TEXAS WATER DEVELOPMENT BOARD

January 5, 2007

The People of Texas
The Honorable Rick Perry, Governor of Texas
The Honorable David Dewhurst, Lieutenant Governor of Texas
The Honorable Tom Craddick, Speaker of the Texas House of Representatives
Members, Senate Natural Resources Committee, Texas Senate
Members, House Natural Resources Committee, Texas House of Representatives

With the participation of 16 planning groups and over 450 planning group members, the Texas Water Development Board adopted the 2007 State Water Plan, *Water for Texas 2007* that is transmitted herewith. The Texas Water Development Board adopted this plan pursuant to Texas Water Code, Section 16.051 on November 14, 2006.

The 2007 State Water Plan is the second plan adopted that incorporates regional water plans developed under Texas Water Code, Section 16.053 between January 2001 and January 2005. Volume I is an executive summary that includes statewide water resource information and the Texas Water Development Board's legislative policy recommendations. Volume II includes details of the state's planning process, the 2006 Regional Water Plans, and other water resource information. Volume III is a digital version of the 16 regional water plans and a database of water planning information for each water user group in Texas that is located on the Texas Water Development Board's Web site.

As the state continues to experience rapid growth and declining water supplies, implementation of this state water plan is crucial to ensure public health, safety, and welfare and economic development in the state.

Respectfully submitted,

E.G. Rod Pittman, Chairman

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Water for Texas 2007

Volume I

Texas Water Development Board

Section 16.051 of the Texas Water Code directs the Texas Water Development Board to prepare, develop, formulate, and adopt a comprehensive State Water Plan that incorporates the regional water plans approved under Section 16.053. The State Water Plan shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the entire State.

January 2007

Document No. GP-8-1

Volume I

Highlights of the 2007 State Water Plan

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Highlights of the 2007 State Water Plan

Population in Texas is expected to more than double between the years 2000 and 2060, growing from about 21 million to about 46 million.

The demand for water in Texas is expected to increase by 27 percent, from almost 17 million acre-feet of water in 2000 to 21.6 million acre-feet in 2060.

Existing water supplies—the amount of water that can be produced with current permits, current contracts, and existing infrastructure during drought—are projected to decrease about 18 percent, from about 17.9 million acre-feet in 2010 to about 14.6 million acre-feet in 2060. This decrease is primarily due to the accumulation of sediments in reservoirs and the depletion of aquifers.

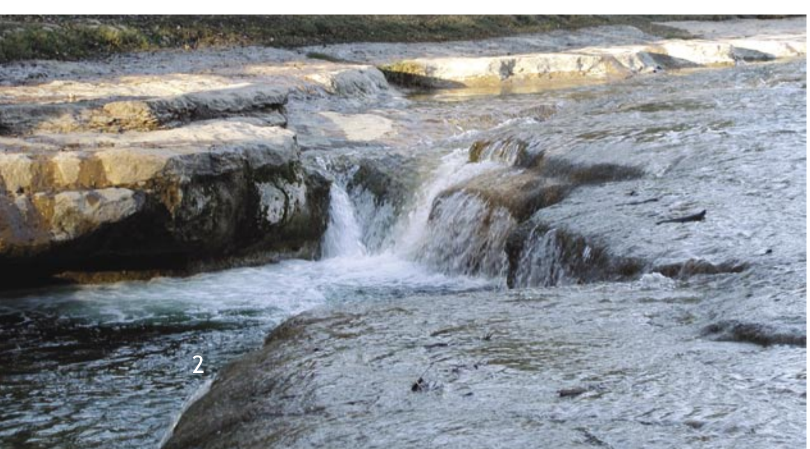
Texas is going to need an additional 8.8 million acre-feet of water by 2060 if new water supplies are not developed.

The planning groups identified about 4,500 water management strategies and projects to generate an additional 9.0 million acre-feet per year of water supplies for Texas.

The planning groups estimated that the capital costs to design, construct, or implement the 4,500 water management strategies and projects would cost about $30.7 billion.

If Texas does not implement the water plan, water shortages during drought could cost businesses and workers in the state about $9.1 billion by 2010 and $98.4 billion by 2060.

If Texas does not implement the water plan, about 85 percent of the state's projected population will not have enough water by 2060 in drought conditions.



This water plan marks the 50th anniversary of the end of the drought of record Texas experienced from 1950–1957. It also marks the 50th anniversary of the creation of the Texas Water Development Board, established by the citizens of Texas to develop a state water plan and finance water supply projects to ensure that the catastrophic consequences of the drought of the 1950s would not be repeated in the future. *Water for Texas—2007* is the eighth state water plan since 1957 and the second developed as a result of the nationally recognized regional water planning process in Texas.

At the same time the 2007 State Water Plan was being drafted from May 2005 to August 2006, the citizens of Texas were once again reminded of the many dire consequences that drought can have on our people, our economy, and our environment. The negative impact of the 2005-2006 drought on agriculture may be worse than any drought since the drought of the 1950s. Wildfires in the winter and spring of 2006 burned over 1.9 million acres of land and a number of homes and buildings, resulting in the loss of human life. Water supplies to both large and small water supply systems have been seriously threatened during this drought. Water use has been restricted in almost every region of the state as a result of declining water supplies.

Why do we plan?

Simply put, we plan so that Texas will have enough water in the future to sustain our cities and rural communities, our farms and ranches, our businesses and industries, and the environment. While Texas is blessed with an abundance of natural resources, water is sometimes in short supply, particularly during periods of drought. Texas has a long history of droughts, and there are more to come. Our state also has one of the fastest growing populations in the country. In 1950, only 8 million people lived in Texas. In 2000, nearly 21 million people called Texas home, and another 25 million will likely arrive by 2060. A growing population, combined with Texas' vulnerability to drought, makes water supply a crucial issue.

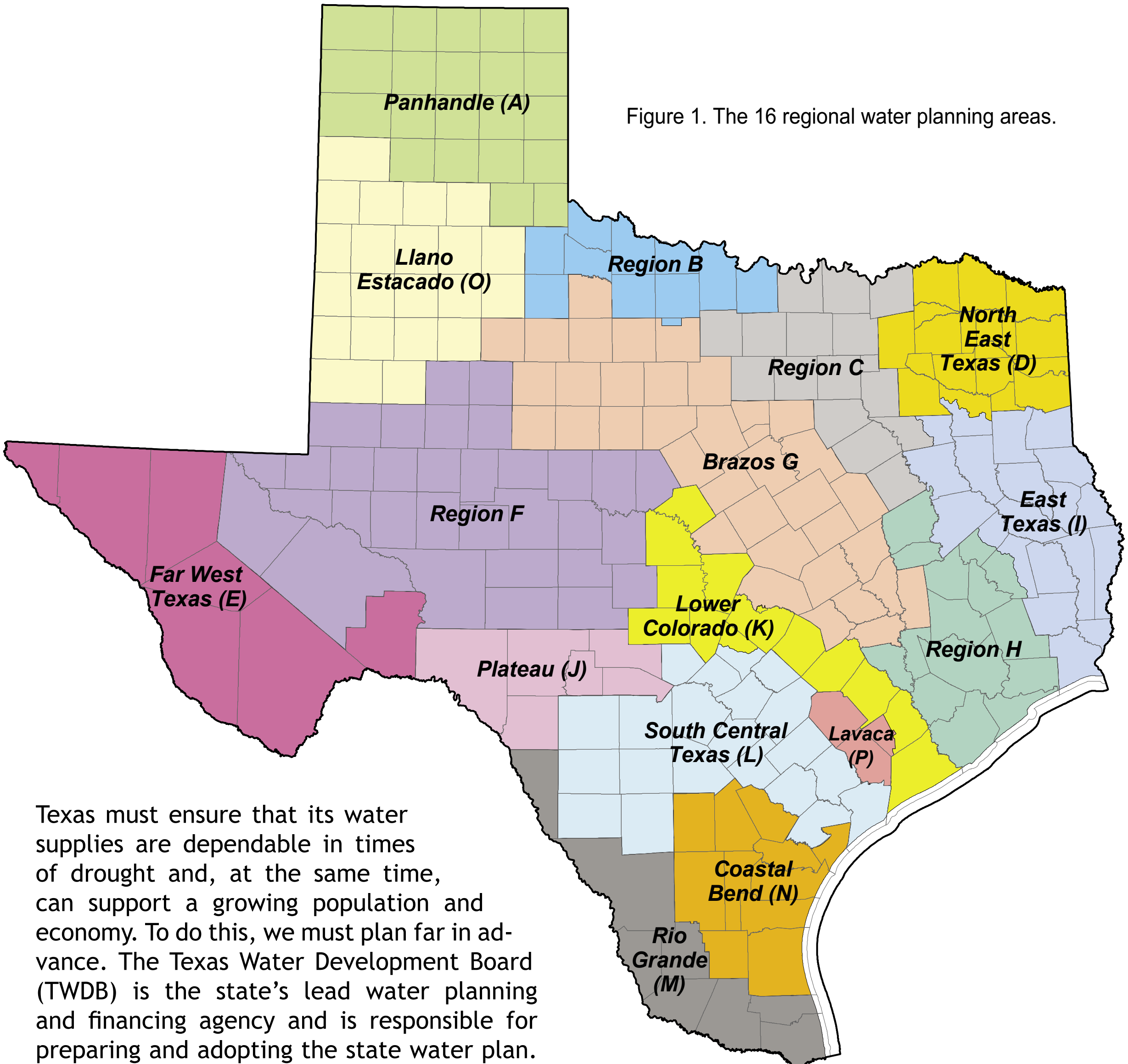


Figure 1. The 16 regional water planning areas.

Texas must ensure that its water supplies are dependable in times of drought and, at the same time, can support a growing population and economy. To do this, we must plan far in advance. The Texas Water Development Board (TWDB) is the state's lead water planning and financing agency and is responsible for preparing and adopting the state water plan. It is important that water plans are updated regularly to reflect and respond to changes in population, water availability, technological improvements, information, and policy. Because the legislature recognizes the importance of water to the future of Texas, it requires the development of a state water plan.

How do we plan?

Water planning in Texas is based on a "bottom-up," consensus-driven approach. The state is divided into 16 regional water planning areas (Figure 1). Each planning area is represented by a planning group that consists of about 20 members representing a variety of interests, including agriculture, industry, environment, public, municipalities, business, water districts, river authorities, water utilities, counties, and power generation. Each planning group evaluates population projections, water demand projections, and existing water supplies available during drought. Based on this information, each planning group identifies who will not have enough water, recommends strategies and projects that could be implemented to obtain more water, and estimates the costs of these strategies and projects. Once the planning group adopts the regional water plan, the plan is sent to TWDB for approval. TWDB then compiles information from the regional water plans and other sources to develop the state water plan. The entire process is open to the public.

cent, from almost 17 million acre-feet of water in 2000 to a projected demand of 22 million acre-feet in 2060 (Figure 3). Demand for municipal water is expected to increase from 4 million acre-feet in 2010 to just over 8 million acre-feet in 2060. However, demand for agricultural irrigation water is expected to decrease, from 10 million acre-feet per year in 2010 to approximately 9 million acre-feet per year in 2060, due to more efficient irrigation systems, reduced groundwater supplies, and the transfer of water rights from agriculture to municipal uses.

How many Texans will there be?

Population in Texas is expected to more than double between the years 2000 and 2060, growing from about 21 million to about 46 million (Figure 2). The growth rates, however, will vary considerably across the state. While some areas will double or even triple their populations, others will grow only slightly, and still others will lose population. Forty-three counties and 297 cities are projected to at least double their population by 2060, but another 45 counties and 137 cities are expected to lose population or remain the same. The rest are expected to grow slightly.

How much water will we require?

Although the population of Texas is expected to double over the next 60 years, the demand for water in Texas will increase by only 27 per-

How much water do we have now?

Existing water supplies—the amount of water that can be produced with current permits, current contracts, and existing infrastructure during drought—are projected to decrease about 18 percent, from about 17.9 million acre-feet in 2010 to about 14.6 million acre-feet in 2060 (Figure 4). Water supplies are from three primary sources: surface water, groundwater, and reuse water. Surface water supplies are projected to decrease about 6 percent, from about 9.0 million acre-feet in 2010 to about 8.4 million acre-feet in 2060. This decrease in surface water supply

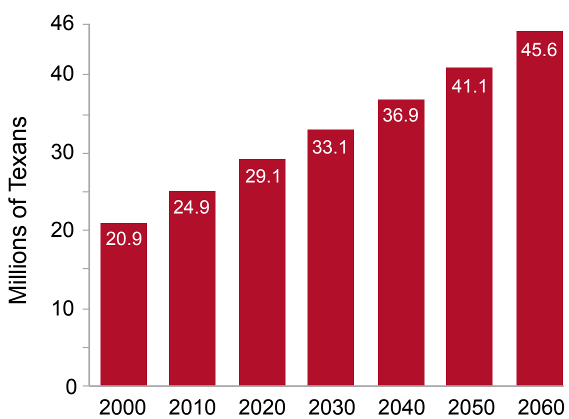


Figure 2. Projected population growth.

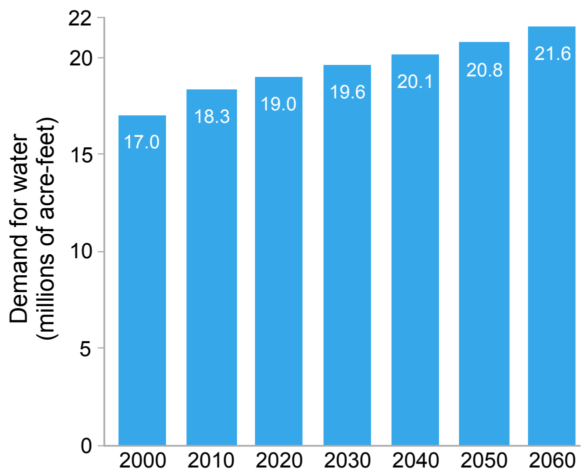


Figure 3. Projected water demand.

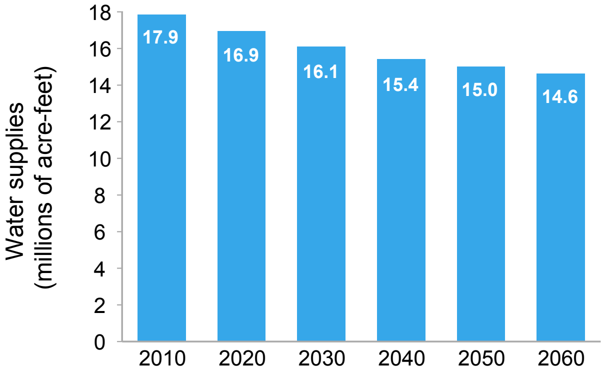


Figure 4. Projected supplies of water with current permits, current contracts, and existing infrastructure during drought.

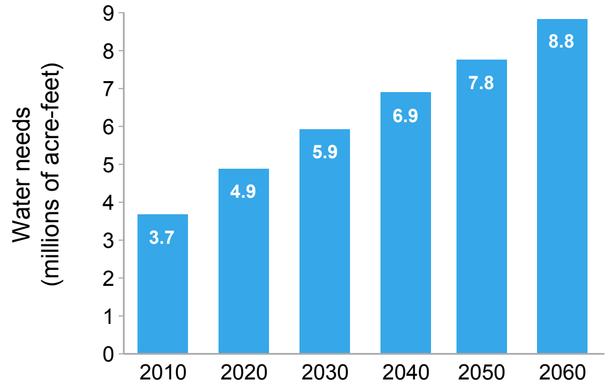


Figure 5. Projected need for additional water in times of drought.

is partly due to the accumulation of sediments in reservoirs. Groundwater supplies are projected to decrease 32 percent, from about 8.5 million acre-feet in 2010 to about 5.8 million acre-feet in 2060. This decrease is primarily due to reduced supply from the Ogallala Aquifer as a result of depletion and reduced supply from the Gulf Coast Aquifer due to mandatory reductions in pumping to prevent land subsidence. Existing water supply from water reuse—the use of water after it has already been used—is expected to be about 370,000 acre-feet per year by 2060.

Do we have enough water for the future?

We do not have enough existing water supplies today to meet the demand for water in the future during times of drought. If Texas does not implement new water supply projects or management strategies, then homes, businesses, and agricultural enterprises throughout the state are expected to need an additional 3.7 million acre-feet of water in 2010 and an additional 8.8 million acre-feet in 2060 (Figure 5).

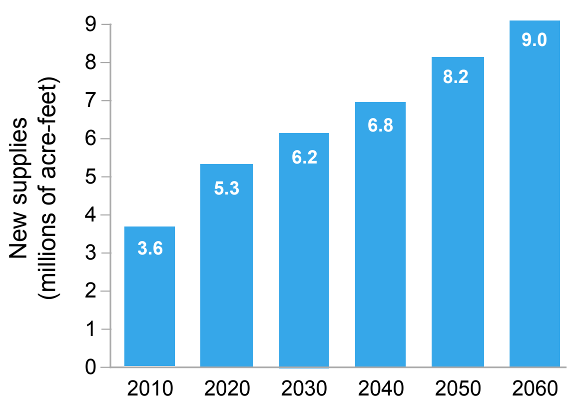


Figure 6. New water supplies from water management strategies in the state water plan.

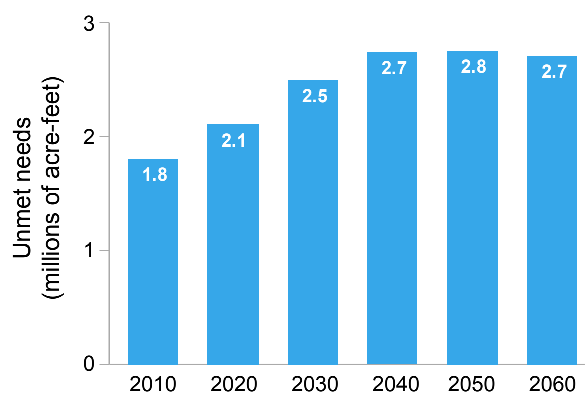


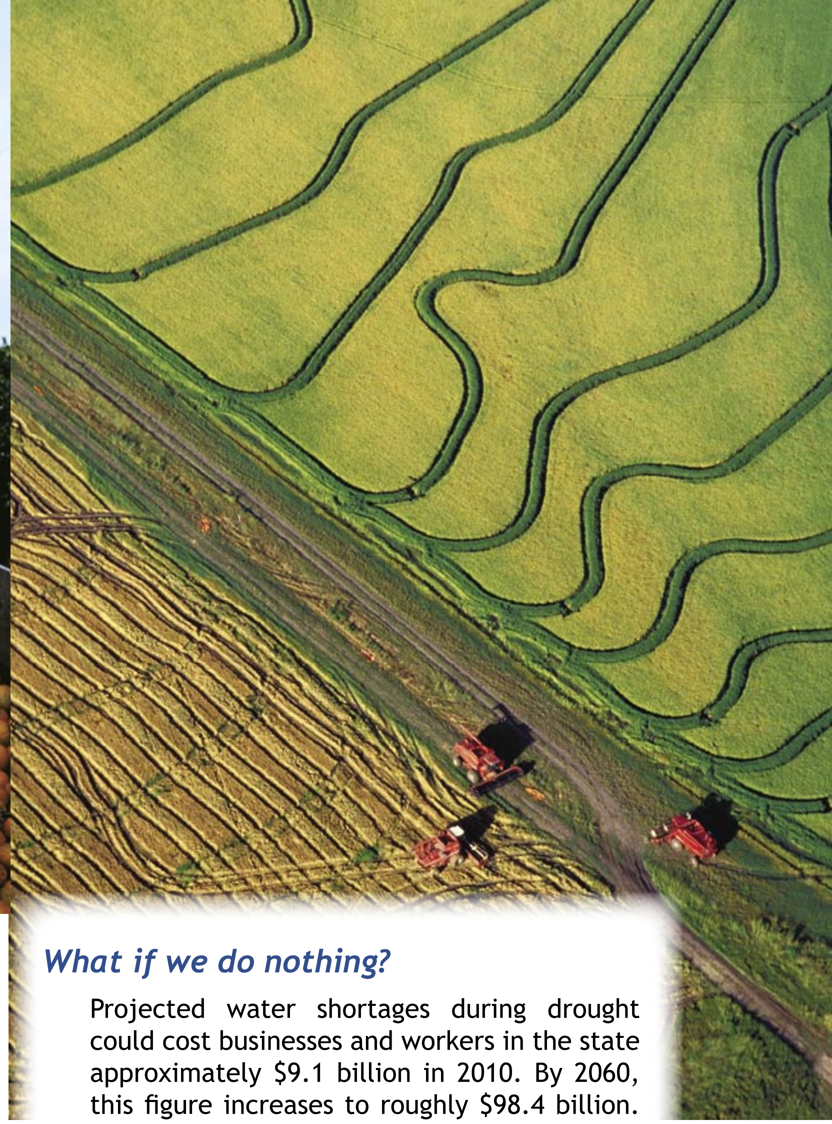
Figure 7. Unmet water supply needs.

What can we do to get more water?

The planning groups identified about 4,500 water management strategies to generate additional water supplies for Texas during drought. A water management strategy is a specific plan to increase water supply or maximize existing supply to meet a specific need. If these strategies are implemented, Texas will increase its water supplies by 3.6 million acre-feet per year by 2010 and 9.0 million acre-feet per year by 2060 (Figure 6). The water management strategies include municipal and agricultural conservation, reservoirs, wells, water reuse, desalination plants, and other strategies. Additional municipal water conservation strategies would result in about 617,000 acre-feet per year of water by 2060. Additional irrigation conservation strategies would result in about 1.4 million acre-feet per year by 2060. Fourteen new major reservoirs would result in about 1.1 million acre-feet per year by 2060. Additional water wells would result in about 800,000 acre-feet per year by 2060. Additional water reuse would result in about 1.3 million acre-feet per year by 2060. Desalination projects would result in about 313,000 acre-feet per year by 2060.

Are all water supply needs met?

Nine planning groups were unable to meet all water supply needs for each water user group in their planning areas. Approximately 1.8 million acre-feet of water supply needs are unmet in 2010, increasing to approximately 2.7 million acre-feet in 2060 (Figure 7). Unmet water sup-



ply needs occur for irrigation, steam-electric power generation, and mining water user groups in 2010 and 2060. The major reason for not meeting a water user group's water supply need is that the planning group did not identify an economically feasible water management strategy to meet the water supply need.

What will it cost?

The planning groups also estimated how much the 4,500 water management strategies would cost to implement. Total capital costs, which primarily consist of up-front money needed to design, construct, or implement strategies, are about $30.7 billion. Based on surveys conducted as part of the planning process, local jurisdictions indicate that a significant part of the total costs can be borne by local sponsors. However, the local jurisdictions identified specific funding needs that the state could fill. Therefore, TWDB recommends that the legislature consider an initial appropriation of $77.5 million for the 2008-2009 biennium, which would provide grants and loans for constructing $929.6 million in projects. Cumulative appropriations of $674.6 million between 2008 and 2028 would result in $1.7 billion in projects. These funds would help ensure that Texas has enough water for the future.

What if we do nothing?

Projected water shortages during drought could cost businesses and workers in the state approximately $9.1 billion in 2010. By 2060, this figure increases to roughly $98.4 billion. The loss of state and local business taxes associated with lost commerce could amount to $466 million in 2010 and $5.4 billion in 2060. If we do nothing, about 85 percent of the state's projected population will not have enough water by 2060 during drought conditions.

What can we do now?

The planning groups noted several issues that the legislature should consider addressing to help implement the state water plan and ensure Texas has water for the future. Based on these planning group recommendations, TWDB developed legislative recommendations on the following issues:

- financing of recommended water management strategies
- reservoir site designation and acquisition
- interbasin transfers of water
- environmental water needs
- water conservation
- expedited amendment process for regional water plans
- indirect reuse

TWDB Policy Recommendations to the Legislature

The specific TWDB legislative policy recommendations are included at the beginning of each issue section below and are followed by a general summary of each issue.

Issue: Financing Water Management Strategies

The legislature should consider appropriating funds to TWDB for debt service to the State Participation and Water Infrastructure Fund programs to fund water management strategies in the 2007 State Water Plan. An initial appropriation of $77.5 million for the 2008-2009 biennium would pay the first two years of debt service on general obligation bonds and grants, ultimately resulting in funding $1.7 billion in projects needed through 2020. The total appropriation needed through 2028 for debt service and grants is $674.6 million.

The legislature should maintain the existing state programs for water and wastewater infrastructure financing in order to provide adequate financial assistance for ongoing compliance with regulatory requirements and ensure Texas continues to access federal funds for water-related infrastructure projects.

Capital costs for recommended water management strategies in the 2007 State Water Plan are about $30.7 billion. Estimates of capital costs include both the direct costs of constructing facilities, such as materials, labor, and equipment, and the indirect expenses associated with construction activities, such as costs for engineering studies, legal counsel, land acquisition, contingencies, environmental mitigation, interest during construction, and permitting fees. Capital costs do not include funds for internal water distribution systems and wastewater infrastructure but only costs associated with getting water supply to a system, which can include cost of treatment plants. To determine the amount of state assistance that would be needed for the $29.3 billion of municipal water supply management strategies in the 2006 Regional Water Plans, the planning groups sent surveys to water providers. Based on the results of those infrastructure financing surveys, the planning groups estimated that $2.1 billion in state financial assistance would be needed between now and 2060. These surveys indicate nearly 91 percent of the $30.7 billion in total cost for implementing the 2007 State Water Plan is anticipated to be provided by local project sponsors through traditional financing mechanisms. However, of the $2.1

billion needed from the state, over $1.7 billion will be needed by 2020. If water management strategies from the 2007 State Water Plan are not implemented, approximately 60 percent of the state's projected population will not have enough water in 2020. Projected shortfalls in 2020 are estimated to be about 4.9 million acre-feet of water.

Factors that contribute to the funding gap and the need for additional state financial assistance include the following:

- *Increasing cost burdens on local water providers and governments*—Municipalities and other entities that provide water and wastewater services in Texas are now facing a more difficult financial future than they have in the past several decades. Over the years, reduced federal support for new capacity and rehabilitation of existing infrastructure are increasing the financial burden on local communities. This increase in responsibility is coming at a time when real interest rates are rising and sources of new water supplies are becoming more scarce and expensive. Moreover, operating and maintenance costs have escalated in recent years due to rising energy costs that place an additional strain on the budgets of local utilities. Population growth also increases the financial burden on local governments for nonwater-related infrastructure, including: new roads, schools, law enforcement, and other public service facilities. These services provide more apparent and highly publicized benefits and jobs for communities when compared to water and wastewater infrastructure projects.
- *Timing issues of implementing large-scale water supply projects*—Without state assistance, many communities may not actively plan and build needed improvements. Under current legal and regulatory requirements, large-scale water supply projects require up to 10 years for planning, permitting, designing, and constructing before water flows through the pipes. Often, local project sponsors are reluctant to approve large capital expenditures for projects that will take many years to realize benefits to the community.
- *Financing constraints in rural, and/or economically disadvantaged communities*—Small, rural, and economically disadvantaged areas in Texas are particularly hard pressed to raise the necessary capital for water projects for a simple reason: ratepayers in these communities lack sufficient income to pay the rate increases required to obtain traditional financing to improve or maintain existing water infrastructure to meet minimum regulatory requirements. These types of communities are far less likely to be able to implement water management strategies that will ensure their water supplies are dependable enough to withstand drought.

TWDB's existing State Participation Program and Water Infrastructure Fund can assist the state in providing financial assistance to fill the gap needed to implement water management strategies that will provide Texas with sufficient quantities of water under drought conditions (Tables 1 and 2, Figure 8). An initial appropriation of $77.5 million for the 2008-2009 biennium would provide grants and loans to construct $929.6 million in projects. Cumulative appropriations of $674.6 million between 2008 and 2028 would result in $1.7 billion in projects. TWDB estimates the investment needed based on a combination of debt service on general obligation bonds and grants to respond to the needs indicated in the Infrastructure Finance Survey for the 2006 Regional Water Plans. This recommendation is consistent with current authorizations in statute and requires appropriations by the legislature.

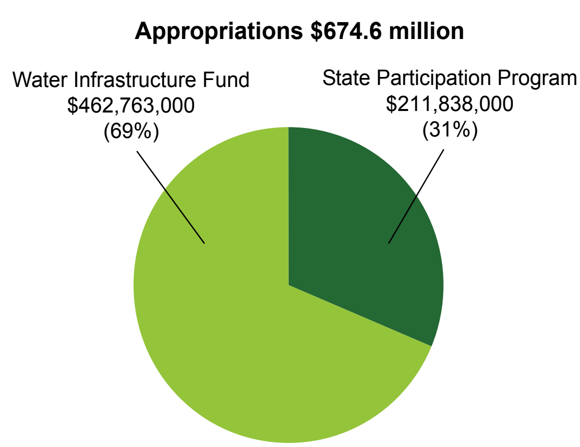


Figure 8. Total appropriations needed for the Water Infrastructure Fund and State Participation Program.

Table 1. Total recommended funding for municipal water supply projects identified in the 2007 State Water Plan (monetary figures reported in millions of dollars)

Fiscal year	2008	2009	Biennium totals	2010-2020	Total (2008-2020)
Funding for project implementation					
Loans and payment deferrals for construction for excess project capacity (State Participation Program)	158.0	158.0	316.0	410.7	726.7
Loans and payment deferrals for construction of nonexcess capacity and support for design and permitting costs and loans for projects that do not meet criteria of the State Participation Program (Water Infrastructure Fund)	352.9	214.0	566.9	355.7	922.6
Grants for economically distressed areas (Water Infrastructure Fund)	9.8	18.1	27.9	0	27.9
Grants and loans for projects in rural areas (Water Infrastructure Fund)	6.6	12.2	18.8	0	18.8
Total	527.3	402.3	929.6	766.4	1,696.0

Table 2. Total recommended appropriations for municipal water supply projects identified in the 2007 State Water Plan (monetary figures reported in millions of dollars)

Fiscal year	2008	2009	Biennium totals	2010-2020	Total (2008-2020)	2021-2028	Grand Total
Projected appropriations							
Loans and payment deferrals for construction for excess project capacity (State Participation Program)	8.1	16.2	24.3	183.1	207.4	4.5	211.9
Loans and payment deferrals for construction of nonexcess capacity and support for design and permitting costs and loans for projects that do not meet criteria of the State Participation Program (Water Infrastructure Fund)	23.2	24.9	48.1	315.6	363.7	27.0	390.7
Grants for economically distressed areas (Water Infrastructure Fund)	0.9	2.5	3.4	27.5	30.9	19.1	50.0
Grants and loans for projects in rural areas (Water Infrastructure Fund)	0.6	1.4	2.0	11.9	13.9	8.1	22.0
Total	32.8	45.0	77.8	538.1	615.9	58.7	674.6

Issue: Reservoir Site Designation and Acquisition

The legislature should designate all remaining viable reservoir sites of unique value for protection under Texas Water Code, Section 16.051(g), that are identified by TWDB and planning groups in the 2006 Regional Water Plans and the 2007 State Water Plan. The legislature should also designate any other feasible sites needed beyond the 50-year regional and state water planning horizon identified by TWDB-funded research currently in progress.

The legislature should designate all river or stream segments of unique ecological value recommended in the 2006 Regional Water Plans and the 2007 State Water Plan for protection under Texas Water Code, Section 16.051(f).

In addition, the legislature should provide a mechanism to acquire viable reservoir sites and possibly associated mitigation areas. These sites could be used to develop additional surface water supplies to meet the future water supply needs identified in the 2006 Regional Water Plans and those that will occur beyond the 50-year planning horizon.

Reservoir construction in Texas was most prolific before 1970. By 1950, Texas had constructed approximately 60 major reservoirs (5,000 acre-feet or greater of conservation storage capacity). Between 1950 and 1980, the number grew to a total of 179, but the pace of construction began to slow in the 1970s and continued the downward trend through the remainder of the 20th century. The reduced number of potentially high-quality reservoir sites, environmental issues or concerns, and increasing costs of reservoir development all contributed to the slow down. Texas currently has 196 major reservoirs. Ten reservoirs that were able to hold more than 5,000 acre-feet of water at conservation pool elevation upon initial impoundment are now no longer able to due to sedimentation and are currently classified as minor reservoirs.

Over time, Texas' state water plans have reflected this slowdown in reservoir development. The 1984 State Water Plan identified 65 major reservoir sites and allocated water from 44 of the new reservoirs to meet needs through 2030. The 1990 State Water Plan included 20 new reservoirs. In contrast, the 1997 and 2002 State Water Plans each recommended only eight major reservoirs to meet needs for additional water supplies through 2050. Major reservoir projects absolutely must remain a strong and viable tool in our water development toolbox if the state is to meet its future water supply needs. Recognizing this, planning groups have recommended 14 new major reservoirs as water management strategies in their 2006 Regional Water Plans to meet future water supply needs (Figure 9).

A number of factors will determine whether or not the major reservoirs recommended in the 2006 Regional Water Plans will actually be developed. One of the primary factors involves the reservoir site itself and the manner in which the state addresses issues associated with preserving the viability of the reservoir site for future reservoir construction purposes.

Certain governmental actions, such as developing public utility infrastructure or actions by federal, state, or local governments to protect natural ecosystems located within the reservoir footprint can significantly impact the viability of a site for future construction of a proposed reservoir. The proposed Waters Bluff Reservoir on the main stem of the Sabine River was prevented in 1986 by the establishment of a private conservation easement. In addition, the proposed Lake Fastrill, which is included in the 2006 Region C Water Plan and the 2007 State Water Plan as a recommended water management strategy to meet the future water supply needs of the city of Dallas, is a current and significant case in point. Land located within the reservoir's footprint is also included within the recently designated Neches River National Wildlife Refuge. If the designation of the Neches River National Wildlife Refuge by the U.S. Fish and Wildlife Service prevails in any legal challenges, it

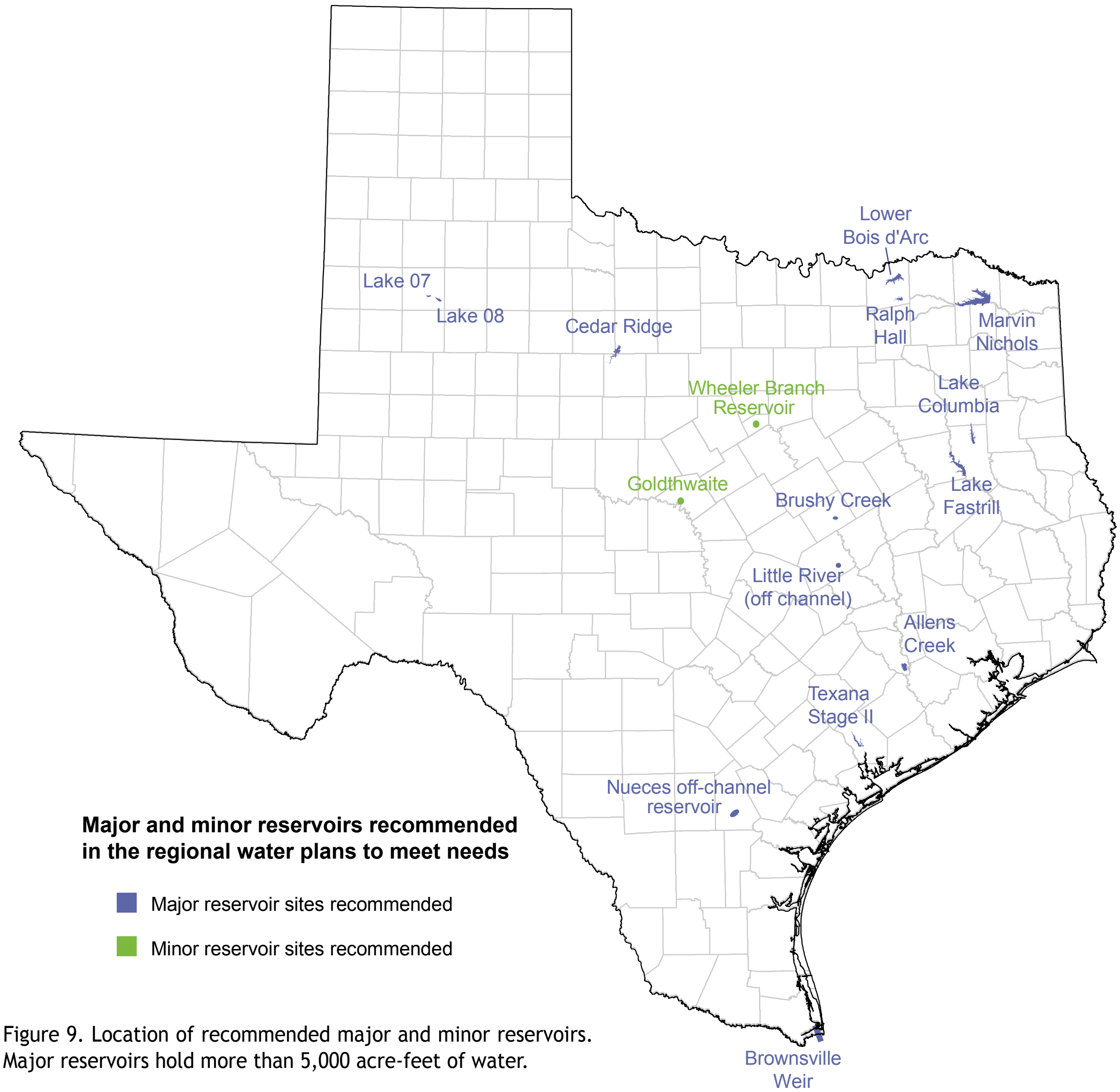


Figure 9. Location of recommended major and minor reservoirs. Major reservoirs hold more than 5,000 acre-feet of water.

would effectively preclude future use of the site for the proposed Lake Fastrill.

Lack of action by the state legislature in protecting reservoir sites has been cited as a problem in precluding federal actions that would otherwise be considered as circumventing the state's primacy over water in the state.

On April 17, 2006, TWDB approved a contract for a research project that will review the potential viability of reservoir projects that have been identified and/or recommended in the past 40 years of state, regional, and local water planning. The major

objective of this research, which is scheduled to be completed by December 1, 2006, will be to identify the remaining viable reservoir sites in the state that are most suitable for protection and/or acquisition.

Designation of Sites of Unique Value for Reservoir Construction

Texas Water Code, Sections 16.051(e) and 16.053(e)(6), provide that state and regional water plans shall identify any sites of unique value for constructing reservoirs that the planning groups or TWDB recommend for protection. Texas Water Code, Section 16.051(g) provides for legislative designation of sites of unique value for the construction of a reservoir. By statute, this designation means that a state agency or political subdivision of the state may not obtain a fee title or an easement that would significantly prevent the construction of a reservoir on a designated site.

Designation by the Texas Legislature provides a limited but important measure of protection of proposed reservoir sites for future development. Issues may arise regarding the level of protection legislative designation provides vis-à-vis certain federal actions. In addition, Texas Water Code, Sections 16.051(e) and 16.053(e)(6), also provide that state and regional water plans shall identify river and stream segments of unique ecological value that the planning groups or TWDB recommend for protection. Texas Water Code, 16.051(f), also provides for legislative designation of river or stream segments of unique ecological value. By statute, this designation means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment that the legislature has designated as having unique ecological value.

In some areas of the state, protecting critical habitats by designating river or stream segments of unique ecological value may be in competition with water supply projects. As previously noted, the legislature may designate ecologically unique river and stream segments and also unique sites for reservoir construction. A stream segment with significant bottomland hardwoods, for instance, may be eligible for either designation. It was suggested in the 2002 State Water Plan that these designation processes could be linked to protect certain ecologically unique stream segments as habitat mitigation areas associated with specific water supply projects, thus creating a balanced outcome.

There are 19 recommended unique reservoir sites (Figure 10) and 15 recommended unique

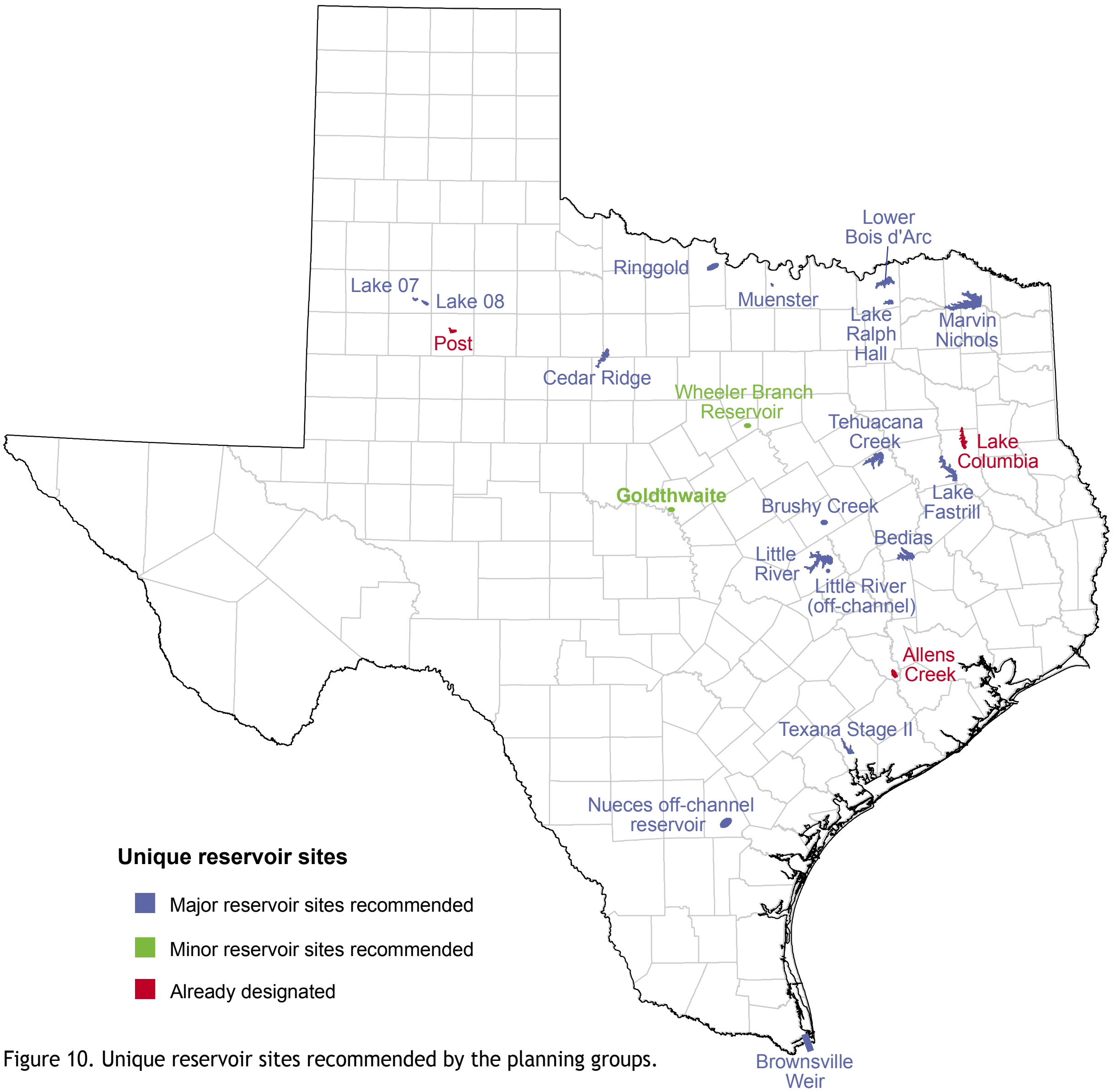


Figure 10. Unique reservoir sites recommended by the planning groups.

stream segments. Seven of the unique stream segments are for Region E (Figure 11), and eight are for Region H (Figure 12).

Aquisition and Protection of Land for Future Development of Surface Water Supplies

In the 1984 State Water Plan, the Texas Department of Water Resources recommended a number of integrated actions to protect suitable sites for future reservoir development, including the following:

- Creation by the legislature of a State Reservoir Site Development Easement System to provide the Texas Department of Water Resources with limited eminent domain power for the purpose of restricting certain land uses that would preclude reservoir construction within sites designated as suitable for reservoir development
- Creation by the legislature of a Reservoir Site Acquisition Fund to be administered by TWDB for the purpose of preserving future reservoir sites

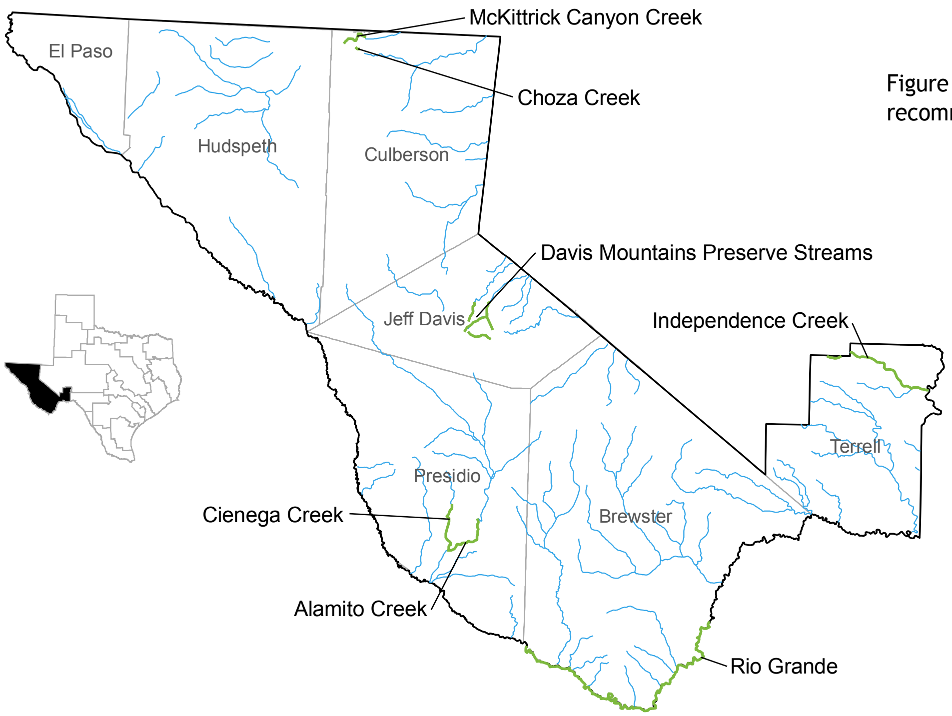


Figure 11. Unique stream segments recommended by Region E.

- Appropriation by the legislature of $100 million in each successive biennium to the Reservoir Site Acquisition Fund to compensate landowners for easements and land options to secure lands for reservoir site preservation

In its discussion of these recommended actions, the 1984 State Water Plan recognized that implementation will directly impact the traditional emphasis upon protection of rights of landowners in areas outside of municipalities. It also recognized that the proposed actions must include proper mechanisms for reservoir site designation and preservation and ways to mitigate the local tax effects of such actions. Also, it is noted that between the time a reservoir site is selected and construction is initiated, the value of land and improvements escalate due to market forces and that protecting reservoir sites from commercial development and inordinate price increases will require new legal and public policy approaches. In a broad context, the 1984 State Water Plan recommendations and discussion of issues related to the preservation of reservoir sites continue to be relevant.

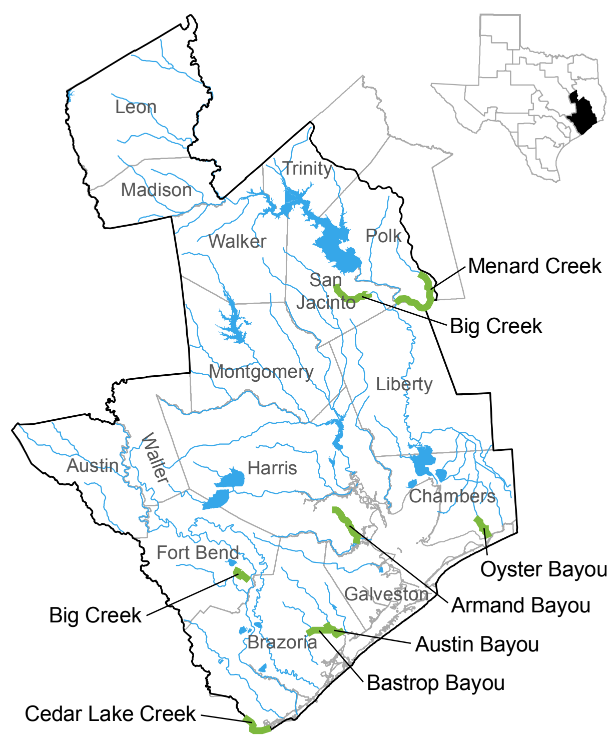


Figure 12. Unique stream segments recommended by Region H.

Texas Water Code, Chapter 15, Subchapter E, contains provisions for a Storage Acquisition Program to be administered by TWDB These provisions, enacted into law primarily by the 67th Texas Legislature (1981) and 69th Texas Legislature (1985), established a Storage Acquisition Fund and authorized TWDB to use the fund for certain projects including the design, acquisition, lease, construction, reconstruction, development, or enlargement in whole or part of any existing or proposed water storage project.

Texas Water Code, Chapter 16, Subchapter E, contains provisions authorizing TWDB to use the State Participation Program to encourage optimum regional development of projects, including the design, acquisition, lease, construction, reconstruction, development, or enlargement in whole or part of reservoirs and other projects. A recent example of TWDB's use of state participation authorization for this purpose was its approval in 2004 of $10 million in financial assistance to the Angelina and Neches River Authority to develop an environmental impact survey on and to purchase most of the fee title land necessary to build Lake Columbia in Cherokee County.

Prior to using the Storage Acquisition Fund (Texas Water Code, Chapter 15) and State Participation Program (Texas Water Code, Chapter 16) for eligible projects, TWDB is required by statute to determine that the state can reasonably expect to recover its investment in the project.

Issue: Interbasin Transfers of Surface Water

The legislature should provide statutory provisions that eliminate unreasonable restrictions on the voluntary transfer of surface water from one basin to another.

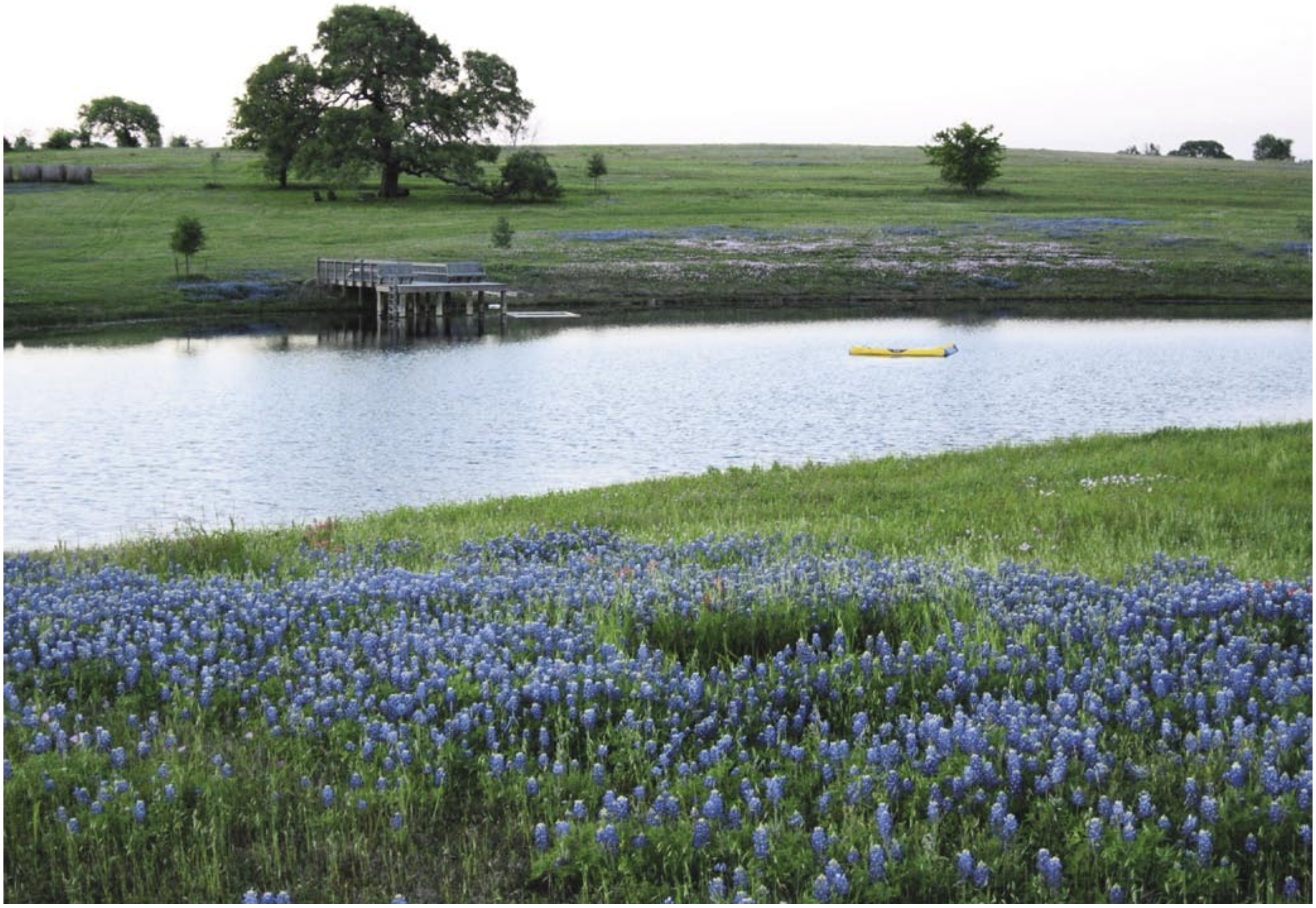
Interbasin transfers of surface water have been an important, efficient, and effective means of meeting the diverse water supply needs of an ever-increasing population in Texas. According to Texas Commission on Environmental Quality data, there have been approximately 193 interbasin transfer permits issued either for existing or planned water supply projects. These interbasin transfers are, or will be, used to meet a wide variety of water demands, including municipal, manufacturing, steam-electric power generation, and irrigated agriculture demands.

Both the historical and current importance of interbasin transfers across the state is illustrated by the interbasin transfer of water from Lake Meredith in the Canadian River Basin to 11 cities in the Canadian, Brazos, and Colorado river basins on the High Plains of Texas. Since the original delivery of water from Lake Meredith on April 1, 1968, by the Canadian River Municipal Water Authority, this project has served as the primary source of water supply for Amarillo, Brownfield, Borger, Lamesa, Levelland, Lubbock, O'Donnell, Pampa, Plainview, Slaton, and Tahoka. Without this project, local groundwater supplies from the Ogallala Aquifer, in many cases already severely depleted, would not have been able to meet the increasing municipal and manufacturing demands of the region.

Prior to the passage of Senate Bill 1, 75th Legislative Session (1997), Texas Water Code, Section 11.085, was entitled Interwatershed Transfers and contained the following provisions:

- Prohibited transfers of water from one watershed to another to the prejudice of any person or property within the watershed from which the water is taken
- Required a permit from the Texas Commission on Environmental Quality to move water from one watershed to another
- Required the Texas Commission on Environmental Quality to hold hearings to determine any rights that might be affected by a proposed interwatershed transfer
- Prescribed civil penalties for violations of these statutory requirements

In Senate Bill 1, 75th Legislative Session, Texas Water Code, Section 11.085, was amended to replace the above provisions with significantly expanded requirements for obtaining an interbasin transfer authorization. Since the amendments to the Texas Water Code requirements for interbasin transfers in 1997, there has been a significant drop in the amount of interbasin transfer authorizations issued. According to Texas Commission on Environmental Quality



data, only two interbasin transfer authorizations that were subject to those provisions have been granted since the passage of Senate Bill 1 in 1997. There has been a significant amount of public discussion about whether the 1997 amendments to Texas Water Code, Section 11.085, have had a negative effect on issuing interbasin transfer authorizations.

Issue: Environmental Water Needs

The legislature should enact statutory provisions similar to those in Article 1, House Committee Substitute Senate Bill 3, 79th Legislative Session considering recommendations from the Environmental Flows Advisory Committee, in light of the importance of balancing human water needs with the needs for instream flows and bay and estuary freshwater inflows and the need for greater certainty in water right permitting.

Debate continues in the state as to how much and by what means water should be provided to the environment for instream flows and freshwater inflows to bays and estuaries. It is important for water planners and surface water right permit applicants to have greater certainty or predictability in how environmental flow conditions will be determined in the water right permitting process. The state, through TWDB, the Texas Commission on Environmental Quality, and the Texas Parks and Wildlife Department, has studied the environmental inflow needs for bays and estuaries since 1977. However, the results of those studies have not obtained widespread acceptance and are not readily incorporated into the water right permitting and regional water planning processes. In addition, these agen-

cies were directed by the 77th Legislature to conduct priority instream flow studies, resulting in the Texas Instream Flows Program that is currently in progress, ultimately diverting resources away from the agencies' bay and estuary studies.

In 2003, the Study Commission on Water for Environmental Flows was created by the legislature to evaluate options for providing adequate environmental flows (Senate Bill 1639, 78th Legislative Session). This commission issued a report in 2004, which was the basis for environmental flow legislation proposed in Article 1, Senate Bill 3, 79th Legislative Session. That legislation proposed a basin-specific, consensus-based process to recommend environmental flow regimes that would be incorporated into an environmental flow standard through rulemaking by the Texas Commission on Environmental Quality. The recommended flow regimes would also be considered in future water right permit applications. In addition, the Texas Commission on Environmental Quality would establish an amount of water that would be set aside for the environment through rulemaking. In the event of an emergency, the Texas Commission on Environmental Quality could temporarily make available any environmental flow set aside for other beneficial uses. Applications for new water issued prior to Texas Commission on Environmental Quality's rulemaking for environmental flow standards and set aside in the applicable basin would contain provisions to adjust any environmental flow condition by 12.5 percent. The legislation authorized TWDB to use the Research and Planning Fund of the Water Assistance Fund to cover certain administrative and technical assistance costs associated with science advisory and stakeholder activities.

At the conclusion of the 79th Legislative Session, however, Senate Bill 3 did not pass. In October 2005, Governor Perry issued an

Executive Order creating the Environmental Flows Advisory Committee and appointed members to the committee in February 2006. The committee was charged with developing recommendations to establish a process that will achieve a consensus-based, regional approach to integrate environmental flow protection with flows for human needs.

Issue: Water Conservation

The legislature should review the Water Conservation Implementation Task Force recommendations and implement those that will result in optimal levels of water use efficiency and water conservation for the citizens of Texas.

In 2001, Senate Bill 2, the 77th Texas Legislature emphasized the importance of water conservation as a water management strategy. This legislation requires that planning groups consider water conservation practices for each need identified for a water user group. A comparison of the 2007 State Water Plan to the 2002 State Water Plan shows the growing importance of water conservation in Texas. For example, recommended water management strategies for conservation in the 2002 State Water Plan generated 14 percent of the water needed to meet the state's needs in 2050—a total of about 990,000 acre-feet per year. In the 2007 State Water Plan, conservation accounts for nearly 23 percent of required water in 2060—a total of about 2 million acre-feet. These figures represent "active conservation," measures usually initiated by water utilities, individual businesses, residential water consumers, and agricultural producers to reduce water consumption. In the 2006 Regional Water Plans, 14 of the 16 planning groups included some water conservation strategies to meet needs, and 13 of the 16 planning groups included policy recommendations concerning water conservation.

In 2003, the 78th Texas Legislature considered a broad spectrum of issues related to water conservation and established the Water Conservation Implementation Task Force via passage of Senate Bill 1094. The task force was created to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the state. The task force also developed a Best Management Practices Guide consisting of 21 municipal, 14 industrial, and 20 agricultural water conservation best management practices. The practices contained in the Best Management Practices Guide are voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe.

Municipal water conservation strategies in the 2006 Regional Water Plans relied heavily on the Water Conservation Implementation Task Force's Best Management Practices Guide and included aggressive plumbing fixture replacement programs, water-efficient landscaping codes, water loss and leak detection programs, education and public awareness programs, rainwater harvesting, and changes in water rate structures. Fourteen of the 16 planning groups recommended municipal water conservation as a potential way to meet future municipal water needs. In total, municipal water conservation strategies constitute nearly 617,000 acre-feet (7 percent) of water generated by all recommend strategies by 2060.

Twelve of the 16 planning groups recommended agricultural water conservation as water management strategies to meet water needs. In total, irrigation conservation strategies would generate nearly 1.4 million acre-feet of water in 2060, which equals about 15 percent of water generated by all recommend strategies by 2060. The planning groups also relied heavily on the Best Management Practices Guide to identify strategies that include the following:

- Irrigation water use management, such as irrigation scheduling, volumetric measurement of water use, crop residue management, conservation tillage, and on-farm irrigation audits
- Land management systems, including furrow dikes, land leveling, conversion from irrigated to dry land farming, and brush control/management
- On-farm delivery systems, such as lining of farm ditches, low pressure center pivot sprinkler systems, drip/micro irrigation systems, surge flow irrigation, and linear move sprinkler systems
- Water district delivery systems, including lining of district irrigation canals, replacement of irrigation district and lateral canals with pipelines
- Miscellaneous systems, such as water recovery and reuse

In addition to identifying specific water conservation best management practices as municipal and agricultural water management strategies to meet needs, many of the planning groups recognized that individual water user groups may adopt additional best management practices that were not selected as strategies in the regional water plans.

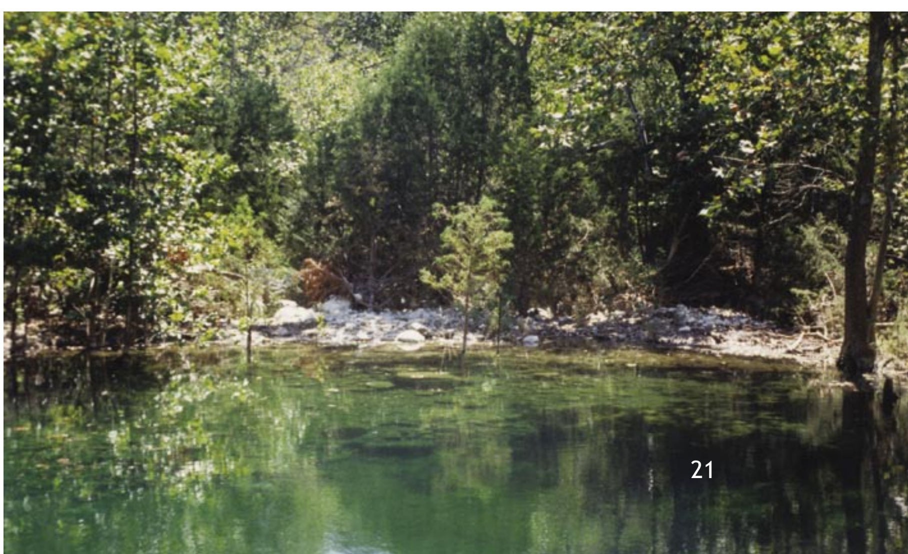
The task force made 25 recommendations that will greatly enhance the ability and desire of Texans to implement water conservation strategies to meet their water supply needs. These recommendations are summarized below:

1. Consider best management practices to be voluntary measures only
2. Create and fund a statewide water conservation public awareness campaign

3. Provide regional water conservation coordinators to planning groups
4. Establish a public recognition program for water conservation efforts
5. Provide grant funding for innovative water conservation programs
6. Provide cost-share funding for on-farm agricultural water conservation best management practices
7. Continue funding the state brush control program
8. Develop a standard methodology to calculate gallons per capita per day water use
9. Adopt the task force's recommended targets and goals for water conservation
10. Encourage planning groups to consider recommending water conservation water management strategies to meet any identified water supply need
11. Require water conservation as a criteria for state funding and provide for enforcement of entities that fail to adopt a water conservation plan or conduct required reporting on water conservation efforts
12. Create a water conservation advisory council to advise on water conservation matters
13. Develop a database for cataloging and tracking water conservation plans
14. Establish performance standards for toilet retrofits
15. Establish a water management resource library
16. Continue funding state water conservation programs
17. Continue funding for state water conservation research and education programs
18. Endorse land stewardship as a water conservation strategy
19. Study the impacts, if any, of "take-or-pay" contracts on water conservation efforts
20. Expand funding of Texas A&M University's potential evapotranspiration network
21. Coordinate state requirements for water conservation and distribution system capacities
22. Provide protection from cancellation of water rights due to water conservation efforts
23. Conduct "end-use" studies of residential water demand
24. Provide funding assistance to bridge gaps in water conservation resources
25. Provide additional funding for water use data

Three of the recommendations (7, 16, and 17) request continued funding of existing programs. Eight of the recommendations (3, 4, 6, 13, 15, 20, 23, and 25) require new or additional funding from the legislature for implementation. Thirteen of the recommendations (1, 2, 5, 8, 9, 11, 12, 14, 18, 19, 21, 22, and 24) require legislation and, in most cases, funding for implementation.

The task force recognized a need for promoting public awareness of water conservation issues (Recommendation 2) and recommended implementing a program that will focus on delivering a simple, enduring, universal water awareness message. The main goal of the program is to promote the importance and relevance of water conservation to all Texans and to strive to make all Texans aware that their natural water resources are limited and not immune to consequences of individual behavior. In 2004, TWDB contracted with consultants to conduct research to develop a market strategy and brand for a possible statewide water conservation public awareness program. The project was funded by a voluntary coalition of 36 water utilities, municipalities, businesses, and conservation groups.



Data from the 2004 study showed that only 28 percent of Texans “definitely know” the natural source of their drinking water. The research also showed a strong correlation between knowledge of water sources and willingness to conserve. As part of the study, 11 logo and tagline variations were tested in focus groups in five cities: El Paso, Laredo, Houston, Dallas, and Lubbock. “Water IQ: Know Your Water” rose to the top as an effective brand because “it challenges you to think” and can be tailored with local information and informative tips. “Water IQ” also resonated with Spanish-speaking Texans with the tagline “Conozca Tu Agua.”

Because of local drought impacts, four significant regional water providers and one groundwater conservation district have embraced the “Water IQ” campaign concept and are currently implementing pilot projects to establish a “Water IQ” awareness in their service areas. Their efforts will contribute print ads, public service announcements, and television spots that can be used in developing a statewide program. To date, the North Texas Municipal Water District, the Lower Colorado River Authority with the City of Austin, and the City of Lubbock with the High Plains Underground Water Conservation District have implemented their pilot projects.

In the 79th Texas Legislature, House Bill 1224 provided for implementing recommendation 19 by requiring TWDB to conduct a research study of the impacts of “take-or-pay” contracts on water conservation efforts. House Bill 1225 addressed recommendation 22 by protecting water rights from cancellation due to nonuse associated with water conservation. The 79th Legislature approved funding to continue to partially address recommendations 7, 16, and 17. In addition, due to efforts of individuals and local and regional water providers, recommendation 2, the conservation public awareness program, has been initiated in various locations.

House Bill 1226 and Senate Bill 3, 79th Legislative Session, did not pass into law; however, one or both of them contained statutory provisions that would have implemented recommendations 1, 2, 3, 5, 11, 12, and 18. Other

bills that did not pass would have implemented recommendation 14 (House Bill 1223) and recommendation 15 (Senate Bill 961). In the First Special Session of the 79th Legislature, House Bill 79 and Senate Bill 57 addressed recommendations 1, 2, 11, and 18 but did not pass.

Issue: Expedited Amendment Process

The legislature should provide statutory authority in Texas Water Code, Section 16.053, to allow for an expedited process for minor amendments to regional water plans where TWDB's Executive Administrator determines the amendment will not result in over-allocation of a source, is not related to a new reservoir, and does not have a significant impact on instream flows or freshwater inflows to bays and estuaries.

Texas Water Code, Section 16.053, requires that water supply projects meet needs in a manner consistent with the state water plan and an approved regional water plan to qualify for state financial assistance. In addition, Texas Water Code, Section 11.134, requires that proposed water appropriations address water supply needs in a manner consistent with state and regional water plans to receive a water right permit from the Texas Commission on Environmental Quality. In the event an applicant's project does not meet needs in a manner consistent with the state and regional water plans, the applicant must seek an amendment of the appropriate regional water plan and the state water plan or seek a waiver of this requirement. Such amendments can be costly and time-consuming because of the following requirements relating to amendments:

- 60 days notice and comment period prior to amending their plan
- Notice must be provided to each municipality greater than 1,000 population, each county judge, each river authority or special law district, each retail public utility, and each surface water right holder
- Notice must be published in a newspaper of general circulation in each county located in whole or in part in the regional water planning area
- A public hearing on the proposed amendment must be conducted to obtain public comments

This recommendation for an expedited amendment process would result in the following requirements for adopting minor amendments to regional water plans:

- Two weeks notice, posted in a place readily accessible to the general public, of the public meeting at which the amendment will be considered, similar to notice of a regular planning group meeting
- Consideration of public comments by the planning group at their public meeting where the amendment is being considered

Issue: Indirect Reuse

The legislature should develop policy in response to the following questions identified by the Texas Water Conservation Association's Reuse Committee:

(1) Under current law, is the use of wastewater effluent after discharge to a stream a use of "state water" subject to the laws of prior appropriation or is it subject to a different regulatory scheme?

(2) Does current law allow effluent derived from different sources of water to be treated differently for purposes of evaluating a request to reuse this effluent?

(3) Does current law provide for different treatment of effluent derived from "future" and "existing" return flows, regardless of the source?

(4) Who can obtain indirect reuse rights?

(5) To what extent should protection be afforded to the environment in reuse permitting decisions?

A briefing memo to the Commissioners of the Texas Commission on Environmental Quality dated February 25, 2005, describes reuse as follows: "In water rights permitting, 'reuse' is the use of surface water which has already been beneficially used once under a water right, or the use of groundwater which has been used," 30 Texas Administrative Code §297.1(44). There are two types of reuse: indirect reuse and direct reuse. Indirect reuse is the reuse of water, usually effluent, which is placed back into a river or stream. This generally occurs when a wastewater treatment plant discharges effluent into a stream and either the discharger or another person or entity diverts the effluent further downstream

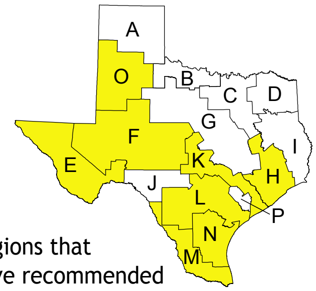
to use again. In contrast, direct reuse occurs when effluent from a wastewater treatment plant is piped directly to a place where it is used.

Historically, much of the effluent from wastewater treatment plants was returned to the rivers or streams of the state. Some of the water rights in this state have been permitted based on the existence of treated effluent in the rivers and streams. In addition, a portion of the effluent that has been discharged into rivers and streams has been available to the environment. Increasingly, there is interest in reusing this effluent to meet increasing water supply needs. In the 2006 Regional Water Plans, both direct and/or indirect reuse is a recommended water management strategy in 14 of the 16 plans. These recommendations include a total of 1.3 million acre-feet of supply by 2060 which includes approximately 416,000 acre-feet from direct reuse and 846,000 acre-feet from indirect reuse.

In permitting indirect reuse through a bed and banks authorization from the Texas Commission on Environmental Quality, several issues arise related to the existing Texas Commission on Environmental Quality rules or the statute. Some of these issues include: what type of analysis is required for bed and banks permits; should the indirect reuse of groundwater have the same requirements as for indirect reuse of surface water; does the owner of the water right, the entity that has contracted to purchase water and treated the wastewater, or other parties have the right to apply for a bed and banks permit; and should historically discharged effluent have the same requirements as future discharges?

The 80th Legislative Session's interim charges for both the House and Senate Natural Resources Committees include the topic of reuse. In addition, the Texas Water Conservation Association has appointed a Reuse Committee, which prepared a report titled "Texas Water Rights and Wastewater Reuse" (See Appendix).

New Water from Desalination



Regions that have recommended water management strategies for desalination.

Freshwater in Texas is limited—there is only so much rainfall and fresh surface water and groundwater to go around. With the population of Texas expected to reach almost 46 million by 2060, it will not be enough to simply identify new sources of fresh water. Texas needs new water. Desalination—the process of turning saline water into freshwater—is the only current technology that promises to deliver substantial amounts of new, drought-proof water.

Because of its location, desalination is ready made for Texas. The state has 367 miles of coastline bordering the Gulf of Mexico, which is a limitless supply of saline water. Even people deep in the heart of Texas can benefit from desalination: there is an ocean of saline water, called brackish groundwater, hidden in the ground—2.7 billion acre-feet worth.

Desalination has been around for decades, but only recently has become affordable on a large scale—and Texas is leading the way. Governor Perry, recognizing the importance of desalination to the future of Texas, directed TWDB to develop a large-scale demonstration seawater desalination project. The Texas Legislature supported these efforts by providing funding for feasibility and pilot plant studies for Brownsville, Corpus Christi, and Freeport. The legislature also provided funding for brackish groundwater desalination demonstration projects, which was awarded to the North Cameron Regional Water Supply Corporation and the cities of Kenedy and San Angelo. The El Paso-Fort Bliss Brackish Desalination Project currently under construction shows great promise and, when completed, will be the largest inland desalination plant in the world. In the current regional water plans, eight of the 16 planning groups included desalination projects as recommended water management strategies to meet water supply needs.

Desalination is not without challenges. Disposal of the concentrate—the salty waste product of the desalination process—can be expensive and have environmental consequences. High energy costs affect the cost of desalinated water. Predicting the long-term ability of brackish groundwater aquifers to produce water is difficult because there is a lack of information on these aquifers. Permitting desalination plants and the disposal of concentrate can be challenging. However, TWDB and others are working to address these economic, policy, and scientific challenges.

Over the last five years, Texas has made great strides toward delivering on the promise of desalination. Today, Texas is recognized as a national and world leader in this important technology.

HOW TO USE THE STATE WATER PLAN

The 2007 State Water Plan has three volumes, each representing a different tier or level of detail.

Volume 1 is an executive summary to provide a basic overview of the plan with major highlights and the TWDB's policy recommendations. Volume I summarizes information at the state level.

Volume II includes more detail and discusses key results of the 2006 Regional Water Plans including:

- **Chapter 1** (*Introduction*) ***summarizes the results of the state water plan***.
- **Chapter 2** (*Regional Summaries*) ***provides graphics, tables, and text summarizing results for each planning area***.
- **Chapter 3** (*Fifty Years of Water Planning in Texas*) ***presents the general history of state water planning in Texas, including how water management strategies and the planning process have evolved over the past 50 years, and discusses the implementation status of water management strategies recommended in the 2002 State Water Plan***.
- **Chapter 4** *(Population and Water Demand Projections)* ***summarizes the methodology and results for population and water demand projections, including discussions of how different economic sectors use water.***
- **Chapter 5** *(Climate of Texas)* ***discusses the climate of Texas, including general rainfall patterns and information on the frequency and magnitude of drought in the state***.
- **Chapter 6** *(Surface Water Resources)* ***presents detailed information on the state's surface water resources and includes estimates of available and existing surface water.***
- **Chapter 7** *(Groundwater Resources)* ***presents detailed information on the state's groundwater resources and includes estimates of available and existing groundwater.***
- **Chapter 8** *(Water Reuse)* ***discusses water reuse in Texas, including projections of existing water supplies generated by this practice***.
- **Chapter 9** *(Water Supply Needs)* ***summarizes water supply needs for different water users in the state during drought conditions and the potential socioeconomic impacts of not addressing water supply needs***.
- **Chapter 10** *(Water Management Strategies)* ***discusses water management strategies recommended by planning groups and the volume and costs associated with these strategies***.
- **Chapter 11** *(Plan Implementation Funding)* ***summarizes implementation costs of the 2007 State Water Plan, including statewide and regional cost estimates for water supply, water distribution and transmission infrastructure, wastewater treatment, and flood control***.
- **Chapter 12** *(Challenges and Uncertainties in Water Supply Planning)* ***analyzes the challenges and uncertainties, such as changing conditions, natural or human disasters, and policy and legislative impacts, that affect regional and state water planning***.
- **Chapter 13** *(Planning Group Policy Recommendations)* ***presents the range of policy issues and recommendations identified by planning groups***.

Volume III is a digital version of the 16 regional water plans and a database of the regional water planning information for each water user group in Texas. It is on the TWDB Web site. The regional water plans are available at: http://www.twdb.state.tx.us/rwpg/main-docs/2006RWPindex.asp and the TWDB's Regional Water Planning Database 2007 can be accessed at http://www.twdb.state.tx.us/data/db07/DefaultSelect.asp.

TEXAS WATER RIGHTS AND WASTEWATER REUSE

Prepared by the Reuse Committee of the Texas Water Conservation Association

Introduction

Generally, about sixty percent (60%) of all water diverted from Texas' rivers and streams or groundwater pumped for municipal purposes enters the state's watercourses as discharges of treated effluent from wastewater treatments plants. Once considered a threat to surface water supplies, due in part to actual or perceived water quality concerns, the value of this treated effluent is now clearly recognized. This is evidenced by a much heightened interest in reuse projects to meet current and future increased municipal demands. Further, the concept of reuse is included in nearly every SB1 regional plan. Treated wastewater effluent discharged into Texas' rivers also helps meet downstream water needs, including those of the environment and agriculture. These competing interests in return flows have crystallized the need to resolve many legal issues involving reuse.

The purpose of this white paper is to: (1) provide some basic legal background and context concerning reuse of wastewater under current Texas law; (2) identify disputed issues with existing law in Texas that may warrant legislative clarification; (3) summarize the various arguments offered on both sides of these issues, without offering an opinion as to the merits of these arguments; (4) and discuss potential consequences of various policy alternatives. The issues discussed in this paper include:

(1) Under current law, is the use of wastewater effluent after discharge to a stream a use of "state water" subject to the laws of prior appropriation or is it subject to a different regulatory scheme?

(2) Does current law allow effluent derived from different sources of water to be treated differently for purposes of evaluating a request to reuse this effluent?

(3) Does current law provide for different treatment of effluent derived from "future" and "existing" return flows, regardless of the source?

(4) Who can obtain indirect reuse rights?

(5) To what extent should protection be afforded to the environment in reuse permitting decisions?

While this paper attempts to identify discrete issues for discussion, it must be stressed that few of the issues identified above can be handled discretely. Indeed, many of these issues are so intertwined that resolution of one issue can and will impact how other issues will need to be considered and resolved. Moreover, while the disputes over indirect reuse are often characterized as a fight between municipalities or dischargers versus senior water rights holders and the environment, the reality is much more complex. Ownership, geographic distribution, sources of water supply, historical reliance on return flows in water rights permitting, and priority of water rights within each river basin vary greatly statewide. Thus, any decisions on the issues set forth in this paper are certain to result in different impacts, "winners," and "losers," depending on the specific facts of each basin and the interests involved. The question is often not whether reuse will occur, but by whom. The ability to engage in indirect or direct reuse translates directly to an ability by some water providers to delay development of additional water supplies while at the same time forcing others to look for alternative water supplies sooner rather than later when the availability of return flows for their use is diminished.

Background – The difference between direct and indirect reuse

Direct reuse

Direct reuse is the use of wastewater effluent that involves delivery of effluent via pipelines, storage tanks and other necessary infrastructure directly from the wastewater treatment plant to others before discharging the effluent into a watercourse.[1]

In Texas today, it is undisputed that a surface water right holder may directly reuse and fully consume effluent, subject only to the limitations contained in the underlying water right from which the effluent was derived.[2] Where contracts or other laws have clearly transferred ownership of that effluent to another, such as the wastewater treatment provider, the direct reuse rights may lie with the owner of the effluent. This approach is generally consistent with a water right holder's right to fully consume the water granted under its water right, subject only to the limitations expressed within the "four corners" of the water right. This approach is also generally consistent with how wastewater treatment providers operate today. Owners of wastewater treatment plants generally have a wastewater discharge (TPDES) permit from the state that allows them to discharge treated effluent to a watercourse. TPDES permits are not viewed as imposing a "duty" or obligation on the wastewater treatment plant owners/operator to continue to discharge effluent at a particular location or in a particular quantity. Rather, these permits restrict the circumstances under which any discharge may occur, if at all.

Obtaining authorization for direct reuse under today's regulatory scheme is fairly streamlined. Typically, only certain water quality authorizations must be obtained from TCEQ to do this kind of reuse.[3] A water right holder may directly reuse the unconsumed water in a relatively unfettered manner so long as the reuse is accomplished for the purposes and in the location of use provided in the underlying water right from which the effluent is derived. Although the direct reuse of effluent reduces the amount of flow in the watercourse that is available downstream for use by other water rights holders and the environment, additional water rights authorizations are typically not required and thus, these impacts to other water rights and the environment are not addressed.

Some owners of wastewater treatment plants have relied on existing law and invested considerable funds in implementing and planning for expanded direct reuse projects. In some cases, wastewater treatment operators are required or have chosen to operate under a "no discharge" permit, which requires them to directly reuse all of the effluent. In most instances, however, direct reuse proj-

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1 *See* 30 Tex. Admin Code § 297.1(44).

2 Tex. Water Code § 11.046(c).

3 *See* Tex. Admin. Code ch. 210.

ects are relatively small in scale. Moreover, there remain practical, technical, political, and fiscal limitations on the ability to implement large direct reuse projects. Human consumption of treated wastewater effluent has yet to gain widespread social acceptance in Texas. The use of treated wastewater for landscape irrigation in areas of heavier human use (e.g. parks and school grounds) has been met with resistance in some areas even though the effluent must be treated to a high standard. Thus, in some cases, high quality potable water is still used for some purposes even though treated effluent could be used under today's rules. This limited implementation of direct reuse projects means that the availability of return flows to meet downstream needs has not yet been significantly impacted. However, it is believed that. as treatment technology advances and treatment costs decrease, and as water becomes more scarce and the cost of developing and delivering new supplies increases, direct reuse of treated effluent (even for human consumption) will become more attractive and feasible over time.

Indirect Reuse

Treated wastewater that is not directly reused and is instead discharged to a watercourse is "return flow."[4] The subsequent downstream diversion and use of wastewater return flows is commonly referred to as "indirect reuse." Indirect reuse substitutes transportation via a state watercourse for the pipeline, and accompanying capital cost, associated with traditional direct reuse projects. The ability to use the stream as the "pipeline" may also provide the added benefit of reducing costs of treating the diverted water, as the mixing and transportation process in the watercourse actually provides additional natural treatment. Like direct reuse, indirect reuse ultimately reduces the amount of flow in the watercourse that is available for use by other water rights holders and the environment. This effect, of course, is most evident downstream of the point where the indirect reuse occurs. Upstream of the indirect reuse point, the return flows continue to provide some instream flow benefit. In contrast to the clear authority to engage in direct reuse without water rights permitting implications, the ability to engage in indirect reuse is less clear. There are currently pending before TCEQ a large number of water rights applications seeking indirect reuse authorization, nearly all of which have been protested. In some cases, these permits applications derive from projects contained in regional water plans. Many of the issues posed in those protests are more fully discussed in the following Issues section of this paper.

ISSUES DISCUSSION

(1) Under current law, is the use of wastewater effluent after discharge to a stream "state water" subject to the laws of prior appropriation or is it subject to a different regulatory scheme?

With regard to surface waters, Texas generally follows the prior appropriation doctrine to authorize use of this state water. Under this principal, available water is permitted for use on a "first in time, first in right" basis. Except in very limited circumstances, a permit is required to use state water. One aim of this permitting process is to ensure that available water supplies are not over-

[4] 30 Tex. Admin. Code § 297.1(43).

committed. Indeed, an application for a new appropriation may only be granted upon a finding that: (a) the application meets the statutory requirements, (b) water is available, and (c) the proposed appropriation is for a beneficial purpose, does not impair existing water rights, is not detrimental to the public welfare, is consistent with the state and regional water plans, addresses water conservation concerns, and includes proper consideration of environmental needs.[5]

One of the most basic disputes in the fight over indirect reuse is whether wastewater return flows are subject to this or some other regulatory scheme. As discussed below, the source of this dispute is rooted in language contained in two statutes, both of which were modified in 1997 by Senate Bill 1: Water Code § 11.046 and Water Code § 11.042.

Bed and Banks Authorization of Reuse

Those who advocate that wastewater return flows are not subject to the permitting requirements that apply to new appropriations focus on Texas Water Code § 11.042[6] – the "Bed and Banks" statute. These applicants argue that section 11.042 changed preexisting law to provide an independent basis for granting indirect reuse authorizations outside the established prior appropriations permitting scheme.

Section 11.042 contemplates the issuance of permits for the delivery of certain waters down the bed and banks of a watercourse under three separate circumstances. Subsection (a) provides the statutory guidelines for delivery of stored waters from reservoirs using the bed and banks of a watercourse and is not at issue here. Subsection (b) provides a statutory basis for delivery of effluent derived from groundwater, and is discussed more fully under Issue (2) in this paper. Many argue that subsection (c) provides the basis for indirect reuse authorizations of surface-water derived effluent. It states:

> Except as otherwise provided in Subsection (a) of this section, a person who wishes to convey and subsequently divert water in a watercourse or stream must obtain the prior approval of the commission through a bed and banks authorization. The authorization shall allow to be diverted only the amount of water put into a watercourse or stream, less carriage losses and subject to any special conditions that may address the impact of the discharge, conveyance, and diversion on existing permits, certified filings, or certificates of adjudication, instream uses, and freshwater inflows to bays and estuaries. Water discharged into a watercourse or stream under this chapter shall not cause a degradation of water quality to the extent that the stream segment's classification would be lowered. . ..

Many applicants for indirect reuse authorization argue that "water" in section 11.042(c) includes all types of water (including surface-water derived effluent) except those specifically addressed in other sections of section 11.042 and that section 11.042(c) removes indirect reuse from the process for permitting new appropriations. They further argue that no priority date should attach to indirect reuse, or that, if a priority date must be assigned, it should be the same priority date that is associated with the underlying water right from which

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5 *See* Tex. Water Code Ann. § 11.134(b).

6 *See also* 30 Tex. Admin. Code § 297.16.

the return flows derive. Applicants also argue that the protections embedded in section 11.042(c) are sufficient to protect the environment and all existing water rights holders. Others argue that section 11.042(c) actually represents a limitation on one's private property right to reuse effluent that did not previously exist.

Further, because a water right holder is entitled to consumptively use or directly reuse 100% of the water granted under an appropriative right (unless otherwise expressly limited in the permit[7]), and because all requests for new appropriations in recent years have been evaluated assuming that the waters under these existing rights will be fully consumed (i.e. there will be no return flows), many argue that a bed and banks permit is the proper mechanism for granting legal rights to indirect reuse of effluent.

Indirect Reuse Permits As New Appropriations

Those arguing that any legal claim to wastewater return flows must be sought through the ordinary water rights permitting process largely rely on preexisting law and Water Code § 11.046. This statute, which also provides the clear authority for direct reuse, provides in pertinent part that:

> Once water has been diverted under a [water right] and then returned to a watercourse or stream … it is considered surplus water[8] and therefore subject to reservation for instream uses or beneficial inflows or to appropriation by others unless expressly provided otherwise in the permit, certified filing, or certificate of adjudication.

Supporters of this position argue that this language codifies the common law, which held that an appropriator had no claim to water that had escaped his land, particularly once it drained into a natural watercourse.[9] They argue that wastewater return flows are "considered surplus water" under section 11.046(c) and thus should be treated as available for use by other downstream water rights holders or subject to permitting only as a new appropriation.

Since section 11.042(c) uses the term "water" and not "effluent" or "return flows," some offer that this section applies to other sources of water proposed to be transferred through state watercourses, such as groundwater or imported surface water (often referred to as "developed water"). This interpretation, they contend, gives meaning to the term "water" used in section 11.042(c) without the apparent conflict between this section and the provisions of section 11.046(c), and without requiring a dual permitting requirement to secure a new appropriation under section 11.046(c) and a bed and banks authorization under section 11.042(c).

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7 *See* Tex. Water Code Ann. § 11.046.

8 *See* Tex. Water Code § 11.002(10); 30 Tex. Admin. Code § 297.1(53).

9 In *City of San Marcos v. Texas Comm'n on Envt'l Quality*, 128 S.W.3d 264 (Tex. App. – Austin 2004, pet. denied), the court ruled that, prior to Senate Bill 1 amendments to the Water Code, no common law right existing by which a city might claim ownership of its wastewater effluent following its discharge into a state watercourse. Instead, a new appropriation was required. *See also* Wells A. Hutchins, The Texas Law of Water Rights 155 (1961). *See also* Ronald A. Kaiser, *Texas Water Marketing in the Next Millennium: A Conceptual and Legal Analysis*, 27 Tex. Tech L. Rev. 181 (1996); *South Texas Water Co. v. Bieri*, 247 S.W.2d 268, 272-73 (Tex. Civ. App. – Galveston 1952, writ ref'd n.r.e.).

Consequences of Different Approaches to Permitting Indirect Reuse

The implications of how indirect reuse of surface water-derived effluent is permitted, if at all, could have enormous implications with regard to who might ultimately obtain such rights, the value of those rights for providing a quantifiable, reliable water supply that can be appropriately protected from use by others, and how potential impacts on other water users and the environment might be addressed. As mentioned earlier, this choice is not always between cities and river authorities or upstream and downstream interests. If anything, the choice may best be characterized as one between: (1) entities seeking to increase their legally available water supply beyond that which they currently hold by contract or water right in a manner that, in many cases, may be more cost-effective or politically acceptable (or both) than a new water supply contract, reservoir project, or costly pipeline, and (2) existing water rights holders or environmental interests who have relied upon or wish to preserve future availability of return flows to meet their own needs, environmental flow needs, or the needs of downstream senior rights who would otherwise make calls upstream to junior rights for the passage of inflows.

Some of the more specific consequences of a “bed and banks” approach to indirect reuse of surface water-based effluent under section 11.042 include:

(1) Protections afforded existing water rights and environmental needs may be less than that statutorily required for a new appropriation. For example, assignment of no priority date or a priority date of the underlying water right renders off-limits those return flows from claims by existing water rights that may have relied on the availability of those return flows to improve reliability of their rights.

(2) Use of section 11.042 as an indirect reuse authorization mechanism would require development of a detailed accounting system to track discharges and diversions of return flows that fall outside the priority system of allocating waters in a watercourse;

(3) Removing return flows from the available “pool” of water available to satisfy determined environmental needs, if any, could result in an inability to meet any such needs, cause the burden to be borne by other water rights holders, or increase the cost of meeting any such needs.

(4) Indirect reuse could significantly extend the water supply available to the entity receiving the authorization.

(5) The State retains some right to evaluate and address the impact of indirect reuse on the environment and other water rights. (The extent of this right is the subject of other issues discussed in this paper.)

By comparison, the types of specific consequences that some suggest result if indirect reuse is treated as a new appropriation under section 11.046 include:

(1) In many basins, the water in the watercourses, even after including return flows, can be fully allocated to existing water rights (at least up to the reliability standard required to permit such use). In these and other cases, determined environmental water needs of the stream or bay systems may exceed the amount of water remaining for appropriation. New permits for indirect reuse could probably not be issued in these basins.

(2) Even if water is found to be available, the water right will receive a junior priority date. Under the "first in time, first in right" approach, this means that these water rights are more likely to be reduced or cut off in times of severe drought.

(3) Increased development of direct reuse projects is likely to occur if other water supply strategies cannot be identified.

(2) Does current law allow effluent derived from different sources of water to be treated differently for purposes of evaluating a request to reuse this effluent?

Groundwater-based effluent

Section 11.042(b), also enacted in 1997, provides a separate mechanism for addressing the indirect reuse of effluent derived from groundwater. Specifically, section 11.042(b) reads:

> A person who wishes to discharge and then subsequently divert and reuse the person's existing return flows derived from privately owned groundwater must obtain prior authorization from the commission for the diversion and the reuse of these return flows. The authorization may allow for the diversion and reuse by the discharger of existing return flows, less carriage losses, and shall be subject to special conditions if necessary to protect an existing water right that was granted based on the use or availability of these return flows. Special conditions may also be provided to help maintain instream uses and freshwater inflows to bays and estuaries. A person wishing to divert and reuse future increases of return flows derived from privately owned groundwater must obtain authorization to reuse increases in return flows before the increase.[10]

Effluent derived from Imported or Stored Waters

While section 11.042(b) singles out groundwater-derived effluent for specific regulatory treatment, section 11.042(c) does not identify the source(s) of the "water" to which it refers, thereby leaving open for argument the issue of whether or how effluent derived from other water supplies is to be treated, if at all, under section 11.042(c).

Because imported waters from another basin, and the effluent derived from them, are sources of supply that would not have ordinarily been available to meet downstream environmental needs or those of downstream water rights holders in the receiving basin, some argue different and perhaps less onerous treatment is appropriate, especially in light of already existing barriers to interbasin transfers.

A few have also argued that effluent derived from waters that are first stored in an in-basin reservoir are waters that would not have been available to the environment or downstream water rights but for the initial efforts of the entity

[10] This language essentially tracks the decision by Texas Natural Resource Conservation Commission (TNRCC) (predecessor to the TCEQ) in the *City of San Marcos* case, in which the City of San Marcos sought a bed and banks authorization to convey groundwater-derived effluent for subsequent diversion and use downstream under the statutes that existed prior to the adoption of SB 1 and section 11.042(c).

that constructed the reservoir to capture and store the source water. Others suggest that there is no difference between reuse of effluent derived from in-basin surface water previously stored in a reservoir and effluent derived from in-basin surface water diverted under a run-of-river permit.

As discussed above under issue (1), many generally recognize there may be a valid basis for distinguishing between supplies that are derived in-basin versus out-of-basin supplies or groundwater. This may be particularly appropriate for new or increased levels of return flows from these water supplies, where no existing water right holder or the environment has come to rely upon those return flows. Indeed, because imported waters are required to go through a rigorous interbasin transfer permitting process that in part addresses impacts to environmental flows and senior rights in the basin of origin, it is arguably already burdened by significant restrictions. Many argue that imposing additional requirements to meet environmental needs in the receiving basin on top of these other requirements represent a punitive requirement on interbasin transfers that have been identified as necessary to meet growing water supply needs.

(3) Does current law provide for different treatment of effluent derived from "future" and "existing" or "historical" return flows, regardless of the source?

While the terms "existing return flows" and "future increases in return flows" are terms that are only contained within the statute that deals with groundwater-based return flows (section 11.042(b)), both the nature of the distinction to be made with regard to groundwater-based return flows and whether any such a distinction can or should be made by regulators when other sources of supply are involved continues to foster considerable debate. Confusion seems to arise around the use of the terms "existing" and "future" return flows, which contributes to the debate. The term "historical" is used by many as synonymous with "existing" return flows. Some use the term "historical" or "existing" return flows to mean only those return flows that have been actually discharged, whereas others use the term to include return flows that derive from existing water rights whether or not they have ever actually been discharged. Similarly, to some, the term "future" return flows means return flows that have never actually been discharged regardless of whether the return flows derive from an existing permitted in-basin or imported surface water supply or groundwater. Lastly, others use this term to refer only to return flows that derive from water supply sources that have yet to be permitted or, in the case of groundwater, developed.

Regardless of the terminology, the issue comes down to whether increases in actual discharges of return flows above current or historical levels is "new" water to the system that could or should be treated as outside the prior appropriation system. The argument in support of this approach is that no water right holder or the environment has ever relied on the actual presence of return flows to satisfy their day-to-day needs. Others dispute this contention, arguing that such assumptions have underlain significant investments in the purchase of water rights, execution of contracts, and construction of infrastructure. Moreover, some argue that past water rights permitting decisions have included express or implicit assumptions about future increases of return flows derived from existing water rights and that this type of reliance on predicted return flow levels should be respected. It is important to recognize that definitive proof of these kinds of assumptions is often elusive. While those assumptions, if any, have only occasionally been stated expressly in agency orders, permits, or other contemporaneous documents, in many (if not most) other instances, any such assumptions may have been included in the evaluation of the water right or contract requirements in accordance with the common practices of the experts at that time and may not be fully documented, if at all. In some cases, certain existing water rights holders have undoubtedly enjoyed an increase in the reliability of their water rights due to the presence of return flows, but clear reliance on the presence of these return flows in the permitting process is often difficult to document. If past permitting reliance is to be honored, defining the appropriate level of proof and the assignment of the burden of proof on this issue is something the Legislature may want to address. These concerns seem to be present not only where in-basin return flows are at issue, but also in situations where the discharge of effluent derived from either groundwater or imported surface water has already occurred for some time and is projected to increase over time.

(4) Who can obtain indirect reuse rights?

Disputes also arise over whether existing law allows TCEQ to give preference to particular types of applicants for indirect reuse authorizations. Some have suggested that holding the underlying water right should provide some preference under current law, whereas others have argued that ownership of the wastewater treatment plant confers a preference under current law. Others have argued that current law does not necessarily establish any preference but that good policy would support giving preference to the water right holder or the discharger, but not third parties with no identifiable ownership interest in the wastewater or underlying water right. As set forth below, the approach *may* depend on the statute under which indirect reuse applications are considered. As such, clarification of the Legislature's intent on this issue may be necessary.

If surface-water derived return flows are treated as "surplus water" under section 11.046(c), available for appropriation by "others," then it appears fairly clear that *anyone* may file such an application, regardless whether the applicant has any ownership interest in the facilities that are discharging the effluent or whether the applicant has an ownership interest in the underlying water right or contract for the water supply from which the effluent was derived. In that instance, TCEQ would presumably evaluate competing applications for the same water based on the type of use and merit of each application.

Subsection 11.042(c), which some argue provides the sole basis for allowing the indirect reuse of surface-water derived return flows, refers to granting a "person" the right to "convey and subsequently divert water," without regard to whether the "person" also needs to be the discharger of the water, the owner of the underlying surface water right from which the return flows are derived, or a person with a contract to either purchase the return flows from the discharger or the underlying surface water from which the effluent is derived. Indeed, some have suggested that *any* person or entity can seek a right under section 11.042(c) even if no contractual or ownership interest with respect to the return flows or underlying water supply exists.

Section 11.042(b), which addresses indirect reuse of groundwater-based effluent, allows that "a person who wishes to discharge and then subsequently reuse the person's existing return flows…" to obtain a permit. This suggests that only the discharger of the return flows may obtain such authorization. By contrast, with regard to <u>future</u> increases in return flows derived from groundwater-based effluent, the same subsection (11.042(b)) provides only that "a person who wishes to divert and reuse" these return flows needs a permit, perhaps suggesting that the same person seeking the permit need not also be the discharger, since the same phrase “discharge and…reuse” is not used. As with section 11.042(c), some point to this different terminology for future increases in return flows to contend that any person can obtain indirect reuse rights to future groundwater-derived return flows even if no contractual or ownership interest with respect to the return flows or underlying groundwater exists.

(5) To what extent should protections be afforded to the environment in reuse permitting decisions?

The benefits that return flows may offer in supplying water to help meet environmental needs in many river basins is undisputed. The ongoing debate of how best to provide water to meet environmental needs of our rivers and bay systems has been further highlighted as the potential and need for the full use, and reuse, of water rights increases over time. Regardless of the permitting approach used - whether through a new appropriation or a bed and banks authorization, or both - the effect of reuse on the environment is a significant issue. Indeed, these approaches generally allow TCEQ to consider environmental flow needs in their assessment of the proposed reuse and include appropriately protective conditions. The question then is the level of protection that is appropriate where reuse is concerned. One factor to consider in incorporating appropriate limitations in any reuse authorization may be the extent to which return flows are or may be relied upon to meet identified environmental flow needs when considered along with the responsibility of other water rights holders in the basin to provide for environmental flows. Actual discharges of effluent and past assumptions with respect to expected increases in return flows over time, if any, may be relevant. Additionally, the extent to which artificially created environments made possible by historical return flows should be protected, should be considered. Prior to the growth of cities and their resulting wastewater discharges, many streams in Texas, including some that were not considered perennial streams, had historical low flows well below current low flows. Fully protecting these artificial baseflows by limiting the amount of return flows that can be reused may not be prudent in light of the state’s needs for additional water supplies. On the other hand, if an environment has been created, even through artificial means, the counterargument that many perennial streams in the state have been dammed up and diverted in a manner that did not take into account water for environmental flows suggests that some trade-off is appropriate. Future return flows that have not been relied upon to meet environmental needs may warrant different treatment.

Photo Citations for the 2007 State Water Plan, Volume I

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Cover Photographs

Front Cover	Jay A. Raney, Rio Grande in Big Bend National Park
Back Cover	Jay A. Raney, McKinney Falls (top left); Texas Department of Transportation (TxDOT), El Paso (top right); Jay A. Raney, Fall Creek falls (right, second from top); TWDB, Angelina Water Supply Corporation water tower (left middle); Jay A. Raney, cracked earth (center); Robert Mace, windmill (right, third from top); John T. Ames, boats at low water level (bottom left); TxDOT, Houston (bottom right)

Photographs

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