

April 1997

RESEARCH ORGANIZATION

session focus

Texas House of Representatives

April 15, 1997

Texas at a Watershed: Planning Now for Future Needs

Almost every area of Texas will be short of water in the next 50 years unless water infrastructure improvements are made by the state, according to the Texas Water Development Board. Population is projected to double in the next 50 years, and despite a wide variety of geographic and meteorological conditions in the state, current supplies will not be able to meet the increased demands for water, especially for the burgeoning needs of urban areas.

The drought that spread across the state in 1996 highlighted the importance of water planning for Texas. A comprehensive water plan, SB 1 by Brown, passed the Senate unanimously on April 3, and has been referred to the House Natural Resources Committee, along with its companion, HB 4 by R. Lewis, and other water-related proposals.

Background

After a severe drought in the 1950s, Texans embarked on a number of major water infrastructure projects to build dozens of reservoirs that more than tripled the dependable yield of Texas' reservoirs by 1980. Although this infrastructure helped to cushion the impact of the recent drought on many areas of the state, it cannot provide new water.

In the past, water supplies were increased by building more reservoirs, pumping more groundwater, and allocating more surface water to those who needed it. According to most water planners, these strategies will no longer suffice: surface water is almost fully appropriated, groundwater in many areas is being depleted faster than it can be recharged, and reservoirs can take decades to build, through a process that is expensive and often delayed by environmental and economic concerns. Alternative technologies such as desalinization, brush control, and aquifer storage and recovery are also being studied for potential use.

Water policy strategists and state legislators are carefully scrutinizing methods to better manage the

water resources that are already available in Texas. Increased conservation, drought management plans, regional planning, transfer of water resources from water-rich to water-poor areas, and expanded state oversight over groundwater districts all are being closely examined.

Contents

Background	1
State Water Plans	2
Current Management of State Waters	4
Water Management Options for Texas	7
Water Funding	13



State Water Plans

Since 1957, TWDB has been required to produce comprehensive state water plans to guide the long-term and short-term development of the state's water resources. The board has produced five plans in all, but the state has never implemented any one in its entirety.

The current state water plan, entitled *Water for Texas Today and Tomorrow, Legislative Summary of the 1996 Consensus-based Update of the State Water Plan*, was prepared jointly by the TWDB, Texas Natural Resource Conservation Commission (TNRCC) and the Texas Parks and Wildlife Department. All references to "state water plan" in this report refer to this updated summary, which was released by the three agencies in January 1997. The full water plan update is expected to be published in September 1997.

The state water plan suggests a variety of management strategies, including regional planning, interbasin transfers, water reuse, conservation, water marketing, new supply development, reallocation of reservoir storage, financial assistance to local governments and small communities for water projects, and drought response management. The plan stresses that

a full range of strategies will be needed to address the water problems of Texas and encourages the state to help local governments with regional planning.

Many of the recommendations in the state water plan are included in SB 1 by Brown, the comprehensive water bill. SB 1 would require regional water planning and statewide drought response planning and make statutory changes concerning water rights permitting, interbasin transfers, water marketing, and water districts. The bill would require TNRCC to pre-view and certify the comprehensive management plans submitted by groundwater districts and allow tax exemptions for water conservation and recycling in the manufacturing process.

The bill also would establish new administrative penalties for violations of water rights and provide a procedure by which TNRCC could identify priority groundwater management areas. The bill would also establish a Water Development Fund; consolidate several existing TWDB bond authorizations, contingent on approval of a constitutional amendment (SJR 17 by Brown); make changes to comply with new federal requirements under the federal Safe Drinking Water Act; and streamline and expand data collection statewide, including mapping data.

Current Planning Efforts

Several large-scale regional water planning studies are already underway with funding from the TWDB. The board initiated the Trans-Texas Program in 1992, a comprehensive water resources planning program to evaluate water management strategies across much of Texas. Four different Trans-Texas studies of urban areas focus on Houston, San Antonio, Corpus Christi, and Austin and surrounding counties. These studies attempt to identify the most cost-efficient and environmentally sensitive water management strategies for each study area.

The Trans-Texas program is evaluating a number of water management options, including conservation, reuse, surface water dams, interbasin transfers, and spring flow augmentation. The TWDB is also funding regional studies in the High Plains, the Middle and Lower Rio Grande Valley, and the El Paso/southern New Mexico area. In addition, the board is currently managing 84 grant contracts for regional planning. Assessments of each river basin and watershed in Texas are carried out by TNRCC. Under the Clean Rivers Act, up for reauthorization this session, TNRCC contracts with river authorities to conduct most of the required assessments.

Water in Texas

Texas has 15 major river basins, eight coastal basins, nine major and 20 minor aquifers, and seven major estuaries along the coast. About 200 major reservoirs hold 5,000 acre-feet of water or more.

Statewide demand for water totaled about 16.5 million acre-feet in 1994, the latest year for which figures were available. Agriculture and livestock consumed about 65.4 percent of this total; industry and manufacturing, 9.3 percent; and municipalities, about 19.6 percent. Electric generation, mining and other uses accounted for the remainder.

As the population of Texas shifts from rural to urban areas, municipal and industrial water will continue to rise and agricultural water use continue to decrease. However, declining water use in the agricultural sector is not enough to offset growing demands in other sectors, and despite oversupply in some areas of the state, it is often not financially or technically feasible to move water to other areas.

Surface water currently accounts for about 43.2 percent of the water used in the state; the TWDB projects that by the year 2050 almost 70 percent of the state's water supply will come from surface water sources. The shift from ground to surface water use is occurring because groundwater in many areas is being depleted faster than it can be replenished.

Rainfall in Texas varies significantly from region to region. In West Texas, annual rainfall averages between 8 and 20 inches, while along the Texas-Louisiana border the average amounts to 56 inches a year. The central and southern portion of the state averages between 21 and 44 inches of rain a year. The eastern portion of the state enjoys a large amount of surface water used mostly for urban areas and industry. In West Texas groundwater is often the only source of water, and most is used for irrigation.

Drought in Texas is common and cyclical, and the state usually experiences at least one serious drought every decade. From 1950 to 1956, Texas experienced a very severe drought; some meteorologists believe that drought of this magnitude occurs approximately every 70 years. In 1996, all of the state's climatic regions were classified as experiencing mild to severe drought conditions. The drought of 1996 is still affecting some areas of the state, but most river and stream levels have returned to normal.

The recent drought — and its lingering effects in many areas of the state — put into high relief the varied nature of localized water problems.

- Many of the 7,000 public water systems in the state need additional water supplies and infrastructure improvements.
- In the High Plains area, more water is being withdrawn than recharged to the Ogallala Aquifer, primarily because of irrigation. "Aquifer mining" is also occurring in the Winter Garden area southwest of San Antonio, where agricultural withdrawals are surpassing recharge of the Carrizo-Wilcox Aquifer.
- The Edwards Aquifer underlying south central Texas is the sole source of water for the City of San Antonio. Within 20 to 30 years, the city will need to double its available water supply from sources other than the Edwards, according to state projections. Meanwhile, after long delays, the Edwards Aquifer Authority is finally poised to regulate withdrawals from the aquifer.
- Williamson County, the second fastest growing county in the United States, will need more water almost immediately and has taken steps to acquire additional supplies from the Brazos and Colorado River basins.
- The quality and quantity of water in the Trinity Aquifer are limited. The drought exacerbated problems for public water systems in the area, which are experiencing difficulties trying to supply new water demands from the aquifer.
- Corpus Christi will run out of water in the next 10 years, unless it develops additional supplies. The city is currently constructing a pipeline to Lake Texana to provide a supplemental water supply.
- El Paso is projected to run short of water in 25 years, due to mining of the Hueco and Mesilla Aquifers by users in both El Paso and Ciudad Juarez.
- The middle and lower portions of the Rio Grande Basin are in the fifth year of drought. Reserves in Amistad and Falcon reservoirs, which supply water to users on both sides of the border, are very low, causing irrigation shortages in Mexico as well as the lower Rio Grande Valley.

Current Management of State Waters

Surface water

Surface water is the water that flows in creeks, lakes, streams, and rivers and into bays. With few exceptions, surface water can only be used with permission from the state, which grants usage rights through permits issued by the Texas Natural Resource Conservation Commission (TNRCC).

Water rights. Cities, individuals and water authorities may apply for water rights permits. State law requires that surface water be used for a "beneficial purpose" in amounts that are reasonable or necessary for that purpose. In order to obtain a permit, an applicant must show that there is a source of unappropriated water available. A water right cannot be issued if it impairs existing water rights, and applicants must demonstrate "reasonable diligence" to avoid wasting water and achieve water conservation. Since 1985, all applicants for new or additional water rights must provide water conservation plans to TNRCC and mitigate, if necessary, any effects to fish and wildlife habitat and the bays and estuaries of Texas.

A few classes of water users do not need to seek permission from the state to use water. Property owners who live adjacent to a river or stream can divert a reasonable amount of water for household

Instream Flows and Freshwater Inflows

Surface water in Texas eventually finds its way to the Gulf of Mexico. Coastal marshes, wetlands, bays and estuaries create breeding grounds for many marine species, including shrimp, and the productivity of these sensitive environmental areas depends on the inflow of fresh water from rivers and streams to dilute the salinity of the coastal breeding grounds. Tourism, recreational activities associated with the coast, and commercial fishing are among the biggest contributors to the state economy. Maintaining adequate instream flows in rivers and streams and freshwater inflows to Texas' bays and estuaries is one of the goals of the state water plan.

The Wagstaff Act

A statutory exception to the "first in time first in right" rule for surface water use, known as the Wagstaff Act, specifies that any appropriation of state waters, other than from the Rio Grande, made after May 17, 1931, for any uses other than domestic and municipal use can be preempted without payment by any city or town. The act has been used only in small uncontested cases, and each time TNRCC interpreted the statute as giving the municipalities new water rights with a 1931 priority date, superseding other rights granted previously at later dates. Some water experts believe the Wagstaff Act could be challenged as a unconstitutional taking without compensation, under the Fifth Amendment to the U.S. Constitution and Art. 1, sec. 17 of the Texas Constitution.

and livestock use. Landowners can also impound up to 200 acre-feet of water for their domestic and livestock uses. County fire departments and other similar entities can also use surface water without a permit in an emergency.

Water permits do not guarantee that water will be available, merely that the holder has a right to available water. All water rights documents have a priority date. The legal doctrine of "prior appropriation" gives priority to those whose rights have greater seniority or, as stated in the Water Code sec. 11.027, "first in time is the first in right." Conflicting claims of surface water rights are usually adjudicated before the TNRCC.

Most water right documents are "run-of-the-river" rights meaning that users can divert water only when stream flow levels are sufficient. Some water rights allow water to be impounded in a lake or reservoir for later use. If downstream users have water rights with older priority dates they can require that stream flows into the reservoir be passed through the dam to satisfy their needs. Once the water is legally stored, however, the downstream right holders cannot claim it. At Falcon and Amistad reservoirs on the Rio Grande, however, purpose of use determines priority so that municipal and industrial water rights have priority over irrigation rights if water shortages require that supplies be allocated.

Water rights documents specify a place and purpose of use, a diversion point and rate, and the

maximum amount of water that can be used each year. Most water rights permits are 100 percent consumptive, meaning that the water rights holder can use up all the water for which they have a permit. For example, a city might in practice discharge 50 percent of the water it pumps for public use back into a river as treated effluent. Under most permits, it could retain that water for direct reuse instead of returning it to the receiving stream. Some water rights have been issued with special conditions that require the water right holder to return a certain amount of surplus water to the stream.

TNRCC can only grant a water right if there is unappropriated water available in the stream. If the historical record suggests most of the water being requested will be available most of the time it will be needed, TNRCC grants the permit. The agency may also issue short-term and temporary permits in basins where waters are fully appropriated but not yet being fully used, as long as the permit will not affect the rights of downstream water users. Term permits are issued for five to 10 years, while temporary permits are valid for up to three years. The commission also can issue emergency permits in certain cases, for up to 30 days and for limited purposes.

A water right is recognized as a property right, and can be sold, leased or transferred to another person. It can be passed on to a buyer when the land is sold or sold separately from the land. TNRCC must

be notified of the sale of a water right in order to reflect the transfer in its records. When a water right is transferred separately from the property, the new owner must submit an application to the agency to change the place of use. In considering such an application, the TNRCC must verify that the transfer will not impair the water rights of other holders or harm the environment.

Some water experts have advocated that TNRCC cancel unused water rights to increase the amount of water available for other users. Amendments to the Texas Water Code in 1991 made it difficult for TNRCC to cancel unused water rights, and the agency has stopped all efforts to do so. Cities, electric generating plants, and other entities hold these rights to meet long-term future water needs and are reluctant to lose them.

Surface water is overappropriated in many areas of Texas. In considering claims under the Water Rights Adjudication Act of 1967, the state granted rights based on historical use rather than water availability. As a result, some rivers may not have enough water for every holder of a water rights permit, especially during droughts. Approximately 10 percent of water rights holders control 90 percent of the water. These include the 10 major river authorities, large cities — including Brownsville, Austin, Corpus Christi, Dallas and Houston — large irrigation districts, and about 50 industrial permit holders, according to the TNRCC.

Surface Water Districts

Surface water districts are local political subdivisions of the state, created by special or general law, and governed by a specific chapter in the Water Code, their enabling legislation, or both. Texas law allows for a number of different kinds of surface water districts to meet varied needs. Water control and improvement districts and municipal utility districts, for example, may obtain water rights from the state and become regional water suppliers, while navigation districts specialize in port operation and regulation.

River authorities are a special kind of district that often encompass entire river basins or watersheds and do not necessarily follow political boundaries. Each river authority is a special law district created by the Legislature and is governed by both state laws and its own enabling act. River authorities supply water to cities, farms and industries, and most have authority for flood control and water storage, supply and conservation in their watersheds. Some river authorities have branched into wastewater treatment and electric power generation and may also operate reservoirs.

Ten large river authorities hold water rights to more than seven million acre-feet of water, supplying about 20 percent of the surface water consumed in the state, according to the TWDB. River authorities also collect for the state basic data on surface water in their basin.

Enforcement. The Water Code allows for levying both civil and misdemeanor criminal penalties for unlawful use of water. The criminal penalty, a Class C misdemeanor, has a maximum penalty of a \$500 fine; the civil penalty for such an offense can be up to \$1,000 a day for each day of the violation. Most TNRCC regulatory programs allow for administrative penalties, but the agency does not have this power against someone unlawfully using water. Although the agency has authority over design, construction and maintenance of dams and levees, for example, the only penalty it can assess for failure to repair a dam or levee is a \$1,000 civil penalty.

The lack of enforcement power in this area was demonstrated during the drought of 1996. In most areas of the state, the honor system governs compliance with water rights. But in the summer of 1996, TNRCC had to increase streamflow monitoring in certain areas to detect unauthorized diversions.

In some areas of the state, TNRCC has established areas for constantly monitoring compliance with water rights. These programs are called watermaster programs. The Rio Grande Watermaster Program coordinates water releases from the Amistad and Falcon reservoir system. The South Texas Watermaster, established in 1988, serves the Nueces, San Antonio, and Guadalupe River basins as well as the adjacent coastal basins. Watermaster programs can be established by petition of water rights holders, TNRCC, or a district court. In a basin overseen by a watermaster, water rights holders notify the watermaster if they plan to divert water. This allows the watermaster to coordinate diversions in the basin and allocate flow among users when there is not enough water to satisfy all demands.

Watermasters can stop illegal diversions, monitor stream flows, and mediate conflicts between water users. Water rights holders in a watermaster division are required to reimburse TNRCC for costs associated with the administration of the watermaster office. The programs are paid for by water rights holders, except domestic and livestock water users, and usually require most water rights holders to meter their pumps. Appropriations for the watermaster program have been capped, however, and can only support the two existing programs.

Watermasters are not authorized to issue field citations for illegal diversions. Enforcement action

must come through the TNRCC Office of Compliance and Enforcement, and may eventually have to be passed on to the Attorney General's Office, a process that can take many months and generate considerable expense for both the violator and the state.

Groundwater

Most of the usable fresh water available in Texas is found underground in geologic formations called aquifers. There are nine major and 20 minor aquifers in Texas, underlying more than half the state. While the state claims regulatory authority over surface water, historically it has neither claimed ownership nor regulated withdrawal of groundwater. The state has ceded the "right of capture" to landowners, who can tap any groundwater they collect from their property with few restrictions, so long as the water is put to beneficial use and not wasted. The courts have generally upheld the right of capture, even when pumping affects the wells of neighboring landowners or diminishes spring flows and related surface streams.

Groundwater is used extensively for agricultural purposes in Texas, but many cities also rely on it. San Antonio is the only major city in the state, however, whose total water supply comes from a single aquifer.

Groundwater levels in many areas of Texas are declining. When more water is withdrawn from an aquifer than is replaced by recharge, groundwater levels fall in a phenomenon known as aquifer mining. The Ogallala, Carrizo-Wilcox, Edwards, Trinity, and Gulf Coast aquifers all are experiencing declines from aquifer mining. As water is withdrawn from aquifers, decreasing water pressure can cause subsidence of the land above the aquifer or allow the encroachment of salty or mineralized water into the main aquifer reservoir. Subsidence has caused flooding problems in the greater Houston area, where the water table has been lowered by excessive withdrawal of fresh water.

Groundwater use is regulated locally to some extent by conservation and reclamation districts created under Texas law. In 1949, the state authorized the creation of underground water conservation districts for the "conservation, preservation, protection, recharging, and prevention of waste" of underground

Critical Groundwater Districts

Critical groundwater areas are those areas in the state where serious water problems exist and no groundwater management authority is present. TNRCC may create a groundwater district for a critical groundwater area if local landowners do not form one themselves. The district must be approved by local voters, but if they veto the district, state funding for various water projects can be withheld. The Texas Water Code requires the state to conduct two sets of studies and hearings in order to form a groundwater district in a critical area where voters have not created one. The state water plan notes that the critical area process is cumbersome and under-funded. During the past six years, according to the Texas Groundwater Protection Committee's report to the 75th Legislature, the critical area process has been placed "on hold," and insufficient funding has prevented state agencies from administering and implementing the program.

water. Most underground water districts are created by the Legislature under Art. 16, sec. 59 of the Texas Constitution, and may be governed by general provisions in Chapter 36 of the Water Code or by special implementing legislation or both. Districts also can be formed when a number of area landowners file a petition with TNRCC, or if TNRCC designates an area as a "critical groundwater area" (see above).

District power to regulate withdrawals is statutorily limited in certain ways. Most districts are prohibited from regulating wells incapable of producing more than 25,000 gallons per day (which includes some aquifers in the state), domestic and livestock wells, hydrocarbon production wells, and other wells that are permitted under authority of the Texas Railroad Commission.

Some districts are active and use their regulatory authority to specify how wells are used and constructed, for example, and may slow water withdrawals through well spacing and other means. Of the 40 underground water conservation districts in the state, three have a strong legislative mandate to regulate groundwater withdrawal. These include the Harris-Galveston Coastal Subsidence District, the Fort Bend Subsidence District, and the Edwards Aquifer Authority.

Most districts, however, do not regulate the amount of water that can be withdrawn. A few districts do not actively participate in groundwater management, and in many areas of Texas, there are no groundwater districts at all. Districts are required to submit a management plan to TNRCC, but there is no penalty for not doing so, and the plans do not have to be reviewed or approved. Many districts have the power to levy taxes and issue bonds, with voter approval.

Once groundwater is captured it can be freely used or sold by private parties and public agencies. There are problems with marketing groundwater, however, since a seller cannot guarantee the amount that will be available over time, especially if pumping increases. The state water plan says that "the marketing of groundwater to help future needs could be enhanced if it were a measurable right and could be afforded greater legal protection vis-a-vis other existing or future users of the same groundwater resource."

Groundwater regulation is a controversial subject in Texas, but as groundwater supplies diminish, different approaches to regulation are being discussed more openly. Although some landowners argue that the rule of capture gives them a private property right to pump as much water as they want, others complain that unlimited pumping by their neighbors is an infringement on their property rights. However, all property rights, including groundwater rights, are subject to reasonable regulation under the police powers of the state in order to protect public health, safety and welfare.

Water Management Options for Texas

The sheer diversity of Texas requires that the state develop a range of tools for use in concert to effectively manage its waters. Some development of new water supplies is possible, primarily through the construction of new reservoirs, but the strategies most likely to have a more immediate effect include conservation, regional planning for water needs and drought, reuse and transfer of water, and water rights strategies to encourage water marketing.

Managing the Edwards Aquifer

The portion of the Edwards Aquifer that underlies south central Texas has generated controversy for years. Conflicts have arisen between rural and urban users of Edwards waters and between those who live over the aquifer and those who live downstream of its spring outlets. In 1991, the Sierra Club filed a lawsuit in federal court alleging that the U.S. Fish and Wildlife Service and other agencies had failed to protect endangered and threatened species that rely on aquifer-fed spring flows at Comal and San Marcos. U.S. District Judge Lucius Bunton ruled in favor of the Sierra Club and gave the Legislature until May 31, 1993, to protect these species or face federal action to do so. The 73rd Legislature in 1993 enacted SB 1477 by Armbrister, establishing a new Edwards Aquifer Authority to regulate groundwater use.

Full implementation of SB 1477 was delayed by a series of legal actions, but in July 1995 the Texas Supreme Court unanimously upheld the constitutionality of the law creating the authority. The court did, however, leave undecided the issue of individual claims by property owners that their property rights were being taken without compensation. Observers expect future legal challenges by landowners demanding to be compensated for what they perceive as a taking of their property. The court warned potential challengers of the law that they would have to "establish a vested property right in the water which the authority eviscerated and prove damages, and the failure to receive adequate compensation."

The Edwards Aquifer Authority is a regional agency whose responsibilities extend across eight counties: Atascosa, Bexar, Caldwell, Comal, Guadalupe, Hays, Medina and Uvalde. In November 1996, region-wide elections were held for 15 positions on the Board of Directors, and the authority began managing the aquifer in earnest. Originally the authority was to inherit the assets of the old Edwards Underground Water District, abolished by SB 1477, but by the time the authority took over, there were few assets to transfer. The authority now needs some sort of emergency funding to cover its costs until it can collect enough water permit fees to become self-supporting. SB 1898 by Ratliff, passed by the Senate on March 25, would make a \$1.8 million emergency appropriation to the TWDB to loan the authority. The loan would have to be repaid with interest by August 31, 1999. SB 1898 is pending in the House Appropriations Committee.

The Edwards Aquifer Authority is a singular district with unusual powers. It has a strong legislative mandate to administer a permit system to regulate withdrawal of water from the aquifer and already has approved rules governing the process by which aquifer users can file historical claims and apply for pumping permits. Currently, staff are analyzing permit applications.

Developing new supplies

There are limited options for developing new water supplies in the state. In the past, especially after the drought of the 1950s, water supplies were increased by building more reservoirs. Now, however, such projects are expensive, time-consuming, and unsuitable for many areas. Reservoirs can cost billions of dollars and take decades to finish. Furthermore, it can be difficult to find a site that is hydrologically advantageous and close to an area where water is needed. Reservoir construction can also be slowed or even stopped by federal environmental regulations and citizens concerned about the environmental impacts of reservoir construction. Last but not least,

there must be political will in an area to fund a project that will may take 10 to 20 years to finish.

The state water plan has recommended that eight additional reservoirs be built to help anticipate water supply needs in the next 50 years:

- Paluxy Reservoir, for Glen Rose and Somerville County;
- Cibolo Reservoir, for the San Antonio area;
- Parkhouse II Reservoir, for the east/northeast portions of the Dallas metropolitan area;
- Rio Grand Wier, for Brownsville;
- Sandies Creek Reservoir, for the Guadalupe Basin and Bexar County;

Managing the Edwards Aquifer, continued

Under SB 1477, permitted withdrawals from the aquifer are limited to 450,000 acre-feet until December 31, 2007, and to 400,000 acre-feet beginning January 1, 2008. The authority may increase maximum withdrawals in certain circumstances, and permitted amounts are subject to equal reductions among all users if needed to achieve a withdrawal reduction goal. Exceptions to this rule include existing irrigators, who are guaranteed two acre-feet yearly for the maximum number of acres irrigated in any one year during the historical period. Users who have operated a well for three or more years are also guaranteed the average amount of water they withdrew annually during the historical period.

Existing users have applied for initial regular permits based on historical withdrawals of water from the aquifer. The cost of reducing withdrawals is to be borne by permit holders and downstream water rights holders. Aquifer management fees must be equitable between users, with the agricultural fee rate capped at 20 percent of the fee rate for municipal use. Authority staff are developing a system to assess and collect the aquifer management fees. The authority anticipates assessing fees in mid-1997.

The authority is required to develop and implement a comprehensive water management plan for the region and coordinate implementation of a critical period management plan; it adopted rules for critical period management in December 1996. The authority has also developed and implemented a Pilot Irrigation Suspension Program, which offers certain irrigators money to suspend irrigation over the aquifer. Aquifer users in the area, including the San Antonio Water System, have pledged approximately \$2.35 million to fund the program.

In the meantime, the 1996 drought and the increased withdrawals it fueled greatly reduced springflows at Comal and San Marcos Springs. The Sierra Club filed a new lawsuit in June 1996, *Sierra Club v. City of San Antonio et al.*, against all classes of pumpers from the Edwards Aquifer, and asked Judge Bunton to order pumping reductions to protect endangered aquatic species in the region. The lawsuit also asked the court to order the U.S. Department of Defense, which has several military bases pumping water from the aquifer, to begin consulting with the U.S. Fish and Wildlife Service to keep its withdrawals from jeopardizing any endangered species. In September 1996, Judge Bunton issued an injunction to impose restrictions on pumping from the Edwards Aquifer in October; the cities of San Antonio, Hondo, Uvalde, and Leon Valley appealed the order. Later that month, a three-judge panel of the 5th U.S. Circuit Court of Appeals temporarily stayed Judge Bunton's order. The panel has yet to release its final decision.

- Allens Creek Reservoir, for the Houston area, especially Fort Bend County;
- Nichols I Reservoir, for Dallas, Tarrant and surrounding counties; and
- Tehuacana, for Tarrant County.

Alternative water supply technologies have been used in some localities and are also being studied for potential widespread use. As yet, however, they do represent a significant source of new water supplies for the state. These strategies include:

- **Desalinization** — At this time, desalinization of seawater is too expensive to represent a significant source of domestic water for Texas cities. Desalin-

ization of naturally salty or brackish ground and surface water, however, is less expensive than desalting seawater and has proved effective in some areas. A desalinization plant in the City of Granbury produces municipal water from Lake Granbury in Hood County. Another plant in the City of Sherman produces municipal water from the Red River.

- **Brush removal** — Brush control has been advocated in certain areas as a means of allowing water to drain down into aquifers and streams, rather than being lost to shrubs that may have little or no economic value. There are little hard data, however, on how much brush clearing could benefit water supplies, and environmental objections have been raised

to the practice in some areas because it may remove habitat for birds and other creatures.

- **Weather modification** — Under the 1967 Texas Weather Modification Act, TNRCC is authorized to oversee local cloud seeding programs in the state. Cloud seeding produces rain by seeding moisture-laden clouds with a chemical that acts as a catalyst to form raindrops. Despite a significant amount of research on the subject, there is still debate over whether or not cloud seeding actually produces more rain or just shifts it to another area. The research has shown that cloud-seeding must be a long-term project and cannot be used as a quick fix, particularly in drought years when moisture-bearing clouds are scarce. After a cloud seeding program in the 1970s was blamed by many citizens for flooding in the state, there have been no statewide initiatives for cloud seeding, although some local cloud-seeding programs are in operation, most notably a program in

the Big Spring area that has been ongoing since 1971.

Conservation

Conservation is touted as the most efficient way for Texas to increase its water supplies. The cheapest water of all, proponents say, is the water already in a system. Since 1985, parties applying for new water rights, or asking to amend existing rights, have had to submit water conservation plans to TNRCC. Entities borrowing more than \$500,000 from the TWDB also are required to develop water conservation plans and emergency demand management plans. State and federal laws mandating water conservation fixtures, such as low-flush toilets, in new construction and prohibiting the sale of non-conforming fixtures have also helped to conserve water across the state.

Conjunctive Management of Ground and Surface Water

Although Texas law treats groundwater differently than surface water, it is hard to clearly delineate where surface and groundwater part company. Precipitation replenishes both ground and surface water, and the hydrological cycle shows that groundwater is related to surface water. Surface water seeps downward to recharge aquifers, and water from aquifers feeds surface streams. Some aquifers are replenished by seeping precipitation, while many others are recharged by surface water through the beds of streams.

If surface water is diverted in the natural recharge area of a surface-supplied aquifer, aquifer levels will be affected; if less water is withdrawn from an aquifer that feeds a river, more water will be available for those who live downstream on that river. The Edwards Aquifer demonstrates this fact: 70 to 80 percent of the Edward's recharge occurs through the beds of surface water streams.

"The laws of Texas perpetuate the myth (long abandoned by hydrologists, but not legislators and judges) that groundwater is separate from and unrelated to surface water," wrote Ronald Kaiser in his *Handbook of Texas Water Law*. "This 'separation myth' has been a major hurdle in the development of an integrated and conjunctive body of water law for Texas."

As water supplies decrease and population rises in Texas, some are calling for conjunctive management of surface and groundwater as well as state regulation of groundwater. The state water plan says, "conjunctive management of these interconnected water resources would provide a better coordinated effective and more comprehensive approach to meeting the state's water needs."

There is still widespread opposition in Texas to state regulation of groundwater because the right to withdraw groundwater is held by many landowners as an inviolable property right. As long as the rule of capture prevails, opportunities for conjunctive management may be limited. Until both surface and groundwater rights are quantified and prioritized, it will be difficult to manage them conjunctively. An alternative to the rule of capture would be to establish a "reasonable use" doctrine that would allow landowners to pump as much as they wished so long as their pumping did not adversely affect their neighbors' wells.

State Conservation Assistance

The TWDB provides information and technical assistance to the state's water utilities to help encourage water conservation. This assistance includes help in developing local water conservation and drought programs, water audit and leak detection services, and educational programs on conservation. The TWDB also provides technical assistance, grants and loans to encourage agricultural conservation, including loans to districts for efficient irrigation equipment and matching grants to local conservation districts for equipment used in conservation activities. The board provides technical assistance to other state agencies, public schools, and governmental facilities regarding facility conservation audits and provides workshops and information to other commercial and industrial water users across Texas. The board is also active in a major water conservation and re-use networking and organizational effort by utilities and organizations across Texas.

Other opportunities for state water conservation initiatives are identified in the state water plan. The plan recommends that municipal and industrial surface water right holders documented as wasting water be required to implement water conservation and drought contingency plans. Other proposals advocate requiring groundwater districts to submit conservation plans to either TNRCC or the TWDB and that the agencies be given some sort of enforcement tool to make sure the plans are implemented.

Some observers say conservation can be encouraged by market incentives. If water becomes a valuable marketable commodity, they say, many water users will be quick to implement conservation measures and sell their extra water for profit.

Water marketing

Water marketing can be more politically palatable than mandatory conservation, regulated use, or the forcible reallocation of water. It is a useful technique when there is a surplus of water in one area and a high demand in another, so long as there is some way for the water to be efficiently transported. Water markets can only work well, however, when rights

are legally defined, a natural or man-made infrastructure exists for transporting water from seller to buyer, and some mechanism is available to monitor the transport and prevent unauthorized diversions.

While groundwater law permits the sale of water, it does not encourage water marketing. The rule of capture makes it difficult to determine the amount of water available to be marketed.

Many Texas cities and river authorities have surplus water that they have secured for future uses and would be glad to sell in the interim but only with some assurances that they would not lose their right to the water in the future. Since state law is ambiguous regarding this kind of sale, many who currently hold excess water rights will not sell the water now.

Such problems have been resolved in the Lower Rio Grande Basin. All water rights holders in the area draw from a common system based on the Amistad and Falcon reservoirs, have water rights with the same priority dates, and are under the common regulatory framework of a watermaster program. Furthermore, it is easy to change the location of use along the Rio Grande, and there are few environmental impacts associated with such changes. As a result of these conditions, a flourishing water market has arisen in the Lower Valley. Once the Edwards Aquifer Authority has issued water rights permits for its region, a water rights market may become active in that area. This would become a unique example of groundwater marketing in Texas.

In 1993, the Legislature created the state water bank, run by the TWDB, to help facilitate the sale and transfer of water and water rights transactions throughout the state. The bank is seldom used, however. Water rights can be transferred on the open market, so there is no real incentive to put them in the bank. Water rights deposited in the bank are protected from cancellation for 10 years, but this has not proved an incentive because TNRCC has not had clear statutory authority to cancel unused water rights since 1991.

Water reuse

As water becomes scarcer, many cities are looking to reuse the treated effluent they have historically

discharged as a way of increasing their existing water supplies. Most cities have a consumptive use permit that allows them use all of the water granted to them, even though they have traditionally returned 40 to 60 percent of that water to state watercourses.

Under direct reuse, an city recycles its treated effluent into use without ever discharging it to a state watercourse. TNRCC rules allow this effluent to be used in a number of ways, including industrial and landscaping applications. It can also be re-treated for use as drinking water. However, public perception inveighs against this type of use; some see it as tantamount to drinking their own waste, even though most if not all the water in some rivers is composed of treated effluent from upstream users. The infrastructure needed to transfer water in a direct reuse project also can be quite expensive.

The City of El Paso has several direct reuse projects. Water from these projects has been used to recharge aquifers, develop wetlands, and return water to irrigators. Several petrochemical industries along the coast also engage in large direct reuse projects. San Antonio has begun work on several reuse projects, scheduled for completion in 2000, which would use treated wastewater to irrigate golf courses, parks, and cemeteries, augment the San Antonio River and Salado Creek, and supply treated wastewater for irrigation and industrial uses. These projects have both direct and indirect reuse components.

Indirect reuse occurs when treated water is discharged into a state watercourse and then withdrawn a little farther downstream. The question of whether water discharged into a state watercourse should automatically be considered state water is a legal grey area. In December 1996, TNRCC directed staff to consider as a new appropriation of state water projects for indirect use of effluent that had historically been discharged to state waters. Under this interpretation, water put back into a stream is subject to appropriation by others unless the water right specifies otherwise.

However, an entity still could obtain a "bed and banks" permit to convey a specified amount of water for subsequent diversion, minus losses from transportation and evaporation. Some entities that want to conduct indirect reuse projects have sought to obtain bed and banks permits because water conveyed by these permits is not preempted by downstream users

with older water rights. There are very few indirect reuse currently underway in the state, but several have been proposed for Tarrant County, San Marcos, and San Antonio.

A large indirect reuse project proposed by the Tarrant Regional Water District would run discharged effluent through man-made wetlands to remove some impurities from the water and then store the water in Cedar Creek and Richland Chambers Reservoirs for future use by district customers. Objections have been raised to the project by Houston and other downstream water rights holders, who fear the project will diminish the amount of water available to them. San Marcos also has proposed an indirect reuse project that would use a bed and banks permit to pick up water it discharges into the Guadalupe River some two miles downstream of the discharge point.

Reuse can have a substantial impact on both downstream water rights and the wildlife that rely on instream return flows. In some cases, downstream water rights have been granted based on those historically returned flows. The environmental and economic impacts of reuse projects are hard to calculate. Since running water through riverbeds cleanses a significant amount of pollution from that water, some entities proposing indirect reuse projects have been criticized for trying to use a state watercourse to clean the water rather than paying for cleanup themselves. Large reuse projects could potentially decrease freshwater inflows to the coast, impacting recreation and coastal industries.

Interbasin transfers

Under current law, water in Texas can be reallocated from one basin to another if TNRCC finds that the transfer would not prejudice persons or property in the basin of origin nor impair existing water rights. The statute does not define "prejudice," however, nor specify whose interests must be considered. Since the early 1900s, the state has approved more than 80 interbasin transfers involving communities ranging in size from Dallas and Houston to Beaumont and Tyler and smaller towns in the Lower Rio Grande region and other areas.

The state water plan suggests additional clarification is needed to state law to ensure that broad-based public interests are considered before interbasin

transfers are approved. It recommends that the Water Code be amended to provide guidance on the criteria for determining whether a transfer should be granted and to delineate the "balancing test" for weighing the interest of the two basins.

Interbasin transfers worry some people because they feel it is difficult to calculate how a transfer would affect the basin of origin and existing surface water rights or available supplies. Interbasin transfers can have environmental, economic, and political ramifications and affect third parties who may not be water rights holders. Recreational businesses like marinas and restaurants, for example, that count on a certain level of water may oppose transfers. Others may object to any water leaving their region for another, especially if the two regions compete economically. Transfers also may be opposed on the grounds that they violate property rights. Finally, residents in the basin of origin may object if they perceive that the receiving basin is not taking appropriate measures to conserve its own water.

Water planning

Droughts are a normal part of the hydrologic cycle in Texas and must be accounted for if the state is to have any kind of effective long-range planning for its water needs. State agencies currently use the "drought of record" as a conservative gauge for calculating reservoir yields and issuing water rights and use permits. However, Texas lacks any statutory requirement for a statewide drought management plan and has no authority to comprehensively respond to the emergencies created by droughts and the long-term effects that can linger long after it has started to rain again (see page 3).

The state water plan recommends amending the Water Code to set in place a statewide drought response framework for coordinating state, regional and local response plans. The state would encourage local and regional drought management planning and help smaller communities cope with added requirements by providing financial assistance. It also would provide for timely and systematic data collection so that state agencies could quickly designate drought-affected areas.

Under the plan, each area of the state would develop a consistent and comprehensive regional water

management plan that encompasses every entity in the planning area. Issues to be addressed include water uses and projected demands, projected availabilities of supplies, plans for water conservation and drought management, and options to better manage demands and supplies throughout the region.

Although the TWDB does fund regional planning studies in a substantial portion of the state, there is no coordinated effort by every area to plan on a regional basis. The state could help local entities with technical assistance and provide financial assistance where needed. The lack of regional plans hampers the ability of TNRCC and TWDB to make decisions on water rights and water supplies and to plan and respond appropriately to droughts, floods and other emergency situations as well the general needs of the state.

The state water plan also recommends new statutory authority to allow state agencies to better respond to emergency situations caused by droughts. According to the plan, TNRCC should be authorized to assess a maximum administrative penalty of \$10,000 per day for certain violations of the Water Code, and the executive director should have the same powers as a watermaster in areas where such a program does not exist. The plan also recommends that the executive director have increased powers and flexibility to take certain actions in regards to permits and water transfers in emergency drought situations.

Water Funding

Most water and wastewater projects in the state are funded by political subdivisions, such as cities, municipal utility districts, and river authorities, through bonds in the open market or from revenues generated by rates. Other water projects and programs in the state are funded through TWDB, TNRCC, the Texas Department of Housing and Community Affairs, and the U.S. Rural Development (formerly Farmers Home Administration). The TWDB is the lead agency for funding water projects in the state through state and federal loan programs. In the past, the federal government funded a variety of state water projects, but federal funding for state water facilities has declined in recent years.

The TWDB estimates that water-related infrastructure projects needed in Texas over the next 50 years will cost \$65 billion.

Existing funding programs

Texas Water Development Board. Most of the water projects in the state are funded by the TWDB, which provides loans to local governments for water supply, water quality enhancement, wastewater treatment, stormwater control, nonpoint source pollution control, and flood control projects. Eligible political subdivisions and nonprofit water supply corporations also may receive loans for regional water supply and wastewater projects, reservoirs, and flood retention basins through state participation projects. The board also funds agricultural water conservation and a wide variety of water related research and planning studies. Board financial assistance programs are funded through state-backed bonds or a combination of state bond proceeds and federal grant funds.

The TWDB administers the Texas Water Development Fund, which provides for the sale of general obligation bonds to finance the construction of local and regional water projects at advantageous interest rates. Up to \$250 million of the \$2.68 billion in bonds authorized for this program goes to the Economically Distressed Areas Program as loans and grants for water and wastewater projects in the state's economically distressed areas and as state matching funds required to access \$200 million of federal funds under the Colonia Wastewater Treatment Assistance Program.

The board also administers the State Water Pollution Control Revolving Fund (SRF), capitalized by federal grants and matching state bond funds, which provides low-interest wastewater loans to political entities that own and operate wastewater treatment facilities. Funds from the SRF also are available for other wastewater projects, including wastewater recycling and reuse facilities, collection systems and stormwater and nonpoint source pollution control projects. Approximately \$1.9 billion has been funded through SRF for wastewater projects. The board also administers the Water Assistance Fund, which uses appropriated funds for water research and regional water and wastewater treatment and flood control planning.

In 1996, the U.S. Congress amended the Safe Drinking Water Act to establish a Safe Drinking Water Revolving Fund in each state to assist small communities with below-market interest rate loans to meet basic water infrastructure needs. An amount equal to 30 percent of the grants issued by the fund can be issued to forgive loans. However, Texas law prohibits the TWDB from forgiving loans for disadvantaged communities. Texas will probably receive about \$70 million from the first year capitalization grant. This money will go into a Safe Drinking Water State Revolving Fund already established by the board. The perpetually revolving fund will provide assistance to political subdivisions for drinking water projects. Under current state law, investor-owned utilities and certain nonprofit, non-community systems are ineligible to apply for water loans from this fund.

Voters have given the TWDB constitutional authority to issue bonds to finance water related infrastructure. The board is limited, however, to specific dollar amounts for specific purposes and must issue separate bonds for each purpose: water supply, state participation, wastewater, and flood control projects. According to the board, bonds for water supply financing will be exhausted at the end of the fiscal 1998-99 biennium, although other types of bond authorization remain largely unused. The state water plan recommends consolidating the existing TWDB bond authorizations into three categories:

- water quality, water supply, flood control and state participation bonds;
- agricultural conservation bonds; and
- economically distressed areas bonds (for colonias).

Loans and grants for agricultural water conservation also are available from the board's Agricultural Water Conservation Bond Program, Agricultural Trust Fund, and Agricultural Soil and Water Conservation Fund. The Agricultural Water Conservation Bond Program has used funding from the State Energy Conservation Office to subsidize interest rates. The program has loaned \$18.8 million to farmers and districts to purchase water conserving equipment and implement conservation practices. Unless additional funds are found and used to subsidize rates for future bond issues, say observers, the program will be hampered by an unattractive lending rate and a lack of funding. The Agricultural Trust Fund, however, received \$10 million in general revenue in 1985. The

Trust Fund, which is invested in U.S. government securities, must reinvest 50 percent of its earnings back into the fund to increase its size. The other 50 percent is divided up among agricultural conservation grants and programs. The trust fund currently holds \$14 million.

The state water plan recommends that the Legislature allow the principal in the Agricultural Trust Fund to be used for agricultural conservation loans to water conservation districts. This would allow the fund to invest in loans to agricultural conservation districts in lieu of government securities. Loans then would be made to farmers or districts to purchase agricultural conservation equipment.

Texas Natural Resource Conservation Commission. TNRCC funds water programs through various assessment fees, federal funds, and general revenue funds. TNRCC revenue for water programs in fiscal 1997 is projected at approximately \$35 million in fees, \$14.5 million in federal funds, and \$12.4 million in general revenue.

TNRCC collects Regional Quality Assessment fees from water and wastewater permit holders to fund water quality assessments for each watershed and basin; regulatory assessment fees from investor-owned utilities, water districts, and water supply corporations to fund oversight of water districts and rate-making by investor-owned utilities; and public health service fees from public water systems to cover the cost of administering state water regulatory programs. The agency also collects other water fees, most of them dedicated to specific water programs.

In testimony before the House Appropriations Committee, TNRCC officials said that the agency does not possess the funding resources to capably administer all the water activities currently mandated by law. Funding limitations have meant curtailing normal water permitting and inspection activities in order to address such urgent needs as drought-induced water shortfalls. The agency has requested increased funding for water programs. It also has asked that the many water fees be consolidated into a single fee designed to reflect usage and other factors in order to increase agency flexibility to address serious water problems.

Texas Department of Housing and Community Affairs. TDHCA funds some water projects

through community development block grants (CDBG) from the U.S. Department of Housing and Urban Development (HUD). TDHCA has field offices in El Paso, Edinburg, Laredo, Lufkin, and Lubbock for administering regional programs. The primary objective of the CDBG program is to provide decent housing, suitable living environments, and expanded economic opportunities for persons of low and moderate income. Of the \$87.7 million awarded to Texas in 1996 by HUD, approximately \$30 million went for water projects, \$22 million for sewer projects, \$12.7 million for other infrastructure needs, and \$22.9 million for colonia planning, housing demonstration projects, economic development and other projects.

CDBG grants fund a number of water projects, including pump stations, water and wastewater treatment plants, water mains, water storage tanks, and lift stations for local communities. Block grants for cities under 50,000 residents and counties under 200,000 are handled through TDHCA, but larger cities and counties must apply directly to HUD. The money is disbursed primarily as grants.

Rural Development. Federal funds in the form of loans and grants are also available for water and wastewater projects in rural areas and small cities and towns through Rural Development, which administers a water and wastewater loan and grant program called the Rural Utilities Service. This service has allocated about \$31 million in loans and \$18 million in grants for projects in Texas for fiscal 1997.

New funding proposals

Senate Bill 1. The fiscal note to SB 1 by Brown, the comprehensive state water bill passed by the Senate on April 3, estimates that \$50,441,293 from general revenue would be needed to fund provisions of the bill through August 31, 1999. The bill would make no appropriation but would provide a basis by which funds could be appropriated, probably through a contingency rider, such as contained in Article 11 of the Senate version of HB 1. The bulk of the money — approximately \$41 million — would go to the TWDB for regional management plans (\$18 million, most passed on to cities); state matching funds to access newly available federal Safe Drinking Water Act capitalized grant funds (\$12.4 million); expanded computerized mapping systems (\$4.5 million); improved water data collection (\$1.9

million); and regional plans (\$1 million, to be passed on to groundwater conservation districts). The remaining money would cover TWDB's administrative expenses.

TNRCC would be given approximately \$6 million for water conservation enforcement measures, water rights permitting and enforcement, administration of interbasin transfers, and data collection. The Texas Parks and Wildlife Department would receive \$700,000 to assess the impact of regional plans on fish and wildlife and for data collection. The Comptroller's Office would receive \$1.5 million in compensation for tax exemptions for water conservation and wastewater recycling; the Texas Agricultural Extension Service would receive a similar amount for educational programs to inform district residents of water issues.

House Bill 1802. HB 1802 by R. Lewis would create a new water facilities fund for loans and grants to political subdivisions for water-related projects. The fund would be paid by fees assessed on water rights holders according to the size of their

meter and a maximum \$1 per month fee added to the water bill of most retail customers. The fund would be administered by the TWDB. HB 1802 is pending in the House Natural Resources Committee.

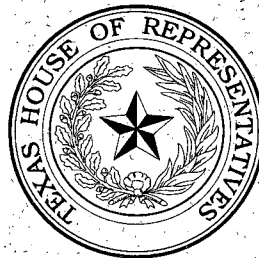
House Bill 2333. The committee substitute for HB 2333 by R. Lewis would raise the cap on the fees wastewater discharge permit holders pay TNRCC for annual wastewater treatment inspections. Upon enactment of HB 2333, the cap would increase from the current \$11,000 to \$25,000. Once Texas was delegated authority for the federal National Pollutant Discharge Elimination System (NPDES) program, the cap would increase to \$40,000.

The fee increases proposed by HB 2333 could be used for water quality programs, state regulation of water rights, and oversight and technical assistance to water and wastewater utilities and conservation and reclamation districts. HB 2333 was reported favorably as substituted by the House Natural Resources Committee.

— by Ann Walther

House Research Organization

Texas House of Representatives
Capitol Extension
Room E2.180



P.O. Box 2910
Austin, Texas 78768-2910
(512) 463-0752
FAX (512) 463-1962

Steering Committee: Henry Cuellar, Chairman • Peggy Hamric, Vice Chairman

Tom Craddick

Dianne White Delisi

Harold Dutton

Roberto Gutierrez

John Hirschi

Bob Hunter

Mike Krusee

Brian McCall

Elliott Naishtat

Al Price

Bob Turner

Leticia Van de Putte

Steve Wolens

Staff: Tom Whatley, Director; Linda Fernandez, Editor; Rita Barr, Office Manager;
Patricia Tierney Alofsin, Kellie Dworaczyk, John J. Goodson, Ann Walther and Kristie Zamrazil, Analysts