCLA National Contingency Plan), pt. 302 (CERCLA reportable quantities), and pt. 401 (CWA effluent limitation guidelines).

The new definition of "waters of the United States" defines three categories of waters: (1) waters that are always considered "waters of the United States"; (2) waters that are considered "waters of the United States" only if they have a "significant nexus" (which in some cases is established by rule); and (3) waters that are not considered "waters of the United States."

a. "Waters of the United States" by Rule

The first category—waters always considered "waters of the United States"—includes some types of water already listed in the current regulations, and these types of water would remain unchanged. For example, the following categories of waters are defined as "waters of the United States" in both the old regulations and in the final rule:

> (1) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
>
> (2) All interstate waters, including interstate wetlands;
>
> (3) The territorial seas;
>
> (4) All impoundments of waters otherwise identified as waters of the United States under this section;
>
> (5) All tributaries, as defined in paragraph (c)(3) of this section, of waters identified in paragraphs (a)(1) through (3) of this section.

80 Fed. Reg. 37,054, 37,104 (June 29, 2015) (proposed to be codified at 33 C.F.R. § 328.3(a)(1)–(5)).

Although tributaries are considered "waters of the United States" under the existing regulations, the final rule confirms the agencies' scientific opinion that tributaries always have a significant nexus to a traditional navigable water, interstate water, or the territorial sea, such that tributaries are necessarily "waters of the United States." 80 Fed. Reg. 37,068. Regardless of whether they are perennial, intermittent, or ephemeral, in the agencies' view they play an important role in the transport of water, sediments, organic matter, nutrients, and organisms to downstream waters. 80 Fed. Reg. 37,068. Tributaries are, therefore, always "waters of the United States" under the new rule.

For the first time, the new rule codifies a regulatory definition of the term "tributary" and holds that only those tributaries that meet the definition and flow directly or indirectly to waters listed above are "waters of the United States." 80 Fed. Reg. 37,105–06 (to be codified at 33 C.F.R. § 328.3(c)(3)). The rule defines "tributary" to require the presence of the physical indicators of a bed and banks and an ordinary high-water mark. 80 Fed. Reg. 37,105–06. The rule states that a tributary may be natural, man-altered, or man-made water and includes waters such as rivers, streams, canals, and ditches not excluded under the specific exclusions from the definition of "waters of the United States," discussed in more detail later in this chapter. 80 Fed. Reg. 37,105–06.

The agencies additionally propose to revise the existing jurisdictional category of "adjacent wetlands" to read as follows:

> (6) All waters adjacent to a water identified in paragraphs (a)(1) through (5) of this section, including wetlands, ponds, lakes, oxbows, impoundments, and similar waters[.]

80 Fed. Reg. 37,104 (to be codified at 33 C.F.R. § 328.3(a)(6)).

Thus, the new "adjacent *waters*" category would replace the old "adjacent *wetlands*"; the rule now expressly covers not only wetlands but also other water bodies that meet the proposed definition of "adjacent." Waters, including wetlands, separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes, and the like are "adjacent waters." 80 Fed. Reg. 37,105 (to be codified at 33 C.F.R. § 328.3(c)(1)). The new rule expands the definition of "adjacent" to include waters adjacent to headwaters of a type (a)(1) through (5) water, in addition to laterally adjacent waters. 80 Fed. Reg. 37,105.

For all of these adjacent waters, the new rule dispenses with any requirement for the EPA or the Corps to show a significant nexus. A water is a "water of the United States" if it is adjacent to a type (a)(1) through (5) water—meaning if it is bordering, contiguous, or neighboring. Like the old rule, the new rule defines the term *adjacent* as "bordering, contiguous or neighboring." 80 Fed. Reg. 37,105. The new rule defines "neighboring" to mean within 100 feet of the ordinary high-water mark ("OHWM") of a type (a)(1) through (5) water or within the 100-year floodplain and not more than 1,500 feet from the ordinary high-water mark, or within 1,500 feet of the high tide line of a type (a)(1) through (3) water. If any part of a water is "neighboring," all of the water is jurisdictional. 80 Fed. Reg. 37,105 (to be codified at 33 C.F.R. § 328.3(c)(2)).

The six types of water listed above are always—by rule—"waters of the United States," for the purpose of establishing Corps and EPA jurisdiction under the CWA (except certain waters excluded from the rule, as discussed later in this chapter).

b. Potential "Significant Nexus" Waters

For waters that are not "waters of the United States" by rule, the new rule codifies a version of Justice Kennedy's significant nexus standard for two types of waters. These new categories address only specified types of waters, which may qualify as "waters of the United States" if a significant nexus is determined to exist on a case-by-case basis. Potential significant nexus waters include—

> (7) All waters in paragraphs (a)(7)(i) through (v) of this section where they are determined, on a case-specific basis, to have a significant nexus to a water identified in paragraphs (a)(1) through (3) of this section.

80 Fed. Reg. 37,054, 37,104 (June 29, 2015) (to be codified at 33 C.F.R. § 328.3(a)(7)). The five types of waters that could be considered "waters of the United States" under section 328.3(a)(7) of the rule (and analogous provisions of other parts) include (1) Texas coastal prairie wetlands along the Texas Gulf Coast; (2) prairie potholes in the upper Midwest; (3) Carolina bays and Delmarva bays along the Atlantic coastal plain; (4) Pocosins predominantly along the Central Atlantic coastal plain; and (5) Western vernal pools in parts of California. *See* 80 Fed. Reg. 37,105 (further defining these five types of waters).

In addition to the five types of waters listed in 40 C.F.R. § 328.3(a)(7), the significant nexus test applies to waters in paragraph (a)(8), which includes the 100-year flood-plain of traditionally navigable waters, interstate waters and wetlands, and the territorial seas, and to all waters within 4,000 feet of the high tide line of these types of waters (if tidal) or their tributaries or impoundments. 80 Fed. Reg. 37,105 (to be codified at 33 C.F.R. § 328.3(a)(8)). If waters in these areas are also "adjacent waters" under paragraph (a)(6), then they are covered adjacent waters and no case-specific significant nexus analysis is required for jurisdiction to attach. Additional details on how to determine whether a water falls into this eighth category of potential "waters of the United States" are provided in the rule.

For purposes of potential significant nexus waters, the agencies define the term "significant nexus" to mean—

> that a water, including wetlands, either alone or in combination with other similarly situated waters in the region, significantly affects the chemical, physical, or biological integrity of a water identified in paragraphs (a)(1) through (3) of this section.

80 Fed. Reg. 37,106 (to be codified at 33 C.F.R. § 328.3(c)(5)). As noted above, paragraphs (a)(1) through (a)(3) include traditional navigable waters, interstate waters and wetlands (i.e., along or crossing a state border), and the territorial seas. The "significant nexus" evaluation is to be done in the aggregate for similarly situated waters within a watershed. For an effect to be significant, it must be more than speculative or insubstantial. The rule lists nine water quality functions considered to be relevant to a "significant nexus" evaluation, including sediment trapping; nutrient recycling; pollutant trapping, transformation, filtering, and transport; retention and attenuation of flood waters; runoff storage; contribution of flow; export of organic matter; export of food resources; and provision of life cycle–dependent aquatic habitat. *See* 80 Fed. Reg. 37,106. Additional details on the "significant nexus" evaluation are provided in the rule.

c. Waters That Are Not "Waters of the United States"

The final rule excludes the following waters from jurisdiction, even where they otherwise would be considered as such by rule or under a "significant nexus" evaluation. Waters defined by rule as not being "waters of the United States" include the following:

> (1) Waste treatment systems (other than cooling ponds meeting the criteria of this paragraph) are not waters of the United States.
>
> (2) Prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.
>
> (3) The following ditches:
>
> (i) Ditches with ephemeral flow that are not a relocated tributary or excavated in a tributary.

(ii) Ditches with intermittent flow that are not a relocated tributary, excavated in a tributary, or drain wetlands.

(iii) Ditches that do not flow, either directly or through another water, into a water identified in paragraphs (a)(1) through (3) of [section 328.3 as (1) waters currently or in the past used or susceptible to use in interstate or foreign commerce, including waters subject to the ebb and flow of the tide; (2) interstate waters, including interstate wetlands; and (3) the territorial seas].

(4) The following features:

(i) Artificially irrigated areas that would revert to dry land should application of water to that area cease;

(ii) Artificial, constructed lakes and ponds created in dry land such as farm and stock watering ponds, irrigation ponds, settling basins, fields flooded for rice growing, log cleaning ponds, or cooling ponds;

(iii) Artificial reflecting pools or swimming pools created in dry land;

(iv) Small ornamental waters created in dry land;

(v) Water-filled depressions created in dry land incidental to mining or construction activity, including pits excavated for obtaining fill, sand, or gravel that fill with water;

(vi) Erosional features, including gullies, rills, and other ephemeral features that do not meet the definition of tributary, non-wetland swales, and lawfully constructed grassed waterways; and

(vii) Puddles.

(5) Groundwater, including groundwater drained through subsurface drainage systems.

(6) Stormwater control features constructed to convey, treat, or store stormwater that are created in dry land.

(7) Wastewater recycling structures constructed in dry land; detention and retention basins built for wastewater recycling; groundwater recharge basins; percolation ponds built for wastewater recycling; and water distributary structures built for wastewater recycling.

80 Fed. Reg. 37,054, 37,105 (June 29, 2015) (to be codified at 33 C.F.R. § 328.3(b)).

The new rule purports to preserve statutory exemptions from section 404(f) permitting requirements, including exemptions for normal farming, silviculture, and ranching activities. *See, e.g.*, 80 Fed. Reg. 37,080 (explaining preservation of agricultural exemptions). It does this by defining "adjacent" not to include these activities. *See* 80 Fed. Reg. 37,104 (to be codified at 33 C.F.R. § 328.3(c)(1)). Also, the rule excludes "prior converted cropland" from jurisdictional coverage. 80 Fed. Reg. 37,054, 37,105 (to be codified at 33 C.F.R. § 328.3(b)(2)). In addition, the regulations defining discharges not requiring section 404 permits are not changed by the new rule. *See, e.g.*, 33 C.F.R. § 323.4; 80 Fed. Reg. 37,106 (not modifying 33 C.F.R. § 323.4).

C. Incidental Fallback

After wetlands delineation and "waters of the United States" inquiry, the third issue in determining whether the EPA and the Corps have jurisdiction is whether the *activity* results in a discharge subject to regulation under the CWA. This involves evaluating whether the activity results in the "discharge of any pollutant" or merely constitutes incidental fallback of dredge or fill materials. Mechanized equipment working in waters of the United States has the potential to discharge dredge and fill material into waters of the United States. Section 404 of the CWA allows the Corps to issue permits for the "discharge of dredge or fill material" into waters of the United States. The Corps and the EPA have long sought to define this phrase to assert jurisdiction over excavation activities. This section discusses the history of the agencies' regulatory efforts and implications of court decisions regarding how to define the scope of federal jurisdiction in these cases.

1. Corps' Initial Rule

Initially, in 1986, the Corps promulgated a rule that would exempt incidental fallback from the requirement for a section 404 permit by defining the phrase "discharge of dredged material" as: "Any addition of dredged material into the waters of the United States" except "*de minimis*, incidental soil movement occurring during normal dredging operations," commonly referred to as "incidental fallback." 51 Fed. Reg. 41,206, 41,232 (Nov. 13, 1986).

2. Tulloch Rule

The Corps' 1986 definition was challenged by environmental groups in *California Wildlife Federation v. Tulloch* (Civ. No. C90-713-CIV-5-BO (E.D.N.C. 1992)). This challenge led to a settlement with the environmental groups that resulted in the following, zero-discharge definition of "discharge of dredged material": "[A]ny addition of dredged material into, including redeposit of dredged material within, the waters of the United States." 58 Fed. Reg. 45,008, 45,035 (Aug. 25, 1993). This rule is commonly referred to as the "Tulloch Rule."

The Tulloch Rule was challenged by industry groups in district court, whose overturning of the rule was ultimately affirmed by the D.C. Circuit Court of Appeals in *National Mining Ass'n v. U.S. Army Corps of Engineers*, 145 F.3d 1399 (D.C. Cir. 1998). The D.C. Circuit Court held that "the straightforward statutory term 'addition' cannot reasonably be said to encompass the situation in which material is removed from the waters of the United States and a small portion of it happens to fall back." *National Mining*, 145 F.3d at 1404. The court noted, however, that since the statute "sets out no bright line between incidental fallback on the one hand and regulable redeposits on the other, a reasoned attempt by the agencies to draw such a line would merit considerable deference." 145 F.3d at 1405. The court therefore affirmed the judgment of the district court and enjoined the Corps and the EPA from enforcing the Tulloch Rule. 145 F.3d at 1401, 1410.

3. Interim Rule (1999)

In 1999, in response to the *National Mining* decision, the Corps and the EPA promulgated an interim rule that removed the word "any" before "redeposit" and excluded "incidental fallback" from the definition of discharge of dredged material, as follows:

> Any addition, including redeposit other than incidental fallback, of dredged material, including excavated material, into waters of the United States which is incidental to any activity, including mechanized landclearing, ditching, channelization, or other excavation.

64 Fed. Reg. 25,120, 25,123 (May 10, 1999). The agencies did not define the term "incidental fallback" but promised to expeditiously undertake further rulemaking to "enhance clarity, certainty, and consistency in determining what activities are subject to section 404 in light of the [*National Mining*] decision." 64 Fed. Reg. 25,121. In the meantime, the agencies would decide whether a discharge of dredged material was regulable on a "case-by-case basis." 64 Fed. Reg. 25,121.

In *American Mining Congress v. U.S. Army Corps of Engineers*, 120 F. Supp. 2d 23 (D.D.C. 2000), the court denied National American Home Builder's motion to compel compliance with the 1997 American Mining Congress injunction, finding the interim rule "facially consistent with the Court's injunction," and noting in particular that "the rule makes clear that the agencies may not exercise § 404 jurisdiction over redeposits of dredged material to the extent that the redeposits involve only incidental fallback." 120 F. Supp. 2d at 29. The court noted that the agencies planned to make a "reasoned attempt to more clearly delineate the scope of CWA jurisdiction over redeposits of dredged material" through notice and comment rulemaking. 120 F. Supp. 2d at 27. In the meantime, the district court approved the agencies' interim approach of determining jurisdiction on a case-by-case basis as to whether a particular redeposit constitutes incidental fallback. 120 F. Supp. 2d at 27.

4. *Tulloch II Rule (2001)*

In 2001 the Corps and the EPA published the "Tulloch II Rule." This rule defined the phrase "discharge of dredged material" to mean—

> [T]he use of mechanized earth-moving equipment to conduct landclearing, ditching, channelization, in-stream mining or other earth-moving activity in waters of the United States as resulting in a discharge of dredged material unless project-specific evidence shows that the activity results in only incidental fallback. This paragraph does not and is not intended to shift any burden in any administrative or judicial proceeding under the CWA.

66 Fed. Reg. 4550, 4575 (Jan. 17, 2001). The Tulloch II Rule also defined the term "incidental fallback":

> Incidental fallback is the redeposit of small volumes of dredged material that is incidental to excavation activity in waters of the United States when such material falls back to substantially the same place as the initial removal. Examples of incidental fallback include soil that is disturbed when dirt is shoveled and the back-spill that comes off a bucket when such small volume of soil or dirt falls into substantially the same place from which it was initially removed.

66 Fed. Reg. 4575.

Industry groups challenged this definition in the D.C. district court. The district court initially dismissed the appeal for lack of ripeness on the merits, but this dismissal was reversed and remanded on appeal. *See National Ass'n of Home Builders v. U.S. Army Corps of Engineers*, 440 F.3d 459, 464 (D.C. Cir. 2006). On remand, the district court disapproved the agencies' reliance in the Tulloch II Rule solely on "small volumes" to define incidental fallback, suggesting that larger volumes might also be considered incidental fallback, depending on the length of time the material is held before being dropped and the distance between the place collected to the place dropped. *National Ass'n of Home Builders v. U.S. Army Corps of Engineers*, No. 01-0274 (JR), 2007 WL 259944, at *3 (D.D.C. Jan. 30, 2007) [hereinafter *NAHB*]. The district court indicated that it expects the Corps and the EPA to try again to refine the distinction between regulable "discharges of dredged material" and nonregulable "incidental fallback," but warned that the agencies "cannot require 'project-specific evidence' from projects over which they have no regulatory authority." *NAHB*, 2007 WL 259944, at *3. The district court therefore enjoined the agencies from enforcing the Tulloch II Rule. *NAHB*, 2007 WL 259944, at *4.

5. *The Current Rule*

On December 30, 2008, the Corps and EPA responded to the district court's decision in the *NAHB* case by abandoning the Tulloch II Rule and publishing a joint rule published at 73 Fed. Reg. 79,641. The agencies stated that the *NAHB* court's decision on the Tulloch II Rule effectively reinstated the text of the 1999 interim rule, and the rule therefore attempted to ensure that the language in the Code of Federal Regulations conformed to the court's decision. The latest rule thus restores the 1999 definition of "discharge of dredged material" and deletes both the narrowly defined term "incidental fallback" and the presumption that use of mechanized earthmoving equipment results in a regulated discharge.

The 2008 rule provides no guidance as to which activities result in the discharge of dredge or fill material and which activities merely result in incidental fallback and are unregulable. As a result, whether an activity is regulable will be decided on a case-by-case basis. Thus, after several rounds of litigation and multiple efforts at rulemaking, predictions concerning whether an activity results in a regulable discharge still lack certainty.

IV. Permitting Process

Processing of section 404 individual permits involves six steps: (1) preapplication consultation, (2) determination of permit type, (3) completion and submission of the application including any required preconstruction notification, (4) public notice, (5) decision-making process including the Corps' public interest review and compliance with the EPA's 404(b)(1) guidelines as well as certain provisions originating outside of section 404, and (6) issuance of a record of decision/statement of finding and a permit, if appropriate.

A. Preapplication Consultation

Potential applicants for a 404 permit have the option of meeting with Corps officials before submitting an application. The consultation is not mandatory, but an applicant can use the consultation to understand which information will be required in the application process and the factors the Corps will consider in making its decision. *See* 33 C.F.R. § 325.1(b).

B. Determination of Permit Type

1. *General Permits: Nationwide Permits*

The Corps may issue general permits for categories of discharges that will have only minimal adverse environmental effects when performed separately and will have only minimal cumulative adverse effects. *See* 33 U.S.C. § 1344(e)(1). The nationwide permit (NWP) is the primary type of general permit issued by the Corps and is designed to regulate activities with little, if any, delay or paperwork. 33 C.F.R. § 330.1(b). NWPs are attractive options because they are valid for use anywhere in the country. Other types of general permits include regional permits (RGP), which might, for example, be limited to a city or state or group of states. *See* 33 C.F.R. § 325.2(e)(2). If a project qualifies under a general permit, the overall time required for evaluation and approval of the application can be reduced. The general permit process eliminates certain steps of the evaluation process outlined in section IV.B.4 below, regarding individual permits, and allows certain activities to proceed with little or no delay, provided that the general or specific conditions for the general permit are met. For example, certain maintenance activities, utility line work, and certain navigational or agricultural activities may be eligible for a general permit.

Pre-construction notification (PCN) to the Corps is required for many NWPs, particularly if a threatened or endangered species or its critical habitat might be affected by the project, or if the activity may have an effect on any historic properties listed or eligible for listing by the National Register of Historic Places. Even without such possible effects, a PCN is required in the application for many NWPs. Such permit applications are not considered complete without the PCN. The Corps has thirty days to review a PCN to determine whether it is complete. Along with basic information regarding the identity of the applicant and the general nature of the proposed activity, all PCNs must include the project's purpose, direct and indirect adverse environmental effects, a discussion regarding its impact on endangered species and historic properties, a mitigation plan for greater than 1/10-acre impact to wetlands that are waters of the United States, other NWPs or individual permits to be used, the JD, and other permit-specific items.

Prospective users of an NWP should read the text of the permits and assess whether a particular NWP authorizes a specific project and whether the project meets all conditions of the NWP. The current NWPs became effective on March 19, 2012, and will expire on March 18, 2017. In addition to careful review of the latest NWPs as a means of authorizing certain activities in streams, wetlands, and other waters of the United States, practitioners should also be aware that division and district engineers, as well as states, may impose regional conditions on NWPs, and regional conditions have been issued for Texas. *See* U.S. Army Corps of Engineers, *Regulatory Program and Permits*, www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx; *see also* Letter from Charles W. Maguire, Water Quality Division Director, Texas Commission on Environmental Quality, to Kristi N. McMillan, U.S. Army Corps of Engineers, Galveston District, Apr. 5, 2012, *available at* www.tceq.texas.gov/assets/public/permitting/assess/401cert/NWPcert.pdf (TCEQ response to the Corps' request for section 401 certification of various NWPs in Texas). In addition, prospective users of an NWP should review the specific conditions imposed by the TCEQ through its 401 certification authority. *See* Texas Commission on Environmental Quality, *401 Certification Reviews*, www.tceq.texas.gov/permitting/401certification/401certification_definition.html. Practitioners should also be aware that some of the NWPs have been corrected since their publication, and the Corps' NWP rules were amended effective February 27, 2013. Further details are available on the U.S. Army Corps of Engineers Web site at www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx.

2. General Permits: State Programmatic General Permits

State programmatic general permits (SPGPs) are general permits based on an existing state, local, or other federal agency program and designed to avoid duplication with that program. For state regulatory programs that are as protective or more protective of the waters regulated by the Corps pursuant to section 404, SPGPs offer a route to increased state oversight of wetlands without the burden of administering the entire program. *See* 33 C.F.R. § 325.5(c)(3). For example, in August 2010, the Fort Worth District of the Corps issued a Programmatic General Permit for certain activities authorized by the Lower Colorado River Authority under a lakewide permit. *See* U.S. Army Corps of Engineers, Fort Worth District, Public Notice No. CESWF-10-PGP-2 (Aug. 20, 2010), *available at* http://media.swf.usace.army.mil/pubdata/environ/Regulatory/permitting/spgp/PGP_2_2010.pdf.

3. Letters of Permission

A letter of permission (LOP) may be issued in lieu of an individual permit (IP) in cases subject to section 10 of the Rivers and Harbors Act, when, in the opinion of the district engineer, the proposed work would be minor, would have insignificant impact on environmental values, and should encounter no appreciable opposition. LOPs are issued through an abbreviated processing procedure that includes coordination with federal and state fish and wildlife agencies, as required by the Fish and Wildlife Coordination Act, and a public interest evaluation, but without publication of individual public notice. 33 C.F.R. § 325.2(e)(1).

4. Individual Permit

The individual permit (IP) is a permit granted on a case-by-case basis for potentially significant impacts that cannot fall under the umbrella of a general permit or qualify for an LOP. *See* 33 C.F.R. § 322.2(e). A party seeking an IP will be required to undergo the standard review process delineated below. The IP process is much more time consuming and complicated than the process for obtaining a general permit or LOP.

a. Submitting the Application

The first required step in the permitting process is the submission of the standard application form, including drawings, sketches, or plans, as well as payment of fees and submittal of other information necessary to enable the Corps to issue a public notice. *See* 33 C.F.R. § 325.1(c)–(f). The Corps district office then has fifteen days to determine whether the application is incomplete and alert the applicant to the missing information, or complete and issue a public notice. *See* 33 C.F.R. § 325.2(a)(2).

If coverage is sought under an NWP rather than an IP, the application process is eliminated or substantially reduced. Nevertheless, PCNs are often required for certain aspects of proposed activities, including activities that are eligible for NWPs. Applicants should ensure that all required PCNs are submitted to complete the application process.

b. Public Notice

The public notice is the primary method of advising interested parties of the proposed activity and of soliciting comments necessary to evaluate the probable impact on the public interest. 33 C.F.R. § 325.3(a). The notice must include sufficient information to give a clear understanding of the nature and magnitude of the activity. 33 C.F.R. § 325.3(a). The district engineer then gathers and acknowledges all comments received and furnishes the applicant with a summary of the comments, the actual letters or portions thereof, or representative comments—allowing the applicant the chance to respond to any objections to the application. *See* 33 C.F.R. § 325.2(a)(3). The time for receipt of public comment normally should not exceed thirty days. *See* 33 C.F.R. § 325.2(d)(2). The district engineer will also evaluate the application to determine the need for a public hearing pursuant to 33 C.F.R. pt. 327. *See* 33 C.F.R. § 325.2(a)(5).

c. Corps Decision Making

i. Public Interest Review

The decision of whether to issue a permit is based on an evaluation by the Corps of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. 33 C.F.R. § 320.4(a)(1). This review process is a balancing test involving a careful weighing of relevant factors, which may include conservation, economics, aesthetics, wetlands, historic properties, navigation, water supply, water quality, and other issues important to the needs and welfare of the public. 33 C.F.R. § 320.4(a)(1). The weight given to any one factor will vary based on the nature and circumstances of each individual project application. *See* 33 C.F.R. § 320.4(a)(3). Since the primary responsibility for determining zoning and land use matters rests with state, local, and tribal governments, during this phase of the process, the district engineer will normally accept decisions by such governments on those matters unless there are significant issues of overriding national importance. 33 C.F.R. § 320.4(j)(2). No individual permit is granted if the proposal is found to be contrary to the public interest. 33 C.F.R. § 320.4(a)(1).

ii. Alternatives Analysis (Compliance with 404(b)(1) Guidelines

Along with the general balancing test applied to the public interest review, the Corps must determine that the proposed activity adheres to the EPA's 404(b)(1) guidelines. The Corps will not issue a permit to applicants who fail to comply with the 404(b)(1) guidelines, which are set forth at 40 C.F.R. pt. 230 of the EPA rules, but even an application that meets these guidelines may be denied if it fails the general balancing test mentioned above. *See* 33 C.F.R. § 320.4(a)(1).

The 404(b)(1) guidelines state that, "[e]xcept as provided under section 404(b)(2), no discharge of dredge or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." 40 C.F.R § 230.10(a). When an activity is not water dependent (i.e., dependent on a particular wetland site), practicable alternatives that do not involve special aquatic sites are presumed to be available. 40 C.F.R. § 230.10(a)(3). A "special aquatic site" is an area, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. 40 C.F.R. § 230.3(q-1).

Under the guidelines, except as provided under section 404(b)(2), no discharge of dredge or fill material will be permitted that will cause or contribute to significant degradation of the waters of the United States, including significant adverse effects on human health or welfare, aquatic ecosystems, and recreational, aesthetic, and economic values. *See* 40 C.F.R § 230.10(c)(1), (4).

Additionally, except as provided under section 404(b)(2), the discharge of dredge or fill material will not be permitted unless appropriate and practicable steps have been taken to minimize adverse effects on the aquatic ecosystem. 40 C.F.R. § 230.10(d). Such appropriate and practicable steps (known as "mitigation") are outlined at 40 C.F.R. sections 230.70–.77.

See 40 C.F.R. sections 230.91–.98 for compensatory mitigation. The rules and guidance for compensatory mitigation are available on the Environmental Protection Agency Website at http://water.epa.gov/lawsregs/guidance/wetlands/wetlandsmitigation_index.cfm. The functional result of the section 404(b)(1) guidelines is that a burden rests on the applicant for a section 404 permit to show that he has engaged in mitigation. That is, he has, in order of preference (1) taken steps to avoid wetlands impact, (2) minimized potential impacts on wetlands, and (3) provided compensation for any remaining unavoidable impacts.

iii. Compliance with Provisions Outside the Scope of Section 404

Individual permits will be evaluated for compliance with the requirements of other laws, including the following:

- Endangered Species Act: Applications will be reviewed for potential impact on threatened or endangered species pursuant to section 7 of the Endangered Species Act. If the district engineer finds that the proposed activity may affect an endangered species or its critical habitat, he will initiate formal consultation procedures with the FWS or the NMFS. 33 C.F.R. § 325.2(b)(5). See Chapter 32 of this book for a discussion of the Endangered Species Act.

- National Historic Preservation Act: If the proposed activity would involve any property listed or eligible for listing in the National Register of Historic Places, the district engineer will proceed in accordance with Corps National Historic Preservation Act implementing regulations. 33 C.F.R. § 325.2(b)(3).
- National Environmental Policy Act (NEPA): A decision on an IP application will require either an environmental assessment or an environmental impact statement unless it is included within a categorical exclusion. 33 C.F.R. § 325.2(a)(4). See Chapters 2 and 27 of this book.
- Coastal Zone Management Act (CZMA): If the proposed activity is to occur in a statutory coastal zone, the district engineer must obtain certification from the applicant that the proposed activity complies with the approved state CZMA program. *See* 33 C.F.R. § 325.2(b)(2).
- CWA section 401 water quality certification: If the district engineer determines that water quality certification for the proposed activity is necessary under the provisions of section 401 of the CWA, the district engineer must obtain a copy of that certification from the applicant or the certifying agency. 33 C.F.R. § 325.2(b)(1). No permit will be granted until the required certification has been obtained or waived. 33 C.F.R. § 325.2(b)(1)(ii). See Chapter 34 of this book for a discussion of 401 Certification.

The final provision listed above relating to 401 Certification is the primary means by which state authorities review any federal permit that may result in discharge to wetlands or other waters under state jurisdiction. In Texas, the Texas Commission on Environmental Quality (TCEQ) is responsible for providing 401 Certification to the Corps for section 404 activities with one exception: activities associated with oil and gas operations covered by section 404 are certified by the Railroad Commission of Texas rather than the TCEQ. *See* Tex. Nat. Res. Code § 91.101; Tex. Water Code §§ 26.011, 26.131. Section 404 permits cannot be issued in Texas unless applicable TCEQ or Railroad Commission certification has been obtained or waived. As noted above, the TCEQ has issued conditions of its 401 Certifications for NWPs that are applicable to Texas projects.

C. Issuance of Decision and Permit

After consideration of the completed application, the district engineer will determine whether the permit should be issued based on the record and applicable regulations. 33 C.F.R. § 325.2(a)(6). The district engineer will prepare a statement of findings or, where an environmental impact statement has been prepared, a record of decision. 33 C.F.R. § 325.2(a)(6). If a permit is issued, the permit decision document will include a discussion of the environmental impacts of the project, the findings of the public interest review process, and any special evaluation required by the type of activity, such as compliance determinations with the section 404(b)(1) guidelines. 33 C.F.R. § 325.2(a)(6). The permit will not become valid until signed by the issuing officer. 33 C.F.R. § 325.2(a)(7). If the application is denied, the applicant will be advised in writing of the reasons for denial. 33 C.F.R. § 325.2(a)(7).

D. Recourse for Dissatisfied Applicants

1. Administrative Appeal

For applicants who are dissatisfied with decisions reached by the Corps district office, regulations provide for a process of administrative appeal. Applicants can appeal jurisdictional determinations, permit applications denied with prejudice, and declined permits to a Corps official at least one level higher than the decision maker. *See* 33 C.F.R. § 331.1.

2. *Suit in Federal Court*

Legal action against the Corps, the EPA, or both in federal court may be an option. The CWA contains limited provisions for judicial review of Corps or EPA rulings, for example, when the EPA or the Corps impose, or threaten to impose, administrative or civil penalties. *See, e.g.*, 33 U.S.C. § 1319(g)(8) (providing a statutory basis for federal judicial review when the EPA or the Corps impose administrative penalties). The Supreme Court has held that the Administrative Procedures Act (APA) allows pre-enforcement review of an EPA-issued compliance order that required respondents to restore property and threatened penalties if they did not comply. *See Sackett v. Environmental Protection Agency*, 132 S. Ct. 1367, 1374 (2012).

The Fifth Circuit, however, declined to allow judicial review of jurisdictional determinations. The Fifth Circuit, declining to extend *Sackett*, held that the Corps' jurisdictional determinations asserted the Corps' "final position on the facts underlying jurisdiction—that is, the presence of waters of the United States as defined in the CWA." *Belle Co., L.L.C. v. U.S. Army Corps of Engineers*, 761 F.3d 383, 390 (5th Cir. 2014), *cert denied, Kent Recycling Services, L.L.C. v. U.S. Army Corps of Engineers*, 135 S. Ct. 1548 (2015). The Fifth Circuit further held, however, that jurisdictional determinations are not actions "by which rights or obligations have been determined, or from which legal consequences will flow." *Belle Co.*, 761 F.3d at 390 (quoting *Bennett v. Spear*, 520 U.S. 154, 178 (1997)). Belle could still obtain a Corps permit to fill, and if Belle did not obtain an acceptable permit, Corps regulations would allow Belle to challenge the permit decision, as well as the underlying jurisdictional determination. *Belle Co.*, 761 F.3d at 394. Therefore, the Corps' jurisdictional determinations are not judicially reviewable.

In any event, an applicant aggrieved by agency action should be aware that there are often legal prerequisites to a judicial challenge, including filing deadlines and exhaustion requirements. *See generally* 33 U.S.C § 1365 (describing such limitations pursuant to citizen suits). The exhaustion of all administrative remedies may be a condition for bringing suit against the EPA or the Corps. *McCarthy v. Madigan*, 503 U.S. 140, 144–45 (1992) (asserting the general rule that applicants must "exhaust prescribed administrative remedies before seeking relief from the federal courts"). *But see Darby v. Cisneros*, 509 U.S. 137, 154 (1993) (holding that where the APA applies, an appeal to "superior agency authority" is a prerequisite to judicial review only when expressly required by statute or when an agency rule requires appeal before review). In response to *Darby*, the Corps added an exhaustion rule to make it explicit that applicants must exhaust the administrative appeal process before seeking relief in federal courts. 33 C.F.R. § 331.12. The viability of any suit depends on many factors, including the grounds for the complaint, the government agencies named as defendants, and the specificity of the applicable administrative regulations regarding administrative appeals and judicial review.

V. Conclusion

As with many projects governed by environmental laws, issues of water quality and water supply may have significant impacts on an existing or proposed activity or development project. Regulatory regimes interact in complicated ways as issues of water quality and water supply are addressed. Water development entities, wastewater dischargers, legislators, government agencies, environmental professionals, and others who are involved in water supply and water quality projects must be attentive to the laws and regulations that govern these matters and remain vigilant in monitoring these laws and policies in the ever-changing landscape of environmental requirements.

CHAPTER 36

Economic Value of Water

Sharlene Leurig[1]

I. Introduction

Water, like any other fundamental economic input, has an intrinsic value whose worth rises as its quantity declines. As with oil, timber, or pork bellies, the quantity of water a consumer demands depends on its price. But perhaps no other scarce resource has been less governed or influenced by price than water.

In the western United States, water allocation regimes entitle users to perpetual access to the resource. In many places, this water is priced at zero. While river authorities or groundwater districts may assess unit costs for a volume of water, those prices typically are set only to recover the cost of administration or delivery infrastructure that may have been laid down close to a century ago (often with considerable state or federal subsidies). The resulting unit costs are often too low to influence consumer decisions.

For years, even treated water delivered to the point of use was priced so low that economists debated whether consumers were sensitive to price at all. It was not uncommon for water demand to be viewed as perfectly price inelastic or independent of price. Yet today, investment in aging water infrastructure and sharpening water scarcity is driving the steady—and, in some places, precipitous—increase in water rates, and consumer sensitivity to price is now a factor that no rational demand forecast should neglect.

Markets have played a marginal role in the development and allocation of most of Texas's water resources—the result of legal frameworks that frustrate the frictionless trade of right holders' surplus water. Yet, as across the western United States, many of Texas's rivers are fully allocated or even overallocated (meaning there are more paper water rights than water). As cyclic droughts and climate change shrink surface water supplies and aquifer production exceeds regulatory limits, markets can be expected to play a greater role in redistributing scarce water among willing buyers, sellers, lessees, and lessors.

While water itself can be viewed as a commodity, the land surface and underground geology that provide and store water are an essential—and also undervalued—infrastructure without which the tradable molecules of water cannot be captured for economic use. The valuation of this supporting

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natural infrastructure is beyond the scope of this chapter but is a critical aspect of the economics of water supply.

II. The Basics of Supply and Demand

Fresh water is a scarce and volatile resource. Surface water supplies can vary considerably year to year with rainfall, as can groundwater in aquifers like the Edwards, where water recharges quickly and moves rapidly out of the system in the form of springs. Both rising temperatures and land use changes are altering the reliability of Texas's existing surface resources at the same time that decades of groundwater use have created structural deficits in the state's least expensive supply of water. As a result, municipalities and private entities are scaling up investment in alternative supplies that are less vulnerable to climate variability or less subject to regulation limiting near-term production. As around the world, the cost of water supplies in Texas is rising far faster than the rate of inflation, reflecting the longer transmission distances or greater energy intensity for treatment of these new resources.

Rising supply costs also reflect increased demand for water or projected increases in demand for water in the future. To be certain, actual demand for water has grown tremendously in some regions where small towns have turned into dense bedroom communities or where the production of shale hydrocarbons recovered through water-intensive hydraulic fracturing has exponentially risen. Yet amazingly, and contrary to the expectations of many, significant population growth has taken place in some of the state's metropolitan regions without total water demand increasing. Per capita water use has steadily fallen in the United States over recent decades, so much so that total use in 2010 was 13 percent less than just five years before. Molly A. Maupin et al., *Estimated Use of Water in the United States in 2010*, U.S. Geological Survey Circular 1405, 44 (2014), *available at* http://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf.

Today's technologies are much more water efficient than those of the past. Responses to drought can also explain some of these efficiency gains; not only does water use tend to decline during drought, but much of that demand shift remains after drought has resolved, an effect often called the "drought shadow." Tarrant County now uses 100 million gallons less water each day than before the most recent drought, despite gaining 130,000 residents during that same period. Linda Christie, Tarrant Regional Water District Presentation to Fort Worth City Manager (Fort Worth, Tex., Mar. 27, 2015) [hereinafter TRWD Presentation]. Projections of future demand that closely track population trendlines should be made with considerable caution. In fact, the credit rating agency Standard & Poor's noted in its most recent proposed update to its water and sewer sector methodology that declines in per capita water use mean there is no "direct correlation between economic growth and system demands." Standard & Poor's Ratings Services, *U.S. Public Finance Waterworks, Sanitary Sewer, and Drainage Utility Systems: Methodology and Assumptions* 36 (Dec. 10, 2014), *available at* www.standardandpoors.com/spf/upload/Events_US/US_PF_Event_RFCRndTblsJan2015_Article1.pdf.

A. Value of Conserved Water

Conservation is often viewed as the least expensive supply of water. By way of example, Tarrant County estimates the cost of conservation as $0.36/1,000 gallons, while its next undeveloped source of water is estimated as $2.63/1,000 gallons. TRWD Presentation. As the cost of water supplies rise, so does the value of conservation. This value can be quantified as the avoided costs of supply expansion and treatment of water, though the former is a far more considerable value. The overwhelming majority of utilities' ongoing costs—up to 80 percent—are fixed, no matter how much water their customers use. These costs are driven by capital expenditures made in the past for existing infrastructure, most of which is debt-financed. The financing costs for capital facilities, which persist for decades even if customers use less water than anticipated, easily dwarf the variable costs of chemicals and energy saved when customer usage declines. The avoided cost of new infrastructure made possible through customers' water conservation can be calculated and put into terms that customers may best understand. One Colorado community communicated the value of conservation to its customers by calculating that rates would have been 91 percent higher if its customers had not undertaken three decades of water conservation. Stuart Feinglas et al., Alliance for Water Efficiency, *Conservation Limits Rate Increases for a Colorado Utility* 7 (Nov. 2013), *available at* www.financingsustainablewater.org/sites/www.financingsustainablewater.org/files/resource_pdfs/AWE-Colorado-Article-FINAL-%28Ver7%29.pdf.

The Texas Water Development Board (TWDB) estimates that roughly one-quarter of future water supplies in Texas will come from conservation. *See* Texas Water Development Board and Texas State Soil and Water Conservation Board, *An Assessment of Water Conservation, Report to 82nd Legislature* 4 (Mar. 2012), *available at* www.twdb.texas.gov/publications/reports/special_legislative_reports/doc/TWDB_TSSWCB_82nd.pdf [hereinafter 2012 Assessment of Water Conservation]. Yet it is also worth noting that the plan estimates future need assuming that peak demands will be met even during times of drought, potentially underestimating the avoided cost of supply expansion through demand management. See Chapter 23 of this book for a further discussion of water conservation.

B. Monopolistic Nature

While the economies of scale for water storage and treatment technologies historically supported the view of utilities as natural monopolies, today's water treatment technologies no longer preserve utilities' monopolistic market structure. In a growing number of cities, buildings can now provide their own onsite wastewater treatment for nonpotable reuse or onsite recharge. In San Francisco and Sydney, water agencies are encouraging developments to produce and sell water bilaterally. These onsite uses and trading programs can be structured to include some payment to the centralized utility but may result in no additional revenue to the water utility. While the economic diversification of supply can lead to a benefit for the utility and its rate base, a utility that fails to account for distributed water providers in future demand projections may overbuild capacity, placing the financing burden of unused capacity on its ratepayers.

III. Pricing Water

A. Pricing Municipal Water

In the 2012 State Water Plan, municipal water use accounts for 41 percent of total future estimated water needs but 86 percent of total estimated capital costs for supply augmentation. *See* Texas Water Development Board, *Water for Texas 2012* 177, 213 (2012), *available at* www.twdb.state.tx.us/waterplanning/swp/2012/. The pricing of municipal water is therefore central to recovering costs of supply expansion. But the demand for water is also influenced by price—a relationship too often neglected in the demand forecasts that drive investment in water infrastructure. Utilities, river authorities, and private investors in water projects who do not properly account for the role of pricing in cost recovery and market demand risk operating deficits and even the stranding of capital assets.

Most municipal demands in Texas are met by municipal or investor-owned water utilities (the minority of municipal demands being provided by private wells). Municipal and investor-owned utilities are limited in their cost recovery by different regulatory structures.

Municipal utilities are overseen by elected or appointed boards or city councils. While most municipal systems' charters prohibit them from clearing a profit, their method for allocating and recovering costs across their ratepayers is a matter of industry guidelines and local policy discretion, not regulation per se.

On the other hand, investor-owned utilities are regulated by the Public Utility Commission (PUC), to which jurisdiction was transferred from the Texas Commission on Environmental Quality (TCEQ) by the 2013 legislature. *See* Act of May 3, 2013, 83d Leg., R.S., ch. 171 (S.B. 567); Act of May 13, 2013, 83d Leg., R.S., ch. 170 (H.B. 1600). The PUC has codified rules for how water utilities may allocate and recover costs and has defined mechanisms for achieving a return on capital for distribution to shareholders. The rate of return permitted by regulators determines the rates investor-owned utilities may assess customers once all pass-through costs are incorporated. See Chapter 6 for a discussion of the jurisdictional transfer. See Chapter 29 for further discussion of rates for the retail sale of drinking water.

The fundamental objective of pricing municipal water is the recovery of the cost of providing clean, reliable water directly to the customer. For all water utilities, this cost of service tends to be driven by peak water use. While most industries tend to use a consistent amount of water year-round, commercial and especially residential customers tend to exhibit seasonal peaks. Nationally, anywhere from one-half to two-thirds of municipal water use is accounted for by residential demand. *See* Erin T. Mansur & Sheila M. Olmstead, *The Value of Scarce Water: Measuring the Inefficiency of Municipal Regulations*, 71 J. Urban Econ. 332, 332 (2012). The same is likely true for Texas. In Texas, peak water use is in the summer months, when water use may as much as quadruple from winter water demand as residents and commercial customers water their landscapes. Even though this spike in usage is short-lived, all of a water utility's infrastructure is designed to meet this peak use. Storage capacity, transmission pipelines, and treatment plants all must be designed to function whether the utility is selling 100 million gallons or 400 million gallons on a particular day. Pricing of water services must recover the cost of this infrastructure, no matter how much water is ultimately used.

Pricing by municipal water systems has changed remarkably over the years. Whereas most water systems once priced their services as a fixed fee independent of usage, a wide array of pricing structures has emerged over the past few decades. Most water providers now assess customers two distinct fees each billing cycle: a fixed fee and a variable fee that depends on the volume of water used. Variable fees based on volumetric use may take many different forms:

- Though once popular, *decreasing block rate* structures, in which higher volumes of water are purchased at lower unit cost, have fallen out of favor. Such a pricing structure has been rejected by many communities for failing to communicate the scarcity of the resource.
- Many systems in Texas continue to charge customers a uniform rate for all volumes of water sold. This means that every gallon of water is priced equally, whether the first or 35,000th.
- *Increasing block rates* have gained great popularity in Texas and beyond over the past two decades as more utilities and policymakers seek to communicate the scarcity of water through price. In these rate structures, higher volumes of water sold are priced at higher marginal prices. While increasing block rates can convey a strong financial incentive for limiting water use, utilities that depend on high-volume water users for a significant proportion of revenue may experience revenue downturns when those customers respond to that pricing signal by reducing their usage. Utilities can protect themselves against revenue shortfalls by designing the lower tiers of usage to recover all or the majority of costs, using revenue from higher tiers to fund conservation programs or reserve funds.

See Mary Tiger et al., University of North Carolina Environmental Finance Center & Sierra Club, Lone Star Chapter, *Designing Water Rate Structures for Conservation & Revenue Stability* (2014), *available at* www.efc.sog.unc.edu/sites/www.efc.sog.unc.edu/files/Texas%20Rate%20Report%202014%20Final_0.pdf.

It was once the case that weather was the only reliable driver of revenue volatility for water utilities. Rainier-than-average summers suppress utility sales as customers need less outdoor irrigation to supplement rainfall. Drier-than-average summers can be a big boost to water systems' sales, as long as they have the water to sell. When a few dry months turn into persistent drought, and reservoir levels begin to fall, that financial boon may be replaced by bane as utilities' drought contingency plans kick into effect. *See* Fitch Ratings, *Special Report: Texas-Sized Drought for the Lone Star State* (Oct. 12, 2011). The drought of 2011 and subsequent dry years began as a flush time for many Texas water systems as customers increased their watering to save their landscaping. By 2013, those systems with mandatory watering limits began to see their revenues and reserves shrink along with their lakes.

As per capita water use has fallen and tiered rates designed to elicit a price response have come into the mainstream, it is no longer just weather that is driving water utility revenue volatility. Recognizing the heightened potential for revenue shortfalls during a nationwide period of needed infrastructure investment, water utilities have turned their attention to the fixed fee as a tool for ensuring reliable revenues.

In most places, the fixed fee is entirely independent of how much water a customer uses and may be fixed across the entire customer class or based on meter size (an indication of capacity-driven fixed costs imposed by the customer, which remain constant for the utility no matter how much water a customer ultimately uses). A water utility eager to ensure a certain level of revenue each month may be tempted to set the fixed fee quite high. Yet the drawback in doing so is the diminished power of price as a tool for communicating scarcity and driving water use behavior. Some utilities address this dual need to recover reliable revenues and to use price as a tool for driving water efficiency by designing fixed fees that depend on the long-term water use of a customer. Unlike the variable fee, which will change each billing cycle based on the previous month's use, a volumetric-dependent fixed fee may look at a customer's water use in the last twelve months or more, being updated only at fixed intervals based on changes in customer behavior. The city of Austin has adopted such a volumetric-dependent fixed fee. Tiger et al., at 22–23.

Other pricing models may assist utilities in recovering more predictable revenue. For example, water rate structures could function more like mobile phone plans, with customers selecting the amount of water per month that is right for them and locking in a fixed monthly fee. Under such a plan, customers who exceed their allotted monthly volume would be assessed a steep volumetric fee for each additional thousand gallons in excess of their allotment. *See* Jeff Hughes et al., Water Research Foundation, *Defining a Resilient Business Model for Water Utilities* (Report #4366, 2014), *available at* www.waterrf.org/PublicReportLibrary/4366.pdf.

As pricing innovations develop, utilities may find that their ability to perfectly balance cost and revenue each financial cycle becomes more erratic. There are a number of tools for managing revenue shortfalls, including rate stabilization funds and even weather risk contracts. *See* D. Matthew Coleman et al., *Should Water Providers Hedge Weather Risk?*, 107 J. Am. Water Works Ass'n 26 (2015). Though revenue surpluses may seem like a mythical and desirable problem for many water utility managers, they also can create headaches if regulators or elected officials view a water utility's rates as creating excessive revenues. Water utilities can look to other regulated utility markets for techniques for redistributing excess revenues, such as end-of-year rebates for customers who used less water than predicted (and therefore overpaid for their share of costs). *See* Hughes et al., at 207.

Advanced metering infrastructure (AMI) and software as a service (SOS) designed to track customers' real-time behavior creates a world of new possible pricing structures for water utilities. Many of the pricing structures currently employed by utilities in the telecommunications or electric power sectors seemed unfathomable to water systems only a few years ago. Today, technology is no longer a barrier to having real-time insight into water usage that could be used for time-of-day pricing or alerts to customers likely to exceed their target usage tiers. These technologies not only are a tool for implementing finer-grain pricing but also may be a key instrument for ensuring customers' willingness to pay for water services. Water utilities who have invested in platforms to enable more direct communication with customers to identify water savings opportunities also report enhanced customer satisfaction. Yet the new costs of metering and software technologies can deter utilities from investing in their procurement, forfeiting valuable conserved water, customer satisfaction, and adaptive pricing tools.

B. Elasticity of Demand: Residential Water Use

Price elasticity of demand is an important concept for water supply and rate planning. It is essential for setting rates for adequate cost recovery, designing rates to drive water conservation, and estimating future demands for water. Unfortunately, despite its criticality, it is a concept that is too often absent from decisions on water pricing or future demand forecasts, an omission that can lead to revenue shortfalls and overbuilt infrastructure assets.

The price elasticity of demand is essentially an estimate of a consumer's sensitivity to the price of water. Formally it is defined as:

$$\text{Price elasticity of demand} = \frac{\text{percentage of change in quantity demanded}}{\text{percentage change in price}}$$

For almost all goods, price elasticity of demand is a value less than 0, meaning that an increase in price yields a reduction in demand. Price elasticity of demand is either elastic or inelastic. An elastic relationship means that the percentage change in demand exceeds the percentage change in price, leading to a reduction in revenue. Inelastic demand also decreases with an increase in price, but the percentage change in demand is less than the percentage change in price.

Table 1: Elasticity of Demand

$E_d = 0$	Demand is perfectly inelastic (price independent)
$-1 < E_d < 0$	Demand is inelastic (demand changes less than price has changed)
$E_d = -1$	Demand is unit elastic (demand changes equally to change in price)
$-\infty < E_d < -1$	Demand is elastic (demand changes more than price has changed)

Price elasticity of demand for municipal water has been empirically observed to be price inelastic, meaning that a percent increase in the price of water will yield a smaller percent change reduction in water demand. The relative inelasticity of water demand is beneficial for water providers, as it means that rate increases can yield an increase in revenue. Note, however, that because demand for water is inelastic, revenue increases will inherently lag behind the increases in price. The increasing complexity of rate structures makes the task of estimating elasticity and revenue gains from rate adjustments more difficult. *See* H. Allen Klaiber et al., *Measuring Price Elasticities for Residential Water Demand with Limited Information*, 90 Land Economics 100 (2014).

Most studies of elasticity of demand for municipal water users focus on residential consumers, a reflection of the residential sector's majority proportion of total municipal demand. There is a wide range of estimates for the price elasticity of demand of residential water users in the United States.

Ultimately, the search for a single elasticity estimate is somewhat meaningless. Residential water users vary in many ways that influence their water use and sensitivity to price changes. Since most water utilities have a heterogeneous customer base, it is more important to understand the price sensitivity of types of customers than the customer base as a monolithic whole. The factors that influence price elasticity of demand in a particular place include the following.

1. *Water Use*

Large water users across a range of studies appear to be more price inelastic (i.e., less sensitive to increases in price). Klaiber et al., at 110. Within limits, this means that conservation rate structures designed to price water at higher marginal rates for larger water users can protect revenue at higher tiers—revenues that can be used to finance conservation at lower tiers. This insight should be taken with caution, however, as other factors may offset the inelasticity of large water users.

2. *Indoor vs. Outdoor Use*

Demand for indoor uses of water is less elastic than that for outdoor water uses (see Table 2). This can be accounted for by the essentiality of water for indoor uses, which are generally less discretionary than outdoor uses of water. It also is the result of indoor use being determined more by fixed appliances and fixtures than behavior. Pricing may shift indoor water use over time, as customers replace older appliances and fixtures with more efficient models. *See* Fernando Arbués et al., *Estimation of Residential Water Demand: a State-of-the-Art Review*, 32 J. Socio-Econ. 81, 88–89 (2003), *available at* www.researchgate.net/profile/Roberto_Martinez-Espineira/publication/222522278_Estimation_of_residential_water_demand_a_state-of-the-art_review/links/09e415072a5c409ea8000000.pdf.

Table 2: Summary of Elasticity Estimates for Indoor vs. Outdoor Water Use

	Indoor demand elasticities	Outdoor demand elasticities
Overall	–0.093	–0.618
Arid season	–0.086	–0.669
Wet season	–0.120	–1.197

Mansur & Olmstead, at 339, tbl. 4.

3. *Climatic Conditions*

Drier weather tends to make water users more price inelastic, as there is little opportunity to substitute rainfall for irrigation water. A survey of water use in eleven urban areas of the United States found outdoor water demand in an arid season to be, on average, five times that of outdoor demand during a wet season. Mansur & Olmstead, at 334. Water users in perpetually dry climates or during drier-than-normal conditions, therefore, should be expected to cut back on water use in response to higher rates, but less so than they would under wetter conditions. This relationship between climate and price sensitivity is especially the case for larger water users. Klaiber et al., at 109–10. A study of residential water users in Phoenix found their water demand to be remarkably more price inelastic in a dry summer than in the winter, or even during a normal summer (see Table 3). Note that the table reinforces the finding that the demand of larger water users is less elastic than that of smaller users.

Table 3: Influence of Climatic Conditions on Price Elasticity for Residential Water Demand

Water usage percentile	2003–2000 (Normal/Normal)		2002–2000 (Normal/Dry)	
	Winter	Summer	Winter	Summer
10	–1.93	–0.99	–1.63	–0.35
25	–1.72	–0.85	–1.34	–0.32
50	–1.54	–0.68	–1.17	–0.30
75	–1.6	–0.56	–1.01	–0.19
90	–1.53	–0.45	–0.94	–0.13

Klaiber et al., at 110, tbl. 4.

4. *Income Effect*

Wealth is also an indicator of a consumer's elasticity of demand. Households with higher income tend to have less elastic water demand than lower income households (see Table 4). Mansur & Olmstead, at 339.

Table 4: Price Elasticities of Demand by Income and Lot Size

Household group	Indoor demand elasticities	Outdoor demand elasticities
Rich, big lot	–0.149	–0.421
Poor, big lot	–0.102	–0.702
Rich, small lot	–0.086	–0.712
Poor, small lot	–0.060	–0.791

Mansur & Olmstead, at 339, tbl. 5.

Accounting for the price elasticity of water demand is a critical component of water planning, including estimating how water rates will affect revenue streams and total demand. It also can guide decisions on whether to adopt drought rates, either as a tool for tamping down on water demand or as a means of ensuring sufficient revenues during times of scarcity.

5. *Forecasting Future Demand*

Projections of future water demand typically incorporate population estimates, indoor efficiency gains from new appliances and fixtures, and occasionally changes in land use that may result in outdoor use trends that deviate from historic norms. Demand forecasts should also account for the demand effect of pricing—especially if forecasts underlie the decision to build a new water supply or treatment asset that would significantly affect rates. Failing to account for the potential for price to reduce demand could result in an upward rate spiral as rate adjustments chase lagging revenues. It can also be used to evaluate whether peak demands would be better met through pricing-induced conservation than through supply and treatment expansion.

6. *Estimating Revenue*

Reliable price elasticity estimates can help evaluate how revenues may shift along with price changes. Klaiber et al., at 112. A community with some large water users, many of whom are also low-income, may decide against implementing a steeply tiered rate structure unless the lower tiers are sufficient to cover most fixed costs, recognizing the income effect of price elasticity. Conversely, a community whose large water users tend to have high incomes may choose to put a steeply inclining block rate in place, betting that the income effect will shield the provider from revenue shocks.

7. *Preserving the Affordability of Essential Water Services*

Although the monthly cost of water services remains lower than discretionary utilities like cable television and mobile phones in many places in the United States, combined water and sewer costs are rising faster than all other utilities—fast enough to garner the attention of the U.S. Conference of Mayors, which in 2014 released a report expressing concern over the declining affordability of essential water services. *See* United States Conference of Mayors, *Public Water Cost Per Household: Assessing Financial Impacts of EPA Affordability Criteria in California Cities* (2014), *available at* www.usmayors.org/pressreleases/uploads/2014/1202-report-watercostsCA.pdf. Although it is a local policy decision about what types of water use are considered essential (e.g., green summertime lawns), elucidating the elasticity of demand for different types of uses and users is an essential part of this policy discussion. Klaiber et al., at 111–12.

8. *Designing Effective Pricing Structures to Manage Drought*

Most water providers effect drought curtailments through regulatory action, such as days-per-week watering restrictions. Yet there is strong evidence that pricing may be as effective in achieving watering targets without foregoing revenue that would otherwise be lost. By estimating the price elasticity of customers, utilities could set drought rates at levels that allow customers to opt out of outdoor watering or pay for the option to continue watering. A pricing study of eleven urban areas estimated that the most common regulatory policy in response to drought—twice-per-week watering limits—could be achieved instead by implementing a price of $5.36 per thousand gallons. That is nearly three times the average marginal price assessed to consumers during the arid season. *See* Mansur & Olmstead, at 341.

C. Connection Charges

Water utilities provide customers two interrelated but fundamentally distinct services: units of water for use today and reserved capacity in treatment, storage, and distribution infrastructure. Utilities design their facilities to meet future capacity needs of their customers; the size of the facility determines the initial cost and the debt payments. These fixed costs persist for decades and represent the overwhelming majority of utilities' ongoing costs—in most places, as much as 80 percent.

Many communities use connection charges (sometimes called "impact fees," "tap fees," or "system development charges") to pay for past and future investments in their water system, with the view that "growth should pay for growth." These investments may include infrastructure, treatment plants, or water rights acquisition.

In places like Texas, where population growth is occurring in areas faced with water scarcity and resource vulnerability, connection charges present an opportunity to manage the future water demands of residents by more clearly linking the scale of the connection charge to the likely water use of the home or business being connected to the water system.

Demand-based or conservation-oriented connection charges may depend on several factors that shape water use: the size of the irrigated area, the water demands of different types of landscape, the efficiency of the interior water fixtures and plumbing design, and the number of bathrooms or water-using fixtures.

The ability of a connection charge to steer development toward a more water-efficient profile depends on the size of the charge. In regions like Front Range, Colorado, connection charges in middle-income bedroom communities have risen as high as $20,000 per household. In that case, the ability of a homebuilder to design a house that incurs only a $5,000 charge (based on landscaping or number of bathrooms) is a clear financial incentive to pick the more water-efficient option. In areas of Texas where a connection charge may be only $5,000, the potential delta between a high and low water-use property is more muted. The type of connection charge that a utility may assess is limited by regulation in many states, including Texas. See Chapter 29 for further discussion of water utility regulation.

D. Pricing Water for Agricultural Irrigation

The TWDB estimates that agricultural irrigation accounts for 60 percent of water used in the state. 2012 Assessment of Water Conservation, at 52. Although today's irrigation systems are dramatically more efficient than historical technologies, highly inefficient methods such as flood irrigation persist. In this environment, there is no shortage of opportunities for increasing the water efficiency of agriculture in Texas.

Numerous tools exist for driving gains in agricultural efficiency, including financial incentives (such as low-cost financing), metering, and pro rata curtailments. Pricing is another tool for driving reductions in irrigation water demand.

Just as with municipal users, there is no single price that will drive agricultural users to install more water-efficient equipment, adjust crop mix, or fallow their fields. Farmers' pricing sensitivity depends on many factors. A meta-analysis of modeled and observed elasticity estimates for agricultural water users in the western United States demonstrates the great range of possible values (see Table 5). The variance between estimates of agricultural users' price sensitivity is explained by a number of factors, including the following:

- Price of irrigation water: The price at which elasticity is measured affects the outcome of the elasticity measurement; because the price elasticity of demand is a percentage, it changes along the demand curve. This leads to estimates that are more inelastic at lower prices and more elastic at higher prices, although generally inelastic across all ranges of prices tested.
- Crop value: The higher the value of crops, the higher the price for water a farmer is willing to pay; this variable has been found to be a significant factor.
- Crop sensitivity to irrigation interruptions: Tree nuts or fruits cannot be fallowed without losing the tree and forgoing future crop years.
- Climate: Intuitively, the less rainfall and the higher the average temperature, the more irrigation water is needed; these variables are not found, however, to have as significant an impact on elasticity of demand as the other variables discussed here.
- Type of study performed: Often, field experiments are undertaken with much lower prices for irrigation water, leading to a much lower price elasticity of demand; mathematical and econometric studies can impose higher prices for irrigation water than what is observed in reality, leading to higher elasticity estimates.

See Susanne M. Scheierling et al., *Irrigation Water Demand: a Meta-Analysis of Price Elasticities*, 42 Water Resour. Res. 1 (2006), *available at* http://onlinelibrary.wiley.com/doi/10.1029/2005WR004009/epdf.

Table 5: Irrigation Water Demand Elasticity Estimates

Type of study	Number of studies	Range of elasticity estimates	Texas-specific studies included
Mathematical programming	13	0.002–1.97	Yes
Field experiment	7	0.001–1.45	Yes
Econometric	4	0.03–1.69	Yes

See Scheierling et al., at 5.

In the long run, agricultural users are likely to exhibit greater price elasticity, as they can make investments in crop adjustments and irrigation technologies. Scheierling et al., at 8.

The ability of pricing to influence agricultural decisions is constrained by historical contracts whose prices have been set based on actual or subsidized costs decades ago. Those historical contracts may dictate prices for decades yet to come. For groundwater, the prices farmers pay may be set by blanket fees imposed by groundwater districts to reflect administrative or metering costs. In such cases, pricing may be prohibited from reflecting more than the actual cost of the district's operations, a price that is inherently too low to invoke a demand response.

For these reasons, it is possible that in the near future the power of pricing to shape agricultural demands lies not in regulatory pricing but in the financial gain a farmer may attain through the trading of water rights. During times of scarcity, farmers with senior water rights and low-value crops stand to profit more from monetizing their water rights than using that water in the growing season. Water rights can be leased for short periods of time or sold in perpetuity. Transaction volume of water trades in the western United States demonstrates the preference of most farmers to lease, rather than sell, these rights, both to ensure their future ability to farm and to enjoy the upside potential of the water rights market.

IV. Water Markets

Limited opportunities exist for water to be exchanged fluidly between those with water assets and economic or environmental interests in search of water. Trading water on river basins in Texas is a drawn-out procedure that can require more than a year of paperwork to execute, and groundwater permits in most aquifers are not exchangeable on a temporary basis. Only two basins in Texas have regulatory structures that actively promote water trading: the Rio Grande and the portion of the Edwards Aquifer regulated by the Edwards Aquifer Authority. There are no legal structures yet in place to facilitate market transactions between surface water users and groundwater owners, despite the strong physical connection of these two resources in many parts of the state. See Chapter 1 of this book for a discussion of the interconnectivity of surface water and groundwater; see Chapter 5 for a discussion of conjunctive management of these resources.

In such an environment, opportunities for holders of excess water to trade with willing buyers can evaporate before water can be traded. The result is needless waste of water on low-value economic activities by those who have water assets in order to protect existing rights, and uneconomic investment in supply augmentation by entities that might otherwise be able satisfy short-term or intermittent needs through water markets.

The potential scale of water markets is indicated by their growth in Australia. As of 2011, $2.4 billion (AUD) worth of water exchanges hands in Australian water markets each year. *See* National Water Commission, *Water Markets in Australia: a Short History* iii (2011), *available at* http://archive.nwc.gov.au/__data/assets/pdf_file/0004/18958/Water-markets-in-Australia-a-short-history.pdf [hereinafter Water Markets in Australia]. More than 90 percent of trading occurs in the southern Murray Darling Basin, where there is a wide geography of connected water resources. Water Markets in Australia, at 13. The proportion of water resources traded in Australia dwarfs the proportion of water traded in the United States: 11 percent of total allocated water was traded in the Murray-Darling Basin and more than 20 percent in New South Wales in 2009–10. Water Markets in Australia, at 13. The Australian markets have the closest thing to a spot market for water, with trades executed in as little as two days from order to delivery (compare this to the electricity spot market, where trades can be executed in fifteen minutes). Water markets in Australia have become so sophisticated that there is now a water futures market, where users can buy and sell future contracts for water.

It is important to note—and often overlooked in discussion of the Australian water markets—that water in Australia is not allocated as a fixed amount in perpetuity, but as a proportion of the total pool of water actually observed in the basin in any given year. *See* Water Markets in Australia, at 7–9. A user's allocation can therefore change year to year to reflect the change in water available due to natural hydrological variability. In a much more attenuated way, Texas also adjusts its water allocations to reflect actual volume in a basin: when the TCEQ has determined a basin to have experienced a new drought of record, total water rights within the basin will be reduced accordingly. However, a new drought of record may only occur once every fifty years, leading to the potential for substantial under- or overestimation of water availability in any given year. Additionally, this water allocation adjustment applies only to surface water supplies, not to groundwater.

A few recent developments in Texas may spur the uptake of markets as a means of allocating water. An April 2015 decision by the Corpus Christi court of appeals found that Texas cannot favor cities and power generators over more senior water rights holders during times of drought. *See Texas Commission on Environmental Quality v. Texas Farm Bureau*, No. 13-13-00415-CV, 2015 WL 1544586 (Tex. App.—Corpus Christi Apr. 2, 2015, no pet. h.). Whereas these privileged water users had previously been able to count on delivery of scarce water supplies no matter the seniority of their rights under the banner of public health and safety, they may now have little alternative but to lease water from senior rights holders during times of drought. A number of interests have sought to ease water trading, including the recently formed Texas Water Exchange, a private entity seeking to build a marketplace for water rights owners and water buyers to discover price and supply. During the 84th legislative session, House Bill 3298 was introduced, which would have directed the TWDB to undertake a study on the viability of a state water grid to facilitate the trading and transport of water, but the bill did not pass. *See* Tex. H.B. 3298, 84th Leg., R.S. (2015).

Two other types of water markets deserve attention as potential structures for managing water scarcity.

A. Onsite Water for Municipal Use

The economics of localized water capture and treatment technologies are now able to deliver clean water at costs on par with centralized delivery, creating the potential for water to be self-supplied or traded between municipal users. Membrane bioreactors can treat municipal wastewater for reuse onsite at the building, parcel, or neighborhood scale. *See* Johnson Foundation at Wingspread, *Optimizing the Structure and Scale of Urban Water Infrastructure: Integrating Distributed Systems* (2014), *available at* www.johnsonfdn.org/sites/default/files/reports_publications/CNW-

DistributedSystems.pdf. These technologies have been in use for more than a decade in numerous cities across the United States and have been shown to achieve up to 50–60 percent reduction in potable water demand from the centralized utility. *See* Ed Clerico, Natural Systems Utilities, *Water Reuse as Integrated Infrastructure*, *in* Growing Water for Central Texas (San Marcos, Tex., Apr. 29, 2015), at 21–22. While technically these treatment technologies can treat water to potable standards, only a handful of potable onsite water projects have been developed, at considerable time and expense to receive regulatory approval.

Sydney, Australia, estimates that half of its urban water demand could be supplied by onsite water recycling systems by 2030. *See* City of Sydney, *Decentralised Water Master Plan 2012–2030* (2012), *available at* www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0005/122873/Final-Decentralised-Water-Master-Plan.pdf. The city of San Francisco now permits developers to capture any type of water available onsite (including wastewater, foundation drainage water, and rainwater) for nonpotable reuse within their development or for trading with nearby properties. *See* San Francisco Public Utilities Commission, *Blueprint for Onsite Water Systems* (2014), *available at* www.sfwater.org/modules/showdocument.aspx?documentid=6057. These technologies can supply nonpotable water and sewer services at a cost of around $11 per 1,000 gallons, making them cost-competitive with centralized utilities in a number of cities across the United States. Clerico, at 25. As the cost of combined water and sewer rates continues to rise, onsite water will become more economically competitive, ushering in the potential for localized water trading to supplement municipal supplies. Seizing on this potential in Texas will require regulatory adaptation in many municipalities, which may prohibit onsite water recycling. See Chapter 24 for further discussion of reuse.

B. Recycled Water for Oil and Gas

The boom in hydraulic fracturing has greatly increased water consumption by the oil and gas industry in Texas's shale basins. While hydraulic fracturing accounts for only 2 percent of total state water use, it can account for a much higher volume of water use at the county level. *See* Jean-Philippe Nicot & Bridget R. Scanlon, *Water Use for Shale-Gas Production in Texas*, 46 Envtl. Sci. & Tech. 3580 (2012), *available at* www.beg.utexas.edu/staffinfo/Scanlon_pdf/Nicot+Scanlon_ES&T_12_Water%20Use%20Fracking.pdf. Oil and gas accounted for 40 percent of total water use in Wise County in 2010 and is expected to reach 89 percent of total water use in La Salle County by 2019. Nicot & Scanlon, at 3582, tbl. 2. In the Permian Basin, 87 percent of wells are in areas of high or extreme water stress. Monika Freyman, Ceres, *Hydraulic Fracturing & Water Stress: Water Demand by the Numbers* 55 (2014), *available at* www.ceres.org/resources/reports/hydraulic-fracturing-water-stress-water-demand-by-the-numbers.

Increasing strain on limited supplies for municipal and other industrial users has the potential to create more competition for the sources of fresh and brackish water that oil and gas producers have relied on, which could increase the cost to oil and gas producers. *See* Margaret A. Cook et al., *Who Regulates It? Water Policy and Hydraulic Fracturing in Texas*, 6 Tex. Water J. 45, 56 (2015), *available at* https://journals.tdl.org/twj/index.php/twj/article/view/7021/pdf_5. However, there is less competition for produced and flowback water created through the hydraulic fracturing process, creating the potential for markets to provide recycled water. Cook et al., at 56. Water recycling decreases both the volume of water that must be purchased and also the cost and risk of deep-well injection disposal of wastewater. Cook et al., at 56.

While the Bureau of Economic Geology predicts limited penetration of recycled oilfield water as a supply source, because of the low volume of water that returns to the surface during the hydraulic fracturing process, House Bill 2767 from the 2013 legislature removed some of the legal barriers that prevented growth of markets for recycled oilfield water. *See* Bridget R. Scanlon et al., *Will Water*

Scarcity in Semiarid Regions Limit Hydraulic Fracturing of Shale Plays?, Environmental Research Letters 9 (2014); Act of May 26, 2013, 83d Leg., R.S., ch. 209 (H.B. 2767) (codified at Tex. Nat. Res. Code §§ 122.001–.004). The bill transfers the ownership and liability of produced water from the producer to the recycler, and ultimately to the water purchaser. *See* Tex. Nat. Res. Code § 122.002.

As competition for other sources of water builds, and as potential regulatory action in response to seismic activity connected to deep water injection wells (the preferred method of oilfield wastewater disposal in Texas) emerges, the market for recycled water may yet grow. Cook et al., at 58. See Chapter 40 of this book for further discussion of the nexus between water resources and energy supply.

V. Conclusion

Historical economics of water have created the illusion of abundance. Deepening supply scarcity and escalating supply costs make pricing of water and facilitation of trade critical tools for ensuring water security in Texas. Pricing to reflect scarcity and markets that facilitate trade can function to manage demand and to drive the more economic use of existing water resources.

CHAPTER 37

Financing Water Projects

Jeffrey A. Leuschel[1]

The importance attached to the public financing of water projects in the state of Texas is readily apparent in the Texas Constitution. The Texas Constitution contains at least fifteen provisions that directly or indirectly relate to the creation of state, regional, and local entities to provide for the conservation and development of the water resources of the state. Twelve constitutional provisions relate specifically to programs administered by the Texas Water Development Board, and two constitutional provisions relate to the conservation and development of the natural resources of the state, including water by regional and local districts. State law has long granted cities the authority to own, operate, and finance water and sewer utility systems. This chapter will describe the law as it pertains to financing water projects at the state, regional, and local levels.

I. State Financial Assistance

A. Texas Water Development Board

In 1957, in response to the drought conditions that affected the state in the 1950s, the Texas Constitution was amended and article III, section 49-c, was added. This section authorizes the creation of the Texas Water Development Board (TWDB) to aid in the conservation and development of the water resources of the state, including the control, storing, and preservation of its stormwaters and flood waters and its rivers and streams by the construction of dams and reservoirs. It also grants the board the authority to issue state general obligation bonds to finance water projects.

The TWDB is the state agency that is primarily responsible for water planning and for administering water financing. Tex. Water Code § 6.011. The board has primary jurisdiction over the development of the state water plan, the administration of the state's various water assistance and financing programs, including those created by the Texas Constitution, and other duties as may be assigned to the board by law. Tex. Water Code § 6.012(a)(1), (2), (4). Under the provisions of House Bill 4, passed by the Texas legislature during the 2013 regular session and signed into law by Governor

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Rick Perry on May 28, 2013, several changes to the composition of the board were enacted. Effective September 1, 2013, the board consists of three members, appointed by the governor with the advice and consent of the Texas Senate. One member must have experience in the field of engineering, one member must have experience in the field of public or private finance, and one member must have experience in the field of law or business. The governor must make appointments to the board in such a manner that the members reflect the diverse geographic regions and population groups of the state and do not have any conflicts of interest prohibited by federal or state law. *See* Tex. Water Code § 6.052. A person is not eligible for appointment to the board if the person served on the board on or before January 1, 2013. Tex. Water Code § 6.053. Board members are appointed to serve staggered terms of six years, with the term of one member expiring February 1 of each odd-numbered year. A person appointed to the board may not serve for more than two six-year terms. Tex. Water Code § 6.056. The governor names a member to serve as chair at the will of the governor, and the board elects a vice-chair every two years. Tex. Water Code § 6.059. The board shall hold regular meetings and all hearings at times specified by board order and entered in its minutes. Tex. Water Code § 6.060. Each member of the board shall serve on a full-time basis. Tex. Water Code § 6.061.

House Bill 4 also required the governor to appoint one person to a term expiring February 1, 2015, one to a term expiring February 1, 2017, and one to a term expiring February 1, 2019. The terms of the six-member board expired September 1, 2013. The law also required the board to appoint an executive administrator by October 1, 2013. The person appointed as executive administrator could not be the person who served as executive administrator on January 1, 2013. *See* Tex. Water Code § 6.103.

1. General Obligation Bond Programs

Exercising its constitutional authority, the TWDB issues general obligation bonds and uses the bond proceeds to make loans to eligible political subdivisions. Because the state's general obligation bonds are backed by its full faith and credit, the bonds bear the credit rating of the state of Texas. The credit rating of Texas has been at or near triple-A, the highest credit rating for municipal securities issued by municipal bond rating agencies. As a result, when issued, the general obligation bonds pay interest at the lowest rates in the public debt markets. The board uses the bond proceeds to make loans to eligible political subdivisions by purchasing bonds issued by the political subdivisions. The board is able to purchase the political subdivision bonds at interest rates lower than those the subdivisions could obtain if they had attempted to sell their bonds in the public debt markets. This provides significant debt service savings to the political subdivisions.

Before 1985, the primary focus of the TWDB was to provide financial assistance by purchasing bonds from political subdivisions that were not able to access the public debt markets in an economical manner. These political subdivisions generally did not possess strong creditworthiness and therefore found it a hardship to borrow funds in the public debt markets. Beginning in 1985, amendments to the Texas Constitution and legislative changes expanded the authority of the board to purchase bonds from all political subdivisions of the state, not just from "hardship" political subdivisions. Article III, section 49-d-5, of the Texas Constitution was added in 1985, permitting the legislature to extend benefits to nonprofit water supply corporations, entities that are not political subdivisions of the state. In addition, the board was given the authority to issue revenue bonds, secured not by the full faith and credit of the state but from the repayments of loans made to political subdivisions through the purchase of their bonds by the board.

a. Texas Water Development Fund

Article III, section 49-c, of the Texas Constitution established the Texas Water Development Fund. The original constitutional amendment authorized the issuance of $200 million in general obligation bonds, secured by the full faith and credit of the state, to finance water projects. Subsequent amendments to the Texas Constitution expanded the authority of the board to finance projects through the issuance of general obligation bonds for wastewater conveyance and treatment (article III, section 49-d-1), flood control (article III, section 49-d-2), and agricultural water conservation projects (article III, section 50-d). Authorization for the state to acquire an interest in water and wastewater facilities is provided in article III, section 49-d.

Texas Water Code chapter 17, particularly subchapter B, provides the statutory framework for the issuance of general obligation bonds by the TWDB under the constitutional authority granted to finance water projects. The bonds, known as "Texas Water Development Bonds," are payable from moneys on deposit in the Texas Water Development Fund (including, if necessary, the first moneys coming into the treasury in each fiscal year, not otherwise appropriated by the Texas Constitution). *See* Tex. Water Code ch. 17, subch. C. The bonds are treated as parity obligations (meaning that no one Texas Water Development Bond has priority of payment over any other Texas Water Development Bond issued). *See* Tex. Water Code § 17.012. Texas Water Development Bonds are sold only through a competitive bid process (*see* Tex. Water Code § 17.020), at such prices as the board determines (*see* Tex. Water Code § 17.013), and pay interest annually or semiannually at either fixed or variable rates, as determined by the board or an authorized representative acting on its behalf (*see* Tex. Water Code § 17.014; *see also* Tex. Gov't Code ch. 1204). In addition, the board may sell refunding bonds to refund outstanding bonds issued under Water Code chapter 17, either by exercising authority granted by section 17.029 or by using the general authority granted to issuers of Texas public securities under Texas Government Code chapter 1207.

The various funds and accounts into which Texas Water Development Bond proceeds must be deposited and from which they must be expended are set forth in Water Code chapter 17, subchapter C. The Texas Water Development Fund contains several different accounts: the "water supply account," the "water quality enhancement account," the "state participation account," the "flood control account," and the "economically distressed areas account." *See* Tex. Water Code § 17.072. The named accounts identify the purpose or type of project eligible to be funded with proceeds of Texas Water Development Bonds.

i. Funding for Water Supply and Water Quality Enhancement

Water supply projects include any work designed to conserve and develop the water resources of the state, including the control, storage, and preservation of its stormwaters and flood waters and the waters of its rivers and streams for all useful and lawful purposes. Tex. Water Code § 17.001(7). The program for funding water supply projects is found in Texas Water Code chapter 17, subchapter D. Water quality enhancement projects include the construction of treatment works by political subdivisions. Tex. Water Code § 17.001(10). Water Code section 17.001(9) defines treatment works to include systems used in the storage and reclamation of waste, such as sewers, or in the recycling and reuse of water. The program for funding water quality enhancement projects from the Texas Water Development Fund is found in Water Code chapter 17, subchapter F. Both subchapters provide for procedures for political subdivisions to submit financial assistance applications to the board, board consideration and approval of financial assistance, including various requirements for permits, and limitations on the use of financial assistance provided to the political subdivisions.

ii. Economically Distressed Areas Program

In 1989, the Texas Constitution was amended to add section 49-d-7 to article III. This provision permits the TWDB to issue general obligation bonds to provide wholesale and retail water and wastewater facilities to economically distressed areas of the state, as defined by law. The ability of the board to provide financial assistance to fund projects to benefit economically distressed areas represents a significant public policy change in how the general obligation bond program is administered. General obligation bonds issued by the board are secured by the full faith and credit of the state, and they are payable from the first money coming into the state treasury in each fiscal year, not otherwise appropriated by the Texas Constitution. *See* Tex. Const. art. III, § 49-d-7; *see also* Tex. Water Code § 17.080. The lending program is structured so that the repayments from political subdivisions received by the board must be sufficient in whole to retire the general obligation bonds issued by the board.

However, proceeds from Texas Water Development Bonds issued to fund the economically distressed areas program are intended to provide financial assistance in the form of grants as well as loans. Therefore, the state expects to appropriate general revenue for payment of the Texas Water Development Bonds issued to fund the economically distressed areas program. These are referred to as EDAP bonds. Water Code sections 17.0111 and 17.0112 limit the principal amount of EDAP bonds that can be issued in a fiscal year. *See* Tex. Water Code §§ 17.0111, 17.0112. A separate "economically distressed areas program interest and sinking fund" was established within the Texas Water Development Fund, and money deposited in this fund is reserved solely for the payment of EDAP bond debt service. *See* Tex. Water Code § 17.0741. This separate interest and sinking fund serves to distinguish the traditional self-supporting general obligation programs of the board from the economically distressed areas program.

Water Code section 17.921 first defined economically distressed areas as those in which (1) water supply or sewer services were inadequate to meet minimal needs of residential users as defined by board rules; (2) financial resources were inadequate to provide water supply or sewer services to satisfy those needs; and (3) an established residential subdivision was located on June 1, 1989, as determined by the board. The initial focus for the economically distressed areas program was to serve communities known as *colonias* in the Rio Grande Valley.

Section 17.921 was amended in 2005 to expand the established residential subdivisions eligible to be treated as economically distressed areas to those areas in which an established residential subdivision was located on June 1, 2005. *See* Act of May 25, 2005, 79th Leg., R.S., ch. 927, § 5. Most of the funding to political subdivisions provided under the economically distressed areas program has been in the form of grants, and repayment is not expected. As of January 1, 2008, the board has issued approximately $238 million in EDAP bonds and the state has appropriated funds from the general fund to make debt service payments on the EDAP bonds. EDAP bonds are not considered on a parity with the outstanding Texas Water Development Bonds, and the program is governed by separate statutory and contractual arrangements, set forth in Water Code chapter 17, subchapter K.

When adopted, article III, section 49-d-7, limited the issuance of EDAP bonds to $250 million. In November 2007, the Texas Constitution was amended to add section 49-d-10 to article III, granting to the TWDB the authority to issue an additional $250 million in EDAP bonds as general obligation bonds of the state. *See* Tex. S.J. Res. 20, 80th Leg., R.S.

iii. State Participation Program

The economically distressed areas program is not the only state funding program administered by the TWDB in which there is no expectation of the recipient's immediately repaying the state for the costs of constructing the project. The "state participation" program is designed to provide funds to encourage optimal regional development of projects including the design, acquisition, lease, construction, reconstruction, development, or enlargement of reservoirs and stormwater retention basins for water supply, flood protection and groundwater recharge, facilities for the transmission and treatment of water, and treatment works. *See* Tex. Const. art. III, § 49-d; *see also* Tex. Water Code § 16.131.

There is one critical distinction between the state participation program and the EDAP bond program: the state has the expectation of recovering its investment in the projects funded through the state participation program. Before the TWDB can acquire a facility or an interest in a facility, it must affirmatively find that (1) it is reasonable for the state to recover its investment in the facility, (2) the cost of the facility exceeds the current financing capabilities of the area involved and optimal regional development could not be achieved without state participation, (3) the public interest will be served by the acquisition of the facility, and (4) the facility contemplates the optimal regional development reasonably required under existing circumstances. Tex. Water Code § 16.135. Local participation also is required for the board to fund the state's share of the costs of a facility. The board may acquire all or part of any authorized facility to the extent that it finds that a political subdivision (1) is willing and reasonably able to finance that portion of the cost of the facility not acquired by the board, (2) has obtained all necessary permits, (3) has proposals that are consistent with the state's water plan, and (4) has a water conservation program for the more efficient use of water. Tex. Water Code § 16.136.

Subchapter F of chapter 16 of the Texas Water Code establishes the authority of the TWDB to sell or lease facilities acquired through the state participation program, which enables the state to recover its initial investment made through the initial financing of the facilities. The sale of facilities is consistent with the state's intention not to permanently acquire water and wastewater facilities but to provide financial assistance to local and regional political subdivisions to construct the facilities.

b. Texas Water Development Fund II

As the Texas Water Development Fund grew and the bond authority granted to the TWDB expanded, elements governing the operation and administration of the Texas Water Development Fund became more burdensome. Article III, section 49-c, of the Texas Constitution requires the board to deposit sufficient money into the interest and sinking fund to pay the interest and principal becoming due during the ensuing year and to establish and maintain a reserve in the interest and sinking fund equal to the average annual principal and interest requirements on all outstanding Texas Water Development Bonds. This section further requires the board to notify the comptroller of public accounts no later than the fifteenth day after the end of each fiscal year of the amounts needed to pay the interest on and principal of all Texas Water Development Bonds coming due during the fiscal year and the average annual principal and interest requirements on all outstanding bonds. The comptroller then makes transfers as necessary to pay these amounts as well as all collection charges and exchanges on the bonds.

The funding requirements of this section result in money well in excess of current debt service requirements being deposited to the credit of the Texas Water Development Fund. During the early years of the general obligation bond program, this approach was prudent as a means to avoid using general revenues to pay debt service on the bonds, but as the programs administered by the board matured, the repayments received by the board resulted in the accumulation of a large surplus. Money in the interest and sinking fund may be used only to pay debt service on Texas Water Development Bonds. Financial assistance programs cannot be funded with this accumulated surplus.

Other constitutional restrictions also affected the ability of the board to administer the financial assistance programs. Water quality enhancement projects funded under article III, section 49-d, of the Texas Constitution cannot be funded with the proceeds of bonds issued under article III, section 49-c, to fund water supply projects, or vice versa. When the proceeds to fund water quality enhancement projects were expended, the board could not use unexpended water supply project proceeds to fund water quality enhancement projects. This resulted in the board's issuing bonds to fund water quality enhancement projects while unspent proceeds remained from bonds issued to fund water supply projects.

In 1997, the Texas Constitution was amended and article III, section 49-d-8, was added. This section established a new fund called Texas Water Development Fund II (also referred to as "Development Fund II"). Development Fund II is separate and distinct from the Texas Water Development Fund. It may be used for any one or more of the purposes currently or formerly authorized by article III, sections 49-c, 49-d, 49-d-1, 49-d-2, 49-d-5, 49-d-6, and 49-d-7, of the Texas Constitution. Pursuant to the requirements of article III, section 49-d-8, three accounts are established within Development Fund II: the "state participation account" (*see* Tex. Water Code §§ 17.956, 17.957), the "economically distressed areas program account" (*see* Tex. Water Code §§ 17.956, 17.958), and the "financial assistance account" (*see* Tex. Water Code §§ 17.956, 17.959). Pursuant to article III, section 49-d-8, the TWDB is authorized, at its discretion, to issue general obligation bonds for one or more accounts of Development Fund II in an aggregate principal amount equal to the amount of bonds previously authorized under applicable sections of the Texas Constitution less the amount of bonds issued under those sections to augment the Texas Water Development Fund.

The amendment gives flexibility to the TWDB in administering the water projects in the state and provides the mechanism for the eventual transfer of the moneys and assets on deposit in the Texas Water Development Fund to the credit of Development Fund II. The funding requirements of the interest and sinking fund contained in article III, section 49-c, applicable to Texas Water Development Bonds are not included in article III, section 49-d-8, and do not apply to bonds issued to augment Development Fund II. Money to pay debt service on bonds issued to augment Development Fund II is deposited as needed into the appropriate account to pay debt service when due. *See* Tex. Water Code § 17.963.

In addition, under article III, section 49-d-8, the board may enter "bond enhancement agreements" to provide additional security for its general obligation bonds and have the payment obligations under the bond enhancement agreements be treated as a general obligation of the state. Water Code section 17.954(c) defines bond enhancement agreements to include agreements to obtain a letter of credit or line of credit and agreements to provide a hedge or interest rate management, such as interest rate swap agreements or other cash flow exchange agreements.

Article III, section 49-d-8, also declares that since it was intended only to establish a basic framework and not to be a comprehensive treatment of Development Fund II, the legislature is granted full power to implement the amendment, including the power to delegate authority to the TWDB as it believes necessary. This provides the legislature the authority to grant the board greater flexibility to administer the financial assistance programs than was available to administer the Texas Water Development Fund.

Subchapter L was added to chapter 17 of the Water Code to implement the provisions of this section. Moneys on deposit in the state participation account and the economically distressed areas program account of Development Fund II are to be used for the parallel programs originally administered under the Texas Water Development Fund. *See* Tex. Const. art. III, § 49-d-8(a); *see also* Tex. Water Code § 17.971. Moneys on deposit in the financial assistance account, however, may be used by the TWDB for any one or more of the purposes described in article III, section 49-d-8, other than for state participation or economically distressed areas program purposes. This allows the board to use bond proceeds flexibly to fund water supply, water quality enhancement, and flood control projects in the manner the board determines necessary for the administration of Development Fund II and to implement the stated objectives of the constitutional framework governing the board.

General obligation bonds issued to augment Development Fund II are known as "Water Financial Assistance Bonds." Tex. Water Code § 17.952. Consistent with the constitutional provisions supporting Texas Water Development Bonds, Water Financial Assistance Bonds also are supported, if necessary, from the first moneys coming into the treasury each fiscal year, not otherwise appropriated by the Texas Constitution. *See* Tex. Water Code § 17.963.

Unlike Water Development Bonds, Water Financial Assistance Bonds may be sold at either a public (or competitive) or private (or negotiated) sale. The bonds may be in the form and denominations provided by the board and issued in the manner and under the terms, conditions, and details provided by board resolution. Tex. Water Code § 17.953. In addition, rather than specifying a time frame for coordinating transfers with the comptroller of public accounts, Water Code section 17.963(a) provides that the board shall cooperate with the comptroller to develop procedures for the payment of debt service on Water Financial Assistance Bonds, thereby providing the legal authority to streamline the transfer and payment process and eliminating the need to provide for additional reserves to make payments on Water Financial Assistance Bonds.

In 2006, completing a process that began in 1997, the TWDB provided for the retirement of the last outstanding Texas Water Development Bonds payable from money in the interest and sinking funds in the Texas Water Development Fund and transferred the final remaining moneys and assets in the Texas Water Development Fund to Development Fund II. Although no Texas Water Development Bonds remain outstanding, the Texas Water Development Fund is still in effect. The flexibility in funding projects and paying debt service on Water Financial Assistance Bonds makes it unlikely, however, that the board will issue Texas Water Development Bonds in the future.

In 2001, article III, section 49-d-9, was added to the Texas Constitution. This section authorizes the TWDB to issue general obligation bonds, at its discretion, for one or more accounts of Development Fund II, in an amount not to exceed $2 billion. Of this additional general obligation bond authorization, $50 million shall be used for the "Water Infrastructure Fund." As of January 1, 2008, there exists approximately $2,180,000,000 in authorized but unissued general obligation bonds that may be issued by the TWDB, of which approximately $262 million is obligated by article III, section 49-d-7, to the economically distressed areas program. The $262 million figure includes the authority granted by the approval of the 2007 constitutional amendment to issue additional EDAP bonds. *See* Tex. Const. art. III, § 49-d-10.

c. Agricultural Water Conservation Fund

Article III, section 50-d, of the Texas Constitution authorizes the TWDB to issue up to $200 million in general obligation bonds to provide moneys for deposit into the Agricultural Water Conservation Fund. Texas Water Code chapter 17, subchapter J provides for the issuance of Agricultural Water Conservation Bonds and the administration of the funding program. Proceeds of Agricultural Water Conservation Bonds are to be used to make loans and grants to fund conservation programs or conservation projects. *See* Tex. Water Code §§ 17.897–.899. Conservation programs include technical assistance, research, and educational programs relating to agricultural water use and conservation. Tex. Water Code § 17.897. Conservation projects include projects that improve water use, prepare irrigated land for conversion to dryland conditions, and prepare dryland for more efficient use of natural precipitation. Tex. Water Code § 17.898. As of January 1, 2008, the board has issued $35,160,000 in Agricultural Water Conservation Bonds to fund conservation programs and conservation projects.

2. *Revenue Bond Programs*

In addition to general obligation bonds, which are secured by and payable from the full faith and credit or taxing power of the issuer, state agencies and political subdivisions issue revenue bonds, which are secured by and payable from a designated revenue source. Utility system revenues are one example of a designated revenue source used to secure and pay revenue bonds. Before 1987, the

TWDB possessed the legal authority to issue only general obligation bonds. In 1987, subchapter I was added to chapter 17 of the Texas Water Code and a new fund, the Texas Water Resources Fund, was created.

a. Texas Water Resources Fund

Revenue bonds may be issued by the board to provide money for the Texas Water Resources Fund; to acquire interests in water supply projects, treatment works, and flood control projects; and to provide financial assistance to political subdivisions, state agencies, or nonprofit water supply corporations. Money in the Texas Water Resources Fund may be used only to provide state matching funds for federal funds provided to any state revolving loan fund created under Texas Water Code chapter 15, subchapter J; to provide financial assistance to water supply corporations; to provide financial assistance for the construction of water supply projects and treatment works; and to provide financial assistance for water supply corporations in economically distressed areas to the extent the board can make that assistance without adversely affecting the current or future integrity of the Texas Water Resources Fund or of any other financial assistance program of the board. *See* Tex. Water Code § 17.853(c).

b. Water Pollution Control State Revolving Fund

The granting of authority to the TWDB to issue revenue bonds was in part in response to the enactment by Congress of the Water Quality Act of 1987 (33 U.S.C. §§ 1251–1327). This federal law authorized the creation of a loan program to provide financial assistance to state agencies and political subdivisions within the states for publicly owned wastewater treatment works, including stormwater and nonpoint source pollution projects. The Act authorized the U.S. Environmental Protection Agency to make grants to states that had established perpetual revolving loan funds to provide financial assistance as described in the Act. Pursuant to 33 U.S.C. section 1382(b)(2), the federal government provides 80 percent of the funds for deposit into the state revolving fund, to be matched by a 20 percent state contribution. Under the Act, the revolving fund established by a state is maintained in perpetuity, and repayments from loans remaining after the payment of debt service on board bonds issued to fund the revolving fund are to be loaned to new borrowers.

In 1987, the TWDB established the State Water Pollution Control Revolving Fund and provided the initial state matching funding through the issuance of Texas Water Development Bonds. Since 1992, the board has issued revenue bonds to provide funds for the State Water Pollution Control Revolving Fund, providing funding for low-interest loans to Texas political subdivisions to finance improvements to publicly owned wastewater treatment works. *See* Tex. Water Code ch. 15, subch. J. The federal funds made available under the Water Quality Act of 1987 enable the board to subsidize the lending rate on the obligations it purchases from participating political subdivisions. Those subdivisions realize significant savings through the State Water Pollution Control Revolving Fund program through interest rates that are as much as 170 basis points (1.70 percent) lower than the political subdivision's alternative cost of funds if it sold its bonds in the public debt market.

The TWDB uses repayments of these loans by political subdivisions to pay the debt service on the revenue bonds that the board issued to provide funding to the State Water Pollution Control Revolving Fund, as well as to make future loans to participating political subdivisions and pay the administrative costs of the program. *See* Tex. Water Code § 15.604. Since the inception of the State Water Pollution Control Revolving Fund, and capitalizing on the ability to leverage the grants from the U.S. Environmental Protection Agency, the board has made more than $3.5 billion in loans to political subdivisions throughout the state.

c. Drinking Water State Revolving Fund

A similar federal funding program was established in 1996 for providing federal capitalization grants to the states for the purpose of assisting communities to comply with federal drinking water regulations. *See* 42 U.S.C. §§ 300f–300j-26 (Safe Drinking Water Act as reauthorized in 1986 and amended in 1996). As a condition for receiving a federal capitalization grant, a state is required to establish a drinking water state revolving fund into which the capitalization grant must be deposited. The state also must provide state matching funds equal to at least 20 percent of the capitalization grant for deposit into the drinking water state revolving fund and comply with certain other requirements of the Safe Drinking Water Act. Money in the drinking water state revolving fund may be used to provide financial assistance to community water systems and nonprofit community water systems in a number of ways, including making direct loans, retiring existing debt through refinancing, and providing loan guarantees for expenditures that facilitate compliance with the primary national drinking water regulations.

Under the Act, no less than 15 percent of the money credited to the drinking water state revolving fund must be provided to public water systems that serve fewer than 10,000 persons, to the extent such funds can be obligated for eligible projects. As much as 30 percent of the federal capitalization grant may be used for loan subsidies (including forgiveness of principal) for disadvantaged communities. Additional set-asides may be made for source water protection loans, programs for capacity development, and state administration of the Act. Pursuant to the Act, the term of a loan cannot exceed twenty years from the completion of a project, except that loans to disadvantaged communities may have a term not to exceed thirty years. As is the case with the clean water state revolving fund, the drinking water state revolving fund is to be created in perpetuity to fulfill the purposes outlined in the Act. Texas established a safe drinking water state revolving fund under the authority of Texas Water Code chapter 15, subchapter J, and since 1998 has provided low-interest loans to communities of interest in an aggregate amount in excess of $250 million.

3. Texas Water Resources Finance Authority; Powers and Relationship to Texas Water Development Board

Chapter 20 of the Texas Water Code grants the TWDB the authority to sell political subdivision bonds acquired with the proceeds of Texas Water Development Bonds or Water Financial Assistance Bonds. *See* Tex. Water Code §§ 17.0871, 17.181, 17.881, 17.968. Specifically, the board may sell political subdivision bonds to the Texas Water Resources Finance Authority, which was created by the legislature in 1987. The authority was created to encourage the conservation and development of the water resources of the state, to encourage the optimal development of reservoir sites in the state, to protect the quality of the water resources of the state, and to aid in flood control and drainage projects throughout the state. In addition, the legislature found that the existing mechanisms to implement these purposes are enhanced by the authority's financing mechanism and that the creation of the authority would increase the availability of financing through the purchase of political subdivision bonds. *See* Tex. Water Code § 20.001(b), (c).

The Texas Water Resources Finance Authority is governed by a board of directors composed of the members of the TWDB. Tex. Water Code § 20.012. The authority may purchase political subdivision bonds issued for the purpose of financing or refinancing projects for water resource development and conservation, water quality enhancement, flood control, drainage, subsidence control, recharge, chloride control, agricultural soil and water conservation, desalination, or any combination of these purposes, including political subdivision bonds owned by the board. Tex. Water Code § 20.071. The authority is authorized to issue revenue bonds to acquire political subdivision bonds. Tex. Water Code § 20.074(a). The authority must enter into contracts with the TWDB with respect to the purchase of political subdivision bonds and the administration of the portfolio of political subdivision bonds so acquired. *See* Tex. Water Code § 20.075; *see also* Tex. Water Code §§ 20.043, 20.071.

In 1989, the Texas Water Resources Finance Authority issued revenue bonds to acquire political subdivision bonds from the TWDB. The repayments to be made under the terms of the political subdivision bonds provide the revenues to the authority to pay the debt service on its bonds. The purchase price paid by the authority enabled the board to establish an escrow to retire Texas Water Development Bonds issued to provide the funds to acquire the political subdivision bonds. The purchase price also includes future payments to the board, representing amounts received from the repayment of political subdivision bonds in excess of coverage requirements maintained under the terms of the financing documents authorizing the issuance of the authority's revenue bonds. The future payments received by the board are used in part to fund the economically distressed areas interest and sinking fund within the Texas Water Development Fund and the economically distressed areas program account within Development Fund II. As a result, the general revenues needed to pay the debt service on EDAP bonds are reduced. In 1999, the authority issued refunding bonds to refinance and restructure the 1989 issue, affording additional benefits to the state and the political subdivisions whose bonds were owned by the authority.

4. Other Texas Water Development Board Assistance Programs

a. Rural Water Assistance Fund

In 2001, the legislature established the Rural Water Assistance Fund. *See* Tex. Water Code § 15.993. The fund is administered by the TWDB. It was created to provide low-interest loans to rural political subdivisions for water or water-related projects and for water quality enhancement projects, including the purchase of well fields, the purchase or lease of rights to produce groundwater, onsite or wetland wastewater treatment facilities, and interim financing of construction projects. Rural political subdivisions are nonprofit water supply or sewer service corporations, water districts, or municipalities that have a service area of less than 10,000 population or that otherwise qualify for financing from a federal agency; or a county in which no urban area exceeds 50,000 population. Tex. Water Code § 15.992(4). The Rural Water Assistance Fund has been funded with proceeds from Water Financial Assistance Bonds issued under authority of article III, section 49-d-8, of the Texas Constitution.

b. Water Infrastructure Fund

In 2001, the legislature established the Water Infrastructure Fund. *See* Tex. Water Code § 15.973. Article III, section 49-d-9, of the Texas Constitution requires that $50 million of the $2 billion of the bonds therein authorized must be used for the Water Infrastructure Fund. In addition to funding traditional water and wastewater projects, money in the Water Infrastructure Fund may be used to provide financial assistance to an eligible political subdivision to fund loans and grants for projects that conserve and develop the water resources of the political subdivision for the ultimate benefit of the public and that develop and diversify its local economy, consistent with the terms and conditions set forth in a program adopted by the governing body of the political subdivision. Tex. Water Code § 15.979. An eligible political subdivision may establish economic development programs and make loans and grants of public funds to assist in providing projects within the political subdivision that conserve and develop the water resources of the political subdivision for the ultimate benefit of the public. Tex. Water Code § 17.980. The authority granted to a political subdivision to make loans and grants constitutes a program in furtherance of the public purposes provided by article III, section 52-a, of the Texas Constitution. Financial assistance received by an eligible political subdivision from the Water Infrastructure Fund may be used to make loans or grants to persons for projects that the political subdivision finds will conserve and develop the water resources of the political subdivision for the ultimate benefit of the public and assist in diversifying and developing the economy of the political subdivision and the state. *See* Tex. Water Code § 15.974. In creating the Water Infrastructure Fund, the legislature recognized the vital role a reliable water supply plays in attracting and maintaining business activity in the state. *See* Tex. Water Code § 15.972. In the 2007 legislative session, General Appropriations Act money was appropriated to the board to support the issuance of approximately $450 million in Water Financial Assistance Bonds in the 2008–2009 biennium to initiate and augment the Water Infrastructure Fund, in furtherance of implementing the state water plan and its objectives.

c. Miscellaneous Texas Water Development Board Financial Assistance Programs

In addition to the programs described above, the TWDB administers numerous grant programs, dealing with such diverse water issues as regional water facility planning (*see* Tex. Water Code § 15.406), community self-help programs (*see* Tex. Water Code ch. 15, subch. P), and water research programs (*see* Tex. Water Code § 15.404). Through funds made available by the federal government, the board administers the *colonia* plumbing loan program to enable low-income residents of *colonias* to connect their homes with existing water and sewer systems. *See* Tex. Water Code ch. 15, subch. L. The board works with the Federal Emergency Management Agency to develop flood mitigation programs to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.

d. The American Recovery and Reinvestment Act of 2009

On February 17, 2009, the American Recovery and Reinvestment Act of 2009 (ARRA) was signed into law. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, Title III, § 3001(a)(1) (2009). The TWDB was the state agency that administered the moneys made available by ARRA to the U.S. Environmental Protection Agency to fund eligible drinking water and wastewater projects in Texas. The TWDB was responsible for disbursing $326 million to fund the eligible drinking water and wastewater projects.

The TWDB disbursed the ARRA funds through the State Water Pollution Control State Revolving Fund and the Drinking Water State Revolving Fund programs. Of the $326 million allocated to Texas, $172 million was contracted for disbursement to political subdivisions for wastewater treatment projects and $154 million was contracted for disbursement to political subdivisions for drinking water projects. All of the ARRA moneys were under contract for disbursement by the TWDB on or before February 17, 2010; $217 million in projects were funded through grants, and $109 million in projects were funded through zero-interest-bearing loans. The funds contracted to be expended by grants will not be repaid. The funds contracted to be expended through loans will be repaid, and the repayments will be deposited to the appropriate accounts within the State Water Pollution Control State Revolving Fund and the Drinking Water State Revolving Fund, and it is expected that the repayments will remain in, and be used in accordance with, the rules governing the respective revolving fund programs.

5. Financial Assistance Application Process

The TWDB has established an application procedure for eligible political subdivisions to seek financial assistance. Financial assistance made to eligible political subdivisions takes the form of loans, through the purchase of bonds and other obligations, and grants. Each financing program administered by the board is governed by rules that address the receipt and review of applications for financial assistance. Information about the different financial assistance programs is provided on the TWDB's Web site at www.twdb.texas.gov/financial/programs/index.asp.

The board may purchase bonds or other obligations of eligible political subdivisions with a maturity date of not more than fifty years from their date of issuance (*see* Tex. Water Code § 17.175), bearing interest at rates determined by the board (*see* Tex. Water Code § 17.176). The political subdivision bonds may be secured by the net revenues of the project to be financed, ad valorem taxes levied by the political subdivision, a combination of taxes and net revenues, and revenues from other available sources. The board may further require that the security for the political subdivision bonds it purchases be a combination of taxes and revenues as the board considers necessary to fully secure the investment. *See* Tex. Water Code § 17.179.

No acquisition of political subdivision bonds is permissible unless the political subdivision has approved the application for financial assistance at an open meeting of the governing body of the political subdivision. *See* Tex. Water Code § 17.1765. All political subdivision bonds to be purchased by the board must be approved by the attorney general and registered by the comptroller of public accounts. Tex. Water Code § 17.177.

The rules of the board detail the requirements of the application for financial assistance. *See* 31 Tex. Admin. Code § 363.12. Under section 363.12, general, legal, and fiscal information must be included in an application. Required information includes the total cost of the project, the amount of financial assistance being requested, a description of the project, the source of repayment of the financial assistance, the financing plan for repaying the total cost of the project, and the most recent annual financial statements and latest monthly and year-to-date reports for the general fund and utility fund of the applicant. 31 Tex. Admin. Code § 363.12(2)(A). The application must contain a preliminary engineering feasibility report in accordance with section 363.13, an environmental assessment in accordance with section 363.14, and a required water conservation plan in accordance with section 363.15. *See* 31 Tex. Admin. Code § 363.12(2)(B), (C), (D).

The preliminary engineering feasibility report must include the following: (1) a description and purpose of the project, (2) the entities to be served and current and future populations, (3) the cost of the project, (4) a description of alternatives considered and reasons for the selection of the proposed project, (5) sufficient information to evaluate the engineering feasibility of the project, and (6) maps and drawings sufficient to locate and describe the project area. 31 Tex. Admin. Code § 363.13.

If the state or federal government prepares or requires an environmental assessment (EA) or an environmental impact statement (EIS) for substantially the same project, the applicant for financial assistance must file the EA or the EIS with the TWDB. 31 Tex. Admin. Code § 363.14(d). The rules also require an applicant, before or concurrently with the submission of an application, to submit preliminary data on any known environmental, social, and permitting issues that may affect the alternatives considered for implementation of the project or that may impact the existing environment in a manner that is the subject of any environmental regulation. 31 Tex. Admin. Code § 363.14(e)(3). This requirement is designed to provide sufficient information to the executive administrator for a determination of the necessary level of review for the proposed project. 31 Tex. Admin. Code § 363.14(e).

The levels of review are as follows: "categorical exclusion review," "mid-level review," or "full review." 31 Tex. Admin. Code § 363.14(f). If the executive administrator determines that the project would not appear to cause significant environmental impacts under any environmental regulation, a categorical review will be performed. If the project would cause only significant environmental impacts that are limited in number or scope or that may be readily avoided, minimized, or mitigated, the executive administrator must do a mid-level review. Only if the project would appear to cause extensive, significant impacts that are not readily avoided, minimized, or mitigated, or would appear to involve a probable or known significant public controversy relating to environmental or social impacts, is a full review under section 363.14 required. *See* 31 Tex. Admin. Code § 363.14(f).

Under the successive rounds of state water planning (see Chapter 20 of this book for a detailed discussion of state and regional water planning), conservation of water resources is taking on greater significance in the review of applications by the board. See Chapters 2 and 23 of this book for discussions of water conservation. For example, water conservation efforts are taken into consideration when the TWDB has limited resources for financial assistance. *See* 31 Tex. Admin. Code § 363.19. This emphasis on water conservation is also reflected in 31 Tex. Admin. Code § 363.15, requiring an applicant for financial assistance to submit a water conservation plan with the application (although there are some exceptions to this requirement). Generally, the water conservation plan must include an evaluation of the applicant's water and wastewater system and consumer water use characteristics, identify water conservation opportunities, and set goals to be accomplished. *See* 31 Tex. Admin. Code § 363.15(b). Minimum elements of the plan are established in section 363.15(b)(1) and include a utility profile including data on population, consumers, water use, water supply system, and wastewater system; quantified five-year and ten-year targets for water savings; a schedule for achieving the targets; water loss; a water rate structure that is not "promotional" of water use; how the implementation and enforcement of the conservation is effected; and a current drought contingency plan that includes specific water supply or water demand management measures. *See* 31 Tex. Admin. Code § 363.15(b)(1).

TWDB regulations also set the procedures regarding loan closings, including the purchase of bonds from political subdivisions. Instruments required at the time of closing include (1) proof that the applicant authorized the issuance of debt; (2) information about the applicant's water conservation program; (3) the approving opinion of the attorney general; (4) bond counsel's unqualified opinion of that the bonds are valid and binding obligations of the political subdivision, and that the interest on the bonds is exempt from federal income taxation; and (5) an executed escrow agreement. *See* 31 Tex. Admin. Code § 363.42(a).

Should the political subdivision default on the payment of the debt service on the bonds, or otherwise default as defined in the proceedings authorizing the issuance of the bonds, the attorney general must institute proceedings by mandamus or other legal remedies to compel performance. These proceedings must be heard in a Travis County district court. *See* Tex. Water Code § 17.180.

In 2011, Senate Bill 660 was enacted into law, with an effective date of September 1, 2011. S.B. 660 provides greater specificity regarding the enforcement actions against entities that default under financial assistance programs administered by the TWDB. The TWDB may request the attorney general in the event of a default to seek a writ of mandamus to compel a "financial assistance program recipient" (a recipient or beneficiary of funds administered by the TWDB under the Water Code) or its officers, agents, and employees to cure the default or any other legal or equitable remedy that TWDB and the attorney general consider necessary and appropriate. Default is defined to include the following: defaults in the payment of debt service on obligations acquired by the TWDB; the failure to perform any covenant related to obligations acquired by the TWDB; the failure to perform any term of a loan, grant, or financing agreement; or any other failure to perform an obligation, breach of a term of an agreement, or default as provided by any proceeding or agreement evidencing an obligation or agreement of a recipient, beneficiary, or guarantor of financial assistance provided by the TWDB. *See* Tex. Water Code § 6.114.

In addition, S.B. 660 provides that if a financial assistance program recipient is not a municipality or county, or a district or authority created under Article III, Section 52, or Article XVI, Section 59, of the Texas Constitution, at the request of the TWDB the attorney general shall bring suit in a district court in Travis County for the appointment of a receiver to collect the assets and carry on the business of the financial assistance program recipient. The receiver would have the power or duty to perform audits, raise rates, fund reserves, make payments on obligations acquired by the TWDB, and take other actions necessary to prevent or remedy the default. *See* Tex. Water Code § 6.115. This power would principally apply to actions against nonprofit water supply corporations who receive financial assistance from the TWDB.

B. Constitutional Amendment of November 5, 2013

On November 5, 2013, Texas voters approved adding sections 49-d-12 and 49-d-13 to article III of the Texas Constitution. Section 49-d-12 creates the State Water Implementation Fund for Texas (SWIFT). Section 49-d-13 creates the State Water Implementation Revenue Fund for Texas (SWIRFT). Both SWIFT and SWIRFT will be administered by the TWDB, or its successor, for the purpose of implementing the state water plan.

In accordance with House Bill 1025, adopted by the Texas Legislature in its 2013 regular session, $2 billion is appropriated from the state's economic stabilization fund for transfer to SWIFT.

House Bill 4, adopted by the Texas Legislature in its 2013 regular session, addresses how SWIFT and SWIRFT may be administered and how projects to implement the state water plan may be prioritized. Texas Water Code chapter 15 was amended to add subchapters G and H, which pertain to SWIFT and SWIRFT, respectively.

Funds in SWIFT shall be held and invested by the Texas Treasury Safekeeping Trust Company (Trust Company). Payments to the TWDB pursuant to a bond enhancement agreement may be made no more often that twice per fiscal year. *See* Tex. Water Code § 15.433. Bond enhancement agreements may be used to support the payment of debt service on bonds if the proceeds of the sale of the bonds have been or will be deposited to the credit of SWIRFT, the Water Infrastructure Fund, the Rural Water Assistance Fund, the State Participation Account within Development Fund II, or the Agricultural Water Conservation Fund. *See* Tex. Water Code § 15.435(b).

At the direction of the TWDB, the Trust Company shall make disbursements from the SWIFT to another fund or account pursuant to a bond enhancement agreement in amounts the TWDB determines are needed for debt service payments on or security provisions of the TWDB's general obligation bonds or revenue bonds, after considering all other sources available for those purposes in the respective fund or account. Disbursements may be made under a bond enhancement agreement to the TWDB for the support of bonds the proceeds of which are used to provide financial assistance in the form of a loan bearing an interest rate of not less than 50 percent of the then-current interest rate available to the TWDB; a loan to finance a facility with a term not to exceed the lesser of the expected useful life of the facility or thirty years; a deferral of loan repayments; incremental repurchase terms for an acquired facility; or a combination of the above-described methods. *See* Tex. Water Code § 15.435(c).

Limitations are imposed on the types of projects to be supported from SWIFT; the TWDB shall undertake to apply not less than 10 percent to support projects that are for rural political subdivisions or agricultural water conservation, and 20 percent to support projects, including agricultural irrigation projects, that are designed for water conservation or reuse. *See* Tex. Water Code § 15.434.

House Bill 4 creates the State Water Implementation Fund for Texas Advisory Committee. The committee consists of seven persons: the comptroller, or a person designated by the comptroller; three members of the senate appointed by the lieutenant governor, including a member of the committee of the senate having primary jurisdiction over matters relating to finance and a member of the committee of the senate having primary jurisdiction over matters relating to natural resources; and three members of the house of representatives appointed by the speaker of the house, including a member of the committee of the house having primary jurisdiction over matters relating to appropriations and a member of the committee of the house having primary jurisdiction over matters relating to natural resources. The committee shall submit comments and recommendations to the TWDB regarding the use of money in SWIFT for use by the TWDB in adopting rules and policies and procedures. *See* Tex. Water Code § 15.438.

The TWDB shall adopt rules providing for the use of money in SWIFT that are consistent with Texas Water Code chapter 15, subchapter G, including rules establishing standards for determining whether projects meet the criteria for rural political subdivision projects and water conservation or reuse projects, and specifying the manner for prioritizing projects included in the state water plan for the purpose of providing financial assistance under subchapter G. *See* Tex. Water Code § 15.439.

The TWDB shall adopt policies and procedures for the purpose of mitigating or minimizing the adverse effects, if any, of federal laws and regulations relating to income taxes, arbitrage, rebates, and related matters that may restrict the TWDB's ability to freely invest all or part of SWIFT or to receive and retain all the earnings from SWIFT. *See* Tex. Water Code § 15.441.

SWIRFT may be used by the TWDB only for the purpose of providing financing for projects included in the state water plan that are authorized by Texas Water Code chapter 15, subchapter Q or R; Texas Water Code chapter 16, subchapter E or F; or Texas Water Code chapter 17, subchapter J. *See* Tex. Water Code § 15.474.

Moneys in SWIRFT consist of moneys transferred or deposited to the credit of SWIRFT by law; the proceeds of any fee or tax imposed by the state that by statute is dedicated for deposit to the credit of SWIRFT; any other revenue that the legislature by statute dedicates for deposit to SWIRFT; investment earnings on amounts credited to SWIRFT; bond proceeds, including proceeds from revenue bonds issued by the TWDB under Texas Water Code chapter 15, subchapter H, that are designated by the TWDB for the purpose of providing money for SWIRFT; repayments of loans made from SWIRFT; money from the sale, transfer, or lease of a project acquired, constructed, reconstructed, developed, or enlarged with money from SWIRFT; and money disbursed to SWIRFT from SWIFT. *See* Tex. Water Code § 15.472.

The TWDB may issue revenue bonds for the purpose of providing money for SWIRFT and to refund revenue bonds or bonds and obligations issued or incurred in accordance with other provisions of law. Revenue bonds do not constitute indebtedness of the state as prohibited by the constitution. *See* Tex. Water Code § 15.475. The terms and conditions relating to the issuance of revenue bonds are set forth in Water Code section 15.475(g).

II. Regional Authorities and Districts

This section will discuss laws relating to the powers of regional authorities and districts to develop the water resources of the state. Those powers include storing the water supply, treating and transporting water, conserving and developing water and hydroelectric power, and navigating the inland and coastal waters of the state.

Article III, section 52, and article XVI, section 59, of the Texas Constitution provide the authority for the creation of conservation and reclamation districts, as well as the ability of cities and other political subdivisions to develop and conserve the water resources of the state. Conservation and reclamation districts are created through the passage of general laws and special laws that address their powers, rights, privileges, and functions. General law districts are created by action of the Texas Commission on Environmental Quality (TCEQ) (see Tex. Water Code ch. 54), by a commissioners court (see Tex. Water Code chs. 53, 55, 56, 57), or, depending on the size of the district, by the TCEQ or commissioners court (see Tex. Water Code chs. 51, 58). See Chapter 7 of this book for a discussion of water districts.

Districts created under the constitution include river authorities, regional water districts, water control and improvement districts, municipal utility districts, and flood control districts. Some of the districts serve wide geographic expanses of the state—for example, the Brazos River Authority, within whose jurisdiction lie the watershed counties of the Brazos River. Some serve distinct geographic areas within a county—for example, Travis County Water Control and Improvement District No. 17.

A. Constitutional Authority

Article XVI, section 59, was added to the Texas Constitution in 1917. Subsection (b) authorizes the legislature to create conservation and reclamation districts. The districts are to promote the conservation and development of the natural resources of the state, as described in subsection (a). Their functions include the control, storage, preservation, and distribution of its stormwaters and flood waters and the waters of its rivers and streams and the conservation and development of water and hydroelectric power. Other purposes are irrigation, the reclamation of land, and the preservation and conservation of all natural resources of the state.

Under subsection (d) of this constitutional provision, the legislature may not create a conservation and reclamation district unless notice of the intention to introduce a bill is published at least thirty days and not more than ninety days before its introduction. The notice must be published in a newspaper having general circulation in the county or counties in which the district will be located. A newspaper must meet the requirements of Texas Government Code section 2051.044.

Subsections (d) and (e) also provide that no law creating a conservation and reclamation district may be passed unless, at the time notice is published, a copy of the bill is delivered to the commissioner's court and to the governing body of each incorporated city or town in whose jurisdiction the district will be located. A copy of the notice and the bill must be delivered to the governor, who must submit the notice to the TCEQ. The TCEQ must file its recommendation on the bill with the governor, lieutenant governor, and speaker of the House of Representatives within thirty days after it receives the notice.

Article XVI, section 59, of the Texas Constitution also authorizes the legislature to permit a district to levy and collect ad valorem taxes for the maintenance of the district and the payment of debt service on bonds. The legislature may not authorize a district to issue bonds payable from ad valorem taxes unless the bonds are approved at the election held by the district. Bonds may be issued to provide for improvements within the district and the maintenance of the improvements.

Article III, section 52, of the Texas Constitution authorizes the legislature to permit any city, county, or other political subdivision of the state to lend its credit, and issue bonds and levy and collect taxes to pay debt service, for specified purposes. Those purposes include the improvement of rivers, creeks, and streams to prevent overflows and the construction and maintenance of pools, lakes, reservoirs, dams, canals, and waterways for the purposes of irrigation, drainage, or navigation.

B. Statutory Authority

Conservation and reclamation districts may be created either by special law or under the general laws of the state. Many of these special laws are codified in the Special District Local Laws Code. The Special District Local Laws Code was enacted in 2003 and became effective April 1, 2005, as part of the state's continuing statutory revision program. Title 6 of the Code contains special laws for water and wastewater districts. These special laws describe the district's boundaries, its organization, and the particular powers of the district.

In addition to special laws creating conservation and reclamation districts, general laws provide authority for the districts to be created. Title 4 of the Texas Water Code contains general laws for water districts. Chapters 49 and 50 of the Water Code apply generally to all water districts, including those created by special law. *See* Tex. Water Code § 49.002; *see also* Tex. Water Code § 50.107. Specific chapters of the Water Code apply to the creation and functions of designated districts. For example, chapter 51 applies to a water control and improvement district, chapter 53 to the creation and functions of a fresh water supply district, chapter 54 to the creation and functions of a municipal utility district, and chapter 65 to the creation and functions of a special utility district. See Chapter 7 of this book for a discussion of the functions and powers of these districts.

The powers granted to these districts are similar, but each Water Code chapter addresses issues unique to each type of district. The laws authorizing these districts were enacted at different times, and the distinctions between the powers and responsibilities of the districts often are a source of confusion. For example, each of the districts has the authority to issue bonds, but the projects that can be financed with bonds differ from entity to entity. The particular chapter of the Water Code governing an entity must be reviewed carefully to confirm that the authority exists to finance a specific type of project, just as the enabling statute must be carefully reviewed for special law districts.

C. Texas Commission on Environmental Quality Oversight

1. *Statutory Authority over District Projects*

Chapter 49 of the Texas Water Code gives the TCEQ jurisdiction over projects undertaken by districts, including the financing of the projects. A district may not issue bonds to finance projects unless the TCEQ (1) determines that the project to be financed by the bonds is feasible and (2) issues an order approving the issuance of the bonds. The issuance of refunding bonds, or bonds purchased by federal or state agencies, such as the Farmers Home Administration and the TWDB, are exempt from TCEQ approval. *See* Tex. Water Code § 49.181(a).

Numerous districts, however, are exempt from TCEQ jurisdiction. *See* Tex. Water Code § 49.181(h). The result of the exemptions is to focus TCEQ jurisdiction on districts that exist primarily as development tools created to encourage residential development. Generally, water control and improvement districts, fresh water supply districts, municipal utility districts, and special utility districts are subject to TCEQ jurisdiction. River authorities and regional water districts generally are not subject to TCEQ jurisdiction.

A district under TCEQ jurisdiction must submit to the TCEQ a written application for investigation of feasibility. An engineer's report describing the project must be submitted with the application. *See* Tex. Water Code § 49.181(b). Upon examination, the TCEQ determines whether the project is feasible. An order is issued either approving or disapproving, as appropriate, the issuance of the bonds to finance the project. *See* Tex. Water Code § 49.181(c)–(f).

The TCEQ may approve the issuance of bonds of a district without the submission of plans and specifications of the improvements to be financed with the bonds. Money must be placed in escrow until the plans and specifications have been submitted to and approved by the TCEQ. *See* Tex. Water Code § 49.181(g).

2. *TCEQ Rules for Financing Projects*

Familiarity with the rules of the TCEQ is essential to determine whether a project is feasible, what costs of a project may be financed or reimbursed from bond proceeds, and the conditions to be met for the approval of bonds. The rules of the TCEQ governing the issuance of bonds are contained in 30 Texas Administrative Code chapter 293, subchapter E (referred to throughout this discussion as the Rules). The Rules address the financing of projects where developer assistance is expected (see Tex. Water Code § 49.052(d) for a definition of "developer").

A developer incurs the construction costs of facilities with the expectation that the money will be reimbursed from bond proceeds. The Rules provide that the feasibility of construction projects depends on a developer paying some portion of the costs. Increases in the property values within the district are necessary for the developer to be repaid for the initial costs. Under section 293.47 of the Rules, the developer must pay not less than 30 percent of the district construction costs. The Rules generally define what costs are eligible to be reimbursed with bond proceeds. Section 293.47, however, exempts numerous districts from this requirement. The exemptions relate to such factors as ratio of debt to assessed valuation, credit ratings on bonds, and contracts with other political subdivisions pledging revenues in consideration of the district's development of water or wastewater facilities. *See* 30 Tex. Admin. Code § 293.47.

To the extent that improvements included in the bond issue are needed to produce values sufficient to support the bonds, and that improvements have not been completed, the developer must enter into an agreement with the district to secure payment of the costs. An escrow of funds, a letter of credit, or similar security may be established in the name of the district to secure the payment of costs. The agreement must be entered before the bond sale is advertised. The agreement is to ensure that the district may draw on the financial guarantee to pay the developer's share of construction and engineering costs. *See* 30 Tex. Admin. Code §§ 293.47(g), 293.56. Section 293.59 of the Rules expands on the statutory requirement that the TCEQ determines the economic feasibility of each proposed bond issue. TCEQ reviews land values, existing improvements, and projected improvements in the district to determine economic feasibility. A reasonable tax rate for debt service payments must result while competitive utility rates are maintained from the facilities to be financed. *See* 30 Tex. Admin. Code § 293.59(b). The TCEQ examines both a "no-growth debt service tax rate" and a "combined projected tax rate" in its review. *See* 30 Tex. Admin. Code § 293.59(e), (f). The approval of tax-supported bonds is subject to satisfying additional requirements affecting the levy and collection of ad valorem taxes.

A no-growth tax rate is the tax rate required to meet projected annual debt service requirements using the current assessed value and a 100 percent tax collection rate. This calculation is used to determine whether sufficient cash flow is available to the district to support indebtedness. A 90 percent tax collection rate is used in determining the projected tax rate collections, unless the district demonstrates that its historical collection rate is higher. *See* 30 Tex. Admin. Code § 293.59(k)(2). The TCEQ requires that at least 25 percent of the projected value of houses and other improvements shown in the projected tax rate calculations must be completed before the bonds may be issued. *See* 30 Tex. Admin. Code § 293.59(k)(7). A written agreement must be executed between the district and the developer and other parties receiving bond proceeds that permanently waives the right to claim any agricultural, open-space, timberland, or inventory valuation for any land, homes, or buildings that the developer or other parties own in the district. The agreement is binding for thirty years, unless such exemptions were in effect at the time of the TCEQ approval of the bond issue and were shown in the projected tax rate calculations. *See* 30 Tex. Admin. Code § 293.59(k)(8).

The 25 percent value requirement is also subject to exceptions. *See* 30 Tex. Admin. Code § 293.59(k)(11). The exceptions are extensive, and it is important to review them before submitting an application to the TCEQ.

The first bond issue and subsequent bonds issues of a district are treated differently under the Rules. Section 293.59(k) of the Rules governs the first bond issue of a district, while section 293.59(*l*) governs the subsequent bond issues. The Rules treat developer projects differently than projects in which there is no developer.

In subsequent bond issues, houses or buildings equal to 75 percent of the projected buildout used in the projected tax rate calculations contained in all prior bond issues must be completed and located on the area developed from the proceeds of prior bond issues, the proposed bond issue, and future bond issues. *See* 30 Tex. Admin. Code § 293.59(*l*)(4). A district may request, and the TCEQ may waive, this requirement. The waiver may be granted on the basis of sufficient assessed values existing in the district, the credit rating issued for the bonds, or the debt-to-assessed value ratio in the district. *See* 30 Tex. Admin. Code § 293.59(*l*)(5).

Applicants must submit all required data at one time in one package. The TCEQ may grant expedited treatment under section 293.42 of the Rules. Section 293.44 addresses developer projects. A developer project is one that provides water, wastewater, drainage, or recreational facility service for property owned by a developer of property in the district. 30 Tex. Admin. Code § 293.44(a)(1). Restrictions on financing oversized facilities are set forth in section 293.44(a)(8) of the Rules. This section also addresses whether certain costs are subject to the 30 percent developer contribution requirements. *See* 30 Tex. Admin. Code § 293.44(a)(8).

An independent appraisal is required before a district can purchase existing facilities from a developer. An appraisal, however, is not required in every instance. Section 293.44 addresses the circumstances in which an appraisal is not required.

A developer may proceed with financing the construction of water, wastewater, drainage, and recreational facilities before TCEQ approval under the conditions described in section 293.46 of the Rules. Failure to comply with the conditions set forth in this rule could result in the denial of reimbursement to the developer of construction costs. *See* 30 Tex. Admin. Code § 293.46.

Decisions need to be made early in the development process by both the district and the developer to determine the most economical method to finance improvements. Developers in particular should analyze whether it is more cost-effective to fund the construction costs up front or seek reimbursement once the projects are completed. It is more likely that credit enhancement can be obtained to support the payment of debt service on district bonds if the improvements have been completed. Improvements in the ground are more likely to result in the construction of homes, giving credit providers comfort that the valuation needed to support the payment of debt service will exist throughout the term of a district bond issue.

D. Contract Revenue Bonds

River authorities and regional districts finance the construction of facilities to provide water supply or wastewater treatment. The water supply or wastewater treatment services are sold to cities and other political subdivisions. To support the payment of debt service on bonds issued by the river authorities and regional districts, contracts are executed with cities and other political subdivisions. Texas Government Code chapter 791 and Texas Local Government Code chapter 552 provide the contracting authority necessary to support this method of finance.

Government Code chapter 791 is commonly known as the Interlocal Cooperation Act. Tex. Gov't Code § 791.002. The Act generally provides authority to a local government to contract with another local government or a state agency to perform governmental functions and services. The Act defines local government to include a county, municipality, special district, junior college district, or other political subdivision of the state. Tex. Gov't Code § 791.003(4). Governmental functions and services are defined at Tex. Gov't Code § 791.003(3). Political subdivision is defined to include any corporate and political entity organized under state law. Tex. Gov't Code § 791.003(5).

Section 791.026 addresses the authority under the Act for certain local governments to contract for water supply and wastewater treatment facilities. A municipality, district, or river authority of the state may contract with another municipality, district, or river authority of the state to obtain or provide part or all of (1) water supply or wastewater treatment facilities or (2) a lease or operation of water supply facilities or wastewater treatment facilities. Tex. Gov't Code § 791.026(a). The contract may provide that the party obtaining services may not obtain those services from a source other than a contracting party unless otherwise provided in the contract, and, if the contract so provides, payments made under the contract are the paying party's operating expenses for its water supply system, wastewater treatment facilities, or both. Tex. Gov't Code §§ 791.026(b), (c). The contract may contain terms and extend for any period on which the parties agree and may provide that the contract will continue in effect until bonds specified by the contract and any refunding bonds issued to pay those bonds are paid. Tex. Gov't Code § 791.026(d). Tax revenue may not be pledged to the payment of amounts agreed to be paid under the contract. Tex. Gov't Code § 791.026(f).

The authority granted by section 791.026 enables contracting parties to structure contracts to provide and finance water supply and wastewater treatment facilities on a "take-or-pay" basis. Since the payments to be made by the contracting party to receive the services are the sole source of funds available to the contracting party to provide the services to pay debt service on its bonds, the contracts are structured so that the receiving party will pay for the service to be provided regardless of whether it actually receives the service. In addition, the contract typically will provide for the payment of operation and maintenance expenses relating to the system constructed by the providing party. See Chapter 37 of this book for a discussion of take-or-pay wholesale water contracts.

A good discussion of the authority granted by the Act to enter into contracts for water supply and wastewater treatment can be found in *City of The Colony v. North Texas Municipal Water District*, 272 S.W.3d 699 (Tex. App.—Fort Worth 2008, pet. dism'd). The City of The Colony entered into a contract with the City of Frisco and the North Texas Municipal Water District, under which the District was to provide wastewater treatment services to the two cities. The District issued bonds to construct a regional wastewater treatment system. The contract provided that it was the sole responsibility of each city to transport, or cause to be transported, at no cost to the other participants, its wastewater to its points of entry. The Colony never constructed transmission lines to its point of entry to the wastewater treatment system and never received wastewater treatment services. The Colony made payments under the contract in support of the debt service and operation and maintenance expenses of the system. After several years of not making payments under the contract, The Colony sued to invalidate the contract.

The contract provided that the cities "shall be obligated unconditionally, and without offset or counterclaim, to make . . . payments . . . in the manner provided in this Contract, regardless of whether or not the District actually provides such facilities and services, or whether or not any [city] actually receives or uses such facilities and services, and regardless of the validity or performance of the other parts of this or any other contract." *Colony*, 272 S.W.3d at 714. The contract also stated that the payments by the two cities were the "only source available to the District to provide" for the payment of debt service on bonds issued by the District. *Colony*, 272 S.W.3d at 714.

The court also addressed whether the contract violated public policy. The court found that the "government code specifically allows for this particular type of contract," citing Government Code section 791.026(a)(1), and that "the government code reflects a public policy that permits the execution of this particular type of agreement." *Colony*, 272 S.W.3d at 730. The validity of the contract was upheld by the court.

The contract language cited above is the classic language of a take-or-pay contract. The obligation of the contracting party to make payments under the contract to the party providing the facilities and services is unconditional, regardless of whether the facilities or services are actually provided, received, or used. The take-or-pay feature of the contract is also sustained by the provisions of Government Code section 791.026(g), which states that the powers granted by section 791.026 prevail over a limitation contained in another law. Tex. Gov't Code § 791.026(g).

Texas Local Government Code chapter 552 also provides contracting authority to support this method of finance. Local Government Code section 552.014 authorizes municipalities to enter into contracts with districts created under article XVI, section 59, of the Texas Constitution. The district will acquire for the benefit of the city and then convey to the city a water supply or treatment system, a water distribution system, a sanitary sewage collection or treatment system, or related improvements. The contract may provide for purchase of the system by the municipality through periodic payments to the district in amounts sufficient to pay the principal of and interest on the bonds of the district. The contract must be approved by the governing body of the municipality. Municipalities are provided with similar authority to contract with water districts under sections 552.012, 552.019, 552.020, and 552.022 of the Local Government Code.

The contract may provide that any payments due are payable from and are secured by a pledge of specified revenues, an ad valorem tax levied to make the payments due, or both. Tex. Loc. Gov't Code § 552.014(c). Contracts between cities and the districts generally are structured as take-or-pay contracts. The contract also will require that the district prepare an annual budget. The budget will set forth the payments to be made for debt service and operation and maintenance expenses, for costs of administration of the system, and for related costs for capital repairs and replacements. Provisions relating to review of the budget and dispute resolution are also common features in these contracts. The payments made for the acquisition of the services received, both for debt service and operation and maintenance expenses, are treated as expenses of the city's waterworks system or wastewater system, either combined or separate, as the case may be. This is consistent with the statutory provisions of Local Government Code sections 552.019(b) and 552.020(e) and Government Code section 1502.056.

E. Texas Government Code Chapter 1371

Texas Government Code chapter 1371 provides broad powers to eligible issuers to finance a wide array of projects defined in Government Code sections 1371.001(2) and (8). Government Code section 1371.001(4) defines an issuer to include a conservation and reclamation district organized or operating as a navigation district under article III, section 52, or article XVI, section 59, of the Texas Constitution, and a district organized or operating under article XVI, section 59, that has all or part of two cities within its boundaries.

An issuer may issue obligations secured by any revenue that an issuer is authorized by the Texas Constitution, a statute, or a home-rule charter to pledge to the payment of an obligation (defined in Government Code section 1371.001(5)). An issuer may adopt proceedings providing the terms and conditions relating to the sale of obligations. The proceedings may authorize one or more designated officers or employees of the issuer to act on behalf of the issuer in selling and delivering the obligation and setting the procedures relating to the obligation. Tex. Gov't Code § 1371.053(c).

The ability of an issuer to delegate the authority to an authorized representative to set the terms of the sale of the obligations is a significant power and provides flexibility in pricing and selling a bond issue. Government Code section 1371.004 provides that a finding by the authorized representative has the same force and effect as if made by the governing body of the issuer.

An issuer also may enter into credit agreements to provide additional security for obligations. A credit agreement includes numerous types of agreements executed in connection with the sale of an obligation issued under Government Code chapter 1371. *See* Tex. Gov't Code § 1371.001(1). Letters or lines of credit, reimbursement agreements, and interest rate swap agreements are a few of the agreements authorized by section 1317.001(1). The payment obligation of the issuer incurred under a credit agreement may be paid from any source, including the proceeds of an obligation to which the credit agreement relates, revenues of the issuer that are available to pay the obligation, and ad valorem taxes, to the extent permitted by Government Code chapter 1371. *See* Tex. Gov't Code § 1371.056(c). The credit agreement must contain the terms and be for the period as approved by the issuer. *See* Tex. Gov't Code § 1371.056(b). An issuer may enter into a credit agreement at any time before, after, or concurrently with the issuance of obligations. *See* Tex. Gov't Code § 1371.056(a).

Amendments to Texas Government Code chapter 1371 enacted in 2007 affect the ability of issuers to enter into credit agreements. Government Code section 1371.001(3-a) introduces a new type of agreement, an interest rate management agreement. An interest rate management agreement provides a hedge for managing interest rates. An interest rate swap agreement, where one party agrees to pay a fixed rate of interest and the counterparty agrees to pay a variable rate of interest tied to an index, is one example of an interest rate management agreement.

Interest rate management agreements generally follow a format where the parties enter into a "master agreement," which contains the common terms governing transactions, and a "confirmation," which is specifically designed for a particular transaction executed under the master agreement. *See* Tex. Gov't Code § 1371.001(3-a). The 2007 amendments to chapter 1371 limit the ability of an issuer to enter into interest rate management agreements. Government Code section 1371.056(j) restricts issuers who may enter into an interest rate management agreement transaction to those that have either entered into at least three interest rate management transactions before November 1, 2006, or entered into one or more transactions with an aggregate notional amount of at least $400 million before November 1, 2006. *See* Tex. Gov't Code § 1371.056(j). Issuers who do not satisfy the restriction of section 1371.056(j) may enter into an interest rate management transaction if it complies with the provisions of Government Code section 1371.056(k). Under this section, the governing body of the issuer must adopt a risk management policy. This policy must address the conditions under which an issuer may enter into an interest rate management agreement without independent advice from a financial advisor. *See* Tex. Gov't Code § 1371.056(k). Texas Government Code chapter 1371, subchapter D, sets forth the requirements governing the eligibility of an entity to serve as a financial advisor for an issuer as well as which issuers are exempt from the requirements of the subchapter.

The policy must address the pricing of the transactions that may be entered under the agreement. Either the governing body of the issuer or its authorized representative must confirm that a transaction conforms to the requirements of the policy. The issuer must review and ratify or modify its risk management policy at least biennially. *See* Tex. Gov't Code § 1371.056(*l*).

The 2007 amendments also require that a designated officer of the issuer monitor interest rate management agreement transactions. The designated officer must provide a report to the issuer describing the terms of transactions and how the transactions were valued. The designated officer also must state whether continuing transactions under the agreement comply with the issuer's risk management policy. The reporting requirements do not apply to issuers who have either entered into at least three interest rate management transactions before November 1, 2006, or entered into one or more transactions with an aggregate notional amount of at least $400 million before November 1, 2006.

The powers granted to issuers under Government Code chapter 1371 have broad application and are utilized not only by regional issuers, such as river authorities, but also by state agencies, such as the TWDB, and designated local units of government. *See* Tex. Gov't Code § 1371.001. The powers exercised by cities in financing water projects under chapter 1371 will be discussed below in greater detail. The authority granted by this statute is limited to those issuers the legislature deems to be sophisticated and with broad financial strength. Most water districts operating under Texas Water Code chapters 49, 51, and 54 are not eligible to act as an issuer under Government Code chapter 1371 and are not authorized to utilize the powers granted by this statute.

III. Local Financial Assistance

Cities are the unit of local government principally responsible under Texas law to finance water projects. Counties, water supply corporations, and special purpose districts also are authorized by Texas law to finance water projects.

A. Cities

Cities are the primary local unit of government responsible for financing water projects in Texas. Cities derive the authority to own and operate utility systems, including waterworks and sewer systems, from Texas Local Government Code chapter 552, Texas Government Code chapter 1502, and, in the case of home-rule cities, their city charter. As discussed above, Local Government Code chapter 552 authorizes cities to enter into contracts with water districts to obtain water supply and water treatment services. Cities possess the legal authority under Government Code chapter 1502 to acquire, purchase, construct, improve, enlarge, equip, operate, or maintain any property, interests in property, buildings, structures, activities, services, operations, or other facilities, with respect to a utility system. *See* Tex. Gov't Code § 1502.002(a). Government Code section 1502.051 also provides cities with the authority to issue revenue bonds to finance extensions and improvements to a utility system. Government Code chapter 1371 provides additional authority to home-rule cities with a population of 50,000 or more to finance utility system improvements. *See* Tex. Gov't Code § 1371.001(4).

1. Revenue Bonds

A city may issue public securities and incur contractual obligations under Texas Government Code chapter 1502 to provide funds to acquire, purchase, or otherwise obtain any interest in property, including additional water or riparian rights, as well as to acquire and construct utility system improvements. *See* Tex. Gov't Code § 1502.051. A city may pledge all or any part of the revenue of the utility system to secure the payment of the public securities. *See* Tex. Gov't Code § 1502.052. The city can determine the priority of liens granted to secure the payment of public securities; however, a statutory first lien against that revenue is preserved for the payment of each expense of operation and maintenance of the utility system, including all salaries, labor, materials, interest, repairs, and extensions necessary to provide efficient service. *See* Tex. Gov't Code § 1502.056. As a result, the revenue bonds are secured by a pledge of "net revenues" of the utility system. A city may enter into a contract with a water district to acquire water supply or other services and provide a superior lien on the utility system revenues that precedes the lien on revenues granted to secure the payment of revenue bonds. *See* Tex. Gov't Code § 1502.056(c).

Public securities issued under Government Code chapter 1502 may not have a maturity of greater than fifty years. *See* Tex. Gov't Code § 1502.062. As additional security for public securities issued or obligations incurred, the city by the terms of the encumbrance may grant a purchaser under sale or foreclosure a franchise to operate the encumbered utility system for a term not to exceed twenty years from the date of purchase, subject to all laws regulating the operation of the utility system in force at the time of the sale or foreclosure. *See* Tex. Gov't Code § 1502.053.

Government Code section 1502.054 provides that public securities issued under chapter 1502 are not debt of the city. It also requires that utility system revenue bonds bear a statement that the holder of the revenue bonds is not entitled to demand payment out of money raised by taxation. *See* Tex. Gov't Code § 1502.054. The revenues pledged to the payment of the public securities may not be used to pay any other debt or obligation of the municipality, except as permitted under Government Code section 1502.059 or Local Government Code section 271.052. *See* Tex. Gov't Code § 1502.058(a). Notwithstanding Government Code section 1502.058(a), or a similar law or municipal charter provision, a city may transfer to its general fund and use for general or special purposes revenue of any municipally owned utility system in the amount and to the extent authorized in the indenture, deed of trust, or ordinance providing for and securing payment of public securities issued under this chapter or similar law.

It is critical, therefore, to carefully draft the authorizing indenture, deed of trust, or ordinance to preserve the ability to use "surplus revenues" for any lawful purpose unrelated to the operation of the utility system. Government Code section 1502.059 does not provide sufficient authority to enable a city to use surplus utility system revenues for a purpose unrelated to the operation of a utility system. Rather, this authority is coupled with the terms of the instrument authorizing the issuance of public securities.

In the public security debt markets, revenue bonds are considered less creditworthy than general obligation bonds because the sole source of security for the revenue bonds is the revenues produced by the enterprise. General obligation bonds are backed by the full faith and credit of the city, and as a result are afforded higher credit ratings.

To protect the interests of bondholders, a city must impose and collect charges for services provided by a utility system in amounts at least sufficient (1) to pay all operating, maintenance, depreciation, replacement, improvement, and interest charges in connection with the utility system; (2) to provide for an interest and sinking fund sufficient to pay any public securities issued or obligations incurred under chapter 1502 of the Government Code; and (3) to pay any outstanding obligations against the system. Tex. Gov't Code § 1502.057(a). The rates charged for utility system services must be equal and uniform, and a city may not allow any free utility system service except for municipal public schools or buildings and institutions operated by the city. Tex. Gov't Code § 1502.057(b).

In addition to the revenues pledged to the payment of revenue bonds, reserves are created and pledged to the payment of the debt service on the revenue bonds. The reserves can take the form of cash or a credit agreement and can be funded from the proceeds of public securities issued under Government Code chapter 1502. Government Code section 1502.064 defines a credit agreement to have the same meaning given that term in Government Code section 1371.001. The need for reserves reflects the fact that the obligations are secured solely by the net revenues of the utility system, and not by the city's full faith and credit. If the volume of sales decreased, a deficiency in anticipated revenue collections would result. Reserves available to pay debt service reduce the potentially adverse consequences of reduced revenue collections.

Proceeds from the issuance of public securities also may be used to pay interest on the public securities during the period of the acquisition or construction of any facilities to be provided through the issuance of the public securities, and for one year after completion of the acquisition or construction of the facilities. Tex. Gov't Code § 1502.060(b); *see also* Tex. Gov't Code § 1201.042(a). The facilities being financed are necessary to generate the revenues needed to pay debt service; if the facilities are not operative, they cannot provide services and thus generate revenues.

The proceedings authorizing the issuance of public securities under Government Code chapter 1502 may reserve to the city the right to issue additional obligations secured on a parity with, or by a lien on the revenues of the utility system subordinate to, the lien on revenues securing outstanding public securities previously issued by the city. *See* Tex. Gov't Code § 1502.061(a). This right, however, is not automatic; a city may issue additional public securities on a parity and of equal dignity with the outstanding public securities only if the ordinance, deed of trust, or indenture of trust authorizing or securing the outstanding public securities provides for the subsequent issuance of additional parity public securities. *See* Tex. Gov't Code § 1502.061(c). The issuance of additional public securities also is subject to conditions contained in the ordinance, deed of trust, or indenture of trust. Government Code section 1502.065 authorizes a city to issue public securities to refinance any obligation incurred under this chapter to which revenues have been pledged. A city may issue refunding bonds under Government Code chapter 1207 for the same purpose.

2. Certificates of Obligation

Cities also may issue public securities known as "certificates of obligation" to finance utility system improvements. *See* Tex. Loc. Gov't Code ch. 271, subch. C. Certificates of obligation are public securities that may be issued by a city or a county to finance the construction of any public work and the purchase of materials, supplies, equipment, machinery, buildings, land, and rights-of-way for authorized needs and purposes. *See* Tex. Loc. Gov't Code § 271.045(c). Specifically, a city may issue certificates of obligation to pay all or part of the contractual obligations incurred for interests in and rights to water or sewer treatment capacity in connection with a water supply and transmission project or sewer treatment or collection project constructed on behalf of the city by another governmental entity or political subdivision under a written agreement expressly authorized under Local Government Code section 552.014 or Government Code section 791.026. Tex. Loc. Gov't Code § 271.045(c).

Certificates of obligation are treated as "debt" within the meaning of article XI, sections 5 and 7, of the Texas Constitution. *See* Tex. Loc. Gov't Code § 271.053. In addition to ad valorem taxes, certificates of obligation may be secured by other revenues if the issuer is authorized by the Texas Constitution or other statutes to secure or pay any general or special obligation by or from those revenues. *See* Tex. Loc. Gov't Code § 271.052(a).

Before certificates of obligation may be issued, the city must publish a notice of intention to issue them. The notice must be published once a week for two consecutive weeks in a newspaper, as defined by Texas Government Code chapter 2051, subchapter C, that is of general circulation in the area of the issuer. The date of the first publication must be before the thirtieth day before the date tentatively set for the passage of the order or ordinance authorizing the issuance of the certificates of obligation. The notice must state (1) the time and place tentatively set for the passage of the order or ordinance authorizing the issuance of the certificates of obligation; (2) the maximum amount and purpose of the certificates to be authorized; and (3) the manner in which the certificates obligation will be paid for, whether by taxes, revenues, or both. *See* Tex. Loc. Gov't Code § 271.049.

The notice requirement allows the residents of the city to present a petition to require a referendum be held to permit the issuance of the certificates of obligation. Should the city receive a petition signed by at least 5 percent of the qualified voters of the city protesting the issuance of the certificates of obligation, the city may not authorize the issuance of the certificates of obligation unless the issuance is approved at an election ordered, held, and conducted in the manner provided for bond elections under Government Code chapter 1251. *See* Tex. Loc. Gov't Code § 271.049. Local Government Code section 271.056 provides for the issuance of certificates of obligation without notice under limited circumstances, such as public calamity.

Certificates of obligation may be sold for cash or in exchange for work provided. A city must limit the principal amount of certificates to an amount equal to (1) the aggregate of the contractual payments or the total costs allocated or attributed, under generally accepted accounting principles, to the capital costs of the project, as opposed to any maintenance or operating costs to be paid under the written agreement, or (2) the total cost of the project multiplied by the percentage of the nameplate capacity of the project acquired or conveyed by the written agreement to the city, whichever limitation is applicable to the contractual interests or rights being conveyed or identified in the written agreement. Tex. Loc. Gov't Code § 271.045(d).

The city may pay or pledge to the payment of the certificates of obligation all or any portion of the revenues of its utility system. *See* Tex. Gov't Code § 1502.058. The city also may determine the provisions governing the issuance of certificates of obligation. *See* Tex. Loc. Gov't Code § 271.047(b). This enables the city to structure a certificate of obligation issue so that the security is a combination of ad valorem taxes and utility system revenues. The levy of ad valorem taxes to pay the certificates of obligation can be made subject to the budgeting of revenues for the payment of debt service, under current standards of interpretation of the law by the state attorney general. This effectively allows an issuer to issue an ad valorem tax-supported obligation but never have to pay that obligation from ad valorem taxes if the revenues budgeted to pay debt service are sufficient to pay the debt service.

The rating agencies treat certificates of obligation secured by ad valorem taxes as the equivalent of full faith and credit general obligations of the issuer, which typically have higher credit ratings than an obligation secured solely by utility system revenues. This financial structure can be a significant advantage to communities whose utility systems are not able to support the rates and charges needed to have obligation ratings match those of ad valorem tax-supported obligations. Many Texas communities structure certificates of obligation in this manner and sell those certificates of obligation to the TWDB under the various financing programs operated by the board.

A pledge of revenues lawfully available to secure other indebtedness is required for an issuer to sell certificates of obligation for cash. *See* Tex. Loc. Gov't Code § 271.052. It is not uncommon for a minimum pledge of revenues, not to exceed $1,000, to be made to secure the payment of the certificate of obligation to effect the sale of certificates of obligation for cash.

3. Texas Government Code Chapter 1371

Although many Texas communities use certificates of obligation to finance utility system improvements, Texas cities with populations above 50,000 also may exercise the authority under Texas Government Code chapter 1371 to structure financing programs, commonly referred to as commercial paper programs. Commercial paper is a public security that is a short-term obligation, with a maturity of 270 days or less. Commercial paper provides interim financing for eligible projects. Eligible projects include public works such as property or facilities for the conservation, storage, supply, treatment, or transmission of water and the treatment, collection, or disposal of water-carried wastes or solid wastes. *See* Tex. Gov't Code § 1371.001. Because commercial paper notes have a short maturity, interest rates borne by the notes are significantly lower than the interest rates borne by long-term, fixed-rate obligations.

Frequent maturities of commercial paper notes require that a market be continuously maintained. When a commercial paper note matures, the issuer may not want to pay the maturing principal coming due on the commercial paper note from available funds. The issuer may want the then-current holder to purchase a new commercial paper note of like principal amount, having a new maturity period and new interest rate. For this to occur, the issuer must have legal authority to enter into agreements with the makers of the market, known as commercial paper dealers (typically investment banking firms), to facilitate this type of market and market activity. If the holder of a commercial paper note does not want to roll over its note (i.e., it wants to be paid the principal and interest due and owing upon maturity), and the commercial paper dealer cannot find other market participants to purchase a new commercial paper note, then the issuer must have sufficient funds available to pay the maturing noteholder its principal and interest, issue bonds to refinance the notes, or have other resources available to pay the noteholder. Therefore, the issuer must have legal authority to enter into agreements with lenders to provide credit or liquidity support, in the form of a line or letter of credit, to generate funds sufficient to pay noteholders should efforts to find new purchasers of the issuer's commercial paper notes fail.

Government Code chapter 1371 authorizes an issuer to execute "credit agreements" in connection with or related to the authorization, issuance, security, purchase, payment, sale, resale, redemption, remarketing, or exchange of an obligation. A credit agreement is an agreement for professional services and must contain the terms and be for the period of time approved by the issuer. The cost of a credit agreement may be paid from any source, including the proceeds from the sale of the obligation to which the credit agreement relates, the revenue of the issuer that is available to pay the obligation, any interest on the obligation or that may otherwise be legally used, or ad valorem taxes to the extent permitted by Government Code chapter 1371. *See* Tex. Gov't Code § 1371.056.

Commercial paper notes must meet the definition of "obligation" set forth in Government Code section 1371.001(5). Obligations may bear interest at no interest or at any rate not to exceed the maximum net effective interest rate allowed by law. *See* Tex. Gov't Code ch. 1204. Interest rates may be fixed, variable, or otherwise. Interest rates may be determined by a formula, index, or other arrangement. *See* Tex. Gov't Code § 1371.054. An obligation, including accrued interest, or a credit agreement may be refinanced by the issuance of another obligation or credit agreement. *See* Tex. Gov't Code § 1371.060.

Government Code chapter 1371 provides authority unique to the issuers of public securities. An issuer, in the proceedings authorizing commercial paper notes, must provide the maximum principal amount of notes that may be outstanding at any one time and from time to time, and a maximum term the notes may be outstanding. *See* Tex. Gov't Code § 1371.053(b).

Unlike the proceedings that authorize the issuance of bonds, new commercial paper notes may be issued once outstanding commercial paper notes have been retired. For example, an issuer authorizes the issuance of up to $100 million in commercial paper notes that may at any time and from time to time be outstanding. The issuer issues $100 million in notes and subsequently pays off $50 million of the outstanding notes. The authority to issue $50 million in commercial paper notes is then restored. This characteristic of a commercial paper program affords an issuer significant flexibility in managing a large-scale capital improvement program, such as those associated with large waterworks and sewer systems, and differs from that under bonds. Once bonds are retired, the ability does not exist under the proceedings authorizing their issuance to issue "new" bonds.

Most municipal utility system commercial paper programs are structured as "bond anticipation notes." The commercial paper notes are not secured by utility system revenues; they are secured by the issuance of commercial paper notes, revenue bonds, or funds provided under a credit agreement. This is the result of historical accident rather than conscious drafting. The authority to issue commercial paper notes in Texas did not exist before 1983, and then-existing utility system revenue bond covenants did not provide for the issuance of variable-rate obligations, the execution of credit agreements, or the pledge of revenues to secure obligations incurred under credit agreements. These limitations made the operation of a commercial paper program impractical, if not impossible to accomplish.

The revenues of the utility system are pledged to support the payment of obligations incurred under a credit agreement, if and when such obligations are incurred. In a typical utility system commercial paper program, a bank provides a line or letter of credit for the possibility of a failed remarketing of maturing commercial paper notes. The noteholder is due principal and interest upon maturity, and if the noteholder no longer wants to own commercial paper notes, and the commercial paper dealer is unable to find a new purchaser for the commercial paper notes, the issuer draws on the line or letter of credit to pay the noteholder whose notes have matured. This results in the issuer incurring a loan from the bank. The credit agreement will provide the terms and conditions under which this loan is to be repaid. The issuer has incurred a lawful obligation and must ensure that covenants regarding debt service coverage that are contained in utility system revenue bond proceedings or the proceedings authorizing the commercial paper program are satisfied.

Contemporary funds management stresses that an issuer with a large debt portfolio must maintain a certain percentage of its debt in variable-rate instruments. An issuer of commercial paper notes is able to achieve this because the commercial paper notes mature frequently and interest rates change upon the new issuance of the notes. Commercial paper notes are an effective tool for an issuer to provide for variable-rate financing at relative low cost.

In the 2007 amendments to Government Code chapter 1371, a city with a population of at least 50,000 may enter into a credit agreement in connection with the issuance of certificates of obligation. A city must comply with Government Code section 1371.056(f) to exercise this authority.

4. Anticipation Notes

Other forms of debt instruments are available under Texas law to finance water projects. Texas Government Code chapter 1431 authorizes cities and counties to issue "anticipation notes" to finance the construction of public works and the purchase of materials, supplies, equipment, machinery, buildings, lands, and rights-of-way for authorized purposes. *See* Tex. Gov't Code §§ 1431.002–.004. Anticipation notes may be secured by a pledge of ad valorem taxes, revenues, or a combination of ad valorem taxes and revenues. *See* Tex. Gov't Code § 1431.007. Anticipation notes that are payable from bonds secured by an ad valorem tax may not be issued unless the proposition authorizing the issuance of the bonds is approved at an election held by the issuer and the proposition states that anticipation notes may be issued. *See* Tex. Gov't Code § 1431.008. Anticipation notes issued for the purposes described above cannot have a maturity in excess of the seventh anniversary of the date the attorney general approves the anticipation notes. *See* Tex. Gov't Code § 1431.009.

Counties with a population of three million or more may issue anticipation notes with a maximum maturity of fifteen years from the date the attorney general approves the anticipation notes. *See* Tex. Gov't Code § 1431.008. Refunding bonds under Government Code chapter 1207 may be issued to refinance outstanding anticipation notes, and the maximum maturity for refunding bonds, forty years from their date of issue, applies to refunding bonds issued to refinance anticipation notes. *See* Tex. Gov't Code § 1431.008. Anticipation notes may be sold at public or private sale for cash. *See* Tex. Gov't Code § 1431.010.

Unlike certificates of obligation, which require a notice of intention be published as a condition of issuance, anticipation notes can be issued without publishing a notice of intention. Although the seven-year maximum maturity is a constraint on the issuance of anticipation notes, the ability to refinance the anticipation notes with refunding bonds with a maximum maturity of forty years may provide an issuer with an effective alternative to issuing public securities to finance utility system improvements.

5. General Obligation Bonds

Utility system improvements also can be financed by a city through the issuance of general obligation bonds. *See* Tex. Gov't Code § 1331.001(a). A city may not issue bonds that are to be paid from ad valorem taxes unless the issuance is first approved by the qualified voters of the city. Tex. Gov't Code § 1251.001. The proposition submitted in the election must state (1) the purpose for which the bonds are to be issued, (2) the amount of the bonds, (3) the interest rate, (4) the imposition of taxes sufficient to pay the annual interest on the bonds and to provide a sinking fund to redeem the bonds at maturity, and (5) the maturity date of the bonds or that the bonds may be issued to mature serially over a specified number of years, not to exceed forty. Tex. Gov't Code § 1251.002.

As a result of amendments to the Texas Election Code, the requirements for bond elections have become confusing. An issuer must take into account both the provisions of Government Code section 1251.003 and the general provisions of the Election Code. Bond elections must be held on one of the two uniform election dates provided in Election Code section 41.001. Notice that provisions for bond elections in the Government Code also differ from, but need to conform to, applicable provisions of the Election Code. Election Code chapter 3 governs when an election can be called. A carefully drafted bond proposition will provide for a maximum amount of bonds and that the interest rates for the bonds when issued will not exceed the maximum lawful rate permitted when the bonds are issued.

General obligation bonds seldom are issued to finance water or wastewater improvements. Most cities finance these improvements with revenue bonds or with certificates of obligation secured by a combination of ad valorem taxes and utility system revenues.

B. Local Financing: Other Entities

Although cities are the principal government entities that own, operate, and manage water systems and sewer systems, other entities can provide for the financing of such system improvements. Water supply corporations are nonprofit corporations that may be created to provide water and sewer services. Counties may own and operate water and sewer systems. Special-purpose districts, such as tax increment reinvestment zones, public improvement districts, and municipal management districts, possess similar powers. Cities and counties can form, individually or jointly, local government corporations to perform any public purpose, which includes the ownership and operation of water and sewer systems. This section will discuss the legal authority under Texas law granted to these entities.

1. *Water Supply Corporations*

Texas Water Code chapter 67 governs the organization and powers of water supply or sewer service corporations. See Chapter 29 of this book for a more detailed discussion. A water supply corporation may be organized to provide water supply, sewer service, or both for a municipality, a private corporation, an individual, or a military camp or base, and flood control and a drainage system for a political subdivision, private corporation, or another person. Tex. Water Code § 67.002.

A water supply corporation has the powers of a general nonprofit corporation. *See* Tex. Water Code § 67.004. It also has the power to construct, acquire, lease, or maintain the facilities or equipment necessary to provide more adequate sewer service, flood control, or drainage for a political subdivision. Tex. Water Code § 67.009. A water supply corporation may contract with any political subdivision, federal agency, or other entity for an authorized purpose. Tex. Water Code § 67.010(a). It may issue bonds and other obligations to finance improvements. *See* Tex. Water Code § 67.010(c). The Securities Act, Texas Revised Civil Statutes articles 581-1–581-43, does not apply to the issuance of bonds or other obligations issued by a water supply corporation. *See* Tex. Water Code § 67.015.

2. *Counties*

Texas Local Government Code sections 562.015 and 562.016 extend to counties certain powers to operate water and sewer utilities. Local Government Code section 412.015 provides the authority to an "affected county," as defined in Texas Water Code section 16.341, to own, operate, and maintain a water or sewer utility in the same manner as a city under Local Government Code chapter 552. Local Government Code section 562.016 provides that a county may acquire, own, operate, or contract for the operation of a water or sewer utility system to serve an unincorporated area of the county in the same manner and under the same regulations as a municipality under Local Government Code chapter 552. Section 562.016 further provides for the issuance of bonds for water or sewer systems. A county may issue bonds payable solely from the revenue generated by the water or sewer utility system. The bonds issued are not a debt of the county but are only a charge on the revenues pledged. The issuance of general obligation bonds payable from ad valorem taxes to finance a water or sewer utility system is not authorized by section 562.016; however, a county with a population of two million or more and any adjoining county may issue general obligation bonds with the approval of qualified voters. *See* Tex. Loc. Gov't Code § 562.016(b). Counties also have the authority to issue certificates of obligation. *See* Tex. Loc. Gov't Code § 271.043(7).

3. *Economic Development Entities*

Texas law provides that a variety of special entities can be created to foster and encourage economic development. Entities such as tax increment reinvestment zones, public improvement districts, and municipal management districts assist in economic development within a community, whether that be industrial or commercial development or residential development. Water and sewer services funded by these entities often are not the primary reason the entities were created, but the revenues generated by these entities can provide funds to pay for these services. Texas Tax Code chapter 311, the Tax Increment Financing Act, authorizes cities and counties to create tax increment reinvestment zones. A base property value of real property within the boundaries of the zone is established, and tax revenues generated as a result of the increased values of real property within the zone above the base property value are captured and used to pay for project costs within the zone or, in limited circumstances, for facilities functionally related to facilities within the zone that may fall outside the boundaries of the zone. Project costs include the costs of public works or public improvements, including water and sewer utility system improvements.

Texas Local Government Code chapter 372, subchapter A, the Public Improvement District Assessment Act, authorizes cities and counties to create public improvement districts to undertake improvement projects. *See* Tex. Loc. Gov't Code § 372.003. The city or county that creates a public improvement district shall determine assessments to be paid by property owners within the district that will benefit from the improvement projects to be undertaken within the district. A public improvement district can include property within the extraterritorial jurisdiction of the city. *See* Tex. Loc. Gov't Code § 372.015. Costs of improvement projects may be paid in accordance with the provisions of Local Government Code section 372.023, and general obligation bonds and revenue bonds may be issued to finance improvement projects as provided in section 372.024.

Local Government Code chapter 375 authorizes municipalities to create municipal management districts. The legislature found that the creation of a municipal management district is essential for accomplishing the purposes of article III, section 52, article XVI, section 59, and article III, section 52-a, of the Texas Constitution to promote, develop, encourage, and maintain employment, commerce, and economic development. *See* Tex. Loc. Gov't Code § 375.001. A district has the rights conferred by the general laws of Texas applicable to conservation and reclamation districts created under article XVI, section 59, including those conferred by Texas Water Code chapter 54. *See* Tex. Loc. Gov't Code § 375.091.

4. Local Government Corporations

A more novel approach for financing utility systems is through the creation of local government corporations. The authority for a city, county, or any combination of cities and counties is found in Texas Transportation Code chapter 431, subchapter D. A local government corporation may be created to aid and act on behalf of one or more local governments to accomplish any governmental purpose of those local governments. To be effective, the articles of incorporation and the bylaws of a local government corporation must be approved by the governing body of each local government that the corporation is created to aid and act on behalf of. *See* Tex. Transp. Code § 431.101(a). Numerous powers granted to housing finance corporations under Texas Local Government Code chapter 394 apply to a local government corporation. For example, section 394.904(b) applies to contracts awarded by local government corporations. As a result, some, but not all, contracts may not be subject to competitive bidding. *See* Tex. Transp. Code §§ 431.101(e), 431.101(g), 431.110. Property owned by the local government corporation is not subject to ad valorem taxation. *See* Tex. Transp. Code § 431.033. Transportation Code section 431.105 provides broad contracting authority to any state agency or political subdivision to contract with a local government corporation. A local government corporation has the power to issue bonds under Transportation Code section 431.070 as well as the powers of a general nonprofit corporation under section 431.006.

Although it would be unlikely, except in connection with an economic development project, for a city to create a local government corporation to finance utility system improvements, the opportunity exists for cities and counties to join together to form a local government corporation to provide regional water or sewer services. The provision of water and sewer services constitutes a public purpose for both cities and counties, and the mechanism of a local government corporation could enable regional water and sewer needs to be met when other means to achieve such results are not available.

The use of economic development entities to finance water and wastewater improvements is limited to the specific purposes for which these entities exist. They complement, rather than replace, the development of a utility system, the operation, maintenance, and financing of which are supported by system revenues.

IV. Administrative Review by the Office of the Attorney General

The role of the TWDB in accepting and reviewing applications for financial assistance under its many loan programs, and the role of the TCEQ in accepting and reviewing applications for financing projects by water districts, are discussed above. A transcript of proceedings regarding the issuance of public securities must be submitted to the Texas attorney general for legal review. Texas Government Code chapter 1202 addresses the submission process.

Government Code section 1202.001 defines "issuer," "public securities," and "record of proceedings." The definition of issuer is broad: any state agency or political subdivision, or a nonprofit corporation acting on behalf thereof, is an issuer. That section also broadly defines public securities to include any bond or other instrument that evidences an interest in payments due to be paid by an issuer. *See* Tex. Gov't Code § 1202.001.

Before the issuance of a public security, unless otherwise excepted from the submission process (*see* Tex. Gov't Code § 1202.007), the issuer must submit the public security and the record of proceedings to the attorney general. If the attorney general finds the issuance of the public security is authorized, the attorney general must (1) approve the public security and (2) deliver to the comptroller of public accounts (a) a copy of the attorney general's legal opinion stating that approval and (b) the record of proceedings. A public security must be issued in compliance with Government Code chapter 1202, unless otherwise exempted by section 1202.007.

The provisions of Government Code section 1202.004 require that the issuer submit with the record of proceedings a nonrefundable fee to the attorney general for the review of the transcript of proceedings.

A public security and any contract the proceeds of which are pledged to the payment of the public security are valid and incontestable in a court or other forum and are binding obligations for all purposes (1) after the public security is approved by the attorney general and registered by the comptroller and (2) on issuance of the public security. *See* Tex. Gov't Code § 1202.006(a).

V. Issues of Public-Private Participation

In recent years, public entities providing water and wastewater services have explored alternatives to providing these services. The alternatives include purchasing water supply from private entities, selling or leasing operations to private entities, and contracting with private entities to manage the public facilities and to provide these services. In considering undertaking any of these alternatives, a public entity must consider legal constraints, both statutory and contractual. Does existing state law permit any of these alternatives to be exercised? Do existing contracts, particularly proceedings governing the issuance of bonds, permit the public entity to undertake an alternative? Also, financial considerations must be taken into account, including such issues as valuing the assets to be purchased or sold, the terms by which a management relationship may be completed, and how rates and charges for services to be provided after a sale are to be determined.

This section of this chapter will explore how existing statutes will impact the analysis of contracting with a private entity in the purchase of water, the sale or lease of facilities, or the management of facilities. As governmental entities on all levels are confronted with budgetary constraints, exploration of private alternatives to providing traditionally public services is likely to increase in the years to come.

For water districts, this section will focus on Texas Water Code chapter 49. In addition, either enabling legislation pertaining specifically to a water district, or chapters in the Water Code relating to specific types of water districts, must be reviewed to determine whether those statutes impact the sale or lease of real or personal property or the management of existing facilities.

A. Public Entity Purchase of Water from a Private Entity

As discussed earlier in this chapter, public entities traditionally obtain their water supply from municipalities, river authorities, and regional districts. Nothing in Texas law, however, prevents a private person or entity from obtaining groundwater rights and conveying the water developed through those rights to public entities. In this discussion, the term "convey" refers to changing ownership rather than the physical transportation of the water from one place to another. As discussed in Part C of this book, particularly in Chapters 16 and 18, a landowner has a right to pump and convey groundwater from under the owner's land, while regulatory agencies, particularly groundwater conservation districts, can regulate the transfer of water beyond the boundaries of the district. How that water may be conveyed, rather than whether that water can be conveyed, becomes the issue a public entity must analyze.

1. Purchases by a Water District

Texas Water Code section 49.213 provides that a water district may contract with a person or any public or private entity for the joint construction, financing, ownership, and operation of any works. Water districts may enter into contracts, which may be of unlimited duration, with persons or any public or private entity on the terms and conditions the board of the water district may consider desirable, fair, and advantageous. Such contracts may be for the purchase or sale of water; the transportation of the district's domestic, industrial, and communal wastes; the maintenance and operation of any works of the district or of another person or public or private entity; and the exercise of any other rights, powers, and duties granted to the district.

An important consideration for a private entity seeking to sell water supply to a district is economic: How will the district pay for the water purchased? The transportation of water from its source to the end user is costly. Similar to the situation confronted by a district when it enters into agreements with municipalities to construct reservoirs and transport water, a private entity seeking to access credit markets most certainly would want similar assurances that the obligation of the purchaser of water to the private entity would be on a take-or-pay basis. Section 49.213 provides a water district with statutory authority to enter into a take-or-pay contract with a private entity, because it authorizes the district to enter into a contract with terms the board of the district considers "desirable, fair, and advantageous" to the district and the goals to be accomplished under the contract. Tex. Water Code § 49.213(c).

2. Purchases by a Municipality

On the other hand, there appears to be no clear statutory authority for municipalities to enter into a take-or-pay contract with a private entity on a basis similar to the basis under Texas Government Code chapter 791. As discussed above, the contracting authority language in section 791.026, which covers contracts between political subdivisions, including municipalities, is both broad and specifically applicable to water contracts. A municipality's authority under section 791.026 to enter into take-or-pay contracts for water from other political subdivisions has been affirmed in *City of The*

Colony v. North Texas Municipal Water District, 272 S.W.3d 699 (Tex. App.—Fort Worth 2008, pet. dism'd). See the discussion at section II.D above. However, Texas Government Code section 1502.002(b), which authorizes municipalities to contract with private entities, does not clearly allow for take-or-pay contracts. Under section 1502.002(b), the governing body of a municipality may "authorize the execution and delivery of contracts between the municipality and any person to" acquire, construct, improve, operate, or maintain any property, services, operations, or other facilities with respect to a utility system. Tex. Gov't Code § 1502.002(b). Unlike Texas Government Code section 791.026, no reference is made as to how and under what conditions a municipality may contract to purchase water from a private entity, leading to the question whether a municipality can enter directly into a take-or-pay contract with a private entity. So, while statutory authority exists for a municipality to contract to purchase water from a private entity, it is uncertain whether that contract may be structured as a take-or-pay contract.

Likewise, Texas Local Government Code section 552.018, another source of authority for municipal contracting, is not as broad as Government Code section 791.026. Section 552.018 provides that a municipality may "contract with an individual, firm, or corporation that operates without profit to make available for delivery to and use by the municipality all or part of the raw or treated water to be used for the municipal water distribution system." Tex. Loc. Gov't Code § 552.018(a). The statute does not address contracting powers; it does provide that a contract is limited to "any duration to which the parties agree and may provide for renewal or extension." Tex. Loc. Gov't Code § 552.018(b). The question whether the legislature, by authorizing contracts with corporations operating without profit, has precluded the municipality from entering into such a contract with a for-profit corporation, must be addressed before proceeding.

If a municipality seeks to purchase water from a private entity and the private entity requires a take-or-pay contract, one possible method to accomplish this would be as follows: an arrangement where the private entity and a water district enter into a take-or-pay contract under authority of Texas Water Code section 49.213, and the district and the municipality enter into a take-or-pay contract under authority of Government Code section 791.026. The water would be conveyed, and could also be transported, to the municipality from the private entity through the water district. The board of directors of the water district would make a finding in its contract with the private entity that the take-or-pay term of the contract with the private entity was desirable, fair, and advantageous for the purchase of water, and the district and the municipality would provide in their contract a take-or-pay provision consistent with the authority granted by Government Code section 791.026.

3. *Public Utility Agency*

Texas Local Government Code chapter 572 permits two or more public entities (defined in section 572.001(3) of the Local Government Code to include a county, municipality, or district or authority created under article III, section 52, or article XVI, section 59, of the Texas Constitution) that have the authority to engage in the conservation, storage, transportation, treatment, or distribution of water to join together as cotenants or co-owners to plan, finance, acquire, construct, own, operate, or maintain facilities. Tex. Loc. Gov't Code § 572.011.

Local Government Code chapter 572, subchapter C, permits two or more public entities to create a public utility agency. The agency is created through adoption by each public entity of a concurrent ordinance (as defined in Code section 572.051(1)). The concurrent ordinance must contain identical provisions, define the boundaries of the agency to include the territory within the boundaries of each participating public entity, designate the name of the agency, and designate the number, place, initial term, and manner of appointment of directors. Tex. Loc. Gov't Code § 572.055.

The agency may enter into a contract, lease, or agreement with departments or agencies of the United States; departments, agencies, or municipalities or other political subdivisions of Texas; or a public or private corporation or person. Tex. Loc. Gov't Code § 572.058(b)(2). The agency may contract, under terms the agency's board of directors considers appropriate, with private entities for the conservation, storage, transportation, treatment, or distribution of water or the collection, transportation, treatment, or disposal of sewage. Tex. Loc. Gov't Code § 572.060. Private entities are defined in section 572.001 to include an entity, other than a public entity, involved solely in financing, constructing, operating, or maintaining water and sewer facilities. Tex. Loc. Gov't Code § 572.001(2). An example is the Hays Caldwell Public Utility Agency, formed in January 2007. Its members are the City of San Marcos, the City of Kyle, the City of Buda, and the Canyon Regional Water Authority. Information regarding the Hays Caldwell Public Utility Agency can be found at its Web site, www.hcpua.org.

B. Public Entity Sale or Lease of Water and Wastewater Facilities to a Private Entity

Whether to reduce the burdens of government, raise cash, or a combination of the two, governmental entities may explore the possibility of selling or leasing assets to a private entity. Facilities that provide water and wastewater treatment services, or the rights to water supply itself, are assets that have immense value, both in the short and long term, and governmental entities exploring this alternative must analyze numerous issues before implementing this alternative. The issues include the legal authority to sell or lease facilities; the consequences raised by a sale or lease if the facilities were financed with obligations, the interest on which is exempt from federal income taxation; and consequences that may result under existing contracts with other governmental entities providing goods and services, specifically contracts relating to the purchase of water supply or wastewater treatment services.

1. Sale or Lease by a Water District

For water districts subject to Texas Water Code chapter 49, the provisions of law relating to the sale or lease of real and personal property are found generally in Code sections 49.225, 49.226, and 49.2261. But see, for example, section 49.002, regarding the application of chapter 49 to all general and special law districts (e.g., groundwater conservation districts are not subject to chapter 49).

Section 49.225 states that a district may lease any of its property, real or personal, to any person. The lease may contain terms and provisions that the board of the district determines to be advantageous to the district. Tex. Water Code § 49.225.

Section 49.226 addresses the sale or exchange of real or personal property. Any surplus personal property valued at more than $300, or any land or interest in land owned by the district, may be sold at either public or private sale, or the land or interest in land may be exchanged for other land or interest in land or personal property needed by the district. Such sales or exchanges must be for fair market value, as determined by the district. Tex. Water Code § 49.226(a). The fair market value requirement does not apply to property dedicated to or acquired by the district without expending district funds, or property of the district that is abandoned, released, exchanged, or transferred to another district, municipality, county, countywide agency, or authority. In such cases, the property may be conveyed on terms and conditions deemed necessary or advantageous to the district. Tex. Water Code § 49.226(b). Before a public sale of real property, the district shall give notice of the intent to sell by publishing notice once a week for two consecutive weeks in one or more newspapers with general circulation in the district. Tex. Water Code § 49.226(c).

If the district has outstanding bonds secured by a pledge of tax revenues, the proceeds of the sale of property originally acquired with bond proceeds must be applied to retire the outstanding bonds or held and treated as surplus bond proceeds and spent only as provided by the rules of the TCEQ relating to surplus bond proceeds. Tex. Water Code § 49.226(d).

The sale of nonsurplus real property is not clearly addressed by the statute. The statute distinguishes between holding a private sale and a public sale, but it appears that unless one of the exceptions in section 49.226(b) applies, the sale must be of surplus property and must be conducted by a public sale. The district must seek bids, which significantly affects the ability of a district to negotiate a sale of assets to a private entity or the price at which the assets could be sold.

2. Sale or Lease by a Municipality

Texas Government Code section 1502.055 restricts the ability of a municipality to sell a utility system. The municipality may not sell a utility system unless authorized by a majority vote of qualified voters, and the governing body of the municipality must hold an election in the manner provided for bond elections in the municipality. Tex. Gov't Code § 1502.055(a), (b). The only exception to the election requirement is the sale of an unencumbered natural gas system owned by a municipality with a population of 100,000 or more. Tex. Gov't Code § 1502.055(c). Section 552.016 of the Texas Local Government Code imposes a similar election requirement in respect to a sale or lease of a water system and plant owned by a Type A general-law municipality. Tex. Loc. Gov't Code § 552.016. (See Local Government Code chapters 7 and 9 for definitions and authority to create a Type A general-law municipality). Government Code chapter 1502 is silent on the question of whether a lease of a utility system requires an election. The lease of a utility system involving an initial payment of consideration and the transfer of rights to a lessee normally associated with ownership could be construed as a sale and may be subject to the election requirement under Government Code section 1502.055. A long-term lease, where a significant upfront payment is made to the municipality by the lessee for consideration to enter the lease, may be treated as a sale, and the election requirement would impact the decision to enter into long-term lease.

3. Existing Covenants in Contracts or Bond Proceedings

Governmental entities typically finance the acquisition and construction of utility system facilities through the issuance of bonds or other obligations secured by the revenues of the utility system. Those obligations generally have been issued as obligations, the interest on which is excludable, for federal income tax purposes, from gross income of the holders. The bond proceedings will contain covenants relating to ownership of the facilities and maintaining a prescribed level of revenues. The revenues must be sufficient to operate and maintain the system. Additionally, revenues must be sufficiently in excess of annual debt service sufficient to pay annual debt service, maintain debt service and other reserves, and pay other costs reasonably expected to be paid from the revenues of the utility system. The proceedings will also contain covenants requiring the governmental entity to preserve the tax-exempt status of the interest on the obligations issued. Municipalities that have entered into take-or-pay contracts must review the contracts to determine if covenants that could impact the ability of the municipality to sell facilities, assign interests in the supply or services purchased, or the continued treatment of any obligations issued by the water district as tax-exempt obligations, are included in the contract.

Proceedings relating to the issuance of obligations typically contain a covenant that restricts the ability to sell, lease, or otherwise dispose of utility system property, except for replacing or substituting for such property. The covenant requires that, to the extent that the proceeds from such sale, lease, or disposition of property are not used to acquire replacement or substitution property, they will be used to acquire other improvements to the utility system, retire obligations issued to finance utility system improvements, or purchase or redeem outstanding obligations. The proceedings also contain a covenant to set rates sufficient to pay operation and maintenance expenses, to pay other obligations of the utility system, and to produce revenues of a specified percentage at least equal to 100 percent of the debt service requirements of outstanding obligations secured by the revenues of the utility system.

Governmental entities that have issued or incurred obligations secured by different pledges of security must also consider rights granted to other participants that have made financial commitments in respect to the obligations issued or incurred by the governmental entity. For example, consent from a bank that issued a credit facility or liquidity facility in support of the payment of debt service on commercial paper notes may be required before the governmental entity may enter an agreement for the sale or lease of the facilities. If obligations have a municipal bond insurance policy issued in support of payment of debt service on the obligations, the policy and related proceedings must be reviewed to determine if a sale or lease of facilities may occur, and under what conditions (e.g., whether consent of the insurer is required).

Because the outstanding obligations typically are issued as tax-exempt obligations, the provisions of the federal Internal Revenue Code relating to tax-exempt obligations also must be considered in connection with the sale of utility system assets. The sale or lease of utility system facilities to a private entity will constitute a "change in use" for purposes of federal income tax law. The Internal Revenue Code, and the regulations and rulings relating to tax-exempt obligations, are designed to inhibit the financing of privately owned or managed facilities with tax-exempt obligations. The sale or lease of facilities financed with tax-exempt obligations to a private entity must be analyzed to determine if the sale or lease can satisfy the covenants relating to maintaining the tax-exempt status on the outstanding obligations. Given the perspective of the Internal Revenue Code and the rationale for the treatment of obligations as tax-exempt obligations, the burden will be on the governmental entity selling tax-exempt obligations to satisfy the covenants to maintain the tax-exempt treatment of the interest on the obligations.

This is especially the case where a water district and a municipality or another governmental entity have entered into a contract to provide water supply or wastewater treatment services and the water district has issued tax-exempt obligations to finance the improvements to provide the services. Were the municipality or other governmental entity to sell or lease its facilities to a private entity, this might adversely affect the tax-exempt status of the bonds issued by the water district, since the result would be that the services provided would no longer be to a governmental entity, but to a private entity for use in its trade or business.

The contract may not allow the assignment of the right to receive services, whether through an explicit prohibition of the right to assign, being silent on the right to assign, or by limitations to the right to assign, such as consent by the other party or parties to the contract.

4. Governmental Immunity

In 2006, the Texas Supreme Court provided a clear roadmap for parties to determine whether a governmental entity can assert immunity from suit. In *Tooke v. City of Mexia*, 197 S.W.3d 325 (Tex. 2006), the court held that words in statutes such as "sue and be sued" do not, in and of themselves, effect a waiver of governmental immunity. Immunity is waived only by clear and unambiguous language. A statute that purports to waive immunity must do so beyond doubt; ambiguities in a statute that purports to waive immunity will be resolved by retaining immunity.

Governmental immunity has two components: immunity from liability and immunity from suit. By entering into a contract, a governmental entity necessarily waives immunity from liability, but entering a contract does not, in and of itself, waive immunity from suit. Both governmental and private entities must look to a specific statutory grant of the ability to waive governmental immunity to determine what the risks are in entering a contract for the sale or lease of facilities or the acquisition of goods and services.

There are many examples in Texas statutes that show that the Texas legislature knows how to grant authority to permit the waiver of governmental immunity. Section 1371.059 of the Texas Government Code provides that an issuer "may agree to waive sovereign immunity from suit or liability for the purpose of adjudicating a claim to enforce the credit agreement or obligation or for damages for breach of the credit agreement or obligation." Tex. Gov't Code § 1371.059(c). This ability to waive, however, does not apply to an issuer that is a state agency (including an institution of higher education) or a county with a population of 1.5 million or more. Tex. Gov't Code § 1371.059(c). Texas Local Government Code chapter 271, subchapter I, provides that a local governmental entity that is authorized by statute or the Texas Constitution to enter into a contract and that enters a contract subject to the subchapter waives sovereign immunity to suit for the purpose of adjudicating a claim for breach of the contract. Tex. Loc. Gov't Code § 271.152. A local governmental entity means a political subdivision of the state, other than a county or a unit of state government. Tex. Loc. Gov't Code § 271.151(3). A contract subject to the subchapter means a written contract for providing goods or services to the local governmental entity. Tex. Loc. Gov't Code § 271.151(2).

Parties to a contract must examine the nature of the contract, the statutory authority to enter into the contract, and the goods or services provided under the contract to determine if a governmental entity that is a party to the contract has the statutory authority to agree to a waiver of governmental immunity.

5. *Other Issues*

In a sale or lease of water or wastewater facilities from a political subdivision to a private entity, once the legal issues have been analyzed, the next step is to determine the fair market value of the property. Making such a determination raises additional issues: Would the amount of funds needed to retire outstanding obligations constitute fair market value if the appraised value of the facilities exceeds the amount needed to retire outstanding obligations secured by the revenues of the utility system? Can the entity accept an offer to purchase the facilities priced at the amount necessary to retire outstanding bonds in this instance? Can the future value of revenues be taken into consideration in determining fair market value? Compare section 1502.059 of the Texas Government Code, which allows a municipality to transfer revenues to its general fund, with section 272.001(f) of the Texas Local Government Code, which provides that an appraisal is determinative of the fair market value of land, an easement, or other real property interest. *See* Tex. Gov't Code § 1502.059; Tex. Loc. Gov't Code § 272.001(f).

Other issues not specifically related to the sale or lease of facilities must be considered. Can the private entity that provides water and wastewater services to a municipality be compelled to provide those services to areas annexed into the municipality after the sale or lease of facilities has taken effect? Would the governing body of the selling entity or the end users of the services have any rights to input if a future rate increase is proposed? Could the governmental entity retain the right to receive service without compensation? If condemnation is necessary to effect improvements for the benefit of the private entity providing the services, would the condemnation constitute "public use" under article I, section 17, of the Texas Constitution, since it is arguable that the taking may result in transferring property to the private entity for the primary purpose of economic development or enhancing tax revenues? The sale or lease of governmentally owned facilities raises many issues that will come from both expected and unexpected sources, and all must be considered with care.

In 2011, Senate Bill 1048 was enacted, adding chapters 2267 and 2268 to the Government Code and providing a detailed procedure for governmental entities and other persons to enter into public-private partnership agreements for qualified projects. Chapter 2267 defines a qualified project in a manner that includes water supply facilities and waste treatment facilities. S.B. 1048 was enacted to meet a public need to acquire, construct, expand, operate, or install qualifying projects, to encourage public entities and private entities and other persons to enter into partnerships to develop and effect qualified projects, and to authorize private entities and other persons to develop or operate qualifying projects to serve the public safety, benefit, and welfare by making the projects available to the public in a more timely or less costly fashion. *See* Tex. Gov't Code § 2267.002. Chapter 2267 provides a detailed process for developing guidelines and negotiating interim and final agreements regarding the development of a qualified project. Chapter 2267 also provides, however, that the procedures outlined in the chapter are not exclusive, and that it does not prohibit a governmental entity from entering into an agreement for or procuring public and private facilities and infrastructure under other statutory authority. *See* Tex. Gov't Code § 2267.002(e).

Chapter 2268 authorizes the creation of the Partnership Advisory Commission to advise governmental entities on proposals received under chapter 2267. The Partnership Advisory Commission consists of the chair of the House Appropriations Committee or the designee thereof, the chair of the Senate Finance Committee or the designee thereof, three representatives appointed by the Speaker of the House, three senators appointed by the lieutenant governor, and three representatives of the executive branch appointed by the governor. Legislative members serve on the commission until the expiration of their terms or until their successors qualify. The members appointed by the governor serve at the will of the governor.

Before negotiating an agreement, the governmental entity must provide copies of a proposal to the presiding officer of the commission and the chairs of the House Appropriations Committee and the Senate Finance Committee or their designees. Certain proposals are not required to be submitted to the commission. *See* Tex. Gov't Code § 2268.058(b). Not later than the tenth day after the date the commission receives a detailed proposal for a qualifying project, the commission shall determine whether to accept or decline the proposal for review and notify the governmental entity of its decision. If the commission accepts the proposal for review, the commission shall provide its findings and recommendations not later than the forty-fifth day after the date the commission receives complete copies of the detailed proposal. Acceptance of a proposal is a condition to a governmental entity commencing negotiations of agreements.

The powers granted by new chapters 2267 and 2268 may be helpful in those circumstances where other existing statutory authority is uncertain or not adequate to pursue a specific project.

C. Management of Public Entity Water and Wastewater Facilities by a Private Entity

A governmental entity may consider contracting with a private entity to manage and operate the facilities owned by the governmental entity. Similar legal issues as discussed above with respect to the sale or lease of facilities must be considered when a public entity is negotiating with a private entity to provide management services. This is especially the case when obligations, the interest on which is excluded from gross income for purposes of federal income taxation, have been issued by the governmental entity to finance the improvements comprising the utility system.

1. Water Districts

A water district, as defined in Texas Water Code section 49.001(a)(1), has the functions, powers, authority, rights, and duties to allow it to accomplish the purposes for which it was created or the purposes authorized by the constitution, the Water Code, or any other law. Tex. Water Code § 49.211(a). Water districts possess broad powers to contract. As discussed in section V.A.1 above, Texas Water Code section 49.213 authorizes a district to enter into contracts with any person or any public or private entity for the performance of any purpose or function permitted by a district. *See* Tex. Water Code § 49.213.

As in the case of a sale or lease of facilities to a private entity, bond covenants and contracts must be reviewed to determine if there are any contractual constraints on the ability of the water district to contract with a private entity to manage or operate its facilities. As will be discussed in section V.C.3 below, one such constraint may be covenants relating to maintaining the tax-exempt status of obligations issued by the water district to finance the facilities.

2. *Municipalities*

Municipalities are confronted by a potential statutory conflict relating to their ability to contract with a private entity to provide management services. While section 1502.002(b) of the Texas Government Code provides that a municipality may authorize the execution of contracts between it and any person to accomplish enumerated purposes, section 1502.070 of the Code provides that management and control of a utility system may be vested in the municipality's governing body or a board of trustees named in the proceedings adopted by a municipality. *See* Tex. Gov't Code §§ 1502.002(b), 1502.70. The issue raised by section 1502.070 is whether the legislature, in enacting section 1502.070, meant to limit or restrict the ability of a municipality to manage its utility system to either its governing body or a board of trustees named in proceedings adopted by the municipality. In considering entering into a management agreement with a private entity, the municipality must determine whether section 1502.070 preempts or restricts its ability to contract with a private entity for management services.

Two other statutes provide municipalities contracting authority regarding management and control of water and wastewater facilities. Under Texas Local Government Code section 552.142, a municipality by ordinance may transfer management and control of two or more of its water, wastewater, storm water, or drainage systems to a board of trustees consisting of seven members, one of whom must be the presiding officer of the municipality. Government Code chapter 791 authorizes a municipality to contract with another municipality, county, or water district to provide governmental services, including those related to obtaining water supply or wastewater treatment facilities under Government Code section 791.026.

Home rule municipalities possess powers under their city charters, which include general contracting powers, and may include specific contracting powers related to their ownership or operation of a utility system. Article XI, section 5, of the Texas Constitution provides that no city charter shall contain any provision inconsistent with the Texas Constitution or of the general laws enacted by the legislature. As discussed, the authority of a municipality appears to be limited in its management and control of its utility system. The question arises whether these statutes restrict the ability of a municipality to contract with a private entity to provide management services for its utility system. A municipality must determine whether sufficient legal authority exists in considering entering into a management contract with a private entity.

3. *Covenants in Bond Proceedings to Maintain Tax-Exempt Status of Bonds*

Hiring a private entity to operate or manage a utility system owned by a public entity gives rise to "private business use" under the federal Internal Revenue Code relating to the issuance of tax-exempt obligations. A safe harbor is provided by Revenue Procedure 97-13, where a management agreement has been negotiated that demonstrates that beneficial use of the facilities has not been passed to the manager.

Under Revenue Procedure 97-13, the primary focus on a management agreement is compensation to the manager. The compensation must be reasonable, and not based, in whole or in part, on net profits that would accrue to the manager. The management contract must contain a periodic fixed fee arrangement that requires that at least 50 percent of annual compensation be based on a predetermined fee. The term of the agreement may not exceed five years, and the agreement must be cancellable by the governmental entity at the end of two years. Exceptions to term length of the agreement are dependent on the basis of the fixed fee arrangement. A maximum term of fifteen years is permissible if the periodic fixed fee determines 95 percent of annual compensation. The challenges of providing services efficiently and economically will cause public entities to explore all options, including privatization. Entering into contracts with private entities is subject to the public entity having the legal authority to enter such contracts, and public entities must proceed with care in determining whether the legal authority exists. Once determined, other issues must be considered carefully to ensure that the objective of providing efficient and economical services can be satisfied.

VI. Conclusion

The importance of water, and the ability of political subdivisions to finance water and wastewater improvements, is affirmed by the number and scope of Texas constitutional provisions and statutes to finance water improvements. The state, acting through the Texas Water Development Board, uses its full faith and credit to enable political subdivisions to access funds at low cost to conserve and develop the water resources of the state. Regional water authorities and districts serve not only to conserve and develop the water resources of the state, providing wholesale water supply and wastewater services to other public entities, but also provide retail services to residents of the state. Local governments have authority to issue obligations secured not only by revenues of their utility systems but also by securing the obligations with their full faith and credit, through ad valorem tax pledges. Public entities, in response to budget concerns or administrative burdens, are looking to partner with private entities to provide water supply, wastewater treatment, or management services in fulfilling their responsibilities to their citizens to provide water and wastewater services efficiently and economically.

CHAPTER 38

Water for a Public Purpose: Governmental Acquisition of Water Rights by Involuntary Means

Phil Steven Kosub[1]

I. Introduction

Anticipated growth in the population of Texas over the next fifty years will place an unprecedented demand on the state's water supply. Texas municipalities and various other governmental and quasi-governmental entities are ultimately responsible for ensuring the health, safety, and welfare of their residents, and nothing is more fundamental to the public's health than water. Recognition of this fact is reflected in the Texas Water Code. *See* Tex. Water Code § 11.024(1) (noting the primary preference given to domestic and municipal use in the appropriation of state water).

Historically, local governments have been able to satisfy their water supply needs through a combination of available surface water rights and unregulated groundwater. Local government use of the power of eminent domain for acquiring water rights has been spare or nonexistent because of cost or political volatility. However, the evolution of Texas water law and planning during the last decade has forced local government officials to examine the adequacy of their future public water supplies. Many local governments have come up short, which may result in the more frequent use of eminent domain power to acquire water rights.

The Texas Commission on Environmental Quality and the Texas Water Development Board anticipate that the population of Texas will increase 82 percent between 2010 and 2060, growing from 25.4 million to 46.3 million. Even with dramatic conservation measures, the water needs of municipalities, industries, and some aspects of agriculture will also expand by approximately 22 percent. Approximately 17 million acre-feet of water were available in 2000. That availability exceeded the overall demand of 16.9 million acre-feet. However, by 2060, availability will actually decrease to 15.3 million acre-feet as a result of reservoir silting and groundwater depletion, and it will substantially lag behind the expected demand of 22 million acre-feet. *See* Texas Water Development Board, *Water for Texas 2012* 2–3 (2012) (2012 State Water Plan), *available at* www.twdb.state.tx.us/waterplanning/swp/2012/index.asp.

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This chapter begins with a discussion of eminent domain and condemnation in general. Next it examines condemnation in the context of water rights, both surface water and groundwater. It will highlight certain 2011 amendments to chapter 2206 of the Texas Government Code and chapter 21 of the Texas Property Code governing eminent domain, and also highlight certain 2003 amendments to chapter 21 that specifically relate to the condemnation of water rights. The chapter will examine federal and state legal theories of inverse condemnation, including physical and regulatory takings, in the context of Texas water rights, and the Texas Private Real Property Preservation Act. Finally, it will discuss what constitutes property in the context of water rights and takings law.

II. Eminent Domain

Eminent domain is the power to take private property for public use. The right of eminent domain is the right of the state to reassert, either temporarily or permanently, its dominion over any portion of the soil of the state on account of public exigency and for the public good. *See Black's Law Dictionary* 601 (9th ed. 2009). This right is balanced against the constitutional protection of private property, found in both the United States and Texas Constitutions. The Fifth Amendment to the U.S. Constitution concludes with the following statement: "nor shall private property be taken for public use, without just compensation." U.S. Const. amend. V.

Article I, section 17, of the Texas Constitution provides in part as follows:

> No person's property shall be taken, damaged or destroyed for or applied to public use without adequate compensation being made, unless by the consent of such person; and, when taken, except for the use of the State, such compensation shall be first made, or secured by a deposit of money . . . .

Tex. Const. art. I, § 17. See below for a discussion of the effect of the difference in language between the state and federal constitutional protections.

Throughout much of our judicial history, the great majority of governmental takings occurred in the straightforward context of land occupation or acquisition. Thus, much of the law of eminent domain has developed for the purpose of providing the procedural structure for governmental takings and the determination of just compensations. See *Hendler v. United States*, 952 F.2d 1364, 1371–73 (Fed. Cir. 1991), for an excellent and concise discussion of this history, citing Julius L. Sackman, *Nichols' the Law of Eminent Domain* § 8 (1991).

The Texas legislature in 2011 enacted Senate Bill 18 relating to the use of eminent domain authority. *See* Act of May 6, 2011, 82d Leg., R.S., ch. 81, eff. Sept. 1, 2011. This legislation made significant amendments to chapters 552 and 2206 of the Government Code, chapters 251, 261, 263, and 273 of the Local Government Code, chapter 21 of the Property Code, chapter 202 of the Transportation Code, chapter 54 of the Water Code, and certain special laws governing nonprofit charitable corporations. The legislation generally imposes new procedural requirements that must be satisfied before initiating eminent domain proceedings and creates new procedural challenges for attorneys and both private and governmental entities engaged in eminent domain practice. The 84th Legislature added a new subchapter D to Government Code chapter 2206, directing the comptroller to create and make accessible on an Internet Web site maintained by the comptroller an eminent domain database with extensive information that may be useful to the practitioner. *See* Act of May 30, 2015, 84th Leg., R.S., ch. 1218, eff. June 19, 2015.

III. Condemnation

Condemnation is the legal process by which the government exercises the right of eminent domain to take the property of a private owner for public use, without consent, but upon the payment of just compensation. *Hubler v. City of Corpus Christi*, 564 S.W.2d 816, 820 (Tex. Civ. App.—Corpus Christi 1978, writ ref'd n.r.e.). Condemnation proceedings are governed by Texas Property Code chapter 21. However, additional procedures required to initiate eminent domain proceedings are now found in chapter 2206, subchapter B, of the Texas Government Code (Truth in Condemnation Procedures Act). Notably, chapter 21 establishes only the *procedure* by which the power of eminent domain is exercised when that power has been delegated. Nothing in chapter 21 constitutes a delegation of the power itself.

An eminent domain proceeding is not within the general jurisdiction of a court; rather, any power to act is special and depends on the particular eminent domain statute. *In re Tarrant Regional Water District*, No. 12-14-00329-CV, 2015 WL 545783 (Tex. App.—Tyler Feb. 11, 2015, no pet.); *Gulf Energy Pipeline Co. v. Garcia*, 884 S.W.2d 821, 822 (Tex. App.—San Antonio 1994, no writ). District courts and county courts at law have concurrent jurisdiction in eminent domain cases. A county court has no jurisdiction in eminent domain cases. Tex. Prop. Code § 21.001.

The object of a condemnation proceeding is to ascertain what would be just compensation to the owner of the land sought to be taken under the circumstances of the particular case. Essentially, the process involves negotiations between the condemnor and condemnee, filing of a condemnation petition in the appropriate court, a commissioner's hearing to assess damages, and potentially a trial de novo on damages and jurisdictional issues.

In Texas, the power of eminent domain must be conferred by the legislature either expressly or by necessary implication and will not be gathered from doubtful inferences. *See Texas Rice Land Partners, Ltd. v. Denbury Green Pipeline-Texas, LLC*, 363 S.W.3d 192 (Tex. 2012). Because the exercise of the power of eminent domain is in derogation of the rights of citizens, statutes that confer such power are strictly construed in favor of the landowner and against those corporations and subdivisions of the state vested with such power. *See Burch v. City of San Antonio*, 518 S.W.2d 540 (Tex. 1975). A governmental entity that has eminent domain power may exercise such authority exclusively through Texas Property Code sections 21.012 through 21.016. *See* Tex. Prop. Code § 21.011. In condemnation proceedings, the requirements of the statutes are strictly followed. *See City of Bryan v. Moehlman*, 282 S.W.2d 687 (Tex. 1955). Those requirements are discussed below.

Where the power of eminent domain is granted, a determination by the condemnor of the necessity for acquiring certain property is conclusive unless the condemnor's decision was fraudulent, in bad faith, or arbitrary and capricious. *City of Austin v. Whittington*, 384 S.W.3d 766, 777 (Tex. 2012); *FKM Partnership, Ltd. v. Board of Regents of the University of Houston System*, 255 S.W.3d 619, 629 n.9 (Tex. 2008).

Before a governmental or private entity with eminent domain authority begins negotiating with a property owner to acquire real property, the entity must send by first-class mail or otherwise provide to the property owner a landowner's bill of rights statement provided by Texas Government Code section 402.031. *See* Tex. Prop. Code § 21.0112(a).

An entity with eminent domain authority that wants to acquire real property for public use must, by certified mail, return receipt requested, disclose to the property owner at the time an offer to purchase or lease is made any and all existing appraisal reports produced or acquired by the entity relating specifically to the owner's property and prepared in the ten years preceding the date of the offer. Tex. Prop. Code § 21.0111(a). A property owner must disclose to the acquiring governmental entity any and all existing appraisal reports produced or acquired by the property owner relating specifically to the owner's property and used in determining the owner's opinion of value. The disclosure must take place not later than the earlier of (1) the tenth day after the date of receipt of an appraisal report or (2) the third business day before the date of a special commissioner's hearing if an appraisal report is to be used at the hearing. Tex. Prop. Code § 21.0111(b).

If the condemning entity is unable to agree with the owners of the property on the amount of damages, it may begin a condemnation proceeding by filing a petition in the proper court. Tex. Prop. Code § 21.012(a). The petition must (1) describe the property to be condemned, (2) state with specificity the purpose for which the entity intends to acquire the property, (3) state the name of the owner of the property if the owner is known, (4) state that the entity and property owner are unable to agree on the damages, (5) if applicable, state that the entity provided the property owner with the landowner's bill of rights statement in accordance with section 21.0112, and (6) state that the entity made a bona fide offer to acquire the property from the property owner voluntarily as provided by section 21.0113. Tex. Prop. Code § 21.012(b); *see also Hogan v. City of Tyler*, 602 S.W.2d 555 (Tex. Civ. App.—Tyler 1980, writ ref'd. n.r.e.). An entity that files a petition under section 21.012 must provide a copy of the petition to the property owner by certified mail, return receipt requested.

The Texas Supreme Court concluded in 2004 that the requirements of Texas Property Code section 21.012 (including the requirement for good-faith negotiation) are not jurisdictional, but failure to address the requirements will necessitate abatement while they are satisfied. *See Hubenak v. San Jacinto Gas Transmission Co.*, 141 S.W.3d 172 (Tex. 2004), consolidated with *MidTexas Pipeline Co. v. Dernehl, Wenzel v. San Jacinto Gas Transmission Co., Kutach Family Trust v. San Jacinto Gas Transmission Co., Cusack Ranch Corp. v. MidTexas Pipeline Co., Midtex Pipeline Co. v. Dernehl, Midtex Pipeline Co. v. Wright, Jr., Midtex Pipeline Co. v. Wright, III*, and *Cusack v. Midtex Pipeline Co.* A single, bona fide, good-faith, take-it-or-leave-it offer based on a thorough investigation and honest assessment of value was sufficient to satisfy this statutory requirement for negotiations. *See State v. Hipp*, 832 S.W.2d 71 (Tex. App.—Austin 1992), *rev'd in part sub nom. State v. Dowd*, 867 S.W.2d 781 (Tex. 1993).

The requirement for and criteria governing a bona fide offer are now set forth with specificity in section 21.0113 of the Property Code. *See* Tex. Prop. Code § 21.0113.

The sufficiency of the petition's description of the property to confer jurisdiction on the trial court is tested by standards used for adequacy of a description in a deed. *Lin v. Houston Community College System*, 948 S.W.2d 328, 332 (Tex. App.—Amarillo 1997, writ denied). The petition must identify a public use for the property to be condemned. However, the determination by the condemnor of the necessity for acquiring the property is conclusive absent fraud, bad faith, and abuse of discretion or arbitrary and capricious actions, as long as the applicable authorizing statute does not require a distinct showing of necessity. *See Lin*, 948 S.W.2d at 337.

The judge of a court in which a condemnation petition is filed or to which an eminent domain case is assigned must appoint three disinterested real property holders who reside in the county as special commissioners to assess the damages of the owner of the property being condemned. Tex. Prop. Code § 21.014(a). The judge who appoints the special commissioners will give preference to persons agreed on by the parties but may appoint a replacement if a person fails to serve as a commissioner. Tex. Prop. Code § 21.014(a). The special commissioners must swear to assess damages fairly, impartially, and according to the law and may compel witnesses to attend and give testimony, administer oaths, and punish for contempt in the same manner as a county judge. Tex. Prop. Code § 21.014(b), (c).

Special commissioners in an eminent domain proceeding must schedule a hearing for the parties at the earliest practical time but may not schedule a hearing to assess damages before the twentieth day after the date the special commissioners were appointed. The special commissioners shall schedule a hearing for the parties at a place as near as practical to the property being condemned or at the county seat of the county in which the proceeding is being held. Tex. Prop. Code § 21.015(a). After notice of the hearing has been served, the special commissioners must hear the parties at the scheduled time and place or at any other time or place to which they may adjourn the hearing. Tex. Prop. Code § 21.015(b). The proceeding before the special commissioners is administrative and not judicial in nature. *Gulf Energy Pipeline Co. v. Garcia*, 884 S.W.2d 821, 823 (Tex. App.—San Antonio 1994, no writ). The sole authority given to the commissioners is to hear the evidence, assess the amount of damages due the owner, and file their decision with the county judge. *Brazos River Conservation & Reclamation District v. Allen*, 171 S.W.2d 842, 846 (Tex. 1943). Jurisdictional issues such as the adequacy of negotiations or the legitimacy of public purpose are reserved for the court in any subsequent appeal from the commissioner's findings.

Each party in an eminent domain proceeding is entitled to written notice issued by the special commissioners informing the party of the time and place of the hearing. Tex. Prop. Code § 21.016(a). Notice of the hearing must be served on a party no later than the twentieth day before the day set for the hearing, and any person competent to testify may serve the notice. Tex. Prop. Code § 21.016(b). This section also sets forth other procedural requirements for service of the notice. *See* Tex. Prop. Code § 21.016(c), (d). Section 21.023 sets forth requirements for disclosure of information at the time of acquisition of the property through eminent domain, including certain rights relating to potential repurchase of the property by the owner established in Property Code chapter 21, subchapter E. *See* Tex. Prop. Code § 21.023. The landowner may waive the right to complain of certain jurisdictional defects if he attends the commissioner's hearing and presents evidence concerning value. *See McConnico v. Texas Power & Light Co.*, 335 S.W.2d 397 (Tex. Civ. App.—1960, writ ref'd n.r.e.). However, by failing to participate in the hearing, the landowner may forfeit an excellent opportunity to recover fair value without expensive additional proceedings.

As the basis for assessing actual damages to a property owner from a condemnation, the special commissioners must admit evidence on (1) the value of the property being condemned, (2) the injury to the property owner, (3) the benefit to the property owner's remaining property, and (4) the use of the property for the purpose of the condemnation. Tex. Prop. Code § 21.041.

With regard to the assessment of damages in a condemnation not filed to acquire water rights, the special commissioners assess damages based on the evidence presented at the hearing. The local market value of the property at the time of the hearing is the damage to the property owner if an entire tract or parcel is condemned. If only a portion of a tract is condemned, the commissioners determine damage based on an estimate of the extent of the injury and benefit to the property owner. This estimate must include the effect of the condemnation on the remainder of the property. The injury or benefit must be peculiar to the property owner with respect to the particular property being condemned and cannot be an injury or benefit in common with the general community. *See* Tex. Prop. Code § 21.042(a)–(d). Since 2003, additional considerations apply for the assessment of damages when water rights are condemned; these will be discussed below.

A party to a condemnation proceeding may appeal the special commissioners' findings by filing a written statement of the objections and their grounds with the court that has jurisdiction over the proceeding on or before the first Monday following the twentieth day after the day the commissioners file their findings with the court. Tex. Prop. Code § 21.018(a). If a party files an objection, the court will cite the adverse party and try the case in the same manner as other civil causes. Tex. Prop. Code § 21.018(b).

With regard to the conduct of this appeal and subsequent trial, property owners should be particularly aware of the statutory time limits for filing the statement of objections and of the requirement that the objecting party has the burden of securing service of citation on the other party within a reasonable period of time. *City of Tyler v. Beck*, 196 S.W.3d 784, 786 (Tex. 2006); *Amason v. Natural Gas Pipeline Co.*, 682 S.W.2d 240, 242 (Tex. 1985). Even though the condemnor has the burden of proving its right to condemnation and the burden of going forward to trial in an eminent domain proceeding, it is under no legal obligation to do so unless and until it has been served with citation. *See State v. Ellison*, 788 S.W.2d 868 (Tex. App.—Houston 1990, writ denied).

In *Skaggs v. City of Keller*, 880 S.W.2d 264 (Tex. App.—Fort Worth 1994, writ denied), a condemnee's service of citation on the city attorney did not constitute proper service upon the city as the condemnor, so as to place the burden upon the city of going forward with the case after the condemnee filed its objections in court. *Skaggs*, 880 S.W.2d at 266. Although the condemnor becomes the plaintiff for purposes of proving its right to condemn, once the condemnation proceeding is converted into a normal cause in the court, the condemnee must still secure service of citation on the condemnor. *Skaggs*, 880 S.W.2d at 265. If the condemnee fails to secure service within a reasonable period of time, the trial court should dismiss the condemnee's objections for want of prosecution and should also reinstate the special commissioners' award; however, once service of citation on the condemnor is accomplished, the special commissioners' award cannot be reinstated. *Skaggs*, 880 S.W.2d at 266.

Except under certain circumstances, the condemnor may take possession of the condemned property after the special commissioners have made an award in a condemnation proceeding, pending the results of further litigation. The condemnor must first provide for payment or deposit the amount of the award with the court subject to the order of the property owner, all in accordance with the requirements of Texas Property Code section 21.021. *See* Tex. Prop. Code § 21.021; *see also Skaggs*, 880 S.W.2d at 266. This authority is critical for the governmental entity anxious to proceed with a project. Once again, the property owner should be aware that a condemnee who withdraws or otherwise accepts the amount deposited by the condemnor in accordance with the award of the commissioners waives jurisdictional complaints and will be thereafter entitled to litigate only the issue of adequate compensation. *Coastal Industrial Water Authority v. Celanese Corp. of America*, 592 S.W.2d 597, 599 (Tex. 1979); *McCampbell v. Coastal States Crude Gathering Co.*, 401 S.W.2d 318, 320–21 (Tex. Civ. App.—Corpus Christi 1966, writ ref'd n.r.e.).

This enumeration of Property Code provisions is not intended to be an exclusive or verbatim list. It is intended as a brief overview of the condemnation process. The statutes and accompanying case law should be studied carefully.

Although commissioner's hearings are intended to be informal proceedings, landowners should be represented by counsel whenever possible and should approach the proceedings with the dignity and respect that would be afforded to a court. The commissioners will in most cases be experienced and fair, but they will have limited patience for unsupported argument by the *pro se* condemnee. As previously noted, statutory timetables are critical.

Ultimately, the great bulk of condemnation litigation in the past revolved around value and the assessment of damages. However, an increasing number of statutory procedural requirements on the purpose and use of eminent domain may be expected to generate litigation in the future. Analysis of the issues inherent in Government Code chapter 2206 and Property Code chapter 21 and the cases addressing these issues is beyond the scope of this chapter.

In most instances, the governmental entity is driven by considerations of time and certainty in acquiring the necessary property. Thus, the landowner often has opportunities for negotiation. In addition to damages, the government might be prepared to make a variety of in-kind concessions in connection with the proposed project. However, where multiple parcels of property must be acquired, such negotiations can be more complicated because the various landowners may have divergent interests. After access to the property has been acquired following the commissioner's hearing, much of the landowner's leverage is lost.

IV. Condemnation of Water Rights

Most legal practitioners have at least passing familiarity with the government's use of condemnation to acquire real property. The power of eminent domain is regularly invoked for the construction of highways, streets, pipelines, drainage improvements, electric transmission lines, and other public facilities. A water treatment plant or storage tank may need to be located on property that is otherwise unavailable for purchase at a fair price. Condemnation may be necessary to acquire the site. But what about the water itself? How is it acquired for public use?

As discussed more fully elsewhere in this book and chapter, waters in the rivers and navigable streams of Texas belong to the state, and groundwater is the property of the owner of the surface estate. Until the middle of the twentieth century, supplies of both were readily available and adequate for the state's needs. A period of record drought in the 1950s, however, and the state's subsequent rapid urbanization led to a regulatory system for use of the state's surface water rights by municipalities, industry, agriculture, and recreational interests. Permits for the use of water rights from the state's rivers and reservoirs are issued by the state and generally transferrable for value, but reliable supplies are now for the most part fully used in the river basins where they are most in demand. See Chapters 3 and 9 of this book.

Groundwater supplies, once seemingly unlimited, were historically unregulated and inexpensively produced by simply purchasing a small parcel of land and drilling a well. However, management of groundwater resources has now been entrusted by the state to a growing number of local groundwater districts created under chapter 36 of the Texas Water Code. These districts may regulate and limit groundwater production through a variety of means. See Chapters 4 and 16 of this book.

With water supplies now limited and demand for water increasing, water utilities must increasingly turn to the market to satisfy their raw water needs. Just as in the case of real property, the market may not willingly make water available for purchase. The use of condemnation to acquire water rights will likely become more common.

Professor Corwin W. Johnson explored the condemnation of water rights in a 1968 *Texas Law Review* article. *See* Corwin W. Johnson, *Condemnation of Water Rights*, 46 Texas L. Rev. 1054 (1968). As the last thorough scholarly analysis of the issue in this state, the article should be a starting point of reference for any practitioner anticipating a water rights condemnation action. At the time the article was prepared, the rule of capture for groundwater was unquestioned and groundwater supplies could be acquired through the acquisition of a tract of land large enough to accommodate a public well. As a result, there was little need for condemnation to acquire groundwater rights. Thus, not surprisingly, the article focuses on the acquisition of surface water rights. Because it predates significant changes in the Texas Water Code, it must be qualified accordingly.

The article, however, includes an excellent analysis of the statutory authority (or lack thereof) of a local government in Texas to condemn water rights. The analysis is a helpful primer on the legal fine points that distinguish general law cities, home-rule cities, and other governmental entities in Texas. Understanding the analysis is critical to understanding the distinction noted earlier: that Texas Property Code chapter 21 is a mechanism for condemnation only when the right to exercise the power of eminent domain is afforded by another statute. In the absence of an express statement of eminent domain authority, the authority does not exist. Counsel for both condemnor and condemnee should therefore begin their work with a careful analysis of the condemnor's constitutional foundation, statutory framework, and corporate powers.

The right to exercise the power of eminent domain in the context of water is found in multiple statutes. With regard to surface water rights, two of the most notable are Texas Water Code section 11.033 and, for municipalities, Texas Local Government Code chapter 251.

Texas Water Code section 11.033 states:

> The right to take water necessary for domestic and municipal supply purposes is primary and fundamental, and the right to recover from other uses water which is essential to domestic and municipal supply purposes is paramount and unquestioned in the policy of the state. All political subdivisions of the state and constitutional governmental agencies exercising delegated legislative powers have the power of eminent domain to be exercised as provided by law for domestic, municipal, and manufacturing uses and for other purposes

> authorized by this code, including the irrigation of land for all requirements of agricultural employment.

Tex. Water Code § 11.033.

Texas Water Code section 11.040(a) provides that "a permanent water right is an easement and passes with the title to the land." Tex. Water Code § 11.040(a). This characterization helps place condemnation of water rights squarely within traditional notions of the use of eminent domain. Vested water rights cannot be taken without compensation, without due process, or retroactively. *In re Water Rights of Cibolo Creek Watershed of San Antonio River Basin*, 568 S.W.2d 155, 156 (Tex. App.—San Antonio 1978, no writ). Both sections 11.033 and 11.040 relate to surface water rights by virtue of their placement in Texas Water Code chapter 11. Chapter 11 defines "water right" as a "right acquired under the laws of this state to impound, divert, or use state water." Tex. Water Code § 11.002(5).

A careful analysis of section 11.033 as undertaken by Professor Johnson suggests that it might be read more restrictively than its sweeping language implies. *See* Johnson, at 1062. However, Texas Local Government Code chapter 251 provides as follows:

> (a) When the governing body of a municipality considers it necessary, the municipality may exercise the right of eminent domain for a public purpose to acquire public or private property, whether located inside or outside the municipality, for any of the following purposes:
>
> > (1) . . . water works system, including reservoirs, other water supply sources, watersheds, and water storage, drainage, treatment, distribution, transmission, and emptying facilities; . . .
> >
> > (2) the determining of riparian rights relative to the municipal water works;
> >
> > (3) the straightening or improving of the channel of any stream, branch, or drain;
> >
> > (4) the straightening, widening, or extending of any alley, street, or other roadway; and
> >
> > (5) for any other municipal purpose the governing body considers advisable.
>
> (b) A municipality condemning land under this section may take a fee simple title to the property if the governing body expresses the intention to do so.

Tex. Loc. Gov't Code § 251.001.

The Code goes on to say that an exercise of the power of eminent domain granted by chapter 251 is governed by Texas Property Code chapter 21. Tex. Loc. Gov't Code § 251.002.

By contrast, the eminent domain authority of a groundwater conservation district is specifically limited. It may not be used for the condemnation of land for the purpose of acquiring rights to groundwater, surface water, or water rights; or the production, sale, or distribution of groundwater or surface water. Tex. Water Code § 36.105(b).

Similarly, the eminent domain authority of a general law district or water supply corporation is specifically restricted by the following language: "The power of eminent domain may not be used for the condemnation of land for the purpose of acquiring rights to underground water or water rights." Tex. Water Code § 49.222(c). See also Chapter 7 of this book.

Interestingly, and significantly for the South Central Texas region, section 1.11(g) of the Edwards Aquifer Authority Act contains the following language with regard to the condemnation of water rights: "The Authority has the power of eminent domain. The authority may not acquire rights to underground water by the power of eminent domain." Act of May 30, 1993, 73d Leg., R.S., ch. 626, § 1.11, *as amended by* Act of May 16, 1995, 74th Leg., R.S., ch. 524; Act of May 29, 1995, 74th Leg., R.S., ch. 261; Act of May 6, 1999, 76th Leg., R.S., ch. 163; Act of May 23, 2001, 77th Leg., R.S., ch. 1192; Act of May 28, 2001, 77th Leg., R.S., ch. 966, §§ 2.60–.62, 6.01–.05; Act of June 1, 2003, 78th Leg., R.S., ch. 1112, § 6.01(4); Act of May 23, 2007, 80th Leg., R.S., ch. 510; Act of May 28, 2007, 80th Leg., R.S., ch. 1351, §§ 2.01–.12; Act of May 28, 2007, 80th Leg., R.S., ch. 1430, §§ 12.01–.12; Act of May 21, 2009, 81st Leg., R.S., ch. 1080; and Act of May 20, 2013, 83d Leg., R.S., ch. 783 [hereinafter Edwards Aquifer Act]. See also Chapter 17 of this book.

The Edwards Aquifer Authority (EAA) is thus limited notwithstanding its statutory mandate to manage withdrawals of groundwater from the Edwards Aquifer in order to protect endangered species while also protecting historic groundwater use. Thus, the EAA is required to achieve its mandate by entirely voluntary or regulatory means. Whether that regulation has itself constituted a taking or acquisition of the water is a question that will be explored below.

The foregoing enumeration of statutory provisions is by no means exclusive. A wide variety of water regulatory entities exist by special-purpose legislation and other statutory frameworks. Although historically there have been few successful jurisdictional challenges in condemnation proceedings, the unique nature of water law may provide opportunities for challenging the authority of a condemnor of water rights.

V. H.B. 803, 78th Legislature (2003)

Notwithstanding the wholesale changes in Texas water law and water policy during the last thirty-five years, the scope and application of the various statutory provisions discussed above have until recently received relatively little attention or clarification from the Texas legislature. In 2003, however, the 78th Legislature adopted a bill that bolstered eminent domain authority for the acquisition of water rights but also dramatically limited the availability and increased the potential cost of this remedy. House Bill 803 made two amendments to Texas Property Code chapter 21 relating to water rights in the context of condemnation. First, the bill added a new section 21.0121 (Condemnation to Acquire Water Rights) that requires a political subdivision in a condemnation proceeding for purposes of acquiring water rights to plead and prove that it has—

(1) prepared a drought contingency plan;

(2) developed and implemented a water conservation plan that will result in the highest practicable levels of water conservation and efficiency achievable in the political subdivision's jurisdiction;

(3) made a bona fide good faith effort to obtain practicable alternative water supplies to the water rights the political subdivision proposes to condemn;

(4) made a bona fide good faith effort to acquire the rights to the water the political subdivision proposes to condemn by voluntary purchase or lease; and

(5) made a showing that the political subdivision needs the water rights to provide for the domestic needs of the political subdivision within the next 10-year period.

Tex. Prop. Code § 21.0121(a). Second, the new section provides that a court shall deny the right to condemn unless the political subdivision proves to the court that the political subdivision has met the requirements of subsection (a). Tex. Prop. Code § 21.0121(b).

With regard to the valuation of such water rights, H.B. 803 did not change the valuation of surface water rights found in Texas Water Code section 11.0275:

> Whenever the law requires the payment of fair market value for a water right, fair market value shall be determined by the amount of money the willing buyer would pay a willing seller, neither of which is under any compulsion to buy or sell, for the water in an arms-length transaction and shall not be limited to the amount of money that the owner of the water right has paid or is paying for the water.

Tex. Water Code § 11.0275. Contrast this more traditional valuation standard for surface water rights with the new Texas Property Code section 21.0421 (Assessment of Damages: Groundwater Rights) under H.B. 803.

Under section 21.0421, evidence relating to the market value of groundwater rights as property apart from the land in addition to the local market value of the real property must be admitted if (1) the political subdivision proposes to condemn the fee title of real property and (2) a finding is made that the real property may be used by the political subdivision to develop or use the rights to groundwater for a public purpose. Such evidence of market value must be based on generally accepted appraisal methods and techniques, including the methods of appraisal under Texas Tax Code chapter 23, subchapter A. *See* Tex. Prop. Code § 21.0421(a), (b).

The damages must be assessed based on "(1) the local market value of the real property, excluding the value of the groundwater in place, at the time of the hearing; and (2) the market value of the groundwater rights as property apart from the land at the time of the hearing." *See* Tex. Prop. Code § 21.0421(c). In making such a finding, the special commissioners or other fact finder must consider:

> (1) the amount of groundwater the political subdivision can reasonably be expected to produce from the property on an annual basis;
>
> (2) the number of years the political subdivision can reasonably be expected to produce groundwater from the property;
>
> (3) the quality of the groundwater;
>
> (4) the location of the real property in relation to the political subdivision for conveyance purposes;
>
> (5) any potential environmental impact of producing groundwater from the real property;
>
> (6) whether or not the real property is located within the boundaries of a political subdivision that can regulate the production of groundwater from the real property;
>
> (7) the cost of alternative water supplies to the political subdivision; and
>
> (8) any other reasonable factor that affects the market value of a groundwater right.

Tex. Prop. Code § 21.0421(d).

Section 21.0421 clarifies that its terms do not affect the appraisal of such property for tax appraisal purposes. Groundwater rights appraised separately from the real property under this section may not be appraised separately from real property for property tax appraisal purposes, and real property condemned for the purpose described by section 21.0421(a) is not subject to an additional tax as provided by Texas Tax Code section 23.46 or 23.55. *See* Tex. Prop. Code § 21.0421(e).

These statutory changes pose significant new obstacles to the condemnation of water rights. To the extent that they articulate a statutory vehicle for such condemnation, they may be seen as a helpful tool in any debate over condemnation authority. However, that benefit comes at a high price.

Section 21.0121 applies to the acquisition of both groundwater and surface water rights. The first two requirements for a drought contingency plan and water conservation plan "that will result in the highest practicable levels of water conservation and efficiency achievable" will almost certainly have been addressed to some degree by any local government resorting to condemnation to secure a water supply. *See* Tex. Prop. Code § 21.0121(a)(1), (2). However, the substance and adequacy of those plans may provide rich ground for jurisdictional litigation, particularly in an effort to define "highest practicable levels achievable."

The requirement that the political subdivision must make "a bona fide good faith effort to obtain practicable alternative water supplies to the water rights which it proposes to condemn" may be a very high hurdle. *See* Tex. Prop. Code § 21.0121(a)(3). It raises many questions. In the widely divergent world of municipal finances, what is "practicable"? How much effort is required? How much must the political subdivision spend? What is a good-faith effort? What if each alternative itself requires condemnation of water rights? A planning effort to obtain alternative supplies will almost certainly take many years. In addition, subsection (5) requires a showing of need within the next ten-year period. *See* Tex. Prop. Code § 21.0121(a)(5). What if the need is short term in order to facilitate alternative planning? Are the alternative supplies not practicable if they would cost more than the rights to be condemned?

Section 21.0121(a)(4) requires the political subdivision to have made a bona fide, good-faith effort to acquire the rights to the water by voluntary purchase or lease. *See* Tex. Prop. Code § 21.0121(a)(4). This requirement reflects and expands the underlying requirement of section 21.012 that the condemnor is "unable to agree with the owner of the property on the amount of damages." *See* Tex. Prop. Code § 21.012(a). But is a "bona fide good faith effort" under section 21.0121 different from the good-faith effort already imposed by Texas courts that have interpreted section 21.012? *See State v. Hipp*, 832 S.W.2d 71 (Tex. App.—Austin 1992), *rev'd in part sub nom. State v. Dowd*, 867 S.W.2d 781 (Tex. 1993); *Hubenak v. San Jacinto Gas Transmission Co.*, 141 S.W.3d 172 (Tex. 2004); and consolidated cases.

The language of Texas Property Code section 21.0421 is even more problematic for the condemning authority. The language of the section raises not only imposing cost issues but new procedural questions as well. Furthermore, the process for valuation of groundwater rights is established in the context of the ongoing uncertainty about the legal nature of such rights. See the discussion below and Chapter 4 of this book.

Before H.B. 803, a political subdivision wishing to acquire a groundwater supply might simply acquire a well site outside the boundaries of a groundwater district and rely on the rule of capture for virtually unlimited production. The cost of the acquisition would be the surface value of the amount of land required for the public well. If the groundwater source fell within the boundaries of a groundwater district that regulates production through correlative rights, it would have also been necessary for the condemnor to acquire sufficient surface acreage to accommodate production limitations imposed by the district's regulations. Even in that event, however, the acreage would have been acquired at a nominal surface valuation.

Section 21.0421 now provides from the outset that the special commissioners or court must admit evidence relating to the market value of groundwater rights *as property apart from the land* in addition to the local value of the real property under the conditions outlined in the statute. *See* Tex. Prop. Code § 21.0421(a). Those conditions include a finding by the special commissioners or court based on evidence submitted at the hearing that the real property may be used by the political subdivision to develop or use the rights to groundwater for a public purpose. Tex. Prop. Code § 21.0421(a)(2). By placing this threshold finding in the hands of the special commissioners, the statute thrusts a new fact-finding role on the commissioners, whose work was previously limited to a determination of value in condemnation proceedings.

Section 21.0421(b) first directs that evidence submitted on the market value of groundwater as property apart from the land must be based on generally accepted appraisal methods and techniques. Tex. Prop. Code § 21.0421(b). However, if the commissioners or court finds that the real property may be used by the condemnor to develop or use the rights to groundwater for a public purpose, the special commissioner's court may assess damages to the property owner based on (1) the value of the real property excluding the value of the groundwater and (2) the value of the groundwater rights as property apart from the land. Tex. Prop. Code § 21.0421(c). The use of "may" suggests that this additional standard for damages is discretionary, but the statute offers no guidance on when it would be appropriately applied.

Section 21.0421(d) enumerates criteria that the special commissioners or court must consider in assessing damages based on the market value of groundwater rights under subsection (c)(2). *See* Tex. Prop. Code § 21.0421(d). Those criteria may create a measure of damages that is wholly inconsistent with long-standing condemnation law and may render the availability of condemnation proceedings meaningless in the groundwater context. As noted above, damages in all other condemnation proceedings are assessed in accordance with the criteria set forth in Texas Property Code section 21.042. Those criteria revolve entirely around the local market value of the property taken at the time of the special commissioners' hearing and the extent of injury and benefit to the remainder if only a portion of the property has been condemned. Pursuant to section 21.041, the special commissioners must admit evidence on (1) the value of the property being condemned, (2) the injury to the property owner, (3) the benefit to the property owner's remaining property, and (4) the use of the property for the purpose of condemnation. Tex. Prop. Code § 21.041.

By contrast, section 21.0421(d) essentially formulates a measure of damages based on the value of the property taken to the condemnor as a consequence of the condemnation, rather than the value of the property taken at the time of the taking. The valuation criteria assumes that the groundwater has the same value in the ground before the condemnation as it will have as a result of the condemnor's development efforts. Even more problematic for the condemnor, subsection (d) requires the commissioners to consider the "cost of alternative water supplies to the political subdivision." Tex. Prop. Code § 21.0421(d)(7). The cost of these alternative supplies will no doubt be enormous and will probably be the motivation for the condemnation in the first place.

Such a measure of damages may afford a windfall to the property owner far in excess of the groundwater's local market value in the ground. In determinations of the market value of condemned land, it is a well-settled principle that a fact finder should not take into consideration any increase or decrease in value that might have accrued to property due to the location of the project for which the property is being condemned. *DeWitt & Rearick, Inc. v. State*, 531 S.W.2d 862, 865–66 (Tex. Civ. App.—El Paso 1975, no writ) (citing *City of Fort Worth v. Corbin*, 504 S.W.2d 828 (Tex. 1974)). A condemnee must be paid for what it has lost, not for what the condemnor has gained. *State v. Ware*, 86 S.W.3d 817, 825 (Tex. App.—Austin 2002, no pet.). The legislature has also authorized the commissioners or court to consider "any other reasonable factor that affects the market value of a groundwater right." Tex. Prop. Code § 21.0421(d)(8).

The changes made by H.B. 803 have not been interpreted by the appellate courts; however, they were placed squarely before the Third Court of Appeals in the case of *State v. 7KX Investments*, No. 03-10-00069-CV (Tex. App.—Austin, filed Feb. 5, 2010) on appeal from Bell County Court at Law No. 1. In that case, the Texas Department of Transportation invoked Texas Property Code chapter 21 to acquire 27.7 acres of real property fronting Interstate 35 for a highway rest stop. The state offered to pay approximately $500,000 for the land to be acquired. The land included six large groundwater wells. Based largely on the value of the groundwater beneath the land, and the requirements of sections

21.0121 and 21.0421, a jury awarded the property owners $5.8 million for the condemned tract of land. The case was settled before the court of appeals issued an opinion.

As highlighted by *7KX Investments*, condemnation of water rights in compliance with the requirements of H.B. 803 will pose many challenges for governmental entities. These challenges will translate into delays, uncertainty, and cost. Nonetheless, the use of condemnation for water supply development is likely to occur more frequently in the future. The state must develop new water supplies for its growing population. Landowners are increasingly sophisticated about the value of water resources and reluctant to sell water on terms acceptable to governmental entities. The enormous cost of infrastructure for a water supply project requires that large volumes of water be available for the project. Restrictions imposed by groundwater districts and other governmental entities encourage low-impact production spread over a large geographic area. Securing rights for such production requires successful negotiations with many different owners in a predictable period of time. Many landowners have no interest in selling their water on any terms.

These are the circumstances that underlie the historic exercise of eminent domain authority. Condemnation will be an essential tool in the acquisition of water rights for public use, as it has been essential for other government initiatives.

VI. Inverse Condemnation

The exercise of eminent domain authority through condemnation is seldom well received by landowners. Unfortunate condemnees may view it as an oppressive incursion by government onto the private property of citizens, which the citizens are largely powerless to prevent. Condemnation is, nonetheless, a straightforward, time-honored, legislatively established process by which the government acquires property for a public purpose and pays fairly for what it receives. Government could hardly function without this authority. Due process and fair compensation are the keys.

However, the exercise of eminent domain is not the only governmental action that involves impacts on private property. Takings may be categorized as either statutory (if the government compensates the owner for the taking) or inverse (if the owner must file suit because the government took, damaged, or destroyed the property without paying compensation). *Kopplow Development, Inc. v. City of San Antonio*, 399 S.W.3d 532, 536 (Tex. 2013) (citing *Westgate, Ltd. v. State*, 843 S.W.2d 448, 452 (Tex. 1992)). By imposing regulations on private property or restricting its use, government may effectively acquire the property for its own purposes, while rendering it without value to its nominal owner. Examples of such government action abound. Overly burdensome land use restrictions, required dedications, and outright seizure of property all can lead to a governmental taking without payment of compensation as required by the U.S. and Texas Constitutions. This is commonly known as inverse condemnation. Such conduct by government may be actionable and has been a rich source of federal and state litigation.

It is expected that the rapid proliferation of groundwater districts in Texas and their evolving efforts to manage or limit the production of groundwater will add to this jurisprudence. Landowners throughout the state are finding that their historic access to groundwater beneath their land has been reduced by newly adopted groundwater district regulations. From the perspective of the affected landowner, this water has been acquired by the government for public use as surely as if it had been condemned and transported away by a distant water utility. However, unlike under the exercise of eminent domain, no compensation has been paid.

Inverse condemnation is a "cause of action against a governmental defendant to recover the value of property which has been taken in fact by the governmental defendant, even though no formal exercise of the power of eminent domain has been attempted by the taking agency." *Hearts Bluff Game Ranch, Inc. v. State*, 381 S.W.3d 468, 475 (Tex. 2012) (quoting *United States v. Clarke*, 445 U.S. 253, 257 (1980)); *see also State v. Brownlow*, 319 S.W.3d 649, 652 (Tex. 2010). Inverse condemnation occurs when property has been taken, damaged, or destroyed for public use without due process or without proper condemnation proceedings, forcing the property owner to seek compensation through the courts. *See City of Dallas v. Stewart*, 361 S.W.3d 562, 567 (Tex. 2012); *City of Houston v. Trail Enterprises*, 300 S.W.3d 736 (Tex. 2009); *City of Abilene v. Burk Royalty Co.*, 470 S.W.2d 643, 646 (Tex. 1971). In an inverse condemnation action, the traditional condemnation roles of the parties are reversed. The property owner, having already lost a property interest, must take the role of plaintiff to recover compensation for his loss. The government, having already taken the property, becomes the defendant. It is well settled that the Texas Constitution waives government immunity with respect to inverse condemnation claims. *City of Houston v. Carlson*, No. 13-0435, 2014 WL 7204431, at *2 (Tex. Dec. 19, 2014) (citing *City of Dallas v. VSC, LLC*, 347 S.W.3d 231, 236 (Tex. 2011)). Nevertheless, such a claim is predicated upon a viable allegation of taking. *Carlson*, 2014 WL 7204431, at *2 (citing *Hearts Bluff Game Ranch, Inc.*, 381 S.W.3d at 476).

Inverse condemnation generally occurs in one of two contexts: physical or nonphysical invasion of the property by the government or regulatory restrictions imposed by the government on the property's use. A subset of this regulatory category may take the form of an exaction by the government in exchange for issuance of a permit to which the property owner is otherwise entitled. The U.S. Supreme Court has defined inverse condemnation as a "shorthand description of the manner in which a landowner recovers just compensation for a taking of his property when condemnation proceedings have not been instituted." *Clarke*, 445 U.S. at 257.

There are three elements of an inverse condemnation action under article I, section 17, of the Texas Constitution. *See* Tex. Const. art. I, § 17. They are (1) the governmental entity intentionally performed an act in the exercise of its lawful authority, (2) that resulted in the taking, damaging, or destruction of the plaintiff's property, (3) for public use. *Comunidad Balboa, LLC v. City of Nassau Bay*, 402 S.W.3d 479, 483 (Tex. App.—Houston [14th Dist.] 2013, pet. denied).

First, a property owner must prove that the governmental entity intentionally performed certain acts in the exercise of its lawful authority. *Steele v. City of Houston*, 603 S.W.2d 786, 790 (Tex. 1980). Mere negligence on the part of the government does not suffice. *Kopplow Development, Inc.*, 399 S.W.3d at 537; *Tarrant Regional Water District v. Gragg*, 151 S.W.3d 546, 554–55 (Tex. 2004). A governmental entity may be liable if it "(1) knows that a specific act is causing identifiable harm; or (2) knows that the specific property damage is substantially certain to result from an authorized governmental action"—that is, that the damage is necessarily an incident to, or necessarily a consequential result of, the government action. *City of Arlington v. State Farm Lloyds*, 145 S.W.3d 165 (Tex. 2004) (quoting *City of Dallas v. Jennings*, 142 S.W.3d 310, 314 (Tex. 2004)). "When the government acts pursuant to colorable contract rights, it lacks the necessary intent to take under its eminent domain powers and thus retains its immunity from suit." *State v. Holland*, 221 S.W.3d 639, 643 (Tex. 2007).

Second, the property owner must show that the government's action resulted in a taking or damage to the property within the meaning of the Texas Constitution. *Woodson Lumber Co. v. City of College Station*, 752 S.W.2d 744, 746 (Tex. App.—Houston [1st Dist.] 1988, no writ). The distinction between a "taking" and a "damaging" is largely an evidentiary matter, and a single pleading will often suffice for both claims. *Hubler v. City of Corpus Christi*, 564 S.W.2d 816, 822 (Tex. Civ. App.—Corpus Christi 1978, writ ref'd. n.r.e.).

Third, the owner must prove that the taking or damaging was "for or applied to public use." "Public use" has been variously defined. One court suggested that a "public use" might be found if the governmental entity intended to accomplish an eminent domain objective under the guise of police power; if the governmental entity was attempting to gain a benefit for the public at large; or if, as a result of the governmental action, a benefit would inure to the general public. *Woodson Lumber Co.*, 752 S.W.2d. at 746.

The issue of public use received intense scrutiny at the federal level in the case of *Kelo v. City of New London*, 545 U.S. 469 (2005). In that case, the city undertook a straightforward condemnation action for urban renewal purposes, with the goal of transferring the acquired property to private developers. The U.S. Supreme Court reaffirmed a broad deference to local governmental determinations of "public use." This decision, although determined under the federal constitution, may be expected to guide the Texas Supreme Court in light of the Texas court's past deference to federal takings jurisprudence. *See Sheffield Development Co., Inc. v. City of Glenn Heights*, 140 S.W.3d 660 (Tex. 2004). Partially in response to the *Kelo* decision, the Texas legislature adopted Texas Government Code chapter 2206, which places limitations on the use of eminent domain if the taking will confer a private benefit on a private party or if it is for certain economic development purposes.

See also the extensive discussion of "public use" in *City of Austin v. Whittington*, 384 S.W.3d 766, 777 (Tex. 2012), and *FKM Partnership, Ltd. v. Board of Regents of the University of Houston System*, 255 S.W.3d 619, 629 (Tex. 2008).

The elements of a federal inverse condemnation cause of action are substantially similar to those for a state action, except, as noted, the additional "damaged or destroyed" language under the Texas Constitution is not found in the Fifth Amendment. However, a federal remedy is not available if relief is available under the state constitution. Federal and state claims may be brought together, but an available state claim will afford exclusive relief. The state court proceedings are required to ripen the federal claims and at the same time become preclusive of the federal claims. The U.S. Supreme Court will not disregard the full faith and credit statute to preserve the availability of a federal forum in a takings claim. *See San Remo Hotel, L.P. v. City and County of San Francisco*, 545 U.S. 323 (2005).

VII. What Constitutes a Taking?

The most difficult federal and state jurisprudence arising from inverse condemnation claims focuses on the second element of proof: Did the governmental action result in a compensable taking within the meaning of the state or federal constitution? In both federal and state jurisprudence, takings can be classified as either physical or regulatory takings. Physical takings occur when the government authorizes an unwarranted physical occupation of an individual's property. *Mayhew v. Town of Sunnyvale*, 964 S.W.2d 922, 933 (Tex. 1998). "When the government physically takes possession of an interest in property for some public purpose, it has a categorical duty to compensate the owner." *United States v. Pewee Coal Co.*, 341 U.S. 114, 115 (1951). There are several distinctions between physical takings and regulatory takings. The former "are relatively rare, easily identified, and usually represent a greater affront to individual property rights," whereas the latter "are ubiquitous and most of them impact property values in some tangential way." *Lowenberg v. City of Dallas*, 168 S.W.3d 800, 801 (Tex. 2005) (citing *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, 535 U.S. 302, 324 (2002)). As a result, it is often inappropriate to treat cases involving one as controlling precedents for the other.

The growth of the regulatory state at all levels of government in the twentieth century resulted in a wide variety of governmental restrictions on private property other than outright occupation or purchase. Physical possession is a taking for which compensation is constitutionally mandated under both Texas and federal law, but under both jurisprudence a restriction in the permissible uses of property or a diminution in its value resulting from regulatory action within the government's police power may or may not be a compensable taking. *Sheffield*, 140 S.W.3d at 669–70. All property is held subject to the valid exercise of the police power, and thus not every regulation is a compensable taking. *Sheffield*, 140 S.W.3d at 670 (citing *City of College Station v. Turtle Rock Corp.*, 680 S.W.2d 802, 804 (Tex. 1984)); *see also In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438 (Tex. 1982).

"Government could hardly go on . . . if to some extent values incident to property could not be diminished [by government regulation] without paying for every such change in the general law." *Sheffield*, 140 S.W.3d at 670 (quoting *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 413 (1922)). Yet, "a strong public desire to improve the public condition is not enough to warrant achieving the desire by a shorter cut than the constitutional way of paying for the change . . . . The general rule at least is, that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking." *Sheffield*, 140 S.W.3d at 670 (quoting *Mahon*, 260 U.S. at 415–16).

As reflected earlier in this chapter, the takings clauses of the Texas Constitution and the U.S. Constitution are different. Nonetheless, the Texas Supreme Court has repeatedly demonstrated its inclination to look to federal jurisprudence for guidance when analyzing a takings claim. *Sheffield*, 140 S.W.3d at 668; *City of Austin v. Travis County Landfill Co.*, 73 S.W.3d 234, 238–39 (Tex. 2002); *Mayhew*, 964 S.W.2d at 932. Prosecution of a takings claim therefore requires some understanding of the federal analysis.

VIII. Federal Analysis of What Constitutes a Taking

For several decades after the U.S. Supreme Court decision in *Pennsylvania Coal Company v. Mahon*, a landowner's relief in a federal constitutional challenge based on a land use regulation that went too far was limited to the court's invalidation of the regulation. In 1978, the fight to preserve air space over New York's Grand Central Station introduced a new era of Supreme Court attention to regulatory takings. *See Penn Central Transportation Co. v. New York City*, 438 U.S. 104 (1978).

In a series of opinions over the following twenty years, the U.S. Supreme Court clearly established the right to compensation for a regulatory taking under the federal constitution, but obscured the analysis of when such a taking occurs. *See Agins v. City of Tiburon*, 447 U.S. 255 (1980); *San Diego Gas & Electric Co. v. City of San Diego*, 450 U.S. 621 (1981); *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419 (1982); *Williamson County Regional Planning Commission v. Hamilton Bank of Johnson City*, 473 U.S. 172 (1985); *First English Evangelical Lutheran Church of Glendale v. Los Angeles County*, 482 U.S. 304 (1987); *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987); *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470 (1987); *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992); *Concrete Pipe & Products of California, Inc. v. Construction Laborers Pension Trust for Southern California*, 508 U.S. 602 (1993); *Dolan v. City of Tigard*, 512 U.S. 374 (1994); *Suitum v. Tahoe Regional Planning Agency*, 520 U.S. 725 (1997).

These cases were collectively described by one land-use practitioner as "intellectual chaos." Gideon Kanner, *Hunting the Snark, Not the Quark: Has the U.S. Supreme Court Been Competent in its Effort to Formulate Coherent Regulatory Takings Law?*, 30 Urb. Law. 307, 309 (1998). In the words of the federal circuit court:

> The Supreme Court itself likes to point out that no set formula exists to determine whether compensation is constitutionally due for a government restriction of property; instead the court must engage in "essentially ad hoc, factual inquiries." But at bottom what emerges is at least the basic notion that the government, under the guise of regulation, cannot take from a property owner the core of economic value of the property, leaving the owner with a mere shell of shambled expectations.

Hendler v. United States, 952 F.2d 1364, 1373 (Fed. Cir. 1991) (citation omitted).

Between 1997 and 2002, the U.S. Supreme Court issued three additional major regulatory takings opinions in the cases of *City of Monterrey v. Del Monte Dunes at Monterrey Ltd.*, 526 U.S. 687 (1999); *Palazzolo v. Rhode Island*, 533 U.S. 606 (2001); and *Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, 535 U.S. 302 (2002). These cases generally reflect that the

Supreme Court takes a dim view of regulatory zeal by local governments. However, only in the *City of Monterrey* case did the Court affirm a takings judgment for the plaintiff.

Notwithstanding their length and complexity, the foregoing cases reflected a discernible federal takings analysis. The analysis relies heavily on case-specific facts and a sense of fairness to justly apportion the burdens of government regulation. Three broad rules emerge from the cases:

1. A taking occurs when the government physically occupies property. No matter how small the intrusion, a permanent physical occupation of private property requires compensation. *See Loretto*, 458 U.S. 419.

2. A taking occurs when the government regulation deprives the owner of all economically beneficial use of the property. *See Lucas*, 505 U.S. 1003.

3. If a landowner has been deprived of less than all economically viable use, the court must determine whether the regulation unreasonably interferes with the owner's right to use and enjoy the property. In that event, the takings inquiry will focus on the multifactor balancing test articulated in *Penn Central*, 438 U.S. 104. That test requires the court to determine on an ad hoc basis whether fairness and justice have been served by balancing the following factors: (a) the character or nature of the governmental conduct, (b) the economic impact on the landowner, and (c) the degree to which the regulation has affected the reasonable, investment backed expectations of the land. *Penn Central*, 438 U.S. at 124.

In considering the character of the action, the court may in turn consider whether (1) the interference can be characterized as an invasion, (2) the interference arises from a public program adjusting the benefits and burdens of economic life to promote the public good, or (3) the action is against the economic interest of an owner for the government's own advantage. *Penn Central*, 438 U.S. at 124. These factors are neither mathematically precise nor a per se rule. They are instead elements in a "complex of factors" leading to the ultimate determination of whether compensation is required.

In *Lingle v. Chevron U.S.A., Inc.*, 544 U.S. 528 (2005), the U.S. Supreme Court reconsidered and disavowed a fourth takings test that was first articulated twenty-five years earlier in *Agins*, 447 U.S. 255. In the context of a challenge to a municipal zoning ordinance, the *Agins* court declared that a regulation effects a taking if it does not substantially advance a legitimate state interest. *See Agins*, 447 U.S. at 260. However, a regulation that does not advance the public interest is not a valid regulation and may be challenged under the Due Process Clause:

> Instead of addressing a challenged regulation's effect on private property, the "substantially advances" inquiry probes the regulation's underlying validity. But such an inquiry is logically prior to and distinct from the question whether a regulation effects a taking, for the Takings Clause presupposes that the government has acted in pursuit of a valid public purpose. The Clause expressly requires compensation where government takes private property "for public use." It does not bar government from interfering with property rights, but rather requires compensation "in the event of otherwise proper interference amounting to a taking." Conversely, if a governmental action is found to be impermissible—for instance because it fails to meet the "public use" requirement or is so arbitrary as to violate due process—that is the end of the inquiry. No amount of compensation can authorize such action.

Lingle, 544 U.S. at 543 (citation omitted).

By confusing the effectiveness of a regulation in accomplishing its purpose with the impact of the regulation on private property, the *Agins* court badly confused takings jurisprudence for the next quarter century. As noted by Justice O'Connor in her *Lingle* opinion, the test tells us nothing about the actual burden imposed on property rights or how that burden is allocated. A regulation that effectively advances a legitimate state interest may nonetheless unfairly burden a private property interest. Similarly, an ineffective regulation may not burden private property rights at all. The court recognized that the effectiveness of the regulation may be a factor in a due-process analysis of its validity, but it has no place in takings jurisprudence and is not a valid method by which to identify regulatory takings for which the Fifth Amendment requires compensation. *Lingle*, 544 U.S. at 540.

As a subset of the three categorical takings rules, the U.S. Supreme Court has articulated a two-part takings test for the "special context" of land use exactions. In both *Nollan*, 483 U.S. 825, and *Dolan*, 512 U.S. 374, governmental entities demanded that landowners dedicate an easement allowing public access to or through their property as a condition of obtaining necessary development permits. Simple appropriation of the easement in each case would have been a compensable physical taking. As described by Justice O'Connor, the question was whether the government could, without paying the compensation that would otherwise be required, demand the easement as a condition for granting a development permit the government was to some degree entitled to deny. *Nollan* and *Dolan* collectively articulated a two-part test for determining whether the exaction constituted a compensable taking. The test holds that an exaction is not a taking if (1) an essential nexus exists between the exaction and a legitimate state interest, and (2) the exaction is roughly proportional to the public consequences of the requested land use for which a permit is required. *Nollan*, 483 U.S. at 837; *Dolan*, 512 U.S. at 391.

Justice O'Connor stresses that, although *Agins* language is quoted in both *Nollan* and *Dolan*, the rule established by those cases is entirely distinct from the "substantially advance" test addressed and disavowed in *Lingle*. *Lingle*, 544 U.S. at 540. For its clarity and holding, the Lingle opinion should be early reading in preparation for a takings claim.

The U.S. Supreme Court was asked to conclude that a decision by the Florida Supreme Court had effected a taking of private property. *See Stop the Beach Renourishment, Inc. v. Florida Department of Environmental Protection*, 560 U.S. 702 (2010). The case arose from certain planned beach restoration activity by two local governments. The local governments applied for and were issued permits for the beach restoration by the State of Florida. Adjoining beachfront property owners asserted that issuance of the permits deprived the owners of certain littoral property rights without just compensation.

The Florida Supreme Court concluded that the state activity did not effect a taking of private property because the right to accretions is not a vested property right, and there is no littoral right to contact with the water independent of the right of access. That decision was challenged in the federal courts. In a majority opinion by Justice Scalia, the U.S. Supreme Court concluded that if a court declares that what was once an established right of private property no longer exists, that is a taking of that property, no less than if the state had physically appropriated it or destroyed its value by regulation. *Stop the Beach Renourishment, Inc.*, 560 U.S. at 714. However, the Court also concluded that no taking had occurred based on the facts of the case. *Stop the Beach Renourishment, Inc.*, 560 U.S. at 731.

The garbled evolution of federal takings jurisprudence suggests that takings claims will be pursued in federal court by only the most intrepid practitioners. The U.S. Supreme Court's decision in *San Remo Hotel* may relieve this trepidation by actually closing the federal courthouse door if relief is available under the applicable state constitution. *See San Remo Hotel, L.P. v. City and County of San Francisco*, 545 U.S. 323 (2005); *see also Williamson County Regional Planning Commission v. Hamilton Bank of Johnson City*, 473 U.S. 172 (1985). Such relief is available in Texas.

IX. State Analysis of What Constitutes a Taking

Similar to the Fifth Amendment to the U.S. Constitution, article I, section 17, of the Texas Constitution provides that property shall not be taken, damaged, or destroyed without adequate compensation being made. Tex. Const. art. I, § 17. This provision, like its federal counterpart, "was designed to bar government from forcing some people alone to bear public burdens, which, in all fairness and justice, should be borne by the public as a whole." *Steele v. City of Houston*, 603 S.W.2d 786, 789 (Tex. 1980) (quoting *Armstrong v. United States*, 364 U.S. 40, 49 (1960)). Earlier Texas constitutions made no provision for damage as distinguished from appropriation. *See* Tex. Const. art. 1, § 17 interp. commentary.

The "damaged or destroyed" language in the Texas Constitution represents a remarkable distinction from the comparable federal provision. The additional language has been largely ignored in Texas case law in recent decades. The distinction, however, was well recognized by earlier Texas courts. "Damage," as distinguished from property taken, signifies that the property has been injuriously affected without any appropriation or intrusion on the land itself. *See Fort Worth Improvement District No. 1 v. City of Fort Worth*, 158 S.W. 164 (Tex. 1913). Under Texas law, since compensation must be paid when property is taken, destroyed, or damaged, the distinction between an appropriation and damage without any appropriation is no longer important in the question of liability to pay compensation. *See McCammon & Lang Lumber Co. v. Trinity & B.V. Railway Co.*, 133 S.W. 247 (Tex. 1911).

The distinction was noted again by the Texas Supreme Court in *Sheffield Development Co., Inc. v City of Glenn Heights*, 140 S.W.3d 660, 669 (Tex. 2004), as follows: "As the court of appeals noted, it could be argued that the differences in the wording of the two provisions are significant, but neither Sheffield nor the City makes this argument." In light of this invitation by the appellate courts, the enhanced relief apparently afforded by the Texas Constitution may be more aggressively explored in the future.

The Texas Supreme Court has issued a number of important opinions in the last twenty-five years addressing inverse condemnation or regulatory takings in the general context of land use. *See Porretto v. Texas General Land Office*, 448 S.W.3d 393 (Tex. 2014); *Hearts Bluff Game Ranch, Inc. v. State*, 381 S.W.3d 468 (Tex. 2012); *Hallco Texas, Inc. v. McMullen County*, 221 S.W.3d 50 (Tex. 2006); *Lowenberg v. City of Dallas*, 168 S.W.3d 800 (Tex. 2005); *City of Dallas v. Jennings*, 142 S.W.3d 310 (Tex. 2004); *Sheffield Development Co., Inc. v. City of Glenn Heights*, 140 S.W.3d 660 (Tex. 2004); *Town of Flower Mound v. Stafford Estates Ltd. Partnership*, 135 S.W.3d 620 (Tex. 2004); *Mayhew v. Town of Sunnyvale*, 964 S.W.2d 922 (Tex. 1998); *City of Tyler v. Likes*, 962 S.W.2d 489 (Tex. 1997); *Taub v. City of Deer Park*, 882 S.W.2d 824 (Tex. 1994), *cert. denied*, 513 U.S. 1112 (1995); *State v. Biggar*, 873 S.W.2d 11 (Tex. 1994); *Religious of Sacred Heart of Texas v. City of Houston*, 836 S.W.2d 606 (Tex. 1992); and *Westgate, Ltd. v. State*, 843 S.W.2d 448 (Tex. 1992). Two other significant Texas Supreme Court regulatory takings pronouncements in the recent past are *City of Austin v. Teague*, 570 S.W.2d 389 (Tex. 1978), and *City of College Station v. Turtle Rock Corp.*, 680 S.W.2d 802 (Tex. 1984).

The opinions by Justice Hecht in *Sheffield* and *Town of Flower Mound* offer guidelines for a takings analysis in a zoning challenge and in the "special context" of land use exactions. In *Sheffield*, the court drew heavily on federal jurisprudence to conclude that a zoning regulation did not effect a compensable taking of the plaintiff developer's property. The court methodically restates and endorses the federal analysis of when a taking occurs:

1. A taking occurs when regulation compels the property owner to suffer a physical invasion of his property.

2. A taking occurs when regulation denies all economically beneficial use of land.

3. When a regulation denies less than all economically viable use, the court must carefully analyze how the regulation affects the balance between the public interest and that of the landowner; in other words, has it "gone too far"? In determining whether a regulation went too far, the court may look to the *Penn Central* factors as guideposts:

   a. the economic impact of the regulation on the claimant;

   b. the extent to which the regulation has interfered with distinct, investment-backed expectations; and

   c. the character of the governmental action.

These *Penn Central* factors are not exclusive, but rather only considerations in a "careful examination and weighing of all the circumstances" in applying "a fact-sensitive test of reasonableness." *Sheffield*, 140 S.W.3d at 671–74.

The court concluded that the zoning ordinance in question "substantially advanced a legitimate state interest" under the *Agins* test (which was subsequently rejected by the U.S. Supreme Court in *Lingle*). The city, citing *City of Monterrey v. Del Monte Dunes at Monterrey, Ltd.*, 526 U.S. 687 (1999), argued that (even before *Lingle*) the U.S. Supreme Court had begun to equivocate on its *Agins* rule. In what may prove to be a significant portent of things to come, Justice Hecht wrote that the Texas Supreme Court was "not . . . bound to follow *Agins* in this case since Sheffield makes no claim under the United State Constitution, but" it looks to "federal takings cases for guidance in applying [the Texas] constitution." *Sheffield*, 140 S.W.3d at 674. The court concluded, therefore, "that *Agins* remains authoritative" and "the statement in *Agins* is correct: that whether regulation substantially advances state interests is an appropriate test for a constitutionally compensable taking, at least in some situations." *Sheffield*, 140 S.W.3d at 674.

In *Town of Flower Mound*, the Texas Supreme Court again drew almost exclusively on federal jurisprudence to analyze a state constitutional takings claim arising from imposition of a development exaction. The court restated the rule of *Nollan* and *Dolan* as follows:

> [C]onditioning government approval of property on some exaction is a compensable taking unless the condition (1) bears an essential nexus to the substantial advancement of some legitimate governmental interest and (2) is roughly proportional to the projected impact of the proposed development.

Town of Flower Mound, 135 S.W.3d at 634. Applying this test, the court concluded that the exaction imposed by the Town of Flower Mound was a taking for which the developer was entitled to be compensated.

The clear, unified guidance propounded by the Texas Supreme Court in *Sheffield* and *Town of Flower Mound* was badly fractured in the 2006 decision of *Hallco Texas, Inc. v. McMullen County*. That case involved a regulatory takings challenge arising from a land use restriction. The majority opinion by Justice O'Neill resolved the case by concluding that it was barred on res judicata grounds following an exhaustive thirteen-year procedural journey through state and federal courts.

Justice Hecht's dissent in *Hallco* reflects the same grasp of regulatory takings principles that characterized his earlier opinions for a unanimous court. *Hallco* is a grim reminder of the challenges presented when a plaintiff must straddle both federal and state courts while properly exhausting administrative remedies and still preserving its claim. In the words of Justice Hecht:

> This case illustrates how the government can use this ripeness requirement to whipsaw a landowner. The government can argue either that there was no request for a variance when there should have been, or that the request was not specific enough, or that it was not rea-

> sonable enough, or that there was insufficient time to consider it—and therefore the landowner's regulatory takings claim is premature, unripe, and should be dismissed. Or else it can argue that a request for a variance would be a waste of time, or that none was authorized, or that the landowner should have known his ridiculous proposal would never be seriously considered—and therefore his claim is late, barred, and should be dismissed. One way or the other, the result is the same. Ripening a regulatory takings claim thus becomes a costly game of "Mother, May I", in which the landowner is allowed to take only small steps forward and backwards until exhausted.

Hallco, 221 S.W.3d at 63.

The *Hallco* opinion should be read in conjunction with the U.S. Supreme Court decision in *San Remo Hotel, L.P. v. City and County of San Francisco*, 545 U.S. 323 (2005), discussed above, for a full picture of the current interplay between state and federal courts in the takings arena.

Inverse condemnation is also prohibited by Texas Government Code chapter 2007 (Private Real Property Rights Preservation Act), which creates a statutory cause of action in Texas for certain governmental actions that affect private real property rights. It also establishes certain requirements that a governmental entity must satisfy to identify and evaluate governmental actions within the meaning of the Act that may result in a taking. *See City of Houston v. Guthrie*, 332 S.W.3d 578 (Tex. App.—Houston [1st Dist.] 2009, pet. denied). The Act's definition of "private real property" includes a groundwater or surface water right of any kind. The relief afforded by the Act may lead to invalidation of the governmental action, or damages. The relief is not exclusive and is cumulative to the relief afforded under article I, section 17, of the Texas Constitution. A real property owner who prevails in a suit or contested case filed under the chapter is entitled to receive attorney's fees and court costs. However, a defendant governmental entity that prevails in a suit or contested case filed under the chapter is also entitled to receive attorney's fees and court costs. Similar relief is not available to either party in a takings claim filed under the state or federal constitution. In *Edwards Aquifer Authority v. Bragg*, 21 S.W.3d 375 (Tex. App.—San Antonio 2000), *aff'd*, 71 S.W.3d 729 (Tex. 2002), certain regulatory actions of the EAA were challenged as violating the Private Real Property Rights Preservation Act. The court concluded that such actions were excepted from the Act because they were reasonably taken to fulfill an obligation mandated by state law. *Bragg*, 21 S.W.3d at 379–80.

X. Inverse Condemnation and the Edwards Aquifer Authority

In the specific context of groundwater rights, the Texas Supreme Court sustained the Edwards Aquifer Authority Act against a takings claim in *Barshop v. Medina County Underground Water Conservation District*, 925 S.W.2d 618 (Tex. 1996). In *Barshop*, the plaintiffs asserted that the Act, on its face, constituted an unconstitutional taking of their property. The case was filed immediately after the Act's adoption by the legislature and before any rules were adopted or permits issued by the EAA. The Texas Supreme Court declined to conclude that the mere adoption of the Act effected an unconstitutional taking of property. "Assuming without deciding" that the plaintiff landowners possessed a vested property right in the water beneath their land, the *Barshop* court also declined to address the essential question of when water regulation unconstitutionally invades the property rights of landowners. *Barshop*, 925 S.W.2d at 626.

Justice Abbott articulated the legal challenge posed by this growing regulatory regime in *Barshop*:

> The State concedes that plaintiffs have significant rights to the water under their land. In the [Edwards Aquifer Authority] Act, the Legislature specifically recognized the ownership

> and rights of the landowner in the underground water and that action taken pursuant to the Act may not be construed as depriving or divesting the owner of these ownership rights.
>
> At the same time, however, the State relies on our opinions which have long recognized the necessity of legislation that conserves and preserves our limited water resources. . . .
>
> While our prior decisions recognize both the property ownership rights of landowners in underground water and the need for legislative regulation of water, we have not previously considered the point at which water regulation unconstitutionally invades the property rights of landowners. The issue of when a particular regulation becomes an invasion of property rights in underground water is complex and multi-faceted. The problem is further complicated in this case because Plaintiffs have brought this challenge to the Act before the Authority has even had the opportunity to begin regulating the aquifer.
>
> Despite these problems and competing interests, this case involves only a facial challenge to the Act. Because Plaintiffs have not established that the Act is unconstitutional on its face, it is not necessary to the disposition of this case to definitively resolve the clash between property rights in water and regulation of water.

Barshop, 925 S.W.2d at 626 (citations omitted).

In light of the fact-specific nature of regulatory takings claims, the "complex and multi-faceted" issue posed by Justice Abbot may never be definitively resolved. However, the San Antonio court of appeals concluded that the implementation of the Act resulted in a taking in the context of a commercial pecan orchard. *See Edwards Aquifer Authority v. Bragg*, 421 S.W.3d 118 (Tex. App.—San Antonio 2013, pet. denied). The court of appeals also concluded that the statute of limitations for takings challenges to the EAA's permit decisions is ten years. For those who timely filed their permit application, limitations began to run on the date of final action by the EAA on a permit application. In a subsequent case, the United States District Court for the Western District of Texas concluded that, for late filers of permit applications, limitations began to run on December 30, 1996, when limitations on withdrawals from the Aquifer under the Act became effective. *See GG Ranch, Ltd. v. Edwards Aquifer Authority*, No. SA-14-CV-00848, 2015 WL 4698851 (W.D. Tex., appeal filed June 4, 2015). The historic right of Texas landowners to pump groundwater without limitation pursuant to the rule of capture is being rapidly curtailed by the rules of groundwater districts around the state as it was curtailed in the Edwards Aquifer region by the Edwards Aquifer Authority Act. These districts do not provide for compensation to a landowner in exchange for limitation of access to groundwater.

XI. Property

The foregoing federal and state takings analyses are predicated on a claim that property has been taken, damaged, or destroyed. If no property is lost, then no compensation can be due. Therefore, prosecution of a takings claim under either the federal or state constitution must begin with an analysis of the property interest affected by the government action. Such an analysis is difficult in a case involving water. What, after all, is the property that has been taken, damaged, or destroyed, and who owns it?

The U.S. Supreme Court has concluded that takings claims in the federal context should be analyzed by reference to units of property as defined by state law. See *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003, 1016 (1992); *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 519 (1987). Where the estate defined by state law is both severable and of value in its own right, it is appropriate to consider the effect of regulation on that particular property interest. *See Keystone*, 480 U.S. at 520. The essential character of property is that it is made up of mutually reinforcing understandings that are sufficiently well grounded to support a claim of entitlement. *Kaiser Aetna v. United States*, 444 U.S. 164, 179 (1979).

Texas courts have defined property in broad terms. "Property," as used in article I, section 17, of the Texas Constitution, means not only the tangible thing owned but also every right and incident that accompany ownership. *Gulf, C. & S.F. Railway Co. v. Fuller*, 63 Tex. 467 (1885). For purposes of inverse condemnation, "property" susceptible of legal injury and a corresponding right to compensation includes incorporeal property as well as tangible property. *See State v. Biggar*, 873 S.W.2d 11 (Tex. 1994).

Texas law recognizes a property interest in water. The nature of that interest varies depending on whether it is surface water or groundwater. Surface water in Texas is held by the state in trust for the people. *Motl v. Boyd*, 286 S.W. 458, 468 (Tex. 1926); *In re Adjudication of the Water Rights of the Upper Guadalupe Segment of the Guadalupe River Basin*, 642 S.W.2d 438, 444 (Tex. 1982); *see also* Tex. Water Code § 11.021(a). Unless and until surface water is made the subject of a water right recognized by the state, it is not private property that can be taken by the state, or for which compensation must be paid by the state. See Chapters 3 and 9 of this book for discussions of surface water rights. Once recognized by the state, however, a water right becomes private property protected by the state and federal constitutions. The water right, and the right of a property owner to the use of water flowing by his land, are identified with the realty and are a real and incorporeal hereditament. *Lakeside Irrigation Co. v. Markham Irrigation Co.*, 285 S.W. 593, 596 (Tex. 1926). A matured appropriation right to water is a vested right subject to beneficial and nonwasteful use. *Texas Water Rights Commission v. Wright*, 464 S.W.2d 642, 647 (Tex. 1971).

For authoritative discussions of surface water rights, see Frank F. Skillern, *Texas Water Law* (1988), and Wells A. Hutchins, *The Texas Law of Water Rights* (1961). See also the following cases: *Lower Colorado River Authority v. Texas Department of Water Resources*, 689 S.W.2d 873 (Tex. 1984); *Board of Water Engineers v. McKnight*, 229 S.W. 301 (Tex. 1921); *Board of Water Engineers v. Slaughter*, 382 S.W.2d 111 (Tex. Civ. App.—San Antonio 1964, writ ref'd n.r.e.), *aff'd*, 407 S.W.2d 467 (Tex. 1966); *Clark v. Briscoe Irrigation Co.*, 200 S.W.2d 674 (Tex. Civ. App.—Austin 1947, writ dism'd).

The legislature amended Water Code section 36.002 in 2011 to clearly recognize that a landowner owns the groundwater below the surface of the landowner's land as real property. *See* Act of May 27, 2011, 82d Leg., R.S., ch. 1207, § 1, eff. Sept. 1, 2011. However, the amendment also scrupulously recognizes the ability of groundwater districts to regulate groundwater production as authorized by Water Code chapter 36. It also recognizes the ability of the Edwards Aquifer Authority and the Harris-Galveston and Fort Bend Subsidence Districts to regulate groundwater pursuant to their respective enabling acts. *See* Edwards Aquifer Act, Act of May 30, 1993, 73d Leg., R.S., ch. 626, § 1.07; Tex. Spec. Dist. Code ch. 8801 (Harris-Galveston Subsidence District); Tex. Spec. Dist. Code ch. 8834 (Fort Bend Subsidence District). Uniquely for the Edwards Aquifer, the legislature by the Edwards Aquifer Authority Act effectively decreed the amount of water available in the aquifer and created a marketplace for permitted withdrawal rights.

The legislature's explicit recognition of groundwater ownership followed several years of evolving debate among Texas water and real estate lawyers about the exact nature of a landowner's ownership interest. Landowners and property rights advocates argued that more than one hundred fifty years of Texas law recognize a property right in the groundwater beneath a landowner's property. Advocates of strong groundwater regulation argued that Texas cases that seem to confirm such a property right in groundwater beneath a landowner's property do so only as dicta, and that no protected property interest exists in groundwater until that groundwater has been reduced to personal possession in accordance with any applicable regulatory restrictions. See Chapters 4 and 18 of this book.

This issue was resolved by the Texas Supreme Court in the case of *Edwards Aquifer Authority v. Day*, 369 S.W.3d 814 (Tex. 2012), in which the court held that land ownership includes an interest in groundwater in place that cannot be taken for public use without adequate compensation guaranteed by article I, section 17(a), of the Texas Constitution. The court did not resolve the issue of whether the Authority's denial of a groundwater withdrawal permit in the amount requested by Day constitutes a taking and remanded the case to the trial court for further proceedings. The case was subsequently settled.

Groundwater conveyances are critical to the development of new, badly needed groundwater supplies in Texas. Practitioners around the state are drafting conveyance and financing documents to facilitate the transfer of groundwater and groundwater withdrawal rights for value. These documents, and the transactions that they memorialize, involve millions of dollars and thousands of acre-feet of underground water supplies. Perhaps more important, from the public perspective at least, municipalities and other water utilities are relying on these transactions to supply new water projects and meet the state's future water needs. See Chapter 18 of this book.

In the context of regulatory takings, the recent explicit recognition of groundwater ownership will require that essential government regulation of this precious resource be undertaken with respect for property rights long assumed by Texas landowners. It is the same essential balance recognized by the U.S. Supreme Court in the *Mahon* case in 1922—that governments must regulate, but the regulation cannot go too far.

XII. Relevant Parcel of Property

A determination that landowners possess a vested property right in the water beneath their land does not end the property component of a takings analysis. Next, the "relevant parcel" or "denominator" issue must be addressed in determining the property interest affected by a given regulation. The issue was articulated in *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992), as follows:

> Regrettably, the rhetorical force of our "deprivation of all economically feasible use" rule is greater than its precision, since the rule does not make clear the "property interest" against which the loss of value is to be measured. When, for example, a regulation requires a developer to leave 90% of a rural tract in its natural state, it is unclear whether we would analyze the situation as one in which the owner has been deprived of all economically beneficial use of the burdened portion of the tract, or as one in which the owner has suffered a mere diminution in value of the tract as a whole.

Lucas, 505 at 1016 n.7.

Must a regulation prohibit all pumping of groundwater to be a compensable taking? If not, how much? Is the groundwater distinct from the land itself, or simply part of the larger estate? What if the real property retains substantial value even without groundwater withdrawal rights? What property interest has been taken or damaged by the regulatory action?

Since *Lucas*, the U.S. Supreme Court has held that a "claimant's parcel of property could not first be divided into what was taken and what was left for the purpose of demonstrating the former to be complete and hence compensable." *Concrete Pipe & Products of California, Inc. v. Construction Laborers Pension Trust for Southern California*, 508 U.S. 602, 644 (1993). This is known as the "parcel as a whole" rule. *See Tahoe-Sierra Preservation Council, Inc. v. Tahoe Regional Planning Agency*, 535 U.S. 302, 327 (2002). As the Court stated in *Penn Central*:

> "Taking" jurisprudence does not divide a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been entirely abrogated. In deciding whether a particular governmental action has effected a taking, this Court focuses rather both on the character of the action and the extent of the interference with rights in the parcel as a whole . . . .

Penn Central Transportation Co. v. New York City, 438 U.S. 104, 130–31 (1978).

It is thus critical to ascertain whether the property affected by a government action constitutes a separate property right apart from the underlying property interest. The analysis may be less important in the context of the unique "damage" language of the Texas Constitution, which is not a factor in the extensive federal case law and commentary. Its significance is also mitigated in the water rights context by the "rich tradition of protection" afforded to water rights as a separate estate in Texas. *See Lucas*, 505 U.S. at 1016.

In the case of *Elliff v Texon Drilling Co.*, 210 S.W.2d 558 (Tex. 1948), the Texas Supreme Court restated the law regarding ownership of oil and gas in place as follows:

> In our state the landowner is regarded as having absolute title in severalty to the oil and gas in place beneath his land. The only qualification of that rule of ownership is that it must be considered in connection with the law of capture and is subject to police regulations. The oil and gas beneath the soil are considered a part of the realty. Each owner of land owns separately, distinctly and exclusively all the oil and gas under his land and is accorded the usual remedies against trespassers who appropriate the minerals or destroy their market value.

Elliff, 210 S.W.2d at 561 (internal citations omitted).

In its opinion in *Edwards Aquifer Authority v Day*, the Texas Supreme Court held that this language correctly states the common law regarding the ownership of groundwater in place. *Day*, 369 S.W.3d at 832. The courts have not yet explored the implications of this language to the "relevant parcel" analysis in a takings case. Nor have the courts explored the relationship of the language to the mandate of Texas Property Code section 21.0421(a) that groundwater rights be treated "as property apart from the land" for purposes of assessing condemnation damages.

XIII. Conclusion

The population of Texas is expected to grow at a rapid pace in the next fifty years. This growth will place enormous demand on water supplies and require the movement of water from regions of plenty to regions of need. Cities and water utilities will ultimately take whatever lawful action is necessary to secure healthy water for their constituents. A wide variety of political, legal, and financial considerations encourage governmental entities to acquire water in the marketplace. Although many governmental entities have condemnation authority to acquire water supplies without landowner consent upon payment of fair compensation, the Texas legislature has made the use of this authority burdensome and expensive.

Condemnation does not pose the only risk to landowners' water rights. Regulatory restrictions on water use imposed by groundwater districts and other governmental entities may effectively take the water from landowners for public use without any compensation at all. In such circumstances, landowners may find relief in the takings clauses of the state and federal constitutions and the Private Real Property Rights Preservation Act.

CHAPTER 39

Flood Management

Leonard H. Dougal[1] and Cassandra Quinn[2]

I. Introduction

Virtually no one would disagree that Texas is in need of additional water resources. But, like the rule of toxicology that "the dose makes the poison," in a state that too often experiences water shortages, severe storms can turn lands desperate for water into areas of uncontrolled flooding. Although flooding is often considered an uncompensable act of God, in certain cases where the "hand of man" has altered the natural flow of water, the flooding may be actionable by a damaged landowner.

This chapter examines issues of surface drainage, liability for flooding, statutes and rules regulating floodplain management, and standards for dam construction. First discussed are claims for flooding brought under section 11.086 of the Texas Water Code, and court decisions that have narrowed the applicability of this statute by limiting its use to flooding that arises from diffused surface waters. Also included is a discussion of how sovereign immunity decisions have further narrowed the class of persons liable under the statute, the types of damages recoverable from flooding, and distinctions between temporary and permanent damages.

Because flood damage can arise from the actions of governmental entities, this chapter includes a discussion of inverse condemnation claims, including recent cases in which flooding resulted from the construction of a dam and from the development and subdivision of land.

The Texas legislature has obligated cities and counties to adopt ordinances as necessary to participate in the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program, and this chapter includes a brief discussion of FEMA's programs and regulations addressing floodplain management. Cities typically implement such programs through the municipal zoning and platting process, which is also discussed.

Finally, this chapter discusses the regulations applicable to owners and operators of dams, including permits, safety reviews, and design standards established by the Texas Commission on Environmental Quality.

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II. Liability from Impoundment or Diversion of Surface Water

As it relates to surface water runoff, Texas law allows the owner of higher ground a right to have surface waters flow naturally from his land onto the land of lower owners. Correspondingly, the owner of a lower property has no right to force back the natural surface flows onto a higher owner's land. The principle was described by the court in *Miller v. Letzerich*, 49 S.W.2d 404, 408 (Tex. 1932):

> These rights of the owners of estates under the civil law are appurtenant to and a part of the land itself, and passed to them with the grants. The right of the owner of the upper estate to have the surface waters falling thereon to pass in their natural condition on to the lands of the lower estate is a servitude or natural right in the nature of an easement over the lower estate of his neighbor.

This legal principle is now codified in section 11.086 of the Texas Water Code, which traces its origins back as early as 1915, when the legislature adopted a statutory cause of action for damage arising from the wrongful diversion or impounding of surface waters. Acts of 1915, 34th Leg., 1st C.S., ch. 7. Consistent with the description in Letzerich, the effect of the current statute is to impose a natural easement on the lower landowner to receive the natural flow of surface water.

Section 11.086 quite succinctly states a person's liability for diversion or impoundment of the natural flow of surface waters:

> (a) No person may divert or impound the natural flow of surface waters in this state, or permit a diversion or impounding by him to continue, in a manner that damages the property of another by the overflow of the water diverted or impounded.
>
> (b) A person whose property is injured by an overflow of water caused by an unlawful diversion or impounding has remedies at law and in equity and may recover damages occasioned by the overflow.

Tex. Water Code § 11.086(a), (b). The statute creates a form of strict liability, as the injured landowner is not required to provide proof of negligence or intentional harm by the offending person. *See Kraft v. Langford*, 565 S.W.2d 223, 229 (Tex. 1978) (listing elements of cause of action).

A typical application of section 11.086 may occur with the subdivision and development of land in a manner that concentrates or increases the natural flow of water off the land by, for example, the addition of rooftops, paving of streets, and construction of other impervious cover. In the absence of the construction of a detention pond or other structure to capture and regulate the rate of release of water from the subdivision, owners of lower lands may be flooded by the increased flows from runoff or by a change in the predevelopment drainage pattern or discharge point. The statute creates a cause of action in favor of the lower property owner if his property is injured by an increase or change in the natural flows. The statute is not exclusive, but it is a remedy in addition to other common-law remedies that may be applicable to interferences with the interests in real property. *Kraft*, 565 S.W.2d at 229.

In urban areas, drainage issues are typically addressed as part of the municipal subdivision platting process. Indeed, a municipal code may require a developer to comply with the city drainage ordinance to manage drainage with a detention pond designed to control flooding from a specific design event, such as a hundred-year storm, so that the new development avoids increasing the volume or velocity of water discharged to lower properties. *See City of Keller v. Wilson*, 168 S.W.3d 802, 808 (Tex. 2005). Importantly, however, compliance with a municipal ordinance does not automatically excuse a concurrent Water Code violation. *See Bily v. Omni Equities*, 731 S.W.2d 606, 611 (Tex. App.—Houston [14th Dist.] 1987, writ ref'd n.r.e.). In some cases the developer may be required to purchase a drainage easement from a lower landowner of sufficient width and distance to convey increased flows to a state watercourse. Additionally, a developer may be required to make improvements to an existing channel, to widen or deepen the channel, so as to prevent the increased flows from flooding onto a neighbor's property.

A. A Neutered Statute

At first reading, section 11.086 is appealing in its simplicity. However, court decisions, such as those limiting the application to only diffused surface runoff, have dramatically narrowed the circumstances in which the statute will provide relief to an injured landowner. A review of cases reported under section 11.086 reveals that the statute has been, in the words of one court, "effectively neutered by many years of judicial construction." *Dietrich v. Goodman*, 123 S.W.3d 413, 418 (Tex. App.—Houston [14th Dist.] 2003, no pet.). Additionally, recent decisions broadly applying sovereign immunity have further limited the types of entities that will be found liable.

As early as 1936, the Texas Supreme Court hinted that this type of statutory cause of action would have limited application. In *Turner v. Big Lake Oil Co.*, 96 S.W.2d 221, 228 (Tex. 1936), the court found that the predecessor statute to section 11.086 was inapplicable to the escape of produced oil-field saltwater from artificial earthen ponds. The court noted that the plaintiff did not plead that the injury arose from the wrongful impounding or diversion of "surface waters" and hence could not recover under the statute.

B. Judicially Narrowed Definition of "Surface Water" in Section 11.086

A number of courts have come to the conclusion that the term "surface water" in section 11.086 is limited to "diffused surface water" rather than the broader, more common use of the term "surface water," which is used to describe the water flowing in streams, rivers, and lakes. *Dietrich*, 123 S.W.3d at 419 (defining "surface water" as water that is diffused over the ground from falling rains or melting snows); *see also Michaelski v. Wright*, 444 S.W.3d 83 (Tex. App.—Houston [1st Dist.] 2014, no pet.); *Jefferson County Drainage District No. 6 v. Lower Neches Valley Authority*, 876 S.W.2d 940, 950 (Tex. App.—Beaumont 1994, writ denied) (holding that surface waters do not remain surface waters once they enter a channel that has been modified by man); *Dalon v. City of DeSoto*, 852 S.W.2d 530, 538 (Tex. App.—Dallas 1992, writ denied) (holding that when rainfall is under control by ditches, tanks, ponds, or pipes, it is no longer "surface water"); *Stoner v. Dallas*, 392 S.W.2d 910, 911–12 (Tex. Civ. App.—Dallas 1965, writ ref'd n.r.e.) (finding no liability in the case of the widening and deepening of an existing creek that flooded a neighboring homeowner).

According to these decisions, a distinguishing feature of the term "surface water" as used in section 11.086 is that it is never found in a natural watercourse. Thus, the term "surface water" is merely a shortened form of the phrase "diffused surface water"—for example, natural precipitation diffused over the surface of the ground until it evaporates, is absorbed by the land, or reaches the bed or channel of a watercourse. *Dietrich*, 123 S.W.3d at 418–19. Indeed, one court has suggested that a landowner might divert the entire flow of the Brazos River across his neighbor's property without subjecting himself to liability under section 11.086. *Dietrich*, 123 S.W.3d at 419.

Diffused surface water is also distinct from floodwaters, which "are waters that have overflowed a natural water course but remain a continuous part of that original part of the water course." *Michaelski*, 444 S.W.3d at 93. There is some split in authority regarding when diffused surface water becomes floodwaters. In 1994, the Beaumont court of appeals stated that diffused surface water changes character when it "enter[s] into a channel that has been touched or modified by the hands of man." *Jefferson County Drainage District No. 6*, 876 S.W.2d at 950. However, more recent cases from the first Houston court of appeals have rejected the argument that water loses the designation of diffused surface water simply because it is "touched by the hands of man" and instead concluded that the critical inquiry is whether diffused surface water comes under the control of a defined waterway. *Texas Woman's University v. The Methodist Hospital*, 221 S.W.3d 267, 281–82 (Tex. App.—Houston [1st Dist.] 2006, no pet.); *Michaelski*, 444 S.W.3d at 96–97.

C. Sovereign Immunity

Court decisions have also narrowed the class of persons who may be held liable under section 11.086. The Texas Supreme Court has stated that the statute is a rule of property that creates easements and limits their use and therefore has "no application to persons or entities who are not proprietors of land." *Kraft*, 565 S.W.2d at 229. Whether the statute would hold a municipality liable for flood damage, given the apparent breadth of the term "person" as used in the statute, has been the subject of numerous decisions, which have reached conflicting outcomes. *City of Brady v. Cox*, 48 S.W.2d 511, 514 (Tex. Civ. App.—Austin 1932, no writ) (statute applicable to municipality); *Meier v. Thompson*, 248 S.W.2d 493 (Tex. Civ. App.—Waco 1952, writ ref'd n.r.e.) (statute applicable to municipality); *City of Houston v. Renault*, 431 S.W.2d 322 (Tex. 1968) (statute not applicable to municipality).

In a recent opinion, a court dismissed a section 11.086 claim against a municipality on the basis that the claim was barred by sovereign immunity. *City of Midlothian v. Black*, 271 S.W.3d 791, 795–98 (Tex. App.—Waco 2008, no pet.); *see also City of Keller v. Wilson*, No. 2-00-183-CV, 2007 WL 614023, at *2 (Tex. App.—Fort Worth Mar. 1, 2007), *vacated*, 2007 WL 1776033 (Tex. App.—Fort Worth June 21, 2007) (reaching same conclusion, but the opinion was vacated and withdrawn on motion of the parties). The court noted that a statutory waiver of sovereign immunity must be made by clear and unambiguous language, following the principles set forth by the Texas Supreme Court in *Tooke v. City of Mexia*, 197 S.W.3d 325, 343 (Tex. 2006). Accordingly, the court rejected the plaintiff's argument that the Code Construction Act's definition of "person" to include a municipality was sufficient to support a conclusion that the legislature intended to waive such immunity in section 11.086, given the use therein of the term "person." *Black*, 271 S.W.3d at 798. Nevertheless, as discussed in section III below, a landowner may still have a cause of action against a city or other political subdivision of the state, even absent the benefits of section 11.086, by bringing an action for inverse condemnation.

D. Damages

Assuming a plaintiff navigates the complexities of section 11.086, damages awards for impoundment or diversion of surface water are dictated by whether the injury to the property is temporary or permanent. These two type of injuries are "mutually exclusive and damages for both may not be recovered in the same action." *Kraft*, 565 S.W.2d at 227. If the injury is temporary, the measure of damages is the reasonable cost of repairs necessary to restore the property to its condition immediately before the injury. *City of Princeton v. Abbott*, 792 S.W.2d 161, 164 (Tex. App.—Dallas 1990, writ denied); *Planet Plows v. Evans*, 600 S.W.2d 874, 876 (Tex. Civ. App.—Amarillo 1980, no writ); *Weaver Construction Co. v. Rapier*, 448 S.W.2d 702, 703 (Tex. Civ. App.—Dallas 1970, no writ). Future damages are not allowed. *City of Princeton*, 792 S.W.2d at 164. Also included in temporary injury damages is any loss as a result of not being able to use the property. *Weaver Construction Co.*, 448 S.W.2d at 703; *City of Princeton*, 792 S.W.2d at 164; *Kilpatrick v. Tomlin*, No. 03-00-00419-CV, 2001 WL 256270, at *4 (Tex. App.—Austin Mar. 15, 2001, no pet.) (not designated for publication). Permanent injury is measured by the difference between the reasonable market value of the property immediately before and immediately after the injury. *Weaver Construction Co.*, 448

S.W.2d at 703; *Kilpatrick*, 2001 WL 256270, at *3; *Kraft*, 565 S.W.2d at 227; *Schneider National Carriers, Inc. v. Bates*, 147 S.W.3d 264, 276 (Tex. 2004).

Whether an injury to property is temporary or permanent also determines when the statute of limitations accrues, and thus when an injured party's claims are barred. A two-year statute of limitations applies in both instances; however, if the injury is permanent, suit must be brought within two years of the first actionable injury, while if the injury is temporary, suit may be brought within two years of any injury, not just the first actionable injury. *Graham v. Pirkey*, 212 S.W.3d 507, 512 (Tex. App.—Austin 2006, no pet.); *Anders v. Mallard & Mallard, Inc.*, 817 S.W.2d 90, 95 (Tex. App.—Houston [14th Dist.] 1991, no writ); *see also* Tex. Civ. Prac. & Rem. Code § 16.003(a).

1. Distinguishing between Permanent and Temporary Injuries

Schneider National Carriers, Inc. v. Bates, 147 S.W.3d 264, 273 (Tex. 2004), established boundary lines between permanent and temporary injury. This decision focused on nuisances, but applies the permanent/temporary distinction to injuries as a result of flooding as well. 147 S.W.3d at 273–74. Defining a nuisance as "temporary" or "permanent" turns on how long it lasts and "whether it is 'infrequent' or 'continuous' or how often it occurs." 147 S.W.3d at 273. A nuisance is temporary if it is uncertain "that any future injury will occur." 147 S.W.3d at 272. It has also been defined as "occasional, intermittent or recurrent" or "sporadic and contingent upon some irregular force such as rain." 147 S.W.3d at 272 (citing *Bayouth v. Lion Oil Co.*, 671 S.W.2d 867, 868 (Tex. 1984), and *Kraft*, 565 S.W.2d at 227, respectively). *Schneider* synthesized this to the basic rule that it must be so "irregular or intermittent over the period leading up to filing and trial that future injury cannot be estimated with reasonable certainty." *Schneider*, 147 S.W.3d at 281. Without overturning the above descriptions of the distinction between permanent and temporary injuries, the Texas Supreme Court recently "reformulated" its definition as follows:

> An injury to real property is considered permanent if (a) it cannot be repaired, fixed, or restored, *or* (b) even though the injury can be repaired, fixed, or restored, it is substantially certain that the injury will repeatedly, continually, and regularly recur, such that future injury can be reasonably evaluated. Conversely, an injury to real property is considered temporary if (a) it can be repaired, fixed, or restored, *and* (b) any anticipated recurrence would be only occasional, irregular, intermittent, and not reasonably predictable, such that future injury could not be estimated with reasonable certainty. These definitions apply to cases in which entry onto real property is physical (as in a trespass) and to cases in which entry onto real property is not physical (as with a nuisance).

Gilbert Wheeler, Inc. v. Enbridge Pipelines (East Texas), L.P., 449 S.W.3d 474, 480 (Tex. 2014).

A nuisance is permanent if it is "constant and continuous" and if the "injury constantly and regularly recurs." *Schneider*, 147 S.W.3d at 272 (citing *Kraft*, 565 S.W.2d at 227, and *Rosenthal v. Taylor, B.&H. Railway Co.*, 15 S.W. 268, 269 (Tex. 1891), respectively). It does not have to occur daily to be constant and continuous, but only with enough regularity as to be predictive with regard to market value. *Schneider*, 147 S.W.3d at 276. Material factual disputes about the frequency, duration, and extent of the nuisance conditions are decided by jurors. 147 S.W.3d at 275. *Schneider* succinctly stated that a nuisance is permanent if it is "sufficiently constant or regular (no matter how long between occurrences) that future impact can be reasonably evaluated." 147 S.W.3d at 281.

The time frame for designating a nuisance as temporary or permanent should be measured in future years, not in future days, because market value (the measure of permanent damages) is based on future years. *Schneider*, 147 S.W.3d at 277. However, even if "exact dates, frequency, or extent of future damage" may remain unknown, if the future impact can be reasonably evaluated, it should be treated as permanent. 147 S.W.3d at 280. Finally, the determination of whether a nuisance is permanent can be made by showing that either the plaintiff's injuries or the defendant's operations were permanent. 147 S.W.3d at 283.

2. *Additional Damage Rules*

Damages claims under section 11.086 are limited to property damage and do not extend to survival actions, personal injuries, or wrongful death. *Raburn v. KJI Bluechip Investments*, 50 S.W.3d 699, 704 (Tex. App.—Fort Worth 2001, no pet.). Exemplary damages may be awarded if there is evidence of an intentional violation of section 11.086 in which the defendant was knowingly indifferent to the plaintiff's rights or if there is evidence of fraud, malice, or gross negligence. *Vaughn v. Drennon*, 202 S.W.3d 308, 321 (Tex. App.—Tyler 2006, no pet.); *Bily*, 731 S.W.2d at 613–14. Where flooding causes damage to a home, the owner may be able to obtain "stigma damages" if the market value of the property has been damaged due to the stigma that may attach to a flooded home. *Royce Homes, L.P. v. Humphrey*, 244 S.W.3d 570, 576 (Tex. App.—Beaumont 2008, pet. denied). If there are multiple responsible parties, damages should be apportioned among the responsible parties if it can be determined for what percentage of injury the parties were liable. *Planet Plows*, 600 S.W.2d at 876.

As discussed in this section, the ability to recover damages for flooding is limited. Typically, an upper landowner may allow the natural flow of surface water to pass onto the property of a lower landowner without liability, and court decisions have substantially limited the extent to which a lower landowner may recover for property damage resulting even from an upper landowner's impoundment or diversion of water. The next section discusses inverse condemnation, a cause of action that may be available when the party responsible for causing flooding is a governmental entity.

III. Inverse Condemnation Claims

When a governmental entity's actions cause or change the character of flooding on private property, a "taking" of the property may result. The type of taking at issue in flooding cases is a physical taking, which is a taking that occurs when the government physically appropriates or invades private property or unreasonably interferes with the landowner's right to use and enjoy the property. *Tarrant Regional Water District v. Gragg*, 151 S.W.3d 546, 554 (Tex. 2004). The Texas Constitution protects landowners from takings by obligating payment of adequate compensation. Specifically, the takings clause of the Texas Constitution provides that "[n]o person's property shall be taken, damaged or destroyed for or applied to public use without adequate compensation being made, unless by the consent of such person." Tex. Const. art. I, § 17. The taking, damaging, and destruction of property are three distinct claims under article I, section 17, although the term "taking" is used as shorthand to refer to all three types of claims. *City of Dallas v. Jennings*, 142 S.W.3d 310, 313 n.2 (Tex. 2004). See also Chapter 38 of this book.

If property has been taken or damaged for public use without compensation, the property owner may obtain compensation through an inverse condemnation or "taking" action. *Westgate, Ltd. v. State*, 843 S.W.2d 448, 452 (Tex. 1992). Although sovereign immunity generally protects governmental entities from lawsuits for monetary damages, it offers no shield against a taking claim brought under the Texas Constitution. *Steele v. City of Houston*, 603 S.W.2d 786, 791 (Tex. 1980).

To establish a taking claim, the claimant must prove that the governmental entity intentionally performed certain acts that resulted in a taking of property for public use. *General Services Commission v. Little-Tex Insulation Co.*, 39 S.W.3d 591, 598 (Tex. 2001) (citing *Steele*, 603 S.W.2d at 788–92). The intent element requires that the governmental entity either knew that a specific act was causing identifiable harm or knew with substantial certainty that the specific property damage would result. *Jennings*, 142 S.W.3d at 314. There must be evidence of "objective indicia of intent." *City of Keller*, 168 S.W.3d at 830.

Not all flooding caused by governmental actions rises to the level of a taking under article I, section 17, of the Texas Constitution. In flooding cases, recurrence is a probative factor to determine the extent of a taking and whether it is necessarily incident to authorized governmental activity and, therefore, substantially certain to occur. *Gragg*, 151 S.W.3d at 555. Although nonrecurrent flooding may cause damage, a single flood event generally does not rise to the level of a taking. This distinction between a taking by flooding and mere temporary damage is best illustrated by *Brazos River Authority v. City of Graham*, 354 S.W.2d 99 (Tex. 1961). In that case, the Brazos River Authority's construction of a dam caused siltation that resulted in a steady increase in the upstream water elevation over time. As a result, the city's sewage treatment plant and water treatment plant, both of which were upstream from the dam, eventually flooded. Because the dam's construction would subject the city's sewage treatment plant to repeated flooding and render its operation impossible, the court held that a taking had occurred. In contrast, the water treatment plant, which was at a higher elevation than the sewage treatment plant, had flooded only once, and although it might flood more frequently in the future as siltation increased, the court held that a taking had not yet occurred. The court observed that until a plaintiff is in a position "to establish the repetitious nature of the injury, he should be confined in his demand for damages to those flowing directly from the single injury or flooding." *Brazos River Authority*, 354 S.W.2d at 108.

Similarly, a taking does not occur when a proposed governmental action merely threatens to cause flooding. Although the proposed action may result in a *future* loss of property, its proposal alone does not give rise to a present cause of action for a taking, in the absence of a current, direct restriction on the property's use. *See, e.g., Howard v. City of Kerrville*, 75 S.W.3d 112, 117 (Tex. App.—San Antonio 2002, pet. denied) (stating that construction of a dam increased the base flood elevation on the claimant's property, but no flooding had yet occurred); *Allen v. City of Texas City*, 775 S.W.2d 863, 865 (Tex. App.—Houston [1st Dist.] 1989, writ denied) (determining that construction of a rainwater levee increased the property's susceptibility to flooding and diminished the market value of the property, but no flooding had yet occurred); *Hubler v. City of Corpus Christi*, 564 S.W.2d 816 (Tex. Civ. App.—Corpus Christi 1978, writ ref'd n.r.e.) (stating that a proposed drainage system, if implemented, would increase flooding on the property, but no flooding had yet occurred).

A governmental entity also is not responsible for a taking when mere negligence contributes to property damage. *Gragg*, 151 S.W.3d at 554. The Texas Constitution requires compensation only if property is damaged or appropriated for public use. When damage is merely the accidental result of the government's actions, there is no public benefit and the property cannot be said to be taken or damaged for public use. *Jennings*, 142 S.W.3d at 313. If no taking has occurred, there will likely be no recovery of damages because governmental entities generally have immunity from negligence actions. *Gragg* addressed the distinction between a taking and mere negligent governmental conduct. In that case, a water district argued that the increased flooding of a downstream landowner's ranch was due to mere negligence in operating the dam's floodgates, and if the dam were properly operated, the amount of water passing downstream would be the same as occurred naturally. The supreme court observed, however, that the landowner's complaint did not concern the amount of water passing downstream but rather the changed *character* of the water, which after construction of the dam arrived sooner, flowed faster, and was deeper, longer lasting, and more forceful. Although the gate-release operations contributed to these effects, there was evidence that the reservoir's physical characteristics, such as its limited excess storage capacity, were significant and inevitably changed the characteristics of floods at the downstream ranch and that the district's releases resulted in unnatural surges of water. The court concluded there was sufficient evidence that the extensive damage suffered by the ranch was the inevitable result of the reservoir's construction and of its operation as intended, and the district's actions were therefore a taking rather than mere negligence. *Gragg*, 151 S.W.3d at 555.

The damages a property owner may recover for a taking vary depending on whether the taking is permanent or temporary. *See Gragg*, 151 S.W.3d at 558. For permanent takings, such as those due to recurrent flooding, a property owner is entitled to recover the diminished value of the property—that is, the difference in the property's value before and after the taking. 151 S.W.3d at 558. For temporary takings, such as those due to a single flooding event, the property owner may recover damages only for injuries that resulted from the specific flood. 151 S.W.3d at 558.

Although options may exist to hold governmental entities accountable when their actions cause flooding, the recovery of monetary damages is a poor substitute for avoiding flooding in the first place. In this regard, local governmental entities often play a significant role in preventing or reducing flooding-related damage by developing and implementing strategies to manage development within the floodplain. Floodplain management and drainage are addressed in the next section.

IV. Floodplain Management and Drainage

A floodplain is any normally dry land area that is susceptible to being inundated by water from any natural source. Local communities often adopt regulations to promote the wise use of floodplains and to reduce damages caused by flooding. These floodplain management programs generally include corrective measures to rectify existing problems and preventive measures to inhibit the development of new problems. The measures used take a variety of forms, but generally include requirements for zoning, subdivision, or building. Local governments have the primary responsibility for establishing and enforcing floodplain management programs; however, state and federal entities play an important role through incentive-based programs and technical and financial assistance.

This section describes the influence of the federal government and FEMA on floodplain management, assistance provided by the Natural Resource Conservation Service to local communities for flood control projects, the involvement of municipalities in implementing floodplain management guidelines through the platting and permitting process, and the use of state watercourses to manage the movement of water.

A. Role of the Federal Government and FEMA

One federal program has had an essential role in shaping state and local floodplain management: the National Flood Insurance Program (NFIP), administered by FEMA. *See* 42 U.S.C. §§ 4001–4129. The NFIP is an incentive-based program that coordinates floodplain management with the availability of flood insurance. Unless a community participates in the NFIP, federally backed flood insurance is not available to residents and business owners in the community. To participate, communities must adopt and enforce minimum floodplain management regulations designed to minimize damage to homes and businesses in "special flood hazard areas" (SFHAs). These areas have the greatest risk of flooding and are defined as those areas of land that would be inundated by a flood that has a 1 percent or greater chance of occurring in any given year (also referred to as the base flood or hundred-year flood). 44 C.F.R. § 59.1. In 1999, the Texas legislature obligated Texas cities and counties to adopt any ordinances or orders necessary to be eligible to participate in the NFIP. Tex. Water Code § 16.3145.

FEMA provides the data that participating communities must use to establish floodplain management regulations. The data available for each community vary. In some communities, the available maps show only the approximate boundaries of SFHAs, while in others, FEMA has undertaken detailed flood insurance studies and published flood insurance rate maps indicating base flood elevations, flood risk zones, and floodways. SFHAs are designated on the flood insurance rate maps as A Zones and V Zones. *See* 44 C.F.R. § 59.1 (defining "areas of special flood hazard").

Occasionally a flood insurance rate map inadvertently includes property within an SFHA even though the property is at or above the base flood elevation. In such cases, the owner or lessee of the property may submit mapping and survey information to FEMA and request a "letter of map amendment," which officially removes a structure or lot from the SFHA. 44 C.F.R. §§ 70.3–.5. To remove a structure from the SFHA, the applicant must demonstrate that the lowest ground touching the structure is at or above the base flood elevation; to remove an entire lot, the applicant must show that the lowest point on the lot is at or above the base flood elevation. *See* FEMA, *Letter of Map Amendment & Letter of Map Revision-Based on Fill Process*, www.fema.gov/letter-map-amendment-letter-map-revision-based-filled-process. In most cases, the applicant will need to hire a licensed land surveyor or a registered professional engineer to prepare an elevation certificate for the property.

More extensive changes to the maps may be requested by the community participating in the NFIP. Procedures are available to request that FEMA revise SFHA boundaries, base flood elevations, and floodways. *See* 44 C.F.R. §§ 65.5–.7. If FEMA agrees to a change, it will issue a "letter of map revision," which is an official revision to an effective NFIP map. 44 C.F.R. § 65.9.

Procedures also exist for obtaining comments from FEMA concerning proposed projects. A "conditional letter of map amendment" is FEMA's comment on whether a proposed project would be excluded from the SFHA shown on the effective NFIP map. 44 C.F.R. § 70.9. A "conditional letter of map revision" is FEMA's comment on whether a proposed project that affects the hydrologic or hydraulic characteristics of a flooding source would necessitate modifying the existing regulatory floodway or effective base flood elevations. 44 C.F.R. § 65.8. Neither of these conditional letters revises an effective NFIP; rather, they indicate how FEMA will recognize a particular project if it is built as proposed.

The minimum floodplain management standards for flood-prone areas are set out in 44 C.F.R. § 60.3. Communities participating in the NFIP must require property owners to obtain permits for all proposed construction or other development in SFHAs. In addition, communities must review subdivision proposals and other proposed new development to determine whether they will be reasonably safe from flooding and whether the utilities and facilities servicing them will be constructed to minimize or eliminate flood damage. Other requirements vary depending on the type of flood risk data FEMA has provided to the community. *See* 44 C.F.R. § 60.3. In general, communities must require that all new construction or substantially improved existing buildings have their lowest floor (including basement) elevated to or above the base flood elevation. Communities that fail to enforce the minimum floodplain management requirements may be placed on probation and eventually suspended from the NFIP. 44 C.F.R. § 59.24(b), (c).

Communities may adopt floodplain management standards that are more stringent than the minimum NFIP requirements, and the NFIP encourages them to do so through its community rating system. *See* 42 U.S.C. § 4022(b). Communities are rated on a scale from one to ten, and those with a lower rating can secure lower premiums for policyholders in the community. *See* FEMA, *National Flood Insurance Program Community Rating System, available at* www.fema.gov/national-flood-insurance-program-community-rating-system.

In each state, a "state coordinating agency" may be designated to assist with implementation of the NFIP in that state. 44 C.F.R. §§ 59.1, 60.25. In 2007, the Texas legislature transferred responsibility for coordinating the NFIP from the Texas Commission on Environmental Quality to the Texas Water Development Board. *See* Act of May 26, 2007, 80th Leg., R.S., ch. 1323. The board is tasked with aiding, advising, and coordinating the efforts of present and future political subdivisions endeavoring to qualify for participation in the NFIP. Tex. Water Code § 16.316(a).

B. USDA Natural Resource Conservation Service Dams

Another federal program that addresses flood management is the Watershed and Flood Prevention Operations Program, which provides local government sponsors with technical and financial support to implement conservation practices and works of improvement, including floodwater-retarding dams and reservoirs. *See* 16 U.S.C. §§ 1001–1012. This program is administered by the Natural Resources Conservation Service (NRCS), which is an agency of the U.S. Department of Agriculture. A crucial aspect of the program is local involvement. Project sponsors must demonstrate strong local support by agreeing to obtain land rights, contribute to the cost of construction, and perform operation and maintenance. 7 C.F.R. § 622.11(a)(7). Authorized project purposes include watershed protection, conservation and proper utilization of land, flood prevention, agricultural water management including irrigation and drainage, public recreation, public fish and wildlife, municipal and industrial water supply, hydropower, water quality management, ground water supply, agricultural pollution control, and other water management. 7 C.F.R. § 622.2(c).

The focus is generally on small projects in upstream tributary watersheds. Projects are eligible only if they do not exceed 250,000 acres and do not include any single structure providing more than 12,500 acre-feet of floodwater detention capacity or more than 25,000 acre-feet of total capacity. 16 U.S.C. § 1002. Any project involving federal contributions in excess of $5 million or construction of any single structure with a capacity in excess of 2,500 acre-feet requires congressional approval. 16 U.S.C. § 1002. At least 20 percent of the total benefits of the project must be directly related to agriculture, including rural communities. 16 U.S.C. § 1002.

Participation in the NRCS program does not obviate the need for obtaining a state water rights permit from the Texas Commission on Environmental Quality. As a condition to providing federal assistance for the installation of works of improvement, local organizations must acquire, or provide assurance that landowners or water users have acquired, such water rights, pursuant to state law, as may be needed in the installation and operation of the work of improvement. 16 U.S.C. § 1004(4).

C. Municipal Authority and Land Development

Municipalities typically implement floodplain management guidelines through the platting and permitting processes. The specific procedures of each municipality vary, but most follow a similar format. In general, no permit for a structure or development may be issued, and no plat may be approved, unless the applicant demonstrates that the permit or plat satisfies the city's flood prevention and drainage requirements. The standards set by most municipalities are based on the requirements for participation in the NFIP, discussed above. As a result, the focus is on determining whether the property under consideration is in a "special flood hazard area" or floodway. The regulations generally require that buildings be constructed in a way that will minimize damage from flooding and will not impair a floodway's ability to pass floodwaters.

D. Use of State Watercourses

Developers may address the increased runoff created by a development project by directing the runoff to a designated location on the property and then into a natural watercourse. Texas has long recognized that landowners may use ditches, drains, and artificial streams to accumulate surface water and direct it into a natural watercourse. *Jefferson County Drainage District No. 6 v. Langham*, 76 S.W.2d 484, 488 (Tex. Comm'n App. 1934, judgm't adopted). This right, however, is not unlimited. The water added to the watercourse may not exceed what the watercourse has the natural capacity to carry. *Langham*, 76 S.W.2d at 488; *Coleman v. Wright*, 155 S.W.2d 382, 383 (Tex. Civ. App.—Waco 1941, no writ). In addition, before reaching the watercourse, the water may not be diverted or impounded in a manner that damages the property of another by overflow of the diverted or impounded water. Tex. Water Code § 11.086.

Because natural watercourses may be used for flood control and drainage, the definition of a "watercourse" is significant. To constitute a watercourse, there must be something more than mere surface drainage over the entire face of a tract of land. *Hoefs v. Short*, 273 S.W. 785, 787 (Tex. 1925). A watercourse has (1) a well-defined bed and banks, (2) a current of water, and (3) a permanent source of supply. *Hoefs*, 273 S.W. at 787. While these three requirements must be met, they are not rigorously applied. The bed and banks may be "slight, imperceptible, or absent" in some instances without the stream losing its character as a watercourse. *Hoefs*, 273 S.W. at 787. The source must be permanent, but it need not be continuous, and a watercourse may be dry for long periods of time. *Hoefs*, 273 S.W. at 787. Permanent source "merely means that the stream must be such that similar conditions will produce a flow of water, and that these conditions recur with some degree of regularity, so that they establish and maintain a running stream for considerable periods of time." *Hoefs*, 273 S.W. at 788. The watercourse may shift positions over time as long as it presently has a defined course. *Domel v. City of Georgetown*, 6 S.W.3d 349, 356 (Tex. App.—Austin 1999, pet. denied).

As discussed in this section, a variety of programs exist to manage the development of land within the floodplain. Although the approaches may vary, the goal is to reduce the damage that results when the floodplain inevitably is inundated by water. This risk of flooding may also be managed with flood control dams, which can be used and operated to accumulate floodwaters and slow their release downstream. The regulation of dam owners and operators is discussed below.

V. Regulation of Dams

Any discussion of the topic of flooding would not be complete without explaining the role of dams. Dams provide several economic and social benefits, including flood control, water supply, hydroelectric power, navigation, recreation, and wildlife habitat. However, in the event of failure, dams also present a risk of severe flooding that can result in loss of life and property damage. See Chapter 27 of this book for a discussion of reservoirs formed by dams. The state of Texas manages this risk by regulating the construction, alteration, and removal of dams. The regulations apply to nearly all dams, including many dams on private land.

A. Dams on State Watercourses

With few exceptions, before a person can begin constructing any work that is designed to store, take, or divert state water, the person must obtain a permit from the Texas Commission on Environmental Quality (TCEQ) to impound and appropriate the water. Tex. Water Code § 11.121. State water is property of the state of Texas and includes "the water of the ordinary flow, underflow, and tides of every flowing river, natural stream, and lake, and of every bay or arm of the Gulf of Mexico, and the storm water, floodwater, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed in the state." Tex. Water Code § 11.021. An applicant seeking a permit to construct a storage reservoir must apply to the TCEQ for a water rights permit and comply with the public notice and permitting requirements of the agency.

B. Dams on Private Land

There are few exceptions to the permit requirement; however, a person may construct on the person's own property a dam or reservoir with normal storage of not more than two hundred acre-feet of water for domestic and livestock purposes without obtaining a permit. Tex. Water Code § 11.142(a), (b). More than two hundred acre-feet of water may be stored temporarily in such a dam or reservoir if the dam or reservoir has not stored more than two hundred acre-feet of water on average in any twelve-month period. Tex. Water Code § 11.142(a). An exempt reservoir may be on-channel, adjacent to the stream, or on a contiguous piece of property through which the water flows. 30 Tex. Admin. Code § 297.21(b). A dam constructed under this exemption may not be located on a navigable stream. 30 Tex. Admin. Code § 297.21(c). The state of Texas owns the lands underlying navigable streams. *State v. Bradford*, 50 S.W.2d 1065, 1069 (Tex. 1932). Thus, a dam constructed on a navigable stream is not considered to be on the person's "own property." *Garrison v. Bexar-Medina-Atascosa Counties Water Improvement District No.1*, 404 S.W.2d 376, 377 (Tex. Civ. App.—Austin), *writ ref'd n.r.e.*, 407 S.W.2d 771 (Tex. 1966). By statute, any stream that has an average width of thirty feet from its mouth up is considered legally navigable regardless of whether it is navigable in fact. *See* Tex. Nat. Res. Code § 21.001(3); *Diversion Lake Club v. Heath*, 86 S.W.2d 441, 445–46 (Tex. 1935); *Texas River Barges v. City of San Antonio*, 21 S.W.3d 347, 352 (Tex. App.—San Antonio 2000, pet. denied).

C. Permits and Construction

The TCEQ is charged with adopting and enforcing rules and orders that are necessary for the safe construction, maintenance, repair, and removal of dams. Tex. Water Code § 12.052(a). As part of this charge, the TCEQ has implemented the Dam Safety Program, which monitors and regulates both public and private dams in Texas. *See* 30 Tex. Admin. Code §§ 299.1–.72. Under the Dam Safety Program, the TCEQ performs safety evaluations of existing dams, reviews plans and specifications for dam construction and major rehabilitation work, inspects construction work on new and existing dams, and reviews and approves emergency action plans. As discussed in this section, the Dam Safety Program underwent significant changes effective January 1, 2009, when the TCEQ adopted new, updated rules for the program. *See* 33 Tex. Reg. 10,465 (Dec. 26, 2008). The Texas legislature made further changes to the program in 2011 by directing the TCEQ to "focus on the most hazardous dams in the state" (*see* Act of May 27, 2011, 82d Leg., R.S., ch. 1021, § 1.07, eff. Sept. 1, 2011 (amending Tex. Water Code § 12.052)) and creating additional exemptions for certain dams (*see* Act of June 14, 2013, 83d Leg., R.S., ch. 641, §§ 1, 2, eff. Sept. 1, 2013 (amending Tex. Water Code § 12.052)).

1. Dams Subject to Regulation

The TCEQ defines a "dam" as "[a]ny barrier or barriers, with any appurtenant structures, constructed for the purpose of either permanently or temporarily impounding water." 30 Tex. Admin. Code § 299.2(14). Despite this broad definition, the TCEQ's dam safety rules apply only to a subset of dams. The rules originally applied to all structures with a height greater than six feet. However, the TCEQ revised its dam safety rules effective January 1, 2009, to apply only to dams that (1) have a height greater than or equal to twenty-five feet and a maximum storage capacity greater than or equal to fifteen acre-feet; (2) have a height greater than six feet and a maximum storage capacity greater than or equal to fifty acre-feet; (3) are classified as a high- or significant-hazard dam, regardless of height or maximum storage capacity; or (4) are used as a pumped storage or terminal storage facility. 30 Tex. Admin. Code § 299.1(a). The rule change effectively removed certain smaller, lower-risk dams from regulation. Nevertheless, the legislature further revised the applicability of the Dam Safety Program in both 2011 and 2013 by amending section 12.052 of the Water Code to exempt dams of low and significant hazard storing less than five hundred acre-feet of water if they are located in a county with a population of less than 355,000 and are not within the corporate limits of a municipality. *See* Tex. Water Code § 12.052.

Under the TCEQ's dam safety rules, the following types of dams are also exempt: dams designed by, constructed under the supervision of, and owned and maintained by federal agencies; embankments constructed for roads, highways, and railroads, including low-water crossings, that may temporarily impound floodwater; dikes or levees designed to prevent inundation by floodwater; certain off-channel impoundments; and aboveground water storage tanks made of steel, concrete, or plastic. 30 Tex. Admin. Code § 299.1(c). A process is also available to obtain an exception to the dam safety requirements if the physical conditions involved or consequences of potential failure, when evaluated using accepted engineering practices, make the requirements unnecessary. 30 Tex. Admin. Code § 299.5.

2. *Design and Flood Evaluation*

The design standard used for dams is the "probable maximum flood." The probable maximum flood is the flood magnitude that may be expected from the most critical combination of meteorologic and hydrologic conditions that are reasonably possible for a given watershed. 30 Tex. Admin. Code § 299.2(47). Dams must be constructed to safely handle an appropriate percentage of the probable maximum flood. The percentage varies based on the dam's size and downstream hazard potential. The dam's size—small, intermediate, or large—is based on the dam's maximum height or maximum reservoir storage capacity. *See* 30 Tex. Admin. Code § 299.13. The hazard classification—low, significant, or high—is based not on any condition of the dam itself but on the potential loss of human life and property damage in the event of a failure or malfunction of the dam or its appurtenant facilities. *See* 30 Tex. Admin. Code § 299.14. All large dams and all high-hazard dams must be designed to safely pass the full probable maximum flood; other dams are required to safely pass only a percentage of the probable maximum flood. *See* 30 Tex. Admin. Code § 299.15. Safely passing a flood for an existing dam means discharging the flood without a failure of the dam or one of its critical elements. As a supplement to its regulations, the TCEQ published *Hydrologic and Hydraulic Guidelines for Dams in Texas*, which contains detailed instructions, standards, and accepted procedures for the hydrologic and hydraulic analysis of existing and proposed dams. *See* Texas Commission on Environmental Quality, *Hydrologic and Hydraulic Guidelines for Dams in Texas* (Jan. 2007), *available at* www.tceq.state.tx.us/publications/gi/gi-364.html/at_download/file.

3. *Dam Safety Review*

The TCEQ is involved at all stages of a dam's life. The construction of a dam or the enlargement, repair, or alteration of an existing dam may not begin without the written approval of the TCEQ's executive director unless the work is ordinary maintenance or emergency repair. 30 Tex. Admin. Code § 299.22. The TCEQ has issued *Design and Construction Guidelines for Dams in Texas* describing the design and construction requirements for the construction of a proposed dam or the reconstruction, modification, enlargement, rehabilitation, alteration, or repair of an existing dam. *See* Texas Commission on Environmental Quality, *Design and Construction Guidelines for Dams in Texas* (Aug. 2009), *available at* www.tceq.state.tx.us/publications/rg/rg-473.html/at_download/file.

A licensed professional engineer must prepare all plans and specifications for dams subject to the TCEQ's review unless the executive director waives this requirement. 30 Tex. Admin. Code § 299.4. If the plans and specifications for a dam are submitted to the TCEQ as part of an application for a water rights permit, the executive director will not issue written approval until after the water rights permit is issued. 30 Tex. Admin. Code § 299.22(e)(2)(A). Approval must be obtained before water is deliberately impounded in a partly or newly completed reservoir that will impound more than one thousand acre-feet at normal storage capacity. 30 Tex. Admin. Code § 299.28. After approval, the executive director may make periodic inspections of the construction to determine if the dam is in compliance with the approved plans and specifications. 30 Tex. Admin. Code § 299.25(b). If a project is not being constructed in accordance with the approved plans and specifications, the executive director will notify the owner of the deficiencies or violations and direct the owner to take the necessary action to bring the project into compliance within thirty days. 30 Tex. Admin. Code § 299.25(b).

After completion, the owner is responsible for operating and maintaining the dam and appurtenant structures in a safe manner. 30 Tex. Admin. Code § 299.41(a). The owner must develop and implement an operation and maintenance plan and, if the dam is an intermediate- or large-size dam with a gated spillway, must also implement a gate operation plan. 30 Tex. Admin. Code §§ 299.43–.44. In addition, owners of high-hazard dams that are notified by the TCEQ of the need for increased security must develop a security plan that includes measures to prevent unauthorized operation or access and backup power requirements to ensure operation. 30 Tex. Admin. Code § 299.62.

The TCEQ will perform periodic engineering inspections of dams, with the frequency of inspections determined by the dam's hazard classification. 30 Tex. Admin. Code § 299.42(a). The executive director may reclassify a dam's hazard classification at any time based on an inspection and downstream hazard evaluation, a breach analysis, or a review of current aerial photography and topographic maps, along with information obtained in the field. 30 Tex. Admin. Code § 299.12(b). If the owner of a dam is required to reevaluate the adequacy of an existing dam or spillway, the TCEQ may enter into an agreement with the owner that includes timelines to achieve compliance with the TCEQ's design criteria and that authorizes deferral of compliance with the criteria, as appropriate. Tex. Water Code § 12.052(b-1).

The TCEQ may issue an emergency order directing a dam's owner to repair, modify, maintain, dewater, or remove an unsafe dam if the dam's existing condition is creating or will cause extensive or severe property damage or economic loss to others, or is posing an immediate and serious threat to human life or health, and other procedures available to remedy or prevent the occurrence of the situation will result in unreasonable delay. Tex. Water Code § 12.052(d). The emergency order may be issued without notice to the dam owner or with notice that is practicable under the circumstances. Tex. Water Code § 12.052(d). If the commission issues an emergency order without notice to the dam owner, the commission must hold a hearing as soon as practicable to affirm, modify, or set aside the emergency order. Tex. Water Code § 12.052(e). If the owner of a dam willfully fails or refuses to comply within thirty days of the TCEQ's final, nonappealable order requiring the owner to construct, reconstruct, repair, or remove the dam, the owner may be subject to a penalty for each day the violation continues. *See* Tex. Water Code § 12.052(c). The owner also may be subject to a daily penalty for willfully failing to comply with any rule or other order issued by the TCEQ pursuant to its dam safety authority. *See* Tex. Water Code § 12.052(c). See Chapter 13 of this book for a discussion of enforcement.

4. Removal of Dams

The owner of a dam eventually may opt to remove the dam. Removal may be motivated by dam deterioration and risk of failure or simply by a desire to return the waterway to its original condition. The decision to remove a dam is made primarily by the owners and stakeholders of the structure. However, the executive director of the TCEQ may require the removal of deficient dams that fail to comply with the TCEQ's dam safety rules and pose a significant threat to human life or property. *See* 30 Tex. Admin. Code §§ 299.2(16), 299.51(a). Owners proposing to remove or breach a dam, or owners ordered to remove a deficient dam, must submit final plans and specifications to the executive director for review and approval before the start of work to remove or breach the dam. 30 Tex. Admin. Code § 299.51. The liability associated with the dam remains with the owner throughout the removal process.

The TCEQ publishes *Dam Removal Guidelines* that provide guidance to dam owners who are considering removing or breaching a dam. *See* Texas Commission on Environmental Quality, *Dam Removal Guidelines* (Sept. 2006), *available at* www.tceq.state.tx.us/publications/gi/gi-358.html/at_download/file. The guidelines state that before removing a dam, the owner should submit a dam removal plan to the TCEQ's Dam Safety Program for approval. *Dam Removal Guidelines*, at 3. The plan should include a schedule for conducting the phases of work, a description of the method to be used to dewater the reservoir, drawings showing the location and size of the breach, a rationale for the sizing and placement of the breach, a plan for preventing erosion and sediment loss, and an emergency action plan to address the risks associated with removal. *Dam Removal Guidelines*, at 3. The guidelines also contain a list of additional actions, approvals, and permits that may be required from both state and federal agencies. For instance, if the project will disturb more than one acre of land, the owner must develop and implement a Storm Water Pollution Prevention Plan. *Dam Removal Guidelines*, at 4. If the project will disturb more than five acres of land or is part of a larger common plan of development, the owner must also secure a Construction General Permit. *Dam Removal Guidelines*, at 4. Projects that involve the use of federal funds or that affect wetlands or waters of the United States may need approval from the U.S. Army Corps of Engineers. *Dam Removal Guidelines*, at 4.

VI. Conclusion

Flooding is an inevitability for much of the state of Texas. As discussed in this chapter, some of the key issues presented by flooding include determining who, if anyone, is responsible for damage caused by flooding and the importance of preventing or minimizing the risk of damage by properly managing land development within the floodplain. Because of the state's lengthy coastline and abundance of watersheds, flood control will continue be an issue even as the state must plan for how to meet the water supply needs of its growing population.

CHAPTER 40

Water-Energy Nexus

Jacob Arechiga[1]

I. Introduction

Water and energy are inseparably related. Obtaining water requires energy, and generating energy requires water, both often in large quantities. This nexus, and the problems associated with meeting a growing population's water and energy demands while trying to conserve both resources, will be a significant challenge in the United States, and particularly in Texas, for years to come.

The availability of an abundant water supply is integral to almost all aspects of energy production. Water is used in the extraction of various natural resources needed to manufacture fuel. For example, water is used in hydraulic fracturing, or "fracking," for oil and gas deposits and is used to manufacture and refine fuel. Water is also needed to cool thermal power generation facilities that generate electricity.

Likewise, a stable and affordable electric energy supply is critical to meeting water demands. Electricity can be a primary cost in supplying water, particularly for public water suppliers, which consume electricity at high rates to withdraw, transport, treat, pump, and deliver water to their many users. Even end users who supply their own water require significant amounts of electricity.

New technologies are constantly being developed to reduce water demand in energy production and reduce energy consumption in supplying water, but ultimately, population growth will be the leading driver of increased use of both. There are few places where this effect is felt more acutely than in Texas. From 2000 to 2010, the Texas population grew by almost 21 percent, to over 25 million, while the population for the entire nation grew by only 10 percent over the same period. *See* Paul Mackun et al., U.S. Census Bureau, *Population Distribution and Change: 2000 to 2010* (C2010BR-01, Mar. 2011), *available at* www.census.gov/prod/cen2010/briefs/c2010br-01.pdf. Texas's population is expected to continue at a high rate of growth through 2060, when it is projected to exceed 46 million. *See* Texas Water Development Board, *Water for Texas 2012* 130 (2012) [hereinafter 2012 State Water Plan], *available at* www.twdb.texas.gov/waterplanning/swp/. This population growth will result in the demand for more water and more energy production within Texas. Further, as Texas is the nation's leading energy producer, producing oil, gas, biofuels, and coal, population growth nationwide will increase water demands within Texas related to energy production.

This chapter first summarizes international, national, and Texas interest in defining and meeting this challenge. Next, the need for water in the energy sector is discussed—from natural resource extraction through electric generation. The critical need for electricity in supplying water is

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then presented. Finally, the chapter closes with a discussion of future policy considerations regarding supply and demand of both water and energy and practical considerations going forward.

Throughout this chapter, it is important to recognize the difference between water "use" and water "consumption." When water is consumed, the water is prevented from being available for another use. Irrigation, in which water is incorporated into farm produce, is an example of consumption. In contrast, nonconsumptive use allows water to be reused quickly or after treatment. For example, most of the water used for once-through cooling in thermal power generation is reintroduced into its water source and therefore constitutes a nonconsumptive use.

A few caveats regarding this chapter: First, research is incorporated from various governmental, quasi-governmental, and private entities. This research relies on different sources of data, including international sources, over extended periods of time. Therefore, while efforts have been made to ensure uniformity in the data provided, much of the data serve as points of reference and cannot be directly compared or calculated. Second, the focus of this chapter regarding water resources is specifically limited to availability and water use and consumption, not qualitative impacts to water (e.g., contamination). References to water quality impacts are limited to determining when water has been impaired and cannot be used again (e.g., consumption) versus impacts that allow continued use.

II. Recent Interest in the Water-Energy Nexus

A. International Interest in the Water-Energy Nexus

The water-energy nexus has been an area of research and study internationally. In 2008, the World Economic Forum (an independent international organization aimed at increasing public-private cooperation and shaping global, regional, and industry agendas) worked to create a special international task force on water security issues. Partnering with the 2030 Water Resources Group (WRG), the two created the Water Resources Group Phase 2 in 2010. WRG Phase 2's purpose is to focus on building awareness and better understanding of the water-food-energy-climate nexus. WRG Phase 2 operates on the assumption that this nexus represents "the most important global dimension of the water crisis in terms of managing economic growth and other impacts connected to water scarcity." World Economic Forum, *Global Risks 2011* 33 (6th ed. 2011), *available at* http://reports.weforum.org/wp-content/blogs.dir/1/mp/uploads/pages/files/global-risks-2011.pdf.

In its *Global Risks 2011* report, the World Economic Forum identifies the water-food-energy nexus as one of the three most significant risks facing the international community. *Global Risks 2011*, at 28. Because of the World Economic Forum's international focus, the report concentrates on the impact of water, energy, and food policy issues in the developing world, finding that "[e]conomic disparity . . . often exacerbates this nexus of risks as governments and consumers seek short-term, unsustainable solutions to economic hardship such as growing high-value, water-intensive export crops in water-deprived regions." *Global Risks 2011*, at 28. The World Economic Forum also explores transboundary water and energy resources, which can lead to geopolitical conflict and international tensions, concluding that solutions to these difficult international issues will require the coordination of multiple stakeholders for regional infrastructure investment and development. *Global Risks 2011*, at 32.

The International Energy Agency (IEA), for the first time in 2012, began examining the water-for-energy relationship as part of its *World Energy Outlook 2012. See* International Energy Agency, *World Energy Outlook 2012* (2012), *available at* www.iea.org/publications/freepublications/publication/world-energy-outlook-2012.html. This included reviewing water requirements for different energy sources and estimating freshwater needs by scenario, energy source, and region. The report found that in 2010, 15 percent of the world's total water *withdrawals* (e.g., use) were related to energy production—an estimated 583 billion cubic meters. *World Energy Outlook 2012*, at 501. The volume of water *consumed* totaled 66 billion cubic meters. *World Energy Outlook 2012*, at 501. The IEA projects that under its new policies scenario, which assumes existing policy commitments are maintained and new commitments are cautiously implemented, global water withdrawals should increase by about 20 percent between 2010 and 2035, while global consumption is projected to rise by 85 percent over that same period. *World Energy Outlook 2012*, at 501. This is driven largely by a shift to higher efficiency power plants worldwide with cooling systems that reduce withdrawals but increase consumption (per unit of electricity produced) and the expansion of biofuels production. *World Energy Outlook 2012*, at 501. But see the discussion at section III.B below regarding the use of water in electric generation in Texas. It would be difficult to extrapolate these statistics to Texas without a complete analysis of water availability, which is beyond the scope of this chapter. See Chapters 12 and 19 of this book regarding Texas surface water and groundwater availability.

In 2014, the IEA held its fourth forum on the Climate-Energy Security Nexus, focusing on water and energy. *See* International Energy Agency, *4th IEA Forum on the Climate-Energy Security Nexus: Water and Energy* (June 12, 2014), *available at:* www.iea.org/media/workshops/2014/nexus/Nexus4WorkshopReportIEAWBCSDJune2014.pdf. Much of the forum's focus was on the effect that climate change will have on the availability of water for energy production and exploring ideas for increasing energy production resilience to changes in water availability. This included exploring the use of nontraditional water sources (saline, brackish, produced water), reusing water, and changing economic and societal behavior.

B. The U.S. Interest in the Water-Energy Nexus

Interest in the water-energy nexus has quickly accelerated in recent years at the federal level. Beginning in December 2004, the U.S. House and Senate requested that the secretary of energy prepare a report on the interdependence of energy and water, which was to serve as a guide to future policymaking. The report was issued two years later. *See* U.S. Department of Energy, *Energy Demands on Water Resources: Report to Congress on the Interdependency of Energy and Water* (Dec. 2006) [hereinafter *Energy Demands on Water Resources*].

In the interim, in 2005, the U.S. Congress established a National Energy-Water Roadmap Program. The purpose of the program was to assess the efforts of the Department of Energy (DOE) and other federal agencies to address energy and water policy issues; a report was finalized in March 2007. *See* Sandia National Laboratories, U.S. Department of Energy, *Energy-Water Roadmap Process*.

The U.S. Government Accounting Office (GAO) expanded on this work, releasing six reports on the water-energy nexus from 2009 to 2012, including—

- *Energy-Water Nexus: Improvements to Federal Water Use Data Would Increase Understanding of Trends in Power Plant Water Use* (Report No. GAO-10-23, Oct. 16, 2009)
- *Energy-Water Nexus: Many Uncertainties Remain about National and Regional Effects of Increased Biofuel Production on Water Resources* (Report No. GAO-10-116, Nov. 30, 2009)
- *Energy-Water Nexus: A Better and Coordinated Understanding of Water Resources Could Help Mitigate the Impacts of Potential Oil Shale Development* (Report No. GAO-11-35, Oct. 29, 2010)

- *Energy-Water Nexus: Amount of Energy Needed to Supply, Use, and Treat Water Is Location-Specific and Can Be Reduced by Certain Technologies and Approaches* (Report No. GAO-11-225, Mar. 23, 2011)
- *Energy-Water Nexus: Information on the Quantity, Quality, and Management of Water Produced during Oil and Gas Production* (Report No. GAO-12-156, Jan. 9, 2012)
- *Energy-Water Nexus: Coordinated Federal Approach Needed to Better Manage Energy and Water Tradeoffs* (Report No. GAO-12-880, Oct. 15, 2012)

These reports focused on discrete industries, as indicated by their titles. Each outlined the role that the industry has on water and electricity resources, drivers affecting water impacts and electricity consumptions, future projections, and recommendations. All the reports are available at the GAO Web site, www.gao.gov/key_issues/energy_water_nexus/issue_summary#t=1.

As the GAO released reports, the DOE was concurrently undertaking its own analyses of the water-energy nexus, and issued various reports, including *The Water-Energy Nexus: Challenges and Opportunities*, in June 2014, available at the DOE Web site, http://energy.gov/downloads/water-energy-nexus-challenges-and-opportunities. The report generally addresses four key topics: (1) impacts of climate change on the nexus; (2) U.S. population growth and regional migration will increase in arid areas, such as the American Southwest; (3) new technologies in energy and water could shift water and energy demands; and (4) policies addressing water rights and water impacts of energy production are introducing both incentives and challenges for decision making.

C. Interest in the Water-Energy Nexus in Texas

The Texas Water Development Board (TWDB) has taken a lead role in examining the connection between energy production and water demands. In 2008, the Bureau of Economic Geology at the University of Texas's Jackson School of Geosciences prepared a report for the TWDB on water demand projections for electric power generation in Texas. *See* Carey King et al., Bureau of Economic Geology, *Water Demand Projections for Power Generation in Texas* (Texas Water Development Board 2008) [hereinafter *Water Demand Projections*], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0704830756ThermoelectricWaterProjection.pdf. The 2008 report examines and reports data on consumption of water for electricity production using thermoelectric fossil fuel, nuclear, wind, solar photovoltaic, and concentrated solar power projects in Texas. *Water Demand Projections*, at 6–27. The report also provides projections for future water consumption for electricity production under a variety of natural gas price and carbon price scenarios. *Water Demand Projections*, at 48–84. The use of water in electric generation is discussed in section III.B below.

Although several reports have briefly discussed the water-energy issues associated with mining and oil and gas extraction in Texas, this was an area where additional work was needed. *See* Ashlynn S. Stillwell et al., the University of Texas at Austin & Environmental Defense Fund, *Energy-Water Nexus in Texas* 41 (2009). Recognizing this need, the TWDB created a new study in 2011 of water use in the mining and oil and gas industries. The study was prompted by the increase in shale gas production and was created primarily to help the TWDB in its next cycle of water planning. *See* Jean-Phillippe Nicot et al., Bureau of Economic Geology, *Current and Projected Water Use in the Texas Mining and Oil and Gas Industry* (Texas Water Development Board 2011) [hereinafter 2011 Mining Water Use Report], *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/0904830939_MiningWaterUse.pdf. This study was updated in 2012 to reflect the shift in the oil and gas industry from gas to oil production and the rapid development in technological advances that increase reuse of water and the use of brackish water. *See* Jean-Phillippe Nicot et al., Bureau of Economic Geology, *Oil & Gas Water Use in Texas: Update to 2011 Mining Water Use Report* i (Texas Water Development Board 2012) [hereinafter 2012 Mining Water Use

Report Update], *available at* www.twdb.texas.gov/publication/reports/contracted_reports/doc/0904830939_2012Update_MiningWaterUse.pdf. The results of these studies are discussed in section III.A below.

III. Water Use for Oil and Natural Gas Extraction, Electric Power Generation, and Biofuel Production in Texas

As noted earlier, this chapter describes the use and consumption of water to develop energy resources. Much of the focus of this chapter concerns the generation of electricity, which includes the direct use and consumption of water for the purposes of thermoelectric generation, as well as related water use and consumption for the extraction of the fossil fuels (e.g., hydraulic fracturing and mining) needed to generate electricity. Natural gas is also extracted for nonelectricity generation purposes, and through similar means, oil is also extracted typically for use in motor and other mobile-source fuels. Finally, biofuels are addressed at the end of this chapter, though development of biofuels has become less of a focus in Texas in recent years.

While much of this chapter focuses on the water demands for energy for electricity production, it is important to note the relative size of this consumption compared to other state consumptive uses. In 2009, steam electric generation constituted roughly 3 percent of total state water consumption; mining (which includes oil and gas development) adds an additional 1 percent to this consumption total. This is compared to 2 percent for livestock, 7 percent for manufacturing, 27 percent for municipal, and 60 percent for irrigation purposes. William "Skip" Mills et al., Texas A&M University, *Viability and Impacts of Implementing Various Power Plant Cooling Technologies in Texas* 6-2, fig. 6-1 (Electric Power Research Institute, Oct. 2012) [hereinafter Viability of Cooling Technologies in Texas].

A. Extraction of Energy Fuel Natural Resources

Water is needed to extract natural resources that can be processed into fuel. In the oil and gas industries, water is used primarily for the following purposes: drilling wells, stimulating and fracking wells, and secondary and tertiary recovery processes. In coal mining, water is used for dust control and other ancillary purposes. The extraction of uranium requires water during in situ mining, but that use is not addressed in detail in this chapter, because current water demand is not as significant as in these other industries and a "large increase in [uranium] production and water use is not expected." *See* 2011 Mining Water Use Report, at 236. Water is also used for mining other substances, such as aggregate and industrial sand, but the extraction of those natural resources is beyond the scope of this chapter. *See* 2011 Mining Water Use Report, at 2.

In 2008 the TWDB estimated that Texas used approximately 160,000 acre-feet in the oil and gas and mining industries, including 35,800 acre-feet for fracking wells and 21,000 acre-feet for other purposes in the oil and gas industry. 2011 Mining Water Use Report, at 1. The TWDB further estimated that the coal industry used 20,000 acre-feet; the remaining water was used in other sections of these industries. 2011 Mining Water Use Report, at 1. The TWDB further estimated that approximately 56 percent of all water used in these projects originated from groundwater (as opposed to surface water). 2011 Mining Water Use Report, at 2.

The 2011 Mining Water Use Report was updated in 2012, prompted by (1) a major shift from gas production to oil production, displacing gas production centers across the state and impacting county-level amounts; and (2) rapid development of technological advances, resulting in more common reuse and the ability to use more brackish water. *See* 2012 Mining Water Use Report Update, at i. One of the major focuses of the report is distinguishing between water use and water consumption, as well as more appropriately accounting for water use in the oil and gas industry; specifically, accounting for the reuse of water from neighboring hydraulic fracturing jobs, use of recycled water from other industry operations or other treatment plants, and the use of brackish water. 2012 Mining Water Use Report Update, at i. The TWDB found that while total water use for hydraulic fracturing increased from 36,000 acre-feet in 2008 to approximately 81,500 acre-feet in 2011, the amount of recycling/reuse and the use of brackish water also increased approximately 21 percent. 2012 Mining Water Use Report Update, at i. Whether water is recycled is largely dependent on the economics of the play, including trucking and disposal costs, costs of treatment and freshwater, and ultimately the proximity of recycled water to future wells. *See* House Committee on Natural Resources, *Interim Report to the 83rd Texas Legislature* 68–69 (Jan. 2013), *available at* www.house.state.tx.us/_media/pdf/committees/reports/82interim/House-Committee-on-Natural-Resources-Interim-Report.pdf [hereinafter 2013 Interim Report]. Thus, hydraulic fracturing has expanded to the southern and western parts of Texas, and the industry is adapting to these drier climates by decreasing its freshwater consumption, but there has still been a total increase in water use and consumption. 2012 Mining Water Use Report Update, at i–ii.

In its 2012 update, the TWDB also estimated that oil and gas fresh and brackish water *use* will continue to increase through 2020 and will plateau for most of the 2020–2030 decade at approximately 180,000 acre-feet per year, and then will slowly decrease over time to approximately 60,000 acre-feet per year by 2060. 2012 Mining Water Use Report Update, at 65. Of this, freshwater consumption by the oil and gas industry is projected to reach a maximum of approximately 100,000 acre-feet per year by 2020 and then will slowly decrease to a few tens of thousands of acre-feet by the middle of the century. 2012 Mining Water Use Report Update, at 65.

1. Oil and Gas Extraction Methods

Significant opportunities for oil production in Texas exist as drilling technology improves and if the price of oil remains high. Water use in oil exploration and extraction has historically been negligible during primary recovery operations, when drillers rely on natural pressure in a formation to extract oil. If natural pressure is insufficient to force oil to the surface, pumps may be used; and in many cases, water, steam, or gas is injected into an oil-producing formation to force the oil to the surface. These latter methods are known as secondary recovery. Another method of oil extraction involves tertiary, or enhanced oil recovery (EOR), which involves the use of chemical reactions or heat either to thin the oil so it flows more freely or to change the properties of the underground rock so the oil does not adhere to it as tightly. While EOR does consume water, the amounts are small relative to water flood and steam recovery and will therefore not be discussed further.

Water flooding is a common and water-intensive type of secondary recovery operation. Basically, the practice involves pumping water into an oil-producing reservoir to replace oil that has been removed by primary production. The water fills the void left by the extracted oil and maintains or increases reservoir pressure enough to extract some of the remaining oil. A 2009 study found that, nationally, around 75 percent of onshore crude oil was extracted using water flooding; however, this was before the rapid expansion in the use of hydraulic fracturing for oil extraction. *See* M. Wu et al., Center for Transportation Research, Argonne National Laboratory, *Consumptive Water Use in the Production of Ethanol and Petroleum Gasoline* 38, fig. 26 (2009), *available at* www.transportation.anl.gov/pdfs/AF/557.pdf [hereinafter *Consumptive Water Use*].

A typical water-flood operation requires 100 percent "makeup" or new water from other sources, including groundwater or surface water supplies, during the initial operation. As well production proceeds, the amount of water produced increases and the demand for makeup water decreases simply because most operations reuse much of the water that they extract. Extracted water—often referred to as produced water—is typically a mixture of free water, oil-water emulsion, and oil and suspended solids, a combination referred to in the oil industry as BS&W (basic sediment and water). Raw production from the wellhead is piped to gathering points known as satellites. From there it is piped to a production facility or "battery," where oil is separated from the water. After final filtration, the water is reinjected into a producing formation or discharged into injection wells and evaporation ponds.

The amount of injection water required varies with the recovery technology. Primary recovery uses an average of 0.2 gallon of freshwater per gallon of crude oil recovered. *See* Peter H. Gleick, *Water and Energy*, 19 Ann. Rev. Energy Environ. 267 (1994). Secondary recovery via water flooding is more water-intensive, but water use varies with the age and characteristics of an individual well and formation. The estimated injection rate for water flooding in the United States is 8.0 gallons of water per gallon of crude extracted; in West Texas, the rate is higher—12.7 to 14.7 gallons of water per gallon of crude. *See Consumptive Water Use*, at 40. These figures are not net of produced water used for secondary recovery.

As mentioned earlier, whether occurring naturally in a formation itself or because of water injection, produced water is an inextricable part of the oil extraction process. Produced water is saline water typically pumped to the surface as part of an oil-water mixture and has a high concentration of dissolved solids. After skimming the oil off, solids are removed and the water is often reinjected for crude recovery. Basically, produced water is recycled during secondary recovery operations, and since the 1980s it has become a major source of injection water for secondary recovery. According to surveys conducted by the American Petroleum Institute, 71 percent of produced water in the United States is reinjected into reservoirs for oil recovery. *See* American Petroleum Institute, *Overview of Exploration and Production Waste Volumes and Waste Management Practices in the United States* (2000). Using produced water for secondary recovery is common in Texas, and after accounting for the portion of produced water reinjected, net water consumption rates are much lower. The national *net* rate is estimated to be 3.2 gallons of water per gallon of crude for U.S. onshore operations. *See Consumptive Water Use*, at 42.

In its 2011 study, the TWDB estimates that at least 1.3 barrels (bbl) of water are required for secondary recovery operations, such as EOR, for every barrel of oil produced. (A barrel is equal to 42 gallons, which is the typical measure in the oil and gas industry. For the majority of other industries, the typical liquid barrel size is 31.5 gallons.) *See* 2011 Mining Water Use Report, at 114. In 1995, the freshwater fraction of EOR was approximately 75 percent. 2011 Mining Water Use Report, at 114. That percentage has declined each year, and in 2010 the fraction of freshwater used in EOR was 20 percent. 2011 Mining Water Use Report, at 114.

Hydraulic fracturing, described in more detail below and in section III.2, has also become a necessary component of the development of oil resources. In Texas, this is particularly relevant in the Eagle Ford Shale play.

Regarding natural gas extraction, historically only nominal amounts of water have been used when extracting gas—primarily when drilling a well. Natural gas trapped under the earth in reservoirs is recovered by drilling a hole through impermeable rock into a reservoir; the gas is typically under pressure, allowing it to escape from a reservoir on its own. This is known as conventional natural gas. Conventional natural gas deposits have been the most practical and easiest deposits to mine. However, as conventional gas deposits have become depleted and as technology and geological knowledge advances, unconventional gas deposits are an increasingly larger percentage of the supply picture, particularly in Texas.

The definition of unconventional natural gas changes through time and from location to location. In addition, economics is a factor in determining whether a reservoir is unconventional. But basically there are six main types of unconventional gas: (1) deep gas, (2) tight gas, (3) shale gas, (4) coalbed methane, (5) geopressurized zones, and (6) ocean methane hydrates. In Texas today, shale gas is the major unconventional gas play, and it is important from the standpoint of water use.

The U.S. Energy Information Association (EIA) defines a "play" as a "set of known or postulated oil and gas accumulations sharing similar geologic, geographic, and temporal properties, such as source rock, migration pathway, timing, trapping mechanism, and hydrocarbon type." U.S. Energy Information Association, *Glossary*, www.eia.gov/tools/glossary/. In lay terms, an oil or gas play is a general geographic area containing oil and gas. Some of more well-known gas (and oil) plays in Texas are the Barnett, Haynesville, and Eagle Ford and are described in greater detail below.

Shale gas in Texas is present in geologic strata that formed from the mud of shallow seas that existed millions of years ago. Shale is a fine-grained sedimentary rock that easily breaks into thin parallel layers. It may also be very soft but does not disintegrate when it becomes wet. The properties of shale have historically made extracting gas difficult and expensive. Yet periods of high gas prices in the late 2000s and early 2010s, as well as improved technology, have allowed companies to employ a technique known as hydraulic fracturing (commonly referred to as "fracking") to tap into shale gas deposits.

Basically, fracking loosens up a formation and allows gas to escape into wells. Fracking is done by pumping a fluid—usually water with some type of high-viscosity additive—down a well at very high pressures for short periods of time. The intense pressure fractures the rock, and a propping agent (usually sand) carried by the water is pumped into the fractures to keep them from sealing when the pressure releases. When the pressure is terminated, the injected fluid travels back through the fracture to the well and up to the surface.

In the beginning of the fracking boom in Texas, depending on the type of well, drillers would use from 1.2 to 3.5 million gallons (3.7 to 10.7 acre-feet) of water in a typical hydraulic fracturing operation or "frac job." *See* James Bene et al., *Northern Trinity/Woodbine GAM—Assessment of Groundwater Use in the North Trinity Aquifer Due to Urban Growth and Barnett Shale Development* 2 (Texas Water Development Board 2007), *available at* www.twdb.texas.gov/groundwater/models/gam/trnt_n/TRNT_N_Barnett_Shale_Report.pdf. These numbers have grown as wells are refracturing and the well lengths and depths have grown, increasing associated water use, with estimates now in the range of 5 million gallons per well. *See* Jean-Philippe Nicot, et al., Bureau of Economic Geology, *Source and Fate of Hydraulic Fracturing Water in the Barnett Shale: A Historical Perspective* 9 (Jan. 2014) [hereinafter Barnett Shale Fracturing Water Study]. Operators in the Eagle Ford Shale (discussed below) have reported varying consumption numbers per well, with reports including 3.5 to 4.2 million gallons per well, 4.95 million gallons per well, and 6.1 million gallons per well. 2013 Interim Report, at 55–56.

2. Texas Oil and Gas Play Development and Water Consumption

Currently, three major oil and gas formations are under development in Texas: (1) the Barnett, (2) the Haynesville, and (3) the Eagle Ford. Water use and consumption vary as the content of the formation, the geographic location (i.e., whether water availability, or lack thereof, drives water conservation), and other site-specific requirements of the formation. The development of these plays, as well as water use and consumption data, is discussed below. While oil and gas extraction is the primary goal of developers, these plays have also been generating condensate liquids that are sold by developers for industrial, chemical, and other purposes. Of these three oil and gas plays, the Barnett Shale was the first to be developed, is the closet to population centers, and is the most heavily researched and examined.

In less than a decade, the Barnett Shale became the largest natural gas play in Texas and one of the largest in the nation. Covering parts of more than fifteen counties in north-central Texas, including portions of the Dallas–Fort Worth area, it is comparable to the oil booms of the early twentieth century. Drilling permits issued by the Texas Railroad Commission grew from 1,114 in 2004 until peaking at 4,065 in 2008. Texas Railroad Commission, *Barnett Shale Information*, www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/barnett-shale-information/ [hereinafter *Barnett Shale Information*]. In 2014, the number of permits issued by the Railroad Commission had fallen to 1,004. *Barnett Shale*

Information. It is important to note, though, that the granting of a permit does not necessarily mean that the well will be drilled. For example, in the Eagle Ford Shale, discussed below, it is estimated that only half of the wells issued permits in 2012 were ultimately drilled. *See* 2013 Interim Report, at 64.

Barnett Shale natural gas and oil production has had a similar rise and fall. The number of cubic feet of natural gas production increased rapidly from 2005 through 2012, when it peaked at 5,744 million cubic feet per day. *See Barnett Shale Information.* As of March 2015, production had dropped to 4,482 million cubic feet per day. *See Barnett Shale Information.* Oil is extracted in the Barnett Shale play, but it is less of a priority. Oil extraction peaked in 2013 at 4,672 barrels per day, which had fallen to 1,755 barrels per day as of March 2015. *See Barnett Shale Information.* This is only a fraction of the oil extracted in the Eagle Ford Shale (see below).

The total number of wells increased in the Barnett Shale from the mid-2000s onward; the amount of water use per well also increased by 60 percent, from 3 to 5 million gallons per well. Barnett Shale Fracturing Water Study, at 1. This was due to a near doubling of horizontal well lengths from approximately 2,000 feet to 3,800 feet, while water-use intensity reduced by 40 percent, from 2,000 to 1,200 gallons per foot of well length. Barnett Shale Fracturing Water Study, at 1. This means that while drilling activity peaked in 2008, water use remained relatively steady from 2009 onward, because of this extra lateral length and higher water use. *See* Barnett Shale Fracturing Water Study, at 17. Water sources in the Barnett Shale were from both fresh surface water and groundwater, with approximately 20 percent coming from groundwater and 80 percent from surface water. 2012 Mining Water Use Report Update, at 56 tbl. 8.

Water use in the Barnett Shale equaled 26,000 acre-feet in 2011, representing 32 percent of all of Texas hydraulic fracturing water use and approximately 0.2 percent of the state's 2011 water consumption. Barnett Shale Fracturing Water Study, at 1. The TWDB estimates that the amount of water used in the Barnett Shale has held relatively steady at approximately 25,000 acre-feet per year. 2012 Mining Water Use Report Update, at 11.

The Eagle Ford Shale, driven largely by oil production, followed the Barnett Shale as the next big natural gas and oil play in Texas. The bulk of activity is concentrated in south-central Texas (mainly in Karnes, Live Oak, Dewitt, and Gonzales counties) and southwest Texas (mostly in Dimmitt, LaSalle, McMullen, and Webb counties). While permit issuance and production in the Barnett Shale peaked in 2008 and 2012, respectively, development in the Eagle Ford Shale came later. In 2009, only 94 drilling permits were issued by the Railroad Commission; this number grew to 5,613 in 2014. Texas Railroad Commission, *Eagle Ford Shale Information*, www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/eagle-ford-shale/ [hereinafter *Eagle Ford Shale Information*]. While natural gas has been developed in the area (52 million cubic feet per day in 2009, rising to 5,112 million cubic feet per day in 2014), the primary focus of development has been oil extraction. *Eagle Ford Shale Information.* Oil production totaled only 843 barrels per day in 2009, but climbed to 1,072,288 barrels per day by 2014. *Eagle Ford Shale Information.* Comparatively, as mentioned above, oil production peaked in the Barnett Shale in 2013 at 4,672 barrels per day.

The TWDB estimates that water use was approximately 24,000 acre-feet per year in the Eagle Ford Shale in 2011, of which 20 percent is brackish water. 2012 Mining Water Use Report Update, at 12. Groundwater constitutes approximately 90 percent of the new water used for hydraulic fracturing in the Eagle Ford Shale, while 10 percent comes from surface water; this does not include recycling and reuse. 2012 Mining Water Use Report Update, at 56.

The TWDB has noted that while total water use may have increased, water intensity (the amount of water used per unit length of lateral or useful vertical section) decreased by roughly half from 2007 to 2011 "due to operational changes moving from high-volume slick water [hydraulic fracturing] operations to gel fracs that can carry as much proppant with much less water." 2012 Mining Water Use Report Update, at 12. Overall, though, given the growth in development activities, the TWDB believes that water use will peak in roughly 2022 at approximately 35,000 acre-feet per year and decrease after that. 2012 Mining Water Use Report Update, at 67.

Finally, activity in the Texas portion of the Haynesville Shale (located in far northeast Texas and extending into Louisiana and Arkansas) followed a similar progression of development as the Barnett Shale, though on a much smaller scale. Activity in Texas peaked in 2010, with the Railroad Commission granting 341 drilling permits; 110 permits were issued in 2014. Natural gas production peaked in 2012 at 1,298 million cubic feet per day; production slowed in 2014 to 1,001 million cubic feet per day. Texas Railroad Commission, *Haynesville/Bossier Shale Information*, www.rrc.state.tx.us/oil-gas/major-oil-gas-formations/haynesvillebossier-shale/. The TWDB predicts that future water use in Texas will peak at no higher than 12,000 acre-feet per year. 2012 Mining Water Use Report Update, at 67. The Railroad Commission does not quantify oil produced in this play.

In Texas, the amount of water used in the extraction of oil and gas is significant, and although the industry is mature and will likely decline over the next few decades, such new recovery technologies as hydraulic fracturing may require substantial amounts of water, particularly on a local or regional level. With conventional gas deposits largely depleted, unconventional gas development will continue to dominate the future of gas production for decades to come. Although unconventional gas development involves more water consumption than conventional development, it is not yet clear how much water will be consumed, given the variables that impact such predictions. Further study of this issue will be critical for Texas water policymakers as unconventional gas development continues to grow and Texas increases its reliance on these resources for both electric generation and transportation.

B. Water Use for Electric Power Generation

The generation of electricity involves the use of water. This relationship is part of the water-energy nexus that is of statewide, national, and international interest. Once again, to understand the impact of water use in electric power production, the difference between water use and water consumption in the production of electricity must be recognized. When water is consumed, the water is prevented from being available for another use (e.g., irrigation). In contrast, when water is used, it can be reused quickly or after treatment. For example, most of the water used for cooling in thermal power generation is reintroduced into its water source and therefore constitutes a nonconsumptive use.

Thermoelectric power is generated from fuels such as coal, uranium, and natural gas. In Texas, thermoelectric plants produce most of the electricity, and water-based cooling systems are a critical component of these plants. Because of its high heat capacity, availability, low relative cost, and reusability, water is the cooling medium of choice.

The difference between consumptive water use and nonconsumptive water use, as in water that has been diverted for thermoelectric generation, is considerable. For example, in 2010, the U.S. Geological Survey reported that the total annual surface freshwater diversion for thermoelectric generation in Texas was an estimated 11.7 million acre-feet. *See* Molly A. Maupin et al., *Estimated Use of Water in the United States in 2010*, U.S. Geological Survey Circular 1405 11, 40 (2014), *available at* http://pubs.usgs.gov/circ/1405/pdf/circ1405.pdf (noting that over 99 percent of all water used for thermoelectric generation is from surface water sources). For the same period, the TWDB estimated that the consumptive use of water for this purpose was 416,334 acre-feet. *See* Texas Water Development Board, *Water Use Survey*, www.twdb.texas.gov/waterplanning/waterusesurvey/index.asp [hereinafter *Water Use Survey*]. Comparing these two estimates makes it clear that much of the surface water diverted for thermoelectric generation is returned, after use, to the surface water source, which is typically a cooling reservoir. At the same time, Texas generated approximately 420,000,000 megawatt-hours of electricity. U.S. Energy Information Administration, *Electricity, Detailed State Data, Net Generation by State by Type of Producer by Energy Source*, www.eia.gov/electricity/data/state/.

On average, about 0.39 gallon of water is consumed for every kilowatt hour of electricity generated; however, this amount can vary considerably depending on the type of generator, cooling technology, and climatic conditions. *See Water Demand Projections*, at xi. The water use rates shown in Table 1 represent "default" values, meaning that they represent water consumption under normal climatic conditions. During abnormally cool and wet periods or hot and dry periods, water use will deviate from typical values, especially during drought when cooling demands spike because of high temperatures and high electricity demand. Rates for steam turbines fueled with coal or natural gas range from 0.35 to 0.70 gallon per kilowatt hour, and nuclear steam turbines consume an average of 0.60 gallon per kilowatt hour. Natural gas combined-cycle units equipped with cooling towers use 0.23 gallon, and gas turbines consume 0.05 gallon per kilowatt hour. *Water Demand Projections*, at 25.

Table 1: TWDB Default Water Consumption Rates, by Fuel/Technology

Fuel	Prime mover	Once-through or cooling tower	Water consumption rate (gal/kWh)
Natural gas	Combined cycle	Cooling tower	0.23
Natural gas	Gas turbine	Cooling tower	0.05
Natural gas	Steam turbine	Cooling tower	0.70
Natural gas	Combined cycle	Once-through	0.23
Natural gas	Gas turbine	Once-through	0.05
Natural gas	Steam turbine	Once-through	0.35
Coal	Steam turbine	Cooling tower	0.60
Coal	Steam turbine	Once-through	0.35
Nuclear	Steam turbine	Any	0.60

Source: Carey King et al., Bureau of Economic Geology, *Water Demand Projections for Power Generation in Texas* 25 tbl. 1.5 (Texas Water Development Board 2008).

The wide range for coal and natural gas steam turbines (0.35 to 0.70 gallons per kilowatt hour) is the result of the different types of cooling systems (closed-loop versus open-loop systems). Open-loop systems consume less water because cooling occurs by evaporation (described as "forced evaporation") and by other means. *See* Brian L. Sledge & W. Greg Carter, *Power Generation for Water Use in Texas for the Years 2000 through 2060* (Texas Water Development Board 2003), *available at* www.twdb.texas.gov/publications/reports/contracted_reports/doc/2001483396.pdf. Sometimes referred to as "once through" cooling, open-loop systems circulate water through a facility once and then discharge it back into a water source, which acts as a heat sink. Closed-loop systems are generally equipped with cooling towers that recirculate water and do not discharge most of it back into a water source. Cooling occurs by direct evaporation of the water in the cooling tower. A small portion of the water in the cooling tower system must be discharged to a water body to maintain an acceptable level of dissolved solids in the water. Rates of consumption are therefore higher in closed-loop systems.

Currently, the use of dry cooling technology, which uses air as a cooling medium, is uncommon in Texas—only two power plants have dry cooling systems as of 2012. *See* Viability of Cooling Technologies in Texas, at 2-5. Dry cooling in Texas is also not likely to see a large increase in future use, because it is less efficient than water cooling and often requires higher capital and operating costs. *See* Viability of Cooling Technologies in Texas, at 2-6.

Water use and consumption data discussed above do not include the water used or consumed during the production of the gas, coal, lignite, or uranium necessary to generate the thermal energy depended on in thermoelectric power generation. As noted in section III.A above, the TWDB has separately analyzed and provided data on water use and consumption relating to energy extraction and water required for other mined minerals in Texas (e.g., industrial minerals, clay, and aggregates). *See* 2011 Mining Water Use Report; 2012 Mining Water Use Report Update.

While water use and consumption are important measures in ascertaining electric generation's impact on water supplies in the state, since the vast majority of Texas's electric generation is cooled by surface water, water availability for this generation is of significant importance in maintaining electric reliability in Texas. Interest in this topic increased after the summer of 2011, when there were concerns about the potential loss of electric generation availability due to a significant drought and reduced cooling water capacity in power plant reservoirs.

Following the drought of 2011, multiple studies were commissioned to assess the impact of the drought on electric generation in the state. A report by the University of Texas found that elevated temperatures resulted in a statewide demand for electricity increase by 6 percent and increased water demands and consumption for electricity by 9 percent. Bridget R. Scanlon et al., Bureau of Economic Geology, *Drought and the Water-Energy Nexus in Texas*, Environ. Res. Lett. 8, 5 (Dec. 20, 2013). In addition, reservoir storage dropped by 30 percent, which would suggest drought vulnerability. Scanlon et al., at 12. However, Texas's power plants "were flexible enough at the plant level" to adapt and adopt less water-intensive technologies that ensured continued operation. Scanlon et al., at 1.

The Electric Reliability Council of Texas (ERCOT) commissioned studies to assess the vulnerability of Texas power plant reservoirs (and hence the ERCOT-operated grid) to future drought. The reports, prepared in 2012 and 2013, concluded that single-year droughts like that of 2011 do not appear to impact generation capacity because of storage improvements, but multiyear droughts are expected to affect capacity as a result of water supply availability and temperature effects for cooling. *See* Black & Veatch, *Water Use and Availability in the ERCOT Region* (July 11, 2013), *available at* www.ercot.com/content/committees/other/lts/keydocs/2013/ERCOT_Water_Use_and_Availablility_-_DrtRpt_1DF.pdf; Black & Veatch, *Drought in the ERCOT Region* (Oct. 12, 2012), *available at* www.ercot.com/content/meetings/rpg/keydocs/2012/1012/Drought_RPG_101212.pdf. The studies used historical rainfall projections through 2035 based on the presupposition that future climate variations are a repeat of climate over the period 1900 to 2012.

The ability of power generators to provide electricity during drought conditions may be further complicated by recent court decisions—specifically, challenges to the Texas Commission on Environmental Quality's (TCEQ) ability to suspend and adjust water rights in nonwatermaster areas under Texas Water Code section 11.053. Under this section and TCEQ-developed rules, the TCEQ has issued several curtailment and adjustment orders. In certain instances, the TCEQ had exempted municipal and power generation rights from curtailment.

The TCEQ's implementation of the rules, and these exemptions from curtailment, were subject to a lawsuit by the Texas Farm Bureau and others. The case began in late 2012, when Dow Chemical Company notified the TCEQ that it was making a "priority call" on water rights holders on the Brazos River, which in essence meant that Dow was requesting the TCEQ to curtail water withdrawals from junior water right holders. The TCEQ did this, but exempted municipal water suppliers and water used for electric power generation. A Texas district court ruled in June 2013 that the TCEQ exceeded its statutory authority by exempting these municipal and power generation water rights from curtailment, as the TCEQ did not properly respect the doctrine of prior appropriation, and that the exemption of these water rights was not authorized by the TCEQ's police powers. This decision was affirmed by the thirteenth court of appeals in April 2015. *See generally Texas Commission on Environmental Quality v. Texas Farm Bureau*, 460 S.W.3d 264 (Tex. App.—Corpus Christi 2015, pet. filed). This decision has been appealed to the Texas Supreme Court and, depending on how the court rules, could significantly affect the ability of the TCEQ to selectively curtail (and exempt from curtailment) water rights and to ensure adequate water supply for certain power generators. A more extensive discussion of the *Farm Bureau* case and the ability of the TCEQ to curtail water use can be found in Chapter 13 of this book.

IV. Biofuels

Biofuels are renewable fuels used to power vehicles and other engines. Biofuels are derived from living matter, which can be regenerated. Thus the fuels are considered renewable. There are several types of biofuels, but the most common are ethanol and biodiesel made from animal or vegetable materials. Water consumption associated with the production of these types of fuels arises primarily from producing feedstocks, with some additional consumption resulting from converting feedstocks into fuel. As with other energy sources, water consumption varies dramatically depending on the type of biofuels being produced and the type of feedstock being used.

A. Ethanol

Ethanol (grain alcohol) is a renewable fuel used in gasoline-powered vehicles and other internal combustion engines. According to the Renewable Fuels Association, about 90 percent of ethanol in the United States is made from corn, largely because of federal subsidies. In 2014, U.S. ethanol production totaled 14.3 billion gallons (10 percent of the U.S. gasoline market) with 213 plants in operation. *See* Renewable Fuels Association, *Statistics*, www.ethanolrfa.org/pages/statistics. Most of these facilities are located in the Midwest, particularly Iowa, Nebraska, and Minnesota.

According to the DOE, depending on climate conditions, corn-based ethanol requires between 2,500 gallons and 29,000 gallons of water per million Btu of energy produced, primarily for crop irrigation. Recent research by the Argonne National Laboratory found that water used to irrigate corn for ethanol production ranged from 10 to 324 gallons for each gallon of ethanol produced. *Consumptive Water Use*, at 29. The large variation stems from differences in geography and climate. Processing or refining ethanol requires an average of 4.7 gallons of water per gallon of ethanol produced. Hosein Shapouri & Paul Gallagher, Office of Energy Policy and New Uses, U.S. Department of Agriculture, *USDA's 2002 Ethanol Cost-of-Production Survey* 14 (2005), *available at* http://ethanolrfa.3cdn.net/6dfd76a7273de6109c_uwm6bh2wy.pdf.

Ethanol production in Texas is limited compared to that of the Midwest. Currently, four facilities are operating in the Panhandle region, with a production capacity of 381 million gallons per year. *See* Renewable Fuels Association, *Biorefinery Locations*, www.ethanolrfa.org/bio-refinery-locations/. Feedstock for the facilities is primarily local and imported corn and local sorghum. Assuming 4.7 gallons of water per gallon of ethanol, if the facilities are operating at full capacity, 4,832 acre-feet per year of water is needed for these plants. If the facilities use local or regional feedstock, irrigation water requirements would be higher; however, specific data regarding the source of feedstock for the facilities are not readily available.

B. Biodiesel

Biodiesel used in diesel engines is an alternative fuel made from animal or vegetable materials. According to the EIA, the United States had an annual production capacity of 2,130 million gallons of biodiesel at the end of 2014, with a total production of 1,270 million gallons. Texas has nine biodiesel plants, with a manufacturing capacity of 315 million gallons per year. U.S. Energy Information Administration, *Monthly Biodiesel Production Report*, www.eia.gov/biofuels/biodiesel/production/.

Water is consumed during the production of fuel and from the production of feedstock used to make that fuel. The consumption of water in the production of fuel from feedstock is estimated at 4.2 gallons per million Btu. *Energy Demands on Water Resources*, at 62.

Estimating water consumption associated with feedstock production is a complicated issue, because it varies dramatically depending on a number of factors. For example, some biodiesel feedstock, such as recycled fats and oils, do not involve any water consumption. These types of feedstock, in fact, would otherwise require disposal, which might burden wastewater collection and treatment systems. A further complicating factor associated with estimating water consumption in biodiesel production is that for nonrecycled feedstock, water consumption varies dramatically depending on the type of feedstock and whether the feedstock crops require irrigation. Assumptions associated with irrigated crops are not applicable to most biodiesel feedstock, because the feedstock comes from nonirrigated crops. Additionally, oil seed crops that are grown specifically for biodiesel production are generally low-water-consuming crops (low water consumption is a primary factor in energy crop selection across the globe), such as jatropha, camolina, or algae. When biodiesel is produced from coproduct oils, such as soybean or peanut oil, where the crop produces a meal product that has its own market and, in many cases, is the primary product, not all of the crop's water consumption can be assigned to the production of biodiesel feedstock; it is not accurate to suggest that the crops would not have been grown if the coproduct oil were not used for biodiesel.

In sum, Texas produces biofuels used to power vehicles and engines. Because water is required to generate this fuel, biofuel production is part of the water-energy nexus, even though the amount of biofuel produced in Texas is fairly limited when compared to other areas of the nation or internationally. Studies of water consumption required for production of ethanol are available to Texas water and energy policymakers; however, similar data are not easily obtainable for (or applicable to) Texas biodiesel production, given the diversity of feedstocks used in Texas.

V. Energy Use for Water Resources

The extraction, treatment, and distribution of water, and the subsequent collection and treatment of wastewater, is an electricity-intensive process, using roughly 4 percent of the nation's electricity. Electric Power Research Institute, 4 *Water and Sustainability: U.S. Water Consumption for Water Supply & Treatment—The Next Half Century* 1–2 (2002) [hereinafter EPRI Water and Sustainability]. In Texas, the electricity requirement for these processes makes up 0.8 to 1.2 percent of total electricity demand. Stillwell et al., at 29. A discussion of wastewater collection and treatment is generally beyond the scope of this book, though there are limited references below.

Electricity demand for the procurement and treatment of water varies according to the particular use and treatment in segments of the population and industry. Key variables that drive electricity consumption are the location of the water source (e.g., nearby surface source vs. distant underground source), the intended use of the water (e.g., domestic drinking vs. industrial processing), the technology employed for pretreatment, and the ultimate location and type of the environmentally compliant discharge of used water. This discussion is limited to electricity demand associated with supplying water to users and related future concerns. All data are national data, with exceptions where Texas-specific information is identified.

A. Water Supply: Extraction, Treatment, and Distribution

The process of taking water from its originating source to its final use involves three primary components: extraction, treatment, and distribution. For the majority of private individuals and some industries, this process is entirely controlled and handled by public water supply systems, also referred to in studies as public water supply agencies. For rural users of water and particularly those that are nonindividual users—commercial, industrial, farming, and the power generation industries—the process is controlled by the end users themselves. This is referred to as self-supply or end-user self-supply.

As shown in Table 2 below, most water demand is for agricultural irrigation and power generation, and the water for these sectors is self-supplied. Public water supply agencies are the primary source of water for domestic use, meeting approximately 85 percent of total domestic demand. EPRI Water and Sustainability, at 4-1, 4-4. In contrast, these public agencies meet only about 20 percent of industrial water demand and provide very little to no water for the purposes of agricultural irrigation, livestock, mining, and electric power generation.

Table 2: Source and Use of Freshwater in the United States, 2010 (Million Gallons Per Day)

Sector	Surface water	Groundwater	Total (data are rounded)
Public supply	26,300	15,700	42,000
Domestic	64	3,540	3,600
Irrigation	65,900	49,500	115,000
Livestock	797	1,200	2,000
Aquaculture	7,610	1,820	9,420
Industrial	12,100	2,900	15,000
Mining	1,130	1,120	2,250
Power generation	116,000	587	117,000
Total U.S.	**230,000**	**76,000**	**306,000**

Source: U.S. Geological Survey, *Source and Use of Freshwater in the United States*, http://water.usgs.gov/edu/wateruse-diagrams.html. (Last modified: Dec. 23, 2014).

The amount of electricity required to treat water depends on the whether the water is publicly or privately provided and on the ultimate industry use. A comparison of nationwide electricity consumption for water supply and treatment is provided in Table 3 below.

Table 3: Summary of Nationwide Electricity Consumption Projections for Water Supply and Wastewater Treatment

Year	2000	2005	2010	2015	2020	2050
Public Supply and Treatment—Million kWh						
Public water supply	30,632	31,910	33,240	34,648	36,079	45,660
Publicly owned treatment works	21,006	24,512	24,895	25,277	26,039	29,820
Private Supply and Treatment—Million kWh						
Domestic supply	894	930	965	1,001	1,038	1,274
Commercial supply	476	499	525	553	581	780

Industrial supply	3,341	3,793	4,236	4,731	5,284	10,255
Mining supply	490	509	528	548	569	713
Irrigation supply	23,607	25,639	27,909	30,453	33,314	60,646
Livestock supply	992	1,047	1,095	1,144	1,192	1,510
Privately operated waste-water treatment (see note)	42,012	49,025	49,790	50,555	52,078	59,641
Total electricity	**123,450**	**137,864**	**143,182**	**148,910**	**156,174**	**210,299**

Source: EPRI Water and Sustainability, at 1-5 tbl. 1-2, including the note that "[i]t was not possible to make electricity consumption projections for privately operated wastewater treatment facilities. . . . The figure shown here is a surrogate representing twice the electricity consumption of POTWs. This estimate was used because there are about 50 percent more privately operated wastewater treatment facilities in the U.S. as POTWs, and their unit electricity consumption is estimated to be about 50 percent greater than that of POTWs because of loss of economies of scale and different treatment regimens."

1. Electricity Demands for Public Water Supply Agency Extraction, Treatment, and Distribution

Turning to the electricity demands associated with supplying water, public water supply agencies are the greatest consumers of electricity, accounting for nearly half of total electricity consumption used to supply water. EPRI Water and Sustainability, at 1-5. Although public water supply agencies consume nearly 50 percent of all the electricity used to supply water, they account for far less than 50 percent of the water supplied. This higher electricity consumption is driven by the nature of supplying water to the public, which includes additional costs for water quality treatment and distribution (e.g., long-distance pumping), which self-suppliers like mining or agriculture do not have. For every million gallons of water consumed, a public water supply agency will expend, on average, 1,406 kWh for surface water and 1,824 kWh for groundwater. EPRI Water and Sustainability, at 1-4. In comparison, end-user self-suppliers will typically expend 300 kWh per million gallons for surface water and 700–800 kWh for groundwater. EPRI Water and Sustainability, at 1-4. With regard to public water supply agencies, electricity consumption rates are fairly constant across all sizes of supply facilities, reducing or eliminating the effect of economies of scale. *See* EPRI Water and Sustainability, at 2-3. In Texas, public water supply systems consume an estimated 2.1 to 2.7 terawatt-hours of electricity per year (TWh/yr). This is roughly 0.5 to 0.7 percent of the total electricity used in the state. Stillwell et al., at 28.

Depending on the location of the water supply for a particular community, there are many variables that may affect the amount of electricity consumed by the public water supply agency. For example, extracting groundwater, on average, is 30 percent more electricity-intensive than extracting surface water. EPRI Water and Sustainability, at 1-2. Additionally, the depth of the groundwater will directly influence extraction costs. Pumping water from a 120-foot well requires 540 kWh/Mgal; a 400-foot well requires 2,000 kWh/Mgal. Stillwell et al., at 20. Given that the average groundwater depth in Texas is nearly 700 feet, electricity consumption in obtaining groundwater sources is likely higher in Texas. Stillwell et al., at 20.

In addition to the energy costs associated with a public water supply agency's extraction of water from wells and surface waters, there are also significant energy costs for water distribution and delivery. On average, for a public water supply agency relying on surface water sources, pumping costs represent 80 to 85 percent of electricity consumption. EPRI Water and Sustainability, at 2-2. However, this may vary. For instance, for arid communities piping water long distances, for pumping water supplies from lower elevations to higher elevations (rather than relying on gravity), or for centralized public water supply agencies that must use a pump to distribute the water to their users, electricity consumption due to distribution can dramatically increase. In California, for example, electricity use ranges from 1,330 kWh/Mgal to 9,930 kWh/Mgal, depending on elevation and distance. *See* California Energy Commission, *California's Water-Energy Relationship, Final Statement Report* (2005), *available at* www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF.

In Texas, the greatest concentration of public water supply agencies permitted for surface water use are in the central and northeast portions of the state. *See* Stillwell et al., at 28 fig. 3.3. This reliance on surface water mirrors both population densities and available surface water supplies, as the rainfall totals increase from west to east across the state and there are more available surface water bodies.

Public water supply agencies must comply with the Safe Drinking Water Act (codified at 42 U.S.C. §§ 300f–300j), which generally requires the supplied water to first be treated. The electricity consumption for treatment, however, varies depending on the quality and location of the water. Treatment of surface water will typically consume more electricity than treatment of groundwater, because groundwater generally has fewer contaminants to remove due to natural purification.

The treatment process for surface water typically includes (1) screening raw water to remove debris; (2) preoxidation with chlorine or ozone to kill bacteria and other organisms; (3) addition of alum or polymeric materials to aid in flocculation and coagulation; (4) flocculation (clarification of water, removal of turbidity); and (5) another round of disinfection to kill any remaining organisms. EPRI Water and Sustainability, at 2-1. Despite all of these processes, the treatment phase of providing water typically does not exceed 15 percent of a public water supply agency's total electricity use. Stillwell et al., at 23. In comparison, the treatment required for groundwater sources may be limited to chlorination, which requires minimal electricity. EPRI Water and Sustainability, at 2-3.

If the water source is not freshwater, additional electricity is needed for treatment. The amount of electricity needed to treat brackish groundwater or for water desalination can, in some cases, exceed the amount needed for extraction and distribution combined. For instance, looking solely at the energy needed for water collection and treatment, which does not include distribution, surface water and groundwater require 220 kWh/Mgal and 620 kWh/Mgal, respectively. In comparison, electricity demands for collecting and treating brackish groundwater climb to 3,900–9,700 kWh/Mgal. For water desalination, electricity demands grow even higher, to 9,700–16,500 kWh/Mgal. Stillwell et al., at 22.

Despite high energy demands and the associated costs for desalination of brackish and seawater, as of 2013 there were forty-six municipal desalination facilities in Texas. Twelve of these facilities treat brackish surface water, for a total design capacity of 50 million gallons per day. The remaining thirty-four facilities treat brackish groundwater, for a total design capacity of 73 million gallons per day. The largest facility is the Kay Bailey Hutchison Desalination Plant in El Paso, with a design capacity of 27.5 million gallons per day. Texas Water Development Board, *Water for Texas, Desalination: Brackish Groundwater*, *available at* www.twdb.state.tx.us/publications/shells/Desal_Brackish.pdf. In addition to municipal supplies, industrial desalination capacity is estimated to be about 60 to 100 million gallons per day. *See* Texas Water Development Board, *Desalination Facts*, www.twdb.state.tx.us/innovativewater/desal/facts.asp. A saltwater desalination facility has yet to be constructed, though it is likely that given the higher salinity of ocean water (compared to many sources of inland brackish water sources), this type of facility would have a higher electricity demand than a comparable land-based brackish water treatment plant. In addition, as more desalination facilities are constructed that rely on any source of water, total electricity demand statewide will increase.

2. *End-User Extraction, Treatment, and Distribution Electricity Demands*

End-user suppliers are those that are able to meet their water demands without public water supply agencies. End users include those individuals who are supplying their own water for domestic purposes, but the vast majority of end-user water consumption, and therefore electricity consumption, is in the industrial, mining, thermal power generation, livestock, and, particularly, agricultural irrigation sectors, as shown in Table 3 above. Eighty percent of industrial and mining water comes from self-suppliers, and all agricultural irrigation and livestock uses, and virtually all water demands for power generation, are met through self-suppliers. EPRI Water and Sustainability, at 4-8.

In general, end-user suppliers use less electricity per million gallons of water supplied than do public water supply agencies. End-user suppliers use an average of 300 kWh/Mgal for surface water and 700–800 kWh/Mgal for groundwater. Compare this to electricity consumption for public suppliers, which is 1,406 kWh/Mgal for surface water and 1,824 kWh/Mgal for groundwater. EPRI Water and Sustainability, at 1-4. Lower electricity requirements for end-user self-suppliers, as opposed to public water suppliers, are directly related to there being far fewer obstacles in obtaining water. Extraction is often limited to bringing water to the surface using smaller, less complicated pumps. *See* EPRI Water and Sustainability, at ch. 4. Distribution is often over much shorter distances and is gravity assisted, because extracted water is generally stored nearby in elevated storage tanks. Treatment costs are either low or nonexistent, as most end-users either do not require treatment or, as is the case for domestic use, are supplied by groundwater sources that do not require extensive treatment.

B. Future Water Supply Electricity Use

Demand for electricity to supply water will likely increase at a rate similar to the rate of population increase. EPRI Water and Sustainability, at 1-2. As demonstrated in Table 4 below, excluding agricultural irrigation and industrial supply, which are expected to more than double by 2050, overall electricity consumption related to water supply is expected to grow by approximately 50 percent in the United States. EPRI Water and Sustainability, at 1-2. The amount of electricity required to obtain a water supply for thermoelectric generation will likely remain flat as new technologies drive down water consumption. EPRI Water and Sustainability, at 1-2. The population in Texas was 25,145,561 in 2010 and is predicted to be 46 million by 2060. *See* U.S. Census Bureau, *2010 Census Data*, www.census.gov/2010census/data/. *See also* 2012 State Water Plan, at 130. Recognizing that there are numerous distinctions between U.S. and Texas uses of water, if the demand for electricity rises at the same rate in Texas, Texas electricity consumption for water will increase by roughly 83 percent by 2060.

Table 4: Electricity Consumption Projections for Supply

Water supply	**2010 (million kWh)**	**2050 (million kWh)**
Public	33,240	45,660
Domestic	965	1,274
Commercial	525	780
Industrial	4,236	10,255
Mining	528	713
Irrigation	27,909	60,646
Livestock	1,095	1,510
Total	**68,498**	**120,838**

Source: EPRI Water and Sustainability, at 1-5.

Despite the predicted growth in electricity consumption, many factors could increase or decrease the amount of electricity consumed by public water supply agencies. Long-haul transfer of water over great distances may become a necessity as rapidly growing populations, particularly in southwestern states like Texas, demand greater access to water. Alternative technologies may be required to obtain and treat lower-quality water, which, as discussed above, would increase electricity consumption. As water delivery and treatment systems age, friction and breakdowns within systems may result in higher consumption of electricity to move water. Replacement of existing facilities would likely lower electricity consumption. However, overall greater demand and more stringent regulations for treating drinking water will likely increase electricity costs. EPRI Water and Sustainability, at 1-2.

VI. The Water-Energy Nexus in the Future

Going forward, federal, state, and local governments, as well private users of water and electricity, will have to consider ways to address the water-energy nexus. This will include policy decisions affecting the use and consumption of these resources, as well as the practical limitations on the availability of water as a resource and complications with meeting growing electricity demands. These considerations are discussed below.

A. Water and Energy Policy

The nature of the interconnections between energy and water policy means that any energy policy will impact water supply, and vice versa. According to a joint report prepared by the University of Texas at Austin and the Environmental Defense Fund, *Energy-Water Nexus in Texas*, the impact of current long-term energy policy in the United States on projected water demand is mixed. Stillwell et al., at 36. Both the Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594, and the Energy Independence and Security Act of 2007, Pub. L. No. 110-140, 121 Stat. 1492, created incentives and market adjustments to favor the development of domestic sources of energy, such as domestically produced fossil fuels, renewable energy, nuclear energy, and unconventional transportation fuels. Stillwell et al., at 36. Current energy policy is resulting in the expansion of all forms of domestically produced energy, which may increase or decrease water demands, depending on the mix of technologies being deployed.

With the exception of natural gas peaking turbines, which do not require water cooling and are typically used during peak electricity demand, domestically produced nonrenewable energy, such as nuclear, coal, and natural gas, consumes water for energy production. On the other hand, wind and solar photovoltaic energy production use virtually no water to produce electricity. Increased adoption of these technologies would decrease water consumption for electricity production. Stillwell et al., at 37. Some renewable energy technologies do consume water. For instance, concentrated solar power systems use thermal energy by applying mirrors or lenses to concentrate solar energy on a heat exchanger to generate steam, which is then piped to a steam turbine that then uses the generated heat to create electricity; this requires the use of a cooling technology. However, solar development currently appears to be favoring photovoltaic solar, such as solar panels, which may limit the growth in use and development of concentrated solar power systems.

There has been much debate regarding the regulation of carbon dioxide emissions in the United States with the recent finalization of the "Clean Power Plan" to limit carbon dioxide emissions from the United States' fossil-fueled electric generation fleet. The impact of the rule would likely have a mixed impact on water demand because of the mix of technologies that would be incentivized under such a system. Therefore, it is difficult to predict the mix of water-consumptive and non-water-consumptive technologies that would ultimately be constructed in response to this rule.

Nuclear is one of the most water-consumptive energy technologies, and some suggest that nuclear is not likely to adopt dry cooling systems. Stillwell et al., at 37. However, in light of the Fukushima Daiichi nuclear disaster, the future of the next generation of nuclear power generation in the United States is less certain. For example, the German government announced on May 30, 2011, its plans to shut down all seventeen of its nuclear reactors by 2022. *See* Judy Dempsey & Jack Ewing, *In Reversal, Germany Announces Plans to Close All Nuclear Plants by 2022*, *New York Times*, May 31, 2011, at A4. Nuclear power represents 23 percent of German electricity production. The United States has not made a similar move to shut down its reactors, but if nuclear energy does not keep pace with the development of renewable technologies for any reason, water consumption in the power sector will decrease accordingly.

A report issued in 2012 by the United States Government Accountability Office, GAO-12-880, found that energy and water planning are generally "stove-piped," with decisions about one resource made without considering impacts on the other resource. *See* United States Government Accountability Office, Energy-Water Nexus, *Coordinated Federal Approach Needed to Better Manage Energy and Water Tradeoffs* 18 (Report No. GAO-12-880, Oct. 15, 2012) [hereinafter Coordinated Federal Approach Needed], *available at* www.gao.gov/assets/650/648306.pdf. The report further identified climate change, population growth, and demographic shifts as significant uncertainties expected to exacerbate the challenges associated with managing both the supply and demand of water and energy. *See* Coordinated Federal Approach Needed, at 26. The report concluded that the Department of Energy needs to take the actions necessary to establish a program to address the water-energy nexus, with involvement from other federal agencies, as described in the Energy Policy Act of 2005. Coordinated Federal Approach Needed, at 27.

Federal legislation has been introduced in recent legislative sessions but continues to fail to pass. Recent examples include H.R. 5827, the Energy and Water Research Integration Act of 2012, that would have required the Secretary of Energy to integrate water considerations by advancing energy and water energy-efficiency technologies that meet the objectives of minimizing freshwater withdrawal and consumption, increasing water use efficiency, and using nontraditional water sources with efforts to improve the water quality from these sources. S. 1971, the Nexus of Energy and Water for Sustainability Act of 2014, was also introduced, which would have established a committee within the National Science and Technology Council to develop common federal goals regarding water-energy nexus research, development, and demonstration activities. Again, this bill failed to pass.

B. Projected Electricity Demand and Its Impact

Texas is growing at a rate of approximately 1,000 people a day. Historically, as population increases, power demand also increases. It is predicted that this trend will continue. In addition to population growth increasing demand, certain electric power generating units will also likely be retired, which would in turn reduce supply. Retirements will accelerate because of environmental rulemakings promulgated by the Environmental Protection Agency. According to ERCOT, which oversees roughly 90 percent of Texas's electricity load and a total capacity of 78,960 megawatts (MW) of electric generation capacity, this will result in 3,300 MW to 8,700 MW of generation retirements. *See* Electric Reliability Council of Texas, *Report on the Capacity, Demand, and Reserves in the ERCOT Region 7, 2016–2015* (May 2015), *available at* www.ercot.com/content/gridinfo/resource/2015/adequacy/cdr/CapacityDemandandReserveReport-May2015.pdf; Electric Reliability Council of Texas, *Quick Facts* (Jan. 2015), *available at* www.ercot.com/content/news/presentations/2015/ERCOT_Quick_Facts_12715.pdf; Electric Reliability Council of Texas, *Impacts of Environmental Regulations in the ERCOT Region* 36 (Dec. 2014), *available at* www.ercot.com/content/news/presentations/2014/Impacts%20of%20Environmental%20Regulations%20in%20the%20ERCOT%20Region.pdf.

The challenge of meeting this demand for energy is significant, and the consequences of failing to meet electricity demand are serious, including the potential for rolling blackouts. This could not only impact home and business activities, but it could also affect the extraction, treatment, and distribution of water, which relies on a consistent electricity supply.

C. Projected Water Demand and Impact

As part of the state and regional water planning process, the TWDB and regional water planning groups develop water demand projections and estimates of potential water shortages (water needs) for six distinct water use sectors: (1) steam electric power generation, (2) mining, (3) manufacturing, (4) municipalities, (5) irrigation (agricultural), and (6) livestock. Through this planning process, municipal water demands and needs are developed for most cities and utilities, and the remaining categories are estimated at the county level. 31 Tex. Admin. Code §§ 357.31, 357.33(b). Demand projections and needs are based on assuming a return of record drought conditions. This assumption is particularly important for some sectors, such as power generation water demands, because those demands tend to peak during abnormally hot and dry conditions, when demands for cooling are high. See Chapter 20 of this book for a discussion of state water planning, including the regional water planning process.

Projections for future water requirements for oil and gas extraction are aggregated into the broader category of mining, which includes water consumed for mining and processing nonfuel minerals such as aggregates (sand and gravel) and clays. Oil and gas demand projections are not currently available as a stand-alone category. Similarly, water consumption for hydraulic fracturing of gas wells is not completely captured in current water demand projections, particularly for the Eagle Ford Shale. However, as mentioned previously, the TWDB and Bureau of Economic Geology at the University of Texas at Austin have studied water use in oil and gas activity throughout the state. *See* 2011 Mining Water Use Report. The TWDB's report on water use in mining and oil and gas has recently been updated with a report specifically on hydraulic fracturing water use, which is estimated at 81,500 acre-feet. 2012 Mining Water Use Report Update, at i. The 2012 update to the oil and gas water use report notes that the growing use of water for oil and gas development because of hydraulic fracturing is somewhat offset by advances in using brackish and recycled water where possible.

Lastly, projections used in the planning process do not include water for the development of biofuels such as ethanol and biodiesel. Any water use for biofuel feedstock grown in Texas is implicitly included in the irrigation category, and it is not possible to distinguish it from other crop production.

The 2012 State Water Plan identifies 47,000 acre-feet of water needs for the mining and oil and gas industry statewide under drought conditions for 2010, for which there is no currently identified water supply strategy. This total unmet need increases to almost 85,000 acre-feet by 2060. *See* 2012 State Water Plan, at 179. These projections attempted to account for the development associated with the boom in natural gas and oil extraction that occurred in the early 2010s but have yet to be updated to reflect the actual effect of exploration and other market developments, including the 2014–2015 drop in oil prices. The 2012 State Water Plan also identifies 63,000 acre-feet of potential water shortages for the steam-electric category in 2010, increasing dramatically to more than 615,000 acre-feet by 2060. *See* 2012 State Water Plan, at 181.

VII. Conclusion

Policy and technological solutions are being sought to address the complicated nature of managing demand and resources in the water-energy nexus. Although research and analysis are ongoing and expanding regarding these issues, there are still no comprehensive state or federal policies addressing these concerns holistically.

Technological developments that may increase efficiencies on both sides of the nexus are continuing. For instance, dry cooling for gas, biomass, or coal thermal power generation reduces evaporative water loss, and higher-efficiency pumps reduce energy consumption in water distribution. But even these proposed improvements may come with their own costs. For instance, dry cooling may reduce water consumption, but it also results in reduced capacity during summer months. This is particularly problematic in Texas, with its longer and more intense summer season. Similarly, water treatment technologies are becoming more efficient, but as drinking water standards become more stringent and individuals desire more extensively treated water, these more complex technologies will ultimately result in higher electricity demands.

Meeting the interrelated demands for energy and water will require integrated action by both energy and water planners, who have historically made separate policy and growth decisions. Coordinated planning by all invested parties, including government, business, academic, and public interests, is necessary to meet the growing and complicated challenges associated with the water-energy nexus.

Statutes and Rules Cited

TEXAS

Texas Constitution

Texas Revised Civil Statutes

Texas Agriculture Code

Texas Civil Practice & Remedies Code

Texas Election Code

Texas Government Code

Texas Health & Safety Code

Texas Local Government Code

Texas Natural Resources Code

Texas Occupations Code

Texas Parks & Wildlife Code

Texas Property Code

Texas Special District Local Laws Code

Texas Tax Code

Texas Transportation Code

Texas Utilities Code

Texas Water Code

Texas Administrative Code

Texas Attorney General Opinions

UNITED STATES

United States Constitution

United States Code

Code of Federal Regulations

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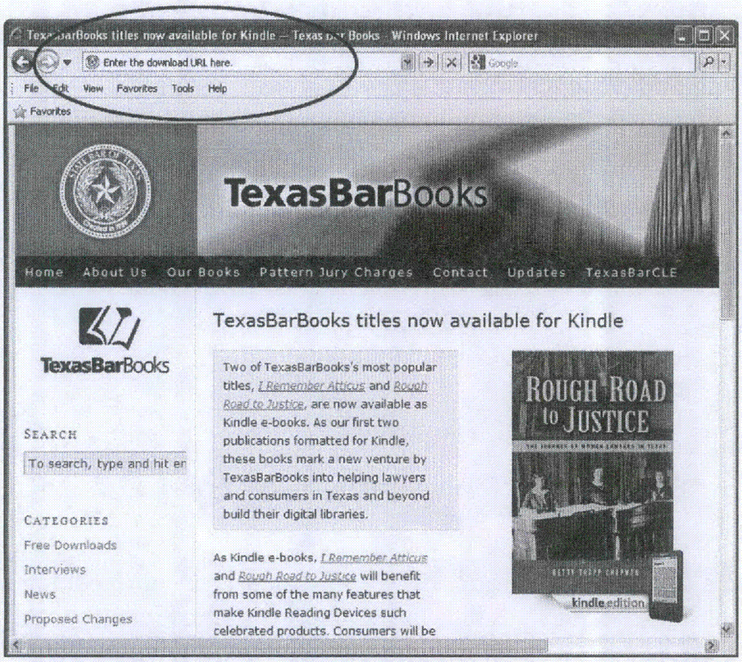

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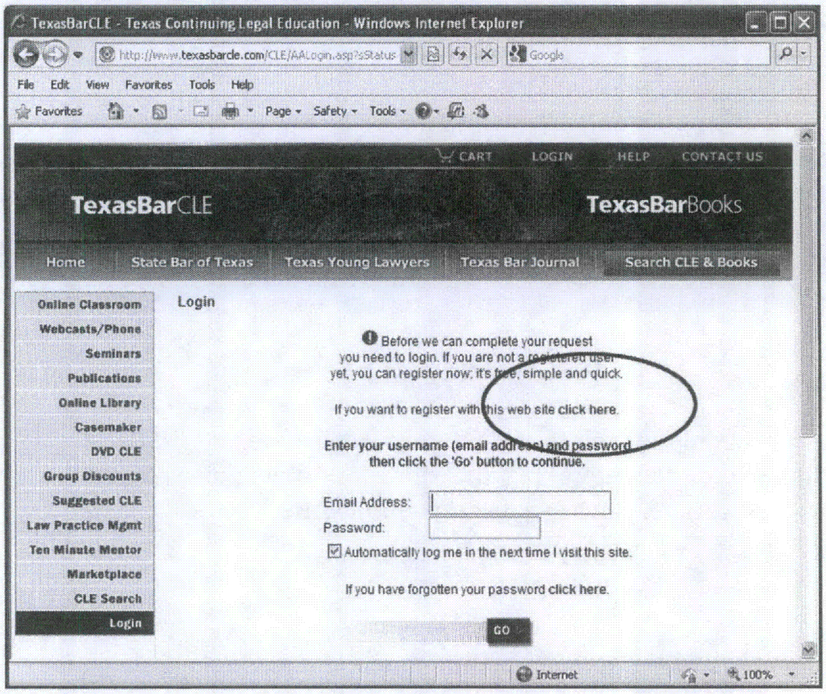

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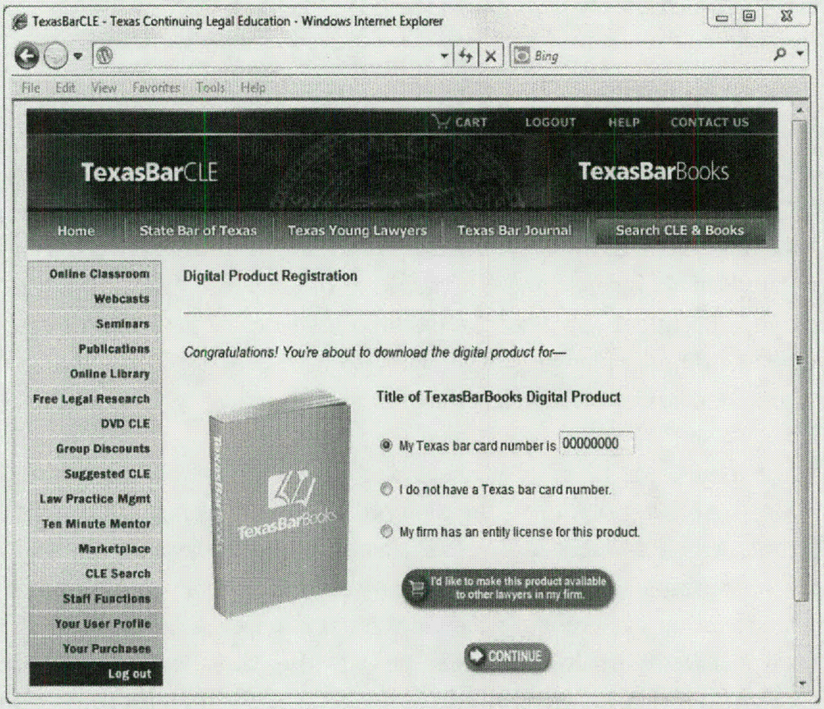

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