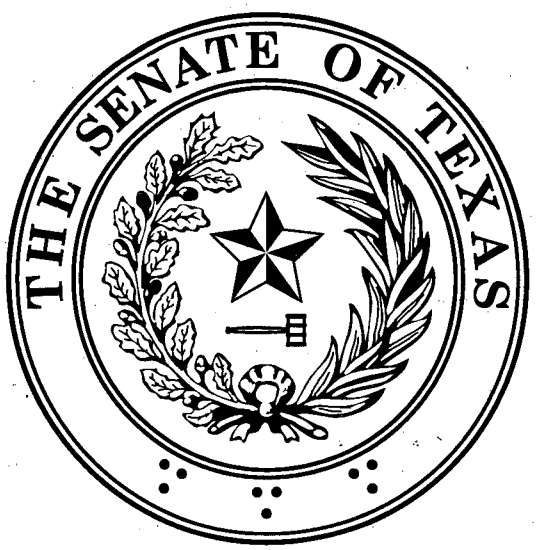
SENATE COMMITTEE
ON
WATER AND RURAL AFFAIRS



Senate Committee on Water and Rural Affairs

Senator Charles Perry, *Chairman*

Members: Senator Brandon Creighton, Vice-Chair; Senator Carol Alvarado; Senator Nathan Johnson; Senator Lois Kolkhorst; Senator José Rodríguez; Senator Larry Taylor

December 17, 2020

Dear Members and Fellow Texans:

Enclosed is the interim report for the Senate Committee on Water & Rural Affairs. The report contained is in response to Lieutenant Governor Patrick's initial interim charges issued in the fall of 2019. The direction to examine critical water, agriculture, utility, and disaster oversight was given prior to the events in the last nine months. I would like to thank Lieutenant Governor Patrick for the confidence in completing the report, to our committee members for their active engagement in drafting this report, and the stakeholders for their consistent commitment to information sharing and discussion.

We find ourselves in a different place from the committee hearing held in January 2019. Political unrest, fossil fuel industry uncertainty, and COVID-19 have contributed to an uncertain short-term future. However, the need for our work as public servants did not change. It is with this perspective that the committee submits the interim report in the hope that the challenges we face will be met and the state can move forward on ongoing state priorities.

The report looks at how to meet our future water supply needs including using new technologies, encouraging collaboration, and investing in new water resources. Texas must continue to invest in earthen dam infrastructure in the state to protect life and property as we grow. Transparency for our river authorities with their infrastructure is critical to mitigation of our resources. Private property rights must be protected in cooperation with local officials to preserve our state's aquifers.

Additionally, building on the lessons learned from Hurricane Harvey, Texas can be better prepared for what we face in the future. We must continue that way of thought that better planning will always lead to better outcomes.

Specifically, the following recommendations are detailed in the Senate Water & Rural Affairs Interim Committee Report:

- Create the Texas Produced Water Consortium with industry stakeholders to pool research and innovation in one spot. This group will create policy recommendations, share technology, and create economically viable solutions for produced water use.
- Support the repeal of burdensome federal rules which limit the growth of water reuse in the state.
- Track produced water formally rather than relying on third-hand sources.

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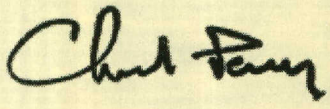
- Investigate reuse rules and regulations to utilized an already existing source of water.
- Require TCEQ to compile and publish a report each biennium detailing River Authority dam maintenance, responsibilities, and costs. The report would serve as an inventory so that decision makers and the public understand this critical infrastructure.
- Examine adding an elected member to River Authority boards in order to give the public needed input into the process.
- Encourage transparency between Groundwater Conservation Districts and users through improved notifications and rule making.
- Continue to fund flood mitigation projects and planning so that Texas can be better prepared for the next natural disaster. This includes earthen dams throughout the state.
- Clearly dictate the policy for hemp products in Texas and close the discrepancies between state and federal law.

As Chairman, I encourage all of us to remember our goals. We can set the state up for success for future generations.

In the 87th Legislative Session, I intend to introduce legislation based on the recommendations in this report. Together we can show the world the resiliency of Texas and its people.

Respectfully,



Chairman Perry

Senate Committee on Water & Rural Affairs

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Senator Charles Perry, *Chairman*

Members: Senator Brandon Creighton, Vice-Chair; Senator Carol Alvarado; Senator Nathan Johnson; Senator Lois Kolkhorst; Senator José Rodríguez; Senator Larry Taylor

December 17, 2020

The Honorable Dan Patrick
Lieutenant Governor of Texas
Members of the Texas Senate
Texas State Capitol
Austin, Texas 78701

Dear Lieutenant Governor Dan Patrick and Fellow Members:

The Senate Committee on Water and Rural Affairs of the Eighty-Sixth Legislature hereby submits its interim report including findings and recommendations for consideration by the Eighty-Seventh Legislature.

Respectfully submitted,

Senator Charles Perry, Chair

Senator Brandon Creighton, Vice-Chair

Senator Jose Rodriguez

Senator Nathan Johnson

Senator Larry Taylor

Senator Lois Kolkhorst

Senator Carol Alvarado

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Interim Charge #1

Examine current laws, processes, and water storage options and availability. Make recommendations promoting the state's water supply, storage, availability, valuation, movement, and development of new sources.

Committee Hearing Information

The Committee held a hearing on January 22, 2020 to hear testimony from invited stakeholders and the public on future water supply availability and strategies in Texas.

Invited testimony from the following persons:

- Temple McKinnon, Director, Water Use, Projections, and Planning, Texas Water Development Board
- John Dupnik, Deputy Executive Administrator, Water Science and Conservation, Texas Water Development Board
- Mark Houser, CEO, University Lands
- Richard Brantley, Senior Vice President for Operations, University Lands
- Mark Havens, Chief Clerk, General Land Office
- L'Oreal Stepney, Deputy Director, Office of Water, Texas Commission on Environmental Quality
- Emily Lindley, Commissioner, Texas Commission on Environmental Quality
- Paul Dubois, PE, Assistant Director for Technical Permitting, Oil and Gas Division, Railroad Commission of Texas

Due to the on-going COVID-19 pandemic, additional interim hearings on Interim Charge #1 were unable to be scheduled.

State Water Plan

According to the State Water Plan (SWP), the population in Texas will reach over 51 million by the year 2070.[1] The state will also see a shortage of 8.9 million acre feet per year by 2070.[2] Additionally, even if all strategies for the SWP are implemented and they perform as expected, Texas will still face a deficit of 400,000 acre feet per year in water needs.[3] Without a thorough examination of the current status of water supply in Texas, projects, and future opportunities, it would be impossible to make recommendations on what our state can do to protect ourselves from a water shortage crisis. The next drought is around the corner and we must prepare ourselves to face it.

The Texas Water Development Board (TWDB) was created as the "primary water planning and financing agency" with responsibilities in data, development of water resources, and financing

[1] Texas Water Development Board, "Interactive State Water Plan," https://texasstatewaterplan.org/statewide, (Last visited August 24, 2020).
[2] *Id.*
[3] *Id.*

water projects.[4] Beginning in 1957, TWDB planned for Texas water needs and following Senate Bill 1 from the 75th Texas Legislature, the agency began to officially release a SWP on a five year cycle.[5] Today, the TWDB provides programs and assistance in the following areas: financial assistance, the Economically Distressed Areas Program (EDAP), data collection, research and planning grants, state water planning, environmental studies, and the Texas Natural Resources Information System (TNRIS).[6]

The state is divided into 16 regional water planning groups (RWPGs) which have representation from the following categories: the public, counties, municipalities, industry, agriculture, environment, small business, electric-generating utilities, river authorities, water districts, water utilities, and groundwater management areas.[7] The RWPGs create the regional water plans which make up the State Water Plan.

The RWPGs plans must address municipal, irrigation, manufacturing, livestock, mining, and steam-electric power water usage in Texas. The plan is released every five years and includes information on rivers and streams, population data, and other related information needed to make water policy decisions in the state.[8] The current 2017 SWP contains 15 water strategy groups as listed in the following chart which includes how much of the total water supply they create.

Strategy Type	Amount (acre-ft/yr)	Strategy Type	Amount (acre-ft/yr)
Other surface water – minor reservoirs and other strategies	35% (1,193,086)	Other Conservation	2.2% (76,071)
Irrigation conservation	18.7% (638,504)	Groundwater Desalination	2.1% (70,137)
Groundwater wells & others	8.9% (303,871)	Conjunctive Use	1.4% (46,779)
Indirect reuse	6.7% (229,829)	Aquifer Storage & Recover	1.4% (46,349)
New major reservoirs	6.5% (220,375)	Direct Potable Reuse	1% (32,858)
Municipal conservation	6% (203,777)	Other	0.9% (29,671)
Other Direct Reuse	4.8% (162,663)	Seawater Desalination	0.1% (2,800)
Drought Management	4.5% (151,932)		

**Texas Water Development Board, "State Water Plan,"* https://texasstatewaterplan.org/statewide.

According to the 2017 SWP, municipal water needs will increase the most from 5.1 million acre feet per year to 8.4 million acre feet a year. This will create a 3.4 million acre feet shortage per

[4] Texas Water Development Board, "Compact with Texans," http://www.twdb.texas.gov/home/compact_texan.asp, (Last visited August 24, 2020).
[5] *Id.*
[6] *Id.*
[7] Texas Water Development Board, "Regional Water Planning Groups", http://www.twdb.texas.gov/waterplanning/rwp/faq/index.asp, (Last Visited September 3, 2020).
[8] Texas Water Development Board, "State Water Planning," http://www.twdb.texas.gov/waterplanning/swp/index.asp, (Last Visited August 24, 2020).

year by 2070 unless the strategies outlined in the plan are implemented.[9] Irrigation needs will have the largest shortage at 3.6 million acre feet per year by 2070. Even if all the water strategies outlined in the plan are completed, water needs will not be met for irrigation.[10]

TWDB will release the next SWP in 2022. The plan will utilize new growth information, implemented strategies, and innovation.

Future Water Supply Strategies

Texas has the opportunity to use innovative water strategies to combat the water shortage the state faces. From the beneficial use of produced water, coastal desalination, aquifer storage and recovery, and others, the residents of the state will increasingly rely on new technologies and scientific breakthroughs to maximize water supply for the growing population.

Produced Water

According to the American Geosciences Institute, produced water refers to the by-product of oil and gas extraction as most formations contain water. It is "naturally occurring water that comes out of the ground along with oil and gas."[11] Stakeholders throughout Texas have been utilizing this water source already and the state has an active role through regulation.

The Texas Railroad Commission (RRC) plays an integral part in the oil and gas industry's use of produced water. In 2017, there were 9.8 billion barrels of produced water and nearly 47% of that was used for enhanced oil recovery with the rest injected into the ground for disposal.[12] RRC closely monitors the disposal capacity, or number of permitted disposal wells, in the state. As of October 2020, there are 34,434 disposal wells in Texas.[13]

Nonetheless, RRC faces issues with disposal well permitting. According to staff with the RRC, the biggest hurdles are earthquakes and the volume of disposal. The agency has started applying conditions to the permits they grant such as spacing and intervals of wells along with if a well is on a fault line. There have also been more protests among nearby operators and landowners of potential disposal wells.[14]

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[9] Texas Water Development, "State Water Plan," https://texasstatewaterplan.org/statewide, (Last Visited September 3, 2020).

[10] *Id.*

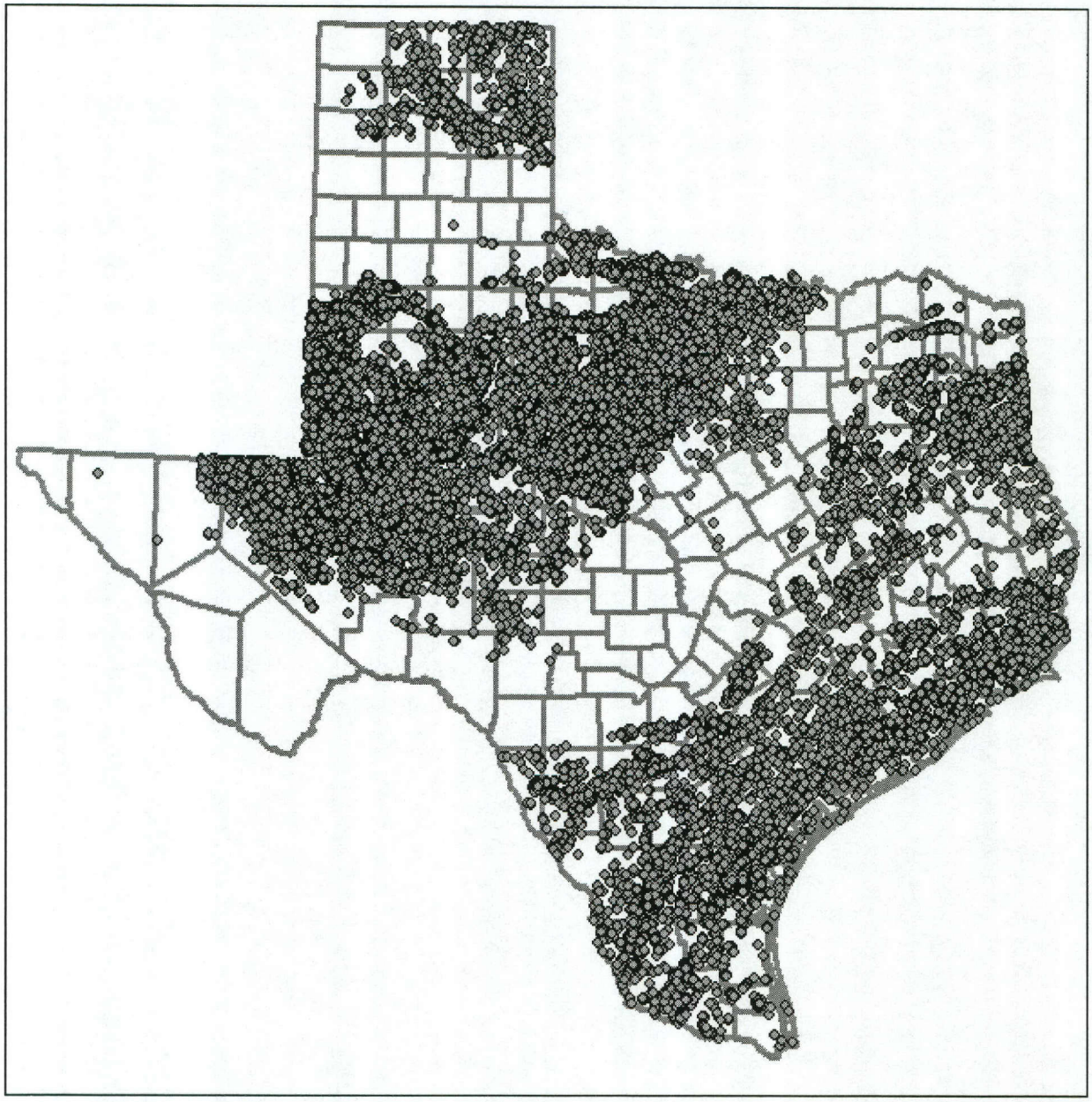
[11] American Geosciences Institute, "What is Produced Water?", https://www.americangeosciences.org/critical-issues/faq/what-produced-water, (Last Visited September 3, 2020).

[12] Meeting with Leslie Savage, Chief Geologist, Texas Railroad Commission, August 16, 2019.

[13] E-mail from Jeremy Mazur, Director of Government Relations, Texas Railroad Commission, to Katherine Thigpen, Director of Senate Committee on Water and Rural Affairs (November 16, 2020) (on file with author).

[14] Meeting with Leslie Savage, Chief Geologist, Texas Railroad Commission, August 16, 2019.

Injection Well Locations in Texas



Reprinted from the Texas Railroad Commission.

According to the RRC, there are issues with produced water including volume, treatment, solids present, dependability, and infrastructure.[15] Currently, the volume of produced water is too great

[15] *Id.*

and there are not enough places to dispose of it or use it. Additionally, treatment technologies continue to be developed and vary on their costs and quality. The produced water is often very different in each location and can have different amounts of salinity and solids. In some cases there is not a disposal system nearby for the solids created from the desalination process with produced water.[16] Water planning requires a 50-70 year timeline whereas oil and gas operations often only go a couple of years at a time which could make produced water as a water source not definite.[17] Finally, the oil and gas industry has high infrastructure costs to begin with and adding water pipes would be more costs to accrue.[18]

The Texas Commission on Environmental Quality (TCEQ) focuses on permitting and enforcement throughout the state. Up until recently, the agency was not directly involved in produced water except for if it was used for something that would require water quality standards. As produced water becomes more commonplace and integrated into the drinking water system, TCEQ's role would increase.[19] The biggest involvement currently is through House Bill 2771 which transfers discharge permit for wastewater from oil and gas operations from RRC to TCEQ. It also requires the agency to seek delegation from the Environmental Protection Agency (EPA) to issue a single permit for the discharge of waste from oil and gas instead of producers getting a separate state and federal permit.[20]

TCEQ is closely monitoring the uses of produced water. The agency is the primary regulatory arm of the state to monitor wastewater treatment plants for compliance. If the scale of reuse for produced water grows, TCEQ would monitor the quality of the water leaving a facility and the disposal of the solids produced.[21]

The Texas Water Development Board's (TWDB) involvement with produced water in Texas has largely centered on the Brackish Resources Aquifer Characterization System (BRACS). In 2015, House Bill 30 directed the TWDB to characterize the brackish aquifers in the state with designated zones. Part of the criteria included the creation of buffer zones around disposal wells.[22] Injection wells could pose a risk to future sources of drinking water that TWDB has identified as it is in or near a brackish aquifer. TWDB and RRC are working together to create a regulatory framework on the buffer zones.[23]

The current requirement for buffer zones around injection wells is a fifteen-mile radius. The radius is a conservative estimate and based on how far the injected water could travel.[24] In the 86th

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[16] *Id.*
[17] *Id.*
[18] *Id.*
[19] Meeting with David Galindo, Director of Water Quality, Texas Commission on Environmental Quality, August 16, 2019.
[20] *Id.*
[21] *Id.*
[22] Meeting with John Dupnik, Deputy Executive Administrator Water Science and Conservation; Kevin Kluge, Director Innovative Water Technologies; and Bryan McMath, Government Relations, Texas Water Development Board, August 13, 2019.
[23] *Id.*
[24] *Id.*

Legislative Session, the TWDB received funding to study the feasibility of the current buffer zones and if they could be adjusted.[25]

TWDB continues to consider produced water for future water strategy development in the state water plan. Currently, Region F in West Texas is the only regional water planning group which has had discussions about utilizing produced water as a water source.[26] There are challenges with using produced water as the buffer zones for injection make production limited due to the volume of water produced and the disposal need.[27] However, TWDB is looking at produced water as a possible contribution for ASR projects and to increase water supply throughout the state.[28]

Outside of state agency regulation, the Bureau of Economic Geology (BEG) at the University of Texas at Austin has focused studies on produced water. According to the BEG, comparisons abound between the use of produced water in Pennsylvania and Texas. However, Pennsylvania faces a different situation. There are only 11 total disposal wells in the entire state compared to the over 34,000 in Texas.[29] All of the produced water is treated and released into the river system in Pennsylvania.[30]

The State of Texas does not record where the water used in oil and gas operations is used so it is difficult to account for produced water in operations.[31] However, there is an accounting of the water injected as waste. According to the BEG, the Eagle Ford in South Texas uses groundwater because projections in the area do not facilitate the creation of a large-scale water system for recycling. The area is seeing a 60 feet per year decline in groundwater resources.[32]

Recent studies by the BEG look at the supply and demand of water resources and produced water. The BEG compared hydraulic fracture water use and produced water volumes throughout the country. The Delaware and Midland Basins in Texas had the largest amount of produced water excess.[33]

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[25] *Id.*
[26] *Id.*
[27] *Id.*
[28] *Id.*
[29] Meeting with Bridget Scanlon, Bureau of Economic Geology, July 8, 2019.
[30] *Id.*
[31] *Id.*
[32] *Id.*
[33] Bridget R. Scanlon, Svetlana Ikonnikova, Qian Yang, and Robert C. Reedy, "Will Water Issues Constrain Oil and Gas Production in the U.S.?," February 20, 2020.

United State Basin Projected Water 2009-2017

Location	Number of Wells	Hydraulic Fracture Water Use (acre feet)	Produced Water (acre feet)	Excess Produced Water (acre feet)
Delaware Basin (Texas)	207,000	8,746,330	31,916,433	23,170,103
Midland Basin (Texas)	113,000	5,953,642	8,040,486	2,086,844
Eagle Ford (Texas)	105,000	2,639,243	920,666	-1,718,577
Bakken (North Dakota & Montana)	68,700	1,350,310	2,915,443	1,565,133
Marcellus (New York & Pennsylvania)	124,000	1,779,954	4,235,065	2,455,111

Information from: Bridget R. Scanlon, Svetlana Ikonnikova, Qian Yang, and Robert C. Reedy, "Will Water Issues Constrain Oil and Gas Production in the U.S.?" February 20, 2020.

Based on the BEG study, The Eagle Ford Basin in Texas would not support a yield high enough to constitute a large-scale produced water facility. However, in the Delaware Basin, excess produced water from 2009-2017 totaled just over 23 million acre-feet.[34] The estimated projected produced water volume available in the Delaware Basin is the equivalent to Lake Meade, the largest surface water reservoir in the country.[35] The amount would also be two times the water use in Texas from 2017.[36]

In light of the 400,000-acre feet per year deficit for the state according to the State Water Plan, Texas has the potential to fill the gap with produced water as a new water strategy. Without a location for the produced water, oil and gas production may slow to account for the disposal of the wastewater.[37]

During the process to clean up the produced water, solids are produced. Salt and other chemicals must be cleaned from produced water prior to discharge or beneficial use. It is estimated that the salt byproduct from produced water volume in the Permian Basin in 2017 would be equivalent to 3,000 Olympic swimming pools.[38] Based on studies, the BEG has determined that the best use for produced water is within the industry until technology makes it more cost effective for beneficial use.[39]

The BEG continues to map the oil and gas operations in the state to show where the best places for produced water production are located. The longer the life of an oil field, the better the

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[34] *Id.*
[35] *Id.*
[36] *Id.*
[37] *Id.*
[38] Bridget R. Scanlon, Robert C. Reedy, Pei Xu, Mark Engle, J.-P. Nicot, David Yoxtheimer, Qian Yang, and Svetlana Ikonnikova, " Can We Beneficially Reuse Produced Water from Oil and Gas Extraction in the U.S.?," February 20, 2020.
[39] E-mail from Bridget Scanlon, Bureau of Economic Geology, to Katherine Thigpen, Director of Senate Committee on Water and Rural Affairs (August, 27, 2020) (on file with author).

opportunity for a wastewater recycling facility for produced water.[40] In order to begin a large-scale operation, there would need to be strong oversight from TCEQ with permit standards and monitoring. Additionally, TCEQ would need to control the quality of the produced water for re-entry into the water cycle or beneficial use.[41]

Industry on the ground, both midstream water and oil and gas companies, in the Permian Basin have utilized extensive research and innovation to find ways to avoid using injection disposal wells. According to Texas Pacific Water Resources (TPWR), there are eight zones economically producing liquids in the Permian Basin and as many as 21 or more zones with the potential for liquid production.[42] The area has seen a 300% increase from 1997 to 2012 in total liquids produced and has 52% of all active rigs in United States.[43]

Active Stratigraphic Zones

County	Basin	# Active Stratigraphic Zones
Loving	Delaware	8
Reeves	Delaware	8
Midland	Midland	7

Information from: Robert Cain, "Permian Basin Water Overview", Presentation on February 19, 2020.

TPWR has reported that with every barrel of oil produced, there are approximately 2-9 barrels of water created. In the Delaware Basin the ratio averages 4:1 and in the Midland Basin it's 2:1. As formations deplete in oil production, the amount of produced water increases.[44] An average well producing 1,000 barrels of oil per day could produce a minimum of 2,250 barrels per day of water and as much as 9,000 barrels of water per day in some formations.[45] TPWR estimates that the per day total for water production in the Permian Basin exceeds 300 million barrels monthly which is just short of 39,000 acre-feet.[46]

According to TPWR, the Permian Basin is working to evolve in the water midstream industry. [47] Large water cuts and high volume fracking design created a new demand in the basin. As the high-density fracking design grew, the need for the large volume disposal of produced water began with the beginnings of the water midstream industry in 2017. Many oil and gas producers shifted to a third party water management company.[48] Technology continued to develop which allowed for the recycling of large produced water volumes to help with declining disposal capacity.[49] In 2019, large scale fully integrated water service companies handled the majority of the water needs in the Permian Basin. These water midstream companies focused their attention on technology and

[40] Meeting with Bridget Scanlon, Bureau of Economic Geology, July 8, 2019.
[41] *Id.*
[42] Robert Cain, "Permian Basin Water Overview", Presentation on February 19, 2020.
[43] *Id.*
[44] *Id.*
[45] *Id.*
[46] *Id.*
[47] *Id.*
[48] *Id.*
[49] *Id.*

creating a more efficient system to recycle produced water, allowing the oil and gas companies to turn their focus back to oil and gas production.[50]

There have been several benefits to the use of produced water in oil and gas operations along with the technological advancements created from the water midstream companies. In some companies, recycled produced water is the only water resource used for fracking operations. Recycling programs have become more commonplace among the industry and have contributed to the reduction in the use of groundwater resources in the area.[51]

TPWR explained one of the challenges to their recycling processes was with Rule 8 with the RRC. The rule prohibits a person from using an unpermitted carrier to transport oil and gas waste including produced water.[52] The rule was amended in April 2013 to encourage water recycling in the oil and gas industry with a focus on operator-based recycling activities. The adaptations have successfully encouraged treatment and use of produced water by on-lease operators. The applications allow for "Permitted by Rule" between an operator and a midstream water company as long as the finished product from the recycled water is returned to the original operator.[53] While the Rule 8 changes benefit operator-based recycling, they have not helped outside commercial water recycling companies.[54]

The Texas Oil and Gas Association (TXOGA) membership represents over 80% of the state's crude oil and gas operators. The organization has been closely monitoring the produced water industry and the use of recycled water in oil and gas operations. According to TXOGA, the oil and gas industry has reduced the reliance on freshwater by using brackish water, wastewater, and produced water in operations.[55] Oil and gas operators are leading the way in water reuse investments and technology.[56]

Specifically, in 2019, 63% of water needed by Cimarex Energy Co. for stimulation treatment was produced water. The company uses produced water first, then brackish water, and last freshwater resources. In 2013, Fasken Oil and Ranch began recycling produced water. By 2014, they were processing 12,000 barrels per day of recycled water. Since Fasken Oil and Ranch could recycle high volumes of water, they were able to discontinue the use of freshwater from the Ogallala Aquifer. This freed up approximately 2.7 million gallons of freshwater that would have been used in oil and gas operations.[57]

TXOGA pointed out several issues that produced water usage could face when used in large volumes. First, the transportation to and from treatment facilities and to the beneficial use location lacks infrastructure and logistics.[58] There is a need for a central location for the produced water to

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[50] *Id.*
[51] *Id.*
[52] Texas Railroad Commission, https://www.rrc.state.tx.us/oil-gas/applications-and-permits/environmental-permit-types-information/swr8-summary/, (Last Visited September 8, 2020).
[53] Texas Pacific Water Resources and Texas Pacific Land Trust, Background information as requested, August 2020.
[54] *Id.*
[55] Todd Staples, Letter to Chairman Charles Perry, (on file with author), August 21, 2020.
[56] *Id.*
[57] *Id.*
[58] *Id.*

collect before it is transported.[59] One way to avoid the need for large-scale transport projects is to utilizing aquifer storage and recovery or water banking.[60] The cost benefit for operators depends on the supply of produced water, predictability, and condition when comparing to other water resource supplies. While there are many gaps as research catches up on produced water, there is still work to be done to understand produced water at a beneficial use level.[61] Research and technology is advancing at a rapid pace and could fill in the gaps and propel produced water forward as a new reliable water source.[62]

The Texas Alliance of Energy Producers (TAEP) has over 2,600 members in 30 states and over 300 member cities. The organization represents the exploration and production segment of the industry.[63] The organization has seen considerable growth in their role with future water supply, specifically produced water. TAEP produced a white paper with the Independent Petroleum Association of America in 2019. It explored produced water management, technology, and regulatory framework, in addition to making recommendations.[64]

TAEP acknowledges that produced water has generally been disposed in injections wells. However, with the growth in hydraulic fracture wells, the demand for water has greatly increased.[65] Estimated statewide volume of produced water was more than 8.5 billion barrels in 2017 with projections showing over 15 billion per year of produced water.[66] Technology is continuing to catch up to the volumes.[67]

The white paper produced by TAEP in coordination with the Independent Petroleum Association of America, discussed issues related to the EPA 98th Meridian rule, preservation of classifications which will benefit production, roadmap to beneficial use, water quality standards, and what incentives would be available.[68] Projections for production show produced water volume steadily increasing.[69]

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[59] Meeting with Kerry Harpole, Chair TXOGA Water Committee and Water Management Advisor for Marathon Oil; Cory Pomeroy, TXOGA VP and General Counsel; Tulsi Oberbeck, TXOGA Director of Government and Regulatory Affairs; and CJ Tredway, Water for TXOGA, July 8, 2019.
[60] *Id.*
[61] Todd Staples, Texas Oil and Gas Association, Letter to Chairman Charles Perry, (on file with author), August 21, 2020.
[62] *Id.*
[63] Jason Madglin, Texas Alliance of Energy Producers Letter to Chairman Charles Perry, (on file with author), August 6, 2020.
[64] *Id.*
[65] *Id.*
[66] *Id.*
[67] *Id.*
[68] Blyte Lyons, John Tintera, Kylie Wright, "Sustainable Produced Water Policy, Regulatory Framework, and Natural Gas Industry: 2019 and Beyond," September 16, 2019.
[69] *Id.*

Produced Water Projections 2019-2024

Year	Million Barrels per Year	Acre Feet per Year
2019	7,090	913,853
2020	7,400	953,809
2021	7,670	988,610
2022	7,990	1,029,856
2023	8,240	1,062,080
2024	8,510	1,096,881

Information from: Blyte Lyons, John Tintera, Kylie Wright, "Sustainable Produced Water Policy, Regulatory Framework, and Natural Gas Industry: 2019 and Beyond," September 16, 2019.

British Petroleum (BP) began to look at uses for produced water in East Texas before finding opportunities in West Texas. According to the company, they have approximately 11 barrels of water for every 1 barrel of oil equivalent.[70] Because of the excess, BP must move the water out of East Texas due to the limited injection wells in the region, no opportunity for aquifer storage and recovery, and a lack of interest in purchase of the produced water.[71] Additionally, Louisiana sends produced water to BP to dispose of as there is little opportunity there for injection.[72]

British Petroleum is interested in produced water technology for a beneficial use as opposed to disposal. The biggest hurdle has been the cost as it is less expensive to move the produced water to areas where injection wells are available.[73] The company has faced hurdles while exploring produced water use and move away from relying on disposal for the oil and gas waste. The first is the EPA permitting process, which will be streamlined into one permit at TCEQ.[74] Additionally, the company continues to struggle with water ownership issues related to produced water once it has been cleaned up.[75]

Desalination

The desalination process refers to removing dissolved salts from water using either thermal or membrane technology.[76]

El Paso, Texas is home to the world's largest inland desalination plant. The Kay Bailey Hutchinson (KBH) Desalination Plant utilizes brackish groundwater to supply freshwater to the surrounding area.[77] The plant can produce up to 27.5 million gallons of freshwater daily. The Hueco Bolson Aquifer uses 16 production wells and 16 blend wells with pre-treatment of sand strainers, cartridge

[70] Meeting with Paula Barnett, British Petroleum, July 30, 2019.
[71] *Id.*
[72] *Id.*
[73] *Id.*
[74] *Id.*
[75] *Id.*
[76] Texas Water Development Board, "Desalination FAQs," https://www.twdb.texas.gov/innovativewater/desal/faq.asp, (Last Visited September 8, 2020).
[77] El Paso Water, "Desalination," https://www.epwater.org/our_water/water_resources/desalination, (Last Visited September 8, 2020).

filters, and anti-scalant. The plant uses five reverse osmosis trains with each train designed to produce three million gallons per day.[78]

The KBH Desalination Plant disposes of the concentrate waste to a surface injection facility which uses a deep well injection in formations 22 miles northeast of the plant. The plant intends to expand in the coming years to as much as 42 million gallons per day.[79]

The City of Corpus Christi is another location in the state which is moving forward with a desalination plant. The applications for discharge and water rights permits were submitted to the TCEQ in January 2020. The original site evaluation and permitting phase were funded with a State Water Implementation Fund for Texas (SWIFT) low interest loan. The next phase was funded with SWIFT again in July 2020 for design and construction. The estimated capacity of the plants will be for 20 million gallons per day with an expanded design capacity for 30 million gallons per day.[80]

City of Corpus Christi Desalination Plant

	Proposed Daily Average Discharge Flow (MGD)	Proposed Daily Max Discharge Flow (MDG)
Inner Harbor Desalination Plant		
Initial Production Capacity - 20 MGD	34	41
Ultimate Production Capacity - 30 MGD	51	62
La Quinta Channel Desalination Plant		
Initial Production Capacity - 20 MGD	34	41
Expanded Production Capacity - 30 MGD	51	62
Ultimate Production Capacity - 40 MGD	69	82

Reproduced from: City of Corpus Christi, "Corpus Christi Seawater Desalination Project Update", August 6, 2020.

Desalination is considered throughout the 2017 State Water Plan. Nine of the 16 regional water planning groups use the water strategy to meet one of their projected water needs totaling 230,000-acre-feet of new water supply by 2070.[81]

Desalination as a 2017 State Water Plan Strategy

Desalination Type	Percentage per Year	Acre Feet per Year
Brackish Groundwater	48.3%	111,000
Seawater	50.4%	116,000
Surface Water	1.3%	3,000

Information from: Texas Water Development Board, "General FAQs" Desalination, https://www.twdb.texas.gov/innovativewater/desal/faq.asp, (Last Visited September 8, 2020).

[78] *Id.*
[79] *Id.*
[80] City of Corpus Christi, "Corpus Christi Seawater Desalination Project Update", August 6, 2020.
[81] Texas Water Development Board, "General FAQs" Desalination, https://www.twdb.texas.gov/innovativewater/desal/faq.asp, (Last Visited September 8, 2020).

Aquifer Storage and Recovery

Another water strategy is aquifer storage and recovery (ASR) which is defined by the storage of water in a suitable aquifer then recovered from the same aquifer when needed. There are three ASR systems in the state: City of Kerrville, San Antonio Water System, and El Paso Water Utilities.[82] Water used for ASR in Texas comes from surface water, groundwater, and reclaimed water. All water injected into an aquifer for ASR must meet the Federal Safe Drinking Water Act prior to injection.[83]

The TWDB is commissioned to study and report on the viability of ASR in the different aquifers throughout the state. The Statewide Aquifer Study was completed in October 2020 and will cost $500,000.[84] The agency has funded and completed several ASR projects for feasibility. They are listed below.

Completed TWDB Aquifer Storage & Recovery Projects

Completion Date	Project	Contractor	Funding Amount
August 2019	Corpus Christi ASR Feasibility	Corpus Christi ASR Conservation District	$433,388
July 2019	Victoria ASR Demonstration Project	Victoria County Groundwater Conservation District/Arcadis-U.S. Inc.	$285,112
May 2019	New Braunfels ASR Demonstration Project	Edwards Aquifer Authority/Arcadis-U.S. Inc.	$281,500
June 2018	Lane City Reservoir Project	Lower Colorado River Authority	$2,411,432
February 2011	Assessment of ASR in Texas	Malcolm Pirnie, Inc.	$102,100
March 2010	Potential for ASR and Retrieval of Stormwater	Alan Plummer Associates, Inc.	$99,670
2002	Identification of Geographic Areas in Texas Suitable for Groundwater Banking	Daniel B. Stephens & Assc. Inc. and the Bureau of Economic Geology	

Information from: Texas Water Development Board, "ASR Projects," https://www.twdb.texas.gov/innovativewater/asr/projects.asp, (Last Visited September 8, 2020).

In 2019, the Texas Legislature passed House Bill 721, which directed the TWDB to conduct a statewide survey of the major and minor aquifers for use in ASR projects and recharge for

[82] Texas Waster Development Board, "FAQ", https://www.twdb.texas.gov/innovativewater/asr/faq.asp, (Last Visited September 8, 2020).
[83] *Id.*
[84] Texas Water Development Board, "ASR Projects," https://www.twdb.texas.gov/innovativewater/asr/projects.asp, (Last Visited September 8, 2020).

suitability. The report is due by December 15, 2020. The Legislature also directed TWDB to work with interested parties to conduct studies for ASR or recharge projects identified in the SWP.[85]

The Bureau of Economic Geology has also looked closely at ASR potential in the state. They have partnered with TCEQ to study the water quality impact of ASR projects and compatibility issues of injected water into aquifers.[86]

Flood Water Resources

Following the devastation from Hurricane Harvey, Texas began pursuing an opportunity to catch floodwaters from major storms. According to Texas Division of Emergency Management, approximately 20 trillion gallons discharged into the gulf following the storm. There is an opportunity in the state to catch storm runoff and use it in ASR projects.

The BEG is also working closely with the Brazos River Authority about suitable reservoirs and aquifers within the watershed for ASR. They are also working with the United States Army Corps of Engineers in the Dallas/Ft. Worth area along with TWDB to assess Forecast Informed Reservoir Operations to capture water from reservoirs for aquifer recharge.[87] In their partnership with TWDB, they evaluate flood flow volumes to be captured and stored for ASR.[88]

House Bill 720 from the 86th Legislative Session creates the process to appropriate unappropriated water, including storm water and floodwater, for ASR projects.[89]

Interbasin Transfers

The Texas Water Code allows for interbasin transfers or the transfer of water from one river system to be used in another river system. In order for a person or entity to complete an interbasin transfer, they must first acquire permits and water rights from TCEQ.[90] In order to complete the permitting process, TCEQ conducts a public meeting, comment period, and requires the applicant to review and submit information on the transfer.[91] The following map is all the interbasin transfers in Texas.

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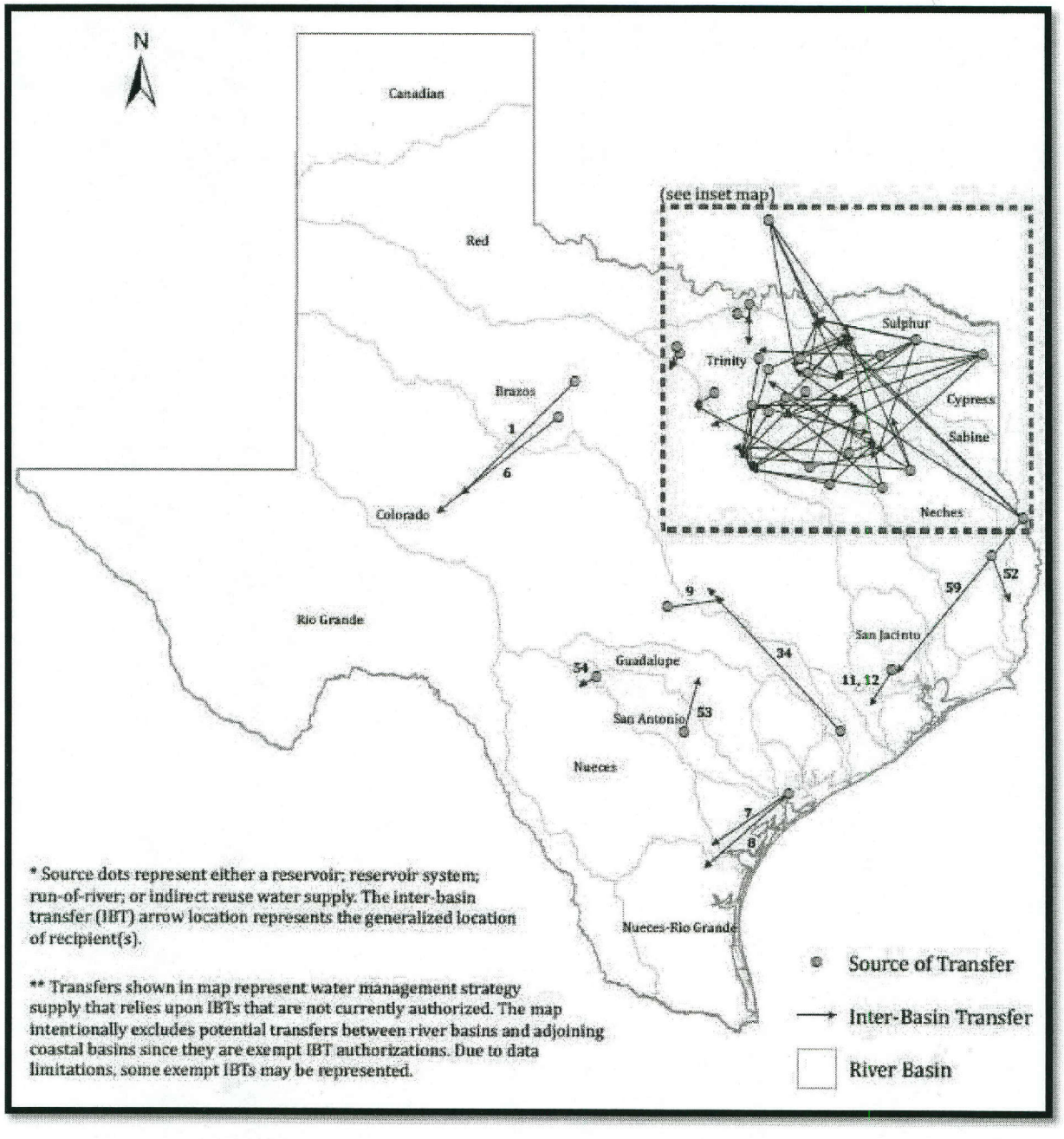
[85] Texas Water Development Board, "Aquifer Storage and Recovery," https://www.twdb.texas.gov/innovativewater/asr/index.asp, (Last Visited September 8, 2020).
[86] Email from Bridget Scanlon, Bureau of Economic Geology, to Katherine Thigpen, Director of Senate Committee on Water & Rural Affairs, August 5, 2020, (on file with author).
[87] *Id.*
[88] *Id.*
[89] Texas Water Development Board, "ASR", https://www.twdb.texas.gov/innovativewater/asr/index.asp, (Last Visited September 8, 2020).
[90] Texas Water Code § 11.085
[91] *Id.*

Current Interbasin Transfers in Texas



Map provided by the Texas Water Development Board.

Total there are 195 interbasin transfers contained in 132 water rights currently in the state.[92]

Future Water Supply and Growth in the State

The availability of water resources is directly tied to the successes of industry in Texas. If another drought of record struck the state, the income of individuals and businesses could see a negative

[92] Email from Ferrell Fields, Director of Government Relations, Texas Commission on Environmental Quality, to Katherine Thigpen, Committee Director, Senate Committee on Water & Rural Affairs,

impact of $73 million in 2020 and more than $151 billion in 2070.[93] Additionally, Texas employment could be reduced by 424,000 in 2020 and 1.3 million in 2070.[94]

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), in the global workforce, it is estimated that three out of four jobs are either heavily or moderately dependent on water resources. Half of the world's workers are employed in water and natural resources dependent industries.[95] In the United States, for every job created in local water and wastewater there are 3.68 indirect jobs created.[96]

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[93] Texas Comptroller of Public Accounts, "Texas Water: Planning for More," https://comptroller.texas.gov/economy/fiscal-notes/2019/apr/tx-water-planning.php, April 2019 (Last Visited September 8, 2020).
[94] *Id.*
[95] United Nations Educational, Scientific and Cultural Organization, "Water drives job creation and economic growth, says new UN Report," https://en.unesco.org/news/water-drives-job-creation-and-economic-growth-says-new-report, (Last Visited September 8, 2020).
[96] *Id.*

Committee Testimony on Interim Charge #1

The Texas Water Development Board (TWDB) administers the development of the State Water Plan (SWP) on a five-year planning cycle. The plan is based upon the "drought of record" which is the period of time in which there was the least amount of water available.[97] In most regions in the state, the period from 1951-1956 is used. However, some areas of the state use different time periods due to a more severe drought of record.[98]

The 2021 SWP will represent the fifth planning cycle since the "bottom up" approach to the process began in 1997 following the passage of Senate Bill 1 of the 75th Texas Legislature.[99] Since the Legislature appropriated $2 billion in 2013 to fund the State Water Implementation Fund for Texas (SWIFT). To date, SWIFT has financed the creation of 1.5 million-acre feet of water supply resources once they are completed.[100]

The Legislature also appropriated $15 million for the planning process every five years. The TWDB administers the SWP with rules and guidance followed by 16 regional planning groups.[101] The following map depicts the planning groups in the state.

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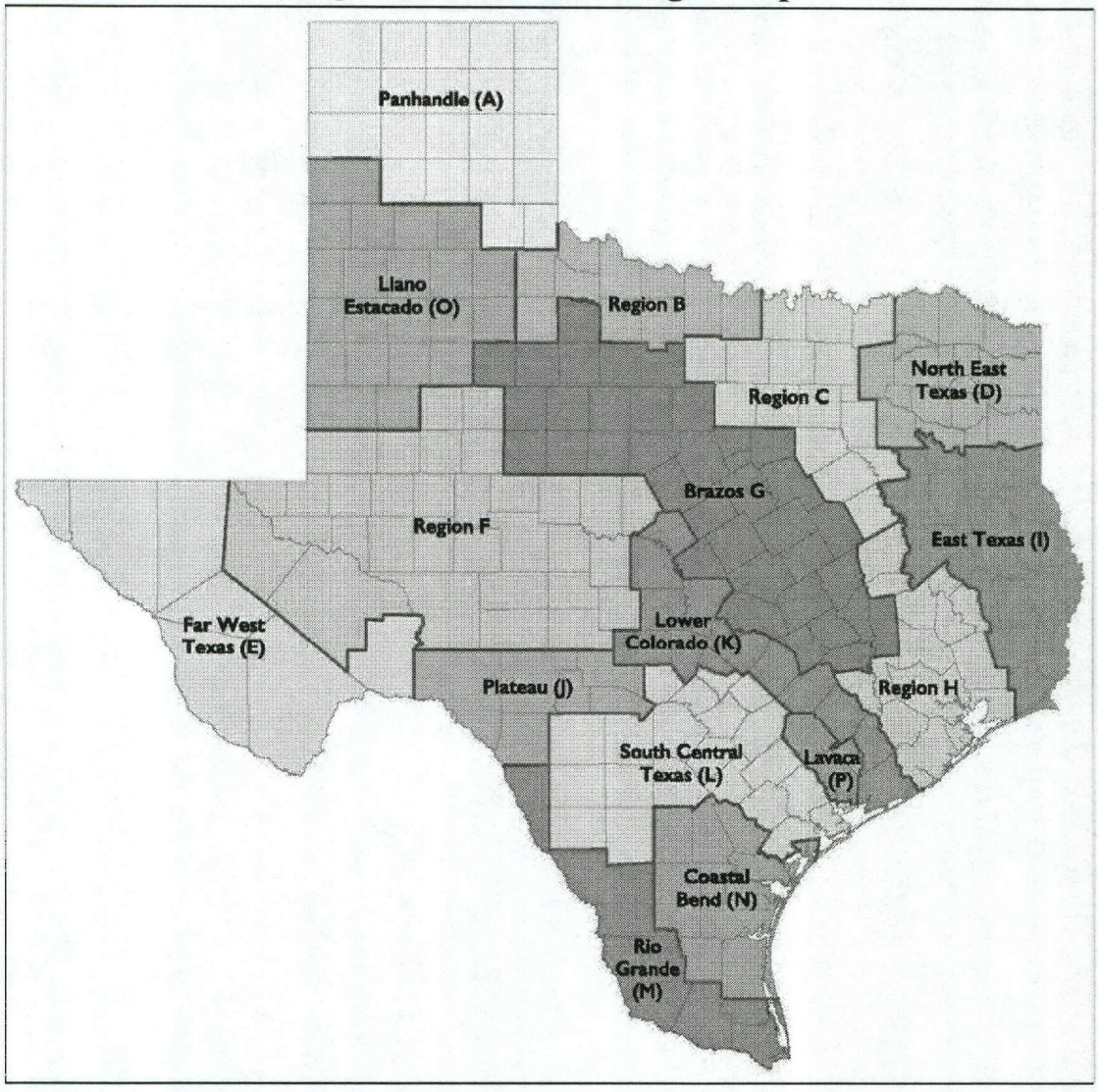
[97] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (testimony from Temple McKinnon, Texas Water Development Board).
[98] *Id.*
[99] *Id.*
[100] *Id.*
[101] *Id.*

Regional Water Planning Groups



Map provided by the Texas Water Development Board.

The regional planning groups act as self-governing groups with adopted bylaws, regular meetings, and frequent public participation.[102] The groups base their planning from the use of the Water Availability Models (WAMs) provided by the Texas Commission on Environmental Quality (TCEQ) and the Groundwater Availability Models (GAMs) from the TWDB.[103] The groups plan for the six categories of water use: municipal, irrigation, manufacturing, livestock, mining, and steam-electric power.[104] The groups are also charged with understanding the interaction with moving water from rural or agricultural areas and the impact it may have on those industries.[105]

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[102] *Id.*
[103] *Id.*
[104] *Id.*
[105] *Id.*

Additionally, the regional water planning groups look at population changes and water demand projections. According to TWDB, the location of water supply resources is very important to creating the management strategies the region will rely on in the future.[106] They look at reliability, quantity, compatibility with existing projects, and cost.[107] The strategies includes some requirements in the plans such as water conservation must be considered with every user group. Desalination and Aquifer Storage and Recovery (ASR) must also be considered in the process. If they cannot be recommended for the region, the planning group must provide an explanation.[108] According to Temple McKinnon, TWDB included the desalination and ASR strategies as a requirement because of increased interest from the public and industry.[109] ASR has less surface impact and avoids evaporation loss. Inclusion of the strategy is based on hydrology and geology in the region.[110]

The current SWP indicates that the population of Texas will increase by 70% by 2070 or 21.5 million people. Statewide water demands will increase by 17% but existing water supplies will decrease by 11% creating an 8.9 million acre-feet deficit in water needs.[111] Municipal needs are increasing the most and in drought conditions, the state would need to come up with an additional 4.8 million acre-feet per year for Texans.[112] According to Ms. McKinnon with TWDB, water supply is decreasing due to sedimentation in surface water reservoirs and significant depletion in several aquifers specifically the Ogallala and the Gulf Coast Aquifers.[113]

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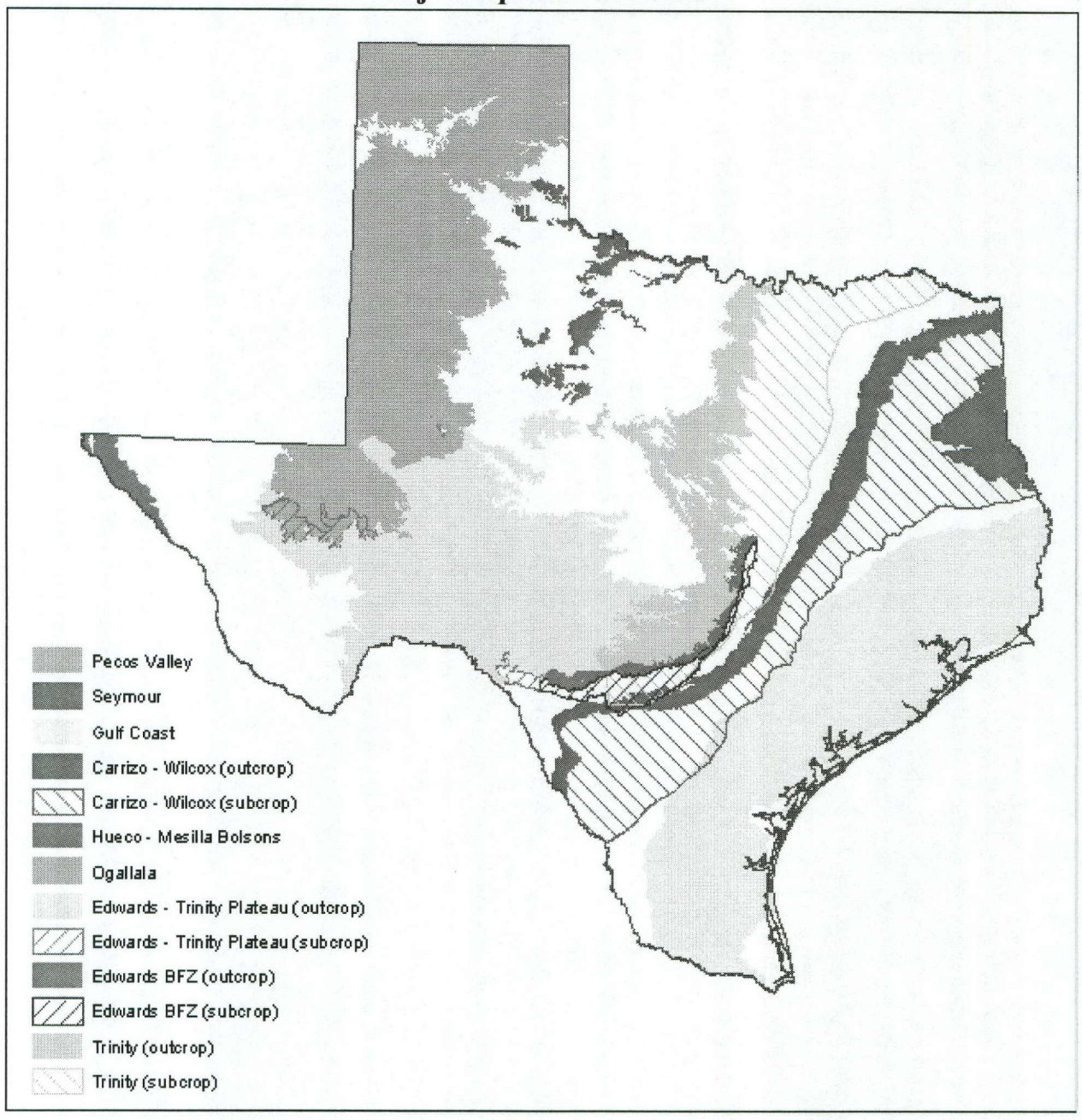
[106] *Id.*
[107] *Id.*
[108] *Id.*
[109] *Id.*
[110] *Id.*
[111] *Id.*
[112] *Id.*
[113] *Id.*

Major Aquifers in Texas



Map provided by the Texas Water Development Board.

Temple McKinnon explained that progress has been made on several reservoirs with funding from the TWDB.[114] The Lower Bois D'arc reservoir has over $1 billion in commitment from SWIFT along with $90 million to Lake Ralph Hall.[115] TWDB will begin going through draft regional plans

[114] *Id.*
[115] *Id.*

this year and the agency plans to look at the reservoirs which are recommended. Some of the reservoirs may be determined to not be feasible.[116]

There are 5,500 strategies recommended in the SWP which meet all municipal water needs if implemented. Over 2,500 projects are recommended to be completed by 2070 totaling $63 billion.[117] Water providers surveyed anticipated needing $36 billion in state assistance.[118]

Produced water was only cited by Region F as a viable option for supply. The region recommends that produced water be used to address demand in the mining industry throughout all 32 counties in the area. The new regional plan for Region F had demands in the mining industry double since the 2017 plan.[119]

Aquifer Storage and Recovery (ASR) refers to the storage of water when available in a suitable aquifer, meaning conditions, and recover of the same water during times of need for beneficial use. Aquifer recharge refers to a means of adding water into an aquifer to avoid water level declines, add availability, improve quality, and augment spring flows.[120]

Currently, ASR as a water resource management strategy is applied throughout the country and the world. Texas has three facilities in operation: El Paso, Kerrville, and San Antonio. The El Paso facility works by distributing wastewater affluent over the aquifer's sandy surface which acts as a filter. Kerrville utilizes a "scalping technique" by catching floodwaters and injecting into an aquifer. Finally, San Antonio Water System (SAWS) takes water from the Edwards Aquifer and transfers it to the Carrizo-Wilcox Aquifer achieving 60 million gallons per day of injection. Over time, SAWS has accumulated 180,000-acre feet available for future use.[121]

There are several ASR projects identified as water strategies in the SWP. If all the projects were realized, they would create 123,000-acre feet of supply.[122]

Several pieces of Legislation have directed TWDB to conduct studies related to alternative water supply strategies. House Bill 721 from the 86th Legislative Session requires the agency to study every major and minor aquifer in the state to their suitability for ASR. TWDB can also perform ASR studies by interested parties.[123] The TWDB is focused on the statewide survey currently looking at hydrology, proximity to a water source, water supply, and demand from the SWP. By the end of the year, TWDB will submit a report and ranking of projects by the end of the year.[124]

In 2003, TWDB contracted a study to evaluate the state's brackish groundwater supply. The study indicated there were 2.7 billion-acre feet of brackish supplies available. From the study, TWDB

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[116] *Id.*
[117] *Id.*
[118] *Id.*
[119] *Id.*
[120] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (testimony from John Dupnik, Texas Water Development Board).
[121] *Id.*
[122] *Id.*
[123] *Id.*
[124] *Id.*

created the BRACS program, or Brackish Resources Aquifer Characterizations System, to create an overall evaluation process.[125]

The Legislature directed TWDB to designate brackish groundwater production zones throughout the state excluding the Edwards Aquifer Water District, Subsidence Districts, and the High Plains Water District. The exclusions are due to the areas already being managed and permitted for brackish groundwater. Eight aquifers have been completed with 31 brackish groundwater zones identified.[126]

The brackish groundwater production zones require a buffer from injection wells permitted by the Texas Railroad Commission. Currently, the TWDB requires a 15-mile radius for the zones from any injection wells used to inject waste or produced water. Together with the RRC, TCEQ, the Bureau of Economic Geology, and the United States Geological Survey, TWDB is working to refine the buffer zones.[127]

University Lands is managed by the University of Texas and Texas A&M University Systems. The agency manages surface and mineral rights over 2.1 million acres in West Texas across 19 counties.[128] The profits from the mineral rights benefit the university systems and, according to Mark Houser, provide low cost energy throughout the world.[129] Water use in oil and gas hydraulic fracturing has increased as well as recycling the produced water. There is also a need for produced water to have a destination or disposal system. University Lands works to balance water conservation with generating revenue.[130]

There are 800 water wells and 250 saltwater disposal wells used by oil and gas producers on University Lands' property. There are also 1,000 miles of freshwater pipes and almost double that amount in produced water disposal wells.[131] University Lands is allowing oil and gas producers to build infrastructure throughout the owned land to move produced water from different sites to promote its use.[132] The agency has also put out new fracking specifications so that oil and gas producers can store produced water above ground for longer periods of time.[133]

University Lands sells approximately 220,000 acre-feet or 170 million barrels of fresh water to Midland, Andrews County, Colorado Municipal Water District, and oil and gas operators.[134] As recycling produced water has become more common, less fresh water is used. In years past, University Lands have made $15 million per year on freshwater sales. Last year, the total income was half that.[135]

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[125] *Id.*
[126] *Id.*
[127] *Id.*
[128] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (Mark Houser, University Lands).
[129] *Id.*
[130] *Id.*
[131] *Id.*
[132] *Id.*
[133] *Id.*
[134] *Id.*
[135] *Id.*

Mark Houser explained that University Lands has been working with midstream water companies. In late 2018 and early 2019, the agency began to push out their full cycle water management program to decrease the use of freshwater and promote the use of brackish aquifers. The program also encourages the use of produced water and smart disposal networks, which move water underground to the disposal site.[136]

University Lands also participates in TxNET which is the seismic monitoring system in the state. They have two monitors on their lands.[137]

The General Land Office (GLO) produced revenue for the Permanent School Fund generating $1 billion last year in revenue.[138] Most of the GLO owned land is in the Delaware Basin. The agency has consistently heard from oil and gas producers that water is a critical need in the region along with disposal wells for produced water.[139]

In 2017, the GLO entered into a lease agreement in Reeves and Culberson Counties with Lane Midstream Water Resources to assist with the groundwater and produced water in the area. Operators can use brackish groundwater at 2,000 or more parts per million. GLO is working with the Lane Midstream to get a network of pipes for the area.[140]

In January of 2020, GLO began looking at existing infrastructure, adding disposal wells to the agency's property, and recycling produced water for oil and gas use with a goal to take the strain away from the area's aquifers. All disposal wells on GLO property go through the RRC permit process, are monitored by TCEQ, and GLO checks the integrity of the wells.[141]

According to Mark Havens, the GLO is continuing to look at what they can do with the produced water. They continually hear from operators that they have the ability to treat the produced water to drinking water standards, but the process is cost prohibitive.[142]

Commissioner Lindley with TCEQ explained that the agency is closely involved with the discharge of produced water in the state because of House Bill 2771 from the 86th Legislative Session. The bill requires TCEQ to request delegation transfer of produced water discharge from oil and gas activities from RRC and Environmental Protection Agency (EPA) to one permit under the agency.[143] The permit falls under the National Pollutant Discharge Elimination System permit (NPDES). TCEQ is working through the steps to complete the delegation change which includes updating the memorandum of understanding (MOU) with TCEQ, creating a stakeholder group, and providing quarterly updates.[144]

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[136] *Id.*
[137] *Id.*
[138] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (Mark Havens, General Land Office).
[139] *Id.*
[140] *Id.*
[141] *Id.*
[142] *Id.*
[143] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (Commissioner Emily Lindley, Texas Commission on Environmental Quality).
[144] *Id.*

The NPDES delegation application will be a partial program submittal. The distinction requires the EPA to act within 90 days of receipt. TCEQ will continue to work with all the agencies in Texas that are involved to make sure the application is complete.[145]

In conversations with EPA, TCEQ learned that the federal agency wanted to make it clear that for Texas to get the full delegation, TCEQ had to include any discharge for wastewater in the state.[146] TCEQ renamed the discharge as produced wastewater and defined it to include any waste in water for discharge from oil and gas operations.[147]

L'Oreal Stepney explained that throughout the delegation transfer process, TCEQ has heard from stakeholders about the potential for large volumes of produced water as a potential source of water for the state. From a quality standpoint, the produced water can vary. There can be a lot of solids or high salinity depending on the source. Industry has expressed that there is technology that can adequately clean the waste to water quality standards.[148] Ultimately, producers or water industry professionals must treat the wastewater to adequate discharge standards which TCEQ monitors.[149]

Stakeholders have also discussed the opportunity to use centralized waste treatment facilities and the potential for collaboration with other producers. The volume of water could be available for wildlife, agriculture, or other industries.[150]

TCEQ has received feedback from stakeholders to review the 98th meridian restriction in the federal rules. The rules refer to a restriction from discharge west of the 98th meridian unless it will be used for wildlife propagation or agriculture. Many stakeholders expressed that the restriction is not necessary, and the EPA is continuing to study the issue.[151]

Currently, produced water is discharged with a permit from RRC and EPA and following the 98th meridian restrictions. For other reuse guidelines, the TCEQ already has a reuse program where industry reuses wastewater for cooling or other purposes. If a company were to receive produced water, the quality would have to be of the standard for the use.[152] Additionally, TCEQ has surface water quality standards for discharge which are the same as EPA and RRC.[153]

According to Paul Dubois with the RRC, produced water volumes are not reported but rather estimates are made through indirect methods such as annual well tests or reported volumes of injection. Trends with produced water volume closely follow oil and gas production.[154] There were

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[145] *Id.*
[146] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (L'Oreal Stepney, Texas Commission on Environmental Quality).
[147] *Id.*
[148] *Id.*
[149] *Id.*
[150] *Id.*
[151] *Id.*
[152] *Id.*
[153] *Id.*
[154] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (Paul Dubois, Texas Railroad Commission).

approximately 10.7 billion barrels of produced water in 2018, which was a 1.1 billion increase over 2017. A small fraction of the volumes recorded include flow back water.[155]

Produced water contains salt and other substances. The RRC enforces rules which prevent pollution such as how wells are drilled, completed, and operated. The agency also looks at how fluids are managed, the permitting of waste haulers, permits for injection, and the encouragement of recycling and beneficial use.[156]

Most oil and gas producers dispose of produced water by using underground injection wells. There are 54,000 total injection wells and 8,000 of those are used for disposal. Abandoned or improperly plugged wells are identified and plugged.[157] The RRC maintains geologic models of groundwater quality and requires well owners to report pressure.[158]

The RRC and TWDB have been working closely on the buffer zones between injection wells and the areas where injections wells cannot be permitted due to usable groundwater. The agencies share well data, GIS information, and the well log library. TWDB, RRC, TCEQ, and USGS meet monthly to share data and discuss changes or needs.

Until recently, underground injection has been the way most producers managed their produced water.[159] Of the 10.7 billion barrels of produced water brought to the surface in 2018, 46% was for beneficial reuse by the oil and gas industry and the rest for disposal. Stakeholders have communicated that there are three categories: treatment, reliability, and infrastructure.[160] Treatment is an issue because of the source of the produced water can provided varying degrees of pollutants in the product. Reliability is an issue due to the volumes of produced water changing over time along with the type and volume of substances present. There continues to be issues with infrastructure in the areas where produced water is prevalent.[161]

Recommendations

Texas prides itself on having the best and most comprehensive water supply plan for the residents of this great state. However, it is critical that people understand that the intended objective of the State Water Plan (SWP) is to meet the needs of the state during the next drought. There is a false sense of security as to supply of water to meet the needs for non-drought periods being perpetuated by the SWP. Meeting the state needs in the next drought is important but securing water to meet the population growth projections, the ongoing water needs of the agricultural, energy, and other business needs is not guaranteed by meeting the SWP drought objectives. The meeting of the next drought does not necessarily equate to meeting the growing needs between droughts.

The 2011 drought proved the state and local resources identified under the SWP of the past were adequate meet the basic municipal needs of the public regarding sanitation and life support.

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[155] *Id.*
[156] *Id.*
[157] *Id.*
[158] *Id.*
[159] *Id.*
[160] *Id.*
[161] *Id.*

The SWP works in conjunction within a regulatory framework that is meant to protect the taking by legal or illegal means of one area to give to another area to the unrecoverable detriment of the source of the water. However, moving water from one region to another does not create more water supply overall. Only the impoundment of water currently not captured (reservoirs and diversion), conversion of existing water to potable standards (marine, brackish and produced water), desalination, reduced evaporation technologies, and God can add to the usable water supply. Conservation and reuse play a vital role in the extension of the available supply but does not add to the overall available water supply.

The concentration of the population growth in the state along the I-35 corridor has commandeered the legislature's attention, focusing on municipal use needs, ignoring the rural areas and energy production industries of the state.

Texas has a robust water portfolio and so the movement of water through interbasin transfers will always be an option. However, transferring the water for economic benefit of the owner will inevitably harm the basin and those using the water resource in the region. The best option for Texas is to develop new water supply utilizing the State Water Plan. Texas will not meet the needs of future economic growth without water. We can survive, but not thrive if Texas does not begin legitimate discussion in developing more water supply from new sources. The 2070 horizon focuses more on meeting a municipal need than the non-municipal needs. Without at least an equal consideration given to all the needs in the SWP and specific regional issues, the economic diversity we enjoy today will not exist. In other words, Texas's best days are behind us when 85% of the geography of the state is void of population due to water unavailability.

Produced water provides the state with unique challenges and an almost endless new water supply. Following the COVID-19 pandemic, the oil and gas industry will continue to recover. According to the Texas Railroad Commission, oil and gas operations significantly declined between March and April 2020, dropping production by 234,000 barrels per day. The type of production declines seen in the state are typically seen during a natural disaster. With the uncertainty of the length of the pandemic, there is still uncertainty when the energy sector will fully recover.

The United States Energy Information Administration has tracked the declines in energy production but has noted that recent months, there has been growth. Additionally, the administration expects drilling activity and production to rise as 2021 continues.

The possibility of cleaning produced water and reducing injection wells in the state provides benefit to numerous stakeholders. The state could come together with a focus to assemble the technology innovators, researchers, user groups, and industry with the creation of a Produced Water Consortium to bring together all stakeholders, Texas can once again lead in innovation and technology. The main purpose of the consortium would be to create the pilot program sponsored by the state for a large scale, interconnected produced water facility in the Permian Basin.

Regulations regarding the capturing and use of flaring need to be updated to allow for use as an energy source to desalination the produced water. The consortium would have the opportunity to utilize this form of energy to power the pilot project.

As oil and gas operations are a mainstay in Texas. The state continues to have an opportunity to curtail issues with injection wells and create a new water source for beneficial use. Texas should continue to support the Texas Commission on Environmental Quality's efforts to receive delegation from the Environmental Protection Agency for NPDES permits.

The state should seek to apply the Rule 8 "Permitted by Rule" approach to commercial water recyclers similar to oil and gas operators. A similar approach to recyclers operating on the same lease, unit or on a commercial recycler's own land would greatly enhance the ability of the new water midstream to meet industry demands and would result in increased usage of recycled produced water. While commercial recyclers would still be permitted and bonded, they would have more flexibility to conduct operations where needed.

Texas should support federal rule changes to the 98th Meridian requirements. Discharge west of the 98th Meridian is allowed only with agriculture or wildlife propagation. Onshore discharge is not permitted east of the 98th Meridian. Texas should continue to support the efforts to update EPA rule to better reflect technological advancements.

Texas can lead the nation in creating a model that works with the creation of a state backed pilot project with site selection, contracting, and permitting created as a roadmap for future produced water facilities. While current economic outlooks do not lend to financial incentives, the state can begin the process of collaboration among state agencies and solicit interested parties to move a large-scale project forward.

Texas should also begin the process to track produced water data formally. While there is available information, there is not a single location where the public and industry stakeholders can look to get the best information in real time.

To see some of the greatest success in cleaning the dirtiest of water, Texas only needs to look in its backyard. The Gulf Coast Authority (GCA) is a conservation and reclamation district created by the Texas Legislature in 1969 originally to help with regional water quality management and the disposal of wastes generated by Chambers, Galveston, and Harris Counties.[162] As GCA provides their leadership in the disposal and treatment of wastewater industrial facilities, the federal government granted permissions and exemptions allowing for the Authority to expand their role in the treatment of what is considered the dirtiest water in the state.[163]

GCA currently operates and maintains one domestic wastewater treatment plant and four industrial wastewater treatment plants. The industrial treatment plants are specially designed to treat specified types of industrial wastewaters. Together, GCA facilities treat approximately fifty million gallons per day of industrial wastewater from over ninety customers. The Odessa South Facility in west Texas provides treated industrial wastewater for use in oil and gas exploration in

[162] Elizabeth Fazio, Gulf Coast Authority Information for Chairman Charles Perry, (on file with author), April 30, 2020.
[163] *Id.*

the Permian Basin. This water is being used in place of groundwater in the development of oil and gas wells.[164]

The GCA regional treatment model works well for the type of industry they serve. The authority cannot enter the produced water recycling industry because as a publicly owned treatment facility, they are restricted and cannot receive an indirect discharge of produced water. Texas should push for the removal of the restriction so that proven industry leaders can contribute to research and innovation.

The progress made with seawater desalination in the interim has been encouraging. Texas must continue to lead in a fair, efficient, and cohesive permitting process. As the plants come online, oversight will be critical to protecting the environment while providing freshwater resources. Texas should pursue research for the potential use of salt byproduct, minerals, and other substances focusing on the possibility for an alternative energy use. Lack of action today could lead to the following:

- Industry to leave or remove Texas from a long-term viable option for business investment consideration;
- Continue the evolution from an agrarian and energy-based economy that supports the people needed to meet the personnel challenges in other sectors such as retail, manufacturing, and service industries; or
- Will undermine national security by expanding dependence on foreign sources for food and energy

ASR and floodwater scalping continue to be evolving technologies that deserve investment from the state. Losing floodwater every year as rainstorms become more intense is no longer an option. Texas should encourage industry to take on these projects and the state to continue to permit them efficiently.

The state must also look to other means to maximize the water already available. Many communities utilize direct non-potable reuse, such as the City of Austin, which is building a permit center which will have its own on-site wastewater reuse.[165] The same would not be possible for a non-municipal site to use, as they would need to obtain a wastewater discharge permit and an alternative means of disposal. The state could amend state law to allow for onsite facilities to beneficially reuse blackish water without needing the additional requirements. TCEQ would need to establish the framework to authorize local governments to adopt on-site non-potable reuse programs.

Texas can lead the way with smaller communities utilizing direct potable reuse systems. While TCEQ allows for direct potable reuse on a case by case basis, a set permit process would help drive communities to seek out this option.

Texas needs to pursue water purchase opportunities from neighboring states. Louisiana has an abundance of freshwater and has indicated their desire to sell it. Opportunities for private

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[164] *Id.*

[165] Robert Mace, Executive Director, The Meadows Foundation with Texas State University, August 7, 2020.

investment with state and federal leverage must be explored. The ability to mitigate flooding on a multi-state level while taking advantage of excess water is a national conversation worthy of the effort to pursue. Our state must drive the national emphasis to create water supply with our federal counterparts. Again, moving water from one area to another only shifts the resources.

There is no option to go without water and Texas is only as strong as it plans.

Interim Charge #2

Examine the roles and responsibilities of river authorities in maintaining their managed assets including, but not limited to, dams. Evaluate the impact on the economy, water supply, and flood control due to deferred maintenance. Make recommendations to promote infrastructure stability and maintain the usability of these bodies of water.

Committee Hearing Information

Due to the on-going COVID-19 pandemic, a public hearing on the interim charge was not held. Information used to prepare the response to this interim charge was garnered from meetings with stakeholders that would have participated in the hearing had one been made available. Unfortunately, the most important aspect of the interim charge was to examine the impact on Texans impacted by river authority's action or lack of action. Given that public testimony was not part of the process, further analysis is needed before any final determinations could be made as to the recommendations.

Background Information

River authorities are public entities established by the Texas Legislature and given a broad range of responsibilities based on their enabling legislation. Each river authority is different in their abilities for funding, requirements under their enabling legislation, and other duties which are specific to their watershed. Twelve river authorities participate in the Clean Rivers program through TCEQ to conduct "water quality monitoring, assessment, and stakeholder outreach in the 23 major river and coastal basins of Texas."[166]

River authorities are subject to Sunset Commission Review on the following schedule.

[166] Texas Commission on Environmental Quality, "Clean Rivers Contact List", https://www.tceq.texas.gov/waterquality/clean-rivers/partners.html, (Last Visited September 10, 2020).

River Authority Sunset Schedule

River Authority	Last Sunset Review	Next Sunset Review
Angelina & Neches River Authority	n/a	2025
Bandera County River Authority	n/a	2023
Brazos River Authority	2021 (under review)	
Guadalupe-Blanco River Authority	2019	2031
Lavaca-Navidad River Authority	n/a	2023
Lower Colorado River Authority	2019	2031
Lower Neches Valley Authority	n/a	2025
Nueces River Authority	2019	2031
Palo Duro River Authority	n/a	
Red River Authority	2019	2031
Sabine River Authority	n/a	2025
San Antonio River Authority	n/a	2023
San Jacinto River Authority	2021 (under review)	
Trinity River Authority	n/a	2025
Upper Colorado River Authority	2017	2029
Upper Guadalupe River Authority	n/a	2023

Information from the Sunset Commission

Angelina-Neches River Authority

The Angelina Neches River Authority (ANRA) is in Lufkin, Texas and was created in 1949. The ANRA jurisdiction is around 8,500 square miles and contains all or part of the following counties: Van Zandt, Smith, Henderson, Newton, Cherokee, Anderson, Rusk, Houston, Nacogdoches, San Augustine, Shelby, Angelina, Trinity, Sabine, Polk, Jasper, and Orange.[167] Governance is by a nine member board appointed by the Governor to six year terms.[168] The main functions of the authority are water quality management, water resource development, and conservation of water resources.[169]

The ANRA receives no revenue from taxes or fees, instead gaining revenue from services the authority provides. They also receive some revenues from utilities delivered.[170] Holmwood Utilities is owned and operated by ANRA as a water and wastewater utility located just west of

[167] Angelina & Neches River Authority, https://www.anra.org, (Last Visited September 9, 2020).
[168] *Id.*
[169] *Id.*
[170] Email from Kelley Holcomb with Attachment, General Manager, Angelina & Neches River Authority to Katherine Thigpen, Committee Director of Senate Water & Rural Affairs Committee, August 14, 2020. (on file with author)

Jasper, Texas.[171] The authority also owns and operates the Neches Compost Facility, which is a bio-solid disposal facility that turns wastewater sludge into compost for beneficial use. The North Angelina County Regional Wastewater Facility is a regional wholesale wastewater utility operated by ANRA. The Redland Wholesale Utilities also is a wholesale and wastewater service in Angelina County operated by ANRA.[172]

Lake Columbia is a proposed reservoir located in Cherokee County that will provide water supply to the Dallas/Ft. Worth metroplex and the five-county service area around the project. ANRA is responsible for the state water right permit and required revenue for the debt service.[173]

Bandera River Authority

The Bandera County River Authority and Groundwater District (BCRA) is located within the boundaries of Bandera County and Groundwater Management Area 9. The Legislature created the Authority in 1971 to monitor and maintain the watershed surrounding Medina Lake. In 2003, the authority was updated to provide services as a groundwater conservation district.[174] The Board of Directors consists of nine elected members with two from each precinct and one member at large.[175]

In 2019, the BCRA approved a tax rate of $0.042165/$100, which is expected to provide $975,900 in income for the authority. The BCRA expects $18,000 from well permits along with other fees and services for a total income of $1,059,720.[176] The BCRA permit wells, monitors water quality in both Medina Lake and groundwater, and provides services for the protection of natural resources. The authority does not have any structures or dams to monitor or maintain.[177]

Brazos River Authority

The Legislature created the Brazos River Authority (BRA) in 1929 as the first governmental entity in the country to develop and manage an entire river basin. The Brazos River begins approximately 50 miles west of the Texas-New Mexico border which begins a watershed that stretches 1,050 miles. The Brazos River enters the Gulf of Mexico two miles south of Freeport, Texas in Brazoria County.[178]

The Board of Directors consists of 21 members appointed by the Governor and subject to confirmation by the Texas Senate. The members serve a six-year staggered term with one-third replaced each odd numbered year.[179]

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[171] *Id.*
[172] *Id.*
[173] *Id.*
[174] Bandera River Authority, https://www.bcragd.com, (Last Visited September 9, 2020).
[175] *Id.*
[176] Bandera River Authority, https://www.bcragd.org/wp-content/uploads/2016/12/FY-2020-Budget-.pdf, (Last Visited September 9, 2020).
[177] Bandera River Authority, https://www.bcragd.com, (Last Visited September 9, 2020).
[178] Brazos River Authority, https://brazos.org, (Last Visited September 9, 2020).
[179] *Id.*

The BRA is self-supporting and does not need revenue from the state except for grant or loan programs. The authority maintains operation through the sale of water to municipalities, industry, mining, and agriculture and through the operation of water and wastewater treatment systems.[180]

The authority owns, operates, and maintains three water supply reservoirs in the watershed which store 45% of the water BRA supplies to customers throughout the basin. Located in Palo Pinto County, Morris Sheppard Dam forms Possum Kingdom Reservoir which was completed in 1941.[181] The reservoir holds 540,000-acre feet of water with 230,750-acre feet available as a water supply for the basin. Morris Sheppard Dam is 2,700 feet long and 190 feet high with release mechanisms for floodwaters.[182]

Completed in 1969, DeCordova Dam and Lake Granbury provide 129,011-acre feet of storage capacity for water supply. The project was completed without use of tax dollars having used sales of water solely. A contract with TXU Electric Company provides principle revenues for the project to purchase water for industrial use. The dam measures 2,402 feet long and has 16 release mechanisms 36 feet wide by 25 feet tall tainter gates.[183]

Finally, Lake Limestone located on the upper Navasota River in Limestone, Robertson, and Leon Counties was built in 1978 as a water supply source. The Sterling C. Robertson Dam runs 8,395 feet and is 72 feet tall with 5 tainter gates that measure 40 feet wide by 29 feet tall for water releases and a 3,000 foot emergency spillway.[184] The reservoir can store 203,780 acre-feet of water.[185]

The BRA also owns and operates the East Williamson County Regional Water System which it purchased from Taylor, Texas in 2004. The facility is a regional treatment center for Taylor, Jonah Water Special Utility District, and Lone Star Regional Water Authority. The system includes 12.8 million gallons per day treatment, a storage reservoir, a raw water intake facility, a pipeline, a treated water pipeline, and a groundwater well.[186]

To fund the operation and maintenance of BRA infrastructure, the river authority uses water rates spread throughout the watershed. The rates have served as a sufficient funding stream for decades and provided needed water to residents and important industry in the state.[187] Currently, the system rate for water is $79 an acre-foot or $55 an acre-foot for agricultural use. BRA expects the system water rate to increase 5-6% annually.[188]

Based on the prior year's plan, capital improvement projects are evaluated to see what has been completed and what can be removed from the list. BRA staff also add any projects that have been

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[180] *Id.*
[181] Email from Matt Phillips with Attachment, Legislative and Governmental Affairs Manager, Brazos River Authority Authority to Katherine Thigpen, Committee Director of Senate Water & Rural Affairs Committee, August 3, 2020. (on file with author)
[182] *Id.*
[183] *Id.*
[184] *Id.*
[185] *Id.*
[186] *Id.*
[187] *Id.*
[188] *Id.*

found throughout the year. The Authority conducts budget meetings with risk management strategies and ultimately all capital improvement projects go before the Board of Directors. Over the next ten years, BRA expects to spend $100 million on projects to maintain, improve, and extend the overall service life of the dams, reservoirs, and treatment plant under their management.[189]

BRA also stores 55% of water supply for its customers in U.S. Army Corps of Engineers owned and operated dams. These include: Lakes Whitney, Proctor, Aquilla, Belton, Stillhouse-Hollow, Georgetown, Granger, and Somerville. The authority spends $7 million annually to the federal partners for operation and maintenance.[190]

Guadalupe-Blanco River Authority

The Legislature created the Guadalupe-Blanco River Authority (GBRA) in 1933 with the primary responsibilities of developing, conserving, and protecting water resources in ten counties. Counties under the jurisdiction include Kendall, Comal, Hays, Caldwell, Guadalupe, Gonzales, DeWitt, Victoria, Calhoun, and Refugio Counties.[191] The main responsibilities of the GBRA are to provide utility services and operations to those throughout the river basin. Canyon Lake is the only flood control and water supply reservoir within the basin and GBRA owns 90,000 acre-feet of water per year to use within the river basin. The ownership of the water facilitates delivery for municipal, industrial, and agricultural water needs.[192]

GBRA has three of the fastest growing counties in the United States: Hays, Kendall, and Comal. GBRA's combined facilities provide over 300,000 residents with drinking water and 50,000 residents with wastewater services each day.[193] The authority manages and operates over $200 million in capital assets including: over 300,000 acre-feet of water rights, 7 dams, over 80 miles of canals, 10 water treatment facilities, 16 wastewater treatment systems, 4 park facilities, and 7 hydroelectric plants with over 20 miles of electric transmission infrastructure, and hundreds of miles of pipelines.[194] In 2021, GBRA projects $64.2 million in revenue and $63.8 million in expenses.[195]

While GBRA cannot levee taxes or collect fees, most revenue is from maintenance and operation charges to users, rates, and services.[196] The authority began a complete review of all infrastructure in 2017 with a goal to develop a risk-based model to prioritize capital improvement projects.[197]

GBRA has infrastructure throughout their service area. The Canyon Lake Hydroelectrical Plant, located in Comal County, provides electricity from Canyon Dam to residents with New Braunfels

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[189] *Id.*
[190] *Id.*
[191] Email from Jonathan Stinson with Attachment, Deputy General Manager, Guadalupe-Blanco River Authority, to Katherine Thigpen, Committee Director for the Senate Committee on Water & Rural Affairs, July 30, 2020. (on file with author).
[192] *Id.*
[193] *Id.*
[194] *Id.*
[195] *Id.*
[196] *Id.*
[197] *Id.*

Utilities (NBU) and other customers in the area.[198] The plant operates through a license from the Federal Regulatory Commission and permits from the Texas Commission on Environmental Quality (TCEQ) and the U.S. Army Corps of Engineers. Each year, GBRA and NBU reconcile income to expenses for the year.[199]

The Guadalupe Valley Hydroelectric System includes Guadalupe and Gonzales Counties. There are six hydroelectric plants that generate electricity for the Guadalupe Valley Electric Cooperative. The six dams located within the system include: at Lake Dunlap, Lake McQueeney, Lake Placid and Lake Nolte in Guadalupe County and at Lake Gonzales and Lake Wood in Gonzales County.[200] GBRA purchased the dams in 1963 and many of the gates were constructed in the 1920s, making repair and maintenance difficult.[201] GBRA began repair work on the 10 of 15 spill gates, however the Lake Dunlap spill gate failed in May 2019 following a similar spill gate failure on Lake Wood in 2016. GBRA has been working with lake associations and private property owners on the affected lakes to collectively establish special taxing districts to cover repairs and operation of the dams on the river system.[202]

In addition to the dam structures, GBRA also maintains and operates wastewater treatment and water service plants throughout the basin.[203]

Lavaca-Navidad River Authority

The Lavaca-Navidad River Authority (LNRA) was created in 1941 to "manage, conserve, and protect the natural resources of the Lavaca Basin."[204] Members of the Board are appointed by the Governor and confirmed by the Texas Senate. Members serve 6-year staggered terms.[205] LNRA has limited taxing authority and has not levied a tax since 1996. The authority became self-sufficient with the sale of water to the City of Corpus Christi in 1994.[206]

The LNRA owns, operates, and manages Lake Texana and the surrounding property. The lake supplies municipal and industrial needs in Jackson, Calhoun, and a seven-county region surrounding Corpus Christi in Nueces County. LNRA acquired the project in 2001 from the Federal Bureau of Reclamation. The authority manages the surrounding property for fish and wildlife, and the public.[207] LNRA also manages the flood operations at Lake Texana and the Palmetto Bend Spillway through an extension flood warning and detection system throughout the basin.[208]

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[198] *Id.*
[199] *Id.*
[200] *Id.*
[201] *Id.*
[202] *Id.*
[203] *Id.*
[204] Lavaca-Navidad River Authority, https://www.lnra.org, (Last Visited September 9, 2020).
[205] *Id.*
[206] Email from Patrick Brzozwski, Deputy General Manager at Lavaca-Navidad River Authority, to Katherine Thigpen Committee Director of the Senate Committee on Water & Rural Affairs, August 11, 2020, (on file with author).
[207] *Id.*
[208] *Id.*

LNRA maintains general operations from the sale of raw water from Lake Texana. Additionally, water delivery is funded by water customers and the rate is determined by the volume extracted for the customers. Rental fees and support fees maintain the recreation areas owned and operated by LNRA.[209]

Lower Colorado River Authority

The Legislature created the Lower Colorado River Authority (LCRA) in 1934 with a complex system of infrastructure, electric generation, water service, and environmental stewardship.[210] The LCRA generates revenue through selling electricity, electric transmission, and water services which sustains the authority so that it does not levy taxes or receive state dollars.[211] The Board of Directors is comprised of 15 members appointed to six year terms by the Governor.[212]

The LCRA manages 600 miles along the Colorado River and providing water supply for over a million residents while also managing flood risks. The authority has built and operates six dams: Buchanan, Inks, Wirtz, Starcke, Mansfield, and Tom Miller.[213] The dams create the Highland Lakes: Buchanan, Inks, LBJ, Marble Falls, Travis, and Austin. Downstream of Austin, Lake Bastrop Dam and Cedar Creek Dam create off channel reservoirs which supply cooling water for power plants.[214]

The dams in the Highland Lakes have hydroelectric generation capabilities and provide more than 295 megawatts of electricity to the state. While these dams were originally a major source of electricity, they only provide power during emergencies when it is requested by the Electric Reliability Council of Texas (ERCOT).[215]

Lake Travis and Buchanan are water supply reservoirs with capacity highly dependent on drought. Mansfield Dam, located on Lake Travis, is the only dam in the Highland Lakes designed to hold back floodwaters.[216]

The J. Scott Arbuckle Reservoir will be the first new reservoir in the Colorado River basin in decades. LCRA expects the new off-channel reservoir to begin operations in 2022 to capture and store large amount of water downstream that would otherwise be lost.[217]

LCRA supplies water to portions of Matagorda, Wharton, and Colorado counties for agricultural use. Additionally, the authority meets the requirement of a Water Management Plan to supply adequate water for the lower Colorado River and Matagorda Bay environmental needs.[218]

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[209] *Id.*
[210] Email from Thomas E. Oney with attachment, General Counsel, Lower Colorado River Authority, to Katherine Thigpen Committee Director of the Senate Committee on Water & Rural Affairs, August 6, 2020, (on file with author).
[211] *Id.*
[212] Lower Colorado River Authority, https://www.lcra.org, (Last Visited September 9, 2020).
[213] Email from Thomas E. Oney with attachment, General Counsel, Lower Colorado River Authority, to Katherine Thigpen Committee Director of the Senate Committee on Water & Rural Affairs, August 6, 2020, (on file with author).
[214] *Id.*
[215] *Id.*
[216] *Id.*
[217] *Id.*
[218] *Id.*

Most revenues for LCRA come from water resources and electricity revenue. The authority has wholesale electricity contracts with 33 cities and electric cooperatives.[219] The revenue contributes to the operation and maintenance of dam infrastructure.[220]

Lower Neches Valley Authority

The Legislature created the Lower Neches Valley Authority (LNVA) in 1933 to cover the Neches River Basin and the Neches Trinity Coast Basin. The authority covers water supply, wastewater treatment, and water treatment. Approximately, 95% of the watered supplied by LNVA is through the canal system across 600 miles in Jefferson, Liberty, and Chambers Counties.[221] Revenues derived from water delivery cover the costs of operation and maintenance of the system.[222]

The Neches River Saltwater Barrier is a federal project with LNVA as the local sponsor. The barrier is part of the freshwater supply system and LNVA splits the local split of 25% with the City of Beaumont. LNVA also serves as the local sponsor for the construction of the Sam Rayburn Dam (later renamed Town Bluff Dam and Lake BA Steinhagen).[223]

Nueces River Authority

The Nueces River Authority (NRA) was created in 1949 to "preserve, protect, and develop water resources; provide for flood control, irrigation, and navigation; develop parks and recreational facilities; finance water supply;" and other environmental control projects.[224] The NRA jurisdiction begins in Edwards County and ends in Corpus Christi Bay. The authority has a 21-member Board of Directors and does not tax, issue permits, or regulate.[225]

The NRA owns 20% of the Choke Canyon Reservoir and a contract with Corpus Christi for the water rights. The city pays NRA $100,000 per year per the terms of the contract.[226] The NRA is in the final stages of construction on the Leakey Regional Wastewater System which was funded through the State of Texas Revolving Loan Fund and Federal Economic Depressed Areas Program through the Texas Water Development Board. The project is to address the rising bacterial counts on the Frio River, a major economic driver for the region. The system will be owned and operated by the Nueces River Authority with revenues generated from user fees.[227]

The NRA has undergone a financial overhaul in the last three years. The authority took actions to reduce their labor force and spending. Through the new revenue from the water/wastewater laboratory, the river authority expects to continue their mission.[228]

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[219] *Id.*
[220] *Id.*
[221] Email from Scott Hall, General Manager, Lower Neches Valley Authority, to Katherine Thigpen, Committee Director with the Senate Committee on Water & Rural Affairs, July 31, 2020, (on file with the author)
[222] *Id.*
[223] *Id.*
[224] Nueces River Authority, www.nueces-ra.org, (Last visited September 9, 2020).
[225] *Id.*
[226] Email from John Byrum with Attachments, Executive Director, Nueces River Authority, August 14, 2020, (on file with author).
[227] *Id.*
[228] *Id.*

Palo Duro Water District (formally Palo Duro River Authority)

The Legislature created the Palo Duro River Authority in 1973 and formally began with the completion of Lake Palo Duro in March 1991. In 2017, the district name was changed to Palo Duro Water District (PDWD).[229] The district is made up of Moore County, Hansford County, and the City of Stinnet and has nine board members. The main purpose of PDWD is to maintain the lake with revenue from recreation fees and tax dollars from the member counties and city.[230]

Red River Authority

The Red River Authority (RRA) was established in 1959 and encompasses all of 43 counties in the watershed of the Red River and its tributaries upstream.[231] The infrastructure system for the RRA is made up of water systems, wastewater systems, support buildings, and equipment. The authority has issued over $489 million in tax-exempt contract revenue bonds for financial assistance to entities throughout the basin.[232]

The RRA provides contracted water and wastewater services to municipalities and unincorporated communities. Since 2017, the RRA has invested $4.42 million to bring the authorities systems into regulatory compliance.[233]

Sabine River Authority

The Legislature created the Sabine River Authority (SRA) in 1949 as a conservation and reclamation district. The 21 basin counties include: Orange, Newton, Jasper, Sabine, San Augustine, Shelby, Rusk, Panola, Harrison, Gregg, Smith, Upshur, Wood, Van Zandt, Kaufman, Rains, Rockwall, Collin, Hunt, Hopkins, and Franklin.[234] The authority manages three major reservoirs, a canal system, municipal and industrial water supply, agricultural water supply, hydroelectric generation, water quality, and economic development in the basin.[235]

The Authority purchased the John W. Simmons Gulf Coast Canal System in 1954. It was built in the 1930s and is made up of a pump stations and more than 70 miles of gravity flow canals. The system provides raw water to industries, a municipality, rice farmers, catfish and crawfish producers, and other customers. The age of the system has contributed to several electrical and mechanical failures, which have resulted in a loss of 50% pumping capacity.[236] SRA is currently constructing a new pump station and replacing existing equipment with a $75 million loan through the State Water Implementation Fund for Texas (SWIFT) from the Texas Water Development Board. The SRA's industrial customers in Orange and Newton Counties will repay funding.[237]

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[229] Palo Duro Water District, https://palodurowaterdistrict.com/, (Last Visited September 9, 2020).
[230] Texas Sunset Commission, "Palo Duro River Authority Self Evaluation Report."
[231] Red River Authority, http://www.rra.texas.gov, (Last Visited September 9, 2020).
[232] *Id.*
[233] Red River Authority, "2020 Asset Management Plan," July 15, 2020.
[234] Sabine River Authority of Texas, "Fact Sheet."
[235] *Id.*
[236] Email from Debra Stagner with Attachment, Treasurer & Chief Administrative Officer Sabine River Authority of Texas, to Katherine Thigpen, Committee Director with the Senate Committee on Water & Rural Affairs, August 6, 2020, (on file with the author).
[237] *Id.*

Revenue from the canal system is derived from water sales to industrial users including petrochemical plants, steel plants, and electric generation plants.[238]

SRA owns and operates Lake Tawakoni which was completed in 1960. The City of Dallas has water rights through contract for 80% of the water yield and pays 80% of the operation and maintenance expenses.[239] Revenue for the lake comes from water sales to Dallas, municipalities, regional water providers, and three special utility districts. The Iron Bridge Dam is an embankment structure which undergoes a three-year detailed inspection. In addition, SRA employees conduct weekly and monthly inspections to address any issues that may be developing.[240]

The Toledo Bend Reservoir is the largest reservoir in the southern United States and is jointly owned by SRA with the corresponding river authority in Louisiana. Each state has 50% assets in the lake including liabilities and revenues. Construction on the dam was completed in 1969. The reservoir provides both water supply and hydroelectric power. Every five years, the Federal Energy Regulatory Commission requires an inspection of the entire dam facility, "a potential failure mode analysis (PFMA); a table-top emergency drill, and a full functional emergency exercise with impacted state and local emergency management officials in both Texas and Louisiana."[241]

Finally, Lake Fork is the final reservoir owned and operated by SRA. Construction was complete in 1980 and a full conservation pool was reached in 1985. Through contracts with electric companies and the City of Dallas, financial obligations for the reservoir are divided. The Lake Fork Dam is inspected annually by a professional engineering firm and every third year a more in-depth evaluation is performed.[242]

San Antonio River Authority

The San Antonio River Authority (SARA) was created in 1937 for the "preservation, protection, and sustainability of the San Antonio Watershed."[243] The area runs from San Antonio to the Texas Coast and is governed by a 12 member Board of Directors.[244]

The SARA maintains 41 dams in Bexar (28) and Karnes (14) Counties. The flood control dams provide significant protection from floodwaters for residents and property. They also allow for water to drain into the Edwards Aquifer, one of the main sources of drinking water for the City of San Antonio.[245] The authority also maintains two flood conveyance tunnels in partnership with the U.S. Army Corps of Engineers to protect San Antonio from flood damage. The San Antonio River flood diversion tunnel is 16,200 feet long and was designed to carry 6,700 cubic feet per second.

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[238] *Id.*
[239] *Id.*
[240] *Id.*
[241] *Id.*
[242] *Id.*
[243] San Antonio River Authority, https://www.sara-tx.org, (Last Visited September 9, 2020).
[244] *Id.*
[245] Email from Hillary Lilly via Shauna Fitzsimmons Sledge, Government Affairs, San Antonio River Authority, to Katherine Thigpen, Committee Director for the Senate Committee on Water & Rural Affairs, August 12, 2020.

The San Pedro Creek flood diversion tunnel is 6,000 feet long and was designed to carry a 100-year flood flow of 4,600 cubic feet per second.[246]

Additionally, SARA created the Mission Reach Ecosystem Restoration and Recreation Project to increase the quality, quantity, and diversity of plants and animals along 8 miles of the San Antonio River Mission Reach area. The project improves the tunnel flood capacity.[247]

In 2003, SARA became a Cooperating Technical Partner with the Federal Emergency Management Agency and invested $14 million to comprehensively map over 1,700 stream miles in Bexar County which updates the area's decades old flood maps.[248]

Revenues for projects are derived from taxes collected for planning, operations, and maintenance activities.[249] The tax is limited to two cents per $100 of assessed property valuation and is currently set at $0.01858 per $100 of assessed property valuation.[250]

San Jacinto River Authority

The San Jacinto River Authority (SJRA) was created in 1937 to "develop, conserve, and protect the water resources of the San Jacinto River Basin."[251] The authority has a 12 member Board of Directors and the area covered includes the entire watershed with all of Montgomery County, and parts of Walker, Waller, San Jacinto, Grimes, Fort Bend, and Liberty Counties.[252]

SJRA manages the Lake Conroe Reservoir. Dam operations cover a 2.2-mile earth filled dam with five tainter gates and a service outlet with three gates. The reservoir has a storage capacity of 412,000 acre-feet and construction was completed in 1973. Lake Conroe is the sole source of surface water supply to a major electric generation facility and 80 retail utilities.[253] All repairs, operation, and rehabilitation costs are covered through revenues collected from raw water sales.[254]

The Highlands System consists of pump stations, levees and canals, and the Highlands Reservoir. The reservoir is a 1,400 acre-foot buffering reservoir with approximately 35,000 linear feet of raised levee completed in 1943. The Highlands Raw Water Delivery System is the sole source of raw water supply to three municipal customers and eight industrial customers, including one of the largest petrochemical refinery complexes.[255] Repair and expansion projects are closely coordinated with the customers who benefit from the system.[256]

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[246] *Id.*
[247] *Id.*
[248] *Id.*
[249] San Antonio River Authority, https://www.sara-tx.org, (Last Visited September 9, 2020).
[250] *Id.*
[251] San Jacinto River Authority, https://www.sjra.net, (Last Visited September 9, 2020).
[252] *Id.*
[253] *Id.*
[254] Email from Jace Houston with Attachment, General Manager, San Jacinto River Authority to Katherine Thigpen, Committee Director with the Senate Committee on Water & Rural Affairs, August 25, 2020, (on file with the author).
[255] *Id.*
[256] *Id.*

The Groundwater Reduction Plan (GRP) System was created to move Montgomery County off groundwater supply to avoid subsidence issues.[257] Eighty utilities joined together to fund the wastewater treatment plan with a 30 million gallon per day capacity. Each participating utility will pay a water rate fee which will fund the construction of the system.[258]

SJRA also manages the Woodlands Water System and the Woodlands Wastewater System, similarly, funded by ratepayers.[259]

Sulphur River Basin River Authority

The Sulphur River Basin River Authority (SRBRA) is in the northeast corner of the state and includes all or part of Fannin, Hunt, Lamar, Hopkins, Red River, Franklin, Titus, Morris, Bowie, Cass, and Delta Counties.[260]

The authority mainly covers water quality, environmental issues, and assisting other entities with debris. The SRBRA does not manage any water or wastewater system or structures.[261]

Trinity River Authority

The Trinity River Authority (TRA) was created in 1955 and contains 60 cities in the Trinity River Basin.[262] The TRA provides treated water to municipalities and districts totaling over 329,726 Texans and wastewater to 1,679,020 residents.[263] The authority divides its infrastructure between the northern and southern regions.[264]

In the northern region, there are five regional wastewater treatment systems. TRA constructed and maintains 370 miles of pipelines. The TRA also operates the Tarrant County Water Supply Project, which draws water from Lake Arlington. The project has 35 miles of lines.[265]

The southern region has three regional water supply systems and Lake Livingston. The East Texas Electric Cooperative owns and operated the Lake Livingston Dam for hydropower. TRA is responsible for the operation and maintenance of the reservoir and dam. TRA and the City of Houston share in the 1.25 million acre-feet annual yield in Lake Livingston. Currently, a project is underway to recoat and rehabilitate the dam's tainter gates. Houston and TRA share in the costs of projects such as this from anywhere in-between 30% to 70%.[266]

TRA also is the local sponsor for the U.S. Army Corps of Engineers for Joe Pool Lake, Lake Bardwell, and Lake Navarro. The authority holds water rights within each of the reservoirs.[267]

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[257] *Id.*
[258] *Id.*
[259] *Id.*
[260] Sulphur River Basin River Authority, https://wwwswbatx.org, (Last Visited September 9, 2020).
[261] Email from Nancy Rose, Sulphur River Basin River Authority, to Katherine Thigpen, Committee Director with the Senate Committee on Water & Rural Affairs, August 10, 2020, (on file with the author).
[262] Trinity River Authority, https://www.trinityra.org, (Last Visited September 9, 2020).
[263] Email from Amy Stelter with Attachment, Government Relations, Trinity River Authority to Katherine Thigpen, Committee Director with the Senate Committee on Water & Rural Affairs, August 5, 2020, (on file with the author).
[264] *Id.*
[265] *Id.*
[266] *Id.*
[267] *Id.*

The regional concept created by TRA is supported by ratepayers in the service areas. The authority does not impose a tax of any kind. [268]

Upper Colorado River Authority

The Legislature created the Upper Colorado River Authority (UCRA) in 1935 with an emphasis on maintaining the Upper Colorado River through water quality and environmental programs. The UCRA does not necessarily own or maintain any large infrastructure but owns water rights, which are sold to neighboring municipalities and San Angelo.[269]

Upper Guadalupe River Authority

The Legislature created the Upper Guadalupe River Authority (UGRA) in 1939 to maintain the quality and conservation of the Guadalupe River watershed in Kerr County.[270] The authority does not own or operate any infrastructure.[271]

Recommendations

River authority jurisdiction in the state is diverse and lacks cohesion. Following the Lake Dunlap dam failure in April 2019, concerns were raised as to whom the river authorities answer to and who has the maintenance and operations responsibility over private dams and lakes. The quasi-public nature of the entities has created confusion as to what purpose they serve and what is their governance. State and federal agencies consistently interact with river authorities but have no overarching jurisdiction over them.

Remedies to avoid the confusions surrounding jurisdiction could lie with the board appointments. Some of the positions could be switched to at-large spots that require an election so that the property owners within the jurisdiction of the authority have input. Another position on the board could be designated as non-voting and held by a state agency representative to provide transparency.

Without transparency, there is no public trust and this leads to hostility from property owners who rely on the resources provided by river basins. When considering the missions of river authorities to protect natural resources and provide services, the case can be made to require more oversight for the governance of these entities.

At a minimum, if a river authority has responsibilities that have the potential of endangering the public, such as deferred maintenance items, the improper taking care of a natural resource, or other matters of public interest, there must be adequate reporting and oversight by the legislature. The 2019 Lake Dunlap dam breach is a prime example of possible public safety issues. The breach itself was a result of the inability to fund a maintenance program to rehabilitate the dam which was the responsibility of the river authority. Other than the enabling legislation, which upon review was conflicting as to the ability to generate enough revenue to manage the maintenance needed to keep the dam safe, there was no other oversight or jurisdiction available.

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[268] *Id.*
[269] Upper Colorado River Authority, https://ucratx.org, (Last Visited September 9, 2020).
[270] Upper Guadalupe River Authority, http://www.ugra.org, (Last Visited September 9, 2020).
[271] *Id.*

The committee recommends that river authorities with oversight of dams, that provide water supply, flood control, recreation, and utilities, report to the state the status of the dams as to structural integrity, the program in place to maintain the structures, and a plan to get the dam into compliance with the safety standards as outlined by the appropriate federal or state standards. An inventory of the dams in the state will help establish who has jurisdiction and the structural integrity of the dams as well as a plan to repair, rebuild, or rehab the dams, serving as a proactive, preventive approach before there are problems.

Interim Charge #3

Study the state's groundwater regulatory framework and make recommendations to improve groundwater regulation, management, and permitting.

Committee Hearing Information

The Committee held a hearing on January 22, 2020 to hear testimony from invited stakeholders and the public on groundwater regulatory framework in the state.

Invited testimony from the following persons:

- Larry Temple, Director, Texas Water Development Board
- Kelly Mills, Assistant Director, Water Availability Division, Texas Commission on Environmental Quality
- Leah Martinsson, Executive Director, Texas Alliance of Groundwater Districts
- Zachary Yanta, Vice President, Texas Farm Bureau

Groundwater in Texas - Local Control

There are ninety-seven groundwater conservation districts (GCDs) in 173 counties in Texas. GCDs are created by the Texas Legislature or through the Texas Commission on Environmental Quality (TCEQ) through the Priority Groundwater Management Area (PGMA) process.[272] GCDs are confirmed by election except in the case of a Priority Groundwater Management Area (PGMA), and often have elected boards.[273] According to the TWDB, of the average 6.95 million acre-feet of groundwater used each year, 90% is managed through GCDs.[274]

The most common way for GCD creation is through legislative action.[275] On average, the Texas Legislature creates one to three GCDs each legislative session.[276] Another way in which a GCD is created is through the PGMA process at TCEQ. The agency is tasked with studying an area in collaboration with Texas Water Development Board (TDWB) and Texas Parks and Wildlife Department (TPWD) to determine if there is a need for groundwater management in the area.[277]

Water as a Resource

Where located, GCDs are responsible for a large swatch of underground water resources that rely on recharge to replenish. Recharge is the "downward flow of water reaching the water table and

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[272] Texas Water Development Board, "Groundwater Conservation District Facts," http://www.twdb.texas.gov/groundwater/conservation_districts/facts.asp, (Last Visited August 7, 2020).
[273] *Id.*
[274] Texas Water Development Board, "Groundwater Conservation District and Groundwater Management Plan FAQ," http://www.twdb.texas.gov/groundwater/faq/index.asp, (Last Visited August 7, 2020).
[275] Tex. Const. art. 16, § 59.
[276] Texas Water Development Board, "Groundwater Conservation District Facts," http://www.twdb.texas.gov/groundwater/conservation_districts/facts.asp (Last Visited August 7, 2020).
[277] Texas Commission on Environmental Quality, "Priority Groundwater Management Areas," https://www.tceq.texas.gov/groundwater/groundwater-planning-assessment/pgma.html, (Last Visited August 7, 2020).

increasing groundwater storage."[278]. Recharge serves as an important component of the water cycle. The degree to which water infiltrates back into the system varies widely across the state.[279] Recharge can occur from four potential sources: precipitation, return flow from irrigation, surface water, and cross-formational flow from other aquifers.[280]

Groundwater professionals estimate recharge in several different ways. Groundwater flow models such as GAMS use a water budget analysis which considers input to all aquifer systems. Surface water methods, which measure seepage or groundwater flow from streams, measure discharge which can evaluate what is beneath the surface. Tracer techniques including groundwater age-dating models and chemical isotope tracers can measure how long water has remained in the aquifer.[281]

In Texas, the highest rate of recharge occurs in aquifers in central Texas including Edwards Aquifer (5.27 inches/year), Hickory Aquifer (3.64 inches/year), and the Marble Falls Aquifer (2.31 inches/year). These aquifers have fractured or faulted formations allowing for the infiltration of runoff.[282] Most aquifers in the state have an estimated recharge rate of 1 inch per year. The lowest rates of recharge are in West Texas where there is also a lower rate of precipitation.[283]

TWDB collaborates to maintain a wide swath of groundwater data for use by GCDs, the public, and other officials. One such data set is the Groundwater Availability Models (GAMs). The process includes "developing and using computer programs to estimate future trends in the amount of water available in an aquifer based on hydrogeological principles, actual aquifer measurements, and stakeholder guidance."[284] The models are critical to future planning and DFC development by GCDs, planning by regional state water planning groups, and other stakeholders. GCD are required to use modeling to manage their resources.[285]

TWDB groups the GAM models in two ways. First, they can be simulated and run based on a district's Groundwater Management Area (GMA). Often some areas may look like they have a high rate of recharge but in face cover a large amount of space and therefore appear to have higher recharge.[286]

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[278] Texas Water Development Board, "Summary of Groundwater Recharge in Groundwater Conservation Districts and Major/Minor Aquifers in Texas," August 2020.
[279] *Id.*
[280] *Id.*
[281] *Id.*
[282] *Id.*
[283] *Id.*
[284] Texas Water Development Board, "Groundwater Models," http://www.twdb.texas.gov/groundwater/models/index.asp, (Last Visited August 7, 2020).
[285] *Id.*
[286] Texas Water Development Board, "Summary of Groundwater Recharge in Groundwater Conservation Districts and Major/Minor Aquifers in Texas," August 2020.

GAM Simulated Recharge Estimates in Groundwater Conservations Districts in each Groundwater Management Area

Groundwater Management Area	Total Simulated Recharge (acre feet per year_
1,2	853,352
3	125,823
4	104,234
6	294,545
7	780,331
8	577,847
9,10	1,009,572
11	315,871
12	519,202
13	206,016
14	245,470
15	176,518
16	53,497
Total	**5,262,278**

Table from: Texas Water Development Board, "Summary of Groundwater Recharge in Groundwater Conservation Districts and Major/Minor Aquifers in Texas," August 2020.

The GAMs are also run by major and minor aquifers. The total recharge estimate for districts by aquifer is over 5.2 million-acre feet per year which is reasonably close to the method of grouping by GMA.[287]

[287] *Id.*

GAM Simulated Recharge Estimates in Major and Minor Aquifers

Aquifer	Recharge in Groundwater Conservation Districts (acre feet per year)	Recharge in Entire Aquifer (acre feet per year)
Blaine	74,806	85,574
West Texas Aquifers	59,400	59,524
Brazos Valley Alluvium	54,249	63,983
Queen City, Sparta	295,141	528,022
Yegua-Jackson	353,417	573,094
Carrizo-Wilcox	421,122	668,360
Dockum	34,524	69,503
Edwards (Balcones Fault Zone)	684,697	908,864
Edwards Trinity (Plateau)	708,367	846,763
Llano Uplift Aquifers	165,326	200,193
Gulf Coast Aquifer	408,615	500,366
Ogallala	838,680	982,345
Pecos Valley	109,822	234,991
Seymour	220,083	358,270
Trinity Hill Country	343,039	355,734
Trinity Woodbine	462,884	596,421
Total	**5,234,172**	**7,032,007**

Table from: Texas Water Development Board, "Summary of Groundwater Recharge in Groundwater Conservation Districts and Major/Minor Aquifers in Texas," August 2020.

The GCD Planning Process

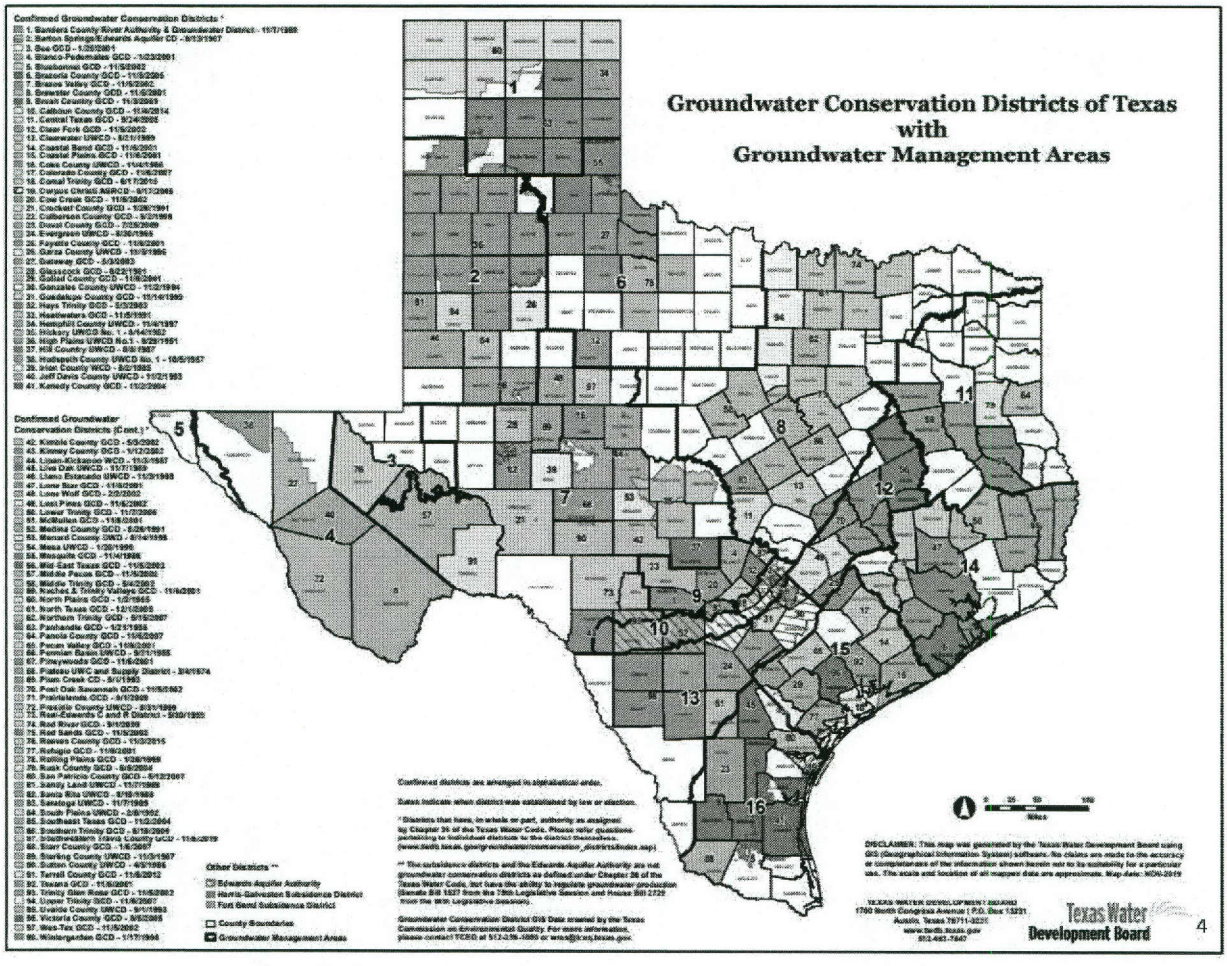
All GCDs are required to submit a Groundwater Management Plan to the TWDB. The plan explains a district's goals to manage their aquifer and contain several statutorily required goals:[288]

- providing the most efficient use of groundwater;
- controlling and preventing waste of groundwater;
- controlling and preventing subsidence;
- addressing conjunctive surface water management issues;
- addressing natural resources issues that impact the use and availability of groundwater, and which are impacted using groundwater;
- addressing drought conditions;
- addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control, where appropriate and cost-effective; and
- addressing the desired future conditions established pursuant to the Texas Water code.

GCDs are regionalized through the 16 Groundwater Management Areas (GMAs) located across the state.[289] The Texas Water Development Board (TWDB) assists the GMAs with their groundwater management. The TWDB works with the GMAs by providing technical assistance through the Groundwater Availability Models and other means.[290]

[288] Texas Water Code §36.1071 - §36.1073; 31 Texas Administrative Code 356.10, 356.51-356.54
[289] Texas Water Development Board, "Groundwater Management Areas," http://www.twdb.texas.gov/groundwater/management_areas/index.asp, (Last Visited March 17, 2020).
[290] Senate Committee on Water & Rural Affairs Hearing, January 22, 2020 (testimony from Larry Temple, Texas Water Development Board).

Groundwater Management Areas in Texas



Map provided by the Texas Water Development Board.

GMAs also participate in the adoption of Desired Future Conditions (DFCs) which refer to the "quantified condition of groundwater resources… within a management area at one or more specified times."[291] The DFCs assist GCDs in planning, permitting, and creating rules for groundwater usage in their area. They also protect the aquifer resources beneath the ground for future use.

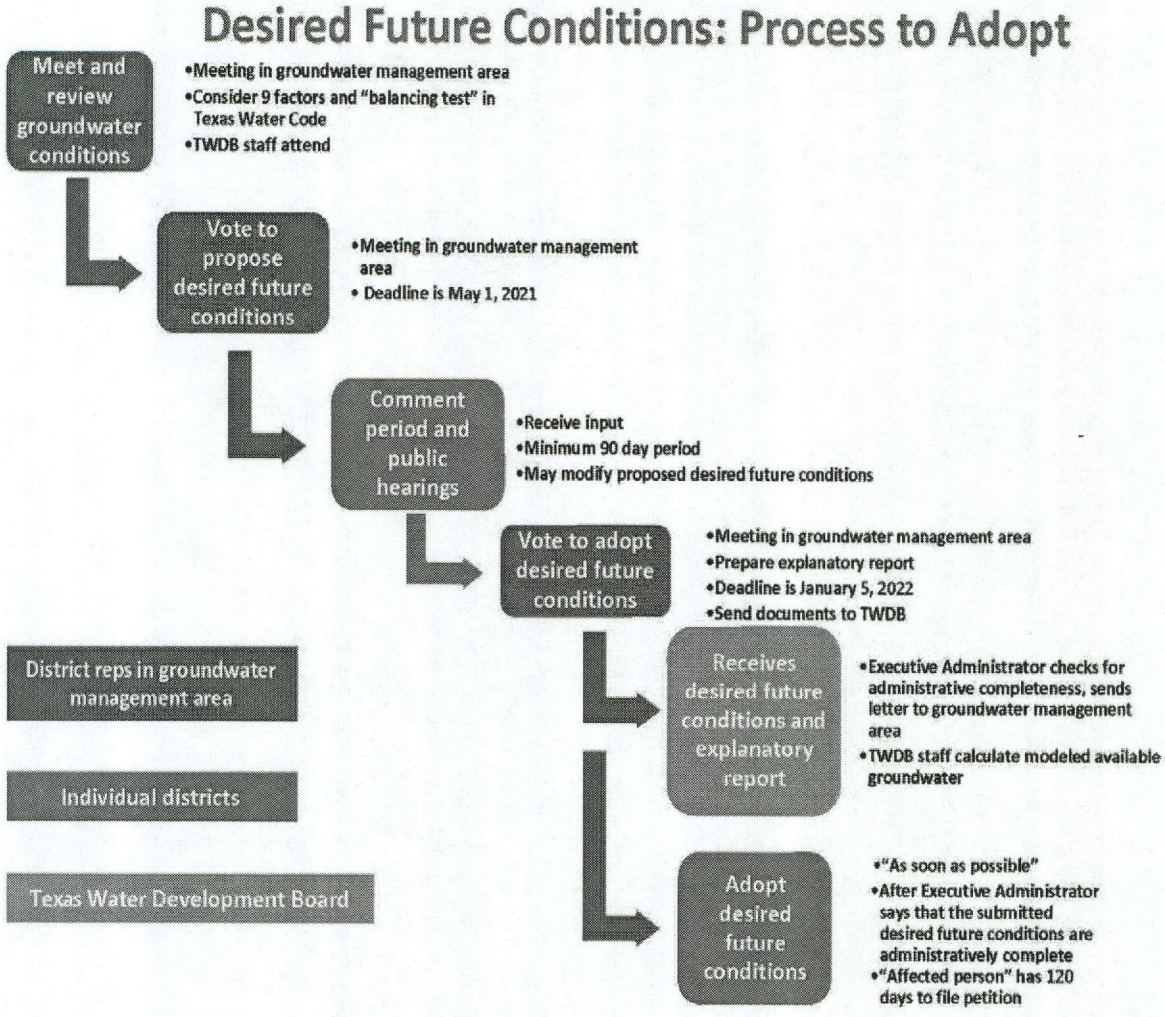
To adopt a DFC, GCDs must consider the following nine factors[292]:

- Aquifer uses/conditions
- water supply needs/strategies in the State Water Plan
- Hydrological conditions
- Environmental impacts
- Subsidence
- Socioeconomic impacts

[291] Tex. Admin Code, Title 31, Part 10 §356.10.
[292] Tex. Water Code Title 2 §36.108(d)

- Private property rights
- Feasibility of achieving
- Other[293]

The districts within their GMAs must consider all factors when developing their DFC. The following chart depicts the process for which GMAs, and districts undertake to complete the DFC process.



Reprinted from Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020, (written testimony from Larry French with Texas Water Development Board).

Rulemaking

Chapter 36 of the Texas Water Code allows for the management of water resources by GCDs through permits, rules, and monitoring of wells. GCDs use rules to limit groundwater production in order to maintain an aquifer through well spacing and land tract size.[294] Statute requires the GCDs to consider among other requirements "groundwater uses and needs, develop rules that are

[293] *Id.*
[294] Texas Water Code, Chapter 36 § 101.

fair and impartial, and consider ownership and rights."[295] Rules for groundwater districts have required posting and appeal processes.[296] GCDs have enforcement authority of their rules with civil penalties, injunctions, and court.[297]

GCDs can create rules and permit the transfer of groundwater out of a GCD area.[298] Districts can limit a transfer permit based upon the conditions of the aquifer and regional water planning in the area.[299]

Production and spacing are also regulated by districts to minimize "the drawdown of the water table..., to control subsidence, to prevent interference between wells, to prevent degradation of water quality, or to prevent waste."[300] Ways in which production can be limited may be well production, capacity of pumping, or specific construction requirements.[301] Additionally, production can be based on the amount of acreage and general production limits. GCDs create rules for spacing by restricting wells on proximity from property lines, other wells, and within a well field.[302]

Court Cases

Private property, groundwater rights, and management of water resources continue to be challenged in court. In 2012, the Texas Supreme Court ruled in the landmark case EAA v. Day which required landowners to be compensated for water taken for public use.[303] In areas where there is no local regulation, a landowner applies the Rule of Capture and can therefore use the water underneath their land without restrictions based on the Rule of Capture.

In the Brazos Valley Groundwater Conversation District (BVGCD) case, landowners challenged the district's classification of a well owned by the City of Bryan, Texas. The case centered on the landowners claim that the district classified the city's well as a previous existing well and therefore eligible for pumping rules which allowed for more production. The property owners asserted that this was a taking and that BVGCD owed them for the water rights.[304] The court found that GCDs are not immune from suit under the 11th Amendment, the trial court should not have abstained from considering the taking or equal protection claims as state law on the ownership of water is sufficiently settled through previous court cases, and the taking claim is ripe for adjudication because the plaintiffs properly exhausted state law remedies.[305] The plaintiff sufficiently argued that they have a takings claim. The court remanded the case to the lower court for a hearing.[306]

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[295] *Id.*
[296] *Id.*
[297] Texas Water Code, Chapter 36 § 36.102.
[298] Texas Water Code, Chapter 36 § 36.122.
[299] *Id.*
[300] Texas Water Code, Chapter 36 § 36.116
[301] *Id.*
[302] *Id.*
[303] Edwards Aquifer Authority v. Day 2012
[304] *Stratta, et al. v. Roe, et al.*, No. 18-50994 (5th Cir. filed May 29, 2020).
[305] *Id.*
[306] *Id.*

In another case, landowners attempted to petition the Lost Pines Groundwater Conservation District (LPGCD) about a permit application for operation and transfer of groundwater in the district.[307] The case went through several jurisdictional procedures with the district court finally ruling that it lacked jurisdiction over the issue due to the landowners' failure to file a timely petition.[308]

The Legislature resolves some cases with a change in state statute. The Uvalde County Underground Water Conservation District, along with the city, county, and landowners sued the Edwards Aquifer Authority (EAA) about the transfer of irrigation rights.[309] According to the plaintiffs, a new EAA rule violated the enabling legislation for the authority allowing for base irrigation on certain lands to be converted to non-agricultural use.[310]

Committee Testimony on Interim Charge #3

Groundwater in the state is managed in two ways. The first is through local control where groundwater conservation districts (GCDs) manage the water resource. Second, groundwater is managed on a regional basis through the joint planning process. For the statewide point of view, groundwater availability numbers are used in the joint planning process.[311] The change brought concerns of increased groundwater production from the Edwards Aquifer which would deplete resources needed by others. The parties in the suit agreed to wait while the 86th Legislature met and passed a stakeholder agreed to House Bill 3656.[312]

According to Larry French with the Texas Water Development Board (TWDB), in order for a region to develop, approve, and implement their desired future conditions (DFCs) for the area, science and policy must come together.[313] DFCs are translated to policy goals to manage the resources and can be expressed as: water levels or changes in the aquifer, spring flows, storage volumes, and/or subsidence. In order to understand the differences in the resource, the regions and state rely on groundwater availability models (GAMs).[314] Mr. French explained that modeled available groundwater is the "amount that would be pumped each year that would satisfy or achieve a DFC."[315]

Sixteen groundwater management areas (GMAs) follow nine major aquifer boundaries. Within each GMA, there are GCDs. DFC adoption takes place in the GMAs with discussion and development from member GCDs. The boundaries of the GCDs are often political boundaries, not

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[307] *End Op, L.P. v. Meyer*, No. 03-18-00049-CV, 2018 Tex. App. LEXIS 6934 (Tex. App.—Austin Aug. 29, 2018).
[308] *Id.*
[309] *Uvalde County Underground Water Conservation District, et al. v. Edwards Aquifer Authority, et al.*, No. 18-06-25064-CV (38th Dist. Ct. Uvalde Cnty. Tex.).
[310] *Id.*
[311] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020, (oral testimony from Larry French with Texas Water Development Board).
[312] Tex. H.B. 3656, 86th Leg., R.S. (2019)
[313] *Id.*
[314] *Id.*
[315] *Id.*

hydrological which is why the state created the regional planning process so that districts which share a common aquifer work together.[316]

Within their GMA, GCDs are required to use policy and science to develop their DFC.[317] They will use various factors such as aquifer conditions, the State Water Plan, private property rights, and others with a balance of the highest practical level of groundwater use coupled with protection of the resource. The 9-point checklist for the DFC is required in statute and each issue must be addressed.[318] According to Mr. French, state law requires that a GCD manage their resources in accordance with the approved DFC.

Affected persons can file petition with the State Office of Administrative Hearings (SOAH) to review the process after a GCD accepts a DFC. TWDB conducts an administrative review to make sure the DFC meets all statutory requirements. TWDB will also run the DFC with the scientific models to make sure it is feasible and identify the deficiencies. The GCD may seek to go to mediation but if not, the appeal will face a full review under SOAH who will send their recommendation to the GCD which issues their final decision. If a DFC is unreasonable, all GCDs in the GMA must reconvene and revise the DFC.[319]

All GCDs are required to create a groundwater management plan (GMP) on a five-year cycle which shows how the district will manage the groundwater and set forth the policies which are implemented by rules. TWDB provides technical assistance as needed and requested by the GCDs but their main role is to certify the plan as administratively complete. If TWDB finds that the GMP is not administratively complete, the agency will not approve it. The GCD must resubmit the plan within 60 days or appeal the decision which can be settled through mediation or district court.[320]

Mr. French explained that the TWDB does a lot of the scientific analysis of the aquifers throughout the state.[321] Last year the agency took 9,000 water level measurements directly through the agency, GCDs, and the USGS. Additionally, TWDB and the state's GCDs collect water quality analysis from around 350 wells each year rotating through the state every four years.[322]

One tool in which the TWDB relies heavily are the Groundwater Availability Models (GAMs) which update on a rolling cycle. The models are used by planners, decisions makers, and local GCDs.[323] A major benefit of GAMs is an enhanced understanding of the "behavior and characteristics of the state's aquifers."[324] Last legislative session, the TWDB received resources to

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[316] *Id.*
[317] *Id.*
[318] *Id.*
[319] *Id.*
[320] *Id.*
[321] *Id.*
[322] *Id.*
[323] *Id.*
[324] *Id.*

invest in software technology that will be "invaluable for decision makers."[325] The agency continues to work together with other state, local, and private entities.[326]

The Texas Commission on Environmental Quality (TCEQ) is responsible for the designation of Priority Groundwater Management Areas (PGMAs).[327] A PGMA is an area that is experiencing or expected to experience critical groundwater issues within a 50-year period. The TCEQ has conducted 18 studies, five updates, and designated seven PGMAs that cover all or part of 35 counties.[328] TCEQ and TWDB identify potential areas for using data through the State Water Plan and joint planning process within GMAs. Once an area is identified, TCEQ must notify stakeholders in an area and solicit comment.[329] Then TWDB, TPWD, and TDA submit information on the area and TCEQ prepares a report with recommendations. If the PGMA is recommended, a contested case hearing will be conducted by SOAH with the Commissioners making the final decision on designation.[330]

With a positive designation, TCEQ will collaborate with Texas A&M Extension Services to consult with the County Commissioner's Courts with outreach for the new PGMA. Residents in the area have two years to establish the new GCD or join an existing GCD. TCEQ can act if there is not compliance.[331]

According to Mr. Kelly Mills with the TCEQ, the agency is required to facilitate the creation of new GCD creation, boundary information, registration of GCD board members, and performance reviews.[332]

TCEQ tracks management plan adoption requirements through a memorandum of agreement with TWDB.[333] Through a memorandum of agreement with TWDB, the TCEQ enforces compliance with groundwater management plan adoptions by GCDs. According to Mr. Mills, TCEQ is responsible for performance review for a GCD if a management plan is not adopted, the TWDB denies the management plan, the State Auditor's Office (SAO) determines a GCD is not operational, or an inquiry into a GCD has been accepted.[334] In a case where a GCD is found to not be in compliance, TCEQ will begin enforcement actions. There are several actions the agency can take including dissolving the Board of the GCD and electing new members, requested the Attorney General file suit to place a receiver as management of the GCD, dissolve the district, or make recommendations for legislative remedies.[335]

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[325] *Id.*
[326] *Id.*
[327] Joint Senate Committee on Water & Rural Affairs and Natural Resources & Economic Development Hearing, January 22, 2020 (testimony from Kelly Mills, Texas Commission on Environmental Quality).
[328] *Id.*
[329] *Id.*
[330] *Id.*
[331] *Id.*
[332] *Id.*
[333] *Id.*
[334] *Id.*
[335] *Id.*

Since 1997, the SAO has found eleven GCDs not operational and other occasions where a GCD has failed to adopt a management plan. In these cases, TCEQ works with the GCD to bring them into compliance through schedules and technical assistance. The agency has required enforcement on three GCDs resulting in the dissolution of one while the other two consolidated with neighboring districts.[336]

The Texas Alliance for Groundwater Districts (TAGD) was created in 1988 by GCDs and represents 86 of the nearly one hundred GCDs in the state.[337] The organization provides technical and educational assistance, resources to the public and officials, and frequently collect data from the members.[338]

TAGD undertook a survey of its members recently of which 69 groundwater districts responded. In the last ten years, 45,000 permits have been issued for groundwater development with a denial rate of less than 0.2%.[339] Of those, 73% had no contested case hearing requests. Sixty-nine cases were requested for a contested case hearing and over half of those were resolved before the case made it to a hearing. Of the 34 cases which were heard, nine were requested to move on to SOAH, 13 engaged attorneys, and five lawsuits were filed.[340]

Chapter 36 allows for GCDs to recover attorneys' fees in a case where they prevail, but the petitioner cannot. Of the GCDs that answered the survey, ten reported being sued with 17 lawsuits in the last ten years. There were 11 suits for permit issuance, five related to a challenge of the GCDs rules, and 1 was against a DFC.[341] the 17 lawsuits, GCDs have prevailed in six, four are on-going, five have been settled, one was dismissed, and the GCD lost the last one.[342] In two of the six cases in which the GCDs prevailed, they were awarded attorney's fees.[343]

More than 3,000 permit or rule violations have been resolved in the last ten years without a lawsuit. There were 21 permit or rule violations which required a lawsuit to be filed for resolution. Of those, two of the cases are on-going and all others, the GCD prevailed except for one in which the GCD chose not to pursue.[344] In thirteen of these cases, the GCDs were awarded attorney's fees.[345]

GCDs continue to work collaboratively with TWDB in support of data collection and scientific research. The joint planning process within the GMAs has increased the coordination between districts. According to Ms. Martinsson, the GMA process provides a good place for GCDs to evaluate how their rules are similar and share data.[346]

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[336] *Id.*
[337] Senate Committee on Water & Rural Affairs Hearing, January 22, 2020 (written testimony Leah Martinsson, Texas Alliance for Groundwater Districts.)
[338] *Id.*
[339] *Id.*
[340] *Id.*
[341] *Id.*
[342] *Id.*
[343] *Id.*
[344] *Id.*
[345] *Id.*
[346] *Id.*

According to Mr. Zack Yanta with the Texas Farm Bureau (TFB), the organization supports the regulation of groundwater by GCDs, however, not when districts interfere with private property rights.[347] Members of the organization have serious concerns with discriminatory rules by some districts that base groundwater production on the type of landowner as opposed to the amount of land they own. TFB also disagrees with allowing cities to use their residents' water rights to have a permit to pump more groundwater compared to a rancher who must use their acreage of land.[348]

As an example of unfair treatment by a GCD, Mr. Yanta paid to have a groundwater survey done over his private property.[349] The study yielded results that were in contrast to what the GCD permitted. In fact, Mr. Yanta believes the GCD is unfairly restricting the amount they can sustainably pump based on their findings.[350] Unfortunately, the GCD does not provide a means for Mr. Yanta to present his data.[351]

TFB also believes that private property owners should receive notice when a permit application is taken by a GCD, which may impact their water supply. The organization also supports the continued discussion on the awarding of attorney's fees.[352]

Recommendations

There is still room for improvement in our groundwater regulations in the state. It is concerning that there are cases such as Mr. Yanta's which occur where a landowner obtains the best available science with no method to submit their findings to a GCD. Private property rights combined with sound science is paramount to our success as a state, which means our residents must have a seat at the table.

The same applies to a private property owner's right to challenge a regulation they feel is impractical or burdensome on their water rights. Thanks to recent court cases, those who challenge a GCD can do so in federal court and avoid the attorney's fees tied to district courts. We should therefore revisit a loser pay system or adjust the current standards and if not, eliminate the attorney's fee requirement.

Groundwater conservation districts (GCDs), the state, local jurisdictions, water users, and private property owners must continue the progress made over the last several years for transparency, collaboration, and the use of the best available science to manage the water resources of our state. Following the 86th Legislative Session, many GCDs worked to create a collaborative, transparent environment engaging local leaders, the public, and state officials. These efforts should continue as they have provided much needed clarity on the inner workings of rules, permits, and enforcement at the GCD level.

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[347] Senate Committee on Water & Rural Affairs Hearing, January 22, 2020 (oral testimony Zack Yanta, Texas Farm Bureau.)
[348] *Id.*
[349] *Id.*
[350] *Id.*
[351] *Id.*
[352] *Id.*

GCD's mission to balance competing interests over a finite resource is untenable at times. Water is the only resource a human requires to survive, but the survival at the expense of another is never good policy. All interests must be considered with the individual rights as to ownership as the basis for consideration.

The consideration of all basin user groups during DFC development is contrary to absolute property rights. The preservation of private property ownership must be paramount to any decision made by a GCD. In order to avoid costly litigation at the expense of the water rights owner, GCD's should always err on the side of private property ownership who have a right to turn their water into economic profit, and user groups have a right to contract for the resource. That said, in order to protect the basin of origin and keep the highest level of transparency, there should be consideration for notifications to the public and affected persons for transfers out of the basin. The basin of origin user groups should have the opportunity to purchase the rights in order to protect their interests. While an individual's private property rights include the right to pump permitted water under their property, transfer water to another user, and possibly outside the basin, the total impact on the basin should be considered. Specifically, the opportunity for the water right holder to convert water to financial gain should be part of the conversation within the basin of origin.

Monitoring Charges

Monitor the implementation of legislation addressed by the Senate Committees on Natural Resources and Economic Development and Water and Rural Affairs passed by the 86th Legislature, as well as relevant agencies and programs under each committee's jurisdiction. Specifically, make recommendations for any legislation needed to improve, enhance, or complete implementation of the following:

Committee Hearing Information

Due to the on-going COVID-19 pandemic, the committee did not hold a public hearing on the interim charges. However, agency action was not delayed on implementing legislation. Specifically, the landmark flood funding and initiatives from Senate Bills 6, 7, and 8 are on schedule. Texas Water Development Board in coordination with the Texas General Land Office and Texas Division of Emergency Management has succeeded in funding mitigation projects throughout the state.

Senate Bill 6

Senate Bill 6 (SB 6) was passed during the 86th Legislative Session to update and respond to disasters in the state. The legislation was in response to the Hurricane Harvey disaster and the need to provide a clear path for local governments to use in responding to state disasters. The bill required the Texas Division of Emergency Management (TDEM) to create guides, study groups, and offer new procedures for responding to a disaster.

TDEM completed the *Response and Recovery Guide*, in December 2019. The guide will provide state and local governments with a reference tool when responding to an emergency or disaster.[353] The state coordinates the overall response to a disaster through "prevention, mitigation, preparedness, response, and recovery."[354] The guide serves as a roadmap of the initial response from the state and recovery efforts.[355]

As witnessed at hearings by the committee in the Hurricane Harvey aftermath, there was confusion on local and state jurisdiction on debris removal. SB 6 addressed the issue by requiring TDEM to create a catastrophic debris management plan and model guide for use by local governments and entities during a disaster.[356] TDEM completed the *Catastrophic Debris Management Annex and Local Catastrophic Debris Management Guide* in December 2019. The guide outlines the responsibilities of different groups during a disaster to avoid the confusion following previous hurricane disasters.[357]

In addition to the debris management guide, TDEM was also tasked with creating a wet debris study group to report back on their coordination efforts. The group is comprised of TDEM, Texas Engineering Extension Service, TCEQ, and Texas Department of Transportation.[358]

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[353] Texas Division of Emergency Management, "Senate Bill 6: Implementation Update," August 2020.
[354] *Id.*
[355] *Id.*
[356] *Id.*
[357] *Id.*
[358] *Id.*

SB 6 required TDEM to create a work group to create a process for credentialing and training local officials. The Emergency Management Professional Development Working Group developed a baseline of qualifications for any emergency manager to meet. The document is on the TDEM website for public comment for 60 days in which time, the group will finalize their recommendations.[359]

Finally, the Legislature charged TDEM with streamlining the process for disaster loans and funding for local officials. TDEM, along with their agency partners, is working on final recommendation for a single intake form. The agency has also created the Disaster Recovery Loan Program which offers short term loans for recovery projects.[360]

Recommendations

Texas has made significant strides in better preparing for natural disasters, however, beginning in March 2020, the state faced an unprecedented type of disaster with the COVID-19 pandemic. The state should continue to explore ways to best mitigate and protect our residents from the loss of life, property, and economic hardship related to disaster management.

The progress made with Senate Bill 6 is commendable. Texas agencies and leadership have paved the way for the state to build sound policy.

Senate Bill 7

In response to the catastrophic damage from Hurricane Harvey, the Texas Legislature passed Senate Bill 7 (SB 7) which created several accounts: the floodplain management account, Hurricane Harvey account, flood plan implementation account, and the federal matching account. The following chart explains the uses for each account.

Account	Use	Appropriated Amount
Floodplain Management Account	Grants, data collection, stream gaging, outreach	$47 million
Hurricane Harvey Account	Local match requirements for federal appropriated funds	$273 million (Hazard Mitigation Account)
		$365 million (Public Assistance Account)
Flood Plan Implementation Account	Finance flood mitigation projects in the State Flood Plan	No appropriations from the 86th Legislature
Federal Matching Account	Meeting matching requirements for projects funded by the US Army Corps of Engineers	No appropriations from the 86th Legislature

The legislation also transferred $793 million from the Economic Stabilization Fund to the TWDB to the Flood Infrastructure Fund (FIF) for flood projects, design, permitting, and mitigation infrastructure. Rules for the program were established on October 18, 2019 and approved

[359] *Id.*
[360] *Id.*

December 5, 2019. The TWDB conducted 14 workshops across the state to provide public input as well as written comments.[361] The TWDB approved the release of the Flood Intended Use Plan (IUP) for criteria for projects at the March 12, 2020 Board Meeting. Applications for funding were accepted through June 15, 2020. TWDB received 286 abridged applications for a total of $2.39 billion from all regions in the state. Applications have been scored and prioritized and will be considered according to category.[362]

TWDB also completed the creation of a flood funding clearinghouse in collaboration with TDEM and the General Land Office (GLO) to create a "one stop shop" for information on flood mitigation funding. The website includes a request for information form that entities can submit for review so that the agency can find the best fit for federal or state funding opportunities.[363]

The Floodplain Management Account will be used to fund the following projects at TWDB: installation of 10 flood gages; model forecast points for 60 high priority sites; updates to reservoir flood pool capacity and evaluations; expansion of the TexMesonet; assessment of the coastal watershed delineations; expansion of base level engineering maps; expand the Flood Decision Support Toolbox in partnership with the US Geological Survey; redevelop TexasFlood.org; and complete LIDAR coverage across Texas.[364]

TWDB completed the requirements for prioritization criteria for the hazard mitigations projects under the Hurricane Harvey account and delivered $27 million to the Texas Division of Emergency Management (TDEM) which included $3.5 million for hazard mitigation grants and $23.5 million for public assistance grants.[365]

Recommendations

The legislation created an oversight committee which should continue to monitor the funds in the account. Additional funding should be supplied as it is available to continue to fortify the state and prepare for the first State Flood Plan.

Senate Bill 8

Texas experienced the devastating effects from Hurricane Harvey in 2017 and several large-scale floods in 2015. Senate Bill 8 (SB 8) created a watershed based statewide flood plan with a ground up approach. Similar to the regional water planning process, the State Flood Plan requires the creation of regional groups across the state. The bill also requires Texas Water Development Board to work with the Texas State Soil and Conservation Board to complete repairs and rehabilitation of aging and failing earthen dams across the state.

In implementing SB 8, TWDB followed the successful regional water planning process associated with the State Water Plan. On May 7, 2020, TWDB adopted rules for state and regional flood planning.[366] In order to get feedback on the process, SB 8 public input was part of the FIF comment

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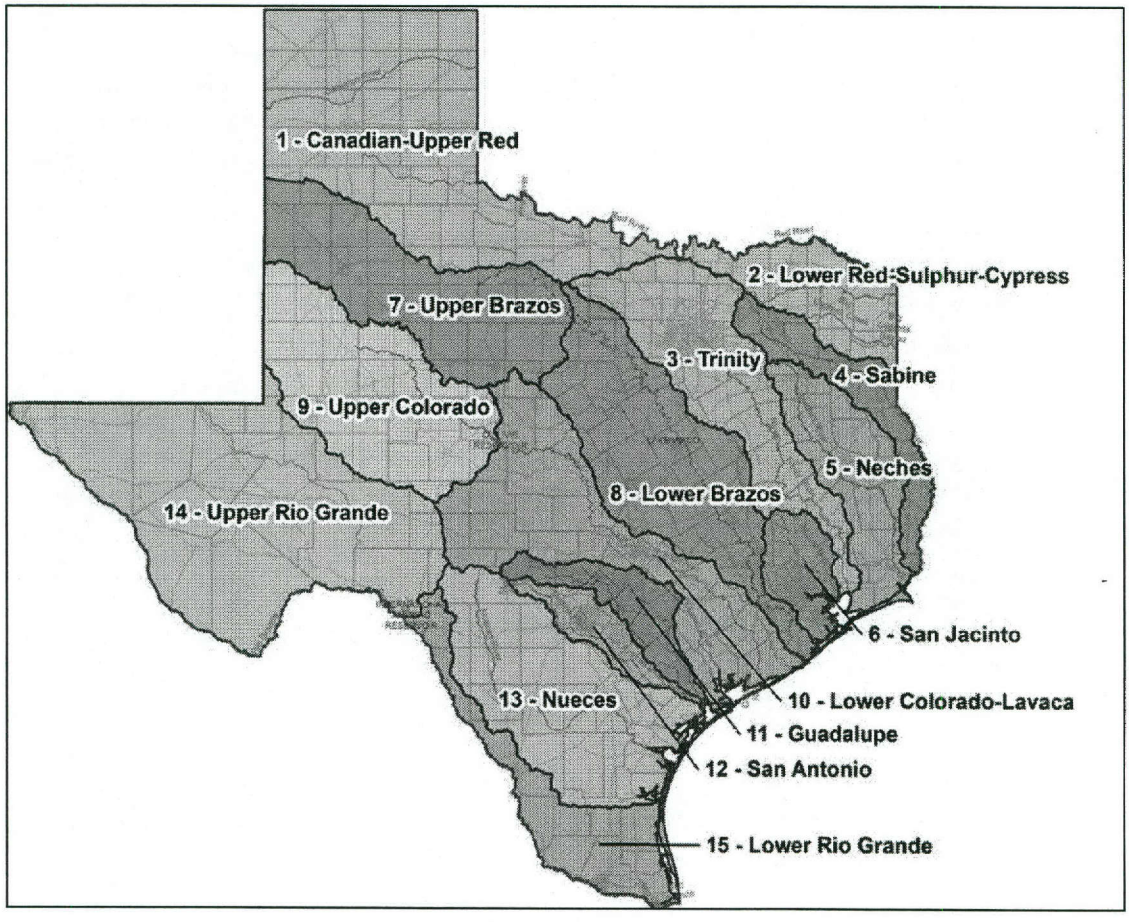
[361] Texas Waster Development Board, "SB 7, SB 8, SB 500, and HJR 4 Update," November 16, 2020.
[362] *Id.*
[363] *Id.*
[364] *Id.*
[365] *Id.*
[366] *Id.*

period traveling to 14 cities and hosting two webinars. The following map depicts the regional flood planning group boundaries.

Flood Planning Regional Group Boundaries



Map provided by the Texas Water Development Board

Based on the rules and the regions, there will be 12 interest position in each of the 15 planning groups. TWDB received over 600 nominations for membership for the positions in fall 2020.[367] Additionally, the agency sought support for the regional flood planning groups from local political subdivisions. TWDB received 30 requests in 14 out of the 15 regions for support. The regional flood planning groups will ultimately pick from a list provided by TWDB.[368]

As of November 2020, the first meetings of the planning groups have begun.[369]

[367] *Id.*
[368] *Id.*
[369] *Id.*

Recommendations

The committee recommends that the state continue to fund the State Flood Plan efforts in the next session. While the COVID-19 pandemic has stretched resources, Texas cannot leave itself unprepared for the next flood disaster.

Senate Bill 500

Senate Bill 500 (SB 500), also known as the supplemental appropriations act, is legislation passed each session that provides additional appropriations based on agency projections. SB 500 appropriated $150 million to the Texas State Soil and Water Conservation Board (TSSWCB) to assist local sponsors with earthen dam repair in the state.

There are 2,041 total earthen dams in the state, which require $14 million in operation and maintenance costs. Of those dams, 181 need repairs totaling $135 million; and 518 dams need rehabilitation/upgrade totaling $2 billion. There are currently sponsor requests for 35 dams needing repair or upgrade totaling $73 million and 36 dams in need of federal rehabilitation totaling $144 million.[370]

TSSWCB has signed agreements for repair, upgrade, and rehabilitation construction have been signed with sponsors to cover 26 dams. TSSWCB has completed six dam repairs. Designs are underway for 22 dams for repair and rehabilitation/upgrade for 20 dams.[371]

Federal rehabilitation planning has begun on 9 dams, and high hazard dam assessment reports are being prepared on 60 dams. Construction is underway on 2 federal dam rehabilitations, and design activities are underway on 10 dams. The total federal funding received for these activities is $54 million.[372]

The funding analysis for the current activities of projected need is about $194 million.[373]

Recommendations

Texas should continue the support for the earthen dam program with the TSSWCB. The status of dam risk across the state is assessed consistently and the number of dams in need of repair or rehabilitation continues to climb. To protect the growing urban centers and new development in rural Texas, the state must plan and invest in the earthen dam infrastructure.

With the same appropriation of $150 million as the 86th Legislative Session, TSSWCB could fund engineering services and construction on all current un-funded applications for dam repair (21) and high hazard dam upgrade (22) with $150 million.

Senate Bill 700

The Texas Legislature transferred the responsibility for ratemaking and other economic related items for water and wastewater from TCEQ to the Public Utility Commission (PUC) in 2013. Senate Bill 700 (SB 700) made changes to the process for ratemaking cases based on information

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[370] Texas State Soil and Water Conservation Board, *Flood Control Program: Update for Board Meeting August 27, 2020.*
[371] *Id.*
[372] *Id.*
[373] *Id.*

received from stakeholders. The legislation reorganizes the three classes investor-owned and sewer utilities are divides into four classes. The change allowed the PUC to streamline the process for smaller utilities. SB 700 also allows temporary rates to remain in effect for a time after a non-functioning utility is acquired which gives new owners the time to make repairs and investments.

The PUC adopted revised rules to reflect the new classifications for water and sewer utilities on April 17, 2020 with Docket No. 49798. The creation and adoption of alternative ratemaking mechanisms is still pending with PUC.

According to the Texas Alliance of Water Producers (TAWP), the implementation by the PUC continues the collaboration which began as soon as the bill was being drafted.[374] The TAWP believes that the agency has been forthright in their communication with them and other stakeholders. Additionally, TAWP is pleased with the PUC's process to reach out to utilities rather than use the process of submitting applications to the State Office of Administrative Hearings, eliminating a costly and burdensome process.[375] By adding another rate classification for water utilities to apply under, TAWP believes there is more of an understanding of the rate process from both utilities and the PUC.[376]

Recommendation

The committee recommends stakeholders continue to provide feedback on the process so that the state can best serve the ratepayers. The collaborative process that was born from SB 700 negotiations with all stakeholders and agency partners serves as an example for sweeping changes that will significantly impact the industry.

Senate Bill 2272

Senate Bill 2272 (SB 2272) addresses the Certificate of Convenience and Necessity (CNN) process. A CCN guarantees an area of service for a utility provider. Some areas have continued to expand into rural areas and conflicts have arisen with the CCN process with landowners. SB 2272 addresses the process to determine whether compensation is owed to a CCN holder and for a landowner to be released from a CCN.

The PUC completed changes to the CCN process, and these were adopted on June 12, 2020. The agency is processing application under the new provisions.

The Texas Rural Water Association (TRWA) is closely monitoring implementation of SB 2272. While there have not been cases which have progressed to the rate appraisal decision, TRWA believe that the cases fall into four categories. The first category of cases fights decertification from a property that currently receives service. These cases have mostly been held pending resolution of the Green Valley SUD Fifth Circuit Case.[377] The Fifth Circuit overturned the decision made in North Alamo WSC v. City of San Juan which held that a utility which had federal debt

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[374] Texas Alliance of Water Producers, Letter to Chairman Perry, September 22, 2020 (on file with author).
[375] *Id.*
[376] *Id.*
[377] Email from Lara Zent, Executive Director, Texas Rural Water Association, to Katherine Thigpen, Committee Director of the Senate Committee on Water and Rural Affairs (September 15, 2020)(on file with author).

equated to making service available even when that service may not be reliable or real.[378] The manner in which the decision was overturned in the Green Valley SUD case may minimize impacts, however, it does create precedent for PUC cases to wait for resolution before deciding some rate appraisal decisions.[379] The second category, according to TRWA, is where the parties have agreed to compensation. SB 2272 is structured in a way that through PUC implementation, petitioners know that if they go through the process, compensation will be awarded in all cases.[380] There have also been cases where the utility did not fight the decertification so there was no compensation. Finally, there are cases that are pending but have not advanced to the appraisal stage.[381]

Recommendations

The committee recommends that stakeholders continue to provide feedback to the PUC and decision makers to make sure the process works for all parties. Stakeholders have indicated a desire to continue to monitor the process and make changes.

House Bill 1325

In response to the 2018 US Farm Bill, the Texas Legislature passed House Bill 1325. In April 2019, citing the federal legalization of hemp, the Texas Department of State Health Services (DSHS) removed hemp from the state-controlled substance schedules. Texas stores sold unregulated, untested, and potentially, unsafe hemp products prior to the passage of HB 1325. The bill provides Texas farmers the opportunity to cultivate hemp under the oversight of the Texas Department of Agriculture (TDA). HB 1325 also added numerous consumer protections through the Department of State Health Services for hemp products being manufactured or sold in Texas.

Lawfully produced hemp in other states is permitted to travel through Texas under federal law. The United States Postal Service had also stated that they would accept and deliver lawfully produced hemp to all 50 states, as long as the business of person mailing the product has a hemp license and the product is under the THC limit.

As of October 2020, Texas Department of Agriculture had issued 856 total active permits in Texas.[382] The licenses include producer, sampler, non-consumable processers, and other required registrations.[383] As of October 2020, there are currently over 4,440 acres permitted, and 11,963,587 square feet of greenhouse production.[384]

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[378] Texas Rural Water Association, " Fifth Circuit Follows TRWA's Amicus Brief in Green Valley SUD's Major CCN Decertification Case," https://www.trwa.org/blogpost/1539239/353750/Fifth-Circuit-Follows-TRWA-s-Amicus-Brief-in-Green-Valley-SUD-s-Major-CCN-Decertification-Case, Last Visited October 25, 2020.

[379] Email from Lara Zent, Executive Director, Texas Rural Water Association, to Katherine Thigpen, Committee Director of the Senate Committee on Water and Rural Affairs (September 15, 2020)(on file with author).

[380] *Id.*

[381] *Id.*

[382] *Texas Department of Agriculture, to Lauren Murray, Policy Analyst of Senate Committee on Water and Rural Affairs (10-29-2020) (on file with author)*

[383] *Id.*

[384] *Id.*

Department of State Health Services rules went into effect on August 2, 2020.[385] As of October 2020, there are 57 consumable hemp product licenses pending with six issued and 1212 retail registrations issued.[386]

The U.S. Farm Bill and HB 1325 created a need for crime laboratories to distinguish legal hemp from illegal marihuana. At the time of the Farm Bill's passage and HB 1325 becoming effective, law enforcement test kits typically only identified the presence and not the percentage of THC.[387] Many public crime labs lacked the capacity to quantitate THC in hemp and marijuana in large volumes, however, several private forensic labs were able to do so. Texas law enforcement can contract with third party labs, many did so, but at an increased cost.[388]

Through a cooperative interlaboratory initiative (Texas Department of Public Safety; Harris County Institute of Forensic Science; Houston Forensic Science Center) publicly funded labs have recently implemented validated analytical procedures to differentiate hemp from marihuana in plant material and forensic testing of casework is underway.[389] Sam Houston State University facilitated the collaboration between operational laboratories, and the overall approach was based upon similar methods that were developed at the federal level by the Drug Enforcement Agency.[390] Validation of testing liquids has begun but as of October 2020, a completion date is unknown but is expected to take several months.

Recommendations

HB 1325 had a few options for remediation for negligent "hot crops" but was rejected by the USDA. The original federal rules did not allow for remediation. Farmers must destroy any crop that is over the THC limit under the current USDA rules. Remediation is an item that will have to be addressed by the federal government.

Under HB 1325, a person transporting hemp plant material originating in Texas must have a shipping certificate or manifest that has been issued by the Texas Department of Agriculture. This is to assist law enforcement at roadside stops. Law enforcement can verify the authenticity of the manifest by contacting TDA. However, this is only available during business hours. TDA and DPS with appropriate funding, could sync their systems to provide law enforcement up-to-date data 24-hours a day. If originating outside of Texas, the person transporting hemp must have documentation identifying the load. The manifest requirement is not required under federal law or rule, but many states have different manifest requirements. There is a need for a nationwide consistency on documentation and manifests for transportation. Texas should work with the USDA, Congress, and other states to develop a nationwide shipping manifest standard that can be accessed by law enforcement.

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[385] *Government Affairs, Department of Health and Human Services, to Lauren Murray, Policy Analyst of Senate Committee on Water and Rural Affairs (8-24-2020) (on file with author).*
[386] *Id.*
[387] *Forensic Science Commission, to Lauren Murray, Policy Analyst of Senate Committee on Water and Rural Affairs (9-9-2020) (on file with author).*
[388] *Id.*
[389] *Id.*
[390] *Id.*

The TDA Hemp Registration and Licensing Fees are dedicated to the TDA Hemp Program. DSHS Hemp Program Licensing and Registration Fees are deposited to the General Revenue. As the DSHS Hemp Program grows, additional staff, testing, and inspections will be needed. The legislature may consider making the DSHS Hemp Program Fees dedicated to the DSHS Hemp Program to meet the increasing demands.

Although the public crime labs now have a method to test plant materials, most crime labs will need new and different instrumentation to establish testing methods for many non-plant materials, especially for edibles.

Currently there is an insufficient source of high-quality reference materials for the development and validation of testing. In many states, adjudicated casework is routinely used for analyst training, the development of new methods, and the validation of new procedures. Use of adjudicated casework in Texas for these purposes has been challenging. The legislature may consider statutory language expressly permitting the use of seized drugs samples from adjudicated cases otherwise scheduled for destruction if the use is limited to laboratory research, validation, and training of analysts. Texas Department of Public Safety has just completed their review of the roadside test kits. The Department purchased 200 of them, but only for the evaluations the crime lab conducted. The cost of the roadside test kits was under $3,000.00. As of now, there are not any to the field for use.

The production in the South Plains and other areas of the state were well-developed, considering the delay in federal and state permitting due to the USDA rule making. The development of seed varieties that can meet the diversity of growing regions will need to be an emphasis for the industry and the available research capacity.

Growers would like to purchase out-of-state genetic material but have stated that the Texas statute does not explicitly allow for hemp plants germinated outside of Texas to be transported into the state. State statute is currently silent on this topic. Hemp seed genetics are currently unstable, especially in newer markets like Texas. The best chance a farmer has to grow and harvest a successful and compliant hemp crop is to cultivate from clones, cuttings, or transplants which may be germinated outside of Texas. Clones or seedlings propagated out of state should be allowed for shipment into Texas if accompanied by a certificate of analysis for that variety and any hemp documentation required by the shipping state.

The hemp statue does not address the transfers of hemp licenses when ownership changes. Ownership transfers are necessary in the ordinary course of business. The law could be revised to include a provision that explicitly allows the transfer of a hemp grower's license subject to criminal background check of principles of recipient to prevent undue business disruption for a business transaction.