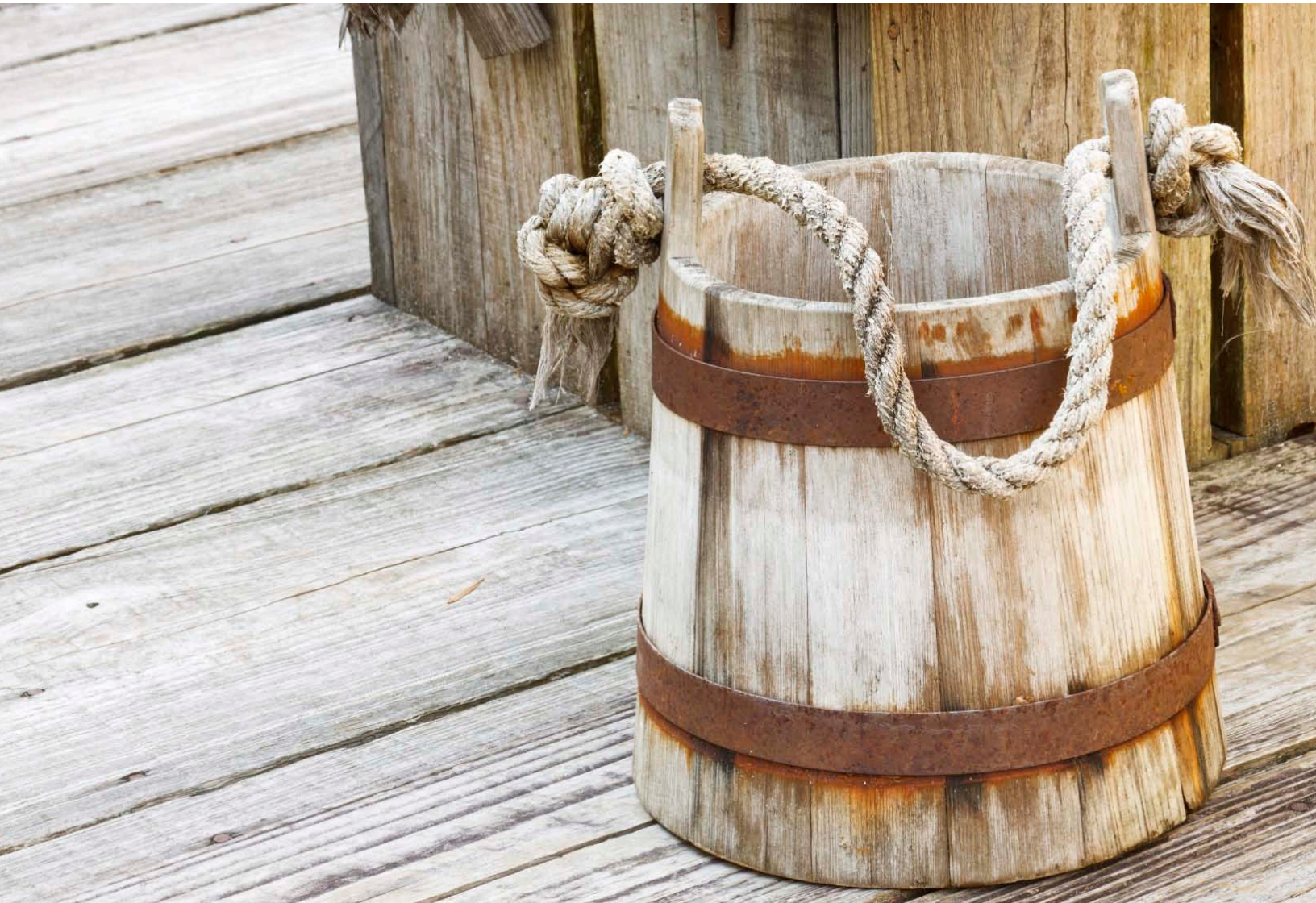
An Assessment of Water Conservation

Report to 82nd Legislature
March 2012

Submitted by
Texas Water Development Board
Texas State Soil and Water Conservation Board



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I. Executive Summary

In 2001, the 77th Texas Legislature enacted legislation in Texas Water Code §16.022 that requires the Texas State Soil and Water Conservation Board (TSSWCB) and the Texas Water Development Board (TWDB) to report on the status of water conservation in Texas. This report is provided as a supplement to the 2012 State Water Plan.

As we confront the challenges presented by frequent drought, increasing population growth, and growing demand for limited water supplies, it becomes necessary to evaluate and consider strategies that encompass various approaches for implementing water conservation efforts and in planning for our state's water supply needs. This report examines aspects of the state's water conservation efforts. To complete this report, staff of the TWDB and TSSWCB drew upon knowledge and practical experience gained by administering many of the state's municipal and agricultural conservation programs and initiatives. This report also represents a continued strong endorsement for effective and efficient utilization of water conservation measures, actions, and practices that are critical to meet the future water supply needs of the state.

This report identifies the key issues impacting the state's future water conservation efforts and offers recommendations for advancing water conservation efforts. The report also provides an overview of municipal and agricultural water conservation efforts as well as an overview of public outreach and education programs conducted by the state. Additionally, the report highlights the trends in future water use needs and presents an overview of recent legislative initiatives.

Issues Impacting Water Conservation

Smart management of the state's water resources will ensure that Texas is sustainable in the future. A central element of our state's long-term planning efforts is to address key issues and challenges that impact conservation efforts. By understanding the challenges associated with the perceptions, the economics, and the measurement of water conservation efforts, we can better prepare for our state's long-term needs.

Texas State Soil and Water Conservation Board Conservation Programs and Efforts

The TSSWCB has a number of major programs that address agricultural water conservation issues and each program includes water conservation in its implementation. The Water Quality Management program implements agricultural best management practices that enhance both water quality and water conservation. The Water Supply Enhancement Program has water conservation as its main objective. The Flood Control Program contributes to water conservation by trapping sediment that would otherwise reduce the capacity of the state's major reservoirs. As a statewide agency, the TSSWCB works closely

with the 216 local soil and water conservation districts and the Natural Resources Conservation Service to provide federal financial cost share assistance and technical assistance to agricultural landowners and producers. The Natural Resources Conservation Service assists agricultural producers with implementation of agricultural water conservation measures through the use of Farm Bill programs such as the Environmental Quality Incentives Program, Agricultural Water Enhancement Program, and Wildlife Habitat Incentives Program. The TSSWCB has determined that 475,000 acre-feet were saved from the implementation of agricultural best management practices over a three-year period.

The TSSWCB also has education and outreach programs that support and recognize conservation. Several teacher workshops are held each summer by soil and water conservation districts in cooperation with the TSSWCB on conservation and natural resource issues. Each year, the TSSWCB and the Association of Texas Soil and Water Conservation Districts co-sponsor the Texas Conservation Awards Program to recognize and honor those who dedicate themselves and their talents to the conservation and wise use of renewable natural resources. The Association of Texas Soil and Water Conservation Districts has established and updated a conservation-related video library that is maintained by TSSWCB staff on their behalf for the benefit of local districts and educators. Currently, there are over 200 conservation-related videos in the library available to districts and teachers.

Texas Water Development Board Conservation Programs and Efforts

The TWDB manages a number of programs and efforts for promoting water conservation. TWDB conservation initiatives involve supporting reporting requirements, data collection and analysis, and providing financial assistance for implementation of conservation strategies. TWDB's service and assistance helps Texans establish effective water conservation programs and reaches the agriculture, municipal, and industrial sector at varying levels.

Water IQ: Know your water is a public awareness water conservation program developed and implemented by the TWDB to educate Texans about their water resources. Access to this information is provided across the state to support local entities with their existing public awareness programs. A public awareness guide, *Developing a Water Conservation Public Awareness Program: Guide for Utilities*, is available for utilities that would like to expand or develop a program. The *Water IQ: Know your water* website, www.wateriq.org, provides local and regional information about water conservation in the state of Texas.

In order to better assist classroom teachers and facilitate the coordination between water suppliers and educators, TWDB has developed new water conservation education resources. The TWDB continues its longstanding support of the *Major Rivers* educational program, which celebrated its 20th year in 2009 by reaching 4th and 5th grade students across the state. During the fiscal years 2007-2011, an average of 50,000 students were reached annually

through the *Major Rivers* program. During that same period a total of 560 educators were trained in Texas water resources and water conservation.

The TWDB provides both agricultural water conservation grants and loans to a number of political subdivisions including groundwater conservation districts, irrigation districts, state agencies, and universities. Annual reports of water savings from agricultural grant recipients are required for several years after a grant is made based on the terms of the contract. For the fiscal years 2007-2011, there were a total of 263,497 acre-feet of water saved reported from agricultural water conservation grant recipients and 33,400 acre-feet of water saved from loan recipients. The TWDB also funds two long-term Agricultural Water Conservation Demonstration Initiative Grants. The objective of these grant awards is to demonstrate and evaluate cost-effective technologies that will increase water conservation and efficiency. They provide education and outreach to enable the transfer of available water conservation technology to irrigated farms.

The TWDB is also responsible for supporting and implementing policy initiatives as directed by legislative policy. §16.0121 of the Texas Water Code requires each retail public utility that provides potable water to conduct a water loss audit once every five years and to report the results of the audit to the TWDB. For the survey year of 2010, TWDB received 1,900 completed audits. The population of the reporting entities was 20.6 million which is 82 percent of the 2010 Texas population. The total of all reported losses was 843,857 acre-feet which is 16.7 percent of the system input volume of the reporting utilities.

In addition to the water conservations plan requirements for TWDB loan recipients, in 2007, the 80th Texas Legislature amended §13.146 of the Texas Water Code to require entities with 3,300 or more connections and certain entities with a surface water right through Texas Commission on Environmental Quality, to submit a water conservation plan and an annual report on the status of their program to the TWDB. As of the date of this report, 278 total annual reports were received for the year 2009, and 386 total annual reports were received for the year 2010. For the year 2010, approximately 55 percent of the reporting entities have reached their 5-year goals for reducing their gallons per capita per day and reducing their water loss.

Water Conservation Policy Initiatives

In the three most recent legislative sessions (80th, 81st, and 82nd) water conservation initiatives were implemented by Texas lawmakers.

<u>80th Texas Legislature (2007)</u>

With the passage of Senate Bill 3 and House Bill 4:

- the Water Conservation Advisory Council was created;
- the TWDB was directed to develop and implement a statewide water conservation public awareness program to educate residents of this state about water conservation; and

- each entity that is required to submit a water conservation plan to the TWDB or Texas Commission on Environmental Quality shall report annually to the TWDB on the entity's progress in implementing the plan.

81st Texas Legislature (2009)
House Bill 2134 relating to requiring annual water loss audits by certain retail public utilities was introduced but did not pass during the session.

82nd Texas Legislature (2011)
Senate Bill 181 passed: The TWDB and the Texas Commission on Environmental Quality, in consultation with the Water Conservation Advisory Council, shall develop a uniform, consistent methodology and guidance for calculating water use and conservation to be used by a municipality or water utility in developing water conservation plans and preparing reports required under this code.

House Bill 3090 passed: A retail public utility that receives financial assistance from the TWDB shall submit annual water loss audit reports.

Additionally, there were initiatives related to the activities of the Water Conservation Advisory Council. In 2008 and 2010, the Water Conservation Advisory Council produced legislative reports that focused on their key legislative charges. Looking forward, the Water Conservation Advisory Council has observed that noteworthy conservation is currently being accomplished with local and regional entities using their own resources from the private sector through contributions and donations. The Water Conservation Advisory Council believes that these efforts represent a commitment to advancing water conservation in Texas. In these legislative reports, the Water Conservation Advisory Council also provided recommendations and identified key elements for advancing water conservation efforts in Texas.

Future Conservation Needs

By 2060, more than 46 million people are expected to call Texas home, 80 percent more than the 2010 population. Although the population is projected to nearly double over 50 years, water demand in Texas is projected to increase by only 22 percent, primarily due to declining demand for agricultural irrigation water and increased emphasis on municipal water conservation. The regional water planning groups recommended water management strategies to meet the identified water needs that, if implemented, would provide an additional 9.0 million acre-feet in additional water supplies by the year 2060. Approximately 24 percent of the volume of these strategies, about 2 million acre-feet, would come from conservation.

Recommendations to Advance Water Conservation Efforts

Findings and recommendations associated with improvements to expand water conservation efforts in Texas are presented in this report. These recommendations focus on the key elements that continue to be relevant in the discussion of ways to improve or expand water conservation efforts in Texas. To advance water conservation efforts on a local, regional, and state level, the Legislature and appropriate state agencies should focus on the following priority areas:

- **Implementation of State Water Plan –** Water providers and users should implement the conservation strategies in the state and regional water plans and in their water conservation plans.
- **Implementation of Senate Bill 181 –** as passed by the 82nd Texas Legislature to monitor the implementation of water conservation strategies as recommended in the regional water plans, improve and streamline the reporting methods for collection and analysis of water use and water conservation savings and develop guidance for utilities and water user groups in collection of these data.
- **Water Conservation During Droughts –** State agencies should increase their capabilities to provide technical assistance to water providers and water user groups for water conservation activities during times of drought conditions.
- **Water Accountability and Loss Control –** The legislature should require all retail public utilities to conduct water loss audits on an annual basis, rather than every five years.
- **Agricultural Water Conservation Incentives –** Economic incentives are needed to encourage the early adoption of voluntary agricultural water conservation best management practices in order to secure adequate water supplies for future generations of Texans.
- **Best Management Practices Guide –** The Texas Water Development Board and the Texas Commission on Environmental Quality should improve efforts and guidance to actively promote the Water Conservation Best Management Practices Guide as a fundamental resource for the development of water conservation plans.
- **Research and Education –** The legislature should identify incentives for the higher education institutions of Texas that will encourage research and academic growth in the areas of water conservation.

II. Issues Impacting Water Conservation

Texas leaders and water supply planners have increasingly recognized that water conservation is an important component of a diversified water supply that will meet our state's future needs. By understanding where and how water is used and then applying effective efficiency practices and technologies, substantial savings can be achieved. However, as the state continues to plan for long-term needs, we discover that there are unique challenges that impact water conservation efforts. These challenges relate to the

perceptions, economics, and measurement of water conservation efforts. We are constantly striving to improve our state's management of water resources and in doing so, it will be imperative to keep in mind these challenges and issues.

Agricultural Conservation Strategies

Agricultural irrigation water use is the largest single source of freshwater demand in the state of Texas, totaling about 10 million acre-feet in 2010. This currently accounts for more than half of the 18 million acre-feet of projected water demands for all water use sectors combined in 2010. Over the 50-year planning horizon, individual regional water planning groups identified strategies to meet future needs. Of the 16 regional planning groups, 12 identified irrigation conservation as a recommended water management strategy to meet a portion of the needs in their region. Four regions: Panhandle (A), Lower Colorado (K), Llano Estacado (O), and Lower Rio Grande Valley (M), all identified it as the one strategy projected to meet the highest percentage of their future needs.[1] These four regions contain the majority of irrigated acreage in the state and represent 80-90 percent of the water used for agricultural irrigation. The irrigation conservation strategies identified by 12 regional water planning groups' results in a total of over 1.5 million acre-feet of irrigation water needed to be conserved by 2060. However, funding currently available to encourage voluntary adoption of water conserving practices is insufficient to meet the scale of conservation needed. Irrigated agricultural producers and surface water irrigation districts will require substantial funding to meet these goals for voluntary conservation. The Natural Resources Conservation Service cost-shares funding for agricultural producers is being reduced in current federal government budgets. The Texas Water Development Board (TWDB) Agricultural Water Conservation Loan Program has had limited participation in recent years. Commercial lending institutions are still a primary source of funding for producers; however, the economics of agricultural water conservation often limit the producer's ability to invest in water conservation strategies.

Economics of Agricultural Conservation

The statewide economic value directly derived from irrigated agriculture was $4.7 billion in 2007. This demonstrates the biggest challenge to implementing voluntary best management practices – the derived income generated from producing an irrigated crop outweighs any immediate economic benefits of conserving that water. It is in the public's best interest, especially future generations, to conserve water today. Yet, individual irrigators' business needs are to produce sufficient yields, requiring adequate irrigation water, in order to cover existing expenses (i.e., the cost of land, labor, and capital). Economic incentives are needed to encourage the early adoption of voluntary water conservation Best management practices in order to secure adequate water supplies for future generation Texans.

[1] Two other regions, Far West Texas (E) and Region F, also identified irrigation conservation as the second most important strategy to meet their future water needs.

Water Loss Control

Water accountability and loss control will garner increasing prominence in water resources management in coming years. Water resources will continue to become more costly to develop, and growing populations and economies will need adequate water supplies.

Many water utilities in Texas experience a variety of losses. The primary type of loss that most operators recognize is piping distribution system leakage, also known as *Real Losses.* Additionally, water suppliers also experience losses from poor accounting, meter inaccuracy, and unauthorized consumption. These losses are collectively labeled *Apparent Losses* and have a negative impact on utility revenue and consumption data accuracy.

While it is essential that system operators employ means to control such losses, the initial step is to assemble a water audit to identify the nature and volumes of losses existing in a water utility. Properly executed water auditing and loss control programs help water utilities to reduce apparent and real losses, improve data integrity, optimize supply efficiency, and optimize revenue recovery.

In 2003, the 78th Texas Legislature enacted House Bill 3338 which requires all retail water suppliers to submit water loss audits to the TWDB. In 2006 and 2011, the TWDB collected water loss audits with response rates that were slightly more than 50 percent. However, that response rate percentage represents at least 75 percent of the water volume usage in Texas. Since HB 3338 was enacted, the 82nd Texas Legislature (2011) passed House Bill 3090 which requires annual water loss audits from all retail public utilities receiving financial assistance from the TWDB. The first of these annual reports is due May 1, 2013.

Gallons Per Capita Per Day

Gallons per capita per day (GPCD) is the traditional measurement for projecting future water demand and evaluating a community's relative water efficiency. Most utilities use this metric as a planning tool to project the amount of water and infrastructure the utility will need to sustain future populations. By achieving lower gallons per capita per day, agencies can reduce future water and infrastructure needs.

The formula for calculating total gallons per capita per day is:
Total gallons per capita per day = Total Gallons of Water Produced/ Total Population

This metric is contentious because of how it is calculated. There are a number of issues that affect the credibility of total gallons per capita per day as a planning and communication tool. Methods of estimating service population can vary widely and adding to the confusion is the tendency to use total gallons per capita per day to compare very disparate communities.

Proposed solutions include providing a set of instructions and a tool for municipal water purveyors to determine use through a sector-based methodology. These types of tools and

guidance would emphasize a breakdown of water use into sectors such as residential and commercial. Sector-based reporting will allow water use analysis to be a useful tool for long-term planning and to determine which conservation programs would yield the best results.

For some providers it is difficult to calculate provider service area and there are varying methods of estimating population. At times providers include the entire population of a region instead of just the portion served by the provider. Providers and utilities strive to accurately derive their population using credible techniques. Since populations are not static, you cannot use year-end water production and population.

When determining gallons per capita per day, utilities and providers may be presented with many variants of gallons per capita per day that are useful in different ways for planning and conservation. Residential gallons per capita per day, a commonly used variant, is often cited as a metric for comparing communities, but the method for deriving those numbers still lacks standardization. There are additional issues relating to the inclusion of transient workers, who commute daily from other jurisdictions, in "customer" population.

Municipalities are unique in demographics, housing mix, industries, economy, and climate. A bedroom community may have a low total gallons per capita per day because it doesn't include much commercial or industrial water use, while the nearby industrial community has a seemingly excessive total gallons per capita per day, because it has few residents to divide out the water use. It is an ongoing challenge to avoid total gallons per capita per day comparisons between communities. Water providers and utilities are encouraged to use their gallons per capita per day history and goals to measure their community's water efficiency progress. Community water usage is dependent on variables such as industrial production, power production, commercial sector activities, infrastructure leaks, recreational facilities like golf courses, and even agriculture production. For this reason, a comparison of communities based on a single gallons per capita per day alone can be misleading.

Outdoor Water Use Efficiency

Texas' inherently diverse climate, coupled with several years of drought, has led to increased awareness of the importance of water conservation both indoors and outdoors in recent years. Although the Texas drought has raised public awareness about the need for water conservation, landscape irrigation continues to be the largest source of residential water use. During the summer season water use tends to increase dramatically as residents try to maintain their lawns and trees. A large majority of that landscape water use can be wasted due to over watering or runoff. Many agencies and municipalities strive to provide consumers with a better understanding of outdoor water use and how to become more efficient in that use. More resources are being produced to inform homeowners on how to design sustainable landscapes and evaluate their irrigation systems.

Long-Term and Short-Term Drought

Droughts are a fact of life in Texas. Every decade in the 20th century, there was a serious drought of some length in at least some part of the state. During a drought, not as much rainfall fills our rivers and reservoirs, or recharges our aquifers. Therefore, less water is available for use. Ironically, we have a tendency to want to use even more water during droughts because there is less rainfall. By contrast, during these dry periods it makes sense to cut back on non-essential uses, such as frequent lawn watering. These types of "drought management" measures help ensure that we have enough water to meet essential needs.

Climate scientists have reported that drought is expected to increase in general worldwide because of the increase of temperatures and the trend toward concentration of rainfall into events of shorter duration (Nielsen-Gammon, 2011). In Texas, temperatures are likely to rise; however, future precipitation trends are difficult to project. If temperatures rise and precipitation decreases, as projected by climate models, Texas would begin seeing droughts in the middle of the 21st century that are as bad or worse as those in the beginning or middle of the 20th century.

Drought management, also called drought contingency planning, is a way to ensure that critical water needs are met during a dry period, minimizing the economic impact of a drought. Water utilities across the state have prepared for such occasions by developing tactical plans, called drought management plans, to reduce peak demands and extend water supplies during a drought.

III. Texas State Soil and Water Conservation Board Conservation Programs and Efforts

The Texas State Soil and Water Conservation Board (TSSWCB) has four major programs that address agricultural water conservation issues: the Technical Assistance Grants Program, the Water Quality Management Plan Program, the Water Supply Enhancement Program (formerly titled the State Brush Control Program), and the Flood Control Program. While neither the Technical Assistance Grants Program nor the Water Quality Management Plan Program is designed specifically or solely for water conservation, each includes water conservation in its implementation. The Water Supply Enhancement Program, however, has water conservation as its main objective. The Flood Control Program also contributes to water conservation by trapping sediment that would otherwise reduce the capacity of the state's major reservoirs. Information on TSSWCB programs is available online at the agency's website[2].

[2] www.tsswcb.texas.gov

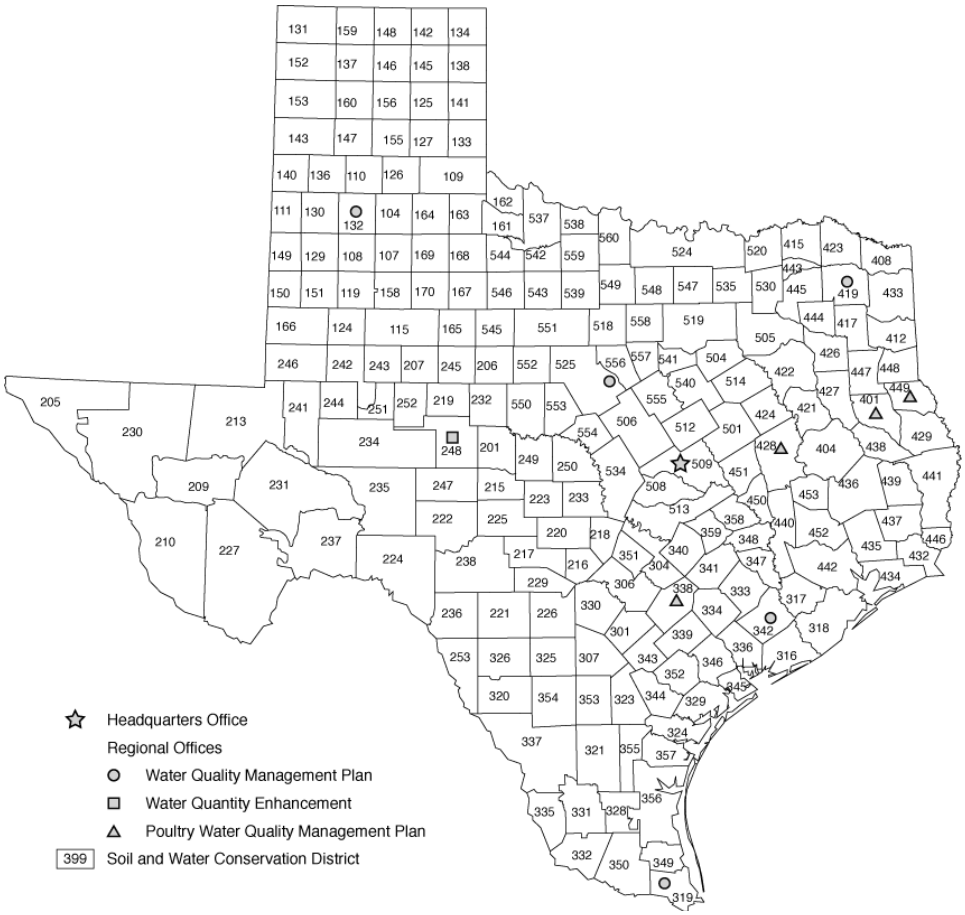


Figure 3-1. Soil and Water Conservation Districts. Texas' 216 soil and water conservation districts provide technical and planning assistance to agricultural producers for implementing conservation best management practices on their farms and ranches.

Technical Assistance Grants Program

Since 1984, the Texas Legislature has appropriated funds annually to the TSSWCB for assisting Soil and Water Conservation Districts in their efforts to provide technical assistance to agricultural producers. These grants may be used to pay employees for performing the duties of a conservation technician. A conservation technician works with owners and operators of agricultural or other lands on the installation and maintenance of various conservation practices. Some of these practices are water conservation practices. In 2011, the TSSWCB provided $1.78 million to soil and water conservation districts for technical assistance. For fiscal years 2012 and 2013 this amount has been reduced to approximately $1.48 million.

Water Quality Management Plan Program

In 1993 the Texas Legislature passed Senate Bill 503 directing the TSSWCB to implement water quality management plans in Texas. They have been implementing water quality management plans since and have completed over 14,000 plans in Texas. A water quality management plan is site-specific and developed through soil and water conservation districts for agricultural or silvicultural lands. The plan includes appropriate land treatment

practices, production practices, management measures, and technologies, or combinations thereof. The purpose of water a quality management plan is to achieve a level of pollution prevention or abatement determined by the TSSWCB, in consultation with local soil and water conservation districts, to be consistent with state water quality standards. While this program is designed for water quality, many of the practices that are included in a water quality management plan are effective at conserving water as well. Water conservation practices include: conversion to more efficient irrigation systems, irrigation land leveling, irrigation tail water recovery, and pond sealing. The Texas Legislature has been appropriating approximately $2.1 million per year to the TSSWCB to use as cost-share to assist agricultural producers with implementing these plans. For fiscal years 2012 and 2013 this amount has been reduced to $1.9 million per year.

Flood Control Program

There are nearly 2,000 small watershed flood control structures across the state on private property that are cosponsored by soil and water conservation districts. These structures, in addition to providing flood control benefits, assist in preventing sediment from reducing the capacity of our major drinking water reservoirs. As an example, Lake Lavon has 82,600 acre-feet of sediment storage. The flood control structures above Lake Lavon have combined sediment storage of 21,500 acre-feet. The total design sediment storage of these flood control structures on a statewide basis is about 390,000 acre-feet. As local sponsors, soil and water conservation districts in many watersheds are responsible for the operation and maintenance of these structures and work with landowners in the watersheds to prevent erosion so that the structures can provide sediment reduction and flood control benefits. Due to the passage of time and difficulty in raising adequate funds locally, the legislature appropriated $15 million dollars to the TSSWCB for grants to local soil and water conservation districts during the 2010-2011 biennia for operation, maintenance, and structural repairs of these dams. Because of budget constraints, the Legislature appropriated $4 million to the TSSWCB for the 2012 – 2013 biennia. This program is helping to maintain and enhance the life and functionality of these structures, including their sediment trapping capabilities.

Water Supply Enhancement Program

The 81st Texas Legislature continued funding for the Water Supply Enhancement Program by providing $4,503,641 in General Revenue Funds for fiscal year 2011. These funds were directed to be used for continuation of brush control projects designated by the TSSWCB. The 82nd Texas Legislature reduced funding for the program to $2.14 million/year for fiscal years 2012 and 2013. Since the beginning of the Water Supply Enhancement Program in 1999, over 741,000 acres of brush have been treated in various watersheds throughout the state.

Currently, the Water Supply Enhancement Program is administrating 14 projects throughout the state. The projects are:

- Twin Buttes Project
- Pedernales Project
- Guadalupe River Project
- Edwards Aquifer Project (Bandera County)
- Fort Phantom Hill Project
- Nueces River Project
- Frio River Watershed
- Lower Guadalupe River Project
- Carrizo-Wilcox Aquifer Project
- Palo Pinto Project
- Bosque Project
- O.C. Fisher Project
- Little Wichita River (Archer and Clay Counties) Project
- Lake Brownwood Project

Water Savings from Brush Control

Water yield estimates are based on feasibility studies or academic research.
State Cost-Share Grants 2000 – 2010—$33,771,142
Landowner Contributions 2000 – 2010—*In Excess of* $14,000,000

Table 3-1. Water Savings Information from Texas State Soil and Water Conservation Board Watershed Projects

Watershed Project	State Cost Per Treated Acre	Treated Acres	Ac-Ft/Acre/Year	Ac-Ft/Year Based on Treated Acres	Total Water Yield for Life of the Project [1]
Lake Ballinger (completed)	$45.00	7,800	0.170	1,326	13,260
Oak Creek Lake (completed)	$47.00	16,224	0.145	2,352	23,520
Lake Champion (completed)	$43.00	14,994	0.097	1,454	14,540
Mountain Creek (completed)	$49.00	1,440	0.142	204	2,040
Greenbelt Reservoir (completed)	$87.50	571	3.000	1,713	6,852
Hubbard Creek (completed)	$58.75	506	3.000	1,518	6,072
Pecos/Upper Colorado (completed)	$70.78	10,580	4.449	47,070	188,280
North Concho River (completed)	$45.50	327,000	0.080	26,160	261,600
Canadian River (completed)	$92.49	16,850	2.509	42,277	169,108
Lake Brownwood	$146.34	1,005	0.294	295	2,950
Bosque River	$162.50	752	0.080	60	600
Little Wichita River	$20.92	24,274	0.497	12,064	120,640
Nueces River	$27.65	10,168	0.224	2,278	22,780
Frio River	$24.22	7,111	0.224	1,593	15,930
Pedernales River	$72.00	70,760	0.668	47,268	472,680
Upper Guadalupe	$123.71	2,540	0.668	1,697	16,970
Edwards Aquifer	$155.75	896	0.668	599	5,990
Twin Buttes	$68.03	226,844	0.077	17,467	174,670
Fort Phantom Hill Reservoir	$0.00	0	0.317		
Palo Pinto Reservoir	$0.00	0	0.600		
Carrizo- Wilcox Aquifer	$262.47	103	NA [2]		
O.C. Fisher Reservoir	$104.98	1,300	0.080	104	1,040
Lower Guadalupe	$101.50	197	0.668	132	1,320
TOTAL		**741,915**		**207,631**	**1,520,842**

[1] **The total water yield is based on the watershed projects having a lifespan of 4 or 10 years depending on the type of brush treated.**

[2] **Carrizo-Wilcox project water yield estimate currently being detemined.**

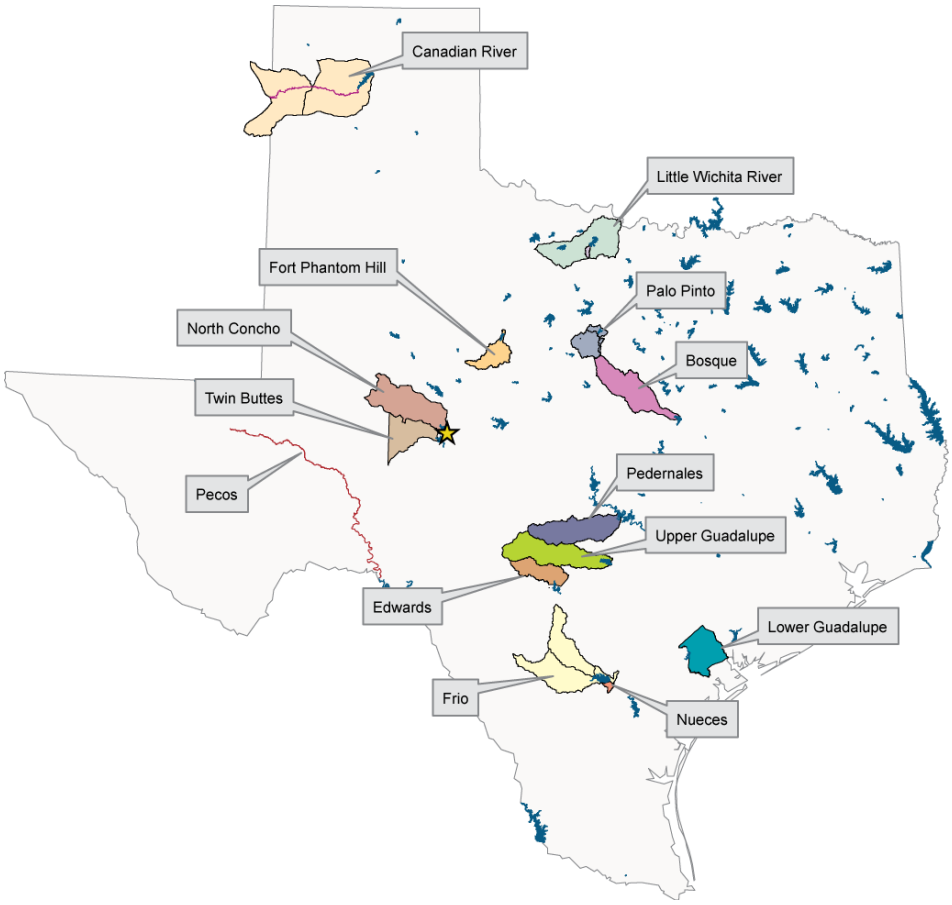


Figure 3-2. Location of major water supply enhancement projects across the state.

Education and Outreach

The TSSWCB has an education and outreach program that supports and recognizes conservation.

Summer Teacher Workshops

Several teacher workshops are held each summer by soil and water conservation districts in cooperation with the TSSWCB on conservation and natural resource issues. The Texas Environmental Education Advisory Committee to the Texas Education Agency approves the content of these workshops, sponsored by the TSSWCB. As an approved Environmental Education Professional Development Provider, teachers are able to get 16 credit hours toward their required continuing education units (CEUs) for recertification.

Texas Conservation Awards Program

Each year, the TSSWCB and the Association of Texas Soil and Water Conservation Districts co-sponsor the Texas Conservation Awards Program to recognize and honor those who dedicate themselves and their talents to the conservation and wise use of renewable natural resources. The 2011 Awards Program marks the 33rd year of this joint program. Local districts

select their outstanding individuals and submit them for regional judging. Those selected as regional winners are honored each May at regional awards banquets. From these regional winners, a state winner is selected for the Outstanding Conservation District, Outstanding Conservation Teacher, Poster Contest, and Essay Contest. These individuals are invited to the annual state meeting for recognition.

The conservation awards program provides competition and incentives to expand and improve conservation efforts, resource development, and increase the wise utilization of renewable natural resources. Through these conservation awards programs, soil and water conservation districts and citizens are benefited. Soil and water conservation districts may enter their local recognition honorees in any of 10 categories (East Texas has an additional category of Forestry Conservationist), depending on appropriateness to the category description. For the youth of the district, there is also a poster and essay contest.

Soil & Water Stewardship Public Speaking Contest

The Soil & Water Stewardship Public Speaking Contest is open to high school Future Farmers of America (FFA) students interested in soil, water, and related renewable natural resource conservation. The contest is aimed at broadening students interest and knowledge of conservation and how individuals must depend on and take care of the world around them for survival. The contest is coordinated through the Texas Future Farmers of America, with contests at the local and state level. Local winners compete in the 10 state Future Farmers of America areas and the first and second place winners at the area level compete for the state title.

Conservation Education Video Library

The Association of Texas Soil and Water Conservation Districts has established and updated a conservation related video library that is maintained by TSSWCB staff on their behalf for the benefit of local districts and educators. Currently, there over 200 conservation-related videos in the library that are available to districts and teachers. Videos can be ordered through local soil and water conservation districts or by contacting the TSSWCB.

Agricultural Water Conservation Best Management Practices (BMPs) Implementation by Landowners

The TSSWCB surveyed soil and water conservation districts planning agricultural best management practices implementation in 2004, 2005, and 2007. The survey was to estimate the effect of best management practices implementation on water savings. Statewide water savings resulting from implementation of these best management practices was calculated based on the estimated water savings contained in the best management practices guide.

This is the only statewide survey and estimate of agricultural water savings in Texas. Over 40 different best management practices were implemented each year. Over half of the estimated water savings over the three years of data was from brush management.

Table 3-2. Soil and Water Conservation District Best Management Practice Achievements

Year	SWCDs Participating	Number of Different BMPs Planned	Brush Management BMP (acres)	Brush Water Savings (ac-ft/yr)	Total Water Savings (ac-ft/yr)
2004	197	47	452,196	203,488	341,729
2005	195	43	777,660	349,947	537,288
2007	199	43	416,449	187,402	475,474

- Agricultural best management practices are being widely implemented by Texas farmers and ranchers, assisted by state and federal technical assistance and cost-share programs.
- The 216 soil and water conservation districts in Texas provide technical and planning assistance to agricultural producers for implementing conservation best management practices on their farms and ranches. The districts work with state and federal programs that provide cost-share assistance to implement conservation agricultural conservation best management practices. The Natural Resources Conservation Service has several federal programs which assist landowners in implementing the agricultural water conservation practices.
- The local soil and water conservation districts also sponsor a number of conservation education events and recognition awards.
- The TSSWCB manages a water quality management plan program that assists with implementing best management practices, many of which are water conservation practices.

Program Coordination with United States Department of Agriculture – Natural Resources Conservation Service

As a statewide agency, the TSSWCB works closely with the 216 local soil and water conservation districts and the Natural Resources Conservation Service (NRCS) to provide federal financial cost-share assistance and technical assistance to agricultural landowners and producers.

The Natural Resources Conservation Service assists agricultural producers with implementation of agricultural water conservation measures through the use of farm bill programs such as the Environmental Quality Incentives Program, Agricultural Water Enhancement Program, and Wildlife Habitat Incentives Program. Included in these programs are conservation practices which improve irrigation efficiencies (such as pipelines, drip irrigation systems, and precision application center-pivot systems), as well as those practices which enhance water yield and infiltration (brush management, furrow diking, rangeland, and pastureland management). These practices are applied by agricultural producers through long-term (up to 10 years) cost-share contracts with the Natural Resources Conservation Service.

Under the Environmental Quality Incentives Program, the Natural Resources Conservation Service gives priority to applications that demonstrate a reduction in water use by the agricultural operation. As a condition of receiving a higher ranking within the grouping of water conservation applications, the producer agrees not to use associated water savings to bring new land under irrigation production. Approximately 75 percent of Environmental Quality Incentives Program funding is used for water conserving conservation practices.

The Agricultural Water Enhancement Program is a funded subprogram of the Environmental Quality Incentives Program and is designed to target areas or regions with specific water quantity and quality improvement efforts. As part of the Environmental Quality Incentives Program, the Agricultural Water Enhancement Program operates through contracts with producers to plan and implement conservation practices to conserve ground and surface water, and improve water quality in project areas established through partnership agreements. Producers may participate individually in the Agricultural Water Enhancement Program or collectively through a partnership project.

IV. Texas Water Development Board Conservation Programs and Efforts

The Texas Water Development Board (TWDB) provides services that help Texans establish effective water conservation programs by implementing best management practices. The TWDB assists municipalities with reporting requirements and collects data from water conservation plans, water loss audits, and annual reports. The agency also provides resources for industrial, commercial, and institutional water conservation programs. Through the agricultural conservation programs the TWDB provides grants, assists in voluntary irrigation metering programs, and collects data for annual irrigation water use estimates. There are also ongoing programs for conservation education and public outreach to promote water conservation and develop water resource educational programs. Additionally, TWDB staff supports the Water Conservation Advisory Council in their mission to establish a professional forum for the continuing development of water conservation resources.

Assessment of Municipal Conservation Programs and Efforts

Municipalities and water utilities are being asked to do more with less. With fewer resources available, utilities are taking a closer look at their data collection and management practices and are exploring new efficiency methods. Recent policy initiatives at the state level encourage municipalities to improve their conservation program analysis. Existing reporting requirements allow the TWDB and the Texas Commission on Environmental Quality to collectively evaluate conservation implementation efforts and water use by municipalities.

Municipal Loan Recipients

Since 1984, TWDB has required applicants who have applied for financial assistance for greater than $500,000 to develop and submit a water conservation plan. The applicant must implement a water conservation program that supports the plan for the life of the loan. The entity receiving financial assistance is required to provide an annual report on the status of their program, identifying specific conservation efforts, and the percent of annual water saved due to those efforts. As of the date of this report, 208 municipal water providers currently have active conservation plans under this program.

The annual reports include data pertaining to specific and quantified 5-year and 10-year targets for total gallons per capita per day and water loss. The reports also include long-term elements for water conservation such as public education, metering, water accounting and savings from reuse, leak detection, and other conservation activities. As of the date of this report, 40 loan recipient annual reports were received for the year 2009, and 151 loan recipient annual reports were received for the year 2010.

Table 4-1. Gallons Per Capita Per Day (GPCD) as Reported by Loan Recipients

	2009	2010
Average residential GPCD [1]	80	89
Average water loss reported in GPCD [2]	18	19
Average water loss percentage [3]	10.9%	14.6%
Average total GPCD [4]	165	130

This table represents an overall average of data reported by loan recipients. Variations in an individual entity's annual data can be due to weather, watering restrictions, economic conditions, and other factors. The use of annual reports to collect data was first implemented May 1, 2009.

1 **Residential GPCD is calculated using the following formula:**
(Single Family and Multi-Family water sold ÷ Population Served) ÷ 365 = Residential GPCD

2 **Water Loss GPCD is calculated using the following formula:**
(Total Water Loss in Gallons ÷ Population Served) ÷ 365 = Water Loss GPCD

3 **Water Loss Percentage is calculated using the following formula:**
(Total Water Loss in Gallons ÷ Total Gallons of Water Produced) x 100 = Water Loss Percentage

4 **Total GPCD is calculated using the following formula:**
(Total Gallons of Water Produced ÷ Population Served) ÷ 365 = Total GPCD

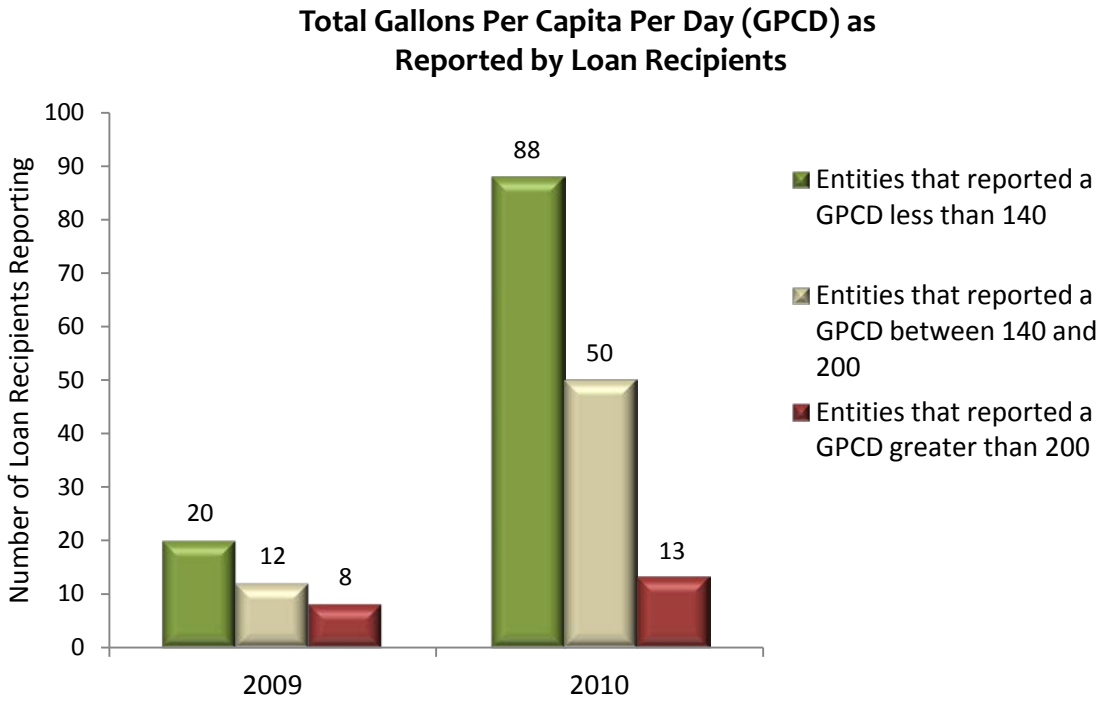


Figure 4-1. The use of annual reports to collect data was first implemented May 1, 2009. Total gallons per capita per day (GPCD) is derived from the annual reports of loan recipients. Total GPCD is calculated using the following formula: (Total Gallons of Water Produced ÷ Total Population Served) ÷ 365 = Total GPCD

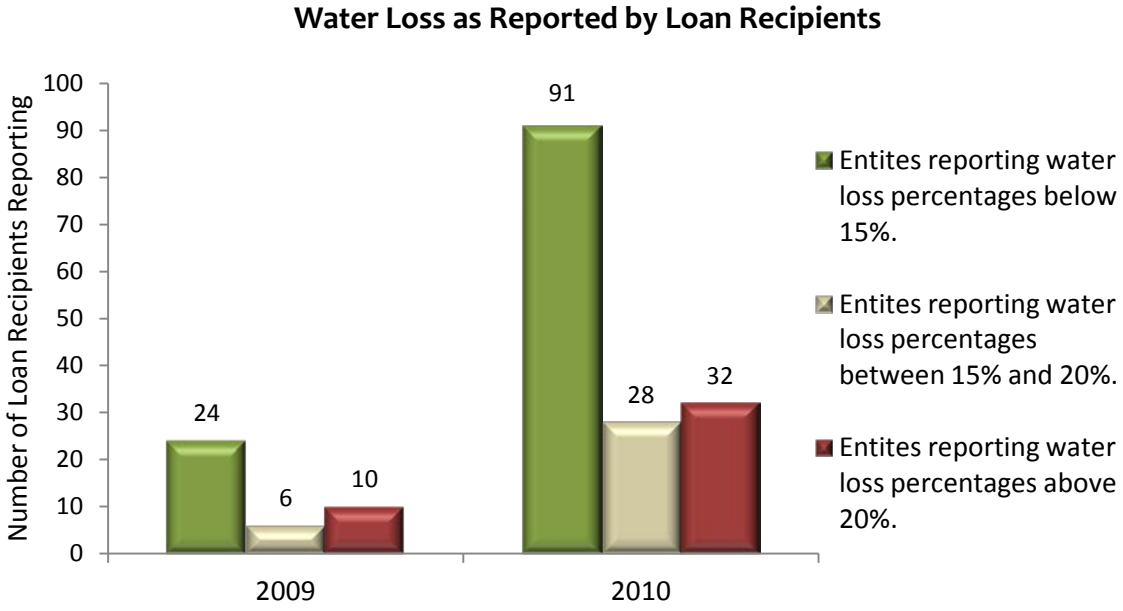


Figure 4-2. The use of annual reports to collect data was first implemented May 1, 2009. Water loss percentage is derived from the annual reports of loan recipients. Water loss percentage is calculated using the following formula: (Total Water Loss in Gallons ÷ Total Water Produced) x 100 = Water Loss Percentage

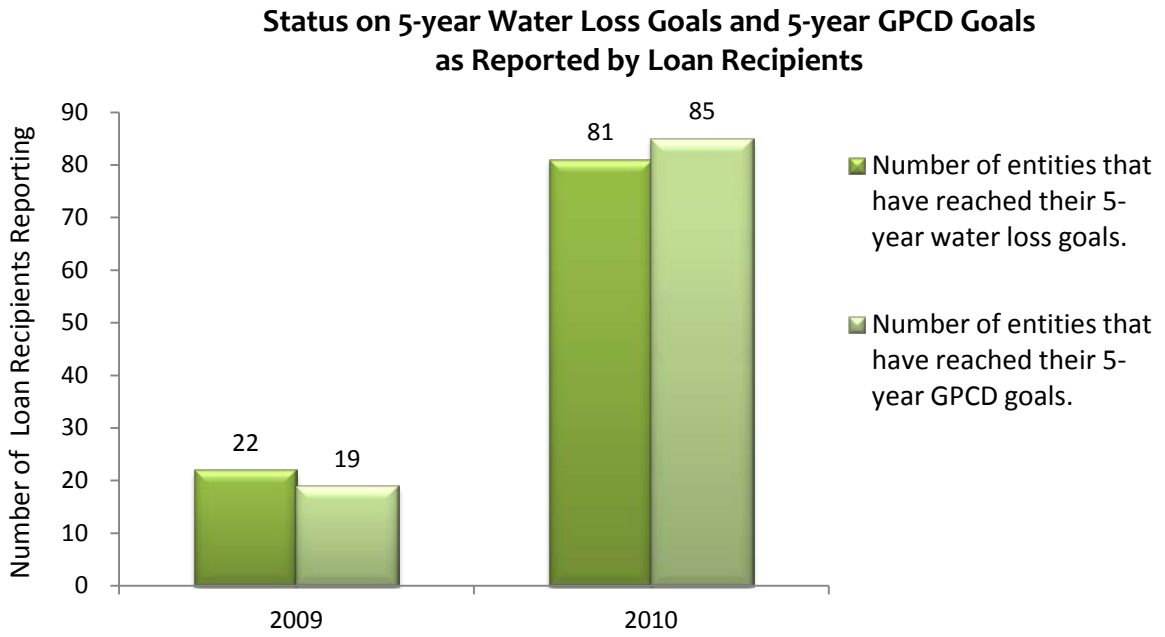
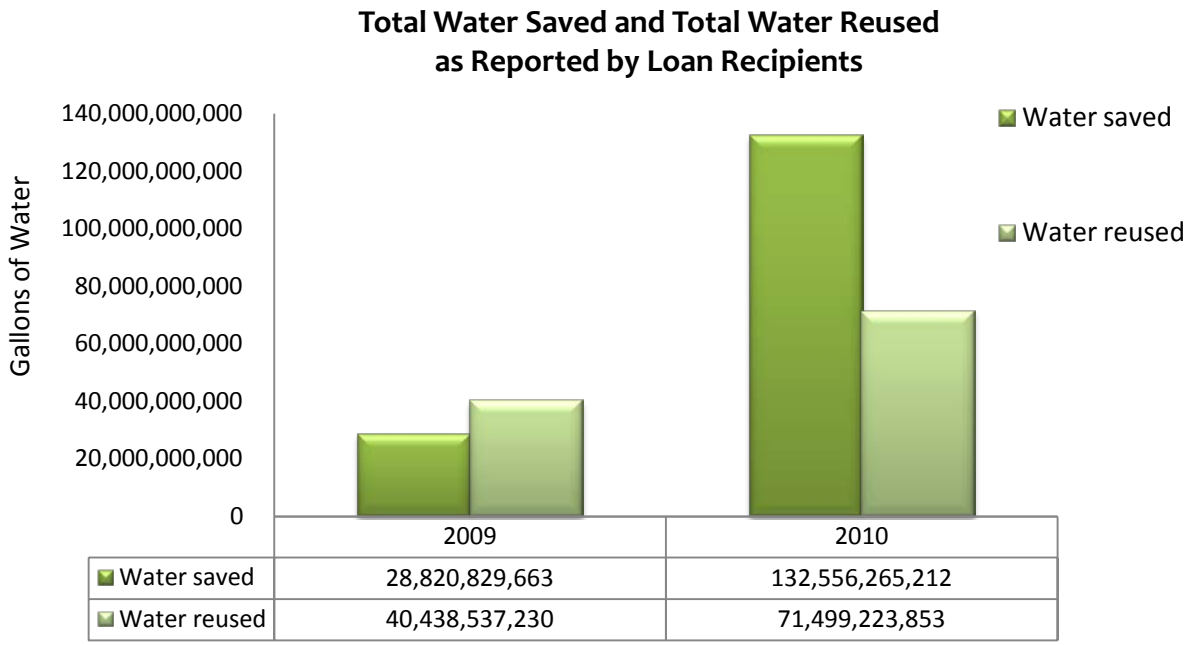


Figure 4-3. The use of annual reports to collect data was first implemented May 1, 2009. An entity will typically establish their 5-year water loss goals and their 5-year GPCD goals when they complete a water conservation plan as part of the requirement for receiving financial assistance. After those goals are established, an entity should annually evaluate their performance in meeting those goals.



	2009	2010
Water saved	28,820,829,663	132,556,265,212
Water reused	40,438,537,230	71,499,223,853

Figure 4-4. The use of annual reports to collect data was first implemented May 1, 2009. Total water saved indicates the total amount of water saved in a year due to conservation efforts made by the utility. Total water reused indicates the total amount of water reused in a year by the utility. Types of reuse include, but are not limited to, landscape irrigation and industrial uses.

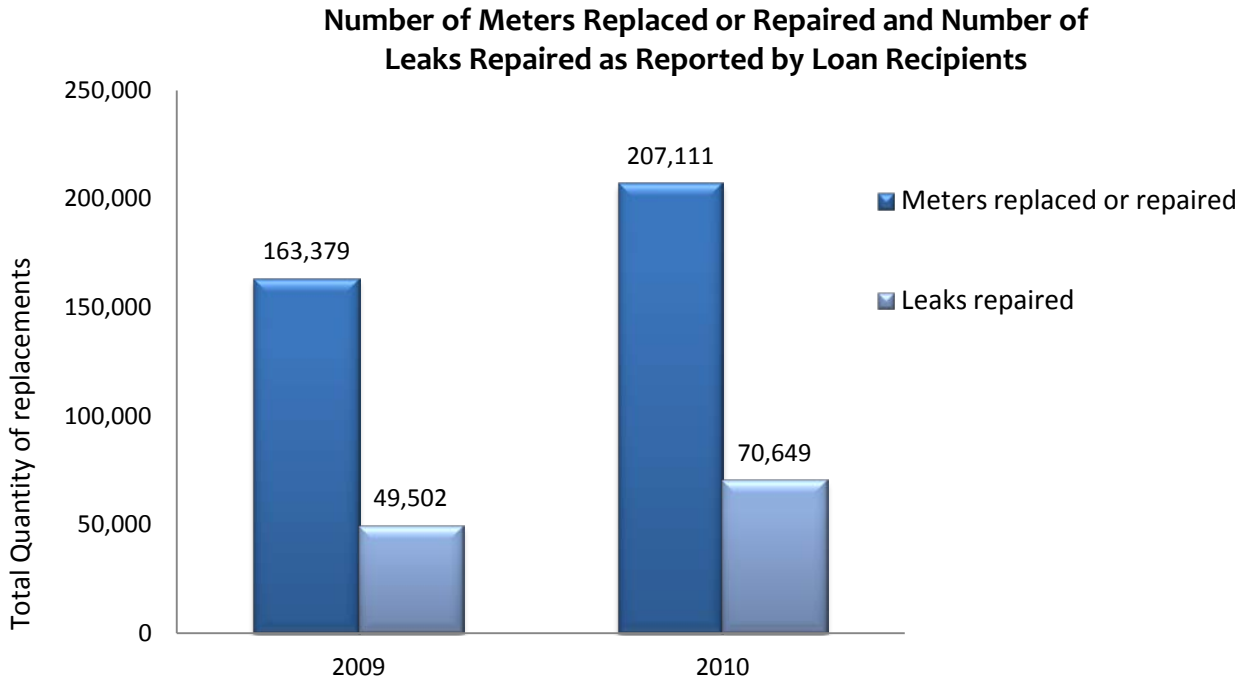


Figure 4-5. The use of annual reports to collect data was first implemented May 1, 2009.

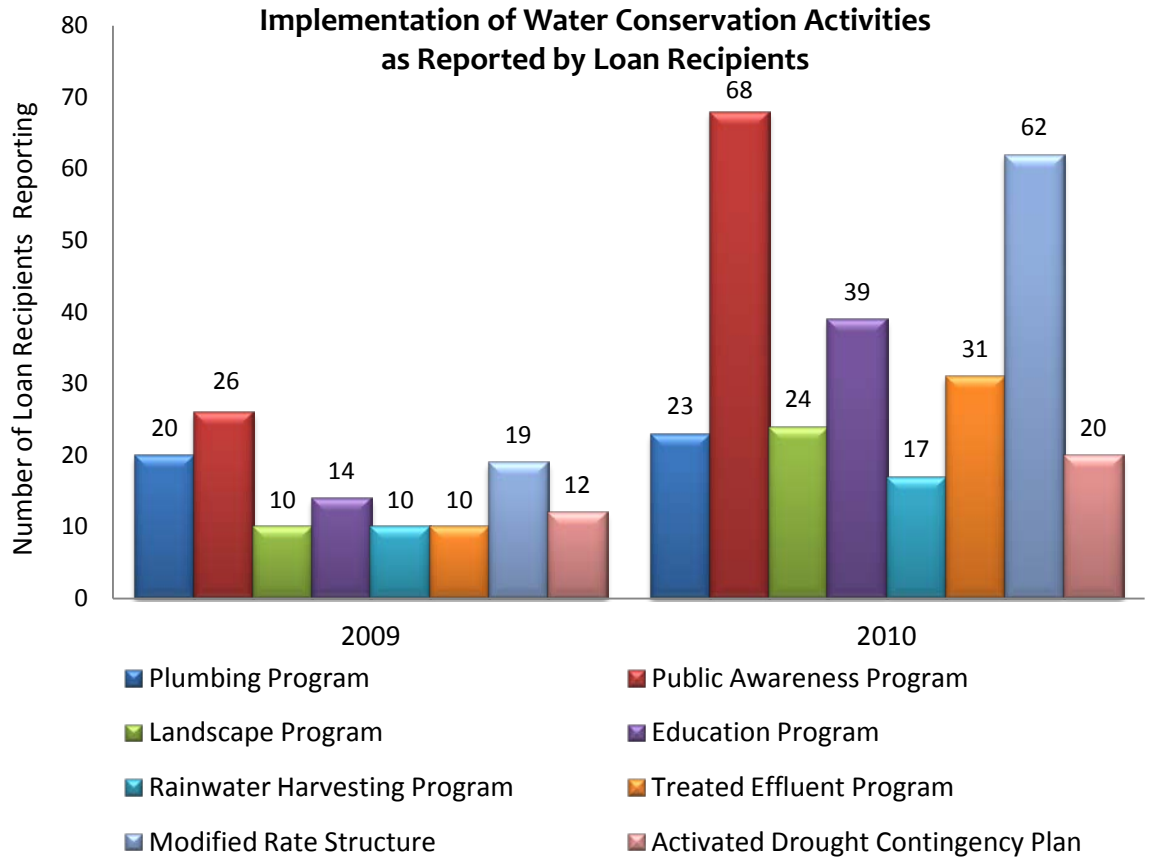


Figure 4-6. The use of annual reports to collect data was first implemented May 1, 2009. Entities use a variety of strategies and best management practices to implement their water conservation plans. This figure depicts the most common types of water conservation programs implemented by entities.

Water Savings by Municipal Loan Recipients

Water savings represents the amount of water saved by recipients of TWDB financial assistance. Savings are interpreted as the result of conservation efforts relative to the amount of water used by the recipients. The amount of water saved is the annual water savings resulting from implementation of water conservation programs. Water savings is a data component that is required as a condition for receiving a grant or loan from the TWDB for the purpose of water supply projects. The values presented are the savings in percent of the total water used by the reporting entities for the period 2007-2011. Annual values vary due to the entities who reported in a specific year and the savings reported by those entities.

Table 4-2. Reported Municipal Water Savings in Percent of Total Water Use

2007	13.3 %
2008	15.5 %
2009	4.4 %
2010	3.5 %
2011	24.6 %
5-year average	12.3 %

Variations in annual data can be due to weather, watering restrictions, economic conditions, and other factors.

Statewide Municipal Conservation Efforts

In 2003, the 78th Texas Legislature amended §16.0121 of the Texas Water Code to require each retail public utility that provides potable water to conduct a water loss audit once every five years and to report the results of the audit to the TWDB. The water loss audit addresses four main points of water loss: loss from distribution lines, inaccuracies in meters, deficiencies in accounting practices, and theft of service. The TWDB compiles the information from the water loss audit reports submitted by retail public water utilities to provide information for the regional water planning groups to use to identify appropriate water conservation management strategies. The first water loss audit summary that TWDB conducted and collected data from was during the year 2005. The current water loss audit is for the year 2010.

For the year 2010, the TWDB requested approximately 3,500 retail water providers to fill out the water loss audit worksheet which could be completed on-line or by hand. As of September 30, 2011, TWDB received 1,900 completed audits. Conclusions from these audits include:

- The population of the 1,900 reporting entities was 20.6 million, which is 82 percent of the 2010 Texas population.
- System input volume which includes all residential use and any industrial, commercial, institutional use served by the reporting utilities was 5.05 million acre-feet.
- Total of all reported losses was 843,857 acre-feet, which is 16.7 percent of the system input volume of the reporting utilities.
- Apparent losses resulting from inaccurate meters, billing errors, and unauthorized consumption totaled 157,385 acre-feet, which is 18.5 percent of total losses.
- Using an assumption of the retail price of water at $4.00 per 1,000 gallons, the cost in lost revenue from apparent losses is estimated at $205 million dollars.
- Real losses, commonly associated with leaks and breaks in the distribution system and other unreported system loss, totaled 691,672 acre-feet, which is 81.5 percent of the total loss in the audits.
- Using an assumption of the cost of treating water at $2.00 per thousand gallons, the cost of real losses from undelivered treated water is $450 million.

The 2010 water loss data is also available in summary form and by individual utility for each of the 16 regional water planning areas and will be made available to the regional water planning groups for their consideration in developing water management strategies.

The 82nd Texas Legislature (2011) passed House Bill 3090 which requires annual water loss audits from all retail public utilities receiving financial assistance from the TWDB. The first of these annual reports is due May 1, 2013.

In 2007, the 80th Texas Legislature amended §13.146 of the Texas Water Code to require entities with 3,300 connections or more to develop a water conservation plan and submit it to TWDB. Additionally, entities with a surface water right through the Texas Commission on Environmental Quality are also required to submit a water conservation plan to TWDB. These entities are also required to provide an annual report that identifies specific conservation efforts and the percent of annual water saved due to those efforts. As of the date of this report, 419 municipal water providers have developed and implemented conservation plans.

The data reported in the annual reports includes specific and quantified 5-year and 10-year targets for total gallons per capita per day (Total GPCD) and water loss from all reports. The data reported also includes long-term elements for water conservation such as public education, metering, water accounting, and savings from reuse, leak detection, and other conservation activities. The following information is from the 235 reports from entities with more than 3,300 connections or Texas Commission on Environmental Quality permits.

Table 4-3. Gallons Per Capita Per Day (GPCD) as Reported in Annual Reports

	2009	2010
Average residential GPCD reported [1]	119	140
Average water loss reported in GPCD [2]	15	20
Average water loss in percentage [3]	10%	12.9%
Average total GPCD reported [4]	150	154

This table represents an overall average of data reported from entities with greater than 3,300 connections, or entities that held a surface water right with Texas Commission on Environmental Quality. Variations in an individual entity's annual data can be due to weather, watering restrictions, economic conditions, and other factors. The use of annual reports to collect data was first implemented May 1, 2009.

1 **Residential GPCD is calculated using the following formula:**
(Single Family and Multi-Family water sold ÷ Population Served) ÷ 365 = Residential GPCD

2 **Water Loss GPCD is calculated using the following formula:**
(Total Water Loss in Gallons ÷ Population Served) ÷ 365 = Water Loss GPCD

3 **Water Loss Percentage is calculated using the following formula:**
(Total Water Loss in Gallons ÷ Total Gallons of Water Produced) x 100 = Water Loss Percentage

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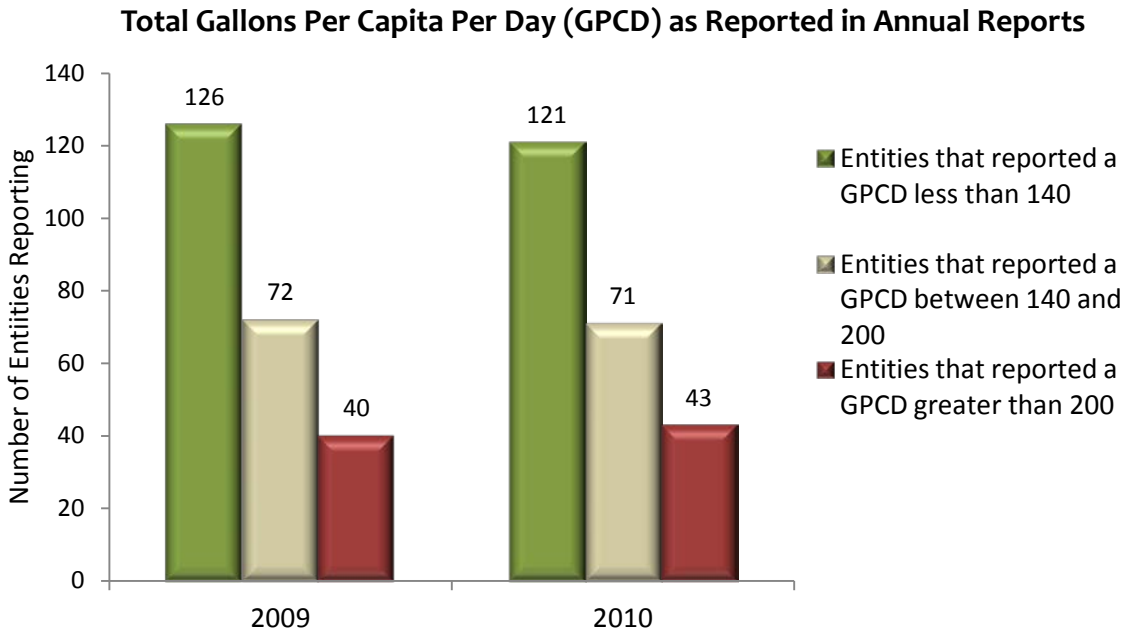


Figure 4-7. The use of annual reports to collect data was first implemented May 1, 2009. Total Gallons Per Capita Per Day (GPCD) is derived from the annual reports of entities with more than 3,300 connections or Texas Commission on Environmental Quality permits. Total GPCD is calculated using the following formula:
(Total Gallons of Water Produced ÷ Total Population Served) ÷ 365 = Total GPCD

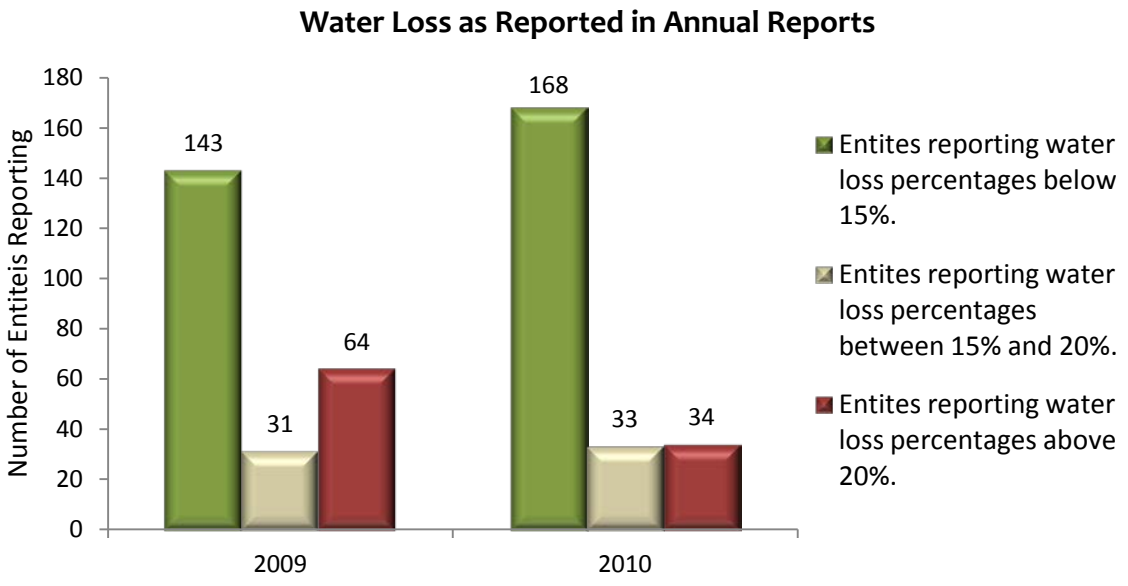


Figure 4-8. The use of annual reports to collect data was first implemented May 1, 2009. Water loss percentage is derived from the annual reports of entities with more than 3,300 connections or Texas Commission on Environmental Quality permits. Water loss percentage is calculated using the following formula:
(Total Water Loss in Gallons ÷ Total Gallons of Water Produced) x 100 = Water Loss Percentage

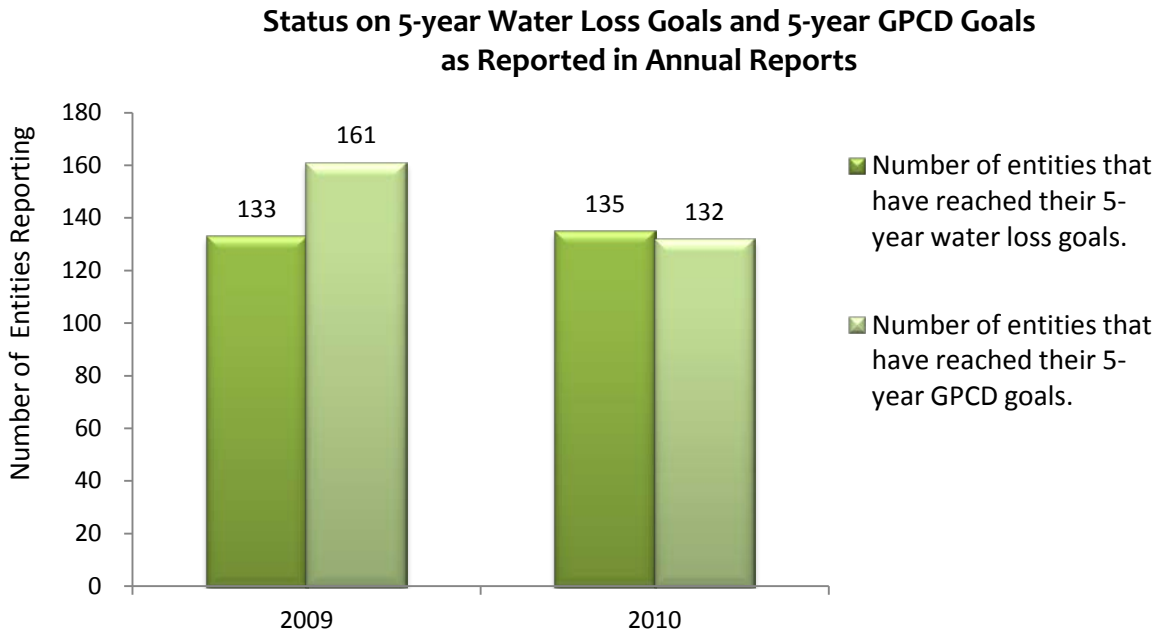


Figure 4-9. The use of annual reports to collect data was first implemented May 1, 2009. An entity will typically establish their 5-year water loss goals and their 5-year GPCD goals when they complete a water conservation. After those goals are established, the entity should annually evaluate their performance in meeting those goals.

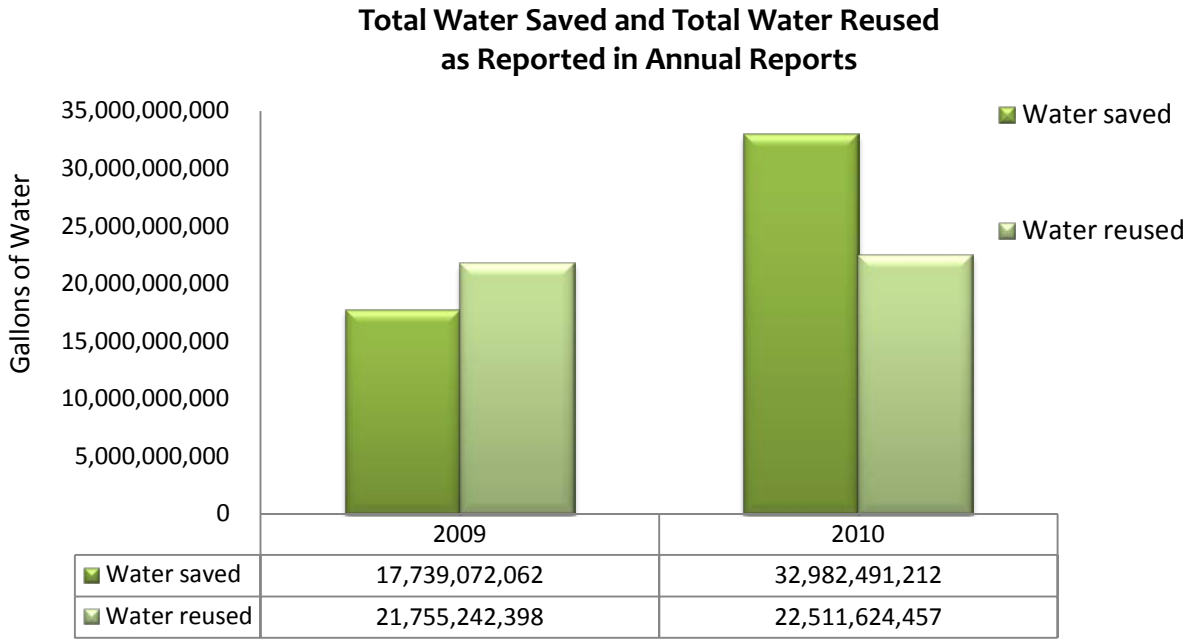


Figure 4-10. The use of annual reports to collect data was first implemented May 1, 2009. Total water saved indicates the total amount of water saved in a year due to conservation efforts made by the utility. Total water reused indicates the total amount of water reused in a year by the utility. Types of reuse include, but are not limited to, landscape irrigation industrial uses.

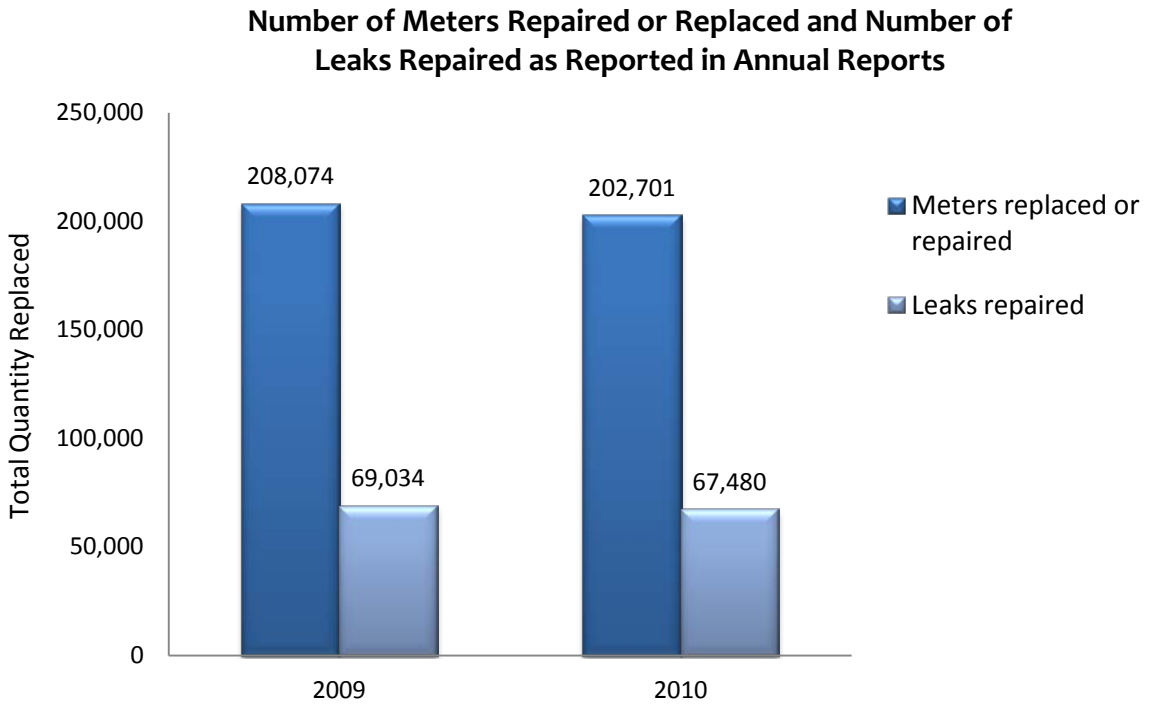


Figure 4-11. The use of annual reports to collect data was first implemented May 1, 2009.

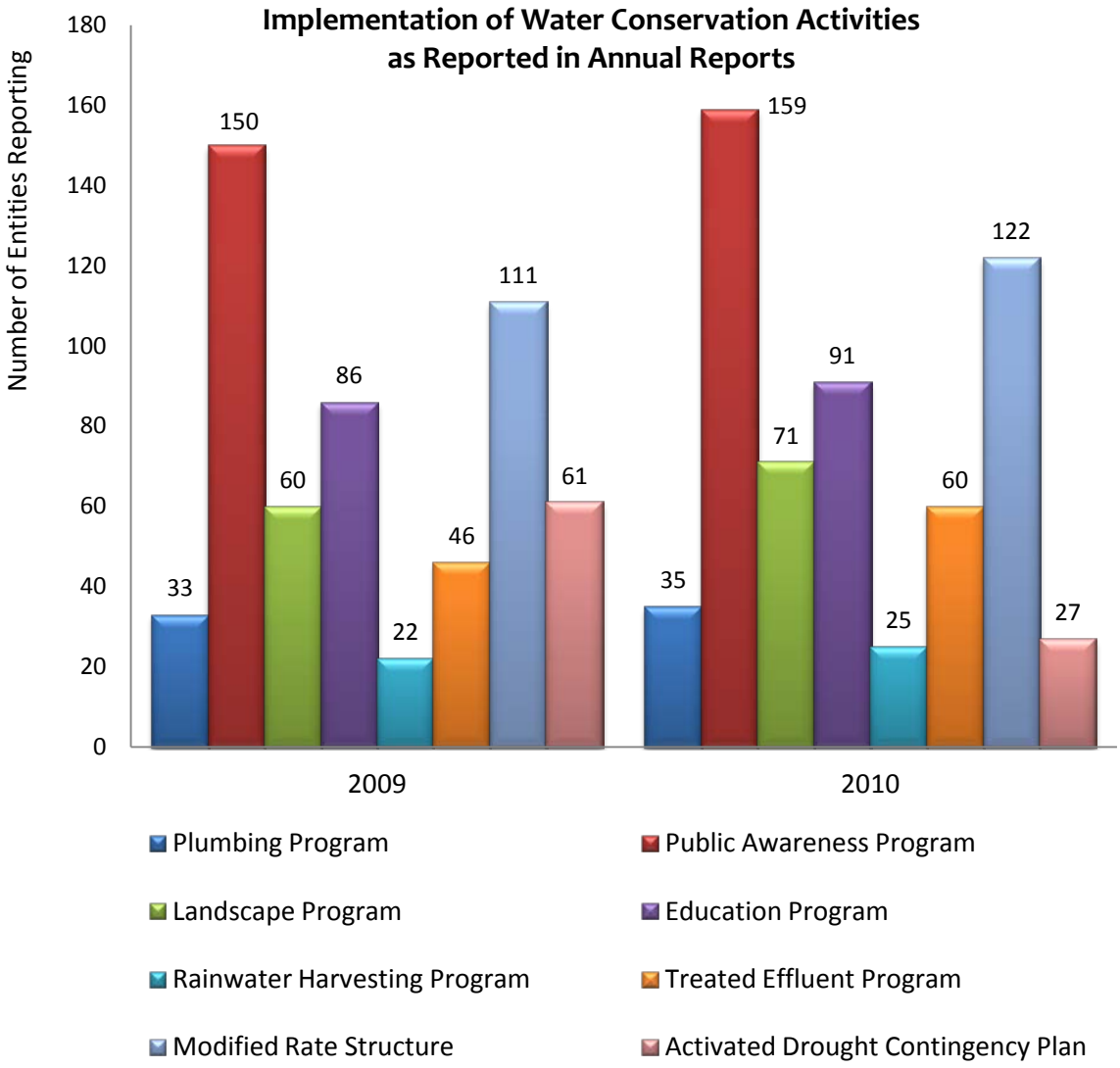


Figure 4-12. The use of annual reports to collect data was first implemented May 1, 2009. Entities use a variety of strategies and best management practices to implement their water conservation plans. This figure depicts the most common types of water conservation programs implemented by entities.

Assessment of Agricultural Conservation Programs and Efforts

Extreme weather patterns and fluctuations for commodities change annually. Farmers and ranchers have made it clear that there is a need for technical assistance, financial assistance, and innovative methods for irrigation in the 21st century. The TWDB, the TSSWCB, and agencies under the U.S. Department of Agriculture have observed this need and have been able to provide different methods of assistance to political subdivisions and individuals statewide.

Agricultural Grants

From the fiscal years 2007-2011, the TWDB has provided 23 different agricultural water conservation grants to 14 separate entities. These political subdivisions include groundwater conservation districts, irrigation districts, state agencies, and universities. The TWDB has awarded grant funds up to $600,000 per year for a wide range of projects that are designed to assist in implementation of water conservation strategies in the state water plan. During this period, over $2.3 million has been awarded and the projects are in various stages of implementation.

Table 4-4. Agricultural Grants Awarded to Political Subdivisions

Fiscal Year	Entity	Amount	Topic
2007	Texas State Soil and Water Conservation Board	$100,000	Technical Assistance to Agricultural Producers for Irrigation Water Conservation Best Management Practices
2007	Mesa Underground Water Conservation District	$35,729	Agricultural Water Conservation Grant for metering
2007	Uvalde County Underground Conservation District	$68,992	Agricultural Water Conservation Grant for metering
2008	Harlingen and Cameron Counties Irrigation District #1	$249,015	Technologies for canal automation, water level, and soil moisture measurements
2008	Panhandle Groundwater Conservation District	$149,968	Agricultural Water Conservation Grant for metering
2008	Texas AgriLife Research	$198,835	Conduct Inventory and Assess the Evapo-Transpiration Networks in the state of Texas
2009	Lower Colorado River Authority	$99,219	Agricultural Water Conservation Grant for metering
2009	Panhandle Groundwater Conservation District	$125,000	Economic Impact of the 50/50 Management Standard

Fiscal Year	Entity	Amount	Topic
2009	Texas AgriLife Research	$99,076	Conservation Education and Public Awareness
2009	Texas AgriLife Research	$275,000	Innovative Technology Transfer- Estimation of Irrigated Land Use
2010	El Paso County Water Improvement District # 1	$50,000	Agricultural Water Conservation Grant for metering
2010	Hemphill County Underground Water Conservation District	$36,491	Agricultural Water Conservation Grant for metering
2010	Medina County Groundwater Conservation District	$60,000	Agricultural Water Conservation Grant for metering
2010	Panhandle Groundwater Conservation District	$63,375	Agricultural Water Conservation Grant for metering
2010	Panhandle Groundwater Conservation District	$127,300	Irrigation System Audits
2010	Sandy Land Underground Water Conservation District	$11,000	Conservation Education and Public Awareness- Conservation Jamboree
2010	Sandy Land Underground Water Conservation District	$47,801	Irrigation System Audits
2010	Texas AgriLife Extension	$57,321	Conservation Education and Public Awareness
2011	Colorado County Groundwater Conservation District	$50,000	Agricultural Water Conservation Grant for metering
2011	Hemphill County Underground Water Conservation District	$10,373	Agricultural Water Conservation Grant for metering
2011	Texas AgriLife Research-Vernon	$77,208	Demonstrations of irrigation efficiency improvements
2011	North Plains Groundwater Conservation District	$250,000	Demonstrations of irrigation efficiency improvements
2011	Texas Tech University	$101,049	Irrigation System Audits

Each fiscal year the TWDB may award up to $600,000 in grant funding. In some instances entities are awarded more than one grant within the fiscal year.

Water Savings from Agricultural Grant Recipients

Annual reports of water savings from agricultural grant recipients are required for several years after a grant is made based on the terms of the contract. From the fiscal years 2007-2011, there was a total of 263,497 acre-feet of water saved reported from agricultural water conservation grant recipients.

Table 4-5. Reported Agricultural Grant Water Savings

	Acre-Feet Before Improvement	Estimated Efficiency Improvement	Acre-Feet of Water Saved
Fiscal Year 2007	100,032	17%	17,150
Fiscal Year 2008	117,141	9%	10,490
Fiscal Year 2009	225,081	23%	52,019
Fiscal Year 2010	698,612	15%	101,3382
Fiscal Year 2011	745,650	7%	82,500

Agricultural water savings are required for all awarded grant contracts.

Agricultural Loans

Through the Agricultural Water Conservation Loan Program, the TWDB provides agricultural water conservation loans to political subdivisions either to improve their facilities or to lend to individuals. Conservation programs or projects are eligible, including a conservation program that funds a political subdivision or person for a conservation project.

A conservation program is an agricultural water conservation technical assistance program, including a program for an on-farm soil and water conservation plan developed jointly by a landowner, an operator, and a local soil and water conservation district as provided by the Texas Agriculture Code, Chapter 201, Subchapter H; a research, demonstration, technology transfer, or educational program relating to agricultural water use and conservation; a precipitation enhancement program in an area of the state where the program, in the TWDB's judgment, would be most effective; and other state agency- or political subdivision-administered water conservation programs that provide loans to a person for a conservation project.

A conservation project improves the efficiency of water delivery to an application on existing irrigation systems; prepares irrigated land for conversion to dry land conditions; prepares dry land for more efficient use of natural precipitation; purchases and installs on public or private property, devices designed to indicate the amount of water withdrawn for irrigation purposes; or prepares and maintains land to be used for brush control activities in areas of the state where those activities, in the TWDB's judgment, would be most effective, including activities conducted under Chapter 203 of the Texas Agriculture Code.

Table 4-6. Agricultural Loans to Political Subdivisions

Fiscal Year	Entity Name	Net Amount
2007	Panhandle GWCD	$500,000
2007	Sandy Land UWCD	$500,000
2008	Panhandle GWCD	$1,000,000
2008	Sandy Land UWCD	$500,000
2010	Sandy Land UWCD	$2,000,000
2011	Panhandle GWCD	$1,000,000
Total		$5,500,000

These net amounts are solely what the TWDB authorized and does not represent actual costs of projects or direct transfers.

Water Savings from Agricultural Loan Recipients

Annual reports from agricultural loan recipients contain information on water saved and estimated water use before improvements financed by the loan were made. This information is reported for the life of the loan. The reports received from all active loans are used to estimate total savings for that year. From the fiscal years 2007-2011, approximately 33,400 acre-feet of water were saved across Texas from loans issued by the TWDB.

Table 4-7. Reported Agricultural Loan Water Savings

Fiscal Year	District	Acre-Feet Before Improvements	Acre-Feet Saved
2007	Medina GCD	1,623	841
	Edwards Aquifer Authority	13,271	4,248
	Sandy Land UWCD	23,952	2,352
	Panhandle GWCD #3	7,510	4,951
2008	Edwards Aquifer Authority	13,271	4,248
	Sandy Land UWCD	4,976	511
	Panhandle GCD	3,744	2,471
	Medina GCD	1,623	841
2009	Sandy Land UWCD	5,641	543
2010	Panhandle GCD	16,802	5,435
	Sandy Land UWCD	4,022	467
2011	Panhandle GCD	18,398	5,955
	Sandy Land UWCD	6,316	543
Total		121,149	33,406

Agricultural loan water savings are required for the life of the loan.

Agricultural Demonstration Initiatives

In February 2004, the TWDB authorized the initiation of a process to fund Agricultural Water Conservation Demonstration Initiative Grants. These long-term grant awards provide funding to political subdivisions for conducting demonstration initiatives to assess proven ability to increase water conservation through cost-effective increases in water use efficiency. The objective of these grant awards is to demonstrate and evaluate cost-effective technologies that will increase water conservation and efficiency. They develop comprehensive data utilizing large-scale demonstration sites that evaluate and determine the impacts on crop productivity, irrigation water use, and available water supplies. These grants provide education and outreach to enable the transfer of available water conservation technology to irrigated farms.

An Integrated Approach to Water Conservation in the Texas Southern High Plains

An eight-year grant of up to $6.2 million was awarded to Texas Tech University for the Southern High Plains project to identify, demonstrate, and quantify the water saving agricultural production practices and technologies that can reduce the depletion of groundwater from the Ogallala Aquifer while maintaining agricultural production and economic opportunities. The knowledge gained from this project will be demonstrated to producers throughout the High Plains and will be extended to other agricultural regions and to the general public. Texas Tech University is partnering with Texas AgriLife Extension, the High Plains Underground Water Conservation District, and agricultural producers in Floyd and Hale counties for the project. The project demonstrates systems that range from monoculture cropping systems to fully integrated crop/livestock/forage systems including dryland cropping and irrigation technologies such as subsurface drip irrigation and surface center pivot irrigation systems. Detailed results from the period of 2005-2010 can be found online at the TWDB web pages[3].

Maximization of On-Farm Surface Water Use Efficiency by Integration of On-Farm Application and District Delivery Systems

A 10-year grant of up to $3.8 million was awarded to the Harlingen Irrigation District (District) for the Lower Rio Grande Valley project, located in Cameron, Hidalgo, and Willacy counties. This project integrates state-of-the-art network control management with on-farm irrigation technology and management systems on a largescale. The project is a demonstration of cost-effective technologies that maximize water use efficiency. The Harlingen Irrigation District is partnering with Delta Lake Irrigation District, Texas AgriLife Extension, Texas A&M-Kingsville, and Lower Rio Grande Valley agricultural producers.

The project demonstrates, documents, and incorporates the District's ongoing conservation projects and provides coordination between the District's staff, agricultural water users, and

[3] http://www.twdb.texas.gov/conservation/agriculture/demonstration/

state and federal technical agencies. The project includes construction and utilization of a meter calibration facility. It also includes demonstrations maximizing the efficiency of flood irrigation, demonstrations of the effectiveness of major irrigation technologies, and showcases how to implement the beneficial findings from field demonstrations to irrigation districts and farmers. Detailed results from the period of 2005-2010 can be found online at the TWDB web pages[4].

Annual Irrigation Water Use Estimates

The TWDB annually calculates irrigation water use estimates for every county in the state. Partnering agencies and entities that assist in this process include the U.S. Department of Agriculture-Farm Service Agency, the Texas Commission on Environmental Quality, Texas AgriLife Research, and local groundwater conservation districts.

The current methodology utilizes available data from agricultural weather stations maintained by Texas AgriLife Research. From this weather data, TWDB calculates crop water needs (inches per acre) based on individual evapo-transpiration rates for all major crops grown within a county. Depending on the geographical location and historic levels of irrigation water use, the initial use rate may be modified to take into consideration irrigation application efficiencies and deficit (limited) irrigation practices.

Crop water needs application rates are applied to irrigated acreage information obtained via a memorandum of understanding with the Farm Service Agency. Individual crops and county total water use (acre-feet) are calculated by multiplying the acres times the rates:

$$Acres * Rate\left(\frac{inches}{acre}\right) * \frac{1\ foot}{12\ inches} = Acre\ Feet$$

Texas Commission on Environmental Quality provides information on amounts of surface water diversions by county in which the release occurred. TWDB applies this information to the appropriate counties in which the irrigation water was applied. Groundwater conservation districts and other local sources are given an opportunity and encouraged to comment or provide revisions to the TWDB annual irrigation irrigated acreage and irrigation water use estimates. Some districts provide revisions to the numbers, which TWDB incorporates into the final estimates. Other districts state their acceptance of the irrigation estimates as calculated by TWDB.

After receiving comments and revisions from the cooperating sources, TWDB develops the final estimates of irrigated acreage and the volume (acre-feet) of groundwater and surface water used in each county in the state.

Irrigation water use estimates for 2003 to 2009 may be found online through the TWDB[5]. Acre-feet-per-acre use rates will vary by crop type, availability of irrigation water supply, type

[4] http://www.twdb.texas.gov/conservation/agriculture/demonstration/
[5] http://www.twdb.texas.gov/conservation/agriculture/irrigation/

of irrigation application system, and by effective rainfall received in each year. Impacts of irrigation water conservation practices should be observable by looking at the long-term trend in irrigation water use rates. A look at the past five years shows there are about 6 million irrigated acres in the state and average irrigation water use is around 9 million acre-feet (Figure 4-13).

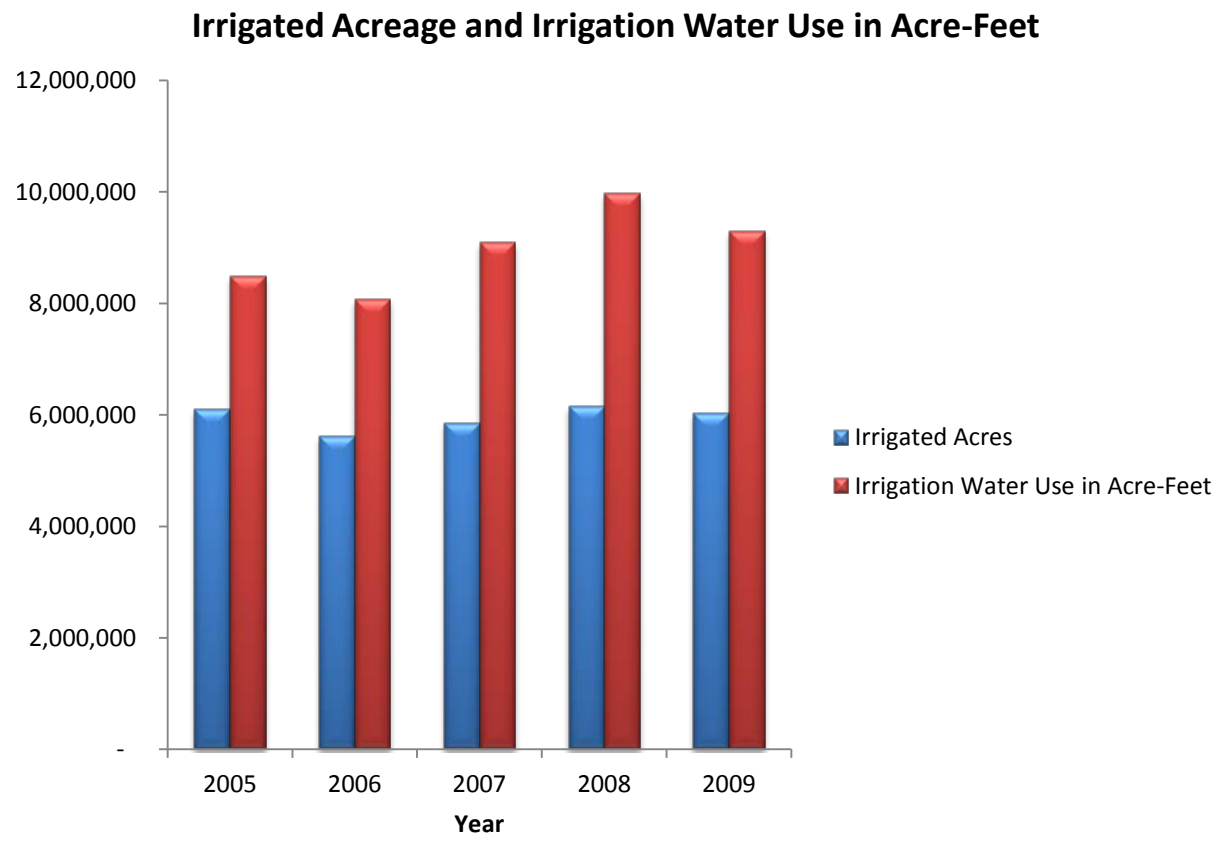


Figure 4-13. Irrigated acreage and irrigation water use in acre-feet

Irrigation Metering Program

The TWDB Voluntary Irrigation Metering Program is one component of the competitive agricultural water conservation grants administered through annual solicitations for request for applications in the Texas Register. Typical metering agreements last for 7-10 years and require at least five years of data reporting (the first few years are reserved for equipment purchases, site location, producer agreements, and installation). Annual data reports must include the following: meter number, county, crop type, irrigated acres, irrigation water volume applied, and inches-per-acre calculation (where available, local rainfall data is also requested). Along with the data reports, annual water savings reports are also required.

Since the program began in 1999, there have been 15 participating entities with TWDB funding several hundred meters. The participating groundwater conservation districts and river authorities observed benefits in terms of increased abilities to quantify irrigation water

use, and in some cases, assisting with the implementation of conservation pricing. Irrigation flow meters provide real-time gallons per minute flow readings and irrigation season total application volumes. Individual irrigators participating in the program gain a valuable tool to help make informed decisions about their irrigation management practices. By knowing the actual use of irrigation water applied per irrigation cycle and/or annually, the irrigator can determine if his irrigation practices are efficient or if conservation measures can reduce his use of irrigation amounts.

A technical report on the TWDB irrigation metering program has been published as TWDB Report 378[6] and is available online through the TWDB.

Agricultural Outreach and Training Activities

Agricultural water conservation staff annually participates in training and outreach across the state. Throughout the fiscal years 2007-2011, staff attended farm and ranch shows held in Lubbock, San Antonio, Amarillo, Victoria, and Harlingen. Staff responds to emails and phone calls daily from other organizations, co-workers, and the general public to assist them in irrigation water use and best management practices.

Statewide Outreach and Educational Programs

The mission statement for the TWDB includes providing information and education for the conservation of water for Texas. The major programs are described below.

School Education Programs

School-based water education programs are a best management practice in water conservation. Water conservation educational efforts for the period between 2007 and 2011 strategically targeted increased educator understanding about water resources and the need to conserve water statewide. Classroom teachers, like many other Texans, have not been educated about watersheds, aquifers, surface water/groundwater interactions, water use, and water planning in our state. Based on a research study contracted by TWDB in 2004, (Statewide Conservation Public Awareness Research Study[7]), it was found that Texans are more likely to conserve water after learning more about it. By educating classroom teachers about water resources, they in turn share that knowledge with their students to help raise environmental literacy about this critical natural resource. Educators are also encouraged to make contact with their local water supply entities including municipalities, river authorities, and groundwater districts for additional information about their regional water issues.

In order to better assist classroom teachers and facilitate the coordination between water suppliers and educators, TWDB created TWDB *Kids*, a new Web portal for the K-12

[6] http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R378_IrrigationMetering.pdf

[7] http://www.twdb.texas.gov/RWPG/rpgm_rpts/2004483531.pdf

educational resources. An information brochure was created and over 10,000 brochures were distributed to teachers across the state. In 2008, a CD-ROM was designed as a teacher resource, developed for the middle school program, called *Raising Your Water IQ*. In 2010, a new Web-based high school curriculum, *Water Exploration*, was added to the educational resources. In 2011, a *Water Exploration* teacher resource CD-ROM was developed. The TWDB continues its longstanding support of the *Major Rivers* educational program, which celebrated its 20th year in 2009, by reaching 4th and 5th grade students across the state. During the fiscal years 2007-2011, an average of 50,000 students were reached annually through the *Major Rivers* program. During that same period a total of 569 educators were trained in Texas water resources and water conservation.

Table 4-8. Students Reached Through Educational Programs

Fiscal Year	Major Rivers Program (Students Reached)	Raising Your Water IQ (CD-ROMs Distributed)	Water Exploration (CD-ROMs Distributed)	Educators Trained
2007	56,880	na	na	50
2008	58,320	85	na	65
2009	57,330	273	na	171
2010	50,940	230	na	127
2011	35,310	198	201	156

The number of students that have been reached through educational programs since 2007.

Water IQ Program

Water IQ: Know your water is a public awareness water conservation program developed and implemented to educate Texans about their water resources. Water conservation public awareness is promoted through various activities such as public outreach events, materials, and education. Access to this information is provided across the state to support local entities with their existing public awareness programs. *Water IQ* offers an easy-to-identify brand, a variety of materials, and a network of groups and communities dedicated to educating Texans about water conservation and the wise and efficient use of our natural resources. The program can complement existing local and regional water conservation efforts. *Water IQ* strives to make all Texans aware that their natural water resources are limited.

TWDB staff offered water conservation outreach and education to the citizens of Texas through workshops and conferences throughout 2009 and 2010. Other TWDB activities included securing partnerships with various entities and developing contacts throughout the state with other public awareness and water conservation education leaders.

A public awareness guide is available for utilities to help with water conservation efforts. *Developing a Water Conservation Public Awareness Program: Guide for Utilities* is available through the TWDB's *Water IQ* Web site. The guide helps utilities develop and implement an effective outreach program as part of local efforts by making use of the mass media.

The TWDB has developed a water conservation public awareness Web site, www.wateriq.org that provides general information about water conservation in the state of Texas. One unique feature on the Web site is a zip code locator that includes zip codes of cooperating entities to provide consumers with local water conservation tips and information. A consumer may enter their local zip code and if that zip code is located in the data base, the consumer will be redirected to their local water conservation Web site(s). The consumer also has the option to locate their local water provider by name in a drop down menu. This allows cooperating entities to maintain their own Web site, but provides consumers another option to locate information regarding water conservation.

If the consumer's zip code is not located (or the water provider is not listed on the drop down menu) the consumer is directed to the TWDB water conservation public awareness Web pages. At the time of preparation of this report, there are 929 zip codes (out of a potential of approximately 4,140) and 57 agreements with various Texas cities and water providers.

Literature

Water conservation brochures are available for sale when larger quantities than the number of free copies are desired. Most materials are available in packages of 100. Limitations may be placed on available quantities of literature due to availability.

Table 4-9. Conservation Literature Distribution Report

Fiscal Year	Requestors	Free Literature	Paid Literature
2007	264	66,911	192,233
2008	234	64,941	93,570
2009	275	106,104	186,501
2010	226	78,664	211,188
2011	234	85,673	125,787
5-Year Total	1,233	402,293	809,279

The amount of literature distributed to the public for water conservation since 2007.

The TWDB offers a variety of conservation brochures as well as educational literature. Most are available free of charge to the public in limited amounts, and many brochures are available for sale when larger quantities are requested.

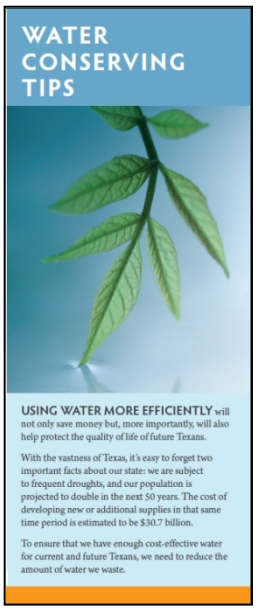
A Watering Guide for Texas Landscape
It is important for homeowners who want to enjoy lawns but are concerned about conservation to realize lawns don't waste water, people do! There are positive features of lawns as recreational surfaces that reduce heat loads, noise, and water and air pollution. This guide provides information on choosing plants adaptive to conditions in your area of the state, measures the amount of water needed to irrigate your landscape, and uses the right tools and methods to deliver the optimal amount of water.

Water Conservation for Industries, Businesses, and Institutions
This brochure provides tips to businesses on how they can conserve water without compromising services.

Water Conserving Tips
This brochure provides tips on how to use water more efficiently. Efficient use of water will not only save money but, more importantly, will also help protect the quality of life of future Texans.

Conserving Water Indoors
This brochure provides tips for saving water indoors by installing water-efficient fixtures and reducing leaks.

Conserving Water Outdoors
This brochure provides tips for saving water outdoors; outdoor water use can account for 50 to 80 percent of home water use.

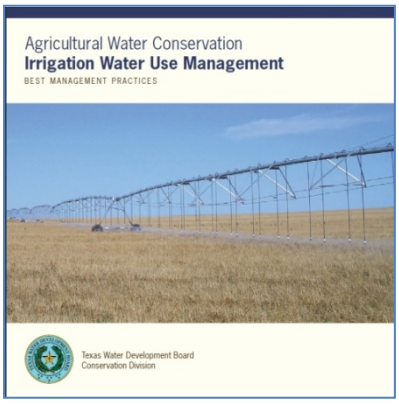


Water for Texas coloring book

In the "Water for Texas" coloring and activity book, Billy the Bull, Amanda Armadillo, Sally Mander, and Grandpa Lizard guide children through fun facts about water in Texas, teach them the names of aquifers and rivers through word finds, give them information on how to conserve water at home, and apply what they have learned to create a story and draw a picture. There is even a maze and a connect-the-dots page. This entertaining 16-page booklet is targeted for grades Kindergarten through 3rd grade.

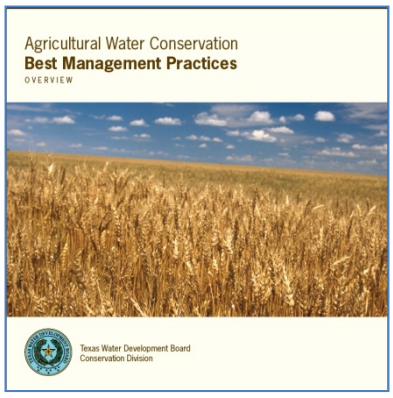
TWDB Kids

Children today face a daunting challenge when they become adults and carry the responsibility for managing and conserving Texas' dwindling water supplies. So they are equipped for this challenge, these future decision makers need to be educated about the scientific background and complex issues associated with this critical resource. This brochure highlights the educational resources offered by TWDB.



Agricultural Water Conservation Irrigation Water Use Management Best Management Practices

This brochure discusses irrigation scheduling, measurement of irrigation water use, crop residue management and conservation tillage, and irrigation audits.



Agricultural Water Conservation Best Management Practices Overview

This brochure details recommendations for Texas agriculture water conservation practices. It also describes what types of assistance government entities can provide and gives an overview of the Texas Water Development Board.

Water Conservation Technical Assistance Activities

The TWDB's review of reported water use has shown that entities with water conservation programs show a reduction in per capita water use. To support conservation planning and programs for municipal water providers, TWDB provides training, workshops, and technical assistance on water conservation plans, water loss, and drought contingency plan development. TWDB also provides workshops, training, and educational information to schools and communities to educate children about water conservation.

The number of total technical assists for water conservation includes providing water conservation information, data, literature, and other technical assistance and services to promote increased water-use efficiency in Texas through statewide water conservation activities, and as included in the regional and state water plans. Assistance is provided to agricultural, municipal, industrial, commercial, and institutional water users. Technical assistance activities are quantified and represent the number of entities and individuals assisted as well as the number of educational activities conducted.

Table 4-10. Total Technical Assists Provided by the Texas Water Development Board

Fiscal Year 2007	306
Fiscal Year 2008	613
Fiscal Year 2009	960
Fiscal Year 2010	965
Fiscal Year 2011	1,184
Total	4,028

Another measure of conservation assistance is the number of political subdivisions that are eligible to receive financial assistance from the TWDB. These political subdivisions receive technical and/or financial assistance for water conservation and financial assistance for water, wastewater, or flood protection planning.

Table 4-11. Political Subdivisions Assisted by the Texas Water Development Board

Fiscal Year 2007	182
Fiscal Year 2008	258
Fiscal Year 2009	339
Fiscal Year 2010	329
Fiscal Year 2011	387
Total	1,495

Groundwater Conservation Districts

The Texas Legislature charged Texas groundwater conservation districts with providing for the conservation, preservation, protection, recharging, and prevention of waste of

groundwater, and of groundwater reservoirs or their subdivisions. Additionally, they are responsible for controlling subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, if applicable. A district is required to submit a management plan, under Texas Water Code §36.1071, to the TWDB executive administrator for review and approval. Texas Water Code §36.1071 requires groundwater conservation districts to include several conservation goals, based on applicability or implementation cost-effectiveness to the district. Those goals may include:

- providing the most efficient use of groundwater,
- controlling and preventing waste of groundwater,
- conservation,
- recharge enhancement,
- rainwater harvesting,
- precipitation enhancement, or
- brush control.

Although each groundwater conservation district has the responsibility to choose goals relevant and achievable by their districts, the management objectives must be specific, quantifiable, and time-based statements, and each must be linked to a management goal. Many districts choose educational outreach or media tools to achieve their conservation goals, including posting water level or drought information on their website. Some districts also identify and report water levels in drought trigger wells to alert district residents about drought conditions.

V. Water Conservation Initiatives

During each session of the Texas Legislature there are opportunities to address critical issues of ensuring adequate water supplies for the citizens and economy of the state of Texas. During the period of time included in this report, water conservation issues were considered in three legislative sessions.

Legislative Initiatives

80th Texas Legislature (2007)

Water Conservation Advisory Council

With the passage of Senate Bill 3 and House Bill 4 during the 80th Texas Legislature - Regular Session (2007), the Water Conservation Advisory Council was created to provide the Governor, Lieutenant Governor, Speaker of the House of Representatives, legislature, Texas Water Development Board (TWDB), Texas Commission on Environmental Quality, political subdivisions, and the public with the resource of a select council with expertise in water conservation. The Water Conservation Advisory Council consists of 23 members representing various state agencies and interest groups as specified in statute. No later than

December 1 of each even-numbered year, the Water Conservation Advisory Council is required to submit a report to the legislature on progress made in water conservation in the state.

Statewide Water Conservation Public Awareness Program

Senate Bill 3 and House Bill 4 also created a statewide water conservation public awareness program by directing the TWDB executive administrator to develop and implement a statewide water conservation public awareness program to educate Texas residents about water conservation. The legislation specifies that the program shall take into account the differences in water conservation needs of various geographic regions of the state and shall be designed to complement and support existing local and regional water conservation programs.

Water Conservation Plans and Annual Reports

Senate Bill 3 and House Bill 4 also addressed water conservation plans by directing that the Texas Commission on Environmental Quality shall require a retail public utility that provides potable water service to 3,300 or more connections to submit to the TWDB executive administrator a water conservation plan based on specific targets and goals developed by the retail public utility and using appropriate best management practices, as defined by §11.002 of the Texas Water Code, or other water conservation strategies.

Also, each entity that is required to submit a water conservation plan to the Texas Commission on Environmental Quality under this code shall submit a copy of the plan to the executive administrator. Each entity that is required to submit a water conservation plan to the TWDB or the Texas Commission on Environmental Quality shall report annually to the TWDB on the entity's progress in implementing the plan.

Senate Bill 3 directed that the TWDB shall give priority to applications for funds for the implementation of water supply projects in the state water plan by entities that:

(1) have already demonstrated significant water conservation savings; or
(2) will achieve significant water conservation savings by implementing the proposed project for which the financial assistance is sought.

81st Texas Legislature (2009)

House Bill 2134 relating to requiring annual water loss audits by certain retail public utilities was introduced but did not pass during the session.

82nd Texas Legislature (2011)

Senate Bill 181, Texas Water Code §16.403. Water Use Reporting

The Texas Water Development Board (TWDB) and the Texas Commission on Environmental Quality, in consultation with the Water Conservation Advisory Council, shall develop a uniform, consistent methodology, and guidance for calculating water use and conservation

to be used by a municipality or water utility in developing water conservation plans and preparing reports required under this code.

SB 181 directs the following:

- Not later than January 1, 2013, the TWDB and the Texas Commission on Environmental Quality, in consultation with the Council, shall develop the water use and conservation calculation methodology and guidance and the data collection and reporting program required by Subsections (b) and (d), §16.403, Texas Water Code, as added by this Act.
- Not later than January 1, 2015, the TWDB shall submit to the legislature the first report required by Subsection (e), §16.403, Water Code, as added by this Act.

During the fall of 2011 and during 2012 the TWDB and the Texas Commission on Environmental Quality, in consultation with the Water Conservation Advisory Council, will develop the data collection and reporting program required by this legislation.

House Bill 3090, Texas Water Code §16.0121

Not later than May 1, 2013, a retail public utility that receives financial assistance from the TWDB shall submit the first annual report required by §16.0121, Texas Water Code, as amended by this Act. The initial water audit report submitted by a retail public utility under that section shall compute the utility's most recent annual system water loss.

TWDB staff is developing the necessary administrative rules and procedures to implement this legislation.

Water Conservation Advisory Council Initiatives

Recognizing the importance of water conservation in Texas, in 2007 the 80th Legislature created the Water Conservation Advisory Council. The legislature directed the Water Conservation Advisory Council to address several charges:

Charge 1:	Monitor trends in water conservation implementation
Charge 2:	Monitor new technologies for possible inclusion by the Texas Water Development Board as best management practices in the Best Management Practices Guide developed by the Water Conservation Implementation Task Force
Charge 3:	Monitor the effectiveness of the statewide water conservation public awareness program and associated local involvement in implementation of the program
Charge 4:	Develop and implement a state water management resource library
Charge 5:	Develop and implement a public recognition program for water conservation
Charge 6:	Monitor the implementation of water conservation strategies by water users included in regional water plans

Charge 7: Monitor target and goal guidelines for water conservation to be considered by the Texas Commission on Environmental Quality and Texas Water Development Board

The Water Conservation Advisory Council's 2010 legislative report was focused on the charges described above. In the report they discuss their progress on these charges including any challenges faced in addressing those charges. Looking forward, the Water Conservation Advisory Council has observed that noteworthy conservation is currently being accomplished with local and regional entities using their own resources and resources from the private sector through contributions and donations. The Water Conservation Advisory Council believes that these efforts represent a commitment to advancing water conservation in Texas. Areas where they would like to focus its efforts include:

- Public Recognition Award
- Best Management Practices Guide
- Metrics and Methodologies
- Water Conservation for Energy
- Resource Library Website
- Research and Education

Water Conservation in Irrigation Districts

The Texas water conservation Best Management Practices Guide has two best management practices applicable to irrigation districts. A survey of irrigation districts was conducted to estimate the best management practices implementation by irrigation districts. The survey was sent to 41 irrigation districts in Texas; 12 districts responded to the survey.

Table 5-1 is a summary of the survey results. Replacing district canals and laterals with pipelines was the most frequently implemented best management practices. The percent completion of best management practices practice implementation ranged from about 5 to 100 percent for the various practices.

The survey was rather simple and completely voluntary, but the results showed a wide range in the level of best management practices implementation. Some districts have aggressively implemented water conservation best management practices, while some still have potential for additional implementation and conservation.

Table 5-1. Survey of Irrigation District Water Conservation Practices Implemented

Conservation Practices Implemented (BMPs)	Units	Units Implemented	Districts Implementing
Lining of District Irrigation Canals	miles	4.21	1
Replacement of Irrigation District Canals and Lateral Canals with pipelines	miles	20.61	8
Other Conservation Practices Implemented (BMPs)	**Units**	**Units Implemented**	**Districts Implementing**
Installing meters	number	16	3
Replacing private laterals with pipelines	miles	9.66	2
Replacing/repairing seeping pipe gates	number	51	1
Installing automatic gates	number	12	2

VI. Future Conservation Needs

By 2060, more than 46 million people are expected to call Texas home – greater than 80 percent of the 2010 population. Although the population is projected to nearly double over the next 50 years, water demand in Texas is projected to increase by only 22 percent, primarily due to declining demand for agricultural irrigation water and increased emphasis on water conservation. The regional water planning groups recommended water management strategies to meet the identified water needs that, if implemented, would provide an additional 9.0 million acre-feet in additional water supplies in the year 2060. Approximately 24 percent of the volume of these strategies, about 2 million acre-feet, would come from conservation.

Trends in Population Growth and Water Demands

The population in Texas is expected to nearly double between the years 2010 and 2060, growing from 25 million to 46 million. The growth rates, however, will vary considerably across the planning regions of the state. While some planning areas will more than double their populations over the planning horizon, others will grow only slightly (Figure 6-1). Some of the fastest growing areas of Texas Include: Rio Grande Valley – Region M, Austin – Region K, Dallas-Ft. Worth Metroplex – Region C, Houston – Region H, and El Paso – Region E.

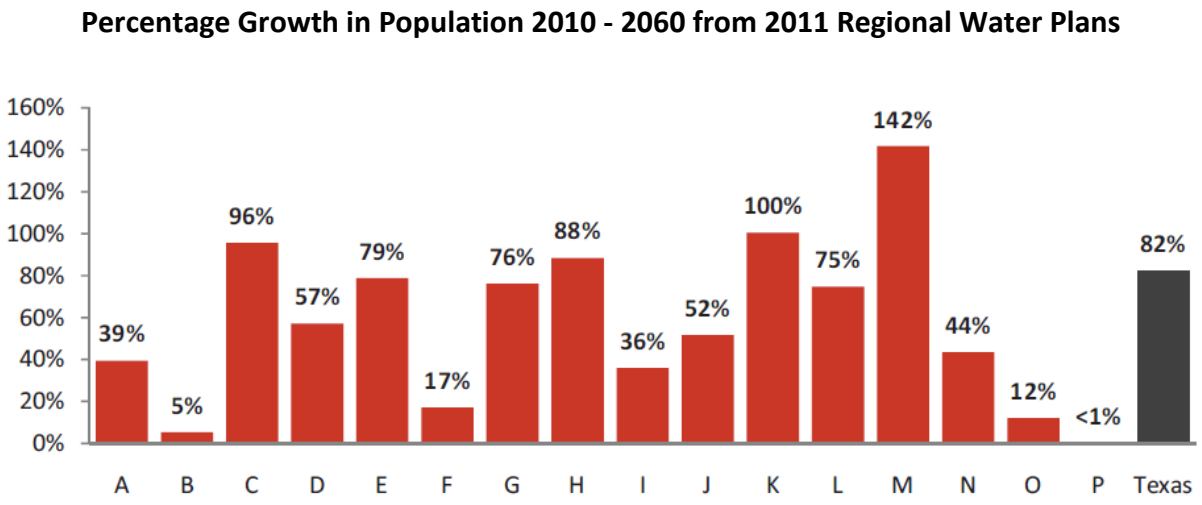


Figure 6-1. Percent Growth in Population 2010- 2060 from 2011 Regional Water Plans
Texas Water Development Board - Water for Texas: Summary of the 2011 Regional Water Plans

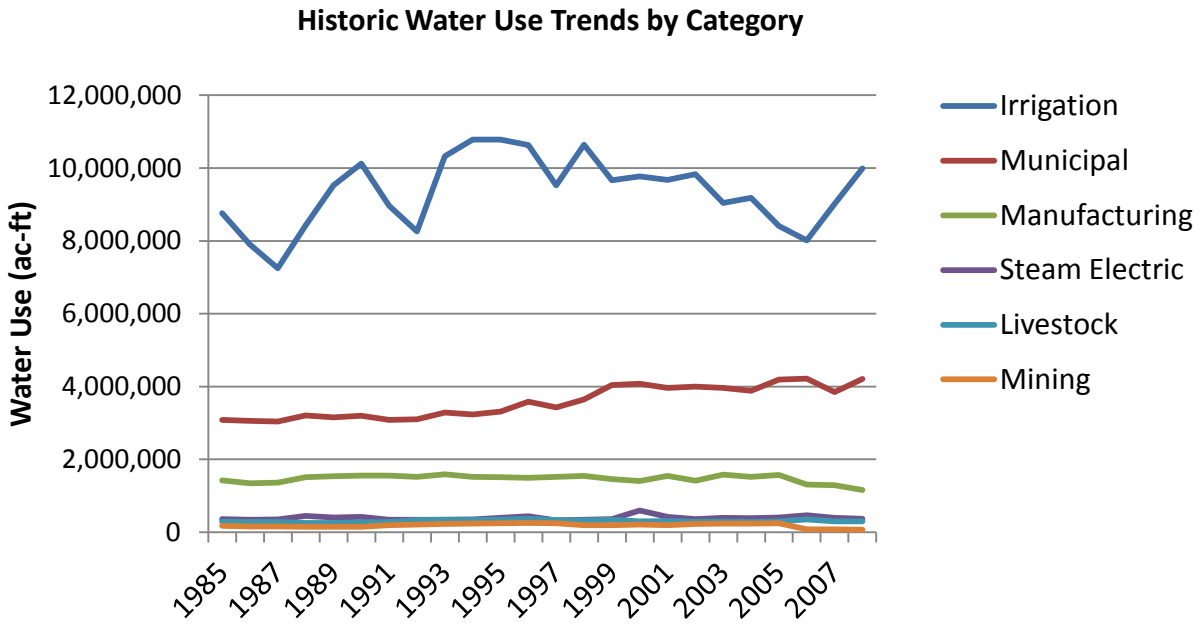


Figure 6-2. Historic Water Use Trends by Category.
Texas Water Development Board - Water for Texas: Summary of the 2011 Regional Water Plans

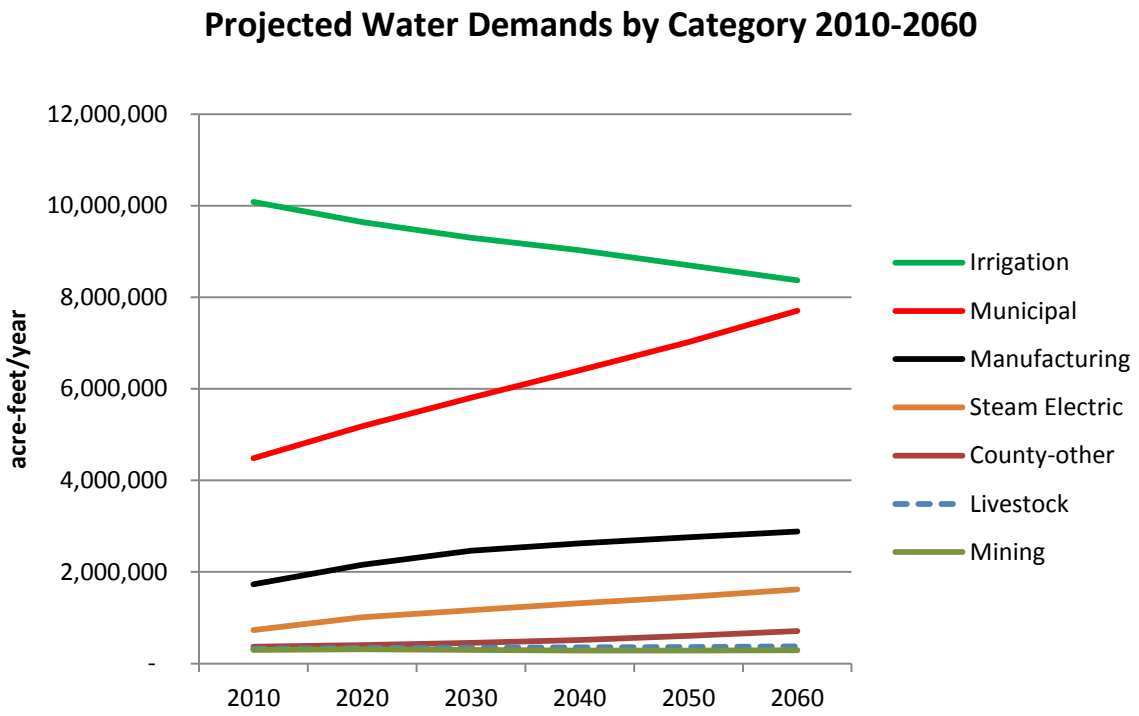
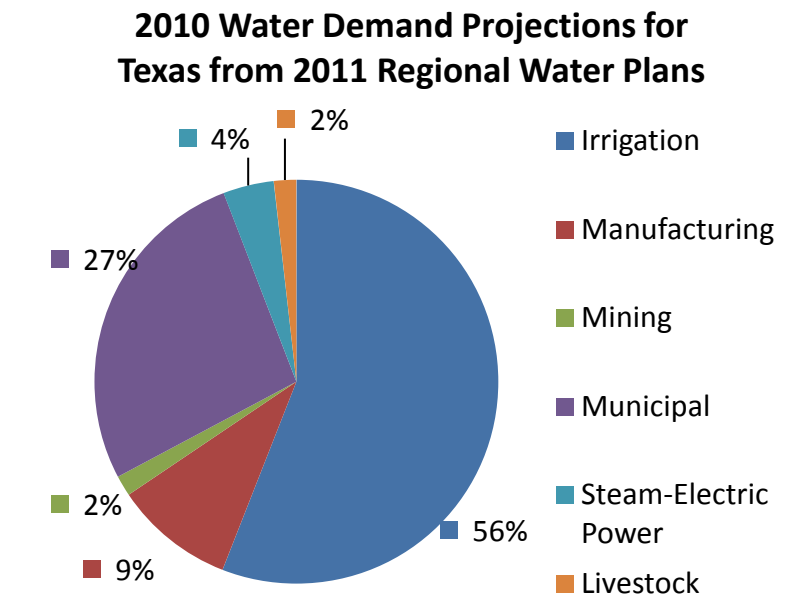


Figure 6-3. Projected Water Demands 2010 - 2060.
Texas Water Development Board - Water for Texas: Summary of the 2011 Regional Water Plans

Although the population is projected to nearly double over 50 years, water demand in Texas is projected to increase from approximately 18 million acre-feet/year of water in 2010 to a projected demand of about 22 million acre-feet/year by 2060. This small increase is primarily due to declining demand for agricultural irrigation water and increased municipal demand.



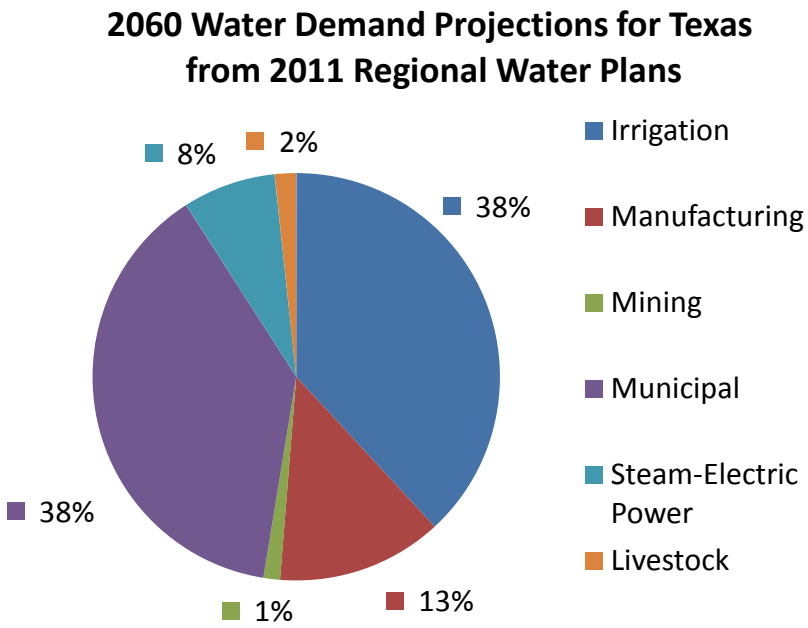


Figure 6-4. Projected Water Demands 2010 – 2060 from 2011 Regional Water Plans.

Conservation Strategies in 2011 Regional Water Plans

It is projected that almost 22 million acre-feet of water per year would be required to meet the water demands of the state's homes, businesses, and agricultural enterprises if the drought of record were to occur. However, without implementation of recommended water management strategies, only 15 million acre-feet would be available to meet those demands. The discrepancy between demand and supply is inherent because existing surplus water supplies in some areas are not necessarily available to meet demands in other areas. The total needs for water in 2060 for all water user groups would amount to 8.3 million acre-feet.

The regional water planning groups recommended water management strategies to meet the identified water needs that, if implemented, would provide an additional 9.0 million acre-feet in additional water supplies. Approximately 24 percent of the volume of these strategies would come from conservation and 10 percent would come from reuse.

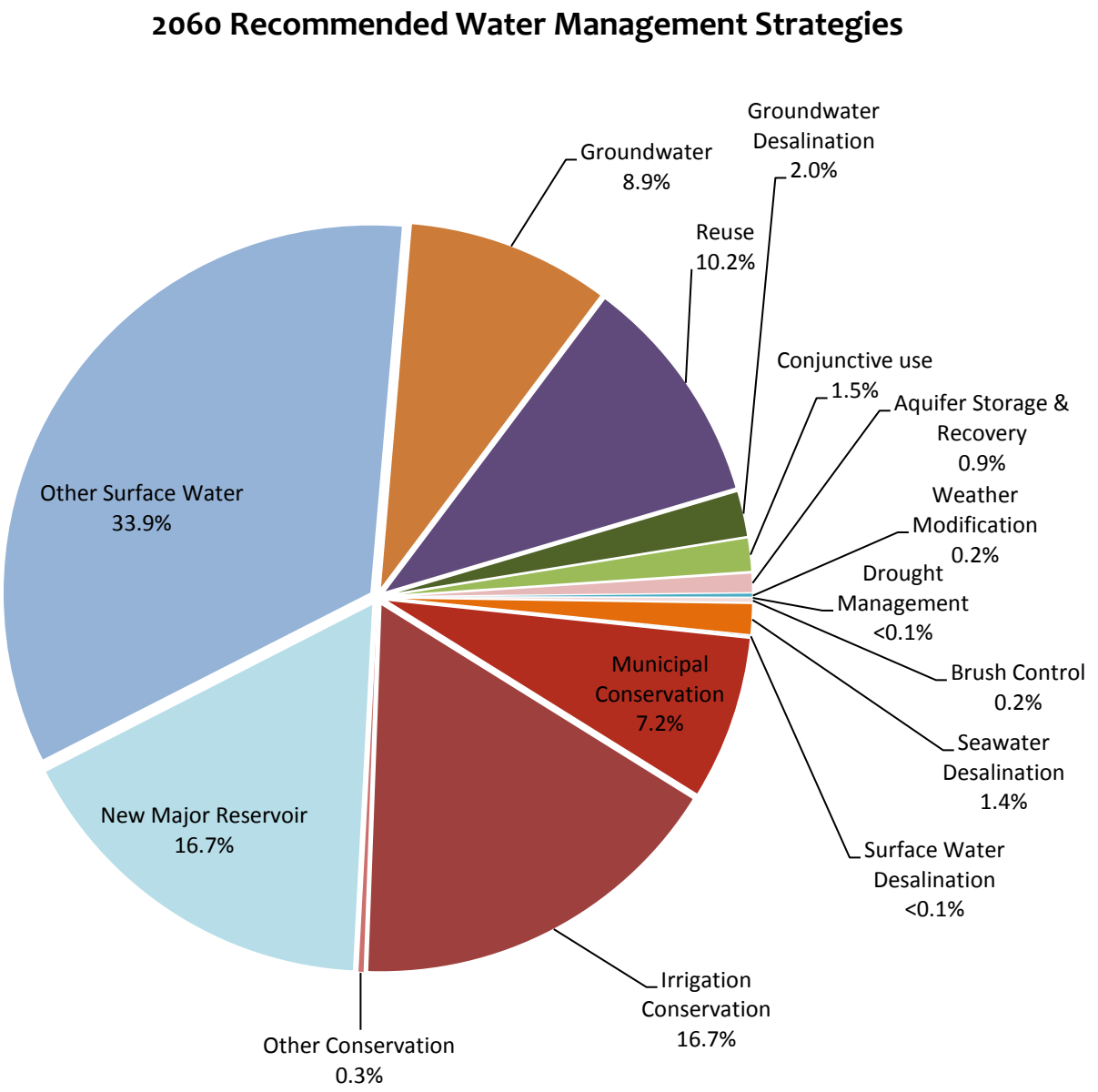


Figure 6-5. 2060 Recommended Water Management Strategies.
Texas Water Development Board - Water for Texas: Summary of the 2011 Regional Water Plans

VII. Recommendations to Advance Water Conservation Efforts

In Texas, water is a natural resource under increasing pressure from growing demand and changing supplies. Water resources are crucial for sustainable and economic development and for the natural environment, agricultural production, and human health. The state water plan clearly recognizes the need to manage our precious and limited water resources and documents the need to use every tool at our disposal to ensure that maximum beneficial use is achieved. One of the most cost-effective tools we have in meeting the growing demand for water is conservation. According to the 2012 State Water Plan, conservation accounts for nearly 24 percent of the projected additional water supply needed in 2060—a total of about two million acre-feet per year.

Effective water conservation is achieved by both water suppliers and end users. It is, therefore, imperative that the public, businesses, and industry become more aware of the need to conserve and motivated to implement water conservation practices. Conservation programs prove to be more effective when they are supplemented with data, resources, and expertise. Furthermore, it is an absolute necessity to have a means of evaluating progress in order to fairly assess which efforts are achieving the greatest benefits from the level of resources that are being committed. To achieve success in conservation on a local, regional, and state level, efforts must be focused on the following priority areas.

Implementation of State Water Plan

Water providers and users should implement the conservation strategies in the state and regional water plans and in their water conservation plans.

Texas is rapidly growing and its population is projected to double by mid-century. To ensure that there are stable water supplies for consumers, industry, and agricultural production, many of the regional water planning groups have been looking to meet demands in part through improved conservation and efficiency measures. In recent years the awareness and understanding of water conservation as a strategy and water use efficiency has grown significantly in Texas. During the development of the 2011 Regional Water Plans, conservation became increasingly important as a means to meet water supply needs.

Water utilities across the country have shown that water conservation is a cost-effective way to meet increased water demands. Utilities can create programs that encourage water-efficient behaviors or implement water-efficient technologies. Conserving water by consuming less, wasting less, or reusing more may postpone new water supply infrastructure projects.

Irrigated agriculture has long been one of Texas' greatest water consumers, accounting for about 60 percent of all water demand in the state, much of which consists of groundwater.

However, the agricultural industry continues to make improvements in water use efficiency. Agricultural irrigation conservation programs have been widely promoted in areas of the state with large concentrations of irrigated crop production, such as the High Plains and Lower Rio Grande Valley.

The recently released 2012 State Water Plan indicates that conservation accounts for nearly 24 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 addition, Texas will also save large amounts of water through "passive water conservation." Passive water conservation involves water savings that result from state and federal legislation requiring plumbing manufacturers to sell more water-efficient plumbing fixtures such as showerheads, faucets, and toilets.

However, it is important to point out that a primary message of the 2012 State Water Plan is that in serious drought conditions, Texas does not and will not have enough water to meet the needs of its people, its businesses, and its agricultural enterprises. It is emphasized that not implementing the plan could have economic losses in the billions and job losses would also be suffered. Implementing recommended conservation strategies should be considered a high priority. Water conservation strategies are considered to be a long term, affordable, and sustainable method to developing additional supplies.

Implementation of Senate Bill 181, 82nd Legislative Session

Monitor the implementation of water conservation strategies as recommended in the regional water plans, improve and streamline the reporting methods for collection and analysis of water use and water conservation savings, and develop guidance for utilities and water user groups in collection of these data.

The Texas Legislature should consider allocating adequate funding and staffing resources to the Texas Water Development Board in order to sufficiently develop and implement a mechanism by which the state and regional water planning groups can measure and monitor the implementation of water conservation strategies as recommended in the regional water plans. Because water conservation is a key strategy in meeting the state's future water needs, aggressive steps at the regional and state levels should be taken to track and measure the implementation levels and savings of conservation strategies and programs. In the state water plan, the regional water planning groups identify strategies to meet certain long- term goals and needs. However, there is not a clearly defined mechanism for how the regional water planning groups can measure or monitor the progress in implementation of those strategies.

Legislative statute has enabled the state to implement specific efforts that focus on municipal water utilities and providers. Statute requires certain entities to develop water conservation plans with quantified 5-year and 10-year targets for water savings. These

entities are also required to submit annual reports on their progress in implementing their water conservation plans. Statute also required that any entity receiving financial assistance from the TWDB to complete a water loss audit. These water conservation plans, annual water conservation implementation reports, and water loss audit reports create opportunities for more quantitative measures of water conservation implementation at the local level.

The cornerstone of successful plans and programs is having a mechanism in place that identifies strategies, targets, goals, and measures the implementation levels associated with those strategies and goals.

The Texas Legislature should provide adequate funding to support and improve the implementation of current legislative initiatives and statutes. Adequate funding would enable the state to develop enhancements that streamline the collection and analysis of water use and water conservation data. Many of the recent statutes relating to reporting requirements for water utilities and providers involve expanded data collection efforts for water conservation plans, annual water conservation implementation reports, and water loss audits. Currently, the state has managed to implement many of the statute directives with limited staff resources and limited information technology capabilities. However, in order to effectively implement new and future directives guided by statute, there is an increasing need for improvements in software capabilities and data collection tools that would enable the state to perform more efficient and comprehensive analyses.

Additionally, many of the water suppliers who routinely complete several of the state's reporting requirements find that the state's multiple reporting methods are fragmented and inconsistent. One reason for this is because there are overlapping initiatives behind the collection and use of the data. Some data is collected and used for planning purposes and in other instances very similar data is collected and used for purposes of conservation analysis. Enhanced reporting methods that streamline the collection and analysis of water use and water conservation savings would allow both regional water planning groups and water providers to accurately assess opportunities for conservation.

In an effort to improve regional water planning and conservation savings and analysis, the state should expand reporting requirements and continue efforts to develop guidance for utilities. Although the state is currently improving its reporting efforts in the area of conservation analysis and savings, there is a need for improved guidance to assist water suppliers in providing the most accurate and current data. Entities approach the reporting requirements with various levels of interest and capability, so the quality of reporting varies. Methods used by the entities also vary considerably, so the quality of information produced may be questionable in some cases. Other issues that impact accurately assessing improvements in water conservation concern the year-to-year variations in water use due to climate as well as the gradual year-to-year changes due to changes in the mix of uses (institutional versus residential) in high growth areas. Additionally, some of the existing planning and reporting requirements do not capture all water users.

Currently, the state is developing a sector-based methodology and standards for water conservation reporting. TWDB and Texas Commission on Environmental Quality are also developing guidance for how gallons per capita per day should be determined and how it should be applied to population-dependent water use only. However, metrics for measuring water use and water savings vary across the major water use sectors and even within the water user groups. Standardized metrics should be developed statewide for the purpose of evaluating water use and water savings. Establishing more consistent methods for collecting and reporting water use, as well as requiring frequent reporting, will enhance both the quantity and quality of data obtained. As data collected at the state level is enhanced and measurement tools for conservation are refined, the state's planning efforts will be improved, and the most efficient strategies can be pursued.

Water Conservation During Droughts

State agencies should increase their capabilities to provide technical assistance to water providers and water user groups for water conservation activities during times of drought conditions.

As recognized by the Texas Legislature upon passage of omnibus water planning legislation in 1997, water— more than any other natural resource—challenges the state's future. Scarcity and competition for water, environmental concerns, and the cost of new water supplies have made sound water planning and management increasingly important. With the state's population expected to grow by 82 percent in the next 50 years, the availability of water supplies during times of drought is essential for not only the Texans of today but for those of tomorrow as well.

The State Drought Preparedness Plan is intended to complement the state water plan and ongoing water resource planning efforts identified in local and regional water conservation plans and drought contingency plans. The Texas Water Code and state water plan are important items of discussion in any water planning effort, and it is anticipated that measures and actions outlined in these documents will be incorporated into existing or future water and drought planning efforts.

In designing the action items of the State Drought Preparedness Plan, every effort has been made to use existing partnerships and lines of communication as well as input of local Texas stakeholders in providing feedback as to the effectiveness of planned or implemented mitigation measures. However, to insure that state agencies can meet this challenge when it does occur, the agencies should develop and implement viable drought response programs.

Water Accountability and Loss Control

The legislature should require all retail public utilities to conduct water loss audits on an annual basis, rather than every five years.

System water loss refers to the difference between how much water is put into a water distribution system and how much water is verified to be used for consumption. Water loss includes theft, under-registering meters, billing adjustments and waivers, main breaks and leaks, storage tank overflows, and customer service line breaks and leaks. High values of water loss impact utility revenues and unnecessarily increase the use of water resources, especially during drought. During reviews of loan applications, TWDB has seen water losses as high as 50 percent for some water systems. Smaller municipal water systems tend to have higher percentage water losses than larger systems. Based on information collected in 2005, statewide water losses were estimated at 250,000 to 460,000 acre-feet per year (Alan Plummer Associates, Inc. and Water Prospecting and Resource Consulting, LLC, 2009).

The first step toward addressing high water losses is measuring where the water is going in a system with a water loss audit. An audit shows a utility how much of its water is lost and where they may need to focus efforts to reduce those losses. Water loss audits done over time help a utility identify progress with minimizing water losses as well as identifying any new water loss issues.

Currently, the Texas Water Code requires all retail public water supply utilities (about 3,600 in all) to submit a water loss audit to TWDB every five years. During the 82nd Legislative Session, based in part on TWDB's Legislative Priorities report for the 81st Legislative Session, the legislature required annual reporting for retail public water supply utilities that receive financial assistance from TWDB. While this is a step in the right direction, TWDB believes that all retail public utilities would benefit from annual water loss surveys. Municipal water conservation is expected to account for about 7 percent of new water supplies (about 650,000 acre-feet per year) by 2060 in the state water plan. Measuring—and ultimately addressing—water loss will help achieve those conservation goals.

Agricultural Water Conservation Incentives

Economic incentives are needed to encourage the early adoption of voluntary agricultural water conservation best management practices in order to secure adequate water supplies for future generation Texans.

The irrigation conservation strategies identified by 12 regional water planning groups' results in a total of over 1.5 million acre-feet of irrigation water needed to be conserved by 2060. However, funding currently available to encourage voluntary adoption of water conserving practices is insufficient to meet the scale of conservation needed. Irrigated agricultural producers and surface water irrigation districts will require substantial funding to meet these goals for voluntary conservation. Natural Resources Conservation Service cost-shares funding for agricultural producers is being reduced in current federal government budgets. The TWDB Agricultural Water Conservation Loan Program has had limited participation in recent years. Commercial lending institutions are still a primary source of funding for

producers; however, the economics of agricultural water conservation often limit the producer's ability to invest in water conservation strategies.

The Texas Legislature should continue funding the State Water Supply Enhancement Program at current levels and at expanded levels as funds become available. In addition, continued funding of the TSSWCB Flood Control Dam Operation and Maintenance and Repair Program would allow the agency to maintain current efforts. The Texas Legislature should consider expanding the state's role in funding a TSSWCB cost-share program to implement on-farm water conservation management plans based on agricultural water conservation best management practices. Additional funding is also recommended for a TSSWCB grant program that provides incentives for landowners to implement conservation best management practices across the state in priority areas determined by the state board in consultation with local soil and water conservation districts.

Best Management Practices Guide

The Texas Water Development Board(TWDB) and the Texas Commission on Environmental Quality(TCEQ) should improve efforts and guidance to actively promote the Water Conservation Best Management Practices Guide as a fundamental resource for the development of water conservation plans.

Along with enhancements to the guide and incorporation of best management practices into water supplier's conservation plans, expanding services such as additional training and technical guidance will benefit water users in developing water conservation plans. Active promotion of the guide as a resource and tool will improve the use of water conservation best management practices. With the appropriate resources and tools on the state level, a resource such as the Best Management Practices Guide can prove to be a very useful tool for water user groups.

Statute allows the TWDB to update the guide as needed and directs the Council to monitor new technologies for possible inclusion in the guide. Currently, the TWDB, Texas Commission on Environmental Quality, and the Water Conservation Advisory Council have established a process to receive and review suggestions for new best management practices or recommended revisions or deletions of existing best management practices. The intent is that the guide remains an evergreen document that incorporates changes or additions on an ongoing basis. By maintaining current information in the guide, water users will be able to more effectively use the guide as a resource and tool in implementing their water conservation plans and programs.

With information reported to state agencies, trends have indicated that a large majority of the more successful water conservation programs identify and implement best management practices as strategies for using water more efficiently. In particular, information gathered from reports to the state agencies show that a significant number of municipal water conservation plans do not refer to specific best management practices nor

do the reports include detailed implementation plans for identified best management practices. Agricultural water conservation best management practices, however, are widely used across the state and are continually being implemented by Texas State Soil and Water Conservation Board and Natural Resources Conservation Service cost-share programs working through local Soil and Water Conservation Districts and result in significant water savings. With annual reporting requirements on water conservation plans, the Water Conservation Best Management Practices Guide can be a valuable resource to assist entities in evaluating their progress and in determining the amount of water conserved through their programs.

Research and Education

The legislature should identify incentives for the higher education institutions of Texas that will encourage research and academic growth in the areas of water conservation.

Municipal and industrial water uses are the fastest growing water user groups of the Texas economy. Yet, other than horticultural and landscape irrigation research, there is little water conservation research or education being directed at these sectors in the higher education facilities in Texas. Traditionally, many of the Texas land grant universities have well-founded research and academic programs relating to agriculture best practices, economic impacts, and benefits of water efficiency. Additionally, several Texas based universities are already engaged in similar levels of energy efficiency research and have incorporated that research into their academic curriculum. There is a need to provide incentives for the creation of higher institutional research and academic programs relating to water conservation and water resources planning. More research in the areas of municipal, commercial, industrial, and institutional water use sectors is needed. Additionally, there is a need for more academic programs that will produce trained water resource planning professionals.