

A Report on Progress of Water Conservation in Texas

Report to 83rd Legislature
December 2012



Submitted by
Water Conservation Advisory Council
www.savetexaswater.org

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Water Conservation Advisory Council

Council Members

C.E. Williams
Regional Water Planning Groups

Scott Swanson
Texas Commission on Environmental Quality

Richard Eyster
Texas Department of Agriculture

Cindy Loeffler
Texas Parks and Wildlife Department

Richard Egg
TX State Soil and Water Conservation Board

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James Parks
River Authorities

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Gary Spicer
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Gene Montgomery
Mining and Recovery of Minerals

Brad Smith
Landscape Irrigation and Horticulture

Linda Christie
Water Control and Improvement Districts

Lara Zent
Rural Water Users

Donna Howe
Municipal Utility Districts

December 1, 2012

The Honorable Rick Perry
Governor, State of Texas

The Honorable David Dewhurst
Lieutenant Governor of Texas

The Honorable Joe Straus, III
Speaker, Texas House of Representatives

Re: Water Conservation Advisory Council Report

Dear Sirs:

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. This Council's purpose is to provide the Governor, Lieutenant Governor, Speaker of the House of Representatives, Legislature, Texas Water Development Board, Texas Commission on Environmental Quality, political subdivisions, and the public with the resource of a select Council with expertise in water conservation. No later than December 1 of each even-numbered year the Council is required to submit a report on progress made in water conservation in this state. This report contains the Council's activities specific to the charges contained in the enabling legislation. Key findings in the report are intended to address current status of water conservation activities in Texas and to suggest future action to increase utilization of water conservation practices.

The Council strongly emphasizes the importance of how quality data collection methods can improve the understanding of how our water resources are being used. Identification of water waste and water needs through data analysis aids in implementation of conservation measures. We can no longer simply look at total gallons per capita per day to make meaningful decisions about our conservation efforts. The Council remains committed to our recommendation that sector analysis of water use is employed to focus both on those population dependent uses of

water using a gallons per capita per day ratio and the other industrial, commercial, and agricultural uses that can best be analyzed by production related metrics that are not population dependent.

The ongoing work of the Council will continue to focus on the charges as contained in the legislation. Progress of water conservation efforts in Texas is significantly dependent on the level of resources that are committed. Noteworthy conservation is currently being accomplished with local and regional entities using their own resources; however, a greater commitment of resources to water conservation would accelerate that progress substantially and produce incredible benefits for the state in meeting our water needs. How effectively water conservation is implemented today will have a profound effect on the level of additional water resources needed in the future.

Outside of their individual professional endeavors, the 23 members of the Council, as well as others participating as member alternates and interested parties, have voluntarily provided many days of their time and effort on Council activities. The 23 members of the Council are honored to serve on the Council and are pleased to submit this third biennial report to the elected leadership of the state of Texas.

Respectfully submitted,



C. E. Williams
Presiding Officer for Members of the Council
Water Conservation Advisory Council

cc: The Honorable Troy Fraser, Chairman, Senate Natural Resources
Committee

The Honorable Allan Ritter, Chairman, House Natural Resources
Committee

I. Executive Summary

Water conservation is critical to the future economic and environmental sustainability of Texas. The 2012 State Water Plan envisions 24 percent of new water supplies—more than 2 million acre-feet per year (651.6 billion gallons per year)—resulting from municipal and agricultural water conservation by 2060. Recognizing the importance of water conservation in Texas, in 2007 the legislature created the Water Conservation Advisory Council (Council), a group of 23 experts representing various agencies, political subdivisions, water users, and interest groups. The legislature directed the Council to address several charges and provide a report to state leadership before every legislative session. This is the Council’s third biennial report.

The Council members, as well as others participating as member alternates and interested parties, have volunteered numerous days of time and effort to Council activities. During 2011 and 2012, the Council held 13 public meetings and many workgroup teleconference sessions. The 23 members of the Water Conservation Advisory Council are honored to serve and are pleased to submit this report to the citizens and elected leadership of the state of Texas.

Although there have been significant efforts in promoting and implementing water conservation in Texas, the Council finds that there is ample room for improvement in advancing water conservation in the state, including needed improvements in

- quantifying the implementation of water conservation measures in the state,
- funding a statewide water conservation public awareness program and in quantifying its effectiveness,
- quantifying the implementation of water conservation strategies in the water plans, and
- collecting the detailed level of information for water providers to accurately assess opportunities for conservation.

As water demand projections depict a growing need for conservation, water user groups will need to refer to uniform tools and quality data to better plan for those needs. Primary efforts towards meeting future challenges should focus on enhancements such as expanded data collection and reporting efforts, defined standards, as well as uniform and consistent tools. With recent legislation, the practice of focusing solely on total gallons per capita per day is being replaced by calculating more detailed water use metrics that evaluate water use by sector. The Council recommends that sector based analysis replace total gallons per capita per day as the preferred water use and water conservation metric.

As public awareness evolves, enhancements in analytical information and data collection will improve conservation tools and strategies, and ultimately these collective elements will allow for a more effective planning process. The economic future of Texas depends on how well the state manages its water resources. Water conservation is a significant component of the state’s water management strategies and a focused effort is needed now to develop plans for managing and achieving water conservation success.

Areas where the Council would like to focus its efforts in the next biennium include

- exploring the energy and water nexus,
- expanding public recognition awards,
- improving the Best Management Practices Guide,
- improving metrics and methodologies, and
- exploring research and education.

In addition to working with other state agencies, the Council works closely with the Texas Commission on Environmental Quality (Commission) and the Texas Water Development Board (Board) in addressing these issues.

Progress of water conservation efforts in Texas significantly depends on the level of resources that are committed. Noteworthy conservation is currently being accomplished with local and regional entities using their own resources. Additionally, businesses and trade associations from across the state have recognized a role for the private sector to promote water conservation and have developed consumer awareness materials to help educate the public. However, a greater commitment of resources to water conservation would accelerate that progress substantially and produce benefits for the state in meeting our water needs. Conservation is a process that evolves over time and experience has shown that it can be very challenging to implement effective conservation steps when faced with a water crisis. Based on the experience from the 2011 drought, it is in the state's economic interest to actively continue to advance and implement water conservation strategies. Clearly, successful water conservation plans implemented today will have a profound effect on the level of additional water resources needed in the future.

II. Background and Operation of the Council

In 2003 during the 78th Legislative Session, state policy on water conservation in Texas was described as “fragmented and lacking focus.” The legislature determined that such a fragmented and unfocused approach could potentially compromise Texas’ ability to meet future water supply needs. Understanding the critical role of water conservation, the legislature considered a broad spectrum of issues and established the Water Conservation Implementation Task Force (Task Force) via the passage of Senate Bill 1094.

The legislature charged the Task Force with reviewing, evaluating, and recommending optimum levels of water use efficiency and conservation for Texas, concentrating on issues related to

- best management practices,
- implementation of conservation strategies contained in regional water plans,
- a statewide public awareness program,
- state funding of incentive programs,
- goals and targets for per capita water use considering climatic and demographic differences, and
- evaluation of state oversight and support of conservation.

In addition, Senate Bill 1094 directed the Task Force to develop a Best Management Practices Guide for use by regional water planning groups and political subdivisions responsible for water delivery service. After submitting their report to the 79th Legislature in November 2004, the Task Force was abolished by statute on January 1, 2005.

The Task Force recommended that a permanent standing Water Conservation Advisory Council be established to advise the legislature as well as other state agencies on matters regarding water conservation. In 2007 the 80th Legislature, via passage of Senate Bill 3 and House Bill 4 (Appendix A), established the Water Conservation Advisory Council.

The Council consists of 23 members representing various state agencies and interest groups as specified in statute, including

- Texas Commission on Environmental Quality,
- Department of Agriculture,
- Texas Parks and Wildlife Department,
- Texas State Soil and Water Conservation Board,
- Texas Water Development Board,
- regional water planning groups,
- federal agencies,
- municipalities,
- groundwater conservation districts,
- river authorities,
- environmental groups,

- irrigation districts,
- institutional water users,
- professional organizations focused on water conservation,
- higher education,
- agricultural groups,
- refining and chemical manufacturing,
- electric generation,
- mining and recovery of minerals,
- landscape irrigation and horticulture,
- water control and improvement districts,
- rural water users, and
- municipal utility districts.

After receiving nominations from the above interests, the Board appoints members of the Council who serve staggered six-year terms with seven or eight members' terms expiring on August 31 of each odd-numbered year. Vacancies are filled with a qualified person from the appropriate entity or interest group. Members elect a presiding officer that serves for the duration of his/her term. Board staff provides administrative support to the Council. Table 1 shows the current and previous membership of the Council. Mr. C.E. Williams serves as the presiding officer of the Council. Members are also allowed to assign an alternate. Current alternates are listed in Table 2. In addition, representatives of other state agencies, municipalities, water related utilities, industry, environmental interests, and the public are included in Council activities as "Interested Parties."

Table 1. Current Members of the Water Conservation Advisory Council

Interest Group	Member	Term Ends
Texas Commission on Environmental Quality	Mr. Scott Swanson	2017
Texas Department of Agriculture	Mr. Richard Eyster	2017
Texas Parks and Wildlife Department	Ms. Cindy Loeffler	2015
Texas State Soil and Water Conservation Board	Mr. Richard Egg	2013
Texas Water Development Board	Dr. Robert E. Mace	2017
Regional Water Planning Groups	Mr. C.E. Williams	2015
Federal Agencies	Mr. Steven Bednarz	2017
Municipalities	Ms. Karen Guz	2017
Groundwater Conservation Districts	Ms. Luana Buckner	2013
River Authorities	Mr. James Parks	2015
Environmental Groups	Dr. Ken Kramer	2015
Irrigation Districts	Mr. Wayne Halbert	2013
Institutional Water Users	Mr. H.W. "Bill" Hoffman	2013
Professional Organizations-Water Conservation	Ms. Carole Baker	2013
Higher Education	Dr. Kevin Wagner	2015
Agricultural Groups	Mr. Hughes Abell	2013
Refining and Chemical Manufacturing	Mr. Karl Fennessey	2017
Electric Generation	Mr. Gary Spicer	2015
Mining and Recovery of Minerals	Mr. Gene Montgomery	2013
Landscape Irrigation and Horticulture	Mr. Brad Smith	2017
Water Control and Improvement Districts	Ms. Linda Christie	2013
Rural Water Users	Ms. Lara Zent	2015
Municipal Utility Districts	Ms. Donna Howe	2017

Previous Members of the Water Conservation Advisory Council

Electric Generation	Mr. Greg Carter
Higher Education	Dr. Vivien Allen, Dr. Justin Weinheimer
Water Control and Improvement Districts	Mr. Jim Oliver
Landscape Irrigation and Horticulture	Ms. Kelley Hall
Agricultural Groups	Mr. Wilson Scaling
Rural Water Users	Ms. Janet Adams, Mr. Ken Petersen
Texas Department of Agriculture	Mr. Gary Walker
Texas Water Development Board	Mr. Comer Tuck

Table 2. Current Alternates of the Water Conservation Advisory Council

Interest Group	Alternates
Texas Commission on Environmental Quality	Mr. Chris Loft
Texas Department of Agriculture	Ms. Kelley Faulk
Texas Parks and Wildlife Department	Vacant
Texas State Soil and Water Conservation Board	Mr. Mel Davis
Texas Water Development Board	Mr. Ken Petersen
Regional Water Planning Groups	Mr. Mike Mahoney
Federal Agencies	Mr. John Mueller
Municipalities	Ms. Ruthanne Beilue
Groundwater Conservation Districts	Ms. Stacey Steinbach
River Authorities	Ms. Denise Hickey
Environmental Groups	Ms. Jennifer Walker
Irrigation Districts	Mr. Mike Irlbeck
Institutional Water Users	Vacant
Professional Organizations-Water Conservation	Ms. Nora Mullarkey
Higher Education	Dr. Calvin Finch
Agricultural Groups	Mr. Jay Bragg
Refining and Chemical Manufacturing	Ms. Cindy Jordy
Electric Generation	Ms. Kim Mireles
Mining and Recovery of Minerals	Ms. Debbie Hastings
Landscape Irrigation and Horticulture	Mr. Markus Hogue
Water Control and Improvement Districts	Mr. Dean Minchillo
Rural Water Users	Mr. Fred Aus
Municipal Utility Districts	Mr. Mark Froehlich

III. Acknowledgments

The Council appreciates the efforts of a number of Board staff in assisting the Council in its meetings and duties and in the preparation of this report. In particular, we are grateful for the efforts of Ms. Vanessa Escobar who serves as the Board's primary support for the Council and for Ms. Patsy Waters for her administrative support on Council activities.

IV. Introduction

Texas is expected to increase its population by more than 80 percent by 2060. Along with more people comes a need for more water which places additional stresses on existing—and limited—water resources impacting the state’s economy and environment. One of the most cost effective ways of increasing water resources is to use what we already have more efficiently. The 2012 State Water Plan envisions 24 percent of new water supplies—more than 2 million acre-feet per year (651.6 billion gallons per year)—resulting from municipal, agricultural and industrial water conservation by 2060. If water reuse is added to the equation, 37 percent of new water supplies—more than 3.3 million acre-feet per year (1.1 trillion gallons per year)—would come from more efficient water use. Water conservation is clearly critical to the future of Texas.

Recognizing the importance of water conservation in Texas, in 2007 the 80th Legislature created the Water Conservation Advisory Council to provide the Governor, Lieutenant Governor, Speaker of the Texas House of Representatives, the Legislature, the Board, the Commission, political subdivisions, and the public with the resource of a select council with expertise in water conservation. The legislature directed the 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 Council completed an eighth charge, concerning certified training, in 2008. The legislature also directed the Council to deliver a report on progress made in water conservation in the state to the Governor, Lieutenant Governor, and Speaker of the Texas House of Representatives no later than December 1 of each even-numbered year. The purpose of this report is to meet that obligation. This 2012 report is the third such report to state leadership. The Council’s 2012 legislative report focuses on the progress made in each of the charges. The report also identifies key findings for advancing water conservation efforts in Texas.

Future Conservation Needs

By 2060, more than 46 million people are expected to call Texas home—an increase of greater than 80 percent of the 2010 population. 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 water supplies resulting from these strategies, about 2 million acre-feet, would come from conservation.

Trends in Population Growth and Water Demands

Population growth rates are expected to 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 1). Some of the fastest growing areas of Texas include: The Rio Grande Valley—Region M, Austin—Region K, The Dallas-Ft. Worth Metroplex—Region C, Houston—Region H, and El Paso—Region E.

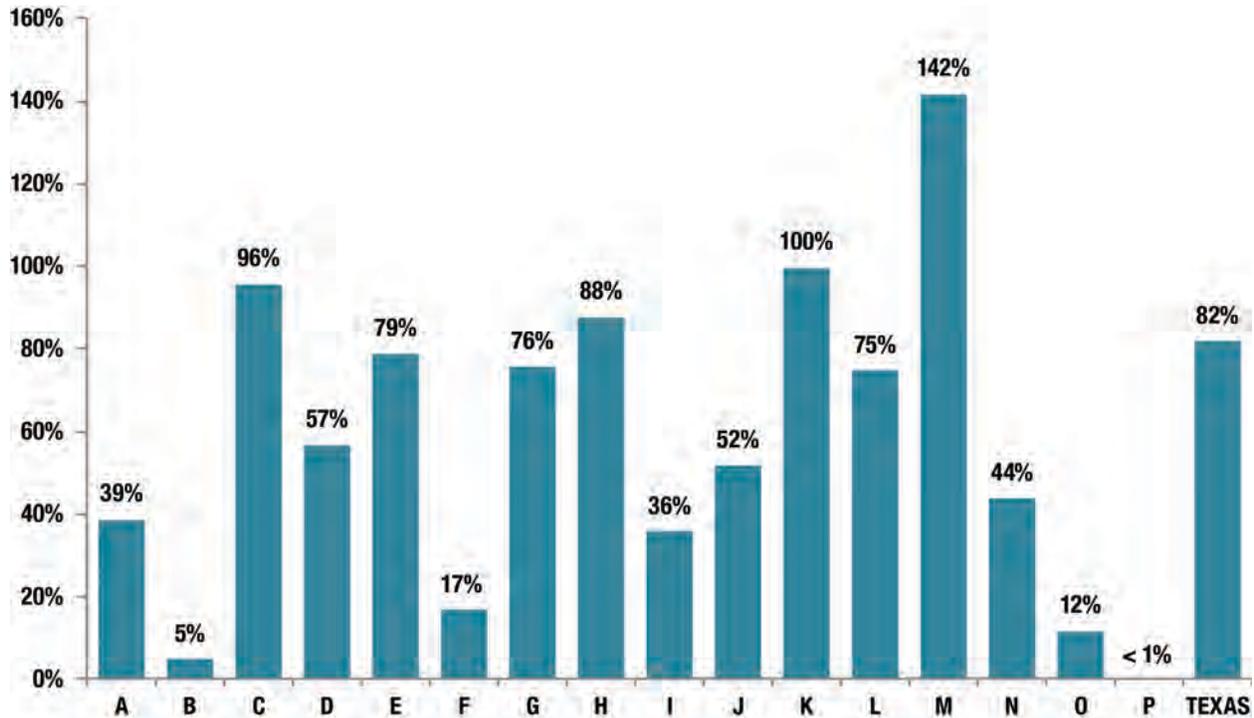


Figure 1. Percent Growth in Population 2010–2060.
Texas Water Development Board—Water for Texas: 2012 State Water Plan

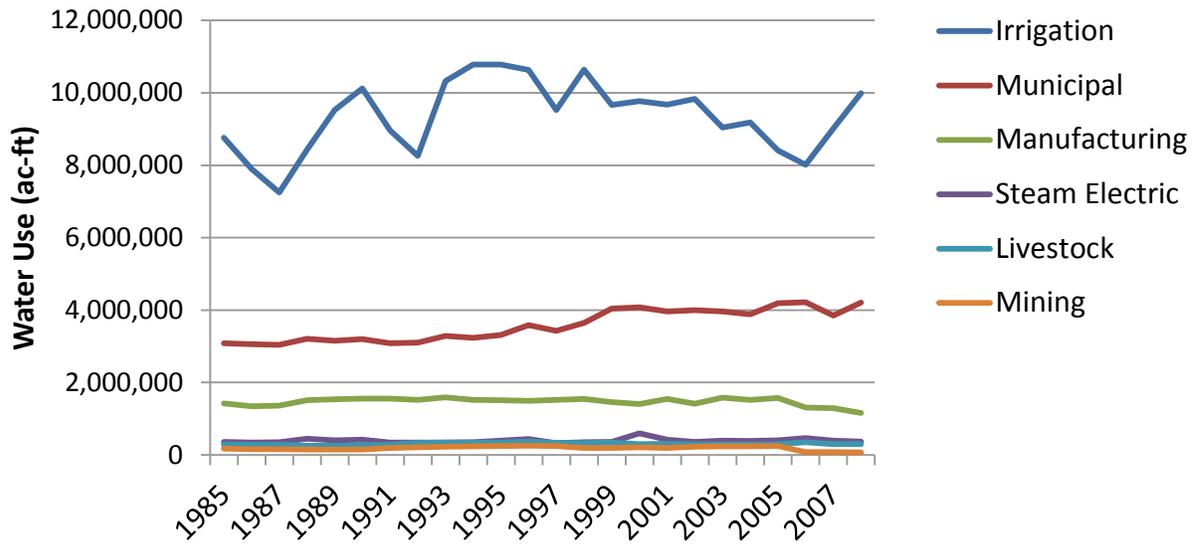
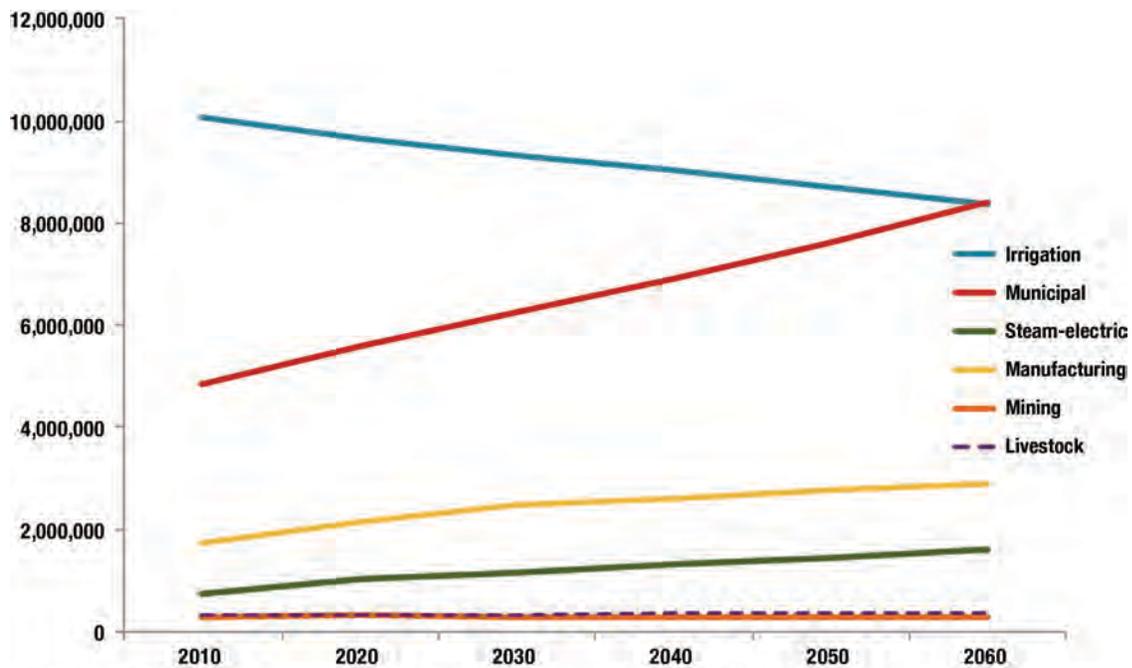


Figure 2. Historic Water Use Trends by Category.
 Texas Water Development Board - Water for Texas: Summary of the 2011 Regional Water Plans.



*Water demand projections for the livestock and mining water use categories are similar enough to be indistinguishable at this scale.

Figure 3. Projected Water Demands 2010 - 2060.

Texas Water Development Board - Water for Texas: 2012 State Water Plan

While the population is projected to increase by more than 80 percent over 50 years, water demand in Texas is projected to increase at a lower rate 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.

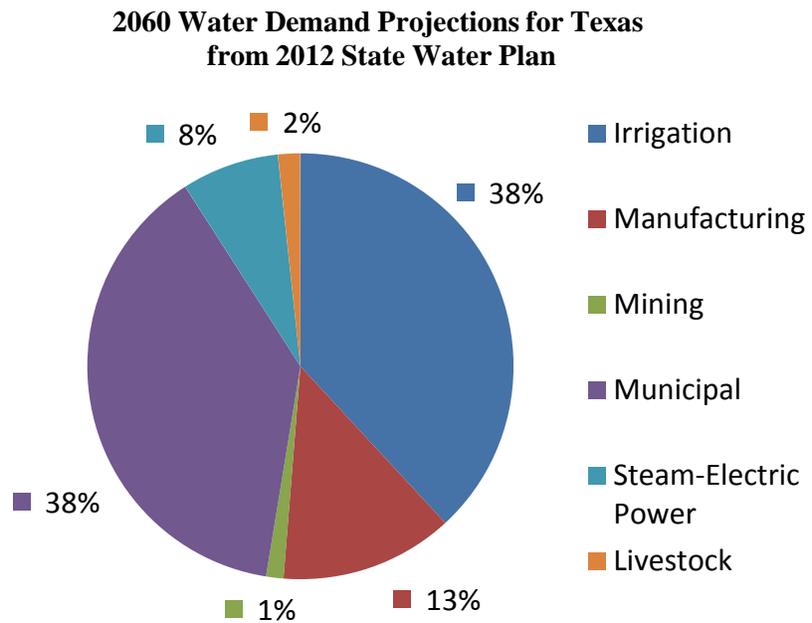
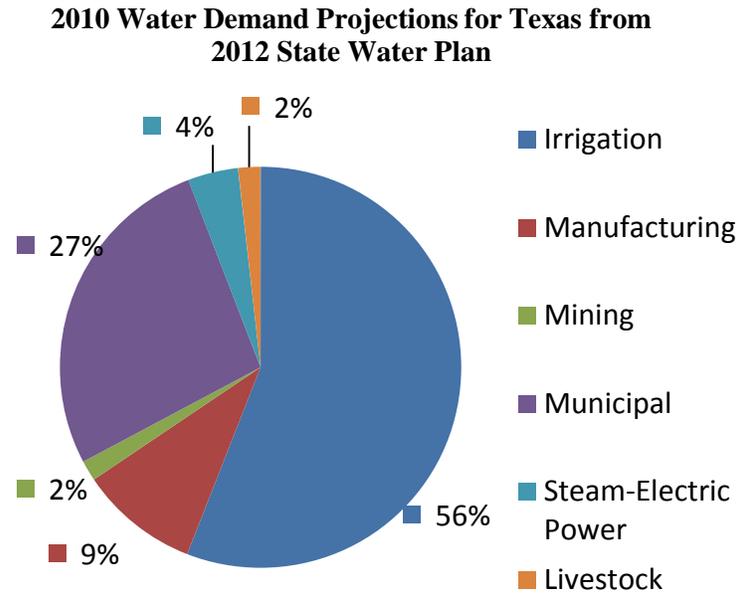


Figure 4. Projected Water Demands in 2010 vs. 2060 from 2012 State Water Plan.

V. Senate Bill 181 – Developing a Sector Based Methodology

In 2011 Senate Bill 181 (relating to the calculation and reporting of water usage by municipalities and water utilities for state water planning and other purposes) and Senate Bill 660 (relating to the review and functions of the Texas Water Development Board) were passed by the 82nd Texas Legislature and implemented into statute. These bills aim to improve conservation reporting procedures as well as establish a consistent method for reporting water use data. Senate Bill 181 requires the Board and the Commission, in consultation with the Water Conservation Advisory Council, to develop a uniform, consistent methodology and guidance for calculating water use and conservation.

The Board and Commission, in consultation with the Council, have been working to develop a sector based reporting methodology and a supporting guidance document. This methodology and guidance will be primarily used by a municipality or water utility in their efforts to develop water conservation plans and prepare annual and five-year implementation reports. The document will also provide guidance to industrial and agricultural entities in their efforts to develop and report on the progress of water conservation plans.

The guidance document is designed to be dynamic and help entities complete their conservation reporting forms in a consistent and uniform manner. Over time the document will improve and be updated as methodologies improve. The following bullets summarize the key points of the guidance document.

- Identifies the method for how a municipality or water utility should calculate total water use in gallons per capita per day
- Identifies the method for how a municipality or water utility should calculate water use in the residential sector, that includes both single-family and multi-family residences, in gallons per capita per day
- Identifies the method for how a municipality or water utility should calculate water use in each of the following sectors using non-population dependent metrics: industrial, agricultural, commercial, and institutional sectors
- Identifies the method for how an agricultural entity or industrial entity should report on their water use and implementation of their water conservation plan

Many utilities across the state are required by statute to submit various reports and surveys to the Board or the Commission for the purposes of conservation reporting or water use accounting. This reported information allows the state agencies to evaluate trends in water usage and project our state's long-term water needs. Texas has 16 regional water planning areas and for each of those planning areas this type of information is necessary for evaluation of conservation strategies and for the development of the regional and state water plans. For many utilities it is also very important to maintain and collect data relating to water use, population, and conservation implementation because that information is critical in planning for a utility's long-term needs.

In evaluating the state's existing reporting efforts in monitoring target and goal guidelines for water conservation, the Council, in conjunction with the Board and the Commission, found that improvements are needed in the area of collecting water conservation data and information as well as in maintaining a consistent methodology for analyzing conservation data.

Sector based reporting will enable water use analysis to be a more useful tool for long-term planning. With well-defined and consistent analysis of data and information, water providers and user groups can develop effective conservation initiatives and programs. The methodology will establish a sector based analysis that can be used by water providers for the primary purpose of evaluating internal water conservation trends and needs. This reporting tool can provide more detailed information on water use per sector which will be highly beneficial to water providers. Senate Bill 181 water use sectors are listed below.

Senate Bill 181 Water Use Sectors

- Residential Single-Family
- Residential Multi-Family
- Industrial
- Commercial
- Institutional
- Agriculture

The document methodology will incorporate standard definitions and formulas for key metrics along with instructional guidance. Specific guidance will be developed to address how gallons per capita per day should be determined and how it should be applied to population-dependent water use only. Emphasis will be placed on how gallons per capita per day evaluations should be used for planning and evaluating and not for comparison of utilities.

The guidance document is available on the following webpages:

www.twdb.texas.gov/conservation/

www.savetexaswater.org

VI. Summary of Progress

Charge 1: Monitor trends in water conservation implementation

Throughout Texas there are various levels of conservation efforts taking place at the state, regional, and local level. Efforts range from policy initiatives (Appendix A) to implementing best management practices or developing a public awareness campaign. As the state confronts the challenges presented by frequent drought conditions, increasing population growth, and growing demand for limited water supplies, Texas continues to make progress towards implementing water conservation measures; however, it is difficult to identify precise trends.

In March 2012 the Board and Texas State Soil and Water Conservation Board produced a joint report that highlighted many conservation efforts implemented in the past five years. The joint report examines major aspects of the state's water conservation efforts, identifies key issues impacting the state's future water conservation efforts, and offers recommendations for advancing water conservation efforts. Staff of the Board and Texas State Soil and Water Conservation Board drew upon knowledge and practical experience gained by administering many of the state's municipal and agricultural conservation programs and initiatives. The joint report also represents a continued strong endorsement of effective and efficient utilization of water conservation measures, actions, and practices that are critical to meet the future water supply needs of the state. Additionally, the report highlights the trends in future water use and presents an overview of recent legislative initiatives. This joint report can be found in the online publication library of the Board at http://www.twdb.texas.gov/publications/reports/TWDB_TSSWCB_82nd.pdf.

Municipal Water Conservation Efforts

At the state level one of the most significant conservation activities taking place is the requirement that certain utilities and entities develop water conservation plans and report progress on conservation through annual reports and five-year implementation reports. The Council encourages those entities required to develop and submit plans and reports to take those duties seriously and to improve the quality of the data. The Council also encourages state agencies to provide technical assistance and guidance to these entities in developing plans and reports and to ensure the quality and consistency of the submitted data. The Council will continue to work with the Commission and the Board on monitoring the implementation of water conservation in the state. The regional water planning groups are now responsible for reporting on the status of implementation of recommended strategies.

Statute requires certain entities to develop water conservation plans. Water conservation plans are required to include specific, quantified five-year and ten-year targets for water savings, generally expressed as a reduction in gallons per capita per day and a reduction in water losses. Entities required to submit water conservation plans either to the Commission or the Board include applicants for new or amended surface water rights, retail public water utilities that provide service to 3,300 or more connections, and any retail public water utility that receives financial assistance from the Board. These entities are also required to submit annual reports to

the Board and five-year implementation reports to the Commission on their progress in implementing water conservation plans. The first annual reports were due May 1, 2010. In addition, all retail water providers (about 3,500) are required to submit a water loss audit to the Board every five years. In 2011 the legislature passed House Bill 3090 which requires recipients of financial assistance from the Board to submit water loss audits on an annual basis beginning in May 2013. The Council believes this requirement should be extended to all entities that are required to submit a water conservation plan.

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 management efficiency methods. Recent policy initiatives at the state level encourage municipalities and water utilities to improve their conservation program analyses. Existing reporting requirements allow the Board and the Commission to collectively evaluate conservation implementation efforts and water use by municipalities. The water conservation annual reports and five-year implementation reports that many utilities are required to complete include data pertaining to specific and quantified 5- 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. Because the very first conservation plan annual reports were received by the Board in 2010, it is difficult to accurately identify trends. However, as the reporting forms are improved and continuous reporting is achieved, data analysis will improve. Currently, the Commission and the Board are working together with the Council to streamline and improve conservation reports.

These water conservation plans, water conservation implementation reports, and water loss audit reports create opportunities for more quantitative measures of water conservation implementation. Completing these various reports enables utilities and suppliers to better track their water usage and water losses and identify where to target conservation programs. There are, however, some issues with the plans and reports. Entities approach the reports with various levels of interest and capability so the quality of reporting varies and resulting information may be questionable in some cases. Other issues that impact accurate assessment of water conservation concern the year-to-year variations in water use due to climate and the more gradual year-to-year variations due to changes in the mixture of uses (institutional versus residential) in high growth areas. While planning and reporting of water conservation is not required of all water users, the Board estimates that there are water conservation plans for about 80 percent of the water used in Texas for municipal purposes.

There are numerous local water conservation programs around the state that have been implemented by utilities. Each program is unique not only in its activities, but its approach and goals, based on the particular needs of the utility, such as limited water resources, water quality, peak demands, and customer base. Utilities should have conservation programs both for their own operations and procedures, and for their customers. Operational programs can include meter testing and repair, leak detection, rate structure, or water reuse. Customer programs can range from simple public awareness by providing brochures or bill messages, to classroom programs, to landscape water days and times, to water use audits, and rebate programs for landscapes or

plumbing fixtures. Many of these local programs can be reviewed on the Water IQ website (www.wateriq.org) by searching on the link by zip code or from the drop down listings.

The Board has analyzed 395 annual water conservation plan reports from municipal water providers for the year 2011. These reports are from utilities with a total population of 18.8 million in their service areas. Conservation programs were reported to save a total of 75.7 billion gallons or 6.4 percent of the total amount of water provided by the utilities. Reported data indicate that the weighted average water loss was 12.2 percent of the system volume. The utilities reported that they tested or replaced 175,500 customer meters and fixed 193,000 leaks, and they reused 67.4 billion gallons of treated wastewater. During the drought year of 2011, drought contingency plans were implemented by 226 of these utilities.

Agricultural Water Conservation Efforts

Agricultural production operations and water conservation efforts are regularly impacted by extreme weather patterns and fluctuations in commodity pricing. In addition, farmers and ranchers have made it clear that there is a need for more technical assistance, financial assistance, and innovative methods for irrigation in the 21st century. The Board, the Texas State Soil and Water Conservation Board, and agencies within the U.S. Department of Agriculture observed this need and have been able to provide different methods of assistance to political subdivisions and individuals statewide to promote the implementation of water conservation efforts.

Since 2004 the Board has provided 50 different agricultural water conservation grants to 24 separate entities including groundwater conservation districts, irrigation districts, state agencies, and universities. The Board continues to award grant funds, up to \$600,000 per year, for a wide range of projects that are designed to assist in implementing water conservation strategies in the state water plan. During this period, over \$4 million has been awarded and the projects are in various stages of implementation.

In February 2004 the Board 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 use efficiency and conservation. Grant recipients 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.

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 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 large scale. 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 Harlingen Irrigation District's ongoing conservation projects and provides coordination between the Harlingen Irrigation District's staff, agricultural water users, and 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 2005-2011 can be found online at the Board web pages as well as on the Harlingen Irrigation District's webpage at www.hidcc1.org.

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 improving 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 2005-2011 can be found online at the Board web pages as well on the Texas Tech University project webpage at www.depts.ttu.edu/tawc/.

The Texas State Soil and Water Conservation Board has several major programs that address agricultural water conservation issues 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 Texas State Soil and Water Conservation Board works closely with the 216 local soil and water conservation districts and the U.S. Department of Agriculture-Natural Resources Conservation Service to provide federal financial cost share assistance and technical assistance to agricultural landowners and producers. A statewide study of agricultural best management practices implementation through the Texas State Soil and Water Conservation Board and U.S. Department of Agriculture-Natural Resources Conservation Service programs estimated the water savings over a three year period were more than 450,000 acre-feet/year of water. Details of the study are available in the report, *An Assessment of Water Conservation, Report to the 82nd Legislature, March 2012*, by the Board and the Texas State Soil and Water Conservation Board at http://www.twdb.texas.gov/publications/reports/TWDB_TSSWCB_82nd.pdf.

The Texas State Soil and Water Conservation Board 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 Texas State Soil and Water Conservation Board on conservation and natural resource issues. Each year, the Texas State Soil and Water Conservation Board 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 a conservation related video library that is maintained by Texas State Soil and Water Conservation Board 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.

In 2011 the Texas State Soil and Water Conservation Board and the Board conducted a voluntary survey of irrigation districts to assess the extent of best management practices implemented by irrigation districts. Replacing district canals and laterals with pipelines were the most frequently employed best management practices. Implementation of best management practices varies widely among districts. Some districts have aggressively implemented water conservation best management practices while many others have the potential for additional implementation and conservation.

U.S. Department of Agriculture-Natural Resources Conservation Service assisted Texas agricultural producers with implementation of water conservation measures through the use of Farm Bill programs such as the Environmental Quality Incentives Program and the Agricultural Water Enhancement Program. Included in these programs are water conservation practices that improve irrigation efficiency (such as pipelines, drip irrigation systems, precision application center-pivot systems, land leveling, and irrigation water management) as well as those practices which enhance water yield and infiltration (brush management, furrow diking, and rangeland and pastureland management). These practices are applied by agricultural producers through long-

term (up to 10 years) cost-share contracts with the U.S. Department of Agriculture-Natural Resources Conservation Service.

Under Environmental Quality Incentives Program, U.S. Department of Agriculture-Natural Resources Conservation Service gives priority to applications that demonstrate a reduction in water use by the agricultural operation. During fiscal years 2011 and 2012, Environmental Quality Incentives Program cost-share payments to agricultural producers for applying water conservation practices totaled \$23 million through 1,494 contracts.

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 Environmental Quality Incentives Program, the Agricultural Water Enhancement Program operates through contracts with producers to plan and implement conservation practices to protect ground and surface water and improve water quality in project areas established through partnership agreements. Producers may participate individually in Agricultural Water Enhancement Program or collectively through a partnership project. During fiscal years 2011 and 2012, Agricultural Water Enhancement Program cost-share payments to agricultural producers for applying water conservation practices totaled \$7.3 million through 510 contracts.

Institutional, Commercial, and Industrial Efforts

The institutional, commercial, and industrial water users combine to form a significant water use sector. Industrial users include manufacturing, electric power generation, and mining operations. Institutional users include schools, hospitals, nursing homes, etc., and commercial users include offices, restaurants, retail, and so on. Based on water use survey data gathered by the Board in 2008, 59 percent of municipal use is for residential purposes. If it is assumed that 10 percent of water is lost through leaks, then 31 percent of municipal use can be attributed to institutional and commercial entities within the city.

At the state level, state supported facilities are building according to new plumbing codes. The Council also encourages state agencies to provide technical assistance and guidance to entities in developing plans and reports and to ensure the quality and consistency of the submitted data. The Council will continue to work with the Commission and the Board on quantifying the implementation of water conservation in these use sectors. The Texas State Energy Conservation Commission has a building guide for state supported facilities. These sectors are specifically identified in Senate Bill 181, and larger industrial water users have been surveyed annually by the Board for several decades.

Many larger cities have developed or are developing specific programs to reach the industrial, commercial, and institutional sectors. Since this sector must keep costs under control, many entities are implementing measures to reduce water use and thus water and wastewater costs on their own. The Commission and the Board require that this sector be addressed in water conservation plans, and annual reports must include information on the progress of these programs.

Water Conservation Public Awareness Efforts

Public awareness and education are often cited in regional water plans as a water conservation strategy, and various awareness and education programs are active in a number of areas across the state. In monitoring water conservation programs and the state's public awareness efforts, the Council found that water conservation awareness programs are most effective when consistent messaging is used and supported with research and data. The Council also found that a number of local utilities are attempting to initiate and implement effective public awareness programs with limited funding budgets. In addition to local efforts, a number of utilities, entities, and agencies are forming partnerships and networks to increase public awareness efforts around the state. The Council believes there is an immediate need for water conservation awareness and heightened messaging on a statewide level. Therefore, the Council believes an expansion of the capabilities and reach of the state's existing water conservation public awareness programs is needed.

State Agencies' Efforts

Currently, there are a number of municipal and agricultural entities throughout the state using Water IQ: Know Your Water (Water IQ) as part of their local campaign. Water IQ is a Board managed statewide public awareness program that supports existing local water conservation efforts and programs. Water conservation public awareness is promoted through various activities such as public outreach events, materials, and education. Water IQ offers an easy-to-identify brand, a wide variety of materials, and a network of groups and communities dedicated to educating Texans about water conservation and the wise and efficient use of all our natural resources. It has become the Board's leading water conservation program. Additional information on the program can be found at www.wateriq.org.

In addition to ongoing technical support to entities that are required to prepare and implement water conservation plans, Commission staff provides water conservation outreach and education to water suppliers and the citizens of Texas through speaking engagements at workshops, conferences, and meetings. The Commission also provides water conservation tips and information through its Take Care of Texas Campaign at www.takecareoftexas.org.

Texas Parks and Wildlife Department has been actively conducting public awareness efforts with messages focused on the importance of water resources in our state's natural and cultural environments. Over the past six years, Texas Parks and Wildlife Department has produced "The State of Water" documentary series exploring the crucial issues facing water in Texas including allocations for wildlife and aquatic habitats. The *Drought Survival Kit*, a website designed to tell the public how to "*Help Wildlife, Save Your Yard, Cut Your Water Bill*" was launched in November 2011 in response to the record drought and the toll it took on everything from wildlife to water bills. The website offers practical tips and suggestions on ways of supporting and coping with nature. The *Drought Survival Kit*, the "State of Water" documentaries, and the "Texas Parks & Wildlife" magazine water issues series can be found at www.texasthestateofwater.org.

In response to the need for increased outdoor water conservation by households and businesses, the Texas Department of Agriculture, the Board, and the Commission began working with a diverse public-private coalition to develop and promote a statewide consumer education campaign. The campaign, known as Texas Water Smart, educates businesses and families on

simple, proactive steps to conserve water. The message promotes practical and easy-to-do techniques that appeal to Texans and are proven to provide water savings. In April 2012, the coalition began implementing a full-scale outreach plan using radio, television, newspaper, social media and print material to educate Texans. The techniques are relevant for businesses and homes regardless of location or climatic conditions. Many local governments and trade associations find Texas Water Smart tools to be helpful at meeting local and regional goals for water conservation education. With the support of the coalition's many private partners, the resources developed through Texas Water Smart are available at no cost to the public partners. Additional information on the program and coalition can be found at www.TexasWaterSmart.com.

Increased resources and efforts are needed to reach various water user groups such as industry, agriculture, municipalities, and ultimately, the general public.

Regional and Local Efforts

Currently around the state, water efficiency networks¹ have been created on the local and regional level to support partnerships between water providers (Appendix B). These collaborative groups allow water providers to network and share information, experiences and resources on local water conservation efforts and initiatives. In most instances these efficiency networks have been created as a result of the efforts of interested parties participating in the discussions and work of the Council. The networking among local water providers committed to water conservation can be useful in supporting consistent policy efforts and public awareness messaging in a local metroplex or region. The Council believes that the establishment of additional regional efficiency networks should be encouraged in other parts of the state.

Local and regional public awareness programs such as "SAVE WATER. Nothing Can Replace It," "Water is Life," "Water Wise," and many other programs across the state are also providing effective messages on water conservation. Following are examples of programs provided by several major entities.

Austin Water Utility (austintexas.gov/departments/water-conservation) uses a wide variety of public outreach and education programs including:

- program advertising and information about watering restrictions;
- presentations and booths on water conservation techniques and available programs for a variety of interest groups;
- a Water Conservation Speakers Bureau;
- providing 13-month usage graphs on customer bills and online;
- providing water conservation training and workshops to licensed irrigators, landscape contractors, and homeowners; and
- the Dowser Dan Show, an original and highly popular assembly program that teaches kids (and teachers) about water conservation.

¹ North Texas Water Efficiency Network
Central Texas Water Efficiency Network
Gulf Coast/ Montgomery County Water Efficiency Network

In April 2012, El Paso Water Utilities (www.epwu.org/conservation) launched its bilingual multimedia water conservation campaign built around the rallying cry “Less is the New More.” Rooted deeply in social norming, the campaign painted water waste as a gluttonous taboo and water conservation as a simple, responsible choice. EPWU’s campaign included television and radio commercials, social media, newspaper ads, billboards, aggressive media relations, and sponsorships at festivals and home improvement workshops. All components integrated the “Less is the New More” branding and drove users to the utility’s one-stop water conservation website: LessisMoreEP.org. By cohesively branding all campaign elements, the campaign not only helped reduce year-to-date consumption, it also initiated an ongoing “Less is the New More” conversation with customers and stakeholders. The utility envisions that conversation as an essential tool in maintaining community buy-in as drought and resulting water conservation measures continue beyond 2012. Concurrent with the campaign, El Paso Water Utilities offers educational programs and presentations to area schools, organizations and community events. Educational programs are tailored to different audiences but they all encourage conservation. On an annual average, EPWU delivers 300 educational programs to more than 13,000 attendees.

The High Plains Underground Water Conservation District No. 1 in Lubbock began its public information/education program with inception of its monthly newsletter, *The Cross Section*, in June 1954. Since then, a wide range of programs/activities have been implemented to educate the public about the importance of water and water conservation within the district’s 16-county service area. These include a newly-redesigned website incorporating social media; news releases; staff media interviews; 60-second radio Public Service Announcements; 30-second TV Public Service Announcements; staff presentations at civic/professional meetings; displays/exhibits at public venues; and various water conservation brochures and reports that are available to the public. In addition, High Plains Underground Water Conservation District No. 1 provides water conservation outreach to students through classroom presentations and sponsorship of the WaterWise™ education program. Additional information is available at www.hpwd.com/programs-and-activities/information-education-programs.

Being the first in Texas to implement the state’s recognized Water IQ public awareness water conservation program in 2006, the North Texas Municipal Water District’s 2011-2012 Water IQ campaign “Save Water – Save Money” continues to promote easy, sensible water saving tips that not only extend our natural resource of water but also reduces the cost of water for consumers. Since 2006 it has been estimated that yearly water consumption has decreased by 200 million gallons per day during peak summer months, or 12-15 percent annually. Through quantitative and qualitative surveys within the North Texas Municipal Water District service area, they have the ability to position its Water IQ campaign reaching its target audience knowing consumers are more likely to conserve water if they know they will be saving money on their water bills and ensuring there is enough water for the future. Information on this program can be found at northtexas.wateriqknowyourwater.org/.

Tarrant Regional Water District supplies raw water to more than 1.8 million people in North Texas with a service area that spans across 11 counties. Dallas Water Utilities serves nearly 2.4 million people in 28 communities in six counties. Both water suppliers rely on surface water from reservoirs to meet the demands of their customers. Since 2009, Tarrant Regional Water

District and Dallas Water Utilities have joined efforts to promote water conservation to more than 6 million people in the North Texas region. Through a public outreach campaign entitled “Save Water. Nothing can replace it”, the two entities have sought to educate the public on how to increase water efficiency and reduce water waste. Beginning in 2011, the campaign created the Lawn Whisperer – a humorous character that talks to lawns and relays messages about how to save water outdoors. The campaign relies on an array of television, radio, and print mediums to reach audiences. But the Lawn Whisperer really shines in the realm of social media through a growing legion of more than 2,000 Facebook fans and public appearances at numerous community events. Tarrant Regional Water District and Dallas Water Utilities have a combined budget of approximately \$2 million/year to fund the campaign’s creative and advertising expenses. Due to the popularity of the character, Tarrant Regional Water District and Dallas Water Utilities will enlist The Lawn Whisperer’s talents for a third consecutive year to continue educating North Texas residents on smart ways to save water. Because of their public outreach efforts and other water conservation measures, both entities are observing significant declines in water usage, which are adding up to billions of gallons each year. To learn more about water efficiency and the Lawn Whisperer visit SaveNorthTexasWater.com.

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

The current version of the Water Conservation Best Management Practices Guide was developed by the Water Conservation Implementation Task Force and published by the Board in 2004. Statute allows the Board to update the guide as needed and directs the Council to monitor new technologies for possible inclusion in the guide.

Working with the Board and the Commission, the Council has established a stakeholder process to review and revise best management practices (Appendix C). Changes to the Water Conservation Best Management Practices Guide will be vetted by all appropriate subject matter experts, interest groups, and state agencies. The intention is that the guide remains a living document that incorporates changes or additions on an ongoing basis. Periodic solicitations will be made to encourage reviews by the user community. As appropriate, the Council will make recommendations to the Commission and to the Board for revisions to the guide.

With information provided by state agencies, the Council determined that a large majority of the more successful water conservation programs identify and implement best management practices as strategies for using water more efficiently. However, in monitoring the role and use of the Water Conservation Best Management Practices Guide, the Council believes that the guide should be used more often throughout the municipal and industrial water use sectors. In particular, information gathered from reports to 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 the Texas State Soil and Water Conservation Board and the U.S. Department of Agriculture-Natural Resources Conservation Service cost-share programs working through local soil and water conservation districts, resulting 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 entities reporting on progress and the amount of water conserved through their programs.

The Council suggests that the Board and the Commission consider enhancing the promotion of the Water Conservation Best Management Practices Guide as a resource for the development of water 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 and can be a very useful tool for water user groups.

Charge 3: Monitor the effectiveness of the statewide water conservation public awareness program and associated local involvement in implementation of the program

Public awareness and education are often cited in regional water plans as a water conservation strategy, and various awareness and education programs are active in a number of areas across the state. In monitoring water conservation programs and the state's public awareness efforts, the Council found that water conservation awareness programs are most effective when consistent messaging is used and supported with research and data. The Council also found that there are a number of local utilities attempting to initiate and implement effective public awareness programs with limited funding budgets. In addition to local efforts there are a number of utilities, entities, and agencies forming partnerships and networks to increase public awareness efforts around the state. The Council believes that there is an immediate need for water conservation awareness and heightened messaging on a statewide level. Therefore, the Council believes that expanding the capabilities and reach of the state's existing water conservation public awareness programs is needed. Increased resources and efforts are needed to target messaging and reach all water user groups such as industry, agriculture, municipalities, and ultimately, the general public.

In 2007 the 80th Texas Legislature passed Senate Bill 3 and House Bill 4. Both pieces of legislation contained provisions authorizing the Board to "develop and implement a statewide water conservation public awareness program." In 2004 the Board contracted a research project that included development strategies, research, and branding for a possible statewide water conservation effort. This research was funded by the Board and a voluntary coalition of 36 utilities, municipalities, businesses, and conservation groups. The research stressed the need for making individual Texans aware of the importance of water conservation, including water reuse, to their future. As a result of this research, the brand "Water IQ: Know Your Water" (Water IQ) was identified as a way to promote awareness of water knowledge and conservation.

Water IQ is the Board's managed statewide public awareness program that supports existing local water conservation efforts and programs and is the Board's leading water conservation program. Water IQ was 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 water resources are limited.

The Board has developed a water conservation public awareness website, www.wateriq.org, providing general information about water conservation in the state of Texas. One unique feature on Water IQ is a zip code locator that includes zip codes of cooperating entities to provide the public 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 website(s). The consumer also has the option to locate their local water provider by name in a drop down menu. Cooperating entities maintain their own websites and provide consumers another option for locating water conservation information. As of September 1, 2012, the Water IQ website listed 63 entities and 961 unique zip codes. Recent additions to the website include the capability to access the regional water planning database to obtain information about local water supplies and water management strategies.

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 Board's Water IQ website. The guide helps utilities develop and implement an effective outreach program as part of local efforts by making use of the mass media.

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

Research is a Key Component in Public Awareness Efforts

Research, both quantitative and qualitative, is an important component to any awareness campaign where changes in social attitudes and behavior are desired. For a water conservation public awareness campaign, pre-campaign research will determine the current attitudes, behaviors, and knowledge of water use and efficient practices. Post-campaign research can further determine if attitudes, behavior and knowledge of water have altered and how to best create a campaign to focus on the desired behavior changes related to water use and knowledge.

Water IQ pre-campaign research in 2004 determined that 24 percent of consumers in Texas, statewide, could not cite the source of their water. Water IQ post-campaign research conducted in 2010, by the North Texas Municipal Water District Water IQ campaign, found that 40 percent of consumers in the North Texas Municipal Water District service area could cite their water source, Lavon Lake, and were knowledgeable about it. After identifying through research that consumers lack the knowledge of the high volume of water used and often wasted outdoors, the North Texas Municipal Water District Water IQ campaign was adapted to add emphasis on outdoor water waste and increase awareness of proper landscape practices to extend currently available supplies. Research surveys indicate that 43 percent of North Texas Municipal Water District residents saw, read, or heard public service messages related to water or water conservation.

Charge 4: Develop and implement a state water management resource library

In 2008 the Council determined that the best solution to providing access to the greatest amount of water conservation resources is to participate in a national clearinghouse for water conservation literature, information, and tools rather than create an independent water conservation library for Texas. The Alliance for Water Efficiency is a stakeholder-based 501(c)(3) non-profit organization dedicated to the efficient and sustainable use of water. Located in Chicago, Illinois, they serve as a North American advocate for water efficient products and programs and provides information and assistance on water conservation efforts and have established a website with a wide range of water conservation information, resources, and tools that are available and searchable at www.allianceforwaterefficiency.org/resource-library/default.aspx/.

The Council has included a link to the Alliance for Water Efficiency's clearinghouse on the Council's website at www.SaveTexasWater.org/. The Water Conservation Best Management Practices Guide has been placed on the Alliance for Water Efficiency's website, and other information and links can be added by the Council, the Commission, or the Board as needed. Future efforts on this charge will focus on implementation and information management. The Council believes that Texas is best served by participating in this national effort so that reliable and quality resources will be available to a variety of audiences.

Charge 5: Develop and implement a public recognition program for water conservation

Leadership exists across the state where progressive efforts in water conservation are the standard. Nevertheless, successful water conservation efforts often remain unrecognized and, therefore, are not profiled or visible to the public. The Council feels that a visible and prestigious public recognition award program would elevate the importance of water conservation related issues. In 2010 the Council created the Blue Legacy Awards because they believe that conservation and stewardship of our water resources deserve recognition. Currently the Council has committed to hosting annual awards presentations for the Agricultural and the Municipal use sectors.

Blue Legacy Awards in Agriculture

Throughout history, the agricultural community has had a personal relationship with both the land and the water resources of Texas. For many agricultural producers water is considered much more than a tool of the trade. Though it often goes unrecognized, the agricultural sector is actively conserving and efficiently using water through everyday decisions, investments, and practices. The Blue Legacy Awards in Agriculture showcase agricultural producers as effective stewards of the state's natural resources and honor agricultural producers whose practices enhance conservation and efficient use of water while maintaining or improving production.

The Blue Legacy Awards in Agriculture is an annual program that recognizes outstanding water conservation efforts and successes within the agricultural community. The award program

provides an opportunity to broaden water conservation awareness by recognizing everyday agricultural producers from around the state for their leadership in improving practices and conserving water. The Council hopes to use these success stories to promote the agricultural industry's efforts in water conservation as well as promote the individuals themselves as credible spokespersons. It is the Council's belief that this program will generate positive awareness about water conservation in agriculture as well as encourage others in the industry to improve their water conservation practices. The Blue Legacy Awards in Agriculture send the message that proper management of water resources is a vital component of sustainable agricultural operations.

Award presentations are made possible through the partnerships with the Texas Irrigation Exposition and the Amarillo Farm and Ranch Show.

Table 3. Agricultural Blue Legacy Award Winners

2011 Agricultural Blue Legacy Award Winners
North Plains Groundwater Conservation District Recognized for excellence in collaborative partnership.
D&D Farms and the Ford Family Recognized for water efficient irrigation methods using strip tillage.
Gertson Farms and the Gertson Family Recognized for their water conservation efforts in their rice farming operation.
Schur Farms and the Schur Family Recognized for water efficient irrigation methods using LEPA center pivot irrigation systems.
2010 Agricultural Blue Legacy Award Winners
Jim Pawlik, Ag Producer Recognized for his contributions to the state's Agricultural Water Conservation Demonstration Initiative.
Jim Hoffman, Ag Producer Recognized for his contributions to the state's Agricultural Water Conservation Demonstration Initiative.

Blue Legacy Awards for Municipal Water Suppliers

Municipal water suppliers have been improving water use efficiency for many years by replacing outdated technologies and updating water supply and delivery practices. In order to accomplish water supply goals both now and into the future, some utilities have prioritized water conservation and incorporated it into their long term plan for water supply. Responsible management of our water resources deserves recognition and is why the Council created the Blue Legacy Awards for Municipal Water Suppliers. The awards are a means to showcase municipal water suppliers as effective stewards of water resources. Through the Blue Legacy Awards the Council honors suppliers whose practices enhance conservation of water while extending the currently available supplies. Recognition is given to municipal water suppliers that have demonstrated outstanding and innovative commitment to the state's mission of promoting responsible management and conservation of water resources in Texas.

Through the Blue Legacy Awards for Municipal Water Suppliers, the Council hopes to encourage others to initiate like-minded programs and reinforce a commitment to conservation and stewardship of water resources in Texas. The Council utilizes the award recipients success stories to promote municipal efforts in water conservation and promotes the winners themselves as credible spokespersons. Through these winners, the program will generate positive information about water conservation in municipal settings as well as encourage others in the state to improve their water conservation practices.

The presentations of the awards are made possible through the partnerships with the Texas Chapter of the American Water Works Association.

Table 4. Municipal Blue Legacy Award Winners

2012 Municipal Blue Legacy Award Winners
<p>City of McKinney’s Office of Environmental Stewardship Recognized for their public awareness program.</p>
<p>New Braunfels Utilities Recognized for their leak detection program.</p>
<p>San Antonio Water System (SAWS) Recognized for their public awareness efforts in working with stakeholders to establish a conservation rate structure.</p>
<p>Travis County Water Control Improvement District No. 17 Recognized for their water reuse projects and efforts.</p>
2011 Municipal Blue Legacy Award Winners
<p>North Texas Municipal Water District (NTMWD) Recognized for their public awareness efforts with Water IQ.</p>
<p>Ft. Bend County MUD # 25 Recognized for their water conservation efforts in their reuse projects and efforts.</p>

Charge 6: Monitor the implementation of water conservation strategies by water users included in regional water plans

As we confront the challenges presented by frequent drought conditions, population growth, and increasing demand for limited water supplies, it is crucial that we monitor and evaluate strategies encompassing various approaches for implementation of water conservation efforts in planning for our state’s water supply needs.

Measuring Progress – Development of Tools

In 2010 the Board funded a research project aimed at identifying and evaluating potential methods (or “tools”) to assist in evaluating actual water savings achieved by municipal water conservation efforts. The results of the study, conducted by BBC Research and Consulting Firm, were presented to the Board in 2012, as *Water Conservation Savings Quantification Study*.

Some of the key findings identified growing concerns about the lack of information on actual progress towards meeting established conservation goals and about the apparent focus on efforts

rather than achievements. The five-year implementation reports received by the Commission in 2009 were representative of this finding. Prior reports and planning documents demonstrate that Texas water user groups and regional planning groups are increasingly incorporating municipal water conservation as part of their strategies to meet future water needs. There has also been increased focus on the need to monitor the actual savings achieved by municipal conservation efforts.

Quantifying water conservation savings is not a simple task and Texas is not alone in confronting this challenge. A variety of evaluation approaches are used across the country; however, results of these evaluations are often limited by data quality and availability. Some organizations have developed tools to aid in evaluating conservation programs, but the tools produce answers only as good as the data they incorporate.

Estimating conservation savings based on systemwide water use data must begin with some form of standardized metric of water use intensity, such as gallons per capita per day. While comparisons of total gallons per capita per day across different municipal water systems may sometimes provide useful information, there are well-known difficulties in developing “apples to apples” comparisons of this metric across different municipalities and between providers.

To estimate the actual water savings achieved by conservation strategies, an individual water provider should begin by correctly calculating total gallons per capita per day and residential gallons per capita per day on an annual or periodic basis. Comparing and evaluating total gallons per capita per day between different water providers is not useful. Evaluating the change in gallons per capita per day over time can provide some indication of the magnitude and direction of change.

The change in total gallons per capita per day over time for each individual provider gives some indication of the magnitude and direction of change. The Council is convinced that a reasonable understanding of water use and conservation success is achievable only using an evaluation of data by sector so that the uses which are not population dependent can be excluded from the population dependent analyses and evaluated separately using metrics that are most indicative of the efficient water use in that particular sector.

The initial round of water conservation annual implementation reports filed with the Board included a wide range of estimated savings from conservation programs. Many providers reported zero or near zero savings or left their response to this question blank. Based on subsequent interviews, municipal providers approached the problem of how to estimate their conservation savings in a variety of different ways. The interviews indicated that both top-down and bottom-up evaluation approaches are important, though over 60 percent of the providers interviewed used a top-down approach.² The combination of top-down approaches to evaluate overall usage with bottom-up approaches for program evaluation is likely the best method for comprehensive analysis of conservation savings, particularly for larger providers. Top-down approaches alone may be well-suited for small to medium-sized providers if other factors such as weather and economic conditions can be normalized.

² Top-down refers to estimation approaches based on aggregate water use changes; bottom up refers to quantification based on adding up savings estimates for individual conservation measures.

The *Water Conservation Savings Quantification Study* produced the following three recommendations.

Recommendation 1. Approach for developing consistent regional and statewide conservation savings estimates. The best approach for estimating overall statewide and regional water conservation savings in Texas would be for the Board to develop a “top-down” statistical analysis based on municipal water use data that it already collects, as well as some additional data from readily available sources. This type of analysis is known as an econometric “panel model” and attempts to control for the effects of factors such as weather and economic conditions on municipal water demand. Such a model would not produce a perfect answer regarding conservation savings – for example, it is likely to be difficult or impossible to isolate the effects of proactive conservation efforts from the effects of changes in water rates and/or rate structures and the effects from the natural replacement of older plumbing fixtures with newer, more efficient models. The conservation estimates from the model would also have a degree of statistical uncertainty.

Recommendation 2. Developing a potential tool to standardize and improve provider-level water use data and conservation savings estimates. The study reviewed numerous examples of “desktop” tools that have been developed to promote standardized water use reporting and analysis and facilitate evaluation of water conservation programs. The study team also gathered input from large and small municipal providers on the characteristics of an ideal tool. None of the tools reviewed are perfectly suited to meet all of the uses and objectives identified by the surveyed water providers, but many provide unique advantage(s) and attributes. It would be possible to build a new desktop tool for these purposes, but it would require additional resources to develop, test, and implement such a tool. A substantial training effort would also be required for successful adoption by municipal providers. A gallons per capita per day calculator is currently being developed by the Council for use in Texas that may prove to be an effective desktop tool for data collection and water conservation analysis (Appendix D).

Recommendation 3. Additional recommendations. Apart from the challenges of accurately compiling and analyzing water use data (particularly for smaller systems), municipal water providers face increasing reporting requirements from state, regional, and local entities, as well as their wholesale water sources. This level of reporting can become redundant and repetitious at best; burdensome and inaccurate at worst. Developing a common data collection and reporting system that the state, regional, and local entities would design and to which they would all have access (likely online) would streamline reporting and, over time, create a robust database of water usage data.

State agencies have commented, however, that due to statutory authority and requirements, they may need to continue to have separate, specific water use questions answered.

The research study and presentation can be found online at www.twdb.texas.gov/publications/reports/contracted_reports/doc/1004831118_Conservation.pdf.

In 2012 the Board approved three water research study priority topics. One of the proposed research topics will build upon previous research and focus on *Determining Cost Benefit and Demand Savings of Municipal Water Conservation Efforts*. The goal of this research is to facilitate municipal water providers in their conservation planning and implementation efforts. This research will allow for a provider to evaluate and measure the impacts and savings resulting from the implementation of their water conservation strategies, measures, and best management practices.

One of the main issues continuing to challenge our state's water planning efforts on both a regional level and an individual water provider level is the ability to quantify water conservation savings. For many water providers, large and small, having the tools to measure savings and perform cost benefit analyses allows for improved conservation planning. These data also enable providers to perform evaluations of their overall conservation programs and existing conservation measures. With proper and effective tools, municipalities will be able to provide more accurate measurements of water savings. This will assist them in measuring the implementation of their water conservation plans.

A focus on the determination of revenue impacts and demand savings resulting from municipal conservation efforts reflects the increasingly important role of municipal water conservation. New research will take a closer look at the following recommendations identified in *Water Conservation Savings Quantification Study (BBC Research & Consulting 2012)*.

1. Estimate overall statewide and regional water conservation savings through the development and use of a "top-down" econometric statistical model that incorporates existing data and attempts to control for fixed and random variables.
2. Estimate the provider level of water conservation savings through the development and use of a "bottom-up" desktop tool that will evaluate and quantify the effectiveness of individual conservation measures in an overall conservation program.

The proposed new research is not duplicative but rather would build upon the previous studies that have identified the need for desktop tools that provide a consistent and confident measure of actual water savings following implementation of best management practices.

The desktop tool will be able to assist a water supply provider in the following areas

- planning for future water supply and infrastructure (water and wastewater) needs;
- evaluating cost-efficiency and water-savings effectiveness among various conservation measures and programs;
- tracking effectiveness and water savings over time; and
- establishing a practice of using consistent methodology in fulfilling reporting.

Conservation Strategies in Regional Water Plans

It is projected that almost 22 million acre-feet of water per year would be required in 2060 to meet the projected water demands of the state's homes, businesses, and agricultural enterprises if the historic drought of record were to occur again during that decade. However, without implementation of recommended water management strategies, only 15 million acre-feet of

available and contractually committed water supplies would be available to meet those demands by that time.

The regional water planning groups recommended water management strategies (including renewal of water supply contracts) to meet identified water needs that, if implemented, would provide an additional 9 million acre-feet of water. Approximately 24 percent of the volume of these strategies would come from conservation and 10 percent would come from reuse (Figure 5). Appendix E provides excerpts from the regional water plans that identify the importance of conservation strategies and outline specific conservation recommendations within each regional water planning group.

In the 2012 State Water Plan, 15 of the 16 regional water planning groups identified conservation strategies that could be implemented to assist in meeting water supply needs for the next 50 years. Because water conservation is a key strategy in meeting the state's future water needs, it is in the state's best interest to track and measure the implementation of water conservation strategies.

Texas Water Development Board Rule 357.45(a) states that "RWPGs shall describe the level of implementation of previously recommended water management strategies. Information on the progress of implementation of all water management strategies that were recommended in the previous RWP, including conservation and drought management water management strategies; and the implementation of projects that have affected progress in meeting the state's future water needs."

However, several regional water planning groups expressed concern about the potential costs and resources associated with the development and implementation of measurement and tracking procedures. Several regional water planning groups also expressed concerns about the difficulty of measuring implementation and about the potential for inconsistent conclusions. In the work underway for the 2015 regional water plans, some Board funding will be made available to the regional water planning groups to conduct the necessary implementation studies.

In 2010 the Council hosted discussions with chairs of some of the regional water planning groups intended to capture perspectives and thoughts on what could or should be the process of monitoring water conservation strategy implementation in a region, how implementation should be evaluated, and how that level of evaluation can be achieved. These discussions have provided further insight regarding the initiatives that are unique to various regions.

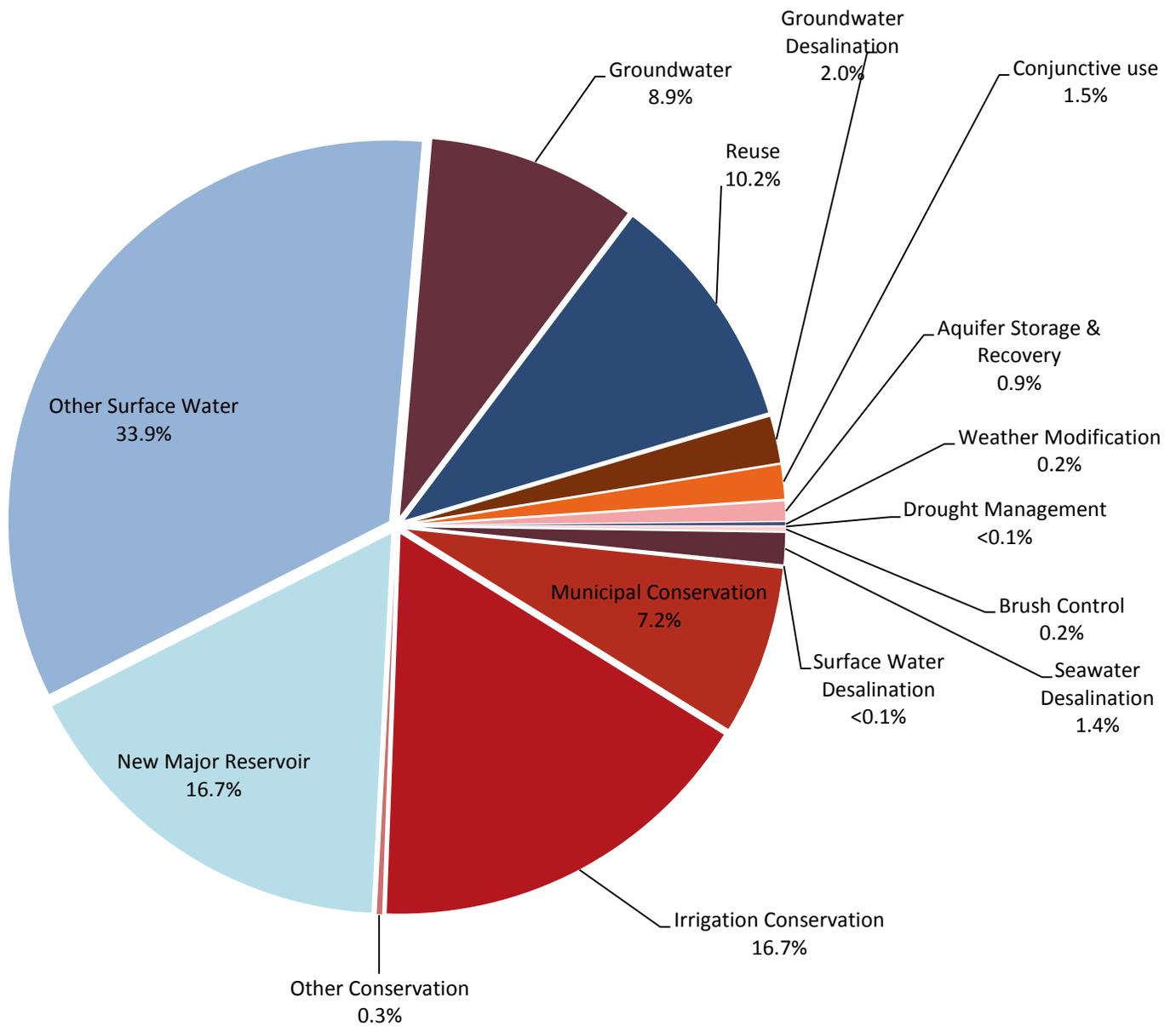


Figure 5. 2060 Recommended Water Management Strategies.
 Texas Water Development Board - Water for Texas: 2012 State Water Plan

Perspectives on Monitoring Conservation Strategy Implementation:

An Overview of Discussions with Regional Water Planning Groups ~ A, B, C, G, I, K, L, N

To address its legislative directive, the Council presented regional water planning group chairs with an opportunity to participate in an informal discussion about water conservation strategy implementation in their regions. The objective of these informal discussions was to gather some information on how each participating region is currently evaluating strategy implementation within their region. The discussions captured the planning groups' perspectives and thoughts on

- appropriate elements to include in a process for monitoring strategy implementation within a region,
- appropriate tools and methods for evaluating implementation, and
- concerns and limitations associated with monitoring and reporting efforts.

The discussions provided further insight to the planning groups' concerns and limitations associated with monitoring conservation strategy implementation and estimating savings. Planning groups expressed the following areas of concern:

- **Regulatory Authority** – Many planning groups do not want to take on an enforcement or regulatory role and feel that a state agency would be the best entity to be charged with the effort of monitoring strategy implementation.
- **Consistency** – Consistent and standardized methodologies do not currently exist for monitoring the levels of strategy implementation. In order to analyze data and information accurately, there should be standard methods and metrics that can be effectively utilized by individual water user groups.
- **Streamline Reports** – Many planning groups emphasized the burden of having too many reports with different timelines, formats, and reporting periods. There is room for improvement and increased efficiency in reporting mechanisms.
- **Dynamic variables** – There are many dynamic variables involved when estimating savings on a year-to-year basis. Estimation of savings should evaluate trends over a rolling time frame. Savings can be attributed to variable factors such as weather, economy, water availability, and drought management measures.
- **Funding and Resources** - Evaluation of strategy implementation and estimation of savings requires large investments of time, personnel, and money. Tools and methods need to be developed, guidance and technical assistance are needed to utilize the tools, and data has to be collected and reviewed.

Planning groups do not monitor the levels of conservation strategy implementation. They do not have regulatory authority to require water user groups to provide that information or the resources to acquire and monitor the information. Planning groups indicated that enhancements to currently existing reporting mechanisms along with consolidation of reporting efforts between state agencies would help in monitoring the implementation of water conservation at the regional level.

Expand Data Collection Efforts to Include All Water Providers and Water Use Categories

The Council understands the need for a comprehensive data set that reflects all water use in Texas. The Board does not currently collect annual water use data directly from wholesalers, though the retail water use surveys do include the source of water from wholesalers. A direct survey of wholesalers would provide more comprehensive and usable data for the state's water planning efforts.

The Council believes there is a need a more comprehensive set of water use data but recognizes that collecting data from individual water users is not a realistic expectation now or in the near future. The best information on water use can come from various sources, such as wholesalers, retailers, groundwater conservation districts, regional water planning groups, and even some trade associations, including those representing the livestock, dairy, power generation, refining, and chemical industries. To the extent possible, the Board's Water Use Survey does survey industrial water users. Some water use data is metered, but often it is extrapolated from other parameters, such as electric power consumption, livestock counts, crop type, and water demand. The Council believes more comprehensive data improve our understanding of our overall water use, though we recognize that some of the data will be less accurate than other data. In time, the data set will become more complete and more accurate.

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

In evaluating the state's existing reporting efforts in monitoring target and goal guidelines for water conservation, the Council in conjunction with the Board and the Commission found that improvements are needed in the areas of collecting water conservation data and in consistency of methodology used for data analysis.

The Council has determined that any evaluation of, and any comparison to, target and goal guidelines is only valid if a consistent methodology is used. To that end, the Council, in cooperation with Board and Commission staff, has identified some future possibilities of developing more specific reporting guidelines for collecting data on population and water use by sectors to facilitate consistent calculation of gallons per capita per day for public water providers and user groups.

The state's current reporting requirements primarily serve purposes related to water use permitting, water use volume, and assessments of water supply planning. The following is a brief historical summary of the legislative initiatives and current conservation reporting activities administered at the state level.

Table 5. Water Conservation Reporting Requirements

Report Name	Who is Required to Report	When is Report Due
Water Conservation Plan	<ul style="list-style-type: none"> ○ Retail Public Water Suppliers with 3,300 or more connections ○ A non-irrigation surface water right greater than 1,000 acre-feet/year, or ○ An irrigation surface water right greater than 10,000 acre-feet/year ○ Water conservation plans are required for all municipal, industrial, and irrigation water right applications 	Water conservation plans are submitted once every five years for non-irrigation water right holders of 1,000 acre-feet or more and irrigation water right holders of 10,000 acre-feet or more.
Water Conservation Annual Report	Entities currently required to have a water conservation plan on file with Board or Commission are required to submit a conservation annual report.	Water conservation annual reports are to be submitted by May 1.
Water Loss Audit	All entities with retail water connections are required to submit a water loss audit once every five years.	<ul style="list-style-type: none"> ○ Water loss audits are to be submitted once every five years by May 1; the next due date is May 1 of 2016. ○ Any entity receiving financial assistance from the Board in an amount great than \$500,000 is required to submit a water loss audit annually by May 1.
Water Use Survey	Entities that use surface water or groundwater for municipal, industrial, power generation, or mining purposes are required by Texas Water Code Section 16.012(m) to yearly submit a water use survey. The Board maintains the list of entities deemed necessary to complete the annual survey.	The water use survey is to be submitted every year by March 1.
Five-year Implementation Report	<ul style="list-style-type: none"> ○ A non-irrigation surface water right greater than 1,000 acre-feet/year, or ○ An irrigation surface water right greater than 10,000 acre-feet/year 	The implementation report is submitted once every five years
Drought Contingency Plan	<ul style="list-style-type: none"> ○ Retail Public Water Suppliers with 3,300 or more connections ○ Wholesale Public Water Suppliers ○ Irrigation Districts ○ Water rights applicants for municipal use 	Every five years

Moving Forward: Sector Based Reporting

In 2011 Senate Bill 181 was passed requiring the Board and the Commission, in consultation with the Water Conservation Advisory Council, to develop a uniform, consistent methodology and guidance for calculating water use and conservation. This methodology and guidance is to be used by a municipality or water utility in developing water conservation plans and preparing reports.

The methodology will establish a sector based analysis that can be used by water providers for the primary purpose of evaluating internal water conservation trends and needs. This reporting tool can be highly beneficial to water providers by providing more specific detail on the water use sectors and their usage. The water use sectors are as follows:

Senate Bill 181 Water Use Sector

- Residential Single-Family
- Residential Multi-Family
- Industrial
- Commercial
- Institutional
- Agriculture

Sector based reporting will enable water use analysis to be a more useful tool for long-term planning. With well-defined and consistent analyses of data and information, water providers and user groups can develop effective conservation initiatives and programs.

The methodology will incorporate standard definitions and formulas for key metrics along with instructional guidance. Specific guidance will be developed to address how gallons per capita per day should be determined and how it should be applied to population-dependent water use only. Emphasis will be placed on how gallons per capita per day evaluations should be for planning and evaluating and not for comparison of utilities.

Many categories of water use (such as agriculture and industry) are not directly related to population data and will require specific water use and conservation metrics that are appropriate for their specific needs. The administrative authorities have determined that Senate Bill 181 does not give the agencies the authority to develop specific metrics for other water use sectors such as agriculture and industry.

Several Council workgroup members have continued their efforts to review, develop, and enhance a calculator tool that can be used for more in-depth analysis of water use and gallons per capita per day. This type of comprehensive calculator would provide useful data for internal planning purposes as well as provide useful information for the development and implementation of conservation programs for public water providers.

The state of New Mexico has a gallons per capita per day workbook that helps water providers submit water use data and make gallons per capita per day analyses on a more uniform basis. The Council has adapted the New Mexico gallons per capita per day calculator for use in Texas. The calculator is posted on the Council website and comments are currently being solicited. The

calculator has the potential to help standardize reporting of water use data and including both volumes and number of connections by sector. The calculator also provides information for extracting population data from the U. S. Census and uses any change in the number of connections to make population corrections. To date, the calculator only focuses on actual data collection and analysis, and because it is an Excel workbook, it could easily be adapted to make water use and population projections that would allow the water provider to set targets and goals and to better understand results of conservation efforts. The Council strongly emphasizes the significance of sector based analysis in achieving a better understanding of water use and conservation success.

The Metrics Challenge: Gallons Per Capita Per Day

Gallons per capita per day is a common metric used by water purveyors for water supply planning and for tracking conservation success. However, gallons per capita per day can be confusing because until recently, a consistent methodology for calculation of gallons per capita per day did not exist. Methods of estimating service population and calculating gallons per capita per day can vary widely as can what water is included in the calculation. The tendency to use gallons per capita per day to compare very disparate communities only adds to the confusion. 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 and continues to be one of the main challenges using this metric.

Because water use data in many instances has been limited to total volume supplied and number of people served, total gallons per capita per day is currently the state's default metric for the evaluation of water use and conservation reporting.

Definition

Total Gallons per Capita per Day (GPCD) - The total amount of water diverted and/or pumped for potable use divided by the total permanent population divided by the days of the year. Diversion volumes of reuse as defined in Texas Administrative Code Chapter 288.1 shall be credited against total diversion volumes for the purposes of calculating gallons per capita per day for targets and goals. (TAC Chapter 288.1)

Calculation

$$\text{Total GPCD} = (\text{Total System Input} \div \text{Permanent Population}) \div 365$$

- Total System Input = Water Produced + Wholesale Water Imported – Wholesale Exported
 - *Water Produced = Volume produced from own sources*
 - *Wholesale Water Imported = wholesale water purchased or imported from other sources into the distribution system*
 - *Wholesale Exported = Wholesale water sold or transferred out of the distribution system*
- Permanent Population = Total permanent population of service area which includes single-family, multi-family, and group quarter

However, this total gallons per capita per day 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.

With the recent enhancements dictated by Senate Bill 181 that include a new sector based methodology for reporting and instructional guidance, state agencies hope to encourage appropriate uses of metrics. The guidance and reporting modifications emphasize a breakdown of water use into sectors such as residential and commercial. Sector based reporting facilitates water use analysis as a useful tool for long-term planning and helps identify which conservation programs yield the best results.

For some providers, it is difficult to calculate provider service area. Also, various methods for estimating population exist. At times providers include the entire population of a region instead of just the portion served by the provider. In most other circumstances providers have to extrapolate estimated population figures from 10 year census data. Providers and utilities continually strive to accurately derive their population using credible techniques; however, improvements are needed.

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 residential gallons per capita per

day lacks standardization. There are additional issues relating to the inclusion of transient workers who commute daily from other jurisdictions in “customer” populations.

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. For this reason, a comparison of communities based on a single gallons per capita per day alone can be very misleading. Total gallons per capita per day comparisons between communities continue to be a challenge. Water providers and utilities are encouraged to use their gallons per capita per day history and goals to measure the water efficiency progress within their community.

Future Potential for Water Use Metrics

The Council has worked closely with the Board and the Commission on evaluating the future potential for standardized metrics. The Council recognizes that Texas has a wide range of per capita water use because its water utilities have varied service and population profiles. Similarly, simple comparisons of per capita water use between Texas municipal water supply providers do not consider significant differences in climate and geography. Without additional data and analysis, making such comparisons may lead to inaccurate conclusions about use efficiencies among those providers.

Several water use sectors, especially irrigated agriculture, industrial processes, and steam electric generation, should be analyzed with unique and appropriate units and metrics. It is evident that tools and resources will need to be developed on a state level to create the standardized metrics and methodologies that are appropriate for various water user sectors.

Another area where improvements are needed is in the estimation of annual population. A consistent methodology to estimate the annual population of water providers is necessary for consistent and accurate calculations of gallons per capita per day estimates. Efforts have been initiated to address this challenge; however, more progress is needed. In 2011 the Board received a finished report on a project that aimed to develop current and accurate maps of service area boundaries of Texas public water providers. A geodatabase was developed that supports standardized basic data used by the Board staff and regional water planning groups, as well as any other data that might help facilitate the planning process.

VII. Advancing 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 economic development and for the natural environment, agricultural production, and human health. The 2012 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 24 percent of the projected additional water supply needed in 2060—a total of about 2 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 to fairly and accurately assess which efforts are achieving the greatest savings from the level of resources that are being committed. To achieve success in conservation on local, regional, and state levels, efforts must be focused on the following priority areas.

Implementation of 2012 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 increase by over 80 percent 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 of meeting 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 continually makes 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 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. 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. Furthermore, not implementing the plan could result in economic losses in the billions, including job losses. 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.

Enhanced Data Collection and Analysis

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.

Because water conservation is a key strategy in meeting the state’s future water needs, steps should be taken to track and measure the implementation levels and savings of conservation strategies and programs. In the 2012 State Water Plan, the regional water planning groups identify strategies to meet certain long-term goals and needs. Until recently there was not a clearly defined mechanism for how the regional water planning groups measure or monitor the progress in implementation of those strategies. Currently, efforts are underway to include information on implementing the next round of regional water supply planning.

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- and 10-year targets for water savings. These entities are also required to submit annual and five-year implementation reports on their progress in implementing their water conservation plans. Statute also required that any entity receiving financial assistance from the Board complete a water loss audit. These water conservation plans, 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, and goals and that measures the implementation levels associated with those strategies and goals. Many of the recent statutes relating to reporting requirements for water utilities and providers involve expanded data collection efforts for water conservation plans, water conservation implementation reports, and water loss audits. However, 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 more efficient and comprehensive analyses. 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.

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. Currently, the state is developing a sector based methodology and standards for water conservation reporting. The Board and the Commission 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 Accountability and Loss Control

Retail water providers would benefit from conducting annual water loss audits.

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. Based on information reported from 1,900 water loss audits for the year 2010, statewide water losses were estimated at 16.7 percent of municipal water system production. During reviews of loan applications, the Board has seen water losses as high as 50 percent for some water systems. In June 2012 the Board implemented a more detailed procedure (Appendix G) for reviewing water loss in the loan application review process.

The first step toward addressing high water losses is measuring where 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.

It is important for a utility to be aware of ALL water use in their system; metered and unmetered, including water loss. Tracking water loss and making improvements can often be financially beneficial to the utility. Once aware of their water use data, a utility can identify if their water loss is "real" (leaks and breaks) or "apparent" (meter inaccuracy, etc.). This information can be used to identify the proper activities to reduce loss and direct programs as necessary. Leaks and line breaks can be a problem if a utility has older distribution lines and can be further

compounded by factors related to soil conditions and during times of drought. Meters should be checked and tested, starting with any master meters. Knowing how much water is truly entering a system is the first step toward accountability. A meter testing program of a utility's customer meters and a scheduled meter replacement program are important since those meters act as the "cash register" for the utility.

Texas Water Code Section 16.0121 requires all retail public utilities that provide potable water (about 3,500 in all) to submit a water loss audit to the Board every five years. During the 82nd Legislative Session, based in part on the Board Legislative Priorities report for the 81st Legislative Session, the legislature required annual reporting for retail public water supply utilities that receive financial assistance from Board. In the Board's Legislative Priorities for the 83rd session of the Texas Legislature, the recommendation is to require annual water loss audits from retail public utilities that serve 3,300 or more connections.

Leak detection, water use accountability, and water loss control are important water conservation measures for retail water providers. 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 2012 State Water Plan. Measuring—and ultimately addressing—water loss will help achieve those conservation goals.

Public Awareness

The capabilities of a statewide water conservation public awareness campaign, Water IQ: Know your water, should be expanded.

Public awareness programs elevate the importance of issues related to water conservation and should be considered one of the primary strategies to implement immediately as part of our long-term water supply planning efforts. Improvements should be made to support the full implementation, maintenance, market research and analysis of the Water IQ: Know your water campaign. In 2004 a statewide market research study reported that less than 30 percent of Texas citizens knew the source of their water. The same research found citizens were more likely to conserve once they knew about their water resources. The state's water conservation public awareness program was developed as a result of a collaborative effort that included strategy, research, and branding for a statewide water conservation effort. The research stressed the need for making individual Texans aware of the importance of water conservation and its role in meeting future water needs. As a result of this research, the brand "Water IQ: Know your water" was introduced as a way to bring awareness about water knowledge and to promote water conservation.

Public awareness and education are critical components in achieving municipal and agricultural water conservation goals and are often cited in the 2011 Regional Water Plans as part of a water conservation strategy. There is an immediate need for heightened water conservation messaging statewide.

Public awareness programs are active in a number of areas across the state; however, there are many regions of the state where utilities and providers simply do not have the resources to

develop their own public awareness programs. The Board's water conservation public awareness program, Water IQ: Know your water, can provide these entities with resources, information; and tools to spread conservation messaging in their local communities. This program has the potential to reach multiple and varying audiences successfully because the water conservation message is consistent and supported with research and data. The current program is limited and only allows the Board to provide basic services such as maintenance of a website, periodic updates to brochure literature, and limited attendance at public community events.

In addition to Water IQ, other local and regional programs across the state are also providing effective messages on water conservation awareness. An expanded and balanced approach would develop a comprehensive public awareness program strategy both before and during a severe drought. The approach could consist of implementation of a statewide, balanced communication mix that creates added-value support for local and regional outreach programs.

[Agricultural Water Conservation Incentives](#)

Economic incentives encourage the early adoption of voluntary agricultural water conservation best management practices to secure adequate water supplies for future generations of Texans.

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-share funding for agricultural producers is being reduced in current federal government budgets. The Texas Water Development Board's 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 State Soil and Water Conservation Board currently has a program that provides for significant water conservation. The State Water Supply Enhancement Program is a cost-effective program for enhancing water supplies in certain areas of the state.

The Texas State Soil and Water Conservation Board has also identified two programs that could conserve significant amounts of agricultural irrigation water. The first is a cost-share program to implement on-farm water conservation management plans based on agricultural water conservation best management practices. The second is a Texas State Soil and Water Conservation Board grant program to provide 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 Board and the Commission 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 incorporating best management practices into water suppliers' conservation plans, expanding services such as additional training and technical guidance will benefit water users in developing water conservation plans. Actively promoting 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 Board to update the guide as needed and directs the Council to monitor new technologies for possible inclusion in the guide. Currently, the Board, the Commission, and the Council have an established 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 the more successful water conservation programs tend to identify and implement best management practices as strategies for using water more efficiently. In particular, information gathered from reports to 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 the Texas State Soil and Water Conservation Board and the U.S. Department of Agriculture-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.

Energy and Water Nexus

Increase efforts to integrate energy and water supply planning as well as improve incentives for less water intensive systems.

As the population of Texas continues to grow, our state faces the challenge of supplying water and energy for both industry and people. Energy and water are vital resources that are closely linked and increasingly strained by rising demand. Increased coordination among state agencies, water planners, and industry would help identify water conservation opportunities associated with energy consumption and to identify the energy savings that are associated with water

conservation best management practices. Increasing efficiency in energy consumption can be one of the most effective methods to conserving our state's water supplies.

Substantially more site specific data are necessary for a full understanding of the nature of the energy water nexus in Texas. Water demand for electricity generation will depend on several factors including water sources, facility location, the available fuel mix for new generating capacity, the type of power plant, and the type of power plant cooling systems that are deployed. Likewise, the amount of electricity used to pump, treat, and deliver public water supply and to treat wastewater will depend on choices about water source and treatment technology. These trends and tradeoffs still need to be better understood, but it is undeniable that there will be important implications for energy and water policy at the state and local level.

Implementing advanced efficiency is the key to the sustainable use of both energy and water. Improving water efficiency will reduce power demand and improving energy efficiency will reduce water demand. Greater efficiency in usage of either energy or water will help to stretch our vital supplies of both, as well as reduce costs to water and power consumers. This includes a study of the end-user energy and water nexus.

Research and Education

Higher education institutions of Texas should encourage research and academic growth in the areas of water conservation.

Municipal and industrial water users are the fastest growing water user groups in Texas. 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 institutions in Texas. Traditionally, Texas universities with agricultural programs have had well-funded 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, industrial, commercial, and institutional water use sectors is needed. Additionally, there is a need for more academic programs that will produce trained water resource planning professionals.

Conservation Incentives for Industrial, Commercial, and Institutional Sectors

Additional emphasis is needed on industrial, commercial, and institutional water conservation programs.

With the rapid growth in the commercial and institutional sectors and the need to keep our industrial sector healthy, it is clear that close coordination of state water conservation activities with these sectors is vital. A special panel consisting of industrial, commercial, and institutional water users, water conservation professionals, selected members of the academic community,

and state agencies could examine how to incentivize these sectors to reduce water use and to determine what additional tools are needed to implement these savings.

Drought Preparedness

Improvements should be made to provide more technical assistance to water providers and water user groups for water management activities during times of drought.

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. However, it is important to be aware of the differences between a drought contingency plan and a water conservation plan.

Drought contingency plan - A strategy or combination of strategies for temporary supply and demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies. A drought contingency plan may be a separate document identified as such or may be contained within another water management document(s).

Water conservation plan - A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, and for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

The State Drought Preparedness Plan is prepared by the State Drought Preparedness Council and 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 and 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 from local Texas stakeholders in providing feedback regarding the effectiveness of planned or implemented mitigation measures. To insure that the state can meet this challenge when it does occur, the agencies continue to provide technical support to the Drought Preparedness Council and to individual public water suppliers. More information can be found at www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/stateDroughtPrepCouncil.htm.

Concluding Thoughts

Although there have been significant efforts in promoting and implementing water conservation in Texas, there is still room for improvement in advancing water conservation in the state.

As water demand projections depict a growing need for conservation, water user groups will need to refer to uniform tools and quality data to better plan for those needs. Primary efforts toward meeting future challenges should focus on enhancements such as expanded data collection and reporting efforts, defined standards, and an increase in research and development of expertise. As public awareness evolves, enhancements in analytical information and data collection will improve conservation tools and strategies, and ultimately these collective elements will allow for a more effective planning process. The economic future of Texas depends on how well the state is able to manage its water resources. Water conservation is a significant component of the state's water management strategies, and an immediate and focused effort is needed to develop plans for managing and achieving water conservation success.

APPENDIX A:

Water Conservation Legislative Initiatives

The following pages provide a quick overview of recent legislative initiatives related to water conservation.

Legislative Initiatives

In 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.

78th Texas Legislature (2003)

Water Conservation Implementation Task Force

Senate Bill 1094 directed the Water Conservation Implementation Task Force (Task Force) to review, evaluate and recommend optimum levels of water use efficiency and conservation for the state. The Task Force membership represented 16 interest groups and consisted of 32 members.

The Task Force was charged to review, evaluate, and recommend optimum levels of water use efficiency and conservation for Texas.

- Best Management Practices;
- Implementation of conservation strategies contained in regional water plans;
- A statewide public awareness program;
- State funding of incentive programs;
- Goals and targets for per capita water use considering climatic and demographic differences; and
- Evaluation of state oversight and support of conservation.

In addition to those charges, Senate Bill 1094 directed the Task Force to develop a Best-Management Practices Guide for use by Regional Planning Groups and political subdivisions responsible for water delivery service.

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, 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 Board's 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 Commission shall require a retail public utility that provides potable water service to 3,300 or more connections to submit to the Board's 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 Commission under this code shall submit a copy of the plan to the Board's executive administrator. Each entity that is required to submit a water conservation plan to the Board or the Commission shall report annually to the Board on the entity's progress in implementing the plan.

Senate Bill 3 directed that the Board 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 Board and the Commission, 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.

Senate Bill 181 directs the following:

“Not later than January 1, 2013, the TWDB and the Commission, 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 Board and the Commission, in consultation with the Water Conservation Advisory Council, developed 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 Board shall submit the first annual water loss audit report required by §16.0121, Texas Water Code, as amended by this Act. The initial water loss audit report submitted by a retail public utility under that section shall compute the utility’s most recent annual system water loss.”

Board staff has developed the necessary administrative rules and procedures to implement this legislation.

APPENDIX B:

Summaries of Water Efficiency Networks

The following pages provide a brief description of the activities and goals for three of the water efficiency networks located regionally around the state.

The Water Efficiency Network of North Texas (WENNT)

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The Water Efficiency Network of North Texas (WENNT) was established in June 2007 to help foster regional coordination of the many municipalities that were hit hard by a devastating drought that began in late 2005. As of this writing, WENNT has been meeting every month for over five years and consists of roughly 70 members representing 41 organizations throughout the Dallas/Fort Worth region. It is a mix of municipalities, water suppliers, industry specialists, regional partners and government representatives. It is with great satisfaction and pride that we see other regions in Texas start similar water efficiency groups based on our model.

Our story has its roots firmly planted in the aftermath of one of the driest periods on record, the likes of which we had not seen since the 1950's. For 18 exhausting months (Oct 2005 – Mar 2007), water suppliers, municipalities and consumers struggled to strike a balance between water supply and demand. For the first time in decades the highly developed urban areas of Dallas and Fort Worth were faced with the daunting task of drastically curbing the water consumption of more than 1.5 million water customers.

Municipal water providers were charged by regional water suppliers to convey a sense of urgency to the citizens and businesses of North Texas regarding the serious implications of a quickly dwindling water supply. Lake levels were dropping at an alarming rate and outdoor water use had to be substantially curbed. The time spent on drought contingency plans, water use restrictions, violation enforcement and public education was all consuming for every municipality in the region. The onslaught of questions, concerns and constraints from water suppliers, city councils, municipal service departments (such as fire, public works and parks departments) as well as increasing irritation from both commercial and residential water customers fully engulfed most municipal water departments.

In March of 2007, as everyone was gearing up for another agonizing spring and summer of intense heat (both from the weather and their water customers), relief came in the way of heavy and widespread April showers. A collective “hallelujah” was heard across the land. The much needed rains had returned to North Texas but it had been a long and gut wrenching 18 months for everyone involved. Water suppliers and municipalities were exhausted and water users were ready to “get back to normal.”

As local water conservation specialists began the task of digging out from the mountain of data generated by their drought response strategies it was common practice to compare notes with neighboring cities. It soon became apparent that cooperation and coordination would be beneficial to all and in June of 2007 the first meeting of the Water Efficiency Network of North Texas (WENNT) was held. Meeting attendance was very small at first, maybe 5 – 6 municipalities sitting around the table with a brown bag lunch. But as word got out about the group, attendance numbers began to soar. In an amazing show of solidarity, each participating

city brought their ideas, information, techniques and communication pieces to share at the monthly meetings. Sharing electronic media such as brochures, presentations, pictures, maps and graphs for presentations and interactive educational materials helped alleviate the feeling that one was alone in his or her struggle to reach their community. In addition, sharing information and education materials saved countless budget dollars and drastically reduced production time for public outreach messages.

The group has cooperatively produced and funded two projects. The first was a 6 panel full color brochure that was adapted (with gracious permission) from an existing Texas AgriLife Extension Earthkind® publication. Group members customized the material to specifically and strategically focus on the primary practices of efficient landscape water use in North Texas. While the group as a whole recognizes the limited benefit of educational brochures, this publication has been very well received by the general public. It is colorful, easy to understand, and speaks directly to the region's soil type, plant materials and irrigation challenges. It is used more as a simplified how-to instruction booklet rather than a common informational brochure.

Our second project was to develop a video series that highlights six major cornerstones of outdoor (landscape) water efficiency. The subjects are General Conservation Indoor and Out, Efficient Irrigation Techniques for Texas Soils, Basic Maintenance Elements of an Irrigation System, Seasonal Adjustments for Irrigation Controllers, Smart (ET) Controllers and Efficient Irrigation Technologies (drip, rotator nozzles, etc.). Through a grant process, four out of the six videos were cooperatively produced and were distributed throughout the membership and beyond in September 2009.

In addition to the development and sharing of educational resources, WENNT members have joined forces to develop and deliver regional workshops, symposiums, seminars and trainings to educate citizens with consistent messaging on water use efficiency practices.

Our meetings are always held the 2nd Friday of the month from 10am – Noon. The agenda always begins with a guest speaker that offers education on new water efficiency technologies, products or services. Additional agenda items include legislation, successful (and not-so-successful) events and programs, rebate program experiences, purchasing and vendor information, consumption and data management, state and local reporting requirements, etc. Meetings are hosted by a different city each month and lunch afterwards is where much of the camaraderie and relationship building happens.

In summary, we openly share information with each other, we learn something new each month (products, services, programs, etc.) and we cooperatively produce and purchase what we need to be successful in our conservation efforts. And most importantly, we have developed significant and long lasting relationships that inspire and encourage us to be bigger than the sum of our parts.

Central Texas Water Efficiency Network (CTWEN)

Jessica Woods

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The Central Texas Water Efficiency Network (CTWEN) was created in April 2011, after a water conservation symposium was planned and sponsored by several Central Texas water purveyors, suppliers, and environmentally minded groups: AARO, the Cities of San Marcos, Cedar Park and Round Rock, Austin Water utility, the Lower Colorado River Authority, the Sierra Club, and the Barton Springs Edwards Aquifer Authority. These entities funded, staffed, and presented at a one-day event in Cedar Park, in March 2011, called “The Business Case for Water Conservation.” It was a huge success, with approximately 150 people in attendance! At the end of the day, attendees were polled about their interest in creating and joining a regional water efficiency networking group.

From that interested party list, a group was created of about forty folks that wanted to be involved with furthering the cause of water efficiency in the region. The group was officially created and named after the Water Efficiency Network of North Texas. It is comprised of water conservation specialists, coordinators, and advocates from a variety of water utilities, MUDs, water districts, municipalities, and non-profit organizations. The CTWEN held its first meeting in May 2011 and has been meeting nearly monthly since. The location is rotated each month, with everyone hosting a meeting location and to get us familiar with our Central Texas region. The group’s defined purpose is to openly and actively share information and promote water efficiency education legislation, programs, technologies, and all other integral components of water conservation in order to regionally have an impact on water supplies and use.

The meetings last about two hours and are comprised of a guest speaker—who briefs the group on a relevant water topic such as car wash water usage or gray water—and then regional business, which has been dominated by the drought this last year, what else!?! There are no formal membership requirements; we simply want folks that are water orientated and not vendors, and no dues requirements. Attendance and participation is strictly voluntary for the sake of information sharing and regional collaboration.

There have been a few subcommittees formed, first for publicity—working on the group’s website, Facebook page, and the press release and yard sign we funded, which promote wise outdoor water use. The signs are available in nearly all the central Texas towns that are involved in CTWEN. Seeing the same sign in multiple towns provides regional cohesiveness during the drought, letting our residents know we are all in this together. The signs also have a QR code printed on them, which leads the person to CTWEN’s website. Another committee was formed to plan the second annual water symposium, which was held this past March 2012 in Austin. While it didn’t have the same attendance rates as the first one, it was still full of valuable information and achieved its purpose. It was called “Drop by Droplless: Managing your Resources through a Drought.” Plans are already underway for next year’s event! We are also starting to work with the Community Association Institute (CAI), which is a group of property

management associations or companies, that have neighborhoods or properties they manage within our Central Texas region. We have a committee that is working to provide them relevant and timely articles on water conservation and efficiency for their monthly member magazine.

Currently we have between 20-25 persons attending the meetings regularly and our presence is beginning to grow locally, with interested professionals asking to join the group or present at a meeting. The best and most beneficial part about the group is the personal aspect—meaning we are literally getting to know our neighbors. We now know who to contact in other towns and organizations when we need a questions answered or have a problem that we'd like some input on. We have colleagues to turn to, to ask how they would handle certain situations. Of course, there is the strictly professional side, where we can let each other know when our restrictions are about to change or we are making modifications to our Drought Contingency Plans, so we can all stay on the same page. Our goal is the same, no matter what group or town we are representing, and that is to be water stewards in our community and our region.

Gulf Coast/Montgomery County Water Efficiency Network (GCMCWEN)

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The Gulf Coast/Montgomery County Water Efficiency Network (GCMCWEN) held its first meeting in June of 2012, pursuant to 2 water efficiency workshops held in the greater Houston area. Attendees at those workshops were asked to express their interest in forming a water efficiency network, with the Lone Star Groundwater Conservation District acting as host and the organizing entity for the group. A significant number of attendees expressed their interest in continuing to meet on a regular basis, and the first meeting of the group took place in May in the form of a Water Conservation Workshop sponsored by Lone Star and the San Jacinto River Authority and held at the Lone Star Convention and Expo Center. The Network has met every month since that initial gathering.

It is the goal of the Gulf Coast/Montgomery County Water Efficiency Network to bring interested water professionals from around the region together to share information relative to water conservation, the efficient use and protection of our water supplies, new laws and regulations affecting water quality and production, as well as evolving technologies in the water business. The group operates under the premise that there is a wealth of information to be gained by getting interested professionals together on a regular basis to share their experiences and successes with others having the same goal; the efficient use of our water resources.

As the Gulf Coast/Montgomery region is a very large and populous area, meeting locations are rotated each month. The meetings are scheduled for afternoons and have typically lasted less than 2 hours. A guest speaker is featured at each meeting, followed by a “roundtable” discussion, giving all members the opportunity to share their experiences (successes and perhaps less successful endeavors) with the group. To date, our speakers have included representatives from the City of Houston detailing the city’s advances in web-based technology, including “smart phone” notification of customers when their water usage exceeds pre-determined parameters. Scheduled speaker topics include discussions of the conservation factor/strategy in the Region H Water Plan 2012, and advances in water conservation by the City of Conroe. While the presentations are an important part of the network, the sharing of information from members remains the primary focus of the group. Members are encouraged to submit topics of interest, as well as recommend particular speakers.

The Gulf Coast/Montgomery County Water Efficiency Network meetings have been very well attended (over 50 persons attended the meeting in August) and we are hopeful that interest will remain high and that participation will increase as time goes on and the word gets out. We are a very young group, but hope to expand our methods to include a website, jointly sponsored conservation initiatives and outreach programs in addition to our monthly meetings.

APPENDIX C:

Stakeholder Participation Process

The stakeholder participation process describes the progressive stages that the Council and stakeholders can anticipate during the development or revision of a best management practice. These stages are identified in order to aid the Council and interested stakeholders during their planning and development efforts. Stakeholders are encouraged to participate at any stage in the process.

Stakeholder Participation Process

The following are progressive stages that the Council and stakeholders can anticipate during the development or revision of a best management practice. These stages are identified in order to aid the Council and interested stakeholders during their planning and development efforts. Stakeholders are encouraged to participate at any stage in the process.

1. Organization Stage

Status of Best Management Practice - Introductory Review and Evaluation

- If necessary, possibly host workgroup work sessions, meetings, or conference calls to discuss priorities, issues, and delegated tasks
- Discuss a particular best management practice revision/addition or a small set of best management practice revisions/additions
- Discuss issues to consider in development of a best management practice
- Delegate assignments to write and develop preliminary content

2. Brainstorming Stage

Status of Best Management Practice - Development of Preliminary Draft

- If necessary, possibly host workgroup work sessions, meetings, or conference calls to discuss content of preliminary draft
- Officially formulate and produce a preliminary draft of best management practice

Status of Best Management Practice – Public Comment Period on Preliminary Draft

- Establish a public comment period
- Post and share preliminary draft with stakeholders.
- If necessary, possibly host workgroup work sessions, meetings, or conference calls to collect comments and feedback on preliminary draft

3. Refinement Stage

Status of Best Management Practice - Development of Secondary Draft

- Incorporate comments and feedback received.
- Delegate assignments to revise and edit draft
- Officially formulate and produce a secondary draft of best management practice

Status of Best Management Practice – Public Comment Period on Secondary Draft

- Establish a public comment period
- Post and share secondary draft with stakeholders
- If necessary, possibly host workgroup work sessions, meetings, or conference calls to collect comments and feedback on preliminary draft

4. Formalization Stage

Status of Best Management Practice - Development of Final BMP

- Incorporate comments and feedback received
- Delegate assignments to revise and edit draft
- Officially formulate and produce a final best management practice

Status of Best Management Practice – Submission to TCEQ and TWDB

- WCAC votes and approves the best management practice for submission to the Commission and the Board
- Present the final best management practice to agencies

Status of Best Management Practice – Adoption

- Best management practice has been adopted by both agencies and will be added to the Best Management Practices Guide

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APPENDIX D:

Texas Gallons Per Capita Per Day Calculator

The following pages provide a quick overview of recent efforts to enhance a gallons per capita per day calculator tool.

Texas Gallons Per Capita Per Day Calculator

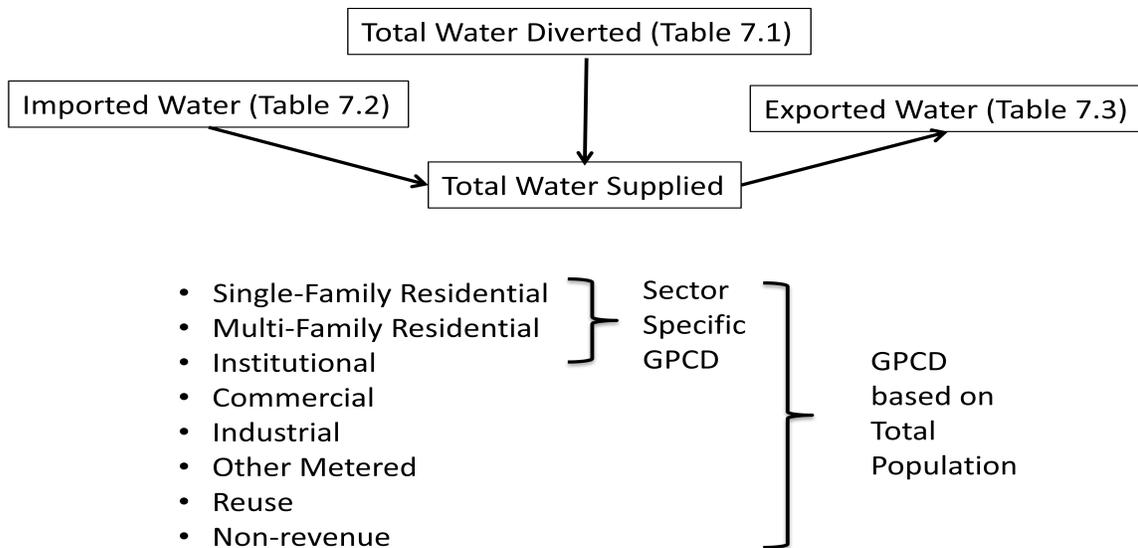
The Council has developed a Microsoft Excel workbook to enable reporting of water use data. The workbook is an adaptation of the New Mexico calculator that has been in use for a few years. Significant redesign of the workbook was made in large part based on the experience that New Mexico has had in their implementation.

Overall the New Mexico approach does an excellent job of balancing the desire for more detailed water use information against the effort required by water suppliers to generate the data.

Basically, the Texas gallons per capita per day calculator strikes the same balance and collects the following data:

1. Population split between single-family, multi-family and institutional.
2. Water volumes by year or month with the ability to split the supplied volumes into eight sectors as shown by the chart below.
3. The number of utility water connections that can be split for each of the same eight sectors.

Utility Water Reporting



The Texas gallons per capita per day calculator includes instructions and links for obtaining population information from the U.S. Census tables. Using the census data, a person's per connection ratio is calculated that allows the utility to adjust population numbers between census years based on the change in service connections.

Based on the collected data the calculator computes the sector based gallons per capita per day for the three population dependent sectors (single-family, multi-family, and institutional) as well as gallons per capita per day for every sector based on total population.

The Texas gallons per capita per day calculator also provides charts showing the input data and the computed gallons per capita per day values. The calculator is simply a tool for reporting water use and displaying the results. Using a Microsoft Excel workbook makes it easy for a water provider to expand the analytical use of the data in whatever manner they might choose such as forecasting future water demand and predicting conservation efficiencies by adding worksheets to their own workbook.

The calculator is currently posted on the Water Conservation Advisory Council website for review and comment. Expansion of the report information to include other report information currently collected by the Board and the Commission is possible and can be considered.

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APPENDIX E:

Conservation in Regional Water Planning Groups

Recommended Strategies and Conservation Recommendations

The following pages provide excerpts from the Water for Texas 2012 State Water Plan. The excerpts focus on conservation recommendations within each regional planning group and depict the role that conservation has in those planning areas. Note that for consistency, figure numbers in this section match chapter 2 of the 2012 State Water Plan.

Region A Panhandle

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Panhandle Planning Group recommended water management strategies focused on conservation and groundwater development. It also recommended connecting to the Palo Duro Reservoir. In all, the strategies would provide 648,221 acre-feet of additional water supply by the year 2060 (Figure A.3) at a total capital cost of \$739 million. However, the Canadian River Municipal Water Authority will provide some of this water to customers in the Llano Estacado Region. Because there were no economically feasible strategies identified to meet their needs, up to six counties in the region have unmet irrigation needs across the planning horizon, and 30,307 acre-feet of unmet irrigation needs in 2060.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent 86 percent of the total volume of water associated with all recommended strategies (Figures A.3 and A.4). Water conservation was recommended for every municipal need and for all irrigation water user groups in the region. Irrigation conservation would be achieved through irrigation equipment improvements, conservation tillage practices, and the adoption of drought-resistant crop varieties.

FIGURE A.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

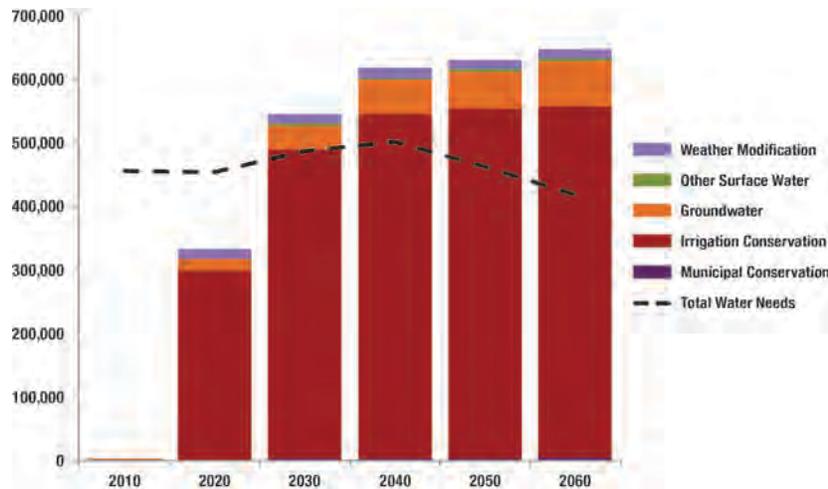
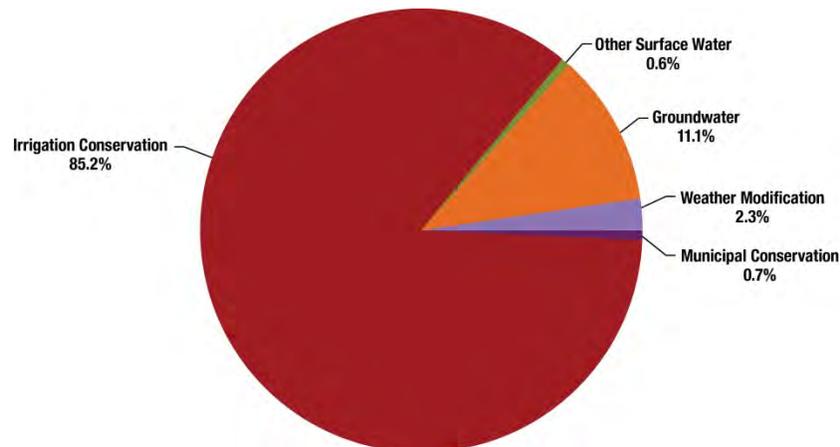


FIGURE A.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region B

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Region B Planning Group recommended water management strategies including groundwater development, direct reuse, reservoir system operation changes, and construction of Lake Ringgold. In all, the strategies would provide 77,003 acre-feet of additional water supply by the year 2060 (Figures B.3 and B.4) at a total capital cost of \$499.2 million. Implementing the recommended water management strategies will meet regional needs projected to occur for 2020 and beyond.

CONSERVATION RECOMMENDATIONS

Conservation strategies for municipal and irrigation water users represent 19 percent of the total volume of water associated with all recommended strategies in 2060. Municipal water conservation was recommended for every municipal and county-other water user group with a need. Irrigation conservation is planned to be accomplished through an irrigation canal lining strategy.

FIGURE B.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

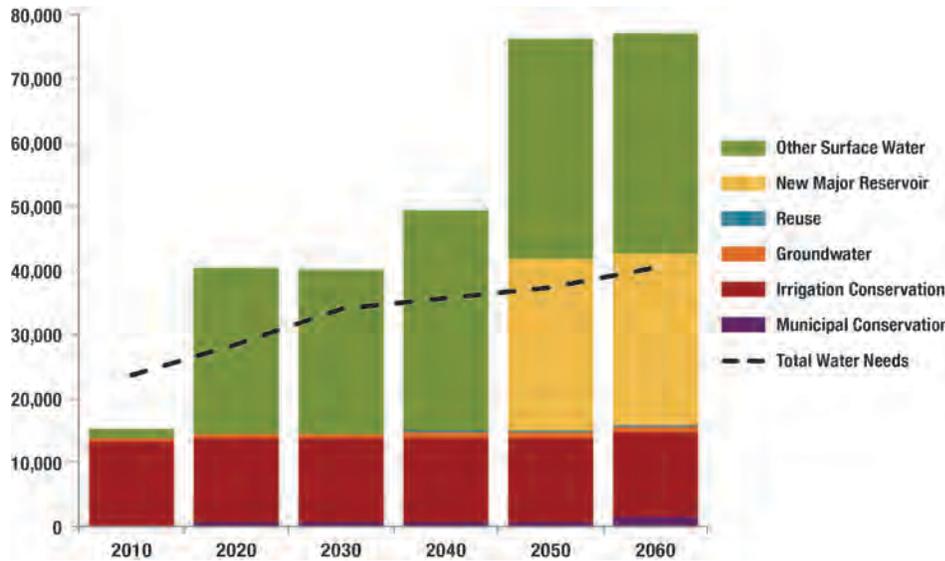
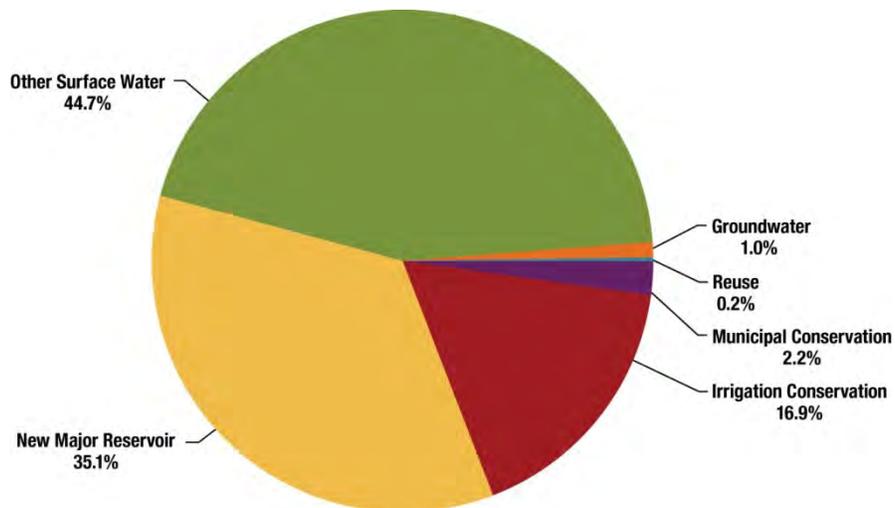


FIGURE B.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region C

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Region C considered a variety of water management strategies to meet needs. In all, the strategies provide an additional 2.4 million acre-feet by 2060 (Figures C.3 and C.4), with a total capital cost of \$21.5 billion if all the recommended water management strategies are implemented. The plan recommends four new major reservoirs: Lower Bois d’ Arc, Ralph Hall, Marvin Nichols, and Fastrill Replacement Project.

CONSERVATION RECOMMENDATIONS

Conservation strategies account for approximately 12 percent (290,709 acre-feet) of the total volume of water associated with all recommended strategies. A basic conservation package, including education, pricing structure, water waste prohibitions, water system audits, and plumbing code changes, was recommended for all municipal water user groups in Region C. An expanded conservation package, including additional strategies such as landscape irrigation restrictions and residential water audits, was recommended for some municipal water user groups.

FIGURE C.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

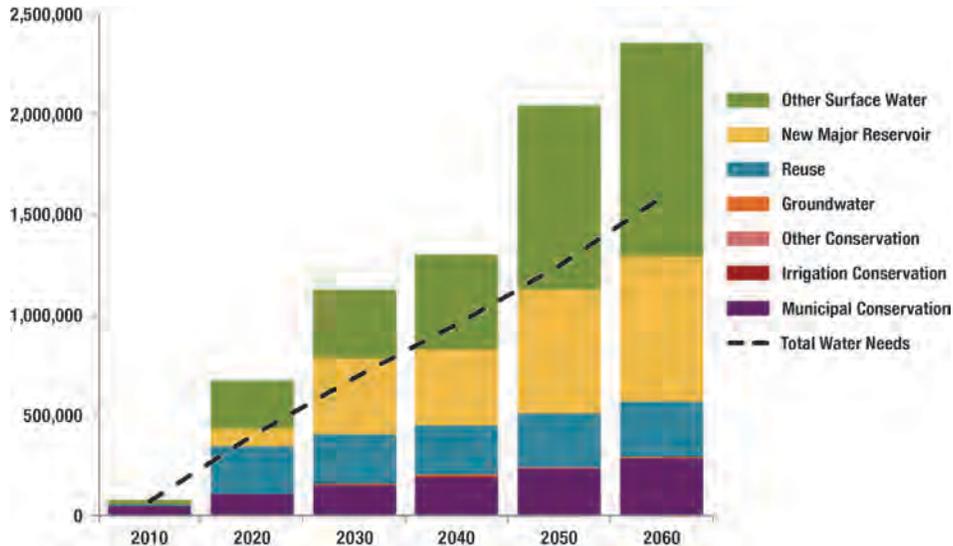
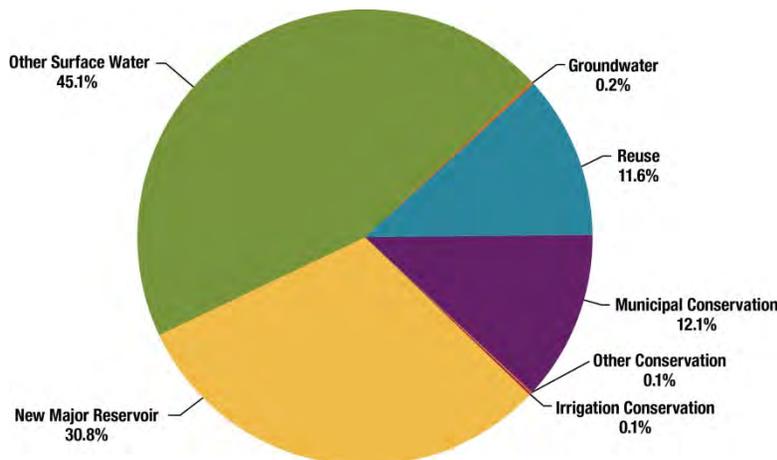


FIGURE C.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region D North East Texas

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Of the 61 identified shortages in the region, 21 are the result of contract expirations. However, the planning group assumed that all contracts would be renewed. For the remaining projected shortages, the planning group recommended two types of water management strategies to meet needs: new groundwater wells and new surface water purchases. If fully implemented, recommended water management strategies would provide an additional 98,466 acre-feet of supply in the year 2060 (Figures D.3 and D.4) at a total capital cost of \$38.5 million. Although groundwater will provide more individual water user groups with water, surface water constitutes approximately 93 percent of the total volume of supply from recommended water management strategies (Figure D.4).

CONSERVATION RECOMMENDATIONS

The North East Texas Planning Group considered conservation strategies for each water user group with a need and a per capita water use greater than 140 gallons per capita per day. Because costs of conservation strategies were relatively high due to the small size of the entities and amounts of water involved, the region did not recommend conservation as a water management strategy.

FIGURE D.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

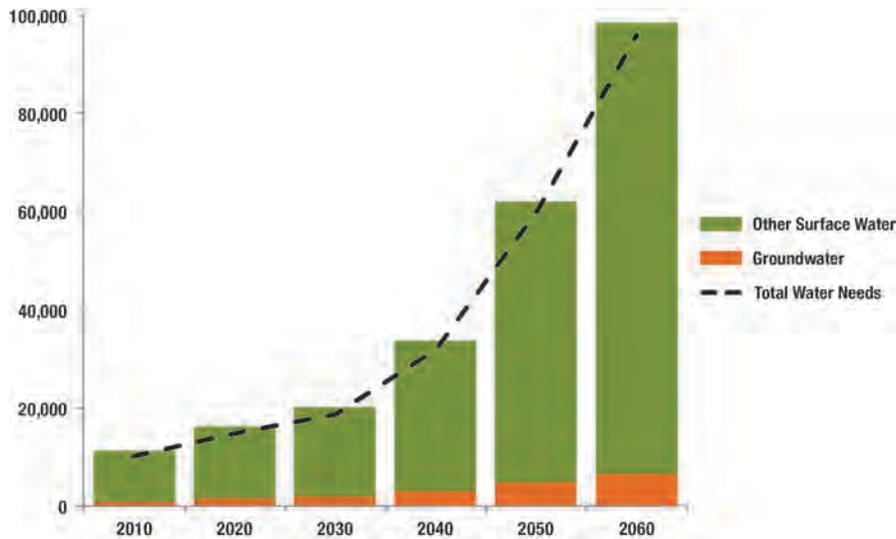
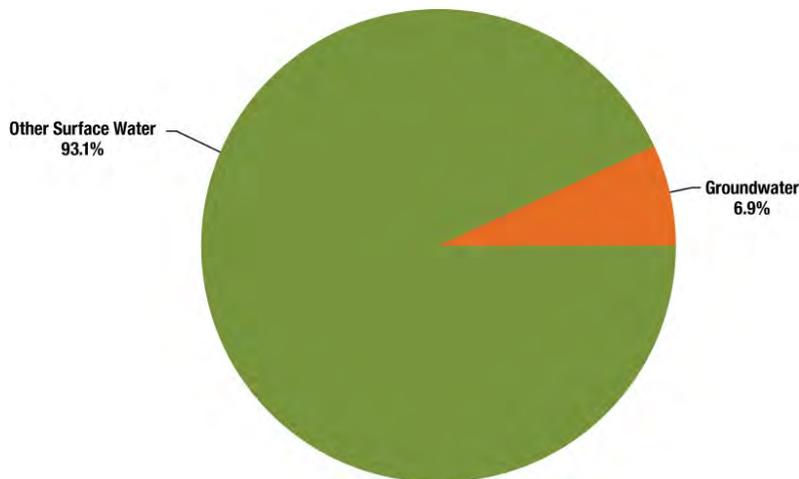


FIGURE D.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY



Region E Far West Texas

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Far West Texas Planning Group recommended a variety of water management strategies, including municipal conservation, direct reuse of reclaimed water, increases from the Rio Grande managed conjunctively with local groundwater, and imports of additional desalinated groundwater from more remote parts of the planning area. In all, the strategies would provide 130,526 acre-feet of additional water supply by the year 2060 (Figures E.3 and E.4) at a total capital cost of \$842.1 million. The Far West Texas Region recommended an integrated water management strategy to meet needs in El Paso, which represents combinations of various sources. Because there were no economically feasible strategies identified, three counties have unmet irrigation needs during drought of record conditions ranging from 209,591 acre-feet in 2010 to 161,775 acre-feet by 2060.

CONSERVATION RECOMMENDATIONS

Conservation strategies for municipal and irrigation water users represent 40 percent of the total volume of water associated with all recommended water management strategies in 2060. Municipal conservation strategies recommended for the City of El Paso have a goal of 140 gallons per capita per day of water use. Total water conservation savings in the plan, including savings from efficient plumbing fixtures as well as improved irrigation scheduling, are projected to be 52,275 acre-feet by 2060.

FIGURE E.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

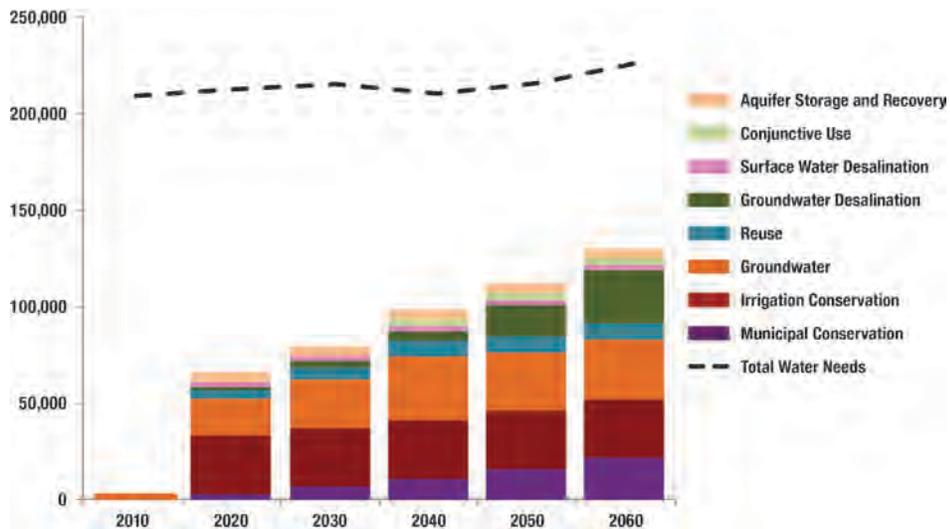
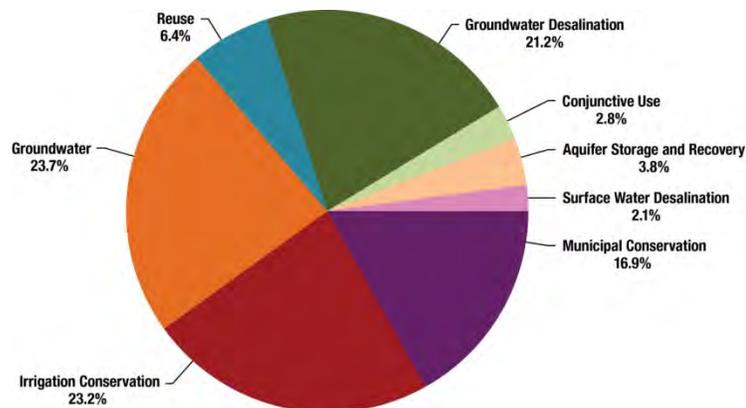


FIGURE E.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region F

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Region F recommended a variety of water management strategies to meet water supply needs (Figures F.3 and F.4). In all, the strategies would provide 235,198 acre-feet of additional water supply by the year 2060 at a total capital cost of \$914.6 million. Because economically feasible strategies could not be identified, 94,108 acre-feet of irrigation needs in 15 counties and steam-electric needs of 14,935 acre-feet in three counties are unmet in 2060.

CONSERVATION RECOMMENDATIONS

Conservation strategies, including municipal and advanced irrigation, provide the largest volume of supply for all strategies in the region. By 2060, they account for 35 percent of the total volume associated with all recommended strategies. The bulk of conservation savings are provided by advanced irrigation strategies that represent over 72,244 acre-feet of savings, 31 percent of the total in 2060.

FIGURE F.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

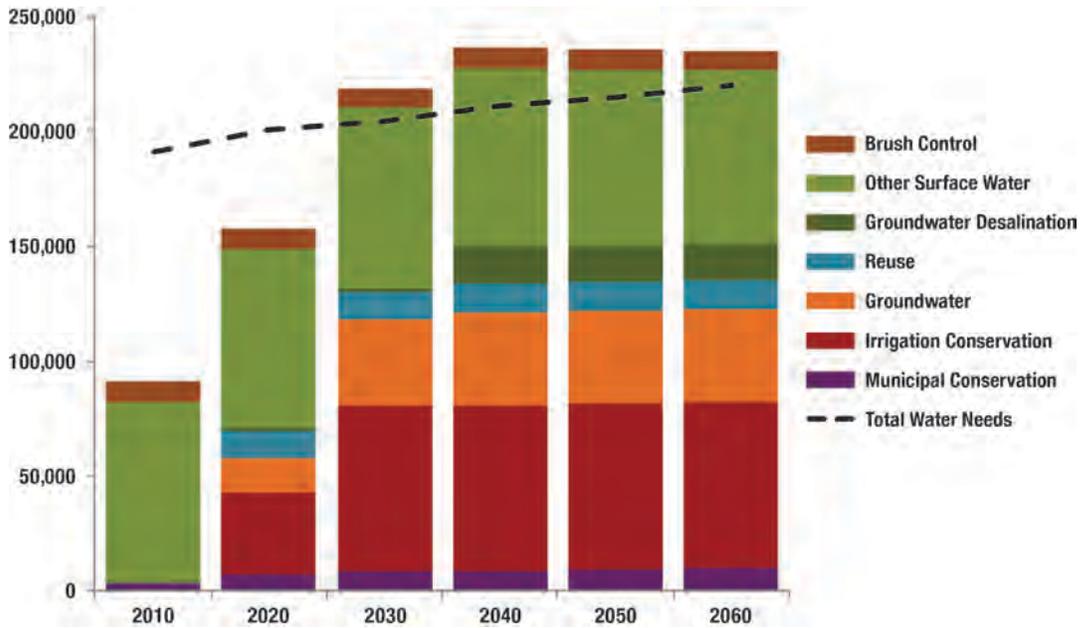
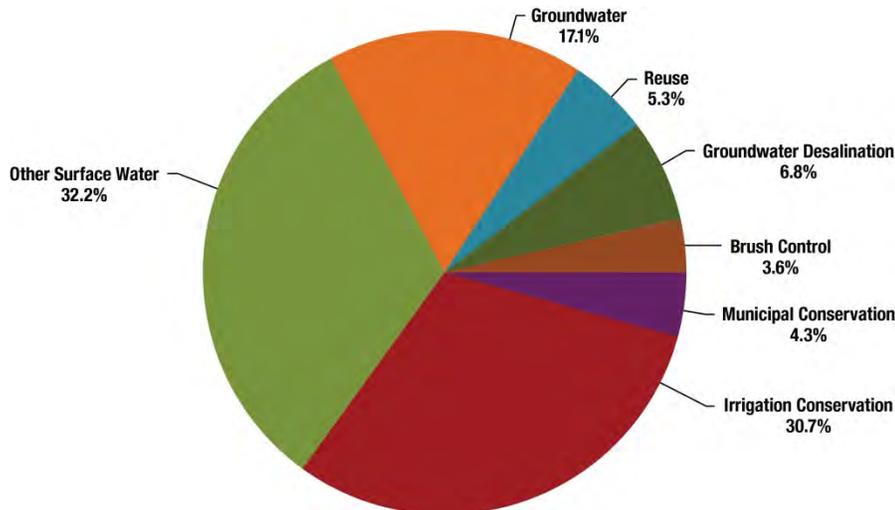


FIGURE F.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region G Brazos

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Brazos G Planning Group recommended a variety of water management strategies that would provide more water than is required to meet future needs (Figures G.3 and G.4). In all, the strategies would provide 587,084 acre-feet of additional water supply by the year 2060 at a total capital cost of \$3.2 billion. Some of this water could be made available to other regions with needs. Because there were no economically feasible strategies identified to meet their needs, six counties in the region have unmet irrigation needs (ranging from 49,973 acre-feet in 2010 to 33,932 acre-feet by 2060). Some mining needs go unmet in each decade (ranging from 1,800 acre-feet in 2010 to 2,567 acre-feet in 2060) due to a lack of feasible strategies. Some municipal (Abilene, Round Rock, and Cedar Park) needs (totaling 2,196 acre-feet) and some steam-electric needs (36,086 acre-feet) would be unmet in case of drought in 2010 because infrastructure is not yet in place to access the supply.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent 7 percent of the total volume of water associated with all recommended strategies in 2060. Water conservation was recommended for every municipal water user group that had both a need and water use greater than 140 gallons per capita per day.

FIGURE G.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

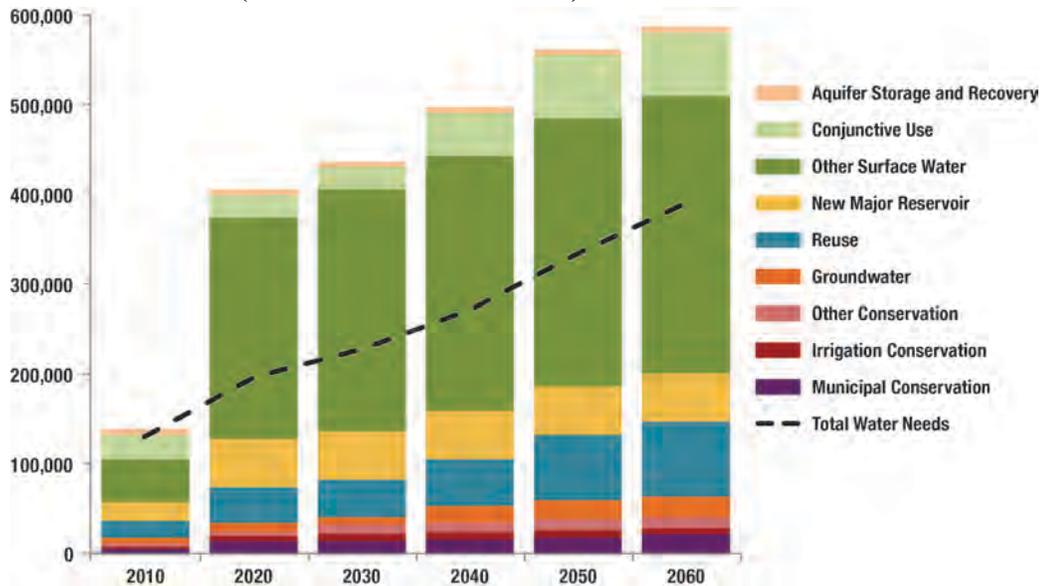
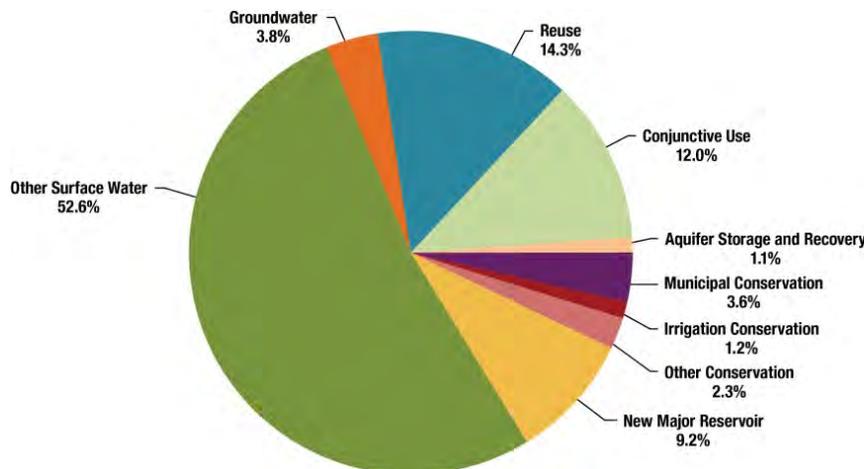


FIGURE G.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region H

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Region H Planning Group’s recommended water management strategies would provide 1,501,180 acre-feet of additional water supply to meet all projected needs by the year 2060 (Figures H.3 and H.4) at a total capital cost of \$12 billion. Contracts and conveyance of existing supplies provide the largest share of strategy supply in the region, followed by reuse projects and new supplies from five new major reservoirs in the lower Brazos basin. Recommended strategies also include new groundwater supplies, conservation programs, and seawater desalination at a facility in Freeport (Figures H.3 and H.4).

CONSERVATION RECOMMENDATIONS

The planning group considered conservation strategies for water user groups with needs. Recommended municipal, irrigation, and industrial water conservation strategies provide savings of 183,933 acre-feet per year. Municipal conservation accounts for up to 105,494 acre-feet of savings; irrigation conservation is recommended to save up to 77,881 acre-feet; and industrial conservation will save 588 acre-feet per year by 2060.

FIGURE H.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

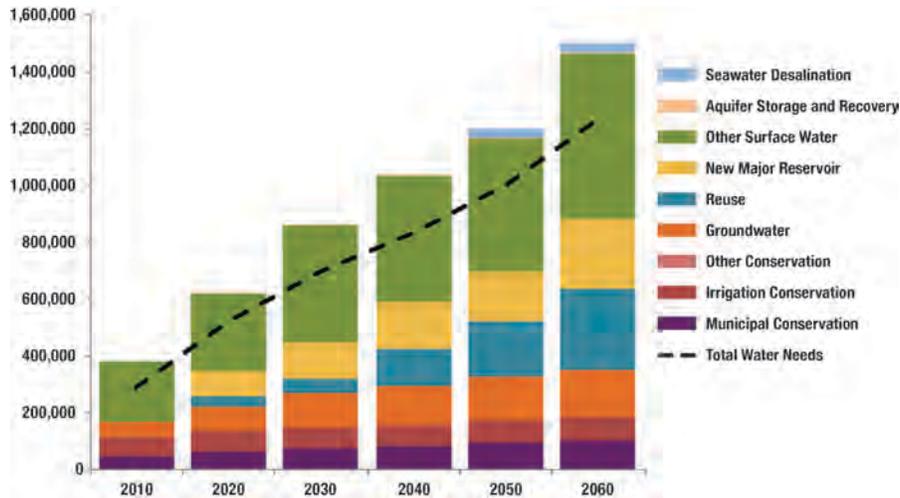
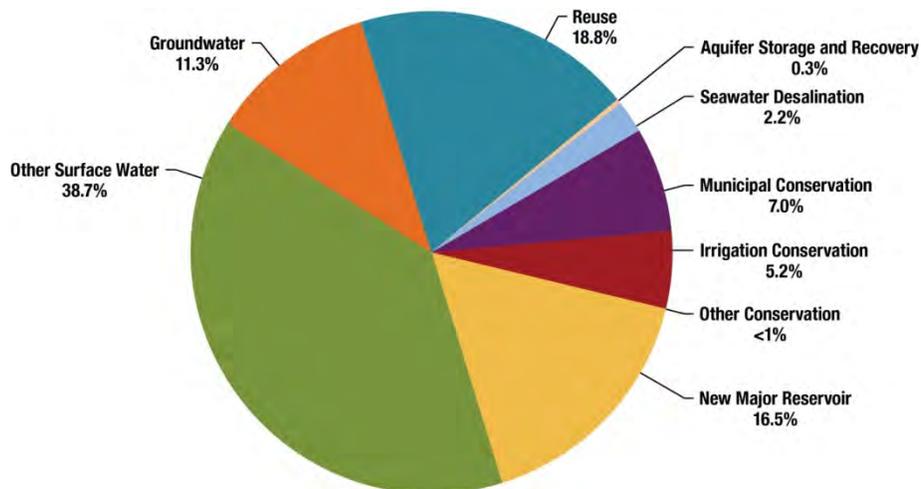


FIGURE H.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region I East Texas

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Water management strategies recommended in the East Texas Regional Water Plan result in 638,076 acre-feet of additional water supply to meet most projected needs by the year 2060 (Figures I.3 and I.4) at a total capital cost of \$884.8 million. Because no feasible water management strategies could be identified, a portion of steam-electric needs in 2010 and mining needs in all decades in Hardin County, totaling 10,770 acre-feet by 2060, were not met.

CONSERVATION RECOMMENDATIONS

Water conservation was evaluated for every municipal water user group with a need and water use greater than 140 gallons per capita per day. Municipal conservation accounts for 1,701 acre-feet of savings by 2060, and most municipal needs will be partially met through conservation. Water conservation in the East Texas Regional Water Planning Area is driven largely by economics, and is not always the most cost-effective strategy for a water user group with a need where plentiful supplies are available.

FIGURE I.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

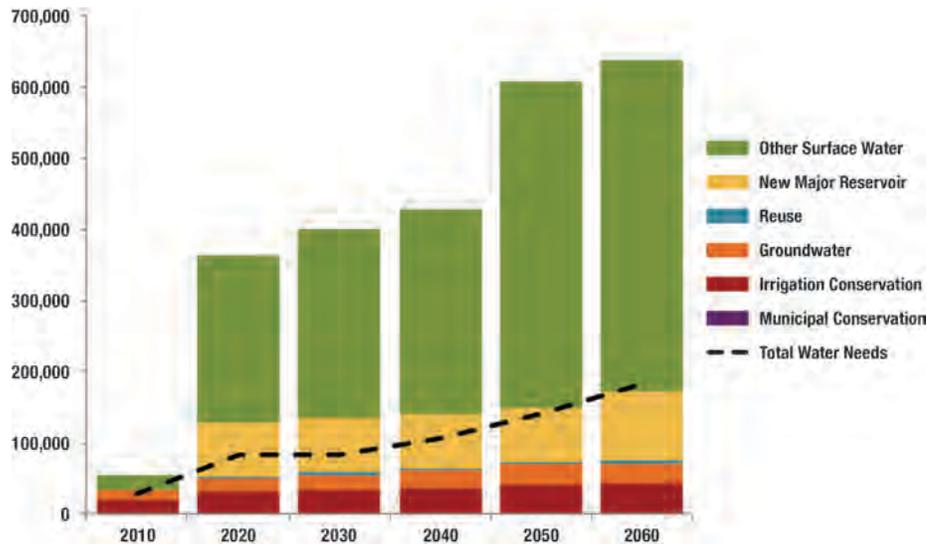
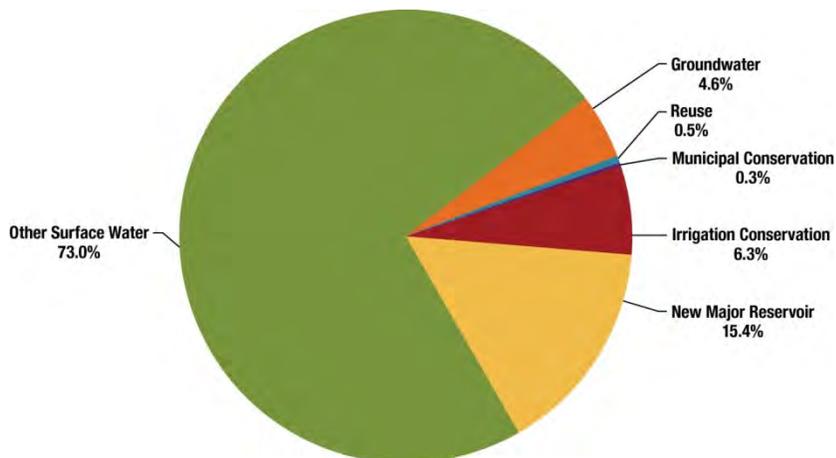


FIGURE I.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region J Plateau

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Water management strategies recommended by the Plateau Planning Group include municipal conservation, groundwater development, brush control, and aquifer storage and recovery. These recommended strategies result in 13,713 acre-feet of water in 2010 and 23,010 acre-feet of additional water supply available by the year 2060 to meet all needs (Figures J.3 and J.4) at a total capital cost of \$54.8 million.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent 3 percent of the total volume of water associated with all recommended strategies. Municipal water conservation was recommended for municipal water user groups with identified needs, which is anticipated to result in water savings of 579 acre-feet in the 2010 decade and 681 acre-feet by 2060.

FIGURE J.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

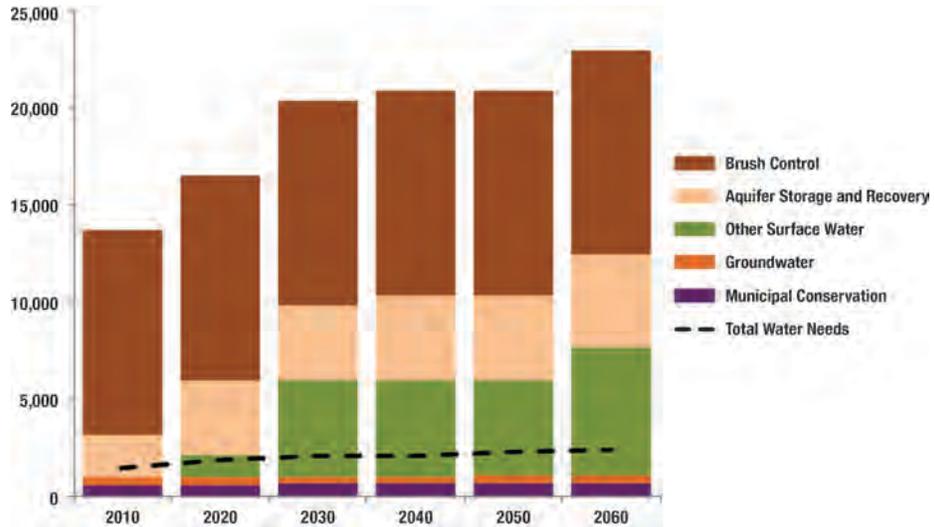
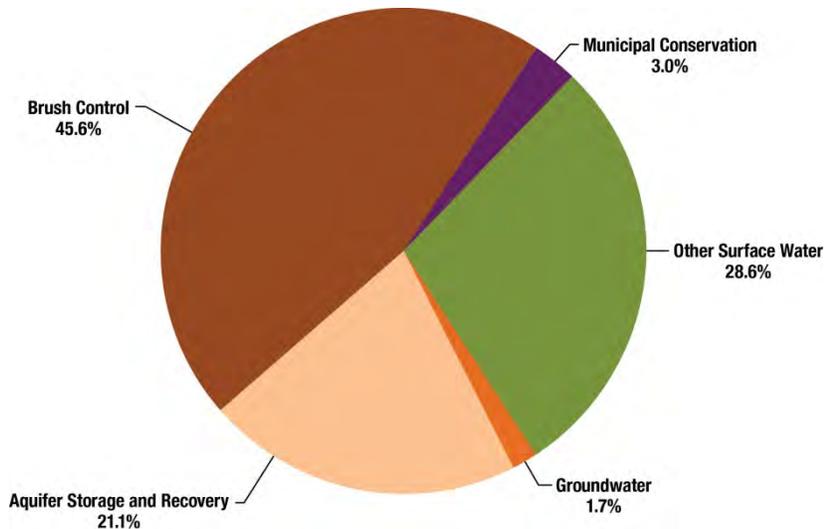


FIGURE J.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region K Lower Colorado

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

Water management strategies included in the Lower Colorado regional water plan would provide 646,167 acre-feet of additional water supply by the year 2060 (Figures K.3 and K.4) at a total capital cost of \$907.2 million for the region’s portion of the project. The primary recommended water management strategy is the Lower Colorado River Authority/San Antonio Water System project that consists of off-channel reservoirs, agricultural water conservation, additional groundwater development, and new and/or amended surface water rights. The costs associated with this project would be paid for by San Antonio and are included in the 2011 South Central Texas Regional Water Plan. If this project is not implemented jointly by the participants, a number of the individual components are recommended as alternate water management strategies to meet Lower Colorado Region needs. There are no unmet needs in the plan.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent up to 37 percent of the total amount of water resulting from all recommended water management strategies. Water conservation was included as a strategy for every municipal water user group with a need and water use greater than 140 gallons per capita per day. A demand reduction of 1 percent per year was assumed until the water user reached 140 gallons per capita per day. Conservation was recommended beginning in 2010 regardless of the decade when needs first occur to have significant effects on demand by the time the needs were realized. In addition to municipal conservation, the plan recommends significant irrigation conservation programs and projects.

FIGURE K.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

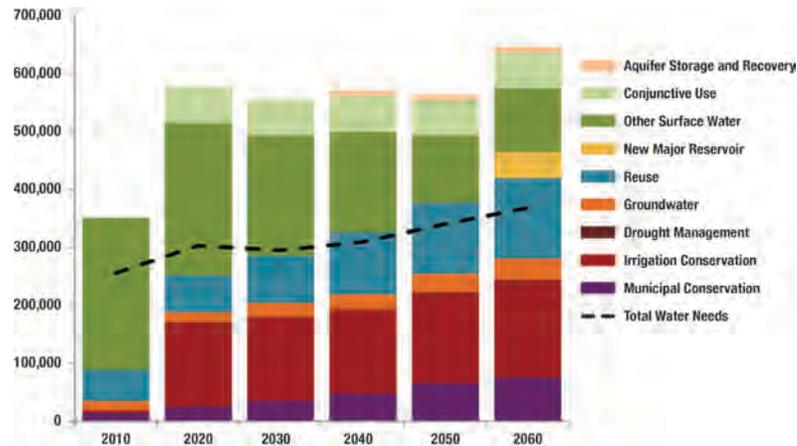
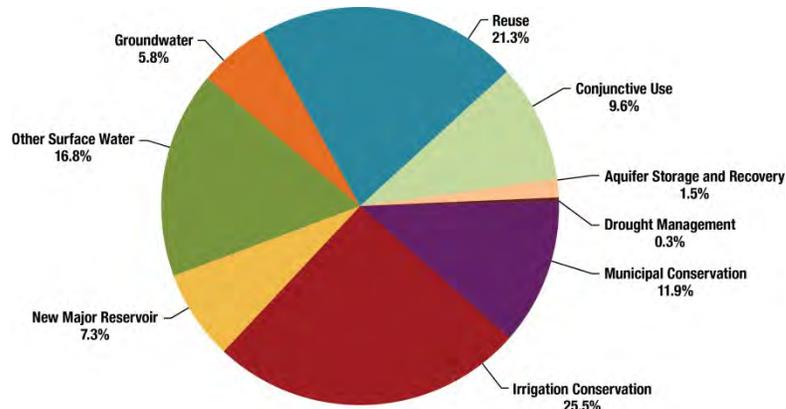


FIGURE K.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region L South Central Texas

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The South Central Texas Planning Group recommended a variety of water management strategies to meet water supply needs (Figures L.3 and L.4). Implementing all the water management strategies recommended in the Region L plan would result in 765,738 acre-feet of additional water supplies in 2060 at a total capital cost of \$7.6 billion. Because there were no economically feasible strategies identified to meet the needs, Atascosa and Zavala Counties have limited projected unmet irrigation needs.

CONSERVATION RECOMMENDATIONS

Conservation strategies account for 11 percent of the total amount of water that would be provided by the region’s recommended water management strategies. Water conservation was recommended in general for all municipal and non-municipal water user groups. In instances where the municipal water conservation goals could be achieved through anticipated use of low-flow plumbing fixtures, additional conservation measures were not recommended.

FIGURE L.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

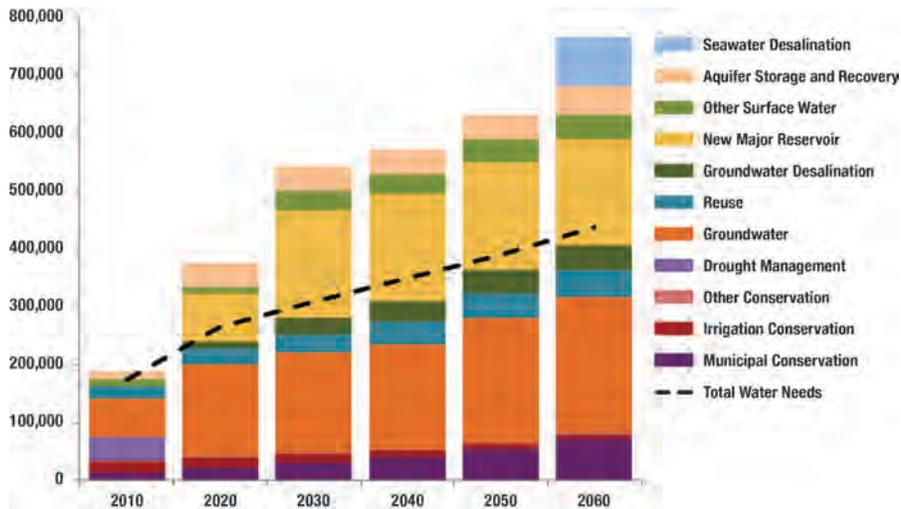
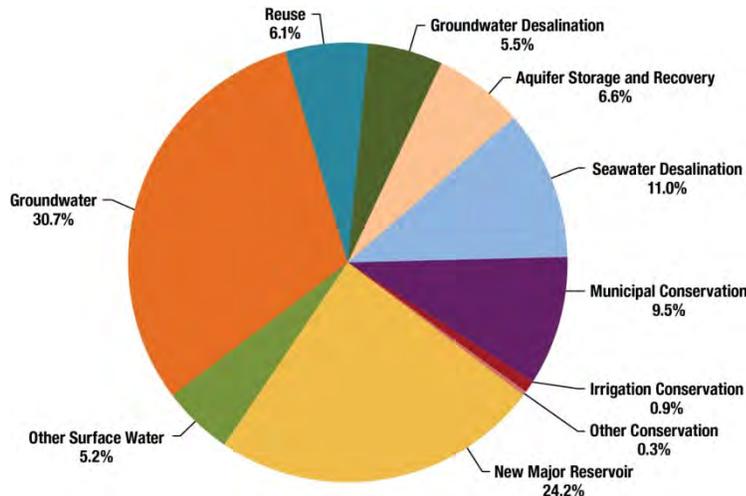


FIGURE L.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region M Rio Grande

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Rio Grande Planning Group recommended a variety of water management strategies to meet future needs including municipal and irrigation conservation, reuse, groundwater development, desalination, and surface water reallocation (Figures M.3 and M.4). The total needs for Region M are projected to decrease between 2010 and 2030 due to the rate of irrigation demand decrease being larger than the rate of municipal demand increase. However, after the year 2030 the rate of change for increasing municipal demand surpasses that of the decreasing irrigation demand resulting in the steady increase of total needs through the year 2060. Implementation of the recommended strategies will meet all regional needs (including all the needs associated with municipalities) for water users identified in the plan except for a significant portion of the region’s irrigation needs, for which no economically feasible strategies were identified. This is estimated to be up to 394,896 acre-feet of unmet irrigation needs in 2010. In all, the recommended strategies would provide over 673,846 acre-feet of additional water supply by the year 2060 at a total capital cost of \$2.2 billion.

CONSERVATION RECOMMENDATIONS

Conservation strategies for municipal and irrigation water users account for approximately 43 percent of the water associated with the region’s recommended strategies. Irrigation conservation strategies account for the majority of these savings, through Best Management Practices including water district conveyance system improvements and on-farm conservation practices. Municipal water conservation was recommended for almost all municipal water user groups with a need. Conservation was also recommended for several communities that do not anticipate a municipal water need during the planning horizon.

FIGURE M.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

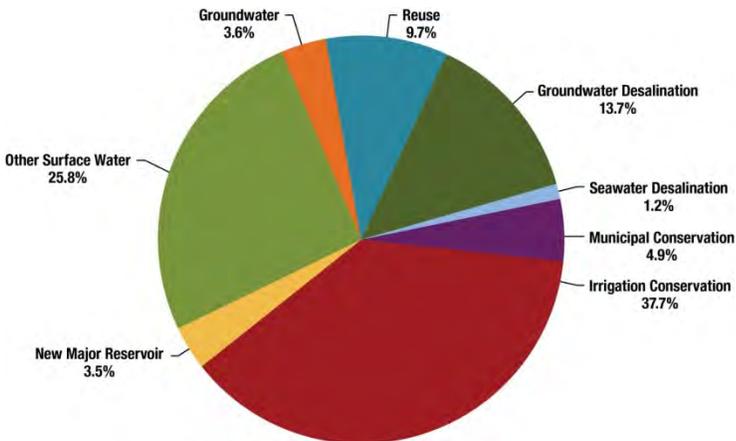
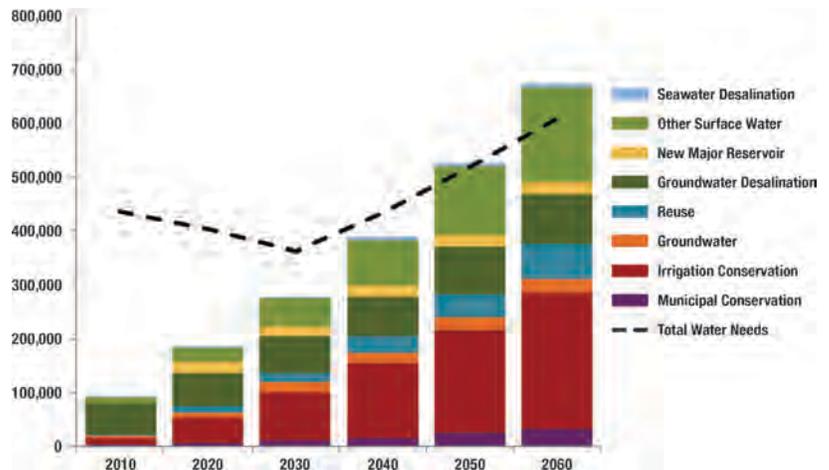


FIGURE M.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.

Region N Coastal Bend

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Coastal Bend Regional Water Planning Group recommended a variety of water management strategies to meet future needs including two proposed off-channel reservoirs, groundwater development, interbasin transfers of surface water from the Colorado River Basin, and conservation. Implementing all recommended strategies in the Coastal Bend plan would result in 156,326 acre-feet of additional water supplies in 2060 (Figures N.3 and N.4) at a total capital cost of \$656.1 million. Implementation of these strategies would meet all projected water needs in the region except for 3,876 acre-feet of mining needs in 2060 that would be unmet because no feasible strategies were identified.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent approximately 5 percent of the total amount of water that would be provided by all recommended water management strategies in 2060. Conservation strategies were recommended for municipal, irrigation, manufacturing, and mining water users. The Coastal Bend Region recommended that water user groups with and without shortages that exceed 165 gallons per capita per day should reduce consumption by 15 percent by 2060.

FIGURE N.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

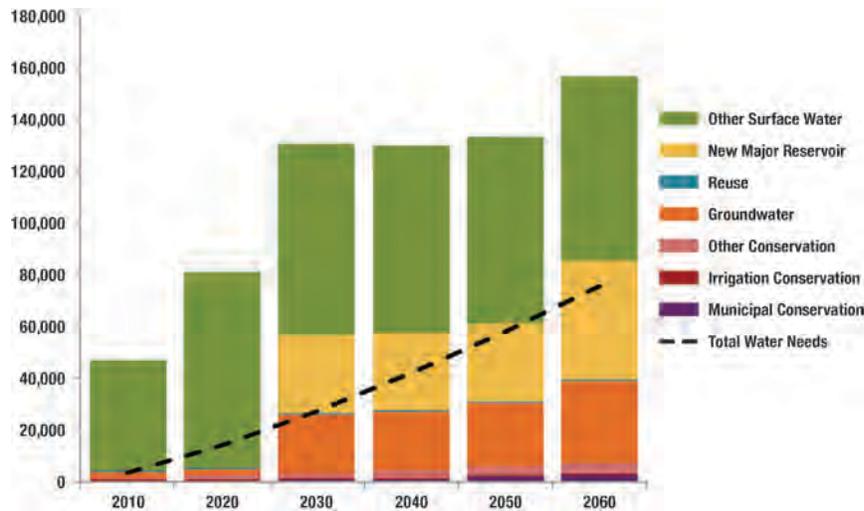
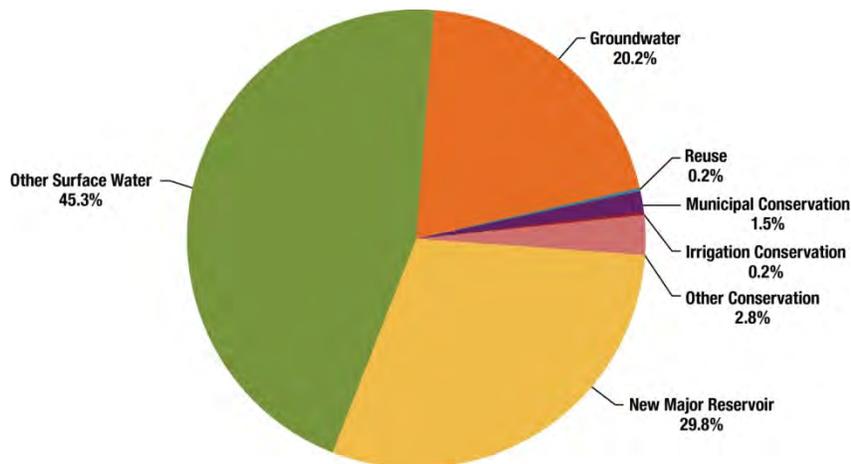


FIGURE N.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES—RELATIVE SHARE OF SUPPLY.



Region O Llano Estacado

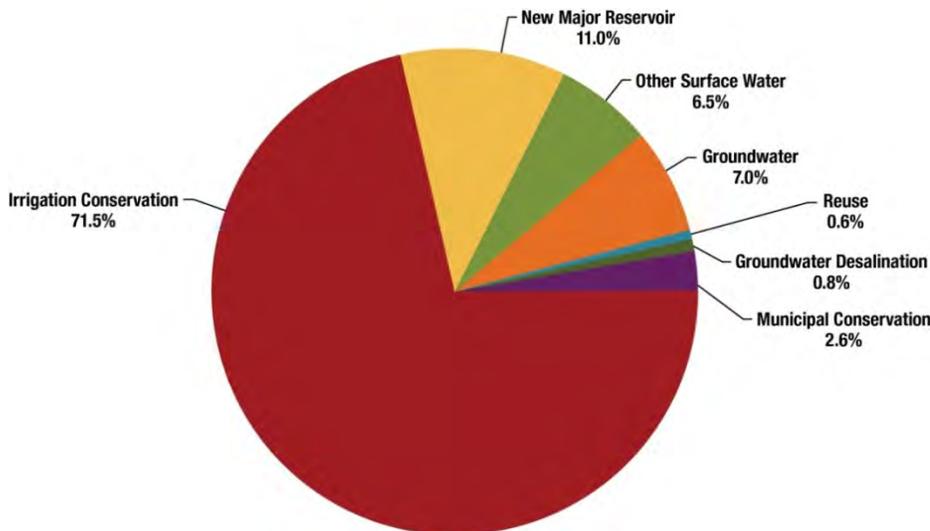
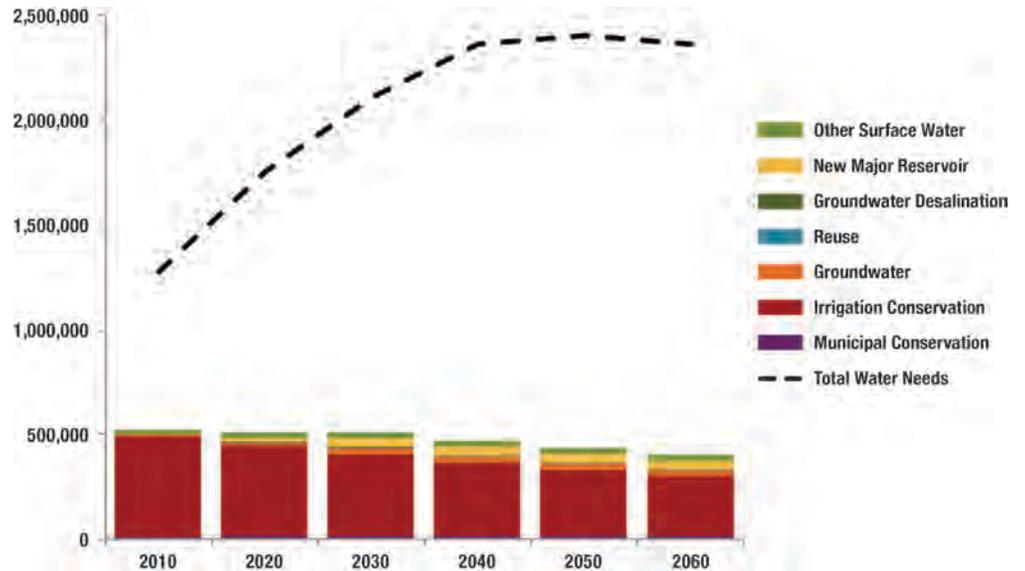
RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Llano Estacado Planning Group recommended a variety of water management strategies, providing 395,957 acre-feet of additional water supply by the year 2060 (Figures O.3 and O.4) at a total capital cost of \$1.1 billion. The primary recommended water management strategy for the region is irrigation water conservation, which generates 72 percent of the volume of water from strategies in 2060, based on approximately 786,000 acres of irrigated crop land that did not have efficient irrigation systems. Unmet irrigation needs (2,043,247 acre-feet) remain in 21 counties in the region in 2060, because there were no economically feasible strategies identified to meet their needs.

CONSERVATION RECOMMENDATIONS

Conservation strategies represent 74 percent of the total volume of water associated with all recommended water management strategies in 2060. Water conservation was recommended for every municipal water user group that had both a need and a water use greater than 172 gallons per capita per day (the regional average).

**FIGURE O.3.
RECOMMENDED
WATER
MANAGEMENT
STRATEGY WATER
SUPPLY VOLUMES
FOR 2010–2060
(ACRE-FEET PER
YEAR).**



**FIGURE O.4. 2060
RECOMMENDED WATER
MANAGEMENT
STRATEGIES—RELATIVE
SHARE OF SUPPLY.**

Region P Lavaca

RECOMMENDED WATER MANAGEMENT STRATEGIES AND COST

The Lavaca Planning Group analyzed various strategies to meet needs, but the only one determined to be economically feasible was temporarily over drafting the Gulf Coast Aquifer to provide additional irrigation water during drought. This strategy produces 67,739 acre-feet of water which is sufficient to meet the region’s needs (Figures P.3 and P.4). There is no capital cost associated with this strategy because all necessary infrastructure is assumed to already be in place.

CONSERVATION RECOMMENDATIONS

Water conservation was not recommended as a strategy because it was not the most cost-effective method to meet irrigation needs, which are the only needs in the region. Since there were no municipal needs, no municipal conservation was recommended. However, the planning group did recommend that all municipal water user groups implement water conservation measures. The Lavaca Planning Group also recommended continued agricultural water conservation practices as one of its policy recommendations. The region supports state and federal programs that provide financial and technical assistance to agricultural producers and result in increased irrigation efficiency and overall water conservation.

FIGURE P.3. RECOMMENDED WATER MANAGEMENT STRATEGY WATER SUPPLY VOLUMES FOR 2010–2060 (ACRE-FEET PER YEAR).

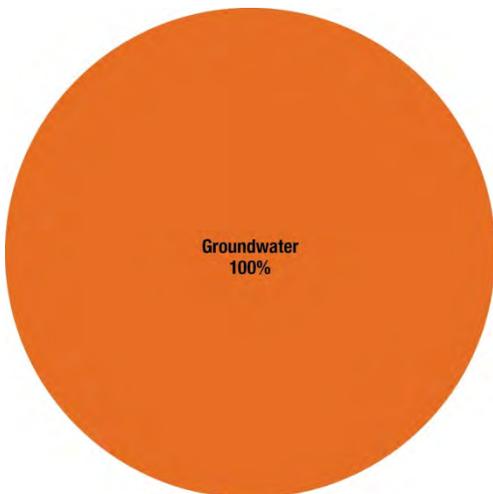
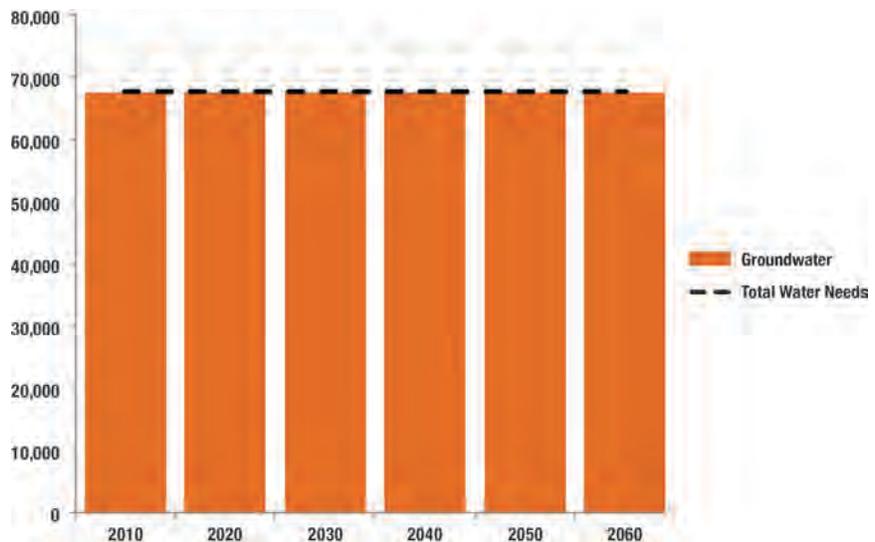


FIGURE P.4. 2060 RECOMMENDED WATER MANAGEMENT STRATEGIES–RELATIVE SHARE OF SUPPLY.

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APPENDIX F:

Regional Water Planning Group Perspectives on Conservation Strategy Implementation

Discussions with Regional Water Planning Groups A, B, C, G, I, K, L, N

The following pages provide the abridged comments of discussions with the regional water planning groups.

Perspectives on Monitoring Conservation Strategy Implementation:

Selection of conservation strategies in the Regional Water Plans

In general the strategy selection process began by gathering feedback and input generated from water user groups, wholesalers, and municipalities. With in-depth reviews of resources such as the Best Management Practices Guide, strategies were identified by category and evaluated for feasibility, cost, and applicability. Many regions selected strategies that concentrated on water loss reductions, water rate pricing, plumbing fixture modifications, landscape modifications, Low Energy Precision Application, and Low Energy Spray Application agricultural irrigation systems.

Monitoring levels of conservation strategy implementation

The levels of conservation strategy implementation are not monitored because it is not a task charged to the regional water planning groups. An effort of this scope would be very challenging for a regional planning group because they do not have regulatory authority to ask or require water user groups to provide that level of information. Additionally, there is not enough funding or resources to take on that effort at the regional water planning group level. Some regions have made attempts to survey the water user groups regarding their current conservation efforts; however, often times response rates are poor and incomplete.

Efforts in monitoring water conservation strategy implementation

Several regional water planning groups expressed their thoughts about the entities that could be the most effective in monitoring implementation. From a regional water planning group perspective, the Texas Water Development Board and Texas Commission on Environmental Quality are the primary choices as agencies to be charged with the task of monitoring implementation. In order to fulfill a charge of monitoring water conservation strategy implementation, an entity or agency would need to have the necessary authority, resources, tools, and funding. When taking those factors into consideration, it should be noted that there is already a basic foundation of resources that exist at the state agency level.

An appropriate role for a regional water planning group would be to develop a scope of work that looks at the issue of monitoring strategy implementation and then evaluate how that measurement and monitoring could be incorporated into regional water planning.

An appropriate role for the water user groups, water providers, and municipalities is to utilize consistent and standardized tools in order to evaluate their conservation strategies and programs. The tools and mechanisms used to evaluate and measure those data could be developed more consistently if done at the state agency level. Several water planning groups stated that it would be very useful if data and information were collected by the state and provided back to the regional water planning groups for application in the planning process.

Tools and methods for monitoring strategy implementation

Several regional water planning groups indicated that the most effective tools and methods in monitoring water conservation strategy implementation would be to use reporting tools with standardized metrics and sector based analyses. Regional water planning groups indicated that enhancements to currently existing reporting mechanisms along with consolidation of reporting efforts across state agencies would help in identifying significant data and information. Expanded metering was also identified as being potentially useful for estimating savings.

Currently there are no state required implementation reports or surveys. Existing reports that show the best potential for streamlined enhancements are:

- Water Use Survey - Texas Water Development Board
- Water Conservation Plan Annual Report - Texas Water Development Board
- Water Loss Audit - Texas Water Development Board
- Water Conservation Plan - Texas Commission on Environmental Quality and Texas Water Development Board

Along with practical and standardized tools, the regional water planning groups stated a need for technical assistance and guidance. There are several small entities that will need training and resources for using the tools. Developing water conservation training programs for members of governing boards would also be useful in promoting and utilizing these types of water conservation tools. There is also a need for training programs and guidance on how water user groups, providers, and utilities can better incorporate implementation efforts into their water conservation plans.

Determining savings from strategy implementation

Many regions found it challenging to estimate the water savings expected from conservation strategy implementation. Often there are very limited data and few consistent methodologies.

Regional water planning groups utilized data and information gathered from reviews of recent literature, the Best Management Practices Guide, and other studies to estimate water savings. Figures and data from the Commission and the Board were also used.

Concerns and limitations related to monitoring implementation and estimating savings

Regional water planning groups expressed the following concerns regarding *efforts to monitor strategy implementation*:

- Regulatory Authority – Many regional water planning groups do not want to take on an enforcement or regulatory role. It is for that reason that many believe a state agency would be the best entity charged with the effort of monitoring strategy implementation. From past experiences, when a regional water planning group surveys an entity for information that the entity is not required to report, the response rates are very low.
- Consistency – Consistent and standardized methods do not exist for monitoring the levels of strategy implementation. Consistency in metrics is a significant aspect to consider. In

order to analyze data and information accurately, the methods and metrics that water user groups use need to be individually standardized for varying water user groups.

- Streamline Reports – Many water planning groups emphasized the burden of having too many reports with different timelines, formats, and reporting periods. There is room for improvement and increased efficiency in reporting mechanisms.

Regional water planning groups expressed the following areas of concern regarding *efforts to estimate savings from water conservation strategies*:

- Dynamic variables - There are many dynamic variables involved when estimating savings on a year-to-year basis. Variables other than conservation strategies may impact results from conservation efforts. In any given year savings can be attributed to factors such as weather, economy, water availability, or drought management measures. Sometimes it actually takes a few years for savings to be evident. Estimation of savings should evaluate trends over a rolling time frame.
- Funding and Resources - Evaluation of strategy implementation and estimation of savings requires large investment of time, personnel, and money. Additional needs include development of tools and methods, guidance and technical assistance for utilization of those tools, and collection and review of quality data.
- Tools and Methods – Consistent and standardized methods do not exist for estimating the savings of conservation strategy implementation. Consistency in metrics is a significant aspect to consider. In order to analyze data and information accurately the methods and metrics that water user groups are using need to be standardized.

APPENDIX G:

Texas Water Development Board Water Loss Procedures

The following pages describe the Board's procedures related to water loss as it impacts staff review of financial assistance applications.

Staff's Initial Review of the Utility's Water Loss Information:

- Upon becoming notified of a retail public utility's interest in applying for financial assistance from the Board, such as a pre-application meeting or invitation to submit an application as part of the intended use plan, or similar, Conservation Division staff determine if the applicant is a retail public utility that provides potable water and check if there is a water conservation plan (with utility profile) and a current (year 2010 or newer) water loss audit for the utility on file.
- The water conservation plan and water loss audit are required with the application under 31 Texas Administrative Code §363.12(a)(2)(E), §371.74, and §375.43. Under 31 Texas Administrative Code §358.6(b), an applicant for a water supply project is ineligible for financial assistance unless it has submitted its required water loss audit. An applicant for a wastewater project is eligible for financial assistance even if it does not submit a required water loss audit.
- If the utility's plan and audit are available, Conservation Division staff begins the review of the water loss information contained in the plan, utility profile, and water loss audit.
- If questions are raised about the data, Conservation Division staff contacts the person listed as the submitter of the water conservation plan or the water loss audit for clarification.
- If this initial contact does not provide the required information, Conservation Division staff may then request assistance from the Project Engineering and Review staff to contact the applicant or their consultant to provide the requested information.

Actions Requested From the Applicant Before Completion of Review of Application:

- If the total water loss exceeds 17 percent of system volume produced, or exceeds 460 gallons per mile per day, or exceeds 24 gallons per connection per day, the applicant will be requested to
 1. submit a most recent year water loss audit to confirm the causes of the losses,
 2. provide information about activities in their water conservation plan and project application that will address the causes of the losses (such as accounting of use, meter testing and replacement, and leaks and breaks), and
 3. provide information on tracking improvements by analyzing data in the annual water loss audits required from Board loan recipients.

- If the total water loss exceeds 25 percent of system volume produced, or exceeds 1,057 gallons per mile per day, or exceeds 50 gallons per connection per day, the applicant will be requested to
 1. include all activities listed above,
 2. acknowledge that activities for reducing water loss can be part of funding requested from the Board, or provide evidence that the utility is conducting or will conduct necessary activities to reduce water loss using other available funding, and
 3. include the specific timelines for implementing and/or completing the activities to achieve a reduction in water loss.

Conservation Staff Comments in the Board Memo:

- Based on the information available, Conservation Division staff prepare a description of the utility's water losses and sources of the losses.
- Conservation staff includes any information provided by the utility regarding its plans for addressing water loss and its responses to the requested information.
- Conservation staff may make recommendations to the utility for additional activities that will help address the water loss.
- As appropriate, Conservation staff may offer to provide water loss technical assistance to the utility.