

Water for Texas Today and Tomorrow

*Legislative Summary of the
1996 Consensus-based Update
of the State Water Plan*

Prepared by the:

Texas Water Development Board

In Conjunction with the:

Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department



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INTRODUCTION

Water, more than any other natural resource, will determine Texas' future in the decades to come. The era of plentiful water when an area's needs could be readily met with development of new supplies are past. Even with water conservation and sound water management, the State's rapidly growing population and economy will require additional water development. The amount and manner in which this basic resource is provided will define, to a large degree, our State's economic potential and its quality of life in the future.

Today, increasing relative scarcity and competition for water, the high cost of new water supply development, and heightened environmental concerns make it difficult to marshal the public support needed to bring major new water development projects to fruition. Against this backdrop, the Texas population is projected to double over the next 50 years, and the water needs of its cities and industry are expected to correspondingly increase. Water is becoming ever-more costly for Texans, and the increasingly full utilization of locally-available water supplies has prompted major urban areas to look to other regions in their search for water. At the same time, providing for the environmental water needs has come to be recognized as an essential element of sound water management.

State Water Plan

The Executive Administrator of the Texas Water Development Board (TWDB) is charged with producing a Water Plan to guide the orderly development of Texas' water resources (see Exhibits 1 and 2). The State Water Plan provides a statewide perspective that places local and regional needs in a broader context. No other planning vehicle provides this overview. The State Water Plan, however, is not done in a vacuum and without regard for local issues. It is built, piece-by-piece, from the local level up, from population and water use projections to water supply and management alternatives. Hundreds of individual and county-level studies are built into the overall regional and statewide equations reflected in the Plan.

Exhibit 1 Statutory Authority

"The Executive Administrator shall prepare, develop, and formulate a comprehensive water plan...[he] shall be governed in the preparation of the plan by regard for the public interest of the entire state. The Executive Administrator shall direct his efforts toward the orderly development and management of water resources in order that sufficient water resources shall be available at a reasonable cost for the economic development of the entire state...the Executive Administrator shall also give consideration in the plan to the effect of upstream development of the bays, estuaries, and arms of the Gulf of Mexico..."

Section 16.051, Texas Water Code

The ultimate goal of the State Water Plan is to identify those policies and actions required to meet Texas' near- and long-term (50 year) water needs, based on a reasonable projected demand for water, affordable water supply availability, and a goal of near- and long-term conservation of the State's natural resources.

In formulating water supply solutions, the Plan focuses on economic viability while keeping an eye on environmental sensitivity. While Texas is developing its water supply capacity, it needs to maintain special attention to the needs of the aquatic environment. The ecological health of Texas' rivers, lakes, and estuaries is vitally dependent upon the supply of clean water. Human activities, such as commercial and recreational fishing, boating, swimming, and other such pursuits, depend on this vital resource. In addition, numerous studies have found that quality of life considerations are a key concern in business relocation or expansion decisions.

The State faces a great task in bringing the varied, and often conflicting, water "interests" into better agreement on how to best provide for future human, economic, and environmental water needs. To avoid gridlock and its potential costs, Texans must work ever more cooperatively to meet this challenge. Texas state government has been proactively addressing these public needs and concerns.

**Exhibit 2
About the State Water Plan**

The TWDB periodically updates the State Water Plan to reflect changed conditions and new information about water policy and water infrastructure. Typically, the Board produces a lengthy summary and an even longer technical document. These published documents are further backed-up by massive data files which provide the underlying information on which the analyses are made. All of this data is available to the public.

For the first time, the TWDB is producing a Water Plan in conjunction with the Texas Natural Resource Conservation Commission (TNRCC) and the Texas Parks and Wildlife Department (TPWD). Another first is that a special Legislative Summary of key policy issues and water management and project findings is provided, designed to highlight important issues so that key policy makers can more readily gather the information needed to make informed decisions.

**Exhibit 3
Key Water Management Tools**

- ▶ Expected Water Conservation
- ▶ Advanced Water Conservation
- ▶ Water Reuse
- ▶ Expanded Use of Existing Supplies
- ▶ Reallocation of Reservoir Storage
- ▶ Water Marketing
- ▶ Subordination of Water Rights
- ▶ Yield Enhancement Measures
- ▶ Chloride Control Measures
- ▶ Interbasin Transfers
- ▶ New Supply Development

All Water Management Tools Needed

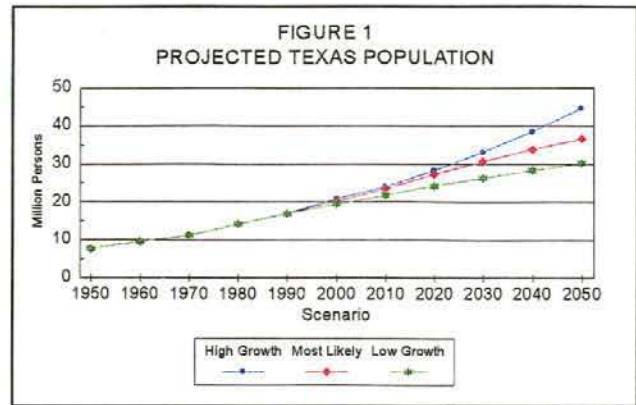
The common element underlying all of the State's water planning efforts is the realization that meeting future water needs will require the full range of management tools (see Exhibit 3). These tools range from less-impacting water conservation and reuse measures to more costly large reservoir construction and a variety of other options in between. At the same time, all of these tools will not be appropriate for every situation. Water availability, economics, and environmental concerns will identify which tool is best suited to meet a particular local or regional need. Texas is a vast and diverse State, and solutions that are appropriate for one region may not be appropriate for another.

STATE WATER PLAN FINDINGS

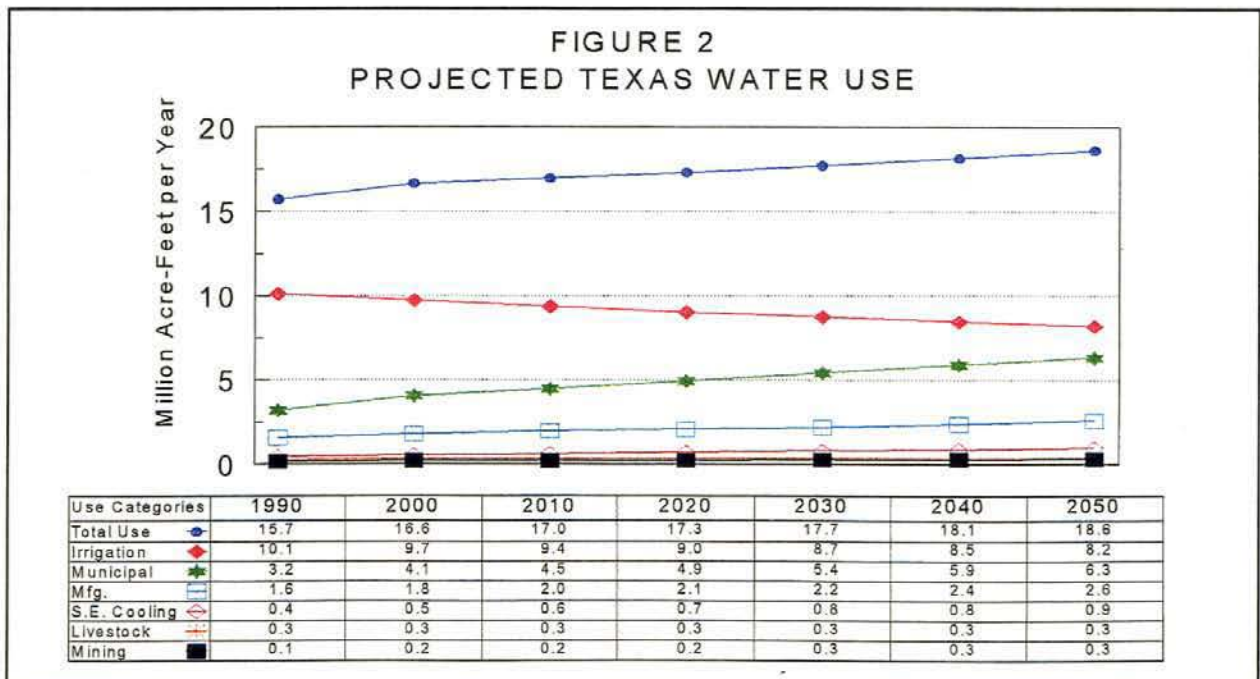
In the remainder of this document, *Part I identifies prospective water demands and significant water supply measures* that can be facilitated by appropriate state water policy actions. The key to success of these management efforts is Legislative action to keep Texas water policy targeted and responsive to the needs of today and tomorrow. *Part II identifies key policy solutions* that can internally improve Texas ability to meet its long-term water needs.

Part I: Texas' Water Future

Texas has been and will continue to be a rapidly growing state, surpassing New York to become the second most populous state in the U.S. in 1992. Texas population has doubled in the past 35 years from 9.5 million in 1960 to approximately 19 million today. The State Water Plan predicts that Texas population will double again in the next 50 years, increasing to over 36 million residents by the year 2050 (see Figure 1).



While State population is expected to double, the projected total water use of the State is expected to increase only about 12 percent between 2000-2050. However, this aggregate total masks significant underlying features. The water needs of Texas cities, manufacturing and the electric power industry are expected to increase by over 53 percent. Although water use by irrigated agriculture is projected to decline by almost 2 million acre-feet, urban water needs are expected to increase by more than twice that volume (see Figure 2). Unfortunately, the majority of these agricultural supplies are not economically accessible to the growing water needs of Texas cities.



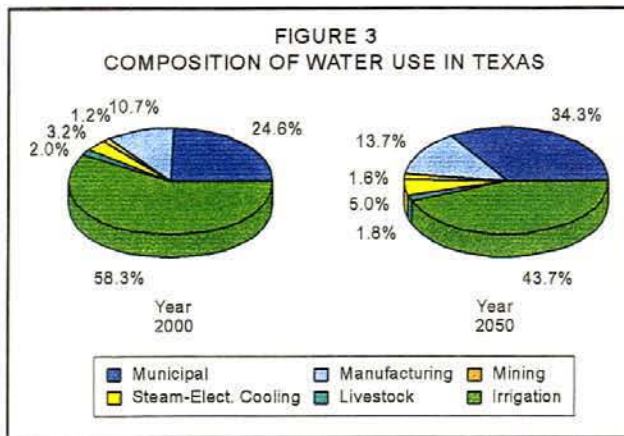


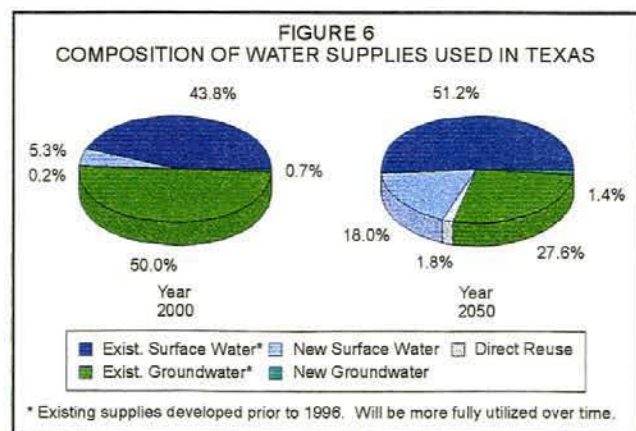
Figure 3 illustrates the changing nature of Texas' water use. The share of irrigation water use is expected to fall from almost 60 percent of current statewide use to about 44 percent by 2050. Urban water uses for municipal, manufacturing, and steam-electric power cooling are expected to increase from 39 percent of current use to 53 percent by 2050. It is anticipated that by the 2040's, urban water uses will exceed the total uses of the rural areas for the first time in Texas history. Water use for mining and livestock is small and comprises only 3 percent of State usage.

So what can be done to address this evolving and challenging water needs picture? As previously mentioned, the detailed analyses supporting the overall State Water Plan findings begin at the municipal and county level and then build to regional and statewide assessments. A specific water supply management plan is developed for each individual municipality and category of water use. However, these details would fill multiple, thick volumes of reports, so that only the most significant development needs of the State can be identified in a summary report such as this.

Figure 4 indicates the various water management tools that have been identified as needed within each major water planning region of Texas. As indicated, a variety of tools is needed in most of the regions of the State. Expected or advanced levels of water conservation measures were included in the Plan as key management measures for all significant water-using entities. In some cases, even after conservation, reuse, and other less-impacting measures are taken, major new water development or interbasin transfers are required to meet the future needs of the area. In listing the various regional measures in Figure 4, it should be noted that not all entities within a region will need or utilize all of these identified measures.

Figures 5 summarizes the new major water supply and conveyance systems anticipated to be needed in the next 50 years. Most of the major projects are needed by large urban areas (San Antonio, Dallas, Ft. Worth, and Houston), although it should be stressed that these supplies, in many cases, will also serve smaller towns in the project vicinity and in metropolitan suburban areas. Entities in need of new major water supplies are expected to achieve advanced water conservation savings prior to project development. Major conveyance facilities are also needed to access this new supply development as well as to convey water from existing projects to the areas of need.

Given these potential project actions and many others, the composition of how Texas' surface and ground-water supplies are expected to meet our existing and future needs will evolve as well. Figure 6 indicates that surface water supplies about one-half of the State's current total water use. With available ground-water supplies continuing to decline in many portions of the State, the trend of converting in-part or in-full to surface water will continue, so that by the year 2050, almost 69 percent of Texas water use will be supplied from surface water sources.



Note: Expected water conservation savings were modeled statewide for all significant water uses. Advanced conservation was recommended where needed or prior to new reservoir development.

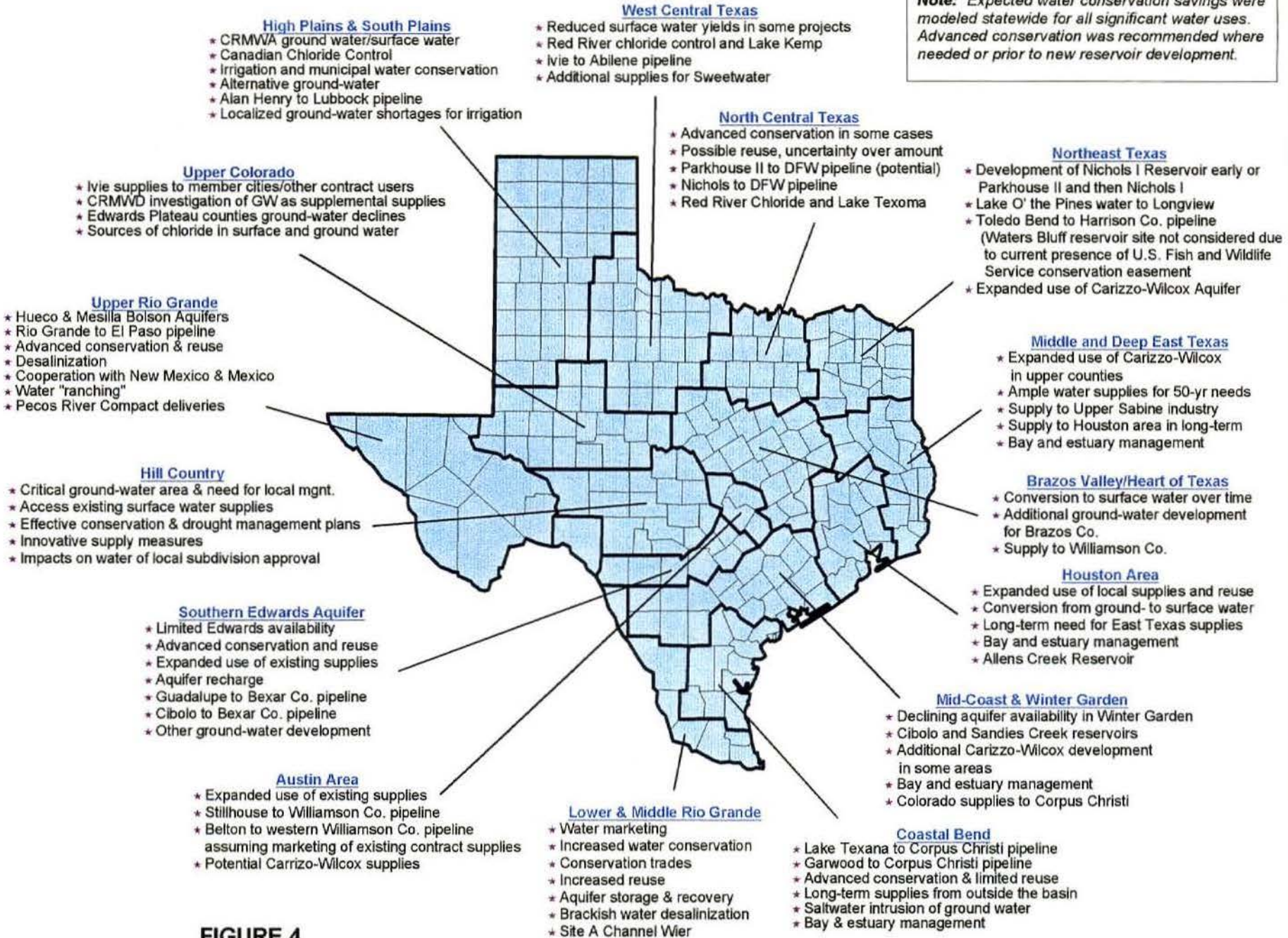
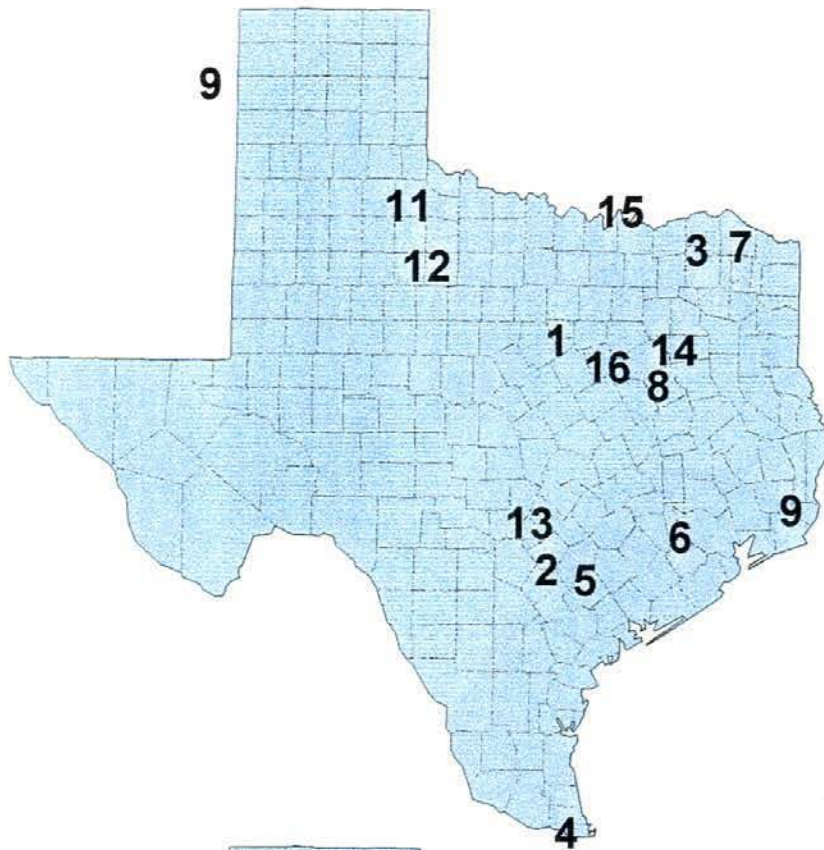


FIGURE 4
REGIONAL WATER PLAN FINDINGS



Water Supply (Date Needed)

- 1 - Paluxy Reservoir (2010)
- 2 - Cibolo Reservoir (2010)
- 3 - Parkhouse II Reservoir * (2015-20)
- 4 - Rio Grande Wier (2005-2010)
- 5 - Sandies Creek Reservoir (2025-30)
- 6 - Allens Creek Reservoir (2025-30)
- 7 - Nichols I Reservoir *(2015-40)
- 8 - Tehuacana Reservoir (2050)

Chloride Control

- 9 - Neches River (2000)
- 10 - Canadian River (2000)
- 11 - Red River (2005)
- 12 - Brazos River (2015)

Reallocation/Modification

- 13 - Canyon Lake subordination (2000-2005)
- 14 - Trinity River reuse diversion * (2025-2030)
- 15 - Lake Texoma reallocation (2045-50)
- 16 - Lake Whitney reallocation (2045-50)

Conveyance

- 1 - Stillhouse to Williamson Co.+ (2000-05)
- 2 - Canyon to Hays Co. + (2000-05)
- 3 - Roberts Co. to CRMWA + (2000-05)
- 4 - Guadalupe to Bexar Co. + (2005-10)
- 5 - Texana to Nueces Co. + (2005-10)
- 6 - Paluxy to Stephenville (2005-10)
- 7 - Moss to Gainesville (2005-10)
- 8 - Conroe to Conroe (2005-10)
- 9 - Whitney to Cleburne (2005-10)
- 10 - Hamlin to Anson (2005-2010)
- 11 - Lake O' the Pines to Gregg Co. + (2005-10)
- 12 - Rio Grande to El Paso Co. + (2005-15)
- 13 - Cibolo to Bexar Co. + (2010-15)
- 14 - Toledo Bend to Harrison Co. + (2010-15)
- 15 - Luce Bayou to Harris Co. + (2015-20)
- 16 - Parkhouse II to NTMWD ** (2015-20)
- 17 - Alan Henry to Lubbock (2025-30)
- 18 - Belton to Williamson Co. *** (2025-30)
- 19 - Allens Creek to Ft. Bend & Brazoria Cos. + (2025-30)
- 20 - Ivie to WCTMWD + (2025-30)
- 21 - Richland Chambers to TRWD ** (2025-30)
- 22 - Nichols I to DFW ** (2015-40)
- 23 - Garwood to Nueces Co. + (2035-40)
- 24 - Texoma to NTMWD + (2045-50)
- 25 - Nichols I to DFW ** (2025-40)
- 26 - Sabine to Harris Co. + (2045-50)

* The Nichols I project, if constructed early-on, could offset or significantly delay the need for other asterisked projects.
 ** Only feasible with concurrence by current contract parties to market surplus water.
 + Anticipate service to multiple entities in an area.

**FIGURE 5
 RECOMMENDED MAJOR NEW WATER DEVELOPMENT**

Part II: Texas' Water Policy Needs

Water supply management is *implemented* at the local and regional level in Texas. Local governments initiate the investment in and development of the State's water resources and water infrastructure – be it reservoirs, pipelines, treatment plants, wells, or distribution systems. The State, through its planning, financing, and regulatory efforts, can create a framework that either facilitates or discourages appropriate action at the local level. **The underlying purpose of the policy recommendations in this document is to ensure that State actions facilitate local governments in taking appropriate action to facilitate local and regional decisions in a statewide context.**



The recent drought has demonstrated some shortcomings in Texas' system of water management. While some major metropolitan areas have experienced water supply problems, most have adequate water supplies at this time. However, small communities have suffered from a disproportionately higher degree of water problems. The drought has highlighted limitations in local and regional planning for and implementation of water supply enhancements.

It should be emphasized, however, that **the best drought response is good long-term water planning and implementation.** The primary reason that Texas' municipalities have been able to cope with the current drought situation was the implementation of our modern-day water supply system. Still, additional tools and flexibility are needed.

The State can act to support and encourage local and regional planning by promoting financial assistance and regulatory requirements on both the local and regional level. Regulatory actions can mandate action and provide incentive to local action while financial assistance can encourage local action and make local and regional problem solving more cost-effective.

The TWDB (the State's water planning and financial assistance agency), the TNRCC (the State's water rights and water quality regulatory agency), and the Texas Parks and Wildlife Department (the State's fish and wildlife management agency) have identified needed water policy actions, addressing:

- ★ *Drought Response Management*
- ★ *Water Management, Marketing, & Transfers*
- ★ *Surface and Ground-water Supplies*
- ★ *Financial Assistance to Local Governments*
- ★ *Small Communities Assistance*
- ★ *Water Data Collection and Dissemination*
- ★ *Environmental Issues*

Drought Response Management

"While with adequate rain there is no country on earth equal to Texas, without strict reference to the drought almost certain to prevail, there is no country on earth less to be relied on and consequently less desirable."

Texas Farm and Ranch, September, 1884.

Even over one hundred years ago, drought in Texas was viewed as a major problem. Not a decade has passed since that time where some substantial portion of our large state has not experienced the significant and damaging effects of drought. It is not an infrequent event in Texas, but a regularly recurring natural phenomenon.



Drought is a natural part of the hydrologic cycle, but its effects accumulate slowly and can persist over long periods. While droughts may not include the dramatic, immediate impacts of floods or hurricanes, they can produce far-reaching consequences of social and economic hardships, environmental perturbations, and population shifts equivalent to or surpassing the effects of most other natural disasters. While Texas frequently experiences the many effects of drought, there is no statutory guidance for State agencies to plan for an organized response of governments to this "slow-onset" and unique form of natural disaster. Of the 12 western states, only Texas, New Mexico, and Wyoming do not have state drought plans.

A statewide drought planning framework that draws on State expertise, coupled with local implementation, needs to be codified to ensure its speedy implementation and effective delivery. Furthermore, drought planning needs to be part of long-term water supply planning.



Key Policy Recommendation State Drought Management Response - Planning



The Legislature should consider amending the Water Code to specify a State drought response planning framework that would address (1) provision of an organizational structure that assures adequate coordination and efficient information flow among government agencies and defines the duties and responsibilities of all agencies with respect to drought; (2) provision of timely and systematic data collection, analysis, and dissemination of information and the establishment of criteria to designate drought-affected areas; (3) maintaining an inventory of current federal, state, and local programs used in responding to drought emergencies; and (4) provision for the development of appropriate, coordinated, and effective state, regional and local drought response plans.

As streamflows decrease during drought, the quick and effective enforcement of surface water rights becomes critical. Additionally, unsafe dams and levees pose a threat to downstream life and property. However, current surface water right, dam, and levee safety enforcement is time-consuming and lacks the tools to deter wrong-doers or ensure compliance in areas not covered by the Watermaster program. This is because the TNRCC lacks adequate funding for these activities and lacks administrative penalty authority for violations that it has for all other regulatory programs.

Rapid enforcement of surface water rights and dam and levee safety requirements is needed to provide for the orderly allocation of limited surface water supplies, facilitate the marketing and transfer of surface water rights, and protect the public health and safety.

In a drought, situations may arise where emergency action (suspension of permit conditions, allowing variances from permit conditions, or the issuance of emergency permits) is needed, and current law may limit TNRCC's ability to respond quickly and effectively. Current statutes are vague in their terms, and some require TNRCC Commissioners to review Executive Director or Watermaster actions within too short a time frame.

The Water Code allows emergency suspension of permit conditions relating to beneficial inflows to bays and estuaries and instream uses, but requires 72-hour notice and is not broad enough to cover other uses. For example, emergency action may be needed to allow the use of water from old (shut-down) wells, to allow the use of effluent as an alternative to having no water available, or to change the annual diversion, diversion rate, or purpose or place of use in water permits to conserve water or ensure its delivery. Situations may also arise in which immediate action is needed, and an emergency reallocation of water must be made (for example, a city's water supply fails, or a utility runs out of water and no unappropriated water is available). There is no current mechanism to accomplish this, and several apparent barriers present themselves.

The three-member Texas Natural Resource Conservation Commission may have difficulty complying with Open Meeting Act requirements in the time frame required, especially if action is needed on a case-by-case basis. Current statutes may not provide enough flexibility in emergency situations. Current statutes vary in procedural and substantive requirements, and do not expressly provide for Executive Director action. Providing a consistent and flexible method for issuing emergency permits and orders would have benefits beyond the aforementioned drought matters.



Key Policy Recommendations ***State Drought Response Management - Regulatory***



The Legislature should consider statutes to:

- ▶ Authorize the TNRCC to assess a maximum administrative penalty of \$10,000 per day for each violation of an authorization, or Chapters 11, 12, and 16 of the Water Code, or related rules of the agency; and to provide the Executive Director with the same enforcement powers as a watermaster for areas where a watermaster has not yet been appointed.
- ▶ Allow the TNRCC Executive Director, only in emergency drought conditions, to issue emergency permits or temporarily suspend or amend permit conditions without notice or hearing to address emergency conditions for a limited period of time (30 days), with later full notice and hearing before the Commission to determine whether the emergency action should be ratified, continued, or set aside. Prior to an emergency decision, the Executive Director will allow TPWD to comment on the proposal. The TNRCC would use the Administrative Procedures Act definition of an emergency.
- ▶ Consolidate all TNRCC emergency order and permitting provisions and extend emergency order and permit periods to 120 days, with a 120 day extension provision.
- ▶ Allow the TNRCC Executive Director or a Watermaster to mandate, only in severe drought conditions, on an emergency basis without notice or hearing and for a temporary period (60-120 days), the transfer of surface water (not the water right) from a permittee holding a permit for other than domestic or municipal use to a city or utility for domestic or municipal use. Such authority would be limited, contingent upon an emergency declaration, and subject to full review by the TNRCC Commissioners at a later date.

Water Management, Marketing & Transfers

Throughout history, the allocation of water has been a fundamental, and many times complex and contentious, issue. The water problem is multi-dimensional... spanning ownership, types of uses, temporal, and geographic factors. Over time as Texas has grown and changed, so has its system of water allocations -- evolving from Spanish and English common law concepts of grants and riparian rights to a modern-day appropriative surface water rights system. Since the modern-day allocations system was implemented in the early 1900's, various provisions have allowed the system to issue, account for, and manage surface water rights and to respond to changing conditions.



However, resources necessary to effect these legal and regulatory mechanisms to maintain a well-functioning surface water rights system are inadequate. Symptoms of this include antiquated accounting of water appropriations and reported water use, lack (in many areas) of watermaster supervision in managing water use, questions about reuse, and lack of cancellation of unused surface water rights.

Reuse of wastewater effluent can help extend existing water supplies. However, downstream surface water rights and the aquatic environment may be dependent upon these return flows. In particular, it is not clear what should be State policy in regard to the consideration of indirect reuse where a state stream is requested to be used as the conveyance mechanism for the effluent before withdrawal for reuse.

The Watermaster Program is limited to only to the existing Rio Grande and South Texas (Guadalupe, San Antonio, and Nueces basins) water divisions. Lack of a Watermaster elsewhere has made it difficult or impossible to orderly and effectively allocate limited water supplies during drought. There are increasing demands to extend the Watermaster Program. Watermaster protection of surface water rights may also make them a more viable commodity to help meet water needs through water marketing and transfers. A simple funding rider to establish the Water Rights Administration Fund 158 as an estimated fund would allow the program to be broadened to areas of expressed need.

Finally, water marketing is an increasingly important, non-appropriative and voluntary means of re-balancing water supplies and demands among those that have water and those in need. Some cities have water supplies in excess of their current needs, but will need the water supplies in the future. A major question typically posed by a potential water seller is "if I need my water in the future, can I get it back?" State law is unclear on this issue. Because of this, the potential seller often decides that the answer is possibly no. This uncertainty over the ability to conduct interim water sales has limited this tool in facilitating water marketing.



Key Policy Recommendations *Water Management and Marketing*



The Legislature should consider:

- ▶ Providing funding in the FY1998-99 Appropriations Act to allow the TNRCC to better administer surface water allocations and to facilitate water marketing and transfer of surface water rights.
- ▶ Amending the Water Code to provide the necessary criteria under which the reuse of treated effluent may occur in Texas after it has been discharged into a stream. Such amendments should consider the recently-adopted TNRCC interim policy on reuse.
- ▶ Amending various statutes to clarify and lessen liability concerns of water sellers about long-term obligations resulting from intended temporary water sales.

Another difficulty of water management relates to the increasing geographic mis-match between the location of available supplies and the entities in need, giving rise to often-contentious water transfer proposals (see Exhibit 4). Moving surface water from one basin to another gives rise to a number of concerns. Besides potential implications on existing surface water rights or available supplies, these transfers can also typically create what is termed "third-party" effects where concerns about impacts on socioeconomic, cultural, and environmental values are raised. While the third-party effects can also occur with transfer of water within a river basin, they are more typically recognized as major issues in instances involving movement of surface water between basins.

Exhibit 4 ***Interbasin Transfers***

The subject of interbasin transfers is one of the more politically sensitive and misunderstood issues in Texas today. Interbasin transfers are a way of life in Texas and have been for many years. More than 80 interbasin transfers currently take place in Texas. Communities where interbasin transfers currently occur include Amarillo, Lubbock, Dallas, Houston, Galveston, Corpus Christi, Beaumont, Texarkana, Tyler, much of the Lower Rio Grande Valley, and many other smaller towns. Cities such as Abilene, Corpus Christi, Longview, Irving, and Victoria, among others, have approved interbasin transfer permits which they have yet to exercise.

Interbasin transfers are not appropriate in every circumstance and have to be viewed on a case-by-case basis. Under law, the appropriateness of a specific permit request is under the purview of the Texas Natural Resources Conservation Commission. As a matter of practice, the Board does not recommend interbasin transfer permits in the State Water Plan unless projected 50-year needs of a basin from which water would be transferred can be met.

Broad provisions exist in the Water Code for the permitting of such interbasin movement of surface water. This provides the TNRCC with the discretion, as well as the tremendous burden, of balancing the public interest, the needs of competing basins, and impacts to third parties. Additional clarification is needed in State law to ensure that broad-based public interest values are considered in interbasin transfers by statutorily specifying the applicable criteria to be used in this review; to direct the TNRCC to develop a regulatory process capable of weighing these criteria in evaluating transfers, and to provide that the TNRCC consider ways of mitigating adverse impacts.

While there are significant issues concerning the appropriative rights system and water transfers in Texas, these are not matters easily addressed due to high political stakes, significant vested interests, property rights concerns, regulatory funding needs, and so on. While there are neither singular nor perfect answers to this puzzle, needed actions such as enhanced water marketing and objective consideration of interbasin transfers are critical to the State's future.



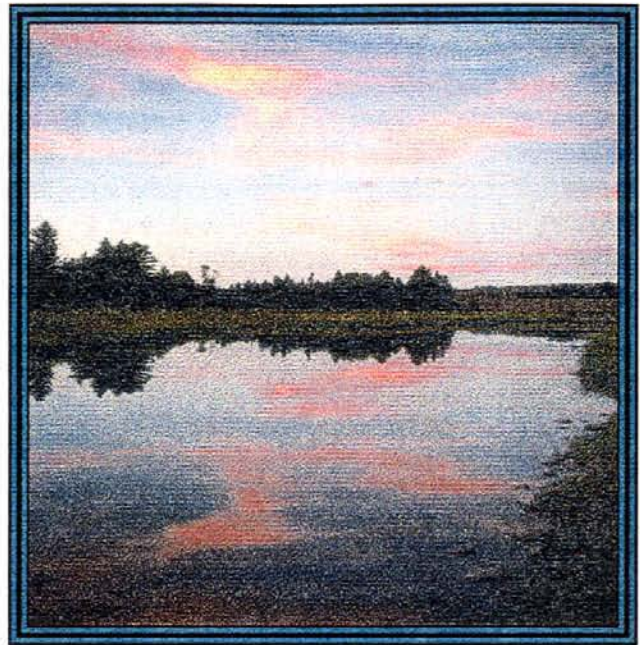
Key Policy Recommendation ***Interbasin Water Transfers***



The Legislature should consider amending Section 11.085 of the Water Code to provide clear guidance on the criteria to be used in determining whether an application for an interbasin transfer should be granted by delineating the balancing test to be performed between the two basins, and more specificity on the administrative aspects (e.g. public notice, party status, hearings, planning period, etc.) of a surface water rights application for interbasin transfer. Such clarification should maintain interbasin transfers, under appropriate conditions, as a necessary option for State water management.

Surface and Ground-water Supplies

Over the past two decades, Texas has experienced a shift in its perspective of providing for its water needs. The days of relative plenty when an entity could drill a well or build a nearby lake to meet its needs have mostly passed. Available ground-water supplies are being depleted in many areas, and most of the remaining surface water available for development is typically found at a greater distance from the current demand center. With its doubling of population over the last 35 years and its prospective doubling again in the next fifty years, Texas faces future challenges of increasingly scarce water supplies; regional and inter-regional competition for water; increased infrastructure and regulatory costs; and limited financial resources.



In response to the drought of the 1950's, communities in Texas embarked upon a period of aggressive reservoir construction that has provided a safety net of "firm yield" supplies for most of today's citizens and industries, created a buffer of water reserves for the State, and allowed for the transition of many users from diminishing ground-water supplies to more renewable surface water resources. However, given the difficulty, expense, and environmental impact of developing major new surface water supplies, this historical safety margin of water supply for human uses has been diminishing since that time. Further, given increasing land development and regulatory considerations, what may be viable reservoir sites today may be unaffordable or incapable of being developed in the future.

Water conservation is a critical element of stretching existing supplies and reducing demand for additional supplies. Currently, State agency rules only requires water conservation plans for new or amended application for surface water rights at the TNRCC or where TWDB financial assistance is provided. It is estimated that currently this has affected only about 15 percent of the State's public water supplies. More conservation planning can and should be done.



Key Policy Recommendation
Water Conservation and Drought Plans - Regulatory



The Legislature should consider statutory changes to:

- ▶ Provide that all municipal and industrial surface water right holders having an annual appropriation of 200 ac-ft/yr or more, or who have been found in violation of rules prohibiting the waste of water, must develop and implement a water conservation and drought contingency plan.
- ▶ Provide that drought contingency plans should also be a requirement for municipalities and public water suppliers.

The State Water Plan serves as guidance to local and regional entities which are the only entities that can implement plans and provide water supplies. Some larger municipalities and water districts have developed long-range, relatively comprehensive water management plans, but for most areas, plans focus on narrow local issues, fail to cover all necessary topics, and do not include all entities in the region with water needs. The State can assist local entities in addressing long-term water management through planning and financial assistance. Developing comprehensive plans that guide regions and link the State Water Plan to local needs would be an important improvement to water planning in Texas.

The State should encourage regional planning that is comprehensive and addresses the needs of all entities in the planning region. This encouragement would involve: the potential for partial funding of study expenses, TNRCC streamlining regulatory considerations; projects eligible for State Participation in project financing, and would include studies requested by the three State water agencies to address environmental water needs. Also, the approved regional management plans would guide the TNRCC when making water rights determinations and the TWDB when making water supply financial decisions.



Key Policy Recommendation
Regional Water Management Plans



The Legislature should consider amending statutes to:

- ▶ Authorize the Executive Administrator of the TWDB and political subdivisions to prepare regional water management plans and make this an eligible portion of the regional planning program.
- ▶ Provide for the TNRCC considering consistency with approved regional plans in water rights permitting decisions as well as to provide for more streamlined consideration of such applications.
- ▶ Provide for the TWDB considering consistency with approved regional plans in water supply financing decisions as well as to provide for more streamlined consideration of such applications.

Various portions of the Ogallala, Carrizo-Wilcox, Edwards, Trinity, Gulf Coast, Bolsons, and other aquifers in Texas are experiencing declining ground-water levels over time, i.e., more water is being removed or discharged than is being recharged. A process was defined by the State for identifying "critical" ground-water areas where noticeable ground-water availability and/or water quality problems have developed, no ground-water management authority is present, and the creation of a local district is deemed important. However, the critical area process is cumbersome, has not been well-funded nor implemented, and is primarily designed to respond to problems too late or after the fact, and there are large portions of areas studied for critical area designation for which there is no ground-water management district in existence.

Exhibit 5
Ground-water Allocation Doctrines

Common Law Doctrines

Absolute Ownership (Right of Capture) - Under the absolute ownership doctrine, there is no legal liability for interfering with the production of another's well.

Reasonable Use - Under the reasonable use doctrine, ground water may be used without waste on overlying land. Ground water may be used on non-overlying land, unless the use unreasonably interferes with use of other overlying landowners.

Correlative Rights - When conflicts among overlying users occur, each is entitled to his proportionate share of the available supplies.

Restatement of Torts (2d)/Eastern Correlative Rights - The reasonableness of competing ground-water uses may be compared in well interference cases using specific criteria.

Appropriative Doctrines

Prior Appropriation - A state appropriation permit is required before a well can be installed or used. Typically, a ground-water appropriator must meet the same type of requirements as for a surface water appropriation: due diligence, perfection, actual use, beneficial use, etc.

Eastern Permit Statutes - May vary from permits required only for large users to integrated surface and ground-water permitting.

A continuing major water supply issue revolves around the private "right of capture" of ground water. Exhibit 5 presents a summary of various ground-water appropriation doctrines that are used in various U.S. states. In areas of Texas *without* ground-water district management, the absolute ownership doctrine or "right of capture" prevails. This approach maximizes individual freedom of action, but at the same time provides little or no legal recourse for landowners adversely affected by neighboring ground-water development.

In areas of Texas *with* underground water conservation district management, ground-water allocation doctrines range from versions of "reasonable use" to more appropriative approaches. A pivotal element of the debate over the State's ground-water future is which allocation method(s) best protects private property rights... methods that emphasize unlimited freedom of action or those that provide some recourse to prevent or mitigate unreasonable use? About one-half of the state's water supply is ground water, and it will be a significant factor in meeting the state's future water needs. The marketing of ground water to help future needs could be enhanced if it were a measurable right and could be afforded greater legal protection vis-a-vis other existing or future users of the same ground-water resource.

The State has previously determined local ground-water districts as its preferred means of addressing ground-water management. This approach has worked very well in some cases, while in other instances, restricted authority or funding has limited effective operation and management. In many locations in the State, there are no ground-water districts. The Water Plan goals for ground-water management are to protect private property rights, provide for local control, and help assure good administration and protection of the resource in the years to come. As competition increases over time for the declining resource, a basic question facing Texas, now and in the future, is what allocation doctrine(s) will best provide for the attainment of these management goals.

Also, existing state law does not recognize the hydrologic connection between surface and ground water, resulting in conflicting management schemes. For example although 70-80% of the recharge of the Edwards Aquifer occurs through the beds of surface streams, no legal consideration is

required to be given to ground-water impacts in determining whether to grant an appropriation of surface water. Similarly, impacts to surface water rights from the withdrawal of water from aquifers which contribute to surface streams may also occur. Conjunctive management of these interconnected water resources would provide a better coordinated, effective, and more comprehensive approach to meeting the state's water needs.



Key Policy Recommendation
Ground-water Management



The Legislature should consider:

- ▶ Amending the Water Code to streamline the Critical Area process and to provide incentives and other measures to better assure ground-water management district creation.
- ▶ Amending the Water Code to allow underground water conservation districts, at their discretion, to regulate previously-exempt wells.
- ▶ Reassessing ground-water law doctrines to ascertain if improvements can be made to State law to provide for better management of ground-water resources.

In 1985, the Legislature authorized the Texas State Soil and Water Conservation Board through local Soil and Water Conservation Districts to conduct a program which includes cost share assistance for the "selective control, removal, or reduction of noxious brush such as mesquite, salt cedar, or other brush species that consume water to a degree that is detrimental to water conservation." When this was enacted ten years ago, it was not funded. The federal Natural Resource Conservation Service estimates that brush uses about 10 million ac-ft of water annually versus the 15 million ac-ft per year for current human use. Possible advantages of brush control could be additions to State water supplies, recharge of ground-water aquifers, springflow enhancement, and others. There are some issues related to potential benefits, beneficiaries, and who pays that are not yet adequately defined that may limit the potential investment in this program.

In 1995, the Legislature enacted a program designed to promote research and pilot development of aquifer storage and recovery (ASR) projects to ascertain their usefulness in the management of water resources. In essence, ASR involves using a suitable aquifer for the temporary storage of water from either a surface water or alternative ground-water resource. This water is temporarily stored in a defined freshwater "bubble" underground and is typically recovered during peak use periods or periods of low alternative supply. With some experience gained since the legislation was passed, the TWDB feels that statutory amendments broaden the eligibility for the research program and to investigate the storage of treated effluent in brackish or saline aquifers could provide for program enhancements and improved technology transfer to the water managers of Texas.



Key Policy Recommendation
Watershed Yield and Water Storage Enhancements



The Legislature should consider:

- ▶ providing funding to the Texas State Soil and Water Conservation Board to conduct pilot projects on a watershed scale which would include cost share assistance, technical assistance, monitoring, and evaluation to support applied brush control research towards identifying potential benefits, how much water might be available for what uses, and who should pay for large-scale implementation.
- ▶ amending the Water Code to remove the restriction that only certain aquifers in certain counties are eligible for the Aquifer Storage and Recovery program and that the TNRCC and TWDB should investigate the potential for storage and recovery of treated effluent in suitable non-potable aquifers.

Financial Assistance to Local Governments

Perhaps the greatest opportunity for the State to take a leadership role in aiding local governments to meet their long-term water needs is in the financial assistance area. Currently, the State of Texas, through the Texas Water Development Board, provides some \$300 million annually in financial assistance to local governments for water supply, wastewater, flood control, agriculture conservation, and other purposes. But this role and resulting savings to its citizens could be expanded.

A key element of State assistance which has never been fully implemented is the **State Participation Program**. The State Participation Program was established in 1985 to provide leadership for the State to encourage cost-effective regional solutions and support conversion of ground water to surface water use. Full implementation has been limited by available funding. Significant financial relief can be provided to small and mid-size communities through cooperative development of cost-effective systems through State infrastructure investments. The State Participation Program could be used to stimulate this consolidation, thereby gaining economies of scale and reducing the cost of providing service to local water and wastewater ratepayers. The larger the entity, generally the less expensive the service is on a per capita basis.

The State Participation Program could provide enormous benefits. With this program, the size of a regional project can be optimized at the front-end by having the State invest its dollars into acquiring excess capacity. As local growth accesses this additional capacity, the State recoups its initial investment and can then acquire interest in other projects. This money could be invested again and again over time. Special consideration should be given to the *investment (for the future) nature* of this program and to the opportunities for significant cost-savings at the local level.



Key Policy Recommendation State Participation Financial Assistance



The Legislature should consider appropriating funds to implement the State Participation program in the General Appropriations Act as it weighs the full range of State funding needs.

The availability of bonds for water supply financing will be virtually exhausted at the end of the 1998-99 biennium (see Table 1). However, other types of bond authorization remain largely unused. The TWDB is faced with two alternatives:



- (1) to seek additional authorization for the water supply category, or
- (2) to consolidate existing bond authorizations so as to use existing authorization among categories and better manage what has already been approved by the voters. The Board estimates this would allow for 7 to 10 years of additional bonding authority.

Item	Water	Water Quality	Flood Protection
Remaining Current Authorization	\$212	\$353	\$241
Est. FY97 Commitment	\$95	\$30	\$25
Remaining Authorization	\$117	\$323	\$216
Anticipated Needs FY98-99	\$100	\$40	\$50
Net Balance	\$17	\$283	\$166

Note: Loan repayments are used to retire State bonds.
New authorization is needed to issue new bonds.



Specifically, the Board would recommend consolidation into three categories for bond authorizations: 1) Agriculture Conservation Bonds, 2) Water Quality, Water Supply, Flood Control, and State Participation Bonds, and 3) existing Economically Distressed Areas Program (colonia) Bond authorizations. Agricultural Conservation and EDAP bonds would remain at their current authorization level, and the only intermingling would occur in the other four categories.

Through consolidation and modifying the antiquated reserve fund requirements for these bonds in the interest and sinking requirements associated with consolidating bond authorizations, greater efficiencies could be achieved. A single issue of debt at a larger size, and therefore more efficient issuance, could be created as opposed to multiple bond sales that have to be done currently for those individual authorization categories. This approach will assist in driving down State issuance costs, which in turn, will increase dollar savings to local governments.


	<p style="text-align: center;">Key Policy Recommendations <i>Bond Authorization and Funds Flexibility</i></p>	
<p>The Legislature should consider:</p> <ul style="list-style-type: none">▶ Amending the constitutional provisions allowing for consolidation of certain bond authorizations to increase the amount and efficiency of state financing assistance to local governments.▶ Supporting a constitutional amendment to modify the antiquated reserve fund requirement on TWDB general obligation bond issues. Current laws cause inefficient flow of funds in the Water Development Fund. The cash flow for the payment of debt service on the TWDB general obligation bonds is provided in Article III, Section 49-c and 50-d of the Constitution.		

One of the most-cost effective “new water supplies” is the efficient use of water. The State took laudable steps forward in 1985 and 1991 towards promoting water conservation with the Agricultural Water Conservation Bond Program and water-efficient plumbing legislation. However, the Agricultural Bond Program has been hampered by an unattractive lending rate and a lack of funding that yields insufficient financial incentive. The separate Agricultural Trust Fund was capitalized in 1985 with a \$10 million general revenue appropriation. The corpus of the Agricultural Trust Fund is invested in U.S. Government Securities. The Fund rules require that fifty percent of its earnings go back into the corpus to increase its size while the other fifty percent of its earnings go to agriculture conservation grants and to four state water agencies’ agricultural programs.


Current federal tax law requires that the State’s authorization of bonds for agriculture conservation must be sold at taxable (or higher) interest rates. By using the corpus of the Agricultural Trust Fund as an investment vehicle for agriculture conservation loans, a more efficient and useful lending apparatus could be achieved. In the simplest terms, the Fund would be invested in loans to agriculture water conservation districts, and these loans, in turn, would be made to farmers for agricultural conservation purposes or by the districts themselves for water conservation. The investment earnings, (i.e. interest paid on these loans) would be used as a source of revenue for the Fund in conjunction with other investment vehicles. Monies for other beneficiaries of that Fund, such as the agriculture conservation grants and agency operations, would still be maintained.

	<p style="text-align: center;">Key Policy Recommendation <i>Agricultural Water Conservation Financial Assistance</i></p>	
<p>The Legislature should consider allowing the Agricultural Trust Fund to “invest” in agricultural conservation loans, while maintaining the other purposes originally established for the Fund.</p>		

A further issue of importance is that of adequate water management where resources are shared by Texas and other U.S. states or Mexico. Currently, the spending of State of Texas funds for projects located in other states or countries is not allowed without specific Legislative approval, even where such projects may be of significant benefit to Texas. In areas along the Rio Grande, Canadian, Pecos, Red, and Sabine river basins, there are situations where the collection of data and/or conduct of more comprehensive studies that, to some extent examine water or socioeconomic features of our adjacent neighbors, could be of substantial benefit to Texas water planning and management. The utilization of jointly-shared water supplies, wastewater reuse potential, water quality programs, and meeting environmental water needs are but some of the issues where prudent use of State funds to examine the wider regional issues of water management could be of significant direct benefit to Texas' citizens.



Key Policy Recommendations
Transboundary Spending Authorization



The Legislature should consider providing:

- ▶ the TWDB with the authority to use State grant or loan funds to provide for data collection, planning studies, water research, or capital improvements in regional areas that may include other portions of adjacent states or countries where the provision of such information or improvements may be of direct benefit to the management or use of water resources in Texas.

Small Communities Financial Assistance

Much of Texas' heritage and social values originated in our small towns. Texas currently has over 1,200 smaller communities (of less than 15,000 population), comprising about 90% of the municipalities, but only 27% of the State's overall population (see Table 2). Many small towns have experienced stagnant population and economic conditions in recent decades, and even meeting basic water and wastewater infrastructure needs (and regulatory requirements) can be very difficult.

Ninety percent of the community water systems across the country, found in violation of drinking water regulations during 1991, were small systems (EPA, 1992). Without additional action, this situation will continue to deteriorate. With the advent of new Federal Safe Drinking Water Act requirements, heightened wastewater discharge and other environmental requirements, and increasing scarcity of affordable water supply, small communities are facing even more greater challenges than ever before in funding and providing basic water and wastewater infrastructure.

Pop. Size Range	Number	Population
over 15,000	135	11,604,912
10,000-14,999	63	787,590
5,000-9,999	119	830,090
1,000-4,999	531	1,221,326
0-999	500	223,613
rural	0	3,745,543

Includes Census designated place names.
Source: Texas State Data Center, 1995.



The unit cost of service is typically much higher for small communities when compared with larger cities because of the lack of economies of scale. The Federal government projects that by the year 2000 the increase in annual cost per household for water and wastewater service will be almost 2.8 times higher for a home in a town of 2,500 population than for a similar household located in a city of 250,000 population (EPA, 1988).

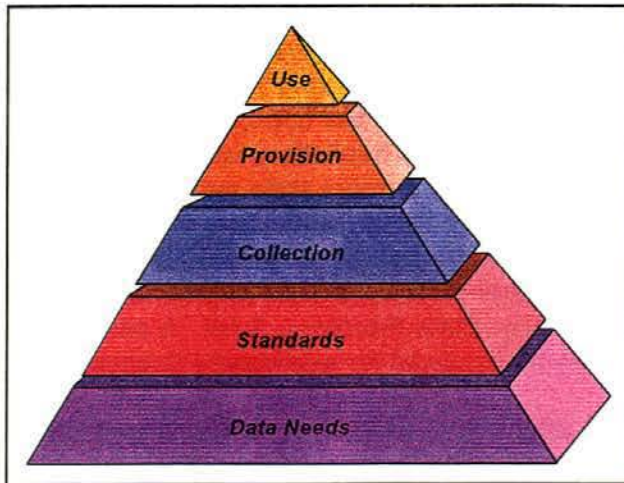
The recent passage of the Federal Safe Drinking Water Act Revolving Fund, which is modeled on the highly successful wastewater State Revolving Fund, should allow further assistance to small communities at below market interest rates. An emphasis of the Safe Drinking Water Act legislation is to assist small communities and disadvantaged areas. However, the opportunity for reducing interest rates is very much predicated on State financing. The fund is capitalized with an 80 percent Federal capitalization grant which must be used for loans. The 20 percent state match could come from State general obligation water supply bonds or from a cash match, particularly for a portion of the loan program which could be directed towards small and/or disadvantaged communities. To provide for low interest loans for small communities for water projects, a state appropriation could be used for the match for the newly created Drinking Water State Revolving Fund. A similar low-interest loan program for small communities could also be designed for wastewater financing.

The current TNRCC statutory rate setting scheme also limits options for addressing financial difficulties encountered by small utilities and may not make Investor Owned Utilities (IOUs) attractive to competent/financially stable investors or to other IOUs seeking to purchase or consolidate with existing systems. Such rate-setting flexibility is already available for cities and non-profit water supply corporations. If the TNRCC were authorized to adopt alternate rate setting schemes in certain situations, it could increase cash flow and/or make IOUs more attractive to investors.

Another issue relates to the State's ability to require continuation or improvement of service in a distressed utility's service area through a required consolidation of service areas with a neighboring utility. Currently, only IOUs, which come under the TNRCC's jurisdiction, can be ordered to serve. If the TNRCC were allowed to order other retail utilities, such as districts, affected counties and possibly even cities, to serve an area when a certificate of convenience and necessity (CCN) is canceled, this would ensure that customers could continue to receive adequate service from a neighboring service provider.

If the TNRCC were also authorized to apply more stringent criteria for formation of IOUs with a stronger impetus toward utility regionalization, increasing financial and planning requirements, and higher minimum facility standards, this would help avoid future problems with IOU viability. While this approach would make it more difficult to establish new IOUs, it would help ensure that those IOUs that are established would be viable and less likely to require State intervention if financial or chronic utility service difficulties occur.

	<p style="text-align: center;">Key Policy Recommendation <i>Small Communities Revolving Funds</i></p>	
<p>The Legislature should consider:</p>		
<ul style="list-style-type: none">▶ Appropriating general revenue to be used in conjunction with EPA capitalization grants to create two special pools of revolving funds, maintained within the overall larger Revolving Funds, that could be loaned out at low interest rates to small communities in Texas for water and wastewater infrastructure. Establishing criteria for eligibility for this pool could be specified by the Legislature, or through rule-making, by the TWDB.▶ Amend the Water Code to provide rate setting flexibility and to facilitate the consolidation or merging of non-viable systems.▶ Amend the Water Code to allow TNRCC to order other retail utilities such as water supply corporations (WSCs), districts, affected counties and maybe even cities to serve an area when a certificate of convenience and necessity (CCN) is canceled by TNRCC action.▶ Amend various statutes to allow the TNRCC to avoid future problems with IOU viability through more stringent criteria for formation with a stronger impetus toward regionalization, increasing financial and planning requirements, and higher minimum facility standards.		



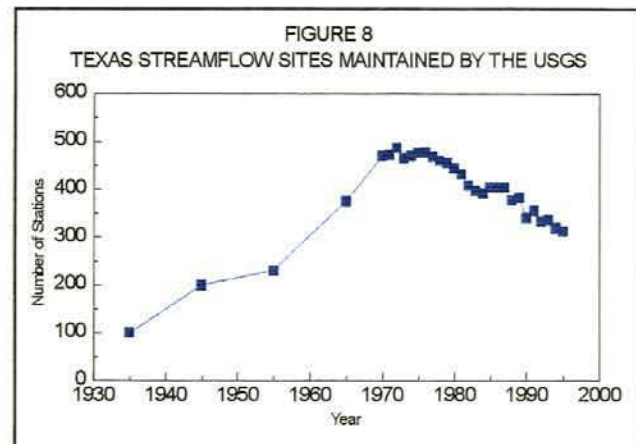
Water Data Collection and Dissemination

All of the previous planning and policy prescriptions and any water resource decision-making are of questionable value without basic water data. Collecting basic data over time, monitoring changing conditions, and providing the data to all users that need it, is the foundation of all water planning, design, regulation, construction, and utility service provision. Literally, billions of dollars of public investment decisions depend upon the quality of this information.

Issues and concerns associated with data collection efforts include *continuing* collection of data so that time series information exists, ensuring data quality, making data accessible to users, reducing duplicative efforts, and filling in data gaps. Regulatory and planning programs that depend on continuous, accurate data collection include those associated with surface water and ground-water quantity and quality, bay and estuary inflow and instream flow maintenance, sediment surveys, and several others. Benefits to the average citizen of data collection programs include adequate water supplies, high quality drinking water, flood and drought monitoring, water recreation, power production, subsidence monitoring, agricultural productivity, and economic development.

In September 1996, a Texas Water Monitoring Congress was held. The Water Monitoring Congress is a self-initiated coalition of local, State, and Federal government agencies and private groups addressing concerns about the deteriorating overall condition of water-related data collection and the need to improve data sharing. Information from this recent workshop conference has provided additional information pertinent to Federal, state and local water data needs, responsibilities, and funding, some of which are embodied in these recommendations.



Indicative of overall trends in water data collection, streamflow quantity gaging stations, maintained by the United States Geological Survey (USGS) and cooperatively supported by State and local funding, rose to a peak in 1972 then began a steady decline (Figure 8). The cost per station has risen over time while Federal funding has remained static or decreased, resulting in a decrease in stations. At this time, the number of stations will soon fall to the level of the mid-1950's. Many important programs are directly affected by reduced data collection efforts, including water quantity, water quality, and water rights assessments.



Two key areas of data improvement needs involve the TNRCC's water availability models and water use data collection efforts at the very heart of the agency's day to day activities related to surface water rights permitting and management. Most of the current water availability models are 20 years or older and need to be revised to current technology and to reflect current TNRCC policy. New

models would give the TNRCC the ability to look at what impacts their decisions could have on future and past water supplies in Texas, and allow the TNRCC and the TWDB to make more informed decisions in the overall water management and water planning processes.

Modern computer and software capabilities have provided highly productive and cost-efficient tools to natural resource agencies for linking geographical and data base information for use in analysis and mapping. The State of Texas needs up-to-date digital base maps for a variety of State natural resources management purposes as well as other State purposes. The "StratMap" Program proposes to leverage State funds with available Federal and local funds to develop standardized digital base maps for Texas. Having such maps developed with common standards would provide a very valuable set of base information to be used throughout State government and the private sector, resulting in significant cost savings in avoiding duplication of effort, reducing the cost of map updating, and helping assure transferability of mapped information among agencies and the public. It is proposed that the Texas Natural Resources Information System (TNRIS) serve as the coordinating entity for this program.

	<p style="text-align: center;">Key Policy Recommendations Water Data and Mapping Funding</p>	
<p>The Legislature should consider providing:</p>		
<ul style="list-style-type: none">▶ funding to maintain and enhance State water data programs. Without continued financial authorization, programs supported by the Water Assistance Fund, including -water data and environmental data collection, and regional planning studies, will no longer continue.▶ funding to support the implementation of a statewide digital base map development program (StratMap).▶ funding to revise and update the TNRCC water availability models and water use data collection efforts.		

Opportunities also exist for improving the integration and comprehensiveness of the information produced from water data collection efforts. These opportunities lie primarily in improving efficiencies and reducing duplication of efforts through a coordinated, systematic, distributed approach to collection and dissemination of data. Where multiple responsibilities exist, the potential for sub-optimization is greatest. TNRIS' statutory role as a centralized data clearinghouse for the State natural resources agencies was defined prior to modern-day Internet, local networking, and geographic information systems (GIS) technologies. These improved information-generating and data-sharing technologies have created multiple roles and entities all trying to accomplish much the same end. Legislation is needed to modernize TNRIS' role in State government to enhance data availability and minimize duplication by requiring interagency coordination and data sharing. A merger of the TNRIS Task Force and GIS Planning Council would streamline coordination, broaden agency participation, and provide a single point of contact for Federal coordination.

A number of other actions for improving water monitoring are in progress. These can and should proceed, and no Legislative action is required to implement them. However, because of the number of special-purpose data collection activities, there is a likelihood of duplication of effort and other inefficiencies. This process could result in water data that meets the needs of specific programs, but does little to improve the ability to assess the overall needs of the State. Some entity should be charged with the responsibility to optimize the systems of data collection. This should not unduly infringe on the program responsibilities of various entities, but ensure that a systematic approach to data collection and dissemination is taken in Texas.



Key Policy Recommendation *Data Collection and Dissemination Optimization*



The Legislature should consider:

- ▶ Amending the Water Code to authorize the TWDB to lead a statewide water resource data network optimization effort coordinated with other state data users and provide a report to the 76th and subsequent Legislatures on the status of this effort with proposals for long-term strategic actions to enhance the efficiency and effectiveness of water data collection and dissemination efforts.
- ▶ Amending the Water Code to better integrate the Texas Natural Resources Information System's role in state government by improving coordination and reducing duplication and to merge the TNRIS Task Force and the GIS Planning Council into a single advisory body.

Environmental Issues

The economic viability of Texas is directly linked to the ecological health of the State's rivers, lakes and estuaries. When combined, recreation and tourism form the fastest growing industry and the one of the largest economic contributors to the State economy. Hunting, fishing, and "nonconsumptive" activities, such as birding and wildlife viewing, account for \$3.6 billion in expenditures a year in Texas, the second highest total in the nation. These activities are inseparably linked to the health of our terrestrial and aquatic ecosystems.

In addition, the high aesthetic value and abundance of natural resources associated with our State's healthy environment attracts other rapidly growing economic sectors, such as the computer "high tech" field. All of these industries form an economic base that will continue to grow and contribute to the Texas economy if we wisely manage the water resources.



The goal must be to preserve ecological and economic benefits while meeting the water needs of the citizens of Texas. This goal can be accomplished by maintaining adequate, high quality, instream flows which, in turn, maintain the health of Texas' rivers and streams, supply our reservoirs, and provide freshwater inflows to our bays and estuaries. Doing so will help assure healthy, productive aquatic ecosystems as well as dependable, safe water supplies for present and future generations.

Water planning and management require a thoughtful assessment of both human use of water supplies and the maintenance of sufficient flows to protect the health of Texas' aquatic ecosystems. An appropriate balance that allows for both can and should be maintained. The consensus-based Water Plan process has incorporated a set of agreed-upon planning criteria designed to balance these needs on a statewide basis. The planning criteria provide for significant flows during normal periods that are then reduced as streamflows decline as dry weather or drought conditions prevail, mimicking natural conditions. The framework of these planning methods should also be implemented in the water rights regulatory process.

All types of environmental water needs must be considered as "part of the equation" for various water management measures. In the revisions to the Water Code in 1985, particular emphasis was placed upon the study, determination, and provision of freshwater inflows to the State's bays and estuaries with only passing reference to instream flows for the State's rivers and streams. Statutory language more fully addressing the study and provision of flows to maintain instream uses should also be considered.

Although environmental water needs are being considered in water planning and management activities, studies to provide site-specific environmental flow needs under a range of conditions are incomplete. Future efforts to implement adequate, high quality, instream flows and freshwater inflows should take an integrated approach that considers all water needs, human and environmental, within a basin and should be coordinated among all users within a basin. Once all water needs are identified, alternative strategies to meet those needs should be analyzed, using the best scientific data available. As new data become available, prior analyses should be reevaluated for any new actions.

The TPWD, TNRCC and TWDB should cooperatively conduct these watershed-oriented studies to determine instream flows needed to maintain an ecologically sound environment in rivers and streams necessary for the maintenance and productivity of fishes and other aquatic organisms and the living resource upon which they depend, including riparian resources. Similarly, the TNRCC would consider both instream and bay and estuary environmental water needs when considering water rights matters.

Another area of environmental concern of water resources development is the loss of wetland, riparian, and terrestrial habitat when water projects are constructed. Previously when project mitigation for these effects have been required, typical practice has been to identify a mitigation tract that is associated with the project being permitted. Where in-kind mitigation can be provided, maximizing use of public lands or use of regional habitat mitigation banks (where feasible) for habitat mitigation would likely provide for more consolidated tracts with improved management capability for habitat productivity.



Key Policy Recommendation Environmental Water Needs



The Legislature should consider:

- ▶ Expanding the Water Code to provide for the evaluation and determination of the environmental flow needs for streams and rivers as currently exists for the bays and estuaries and promote the concept of watershed planning and management.
- ▶ Providing additional funding for a State inter-agency (TWDB, TNRCC, and TPWD), cooperative "instream" environmental data collection program, as it does with freshwater inflows to bays and estuaries, to better quantify environmental flow needs. Additional funds would be needed to out source the necessary field studies in major river basins to speed the evaluation of environmental flow needs on a river segment-by-segment basis.
- ▶ Directing the TNRCC and TPWD, in coordination with the TWDB, to develop guidelines, and where necessary adopt rules, to assure that mitigation for water development projects, subject to State approval, maximize use of existing public lands to meet state and federal mitigation requirements, and where feasible, develop mitigation banks to provide maximum benefit to fish and wildlife resources while minimizing any delays to water development projects.

Water Plan Summary

As previously discussed, many actions are needed to help assure the State's water future. While the challenges of future water management are formidable, the State of Texas can implement a viable plan that pro-actively guides the State and meaningfully addresses these various concerns. In responding to the statutory charge to plan for orderly water development at reasonable costs, to address both human and environmental water needs, and to identify policy changes needed to facilitate good water management, the Water Plan must make various planning and policy assumptions... assumptions that may or may not materialize. What might be the consequences of a "no action" future where one or more of these key assumptions are not attained?

Many scenarios are possible. If various planning goals are not attained, uncertainty and conflict will likely increase. If anticipated *growth* does not occur, then a lesser number of supply measures would be warranted. On the other hand, if growth is even more rapid then even greater management responses will be required. If various water supply *yield* assumptions are not met, cities may not provide sufficient water supplies to meet *dry-year* water demands. If water *conservation* goals are not realized, then demands may be too high for available supplies. If water *rights* that will be ultimately used are not honored, then such entities could not reliably depend on such supplies. If water rights that will not be used are not made available for other use through water *marketing*, rights subordination or even cancellation, then needed water will remain "locked up" in these permits. If Texas communities and regions do not *cooperate* in providing water supplies, then conflict will predominate and less efficient and more impacting supplies will be developed. If *environmental* water needs are not adequately addressed, the State's natural resources, economy, and quality of life will be impacted, and new development will face tremendous regulatory costs and potential legal challenge.

If various policy goals are not achieved, then a variety of potential consequences can also occur. Inadequate or inaccurate *basic water data* may adversely affect many important and costly water decisions. Vague policy on surface and ground-water *allocation mechanisms* may result in the

regulatory uncertainty and/or the courts defining State water policy. Failure to provide *basin of origin protection* in addressing interbasin transfers proposals may create unacceptable human and environmental effects. Failure to maintain *interbasin transfers* as a viable water management tool could noticeably affect the future growth and prosperity of the State's major urban areas and could lead to the development of more-costly and environmentally-impacting local water supply projects. Water suppliers will see increased competition and conflict and higher water supply costs if communities fail to work together to implement *regional water management* solutions. Deficiencies in addressing various *water quality* concerns, such as chloride concentrations, could allow significant quantities of water to go underutilized or unused. Communities of various sizes, especially small towns and utilities, could incur millions of dollars of additional capital outlays or may even be unable to respond to basic water infrastructure needs if low-cost State *financial assistance* is inadequate or unavailable.

The potential costs of no action are significant. In its water planning analyses, the TWDB prepares a "no development" scenario to forecast what water shortages might arise if the State continues to grow, but no new water development occurs. By the year 2010, about 15 percent of potential statewide urban demands could not be met (even with reasonable water conservation measures in place), yielding a potential opportunity loss to the Texas economy of between \$25 to \$40 billion per year with no new water development.

For such a basic natural resource that underlies almost every facet of human, economic, and ecological activity, the prospect of significant inaction or tardy reaction to needed water policy and future water needs is hard to fully comprehend. Over two hundred years ago, Ben Franklin said that "one knows well the worth of water once it is gone." Texans have met the water challenges of the past and know well the value of clean, adequate water for our future.