

A Report on Progress of Water Conservation in Texas

Report to the 82nd Texas Legislature

Submitted by
Water Conservation Advisory Council

December 2010

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Water Conservation Advisory Council

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Mining and Recovery of Minerals

Kelly Hall
Landscape Irrigation and Horticulture

James Oliver
Water Control and Improvement Districts

Janet Adams
Rural Water Users

Donna Howe
Municipal Utility Districts

December 1, 2010

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. The enclosed 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 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. However, noteworthy conservation is currently being accomplished with local and regional entities using their own resources. How effectively water conservation is implemented today will have a profound effect on the level of additional water resources that will be 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. During 2009 and 2010, the Council held 12 public meetings and numerous workgroup teleconference sessions. The 23 members of the Council are honored to serve on the Council and are pleased to submit this second biennial report to the elected leadership of the State of Texas.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "C. E. Williams", with a long, sweeping horizontal stroke extending to the right.

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

EXECUTIVE SUMMARY

Water conservation is critical to the future economic and environmental viability of Texas. The 2007 State Water Plan envisions almost 23 percent of new water supplies—more than 2 million acre-feet per year (651.6 billion gallons per year)—sourcing from municipal and agricultural water conservation by 2060. Recognizing the importance of water conservation in Texas, the legislature created the Water Conservation Advisory Council in 2007, a group consisting 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 our second 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 2009 and 2010, the Council held 12 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,
- quantifying the effectiveness of public awareness programs,
- funding a statewide water conservation public awareness program,
- 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.

In addition to working with other state agencies, the Council is working closely with the Texas Commission on Environmental Quality, the Texas Water Development Board, and the State Energy Conservation Office in addressing several of these issues; however, appropriations may be required to adequately address needs. Although the State Energy Conservation Office does not currently have membership on the Water Conservation Advisory Council, there is a strong interest among the council members to include the State Energy Conservation Office as a permanent Council member.

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 a focused effort is needed now to develop plans for managing and achieving water conservation success.

Our legislative charges, and our progress to date, include:

Charge 1: Monitor trends in water conservation implementation

Progress: The Council (1) surveyed state and federal agencies and selected water providers for updates on water conservation activities and (2) worked with the Texas Commission on Environmental Quality and the Texas Water Development Board to evaluate the potential of developing tools and resources for the collection, monitoring, and analysis of water conservation implementation in Texas related to annual reports and five-year implementation reports on water conservation plans. Implementation of water conservation measures continues in Texas, but it is difficult to quantify.

See Key Findings on page 14.

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.

Progress: The Council worked with the Texas Water Development Board and the Texas Commission on Environmental Quality to develop a process through which the Water Conservation Best Management Practices Guide can be updated.

See Key Findings on page 20.

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

Progress: The Council has supported efforts to promote Water IQ as a statewide water conservation public awareness program. In addition to that the Council has (1) gathered information on a number of existing water conservation awareness campaigns across the state and (2) compiled information from the Texas Water Development Board on the Water IQ water conservation public awareness program. Due to an absence of a state-funded statewide

advertising campaign, local water providers and districts and the Texas Water Foundation have funded media messages. Local water providers and districts have shared water conservation messages with their respective markets. The Texas Water Foundation, in cooperation with a number of contributors and the Texas Association of Broadcasters, funded a statewide media campaign based on Water IQ in 2010.

See Key Findings on page 22.

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

Progress: The Council (1) integrated Texas-specific resources into the Alliance for Water Efficiency's online resource library and (2) included links on the Council's Web page to this resource library and other water conservation resources in Texas. The Council will continue to develop and support the library by posting materials and encouraging others to post materials to the online resource library.

See Key Findings on page 26.

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

Progress: The Council (1) partnered with the Texas Commission on Environmental Quality on its Texas Environmental Excellence Awards on a Water Conservation Award and (2) developed a program to present water conservation awards at existing events across the state.

See Key Findings on page 27.

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

Progress: The Council addressed this charge by (1) holding informal discussions with chairs of several of the regional water planning groups regarding water conservation strategy implementation in their region, (2) reviewing region-specific studies related to water conservation, and (3) monitoring the general trends in implementing water conservation in Texas.

See Key Findings on page 29.

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

Progress: The Council identified more specific reporting guidelines that can be used for collecting data on population and water use by sectors for consistent calculation of gallons per capita per day for inclusion in water conservation plans and reports by water suppliers. This is a tool that will be useful for quantifying implementation of water conservation strategies in regional water plans.

See Key Findings on page 33.

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

- water conservation for energy,
- resource library website,
- public recognition award,
- best management practices guide,
- metrics and methodologies, and
- research and education .

Please see page 41 for more detail on the Council's future objectives.

Progress of water conservation efforts in Texas is significantly dependent on the level of resources that are committed. However, noteworthy conservation is currently being accomplished with local and regional entities using their own resources. It is evident that successful water conservation implemented today will have a profound effect on the level of additional water resources that will be needed in the future. The ongoing work of the Council will continue to focus on the charges as contained in the legislation.

INTRODUCTION

Texas is expected to double its population 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 2007 State Water Plan envisions 22.5 percent of new water supplies—more than 2 million acre-feet per year (651.6 billion gallons per year)—sourcing from municipal and agricultural 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 (651.6 billion gallons per year)—are sourced from using water more efficiently. Water conservation is clearly critical to the water 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 Texas Water Development Board, the Texas Commission on Environmental Quality, 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, last biennium. 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 report is the second such report to state leadership.

The Council's 2010 legislative report is focused on the charges described above. In the report we discuss our progress on these charges including any challenges we faced in addressing those charges. We also provide information on the background of the Council and appendices that include, among other items, our enabling legislation, charter, and bylaws.

The Council's 2008 legislative report focused on the development of three core elements for achieving success in water conservation. Along with identifying the core elements the report focused on a number of key findings and recommendations for advancing water conservation in Texas. These core elements outlined in the 2008 report are as follows:

Public Awareness and Recognition

According to a statewide market research study conducted in 2004, less than 30 percent of citizens know where their water comes from. Yet the same research found citizens are more likely to conserve once they know about their water resources. Increased awareness and recognition efforts are needed to reach various users such as industry, agriculture, municipalities, and ultimately the general public. To reach multiple audiences successfully, water conservation messaging needs to be consistent and supported with research and data. Technical, financial, and staffing support enhance the effectiveness of any awareness and recognition efforts. Additionally, public recognition of conservation successes is a key component because it is a way to motivate people, as well as showcase successful examples.

Resources: Information, Tools, and Expertise

As water demand projections depict a growing need for conservation, water user groups will need to refer to tools and resources to develop, implement, and manage effective water conservation programs. Only limited resources currently exist for Texas water conservation programs. An aware and motivated audience must have easy access to information that will assist them in developing good conservation practices. Access to certified training and expertise are also important to help water users apply the most efficient conservation measures. Texas is not unique in our need for conservation; therefore, pursuing opportunities to collaborate with existing national efforts will strengthen the resources for Texas and allow the state to use those resources efficiently. Regional and local conservation programs will be more successful if they have resources and tools for guidance.

Implementation and Measurement

The cornerstone of any successful program is having the metrics in place to set targets and goals and measure success. Conservation-specific metrics are not in place today for water conservation programs. Existing measurements for conservation are inconsistently used and create confusion and misinformation. Because water conservation is a key strategy in meeting the state's future water needs, aggressive steps at local, regional, and state levels should be taken to track and measure the implementation levels and savings of conservation programs. Plans must define specific actions, set targets and goals to monitor progress, and define how progress will be measured. Standardized methodologies and metrics must be developed statewide for the purpose of consistency and uniformity. 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.

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 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 permanently 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 (see **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,
- 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 Texas Water Development 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. Texas Water Development 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	2011
Texas Department of Agriculture	Mr. Gary Walker	2011
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	2011
Regional Water Planning Groups	Mr. C.E. Williams	2015
Federal Agencies	Mr. Steven Bednarz	2011
Municipalities	Ms. Karen Guz	2011
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. Vivien Allen	2015
Agricultural Groups	Mr. Wilson Scaling	2013
Refining and Chemical Manufacturing	Mr. Karl Fennessey	2011
Electric Generation	Mr. Gary Spicer	2015
Mining and Recovery of Minerals	Mr. Gene Montgomery	2013
Landscape Irrigation and Horticulture	Ms. Kelly Hall	2011
Water Control and Improvement Districts	Mr. James Oliver	2013
Rural Water Users	Ms. Janet Adams	2015
Municipal Utility Districts	Ms. Donna Howe	2011

* listed in the same order as listed in the Texas Water Code.

Previous Members of the Water Conservation Advisory Council

Texas Water Development Board	Mr. Comer Tuck
Electric Generation	Mr. Greg Carter
Rural Water Users	Mr. Ken Petersen

Table 2: Current Alternates of the Water Conservation Advisory Council

Interest Group	Alternates
Texas Commission on Environmental Quality	Mr. Stephen Densmore
Texas Department of Agriculture	Ms. Kelley Stripling
Texas Parks and Wildlife Department	Dr. Dan Opdyke
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	Mr. Juan Soulas
Groundwater Conservation Districts	Mr. Greg Ellis
River Authorities	Ms. Denise Hickey
Environmental Groups	Ms. Jennifer Walker
Irrigation Districts	Mr. Mike Irlbeck
Institutional Water Users	Mr. Felix Lopez
Professional Organizations-Water Conservation	Ms. Nora Mullarkey
Higher Education	Mr. Rick Kellison
Agricultural Groups	Mr. Hughes Abell
Refining and Chemical Manufacturing	None
Electric Generation	Ms. Kim Mireles
Mining and Recovery of Minerals	Ms. Debbra Hastings
Landscape Irrigation and Horticulture	Mr. Jim Reaves
Water Control and Improvement Districts	Ms. Linda Christie
Rural Water Users	Ms. Lara Zent
Municipal Utility Districts	Mr. John Chisholm

The operational approach adopted and practiced by the Council includes:

- adopting a charter and bylaws which outlines the purpose, goals, form, and function of the Council;
- holding agenda-driven, all-day meetings of the full Council every 30 to 90 days;
- ensuring Council meetings are posted and open to the public to provide an opportunity for public comment;
- holding workgroup meetings or discussions as needed in person and/or via teleconference or the Internet; and
- pursuing consensus on substantive decisions but accepting the passage of motions by a majority vote on the basis of affirmation by two-thirds of the voting Council members present.

In 2007, the Council adopted a charter and bylaws (**Appendices B and C**, respectively). The charter includes our mission statement:

To provide a professional forum for the continuing development of water conservation resources, expertise, and progress evaluation of the highest quality for the benefit of Texas—its state leadership, regional and local governments, and general public.

The charter also includes our definition of water conservation:

Those practices, techniques, programs, and technologies that will protect water resources, reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

This definition is derived from the 2004 report of the Water Conservation Implementation Task Force.

All Council meetings are open meetings posted in the Texas Register and on the Council's Web site: www.savetexaswater.org. E-mail advisories are also issued for each meeting. A public comment period is included in each Council meeting. Drafts of Council documents are posted on the Council's Web site and e-mailed to a large number of interested parties. Council agendas and minutes, as well as many other documents, are posted at the Council Web site. Information on the draft documents and invitations to comment are also made available. E-mails are sent to interest group members who request information on Council reports and activities. Any public input was discussed and considered in detail by the Council as it developed this report.

Because the Council recognized the potential value of combining related tasks and duties into areas of focus, we formed workgroups from our membership. Each workgroup is responsible for addressing its area of focus. The Council agreed that all substantive decisions and/or recommendations made by the workgroups would be reported back to the full membership for consideration and final disposition. Formation of the workgroups provided a helpful focus on the issues and had the added benefit of achieving a voluntary division of labor based on individual member expertise and interest. Council members were encouraged to serve on as many workgroups as they wished, and many served on more than one subgroup. The workgroups and tasks were organized as follows:

Workgroup	Legislative Charges
1: Public Awareness and Recognition	• Monitor the effectiveness of the statewide water conservation public awareness program developed under Texas Water Code, Section 16.401, and associated local involvement in implementing the program. • Develop and implement a public recognition program for water conservation.
2: Metrics and Trends	• Monitor trends in water conservation implementation. • Monitor target and goal guidelines for water conservation to be considered by the Texas Water Development Board and Texas Commission on Environmental Quality.
3: Regional Plan Implementation	• Monitor the implementation of water conservation strategies by water users included in regional water plans.
4: Resource Library and Best Management Practices	• Monitor new technologies for possible inclusion as best management practices in the Best Management Practices Guide developed by the Water Conservation Implementation Task Force under Chapter 109, Acts of the 78th Legislature, Regular Session, 2003. • Develop and implement a state water management resource library.

Charge 1

Monitor trends in water conservation implementation

Summary of Progress

To address this charge, the Council (1) surveyed state and federal agencies and selected water providers for updates on water conservation activities and (2) worked with the Texas Commission on Environmental Quality and the Texas Water Development Board to evaluate the potential of developing tools and resources for the collection, monitoring, and analysis of water conservation implementation in Texas related to annual reports and five-year implementation reports on water conservation plans. Implementation of water conservation measures continues in Texas, but it is difficult to quantify.

Key Findings

Texas continues to make progress implementing water conservation measures; however, it is difficult to identify precise trends. Below are a number of progress reports concerning water conservation programs and implementation from various state and federal agencies as well as several cities. The sections for Charge 3 and Charge 6 as well as **Appendices D and E** also discuss progress on implementing some aspects of water conservation. These progress reports are, by no means, inclusive of all the efforts across the state to conserve water, nor do they document a lack of implementation.

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 losses¹. Entities required to submit water conservation plans either to the Texas Commission on Environmental Quality or the Texas Water Development 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 Texas Water Development Board. In 2007, the legislature passed Senate Bill 3 and House Bill 4 which requires recipients of financial assistance from the Texas Water Development Board, specific holders of surface water use permits from Texas Commission on Environmental Quality, and all retail water providers serving 3,300 or more connections to submit annual reports on their progress in implementing their water conservation plans. The first annual reports were due May 1, 2010. In addition, all retail water providers (about 4,200) are required to submit a water loss audit to the Texas Water Development Board every five years.

¹ “Water loss” includes apparent losses of water consumed but not paid for or accounted for in the billing records and real losses are physical losses that are not utilized for beneficial purposes.

These water conservation plans, annual water conservation implementation reports, and water loss audit reports create opportunities for more quantitative measures of water conservation implementation. 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. Methods used by the entities vary considerably, so the quality of information produced may be questionable in some cases. Other issues that impact accurately assessing improvements in water conservation concern the year-to-year variations in water use due to climate and the more gradual year-to-year changes due to changes in the mix of uses (institutional versus residential) in high growth areas. Finally, the planning and reporting is not required of all water users (although the Texas Water Development Board estimates that there are water conservation plans for about 80 percent of the water used in Texas for municipal purposes).

The Texas Water Development Board has analyzed the first round of water loss audit reports (which were submitted in 2006). A second round of water loss audit reports, due in 2011, will theoretically allow the state to assess improvements in water losses over the previous five years. The Texas Water Development Board is currently analyzing the first round of annual water conservation implementation reports that were submitted in May 2010 for progress in implementing water conservation measures and the amount of water saved. The next round of water conservation plans will be due in 2014 which will allow the state to assess improvements in water conservation and changes to water conservation goals over the previous five years.

The Council encourages entities required to develop and submit plans and reports to take those duties seriously to improve the quality of the data. The Council also encourages the state agencies to provide technical assistance and guidance to the planning and reporting 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 Texas Commission on Environmental Quality and the Texas Water Development Board on quantifying the implementation of water conservation in the state.

Although the State Energy Conservation Office does not currently have membership on the Water Conservation Advisory Council, there is a strong interest among the council members to include the State Energy Conservation Office as a permanent Council member.

Statewide Trends

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality has been actively expanding their efforts in reviewing water conservation plans, establishing and enforcing new conservation related regulations, and participating in water conservation awareness efforts. The agency has developed a successful and recognizable public recognition program and has taken an active role in public awareness. In the area of water conservation reporting, the agency is continuing to look for ways to effectively track conservation implementation efforts.

Please see Appendix D on page 53 for more information about these programs.

Texas Comptroller ~ State Energy Conservation Office

The 77th Legislature directed the State Energy Conservation Office to develop a set of water efficiency standards for state agencies. The standards apply to new buildings, major renovation projects, and purchase of any new or used equipment by the state. A system approach will also be used when examining water use in this sector. The goal is to balance water, wastewater, energy, and related costs to achieve the lowest lifecycle cost when purchasing new equipment or making modifications to existing equipment.

Please see Appendix D on page 54 for more information about these programs.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board surveyed soil and water conservation districts planning the implementation of agricultural water conservation best management practices in 2004, 2005, and 2007. The survey estimated water savings from implementing the best management practices. Statewide water savings resulting from implementation of these practices were calculated based on the estimated water savings contained in the Water Conservation Best Management Practices guide. Over 40 different best management practices were implemented each year. Over half of the estimated water savings over the three years of data was from brush management.

Please see Appendix D on page 56 for more information about these programs.

Texas Water Development Board

The Texas Water Development Board has implemented new rules and guidelines relating to water conservation plan reports. The agency is currently receiving and processing annual conservation plan reports, and future goals include greater analysis of implementation efforts. The agency plans to use the information from these annual reports to assist in developing studies on water conservation implementation within the state. The agency also continues to promote public awareness and consistent messaging of the Water IQ program.

Please see Appendix D on page 58 for more information about these programs.

Agricultural Trends

High Plains Agricultural Demonstration Initiative

This agricultural demonstration initiative began in 2005 and includes 30 cooperator demonstration sites covering over 4,000 acres in Hale and Floyd counties. The goal of the initiative is to demonstrate how to reduce total water required by agricultural production while ensuring a level of profitability to sustain producers, families, and area communities. The project is designed to connect today's producers with the latest research through a shared experience that draws on our knowledge-building traditions of demonstration sites and field days.

Please see Appendix D on page 60 for more information about these programs.

Lower Rio Grande Valley Agricultural Demonstration Initiative

This agriculture demonstration initiative is implemented through the Harlingen Irrigation District in the Rio Grande Valley. The primary objective is the demonstration and evaluation of on-farm water conservation technologies in a real world setting. Approximately 30 growers across the Rio Grande Valley cooperate by implementing conservation technologies on a portion of their farms in a multi-year setting.

Please see Appendix D on page 61 for more information about these programs.

USDA ~ Natural Resources Conservation Service

The agency assists agricultural producers with implementation of agricultural water conservation measures through the use of Farm Bill programs such as Environmental Quality Incentives Program, Agricultural Water Enhancement Program, and Wildlife Habitat Incentives Program. Included in these programs are conservation practices which improve irrigation efficiencies (such as pipelines, drip irrigation systems, precision application center-pivot systems), as well as those practices which enhance water yield and infiltration (brush management, furrow dikes, rangeland, and pastureland management).

Please see Appendix D on page 62 for more information about these programs.

Municipal Trends

City of Dallas

Water conservation is an important element of Dallas's long range water supply strategy. The utility's Five-Year Strategic Plan defines water conservation goals and recommends water conservation strategies and budgets to achieve these goals. For the past 10 years, ongoing water conservation efforts and implementation of the strategic plan has helped Dallas to save approximately 300,751 acre-feet (98 billion gallons) of water. Total per capita water use has steadily declined from its fiscal years 1999-2000 peak to present.

Please see Appendix D on page 64 for more information about these programs.

City of El Paso

El Paso Water Utilities began its water conservation program in 1991. Combining enforcement, incentives, and education has reduced average per capita water use from 200 gallons per day to 135 gallons per day in 2009. El Paso is located in the Chihuahuan Desert and receives only 8 inches of rainfall in an average year. The utility has adopted an inclining rate structure and has increased public awareness through various media formats. Additionally, the water utility supplies customers with 5.25 million gallons per day of reclaimed water.

Please see Appendix D on page 66 for more information about these programs.

San Antonio Water System

San Antonio Water System updated its water management plan in 2009 to include more aggressive conservation goals. San Antonio Water System has 50 percent more customers in 2010 than it did in the 1980s but meets their needs with the same amount of water. Each year ratepayer investments in diverse conservation programs have yielded new supplies for the community at a reasonable cost. The steady investment has yielded a sound water conservation ethic in the community.

Please see Appendix D on page 69 for more information about these programs.

Conservation Legislation Trends

Texas Legislation and Standards

There will be additional water conservation as a result of legislation that was passed in the 81st Regular Session of the Texas Legislature in 2009. House Bill 2667 requires the use of more efficient plumbing fixtures (commercial pre-rinse spray valves, faucets, shower heads, toilets and urinals) in the future that will reduce water use. For example, the performance standard for a toilet sold in Texas after January 1, 2014, will change from an average flush of 1.6 gallons to an average of 1.28 gallons.

Effective January 1, 2009 House Bill 1656 required the use of landscape irrigation standards that include standards of conduct for a licensed irrigator, licensed technician, and licensed inspector. In addition, standards for designing, installing, and maintaining landscape irrigation systems were established.

Local governments are encouraged to use these state standards to establish their local irrigation programs. Municipalities with a population of 20,000 or more (House Bill 1656) by ordinance shall require an installer of an irrigation system to hold a valid license and obtain a permit before installing a system.

Please see Appendix D on page 70 for more information about these programs.

Federal Legislation and Standards

Federal legislation focusing on water conservation issues has been prominent during the 111th Congress with close to 30 bills introduced in the House and Senate reflecting language addressing water infrastructure needs, authorizing the Environmental Protection Agency WaterSense program, developing a federal environmental residential and commercial building strategy, directing innovative water and energy research and development programs, and for the first time in history, prominently placing water efficiency incentives side-by-side with energy efficiency incentives with an all important funding mechanism for water conservation efforts nationwide. It is clear that water conservation issues have moved front and center onto the federal scene. The Administration has demonstrated a commitment to water conservation by issuing an executive order which sets sustainability goals for Federal agencies. Among other provisions, the White House Executive Order requires Federal agencies to conserve water by improving the efficiency for water usage and mandating a 26 per cent improvement in water efficiency by 2020.

Please visit www.allianceforwaterefficiency.org under *News/Legislative Watch* for more information.

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

Summary of Progress

To address this charge, the Council worked with the Texas Water Development Board and the Texas Commission on Environmental Quality to develop a process through which the Water Conservation Best Management Practices Guide can be updated.

Key Findings

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

Working with the Texas Water Development Board and the Texas Commission on Environmental Quality, the Council has established a process to receive and review suggestions for new best management practices or recommended revisions or deletions of existing best management practices. Changes to the Water Conservation Best Management Practices Guide will be vetted with all appropriate subject matter experts, interest groups, and state agencies. The intent is that the guide remains an evergreen 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 Texas Commission on Environmental Quality and Texas Water Development Board for revisions to the guide. A process to monitor new best management practices technologies is now in place and is coordinated by the Council, Texas Commission on Environmental Quality, and Texas Water Development Board. A request was posted on the Council's Web site in Spring 2010 and was sent to the Council's e-mail list and to a list of other interested water users.

With information reported to the 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 the state agencies show

that a significant number of municipal water conservation plans do not refer to specific best management practices nor do the reports include detailed implementation plans for identified best management practices. Agricultural water conservation best management practices, however, are widely used across the state and are continually being implemented by Texas State Soil and Water Conservation Board and USDA - Natural Resources Conservation Service cost share programs working through local Soil and Water Conservation Districts and result in significant water savings (see **Appendix D**). With annual reporting requirements on water conservation plans, the Water Conservation Best Management Practices Guide can be a valuable resource to entities reported on progress and the amount of water conserved through their programs.

The Council suggests that the Texas Water Development Board and the Texas Commission on Environmental Quality 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. 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.

Charge 3

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

Summary of Progress

To address this charge, the Council (1) gathered information on a number of existing water conservation awareness programs across the state and (2) compiled information from the Texas Water Development Board on the *Water IQ* water conservation public awareness program. Due to an absence of a state-funded statewide advertising campaign, local water providers and districts and the Texas Water Foundation have funded media messages. Local water providers and districts have shared water conservation messages with their respective markets. The Texas Water Foundation, in cooperation with a number of contributors and the Texas Association of Broadcasters, funded a statewide media campaign based on *Water IQ* in 2010.

Key Findings

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 has found that water conservation awareness programs are most effective when consistent messaging is used and supported with research and data. The Council has also found that there is an immediate need for water conservation awareness and heightened messaging on a statewide level. Therefore, the Council believes that enhancement of the capabilities of existing water conservation public awareness programs is needed.

Water IQ is a Texas Water Development Board managed statewide public awareness program that supports existing local water conservation efforts and programs. It has become the Texas Water Development Board's leading water conservation program. Local and regional programs such as "SAVE WATER. *Nothing Can Replace It*," "Take Care of Texas," and "Water is Life" are also providing effective messages on water conservation. The Texas Water Development Board is committed to continuing and increasing its efforts to coordinate with various local and regional awareness programs.

Increased resources and efforts are needed to reach various water user groups such as industry, agriculture, municipalities, and ultimately, the general public. To reach multiple audiences successfully, additional technical, financial, and staffing support would enhance the effectiveness of statewide, local, and regional water conservation awareness programs.

Statewide Public Awareness Efforts

Texas Water Development Board

The agency manages the **Water IQ** public awareness water conservation program that was developed and implemented to educate Texans about their water resources. 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 complements existing local and regional water conservation efforts. Access to this information is provided across the state to support local entities with their existing public awareness programs. At the time of preparation of this report, there are 915 zip codes (out of a potential of approximately 4,140) and 34 agreements with various Texas cities and water providers. These zip codes represent regional areas that are partners with the Water IQ program.

Please see Appendix E on page 73 for more information about these programs.

Texas Water Foundation

In 2010, the Texas Water Foundation initiated a fund raising effort to support a statewide media campaign to help Texas consumers understand the need for sustainable use of water. Fund raising efforts were successful and \$30,000 was raised to develop and produce two television and radio spots in both English and Spanish. The Foundation then joined with the Texas Association of Broadcasters to air a water conservation public awareness campaign. The campaign featured **Water IQ** spots of water conservation tips on radio and television in English and Spanish which were played statewide during hours when the public were more likely to be tuned to the media broadcasts. This initial three-month effort involved over 130 radio and television stations across Texas who reported playing over 12,556 spots valued at \$737,636. The Texas Water Foundation's investment, made possible through donations, was \$80,000.

Please see Appendix E on page 74 for more information about these programs.

Regional Public Awareness Efforts

Lower Colorado River Authority

The Lower Colorado River Authority began using the **Water IQ** program in Central Texas in 2006. The cities of Austin and Cedar Park continue to be partners on the program. The **Water IQ** campaign helps make people aware of the source of their water, educates them on the importance of water for our future, and offers simple tips to help people save water in their homes and businesses. Results of a 2005 survey of residents in the Colorado River Basin indicated that the vast majority of people were willing to save water if it did not mean sacrifice or changing their lifestyle.

Please see Appendix E on page 75 for more information about these programs.

North Texas Municipal Water District

Since 2006, North Texas Municipal Water District has implemented **Water IQ**, the state's recognized water awareness campaign, within its service area. The district advocates and supports water efficiency and conservation efforts, improved water conservation practices, and continued implementation of a water awareness and education campaign. The District provides potable water supplies to over 1.6 million consumers. By 2060, the population of the service area is anticipated to exceed 3.1 million. To date, the District has committed over \$6.7 million bringing awareness, increasing education, and providing resources through the use of *Water IQ*.

Market research conducted in August 2010 indicates a significant positive link between conservation public education and water efficient/water-saving behavior. Since the district's Water IQ campaign was implemented in 2006, North Texas Municipal Water District has been able to curb projected peak day water consumption by an estimated 200 million gallons, despite a 46 percent population increase.

Please see Appendix E on page 77 for more information about these programs.

Panhandle Groundwater Conservation District

Panhandle Groundwater Conservation District provides a number of different programs for public awareness and education on water conservation. Each program takes a different approach in order to affect the largest group of people of different ages. The education and public awareness programs provided are meant to encourage conservation and educate the public about the importance of our water and the serious issues facing us. The district also utilizes **Water IQ** public service announcements that are distributed across the three major networks in the Panhandle Region throughout the summer months.

Please see Appendix E on page 80 for more information about these programs.

Sandy Land Underground Water Conservation District

With the continued depletion of the Ogallala Aquifer, the district believes that it has an obligation to help educate the residents of Yoakum County in water conservation. Specific programs carried out in the district include book covers, calendar art contests, and conservation curriculum, instruction, and education cooperatives. The cooperative is made up of four underground water conservation districts in West Texas that include the Llano Estacado Underground Water Conservation District, the Permian Basin Underground Water Conservation District, the Sandy Land Underground Water Conservation District, and the South Plains Underground Water Conservation District. This joint effort maximizes the efficiency of each district's resources and reaches a large number of water users within the program.

Please see Appendix E on page 82 for more information about these programs.

Tarrant Regional Water District

Tarrant Regional Water District partnered with Dallas Water Utilities in 2007 to promote water conservation across North Texas through an extensive media campaign titled, “**SAVE WATER. Nothing can replace it.**” The water saving messages reach water users through a number of media avenues including radio, television, newspapers, magazines, and billboards. The campaign is now the cornerstone of a regional public outreach effort encouraging responsible water use among millions. Together, Dallas Water Utilities and Tarrant Regional Water District serve more than four million people, representing about 17 percent of the state’s population. Since the partnership began in 2007, the water district has observed an average annual savings of approximately 10 billion gallons.

Please see Appendix E on page 84 for more information about these programs.

Municipal Public Awareness Efforts

City of Dallas Water Utilities

Dallas Water Utilities has implemented a number of public education and outreach strategies including “**SAVE WATER. Nothing Can Replace It.**”, an environmental education Initiative for K-12 students, free irrigation system inspections, industrial-commercial-institutional cooling tower audits, water-wise landscape events, and other public education initiatives. In 2009, Dallas Water Utilities partnered with the Tarrant Regional Water District to leverage its public awareness campaign budget and to provide uniform water conservation messages to the entire media market. This public awareness program budget has grown to \$1.3 million annually.

Please see Appendix E on page 87 for more information about these programs.

San Antonio Water System

San Antonio Water System launched a new multi-media campaign in spring 2009 that was designed to communicate key information to follow stages 1 through 3 of the city’s drought restrictions. Media elements of the conservation campaign included paid advertisements via television, local radio, and newspaper, all covering the message of traditional conservation as well as critical drought messaging. During the drought of 2009 there was a high rate of citizen compliance, and a record number of citizens elected to participate in conservation programs as well. Every conservation ordinance that has gone before the San Antonio City Council has passed with broad support.

Please see Appendix E on page 89 for more information about these programs.

Charge 4

Develop and implement a state water management resource library

Summary of Progress

To address this charge, the Council (1) integrated Texas-specific resources into the Alliance for Water Efficiency's online resource library and (2) included links on the Council's Web page to this resource library and other water conservation resources in Texas. The Council will continue to develop and support the library by posting materials and encouraging others to post materials to the online resource library.

Key Findings

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 and not create an independent water conservation library for Texas. The Alliance for Water Efficiency has established a web site with a wide range of water conservation information, resources, and tools that are available and searchable at: <http://www.allianceforwaterefficiency.org/resource-library/default.aspx>. The Council has included a link to the Alliance of Water Efficiency's clearinghouse on the Council's Web site at www.SaveTexasWater.org. The Water Conservation Best Management Practices Guide has been placed on the Alliance for Water Efficiency's Web site, and other information and links can be added by the Council, Texas Commission on Environmental Quality, or Texas Water Development Board, as needed. Future efforts on this charge will focus on implementation and information management.

Charge 5

Develop and implement a public recognition program for water conservation

Summary of Progress

To address this charge, the Council (1) partnered with the Texas Commission on Environmental Quality on its Texas Environmental Excellence Awards on a Water Conservation Award and (2) developed a program to present water conservation awards at existing events across the state.

Key Findings

In addressing this charge, the Council identified initiatives where public recognition efforts are currently taking place. Under the Waste Reduction Policy Act of 1991, the Texas Commission on Environmental Quality initiated the Texas Environmental Excellence Awards in 1993. Presented every spring, the awards are given in 11 diverse categories across the public and private sectors. By honoring these award winners, the Texas Commission on Environmental Quality hopes to encourage other citizens to initiate like-minded projects and reinforce a spirit of environmental stewardship. Through the Council's partnership with the Texas Commission on Environmental Quality, beginning fall 2010 the Council will have a representative on the Governor's Blue Ribbon Panel to review the entry finalists and select the award winners, including one for the Water Conservation Award. In addition, the Council will also be presenting an award at future events in partnership with the Texas Section of the American Water Works Association (Texas AWWA).

This year's winner of the 2010 Texas Commission on Environmental Quality Environmental Excellence Award for Water Conservation was the Tarrant Regional Water District. The water district's water saving initiatives that include teaming up with the City of Dallas to share the costs of a multimedia outreach campaign and regionalizing conservation efforts among its customers have led to an estimated seven to ten percent reduction in water demands (approximately 20 to 30 million gallons per day).

A Texas municipal supplier was also recognized at the national level during this reporting period. City of Dallas Water Utilities won the U.S. Environmental Protection Agency's Water Sense Award for Fix-a-Leak Week 2010. The initiative serves as an annual reminder for Americans to check their homes for common leaks. Dallas estimates that the week-long event resulted in water savings of some 2.3 million gallons annually.

In addition to the Water Conservation Award, the Council intends to expand recognition of water conservation efforts at other water industry events and functions. Many national and local associations and organizations hold events, conferences, expositions, and workshops

annually throughout different regions of the state. A large number of water professionals and stakeholders convene at these events which will provide an optimal opportunity to recognize leaders in water conservation.

During the Texas Irrigation Expo held in October 2010 at the Rio Grande Valley Livestock Show Grounds in Mercedes, Texas, the Council presented the Irrigator of the Year award. This year's recipients in the Agricultural Water Conservation Category were Jimmy Pawlik and Jim Hoffman, both cooperators in the Lower Rio Grande Valley Agricultural Demonstration Initiative.

Charge 6

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

Summary of Progress

The Council addressed this charge by (1) holding informal discussions with chairs of several of the regional water planning groups regarding water conservation strategy implementation in their region, (2) reviewing region-specific studies related to water conservation, and (3) monitoring the general trends in implementing water conservation in Texas (Charge 1).

The results of the discussions provided further insight to concerns and limitations associated with monitoring conservation strategy implementation and estimating savings. The planning groups shared their opinions on the appropriate tools and methods for evaluating implementation and having the appropriate authority and resources to evaluate implementation. Planning groups expressed interest in more advanced levels of data and information that could be useful in the regional water planning process.

Key Findings

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. In the recent 2007 State Water Plan, 14 of the 16 regional water planning groups identified conservation strategies that would be implemented to assist in meeting water supply needs for the next 50 years.

In 2010 the Council discussed the implementation of water conservation strategies in the regional water plans. The discussions were intended to capture the regional water planning groups' 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. Additionally, the discussions with the chairs of the regional water planning groups have provided further insight regarding the initiatives that are unique to various regions.

Regional water planning statutes, rules, and guidelines do not include any specific requirements or process to track implementation of water management strategies. Several regional water planning groups have expressed their concern about the potential costs and resources associated with the suggested efforts to develop and implement a measurement and tracking procedure. Several regional water planning groups have also expressed concern about the difficulty of measuring implementation and the potential for inconsistent conclusions to be drawn. In the draft 2011 regional water plans published in summer 2010,

there are several region-specific studies related to conservation strategies (all region-specific studies can be accessed at http://www.twdb.state.tx.us/wrpi/rwp/rwp_study.htm).

Some planning groups conducted special study projects relating to conservation strategies within their region. The studies included gathering information for current water conservation programs in the region, developing a list of water conservation best management practices, distributing a water conservation survey throughout the region requesting voluntary feedback, and evaluating survey results. The surveys had response rates that ranged from 20 to 60 percent for rural and urban communities throughout a region for a range of utility sizes from small water supply corporations to the largest wholesale water provider in the region. Some of the completed surveys included system-specific information about voluntary water conservation programs implemented by water users in their region including the amount of reduction in water consumption, program goals, costs, currently implemented best management practices, interest in additional water conservation best management practices, and challenges in implementing future water conservation measures.

Information gathered from these studies indicates that conservation and best management practices continue to be a major focus for water providers within the regions. Most of these strategies target outdoor water use and are perceived as being somewhat to very effective. Most of the providers plan to continue using these strategies. The quantities of water saved by each best management practice are difficult to confirm. There are too many variables that influence water use to accurately assess the water savings and compare these savings to the estimates developed for the regional water plans. There is evidence that water conservation programs are controlling (and reducing) the water use that would have occurred without such measures. However, longer historical records and additional data are needed to confirm these trends and provide reliable estimates of water savings.

Any implementation of water conservation strategies would appear, in part, in water conservation plans and be reflected in the annual water conservation reports and five-year implementation reports discussed under Charge 1.

Additional work needs to be done to effectively monitor the implementation of water conservation strategies. The Council believes that there are limitations in strategy implementation data and information as well as a lack of methodology to collect and analyze such data; therefore, there is reason to move towards improving efforts in tracking strategy implementation on a state level. Without the resources, tools, and methodology to track the levels of strategy implementation, there is no quantitative measure to determine if the strategies listed within the state water plan are being implemented or if the strategies are effectively producing the savings predicted.

The Council suggests that the state agencies consider developing appropriate and standardized methods and tools that will enable them as well as regional water planning groups to track water conservation strategy implementation efforts. Annual reporting and five-year reporting offer an opportunity for the agencies to evaluate the implementation of

conservation measures. Furthermore, water management strategies for conservation can be compared with annual and five-year reporting to evaluate implementation. In June 2010 the Texas Water Development Board approved a research topic on *Standardizing Measures of Long-term Water Conservation Implementation and Short-term Drought Contingency Plan Implementation in Texas*. Results from this study will not be available until October 31, 2011.

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 this 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 region. 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 – Currently consistent and standardized methodologies do not exist for monitoring the levels of strategy implementation. In order to analyze data and information accurately, there needs to 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 improvements and 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.

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Planning groups do not monitor the levels of conservation strategy implementation because they do not have regulatory authority to require water user groups to provide that information or the resources to acquire and monitor the information. The currently existing reports that show the best potential for tracking the implementation of water conservation are the:

- 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 & Five Year Implementation Reports - Texas Commission on Environmental Quality and Texas Water Development Board

Planning groups indicated that enhancements to currently existing reporting mechanisms along with consolidation of reporting efforts across the state agencies would help in identifying the implementation of water conservation.

Please see Appendix F on page 91 for complete overview.

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

Summary of Progress

To address this charge, the Council identified more specific reporting guidelines for collecting data on population and water use by sectors for consistent calculation of gallons per capita per day for possible use by public water providers and user groups.

Key Findings

In its 2004 report, the Water Conservation Implementation Task Force recommended as targets and goals for water supplying entities (1) a minimum annual reduction of one percent in total gallons per capita per day, based on a five-year rolling average, until such time as the entity achieves 140 gallons per capita per day and (2) a statewide goal to reduce statewide water demand to 140 gallons per capita per day. Although the Council recognizes that the optimum gallons per capita varies by service area depending on the mix of residential and institutional use, at this time we do not have sufficient data to enable us to propose any changes to these targets and goals.

The Council determined that any evaluation of target and goal guidelines would require reporting of water use using a consistent methodology that would allow for a valid comparison against a set target or goal. To that end, the Council has, in cooperation with the Texas Water Development Board and Texas Commission on Environmental Quality staff, identified some future possibilities of developing more specific reporting guidelines for collecting data on population and water use by sectors for consistent calculation of gallons per capita per day for public water providers and user groups. Workgroup 2 conducted a review of the New Mexico Office of State Engineer's Gallons Per Capita Per Day Methodology and Tool located at http://www.ose.state.nm.us/wucp_gcpd.html. Several of the workgroup members who represent water provider systems stated that such a reporting tool, with some modifications for Texas conditions, 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.

A consistent methodology to estimate the annual population of water providers is also necessary for consistent calculations for gallons per capita per day estimates (see **Appendix G**). In June 2010 the Texas Water Development Board approved a research project that aims to develop current and accurate maps of the boundaries of Texas public water providers to help

develop more accurate population estimates. This project is expected to be completed by October 31, 2011.

In evaluating the state's existing efforts in monitoring target and goal guidelines for water conservation, there are limitations in water conservation data and information as well as an inconsistency in methodology of data analysis. The state's current reporting requirements primarily serve purposes related to water use permitting, volumes of water use, and water supply planning assessments.

Currently, there is not a well defined reporting tool that can provide both a sector based analysis and can be used by water providers for the primary purpose of evaluating internal water conservation trends and needs. With those findings there is reason to move towards improvements in more comprehensive water conservation sector based data efforts and analysis.

A comprehensive tool can be highly beneficial to water providers by providing more specific detail on the water user groups and their usage. With well defined and consistent analysis of data and information, water providers and user groups can develop effective conservation initiatives and programs.

The Council has worked closely with the Texas Water Development Board and the Texas Commission on Environmental Quality on evaluating the future potential for standardized metrics.

The Metrics Challenge

Gallons per capita per day (gpcd) is a common metric used by water purveyors for water supply planning and for tracking conservation success. However, gpcd can be confusing because a consistent methodology for calculation of gpcd has not been established. Each water purveyor that calculates gpcd may do it differently. Methods of estimating service population can vary widely as can what water is included in the calculation. Adding to the confusion is the tendency to use gpcd to compare very disparate communities. 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 gpcd alone can be misleading.

Proposed solutions include providing a set of instructions and a tool for municipal water purveyors to determine use based gpcd. This tool would emphasize a break-down of water use into sectors such as residential and commercial. Sector reporting will make the gpcd analysis a useful tool for long-term planning and to determine which conservation programs would yield best results.

Existing gpcd Reports Today

Gpcd is currently used in several existing reports, but there is not a consistent set of instructions on how a water purveyor should calculate gpcd. Three existing reports include: Total Municipal gpcd, Residential Municipal gpcd, and a self-reported utility gpcd on Water Conservation reports.

Total Municipal gpcd: This is calculated by the Texas Water Development Board each year. It represents water usage inside city limits excluding industrial and power plant usage. Texas Water Development Board gathers water consumption data from many sources such as industrial users, water utilities, and individual well owners. They use this data to estimate how much water was used within city limits. City population numbers generated by the state demographer's office are used. Because city population figures are not available by the end of each year, postings of Municipal gpcd are two years older than most recently available water usage data. Municipal gpcd calculations are used in completing projections of state water needs.

Residential Municipal gpcd: Recently there has been the addition of a residential municipal gpcd number to the Texas Water Development Board Municipal gpcd reports. Texas Water Development Board gathers information on total residential water sold by water providers who serve each city and estimates how much of the water was sold within the city limits. From these estimates, the entities complete a residential municipal gpcd calculation. Residential municipal gpcd is posted for each city at the same time that the total municipal gpcd numbers are posted.

Conservation Report gpcd: Water utilities that are required to complete conservation plan reports for Texas Water Development Board complete a portion on gpcd. The report requests a total gpcd, a residential gpcd, and a non-revenue water (lost water) gpcd. Each utility is allowed to determine their own method to estimate population and what water to include in the gpcd total. The report also requests gpcd targets and goals.

Summary of Council Recommendations

- 1) The gpcd tool should emphasize a sector-based analysis. (Total gpcd can be shown to illustrate the relationship between all sectors that contribute to the total water use.)
 - The sector-based analysis would be most rigorous for utilities with billing systems that allow sorting sold water by customer type such as residential, multifamily, commercial, industrial, and institutional. However, small utilities without this data detail could still use the tool to generate useful information and a more accurate gpcd.
- 2) Create a common set of instructions for water utilities on how to calculate gpcd for conservation planning and provide a spreadsheet tool to facilitate the process.
 - A similar effort was made by the New Mexico Office of the State Engineer with the result of a highly functional gpcd reporting mechanism for New Mexico.

- 3) Once finalized the gpcd sector tool and spreadsheet tool should be included as part of the Water Conservation Plans, annual reports, and five-year implementation reports.
 - In 2011 a beta test of a calculation tool could be completed on a voluntary basis by utilities of varying sizes to obtain feedback. Several large and mid-sized utilities have already expressed interest in participating. These include but are not limited to: San Antonio, Austin, Dallas, New Braunfels, College Station, Frisco, and Wells Branch Municipal Utility District.
 - A finalized tool could be completed by 2012 so that the new gpcd sector analysis can be used in water conservation plans and reports.
- 4) The gpcd sector tool could be similar to the New Mexico gpcd tool with some important revisions to make it more suitable to Texas needs.
 - The population estimation options need to range from very simple to very rigorous. **Appendix G** has been prepared with examples of options that could be offered to allow for the diversity in data and analysis capabilities by utilities in Texas.
 - The tool should explain how to handle aquifer storage and recovery water. Any water stored for future use would not be counted as consumptive use, while water removed and brought back into the distribution system would be counted as a supply in the calculation.
 - The breakdown of water uses in the New Mexico tool is close to those suggested by the Council. An additional option of including institutional water would be valuable for those communities with universities or other unique user groups. In addition, the Council recommends that utilities move toward using universally accepted codes within customer databases such as the North American Industry Classification System which make it easier to sort customer data accurately. The tool should explain how to account for and credit direct and indirect reuse in the gpcd calculation.

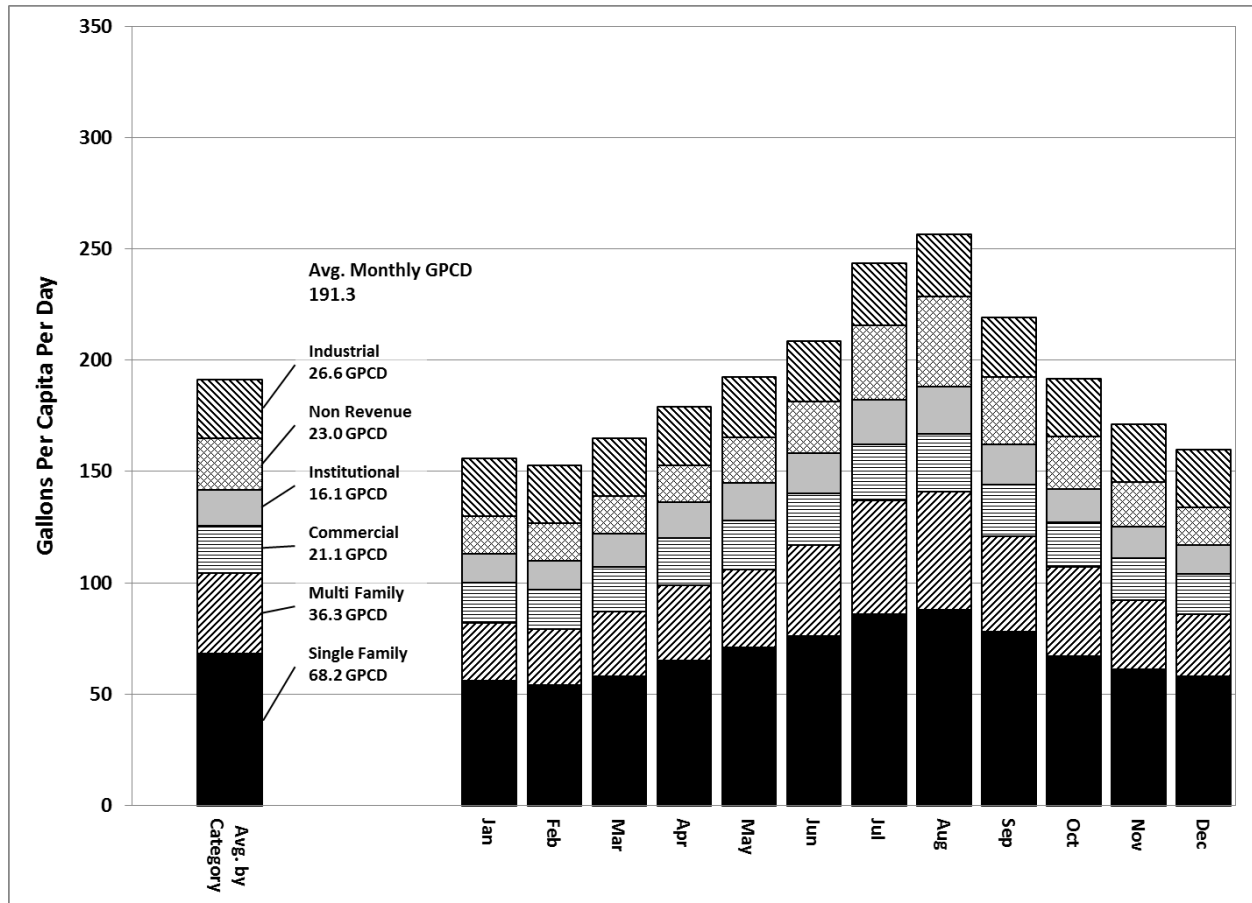
Advantages of Sector-Based Proposal

A comparison of three types of communities has been prepared to illustrate the advantages of a sector-based gpcd report. Each of these examples has a similar gpcd in total but very different opportunities to decrease it. Non-revenue water also varies between the examples, from a low of 9-10 percent in the tourism community to 12 percent in the large urban community to 17 percent in the bedroom community. These differences in non-revenue can be attributed to volume of water passing through the system throughout the year as well as the amount of resources available to resolve non-revenue water issues.

Non-revenue water includes all water that is not billed by a water provider. It may include water lost through system leaks, stolen water, fire protection water, water not accurately measured through meters, and other losses or non-billed uses.

Figure 1: Example of Large Urban Community

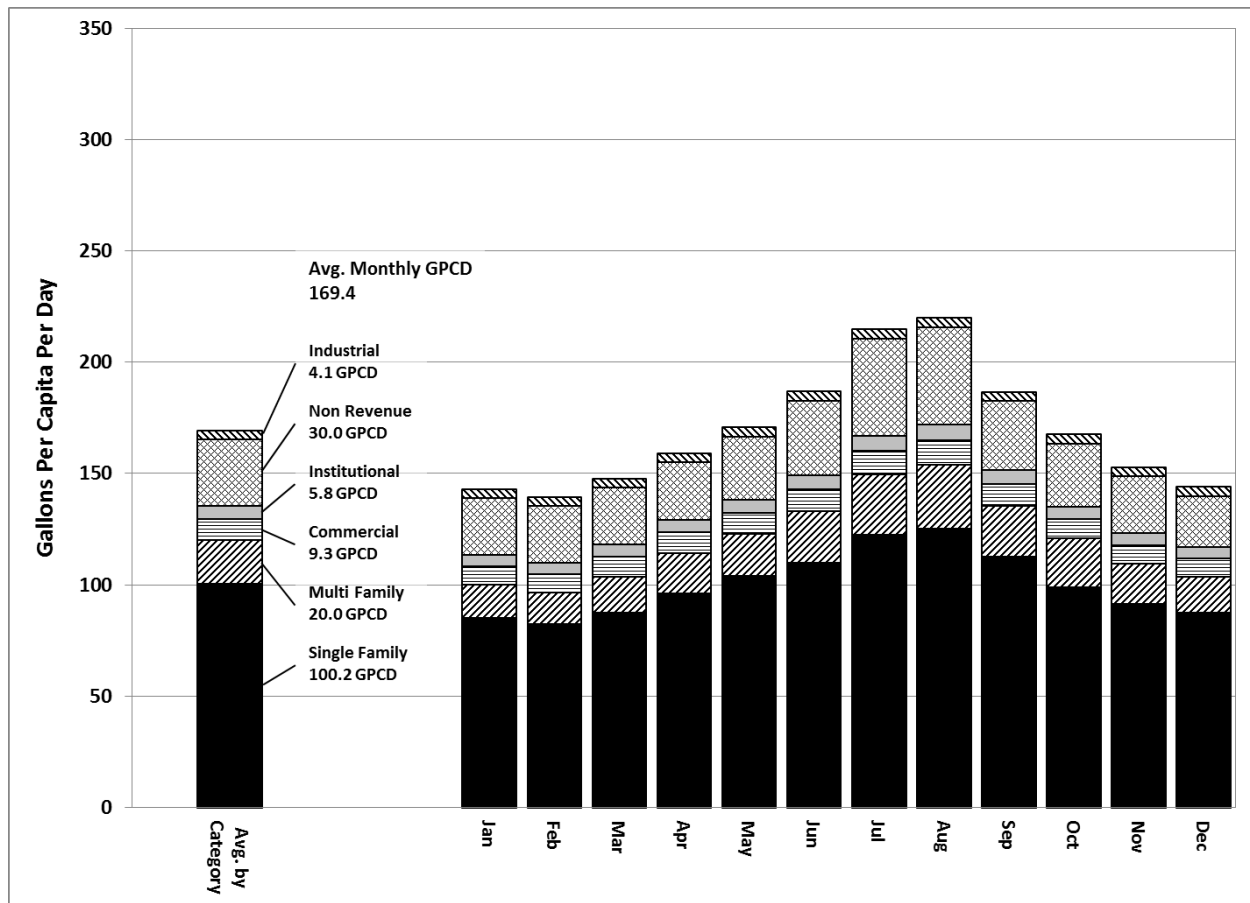
Note: This example does not depict a specifically named community.



The example of a large, urban utility demonstrates that water consumption may be nearly evenly divided between residential uses and needs for commercial and industrial. A utility serving such a wide range of customers would benefit from a broad-based conservation program which includes commercial and industrial initiatives in addition to residential programs.

Figure 2: Example of a “Bedroom Community”

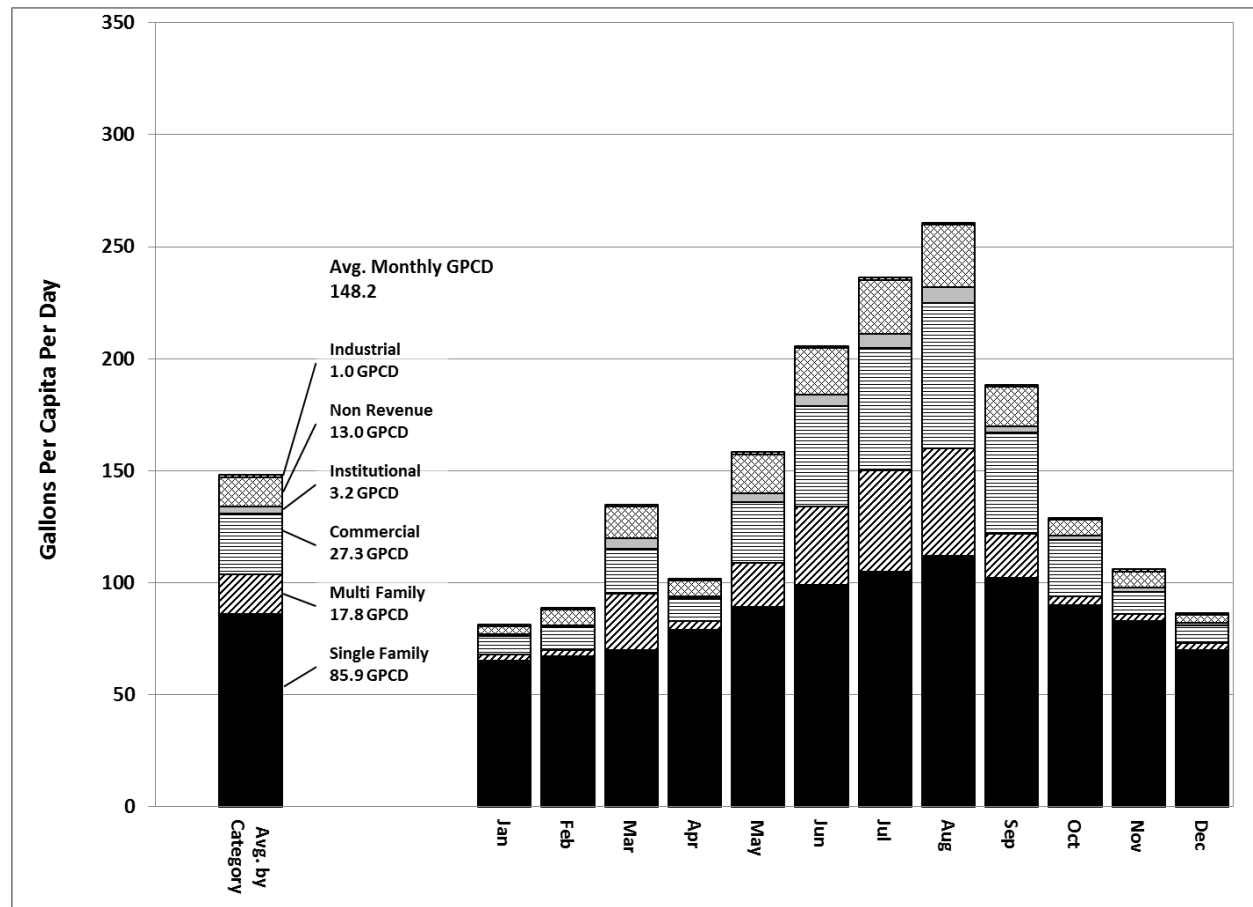
Note: This example does not depict a specifically named community.



The example of a “bedroom community” illustrates that in some cities nearly all of the consumption of water is from residential settings. The non-revenue (lost water) component in a city like this example may be high due to aging pipes and meters. This can highlight opportunity for increased efficiencies.

Figure 3: Example of a Community with Large Tourism Industry

Note: This example does not depict a specifically named community.



The example of a community with a large tourism base shows seasonal fluctuations in the gpcd of some sectors which are because of temporary increases in population due to hotel and other lodging. A program ensuring that hotels have an efficiency program would be a great opportunity for a community like this one.

Summary of Reasons for a gpcd Tool Guideline

1) A Comprehensive Tool Results In Clear Reports

When a gpcd calculation is only partially broken down or when the population is self-reported, there is too much room for doubt and confusion. With different assumptions regarding population and in water to be included, two different gpcd numbers could be generated from the same utility in the same year. A common methodology will prevent this.

2) Sector gpcd Analysis Provides Necessary Planning Tools

The most important reason to have sector data is to drive conservation programs where they are needed. Without a sector analysis, a community can not know if their residential gpcd is the best opportunity or if a commercial program might yield the biggest impact. A tool like the one used in New Mexico will give new insights to communities and show trends not previously noted.

3) Sector gpcd Analysis is Fair to Different Communities

A single gpcd does not provide enough information to explain how a community is performing long-term in conservation efforts. If industrial consumption were to increase due to an economic success, it could mask gains made in reducing residential usage. Seeing how both sectors trend over time would alleviate this problem.

Future Potential for Water Use Metrics

The Council, as well as the Water Conservation Implementation Task Force before them, recognizes that Texas has a wide range of per capita water use because its water utilities have a wide range of service and population profiles. The Council recognizes that a simple comparison of per capita water use between Texas municipal water supply providers does not consider significant differences in climate and geography as well as in their service and population profiles. Without additional data and analysis, making such comparisons may lead to inaccurate conclusions about use efficiencies among those providers.

Therefore, a challenge for the Council has been to identify the potential for a standardized methodology for reporting and using per capita water use data that would:

- provide meaningful assistance to state agencies in the collection and analysis of water use data for water conservation purposes;
- provide assistance to municipal and other water utilities in illustrating potential for progress in water conservation, given their current and future population and service profiles; and
- minimize the potential for inappropriate comparisons between municipal water supply providers and others.

Several water use sectors, especially irrigated agriculture, industrial processes, and steam electric generation, should be analyzed with 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.

LOOKING FORWARD

In this tight fiscal period the Council has observed that noteworthy conservation is currently being accomplished with local and regional entities using their own resources and resources from the private sector through contributions and donations. The Council believes that these efforts represent a commitment to advancing water conservation in Texas.

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

Water Conservation for Energy: As the population of Texas continues to grow, our state will face the challenge of supplying water and energy for both industry and people. Energy and water are finite resources that are closely linked — and increasingly strained by rising demand. To address this issue, the Council plans to work with State Energy Conservation Office to identify water conservation opportunities associated with energy consumption and to identify the energy savings that are associated with water conservation best management practices. Toward this end, the Council has recommended adding one additional element to the Best Management Practices Guide outline “*Determination of the Impact on Other Resources*,” energy being one and labor, materials, capital expenditures, being other examples. Increasing efficiency in energy consumption can be one of the most effective methods to conserving our state’s water supplies.

Resource Library Website: As water demand projections depict a growing need for conservation, water user groups will need to refer to tools and resources to develop, implement, and manage effective water conservation programs. An aware and motivated audience must have easy access to information that will assist them in developing good conservation practices. Texas is not unique in the need for conservation; therefore, pursuing opportunities to collaborate with existing national efforts will strengthen the resources for Texas and allow the state to efficiently use those resources. The Council will continue to participate in a cooperative effort with the Alliance for Water Efficiency in the development of a national water conservation clearinghouse. The goals of the national project align with the goals and charges of the Council. In addition, the Council will identify those documents of particular interest to Texans and provide links to them from our Web site. The Council will also consider exploring social media outlets for the transmission of resources and information.

Public Recognition Award: Recognition award programs help to expand the efforts in promoting water conservation awareness. Visible and prestigious public recognition awards such as the Texas Environmental Excellence Awards help to elevate the importance of water conservation related issues. The Council looks forward to participating in the review process for the Water Conservation Category of the Texas Environmental Excellence Award. The Council also looks forward to recognizing outstanding conservation efforts amongst different water use sectors.

Best Management Practices Guide: With information reported to the 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. 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 plans to continue its efforts towards reviewing submissions for the new and revised Best Management Practices Guide.

Metrics and Methodologies: The cornerstone of any successful conservation program is to have uniform metrics in place to set targets and goals and to measure success. Currently there are very limited uniform metrics in place for water conservation programs. Existing measurements for conservation are inconsistently used and create confusion and inaccurate information. Standardized methods and metrics are critical to achieving a better understanding and success of water conservation efforts. To shorten the timeline for developing these standards, the Council plans to proceed with the development of non-municipal metrics for industry and agriculture so that all inclusive standards can be ready as early as possible. The Council will continue to work towards developing uniform metrics for all sectors of water use. Training will be beneficial for agency and utility staff as metric tools are developed.

Research and Education: Municipal and industrial water uses are the fastest growing water use segments of the Texas economy. Yet, other than horticultural and landscape irrigation research, there is little water conservation research or education being directed at these sectors in any higher education facilities in Texas. The Council has identified that research and education programs for the municipal and industrial areas are necessary for Texas to move forward to ensure the efficient use of its limited water resources.

Several Texas based universities are already engaged in energy efficiency research and have incorporated that into their curriculum. Energy related research is being conducted in the areas of public acceptance, economic impacts and benefits of energy efficiency. Becoming more energy efficient and involves a variety of disciplines including engineering, physical sciences, economics and the social sciences. There is a need to start similar programs for water conservation for the industrial and municipal water using sectors.

ACKNOWLEDGMENTS

The Council appreciates the efforts of a number of Texas Water Development 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 Texas Water Development Board's primary support for the Council and for Ms. Patsy Waters for her administrative support on Council activities.

APPENDIX A:

Enabling Legislation

The following pages provide the legislative statute which directs purpose and activities of the Water Conservation Advisory Council.

ENABLING LEGISLATION

All references are to revisions in the Texas Water Code and are in legislative formatting.

Sec. 10.001. DEFINITIONS. In this chapter:

- (1) "Best management practices" has the meaning assigned by Section 11.002.
- (2) "Board" means the Texas Water Development Board.
- (3) "Commission" means the Texas Commission on Environmental Quality.
- (4) "Council" means the Water Conservation Advisory Council.

Sec. 10.002. PURPOSE. The Council is created to provide the governor, lieutenant governor, speaker of the house of representatives, legislature, board, commission, political subdivisions, and public with the resource of a select Council with expertise in water conservation.

Sec. 10.003. CREATION AND MEMBERSHIP. (a) The Council is composed of 23 members appointed by the board. The board shall appoint one member to represent each of the following entities or interest groups:

- (1) Texas Commission on Environmental Quality;
- (2) Department of Agriculture;
- (3) Texas Parks and Wildlife Department;
- (4) State Soil and Water Conservation Board;
- (5) Texas Water Development Board;
- (6) regional water planning groups;
- (7) federal agencies;
- (8) municipalities;
- (9) groundwater conservation districts;
- (10) river authorities;
- (11) environmental groups;
- (12) irrigation districts;
- (13) institutional water users;
- (14) professional organizations focused on water conservation;
- (15) higher education;
- (16) agricultural groups;
- (17) refining and chemical manufacturing;
- (18) electric generation;
- (19) mining and recovery of minerals;
- (20) landscape irrigation and horticulture;
- (21) water control and improvement districts;
- (22) rural water users; and
- (23) municipal utility districts.

(b) Each entity or interest group described by Subsection (a) may recommend one or more persons to fill the position on the Council held by the member who represents that entity or interest group. If one or more persons are recommended for a position on the Council, the board shall appoint one of the persons recommended to fill the position.

Sec. 10.004. TERMS. (a) Members of the Council serve staggered terms of six years, with seven or eight members' terms, as applicable, expiring August 31 of each odd-numbered year.

(b) The board shall fill a vacancy on the Council for the unexpired term by appointing a person who has the same qualifications as required under Section 10.003 for the person who previously held the vacated position.

Sec. 10.005. PRESIDING OFFICER. The Council members shall select one member as the presiding officer of the Council to serve in that capacity until the person's term as a Council member expires.

Sec. 10.006. COUNCIL STAFF. On request by the Council, the board shall provide any necessary staff to assist the Council in the performance of its duties.

Sec. 10.007. PUBLIC MEETINGS AND PUBLIC INFORMATION. (a) The Council may hold public meetings as needed to fulfill its duties under this chapter.

(b) The Council is subject to Chapters 551 and 552, Government Code.

Sec. 10.008. INAPPLICABILITY OF ADVISORY COMMITTEE LAW. Chapter 2110, Government Code, does not apply to the size, composition, or duration of the Council.

Sec. 10.009. COMPENSATION OF MEMBERS. (a) Members of the Council serve without compensation but may be reimbursed by legislative appropriation for actual and necessary expenses related to the performance of Council duties.

(b) Reimbursement under Subsection (a) is subject to the approval of the presiding officer of the Council.

Sec. 10.010. POWERS AND DUTIES OF COUNCIL. The Council shall:

- (1) monitor trends in water conservation implementation;
- (2) monitor new technologies for possible inclusion by the board as best management practices in the best management practices guide developed by the water conservation implementation task force under Chapter 109, Acts of the 78th Legislature, Regular Session, 2003;
- (3) monitor the effectiveness of the statewide water conservation public awareness program developed under Section 16.401 and associated local involvement in implementation of the program;
- (4) develop and implement a state water management resource library;
- (5) develop and implement a public recognition program for water conservation;
- (6) monitor the implementation of water conservation strategies by water users included in regional water plans; and
- (7) monitor target and goal guidelines for water conservation to be considered by the board and commission.

Sec. 10.011. REPORT. Not later than December 1 of each even-numbered year, the Council shall submit to the governor, lieutenant governor, and speaker of the house of representatives a report on progress made in water conservation in this state.

Sec. 10.012. DESIGNATION OF CERTIFIED WATER CONSERVATION TRAINING FACILITIES STUDY. (a) The Council shall conduct a study to evaluate the desirability of requiring the board to:

(1) designate as certified water conservation training facilities entities and programs that provide assistance to retail public utilities in developing water conservation plans under Section 13.146; and

(2) give preference to certified water conservation training facilities in making loans or grants for water conservation training and education activities.

(b) Not later than December 1, 2008, the Council shall submit a written report containing the findings of the study and the recommendations of the Council to the governor, lieutenant governor, and speaker of the house of representatives.

(c) This section expires June 1, 2009.

APPENDIX B:

Organizational Charter

Water Conservation Advisory Council

The 80th Texas Legislature (2007), via passage of SB 3 and HB 4, directed the establishment of a Water Conservation Advisory Council (Council) to serve as a select and expert resource to state government and the public on water conservation in Texas. This action by the Texas Legislature gives form to one of the principle recommendations put forward by the Water Conservation Implementation Task Force in a report submitted to the 79th Texas Legislature in November 2004.

This organizational charter outlines the purpose, goals, form, and function of the Texas Water Conservation Advisory Council. This is a working document and is subject to change as deemed necessary by the participating members.

Mission Statement

To provide a professional forum for the continuing development of water conservation resources, expertise, and progress evaluation of the highest quality for the benefit of Texas—its state leadership, regional and local governments, and general public.

Goals

- To fulfill its statutory duties in a manner that effectively and directly complements efforts by public and private entities to implement water conservation strategies to meet their current and future water supply needs,
- To ensure that the Council meets the highest standards of professional integrity in the performance of its duties, and
- To ensure, that in the performance of its duties, the Council is guided by a sense of responsibility to equitably serve all of the citizens in every of region of the state.

Membership

The Council is composed of 23 members appointed by the Texas Water Development Board. Appointments are for one member to represent each of the following entities or interest groups:

- (1) Texas Commission on Environmental Quality
- (2) Texas Department of Agriculture
- (3) Texas Parks and Wildlife Department
- (4) Texas State Soil and Water Conservation Board
- (5) Texas Water Development Board

- (6) regional water planning groups
- (7) federal agencies
- (8) municipalities
- (9) groundwater conservation districts
- (10) river authorities
- (11) environmental groups
- (12) irrigation districts
- (13) institutional water users
- (14) professional organizations focused on water conservation
- (15) higher education
- (16) agricultural groups
- (17) refining and chemical manufacturing
- (18) electric generation
- (19) mining and recovery of minerals
- (20) landscape irrigation and horticulture
- (21) water control and improvement districts
- (22) rural water users and
- (23) municipal utility districts

Qualifications

Membership on the Council is based on expertise in water conservation and on an individual's availability to devote time adequate to participate fully in Council activities. In addition, an individual must represent at least one of the 23 interest groups or entities that provisions in statute list for representation on the Council.

Terms

Members of the Council serve staggered terms of six years, with seven or eight members' terms, as applicable, expiring August 31 of each odd-numbered year. In making the initial appointments, the Texas Water Development Board has designated seven members to serve terms expiring August 31, 2009, eight members to serve terms expiring August 31, 2011, and eight members to serve terms expiring August 31, 2013. The Texas Water Development Board shall fill a vacancy on the Council for an unexpired term by appointing a person who has the same qualifications as required for the person who previously held the vacated position.

Definition of Water Conservation

The Council adopts the following working definition of water conservation:

"Those practices, techniques, programs, and technologies that will protect water resources, reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses."

Tasks

Consistent with the duties and requirements of the Council as outlined in HB 4 and SB 3 (80th Texas Legislature), the work of the Council will initially be organized into the following tasks:

- (1) monitor trends in water conservation implementation;
- (2) monitor new technologies for possible inclusion by the Board as best management practices in the best management practices guide developed by the Water Conservation Implementation Task Force under Chapter 109, Acts of the 78th Legislature, Regular Session, 2003;
- (3) monitor the effectiveness of the statewide water conservation public awareness program developed under Section 16.401 and associated local involvement in implementation of the program;
- (4) develop and implement a state water management resource library;
- (5) develop and implement a public recognition program for water conservation;
- (6) monitor the implementation of water conservation strategies by water users included in regional water plans; and
- (7) monitor target and goal guidelines for water conservation to be considered by the Board and Commission.

Not later than December 1 of each even-numbered year, the Council shall submit to the governor, lieutenant governor, and speaker of the house of representatives a report on progress made in water conservation in this state.

The Council shall conduct a study to evaluate the desirability of requiring the Board to:

- (1) designate as certified water conservation training facilities entities and programs that provide assistance to retail public utilities in developing water conservation plans under Section 13.146; and
- (2) give preference to certified water conservation training facilities in making loans or grants for water conservation training and education activities.

Not later than December 1, 2008, the Council shall submit a written report containing the findings of this study and the recommendations of the Council to the governor, lieutenant governor, and speaker of the house of representatives.

Consideration of Water Conservation Implementation Task Force Recommendations

In the performance of their duties, the Council and any workgroups of the Council shall consider and give appropriate weight to the applicable discussion and recommendations put forward by the Water Conservation Implementation Task Force in its report to the 79th Texas Legislature in November 2004.

APPENDIX C:

Organizational Bylaws

Water Conservation Advisory Council

Presiding Officer

The Council members shall elect one member as the presiding officer of the Council to serve in that capacity until the person's term as a council member expires.

Other Officers

The Council shall select one member to serve as a vice-presiding officer in the absence of the presiding officer. The Council may also select members to serve as other officers if and when it decides such positions are necessary. Members elected to these officer positions will serve until their term as a council member expires.

Workgroups

From its own membership, the Council may create workgroups, each of which will focus their attention on the tasks around which the Council has initially organized its work. Formation of these workgroups is intended to provide a helpful focus on the council's duties and have the added benefit of achieving a voluntary division of labor based on individual member expertise and interest.

All workgroup discussions will be accessible to the general public. The Texas Water Development Board will facilitate on site facilities where necessary. Only Council members will openly speak or participate in workgroup sessions. A Council member may invite an external participant to speak or participate in workgroup discussions.

Council Staff Support

Texas Water Development Board shall provide any necessary staff support to assist the Council in the performance of its duties.

Operational Approach

1. For organizational purposes, the Council will hold at least one meeting per calendar year quarter. Consistent with Chapters 551 and 552 of the Texas Government Code and at a minimum, all meeting agendas of the full Council will be posted on the Texas Water Development Board's Web site, be open to the public, and provide an opportunity for public comment. Full Council meetings will be recorded and minutes and/or summaries of the meetings will be made available to the general public via the Texas Water Development Board Web site. Chapter 2110, Texas Government Code, does not apply to the size, composition, or duration of the Council.

2. Work group meetings or discussions, as needed, may be held in person, via teleconference, or via the Internet. All substantive decisions and/or recommendations made by the work groups are to be reported back to the full Council membership for their consideration and final disposition.

Common Ground Rules for Meetings

1. Stay focused on task and adhere to any time limits.
2. Participate, share information, and invite questions.
3. Be specific (e.g. use examples).
4. Signal desire to speak and wait for turn.
5. Don't speak while others are speaking.
6. Agree on what important words mean.
7. Focus on interests, not positions.
8. Disagree and debate openly.
9. Respect those who disagree.
10. Listen actively.

Alternates for Members

Each member shall designate one alternate to represent them when the member is unable to attend a Council meeting. A listing of these designated alternates will be provided to all Council members. Each alternate is expected to maintain an up to date knowledge of council activities and be prepared to report on any activities assigned to the absent member. The alternate may participate in council discussions and may vote on any decision in place of the absent member.

Decisions of the Council

A quorum is defined as at least 12 Council members. Votes will not take place at any meeting without a quorum present. It is desirable for the Council to reach decisions by consensus. However, if consensus does not appear possible the presiding officer may call for a vote. The vote will carry for a decision only by 16 Council members or designated alternates voting favorably. Agendas may have separate items for educational presentations, information gathering on specific issues, discussion on specific issues, and decision-making. Unless an early consensus arises during a discussion item, discussion may continue as long as the presiding officer considers consensus a possibility. However, if consensus does not appear possible, the Council will be expected to reach a decision by two-thirds majority vote unless there is a consensus that more time is necessary or that the decision item should be moved to another agenda. If the Council reaches a decision in the absence of a consensus, the Council will accept a minority position for the record. At each full Council meeting there will be a note taker present for recording decisions and votes. In instances where decisions are made without reaching consensus, the number of voting members or alternates present, the number of those voting in favor of a motion, and the result will be recorded.

APPENDIX D:

A Brief Synopsis of Trends in Water Conservation Implementation

The following pages provide brief descriptions of a selection of examples where water conservation programs are being implemented.

- Texas Commission on Environmental Quality
- Texas Comptroller ~ State Energy Conservation Office
- Texas State Soil and Water Conservation Board
- Texas Water Development Board
- High Plain Agricultural Demonstration Initiative
- Lower Rio Grande Valley Agricultural Demonstration Initiative
- USDA ~ Natural Resources Conservation Service
- City of Dallas
- City of El Paso
- San Antonio Water System
- Texas Legislation and Standards

Texas Commission on Environmental Quality

- Since 2009, staff has administratively reviewed 139 water conservation plans for water rights applications. Of these plans, 23 were technically reviewed because the application requested a new appropriation and/or inter-basin transfer. The agency also received 292 water conservation plans for statutory requirements of water rights holders. During this time period, staff received more than 600 phone calls for technical assistance regarding water conservation plans. In addition, water conservation plan information was presented at 11 public speaking events.
- In 2009, the plumbing fixtures program amended the Texas Administrative Code Chapter 290 and 291 to implement House Bill 2667 which introduced new standards for plumbing fixtures sold for use in the State of Texas. As part of the 5-year phase-in of the new standards, compliance forms were distributed and received from manufacturers that sell shower heads, toilets, or urinals for use in the State of Texas.
- The agency partnered with The Home Depot to host a consumer education event in 16 stores state-wide. Held on April 18, 2009, the event offered tips to save water and money, and included a demonstration on how to build your own rain barrel.
- Texas Commission on Environmental Quality also partnered with the Texas Association of Broadcasters to produce and air public service announcements for TV and radio that encourage water conservation. Running from July 13 through September 30 in 2009, the announcements aired over 15,600 times throughout the state.
- The Texas Environmental Excellence Awards honor select Texans each year for their exceptional efforts to protect our state's natural resources. In 2009, a water conservation category was added to recognize innovations Texans develop to address the critical issue of water supply. The awards spotlight environmental achievements in up to 11 categories, and winners are recommended by the Governor's Blue Ribbon Committee and approved by Texas Commission on Environmental Quality Commissioners and Governor Perry.
- The Environmental Trade Fair and Conference featured a Take Care of Texas Booth featuring water conservation and rainwater harvesting.
- The Take Care of Texas Web Site www.takecareoftexas.org was updated with new water conservation materials and information including a new water conservation page.

Texas Comptroller ~ State Energy Conservation Office

The 77th Legislature directed the State Energy Conservation Office to develop a set of water efficiency standards for state agencies. The following are water standards that should be followed for new buildings, major renovation projects, and purchase of any new or used equipment by the State. These water standards should also apply when purchasing new or used equipment to replace existing equipment, or for making major modifications to existing systems or equipment that equals more than half the original purchase price of the equipment. A system approach should be used when examining water use in this sector. The goal shall be to balance water, wastewater, energy, and related costs to achieve the lowest lifecycle cost when purchasing new equipment or making modifications to existing equipment.

The State Energy Conservation Office is in the final stage of editing and organizing the proposed water standards draft for adoption through the public review and comments process. The State Energy Conservation Office suggested water efficiency standards for buildings and equipment at Texas state facilities:

State Government Code

447.002 –The State Energy Conservation Office shall develop and provide energy and water conservation information for the state.

447.004 –The state energy conservation office shall establish and publish mandatory energy and water conservation design standards for each new state building or major renovation project, including a new building or major renovation project of a state-supported institution of higher education.

447.005 –Subject to applicable state and federal laws or guidelines, the State Energy Conservation Office may:

- (1) implement an energy or water efficiency project at a state agency; or
- (2) assist the agency in implementing the project through an energy or water efficiency program.

2305.032 –The State Energy Conservation Office under the LoanSTAR revolving loan program may provide loans to finance energy and water efficiency measures for public entities

Energy-Water Nexus

A report prepared jointly by The University of Texas at Austin and the Environmental Defense Fund titled “Energy-Water Nexus in Texas – April 2009” at http://www.edf.org/documents/9479_Energy-WaterNexusinTexasApr2009.pdf explored the many relationships between energy and water. Many water conservation programs also reduce energy consumption. A simple example is when water conservation results in the

elimination or reduction in water and wastewater treatment facility requirements saving both construction and operating costs and reducing the energy required to operate the additional facilities. The report states, "Despite the synergies of conservation, we are entering an era in which public policies designed to reduce water use for energy may lead to increases in carbon emissions. Conversely, policies to reduce carbon emissions might increase water use. And, energy policies, such as promotion of alternative bio-fuels for transportation have competing effects on water use."

"Moving forward, these interrelationships must be identified and understood before implementing public policy proscriptions that benefit one component of this complicated carbon-water-energy relationship while accidentally undermining another."

It is imperative that the Texas Water Development Board, Texas Commission on Environmental Quality, and State Energy Conservation Office coordinate their input to the public policy process such that these complex relationships can be clearly identified and balanced in the formulation of public policy. The Council can play an important role in helping to advise these agencies and the legislature to insure that these relationships are identified as early as possible.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board surveyed soil and water conservation districts planning Agricultural Best Management Practices implementation in 2004, 2005, and 2007. The survey was to estimate the effect of Best Management Practices implementation on water savings. Statewide water savings resulting from implementation of these Best Management Practices was calculated based on the estimated Best Management Practices water savings contained in the Texas water conservation Best Management Practices guide. Over forty different Best Management Practices were implemented each year. Over half of the estimated water savings over the three years of data was from brush management.

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

SWCD -Soil and Water Conservation District

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

Water Supply Enhancement Program

The state legislature began funding the Water Supply Enhancement Program in 1999. Since then, over 700,000 acres of brush have been treated in various watersheds across the State.

Currently the Water Supply Enhancement Program has sixteen active projects. Results of the program to date are:

Watershed Project	State Cost Per Treated Acre	Treated Acres	Ac-Ft/Ac/Year	Ac-Ft/Year	Total Water Yield for Life of the Project
<i>Completed Projects</i>					
Lake Ballinger	\$45.00	7,800	0.170	1,325	59,615
Oak Creek Lake	\$47.00	16,224	0.145	2,351	110,495
Lake Champion	\$43.00	14,993	0.097	1,451	62,385
Mountain Creek	\$49.00	1,440	0.142	205	10,044
Greenbelt Reservoir	\$87.50	571	3.000	1,713	149,865
Hubbard Creek	\$58.75	506	3.000	1,518	89,169
Pecos/Upper Colorado	\$70.78	10,580	4.449	47,075	3,331,930
North Concho River	\$45.50	327,000	0.080	26,156	1,190,101
<i>Active Projects</i>					
Lake Brownwood	\$146.34	857	0.294	252	36,843
Bosque River	\$162.50	176	0.080	14	2,288
Little Wichita River	\$20.92	14,387	0.497	7,153	149,642
Nueces River	\$27.65	7,789	0.224	1,746	48,277
Frio River	\$24.22	2,316	0.224	519	12,574
Canadian River	\$92.49	16,850	2.509	42,275	3,910,014
Pedernales River	\$72.00	66,266	0.668	44,284	3,188,430
Upper Guadalupe River	\$123.71	1,500	0.668	1,002	124,008
Edwards Aquifer	\$155.75	457	0.668	305	47,566
Twin Buttes Reservoir	\$68.03	213,881	0.077	16,425	1,117,413
O.H Ivie Reservoir			0.000	0	
Fort Phantom Hill Reservoir			0.000	0	
Palo Pinto Reservoir			0.000	0	
Carrizo - Wilcox Aquifer			0.000	0	
O.C. Fisher Lake			0.000	0	
Lower Guadalupe River			0.000	0	
TOTAL				195,769	13,640,659

Texas Water Development Board

Research

In June 2010 the Texas Water Development Board approved a research project “*Standardizing Measures of Long-term Water Conservation Implementation and Short-term Drought Contingency Plan Implementation in Texas.*” The purpose of this research is to evaluate whether and/or how water providers and cities quantify water conservation implementation; assess the quality and utility of the information currently gathered on water conservation implementation; and develop approaches that will improve the ability of water providers to measure and track municipal water conservation savings while facilitating aggregation of water conservation savings estimates locally, regionally, and statewide. With this information the Texas Water Development Board may be able to develop tools and resources that will improve the ability of water providers to measure and track municipal water conservation savings. However, results from this study will not be available until October 31, 2011, and will be addressed in the Council’s 2012 report.

Conservation Plans and Annual Reports

According to provisions in Texas Water Code Section 16.402.(b), approximately 570 water utilities and certain other water users are or will be required to submit to the Texas Water Development Board an annual report on progress in implementing their water conservation plan. Entities included in this requirement include utilities that have received financial assistance from the Texas Water Development Board, entities that have obtained surface water use permits from the Texas Commission on Environmental Quality, and retail public water providers who serve more than 3,300 connections.

The first submission date was May 1, 2010. At the time of completion of this report the preliminary analysis of the annual reports required in 2010 include the following highlights:

- As of August 31, 2010, a total of 213 completed annual reports were available for analysis as discussed below.
- From the reported data on Gallons Per Capita Per Day usage, 42 percent of the reports indicated that their use was less than the five-year target in their water conservation plan.
- In regard to the reported data on water loss, 64 percent of the reports indicated that their loss was less than the five-year target in their water conservation plan.
- Utilities report reusing 65.9 billion gallons or 8.4 percent of their total water production.
- Reports from the utilities for water conservation water savings was 50.5 billion gallons or 6.4 percent of their total water production.
- Eighty-five percent of the utilities reported testing meters for a total of 124,000 meters.
- Ninety-six percent of the utilities reported doing repairs on leaks during the reporting period.
- Ninety-three percent reported utilizing educational programs as included in their water conservation plan.

- Twenty-six percent of the utilities reported having to utilize their drought contingency plan during the reporting period.

In future years the Texas Water Development Board will have a progression of conservation data and information from these annual reports to assist in developing studies on water conservation implementation within the state.

Rainwater Harvesting on a Statewide Level

Rainwater harvesting is the practice of capturing and using rainwater for a beneficial purpose and is an important tool in the water portfolio of Texas. With the population expected to more than double over the next 50 years and traditional water supply sources dwindling, Texas is turning to alternative technologies such as rainwater harvesting to conserve and supplement existing supplies.

The Texas Water Development Board promotes rainwater harvesting in a number of ways. Staff routinely provides assistance to the public by disseminating information through its Web site (<http://www.twdb.state.tx.us/iwt/rainwater.asp>), responding to public enquiries, providing copies of the popular Texas Manual on Rainwater Harvesting, making presentations at educational and community events, and by actively participating in trade organizations such as the Texas Rainwater Catchment Association and the American Rainwater Catchment System Associations. Texas Water Development Board staff also participates in governmental committees such as the Texas Commission on Environmental Quality's Cross-Connection Control Subcommittee.

To further encourage rainwater harvesting in the state, the Texas Water Development Board established the Texas Rain Catcher Award in 2007. The goal of this competition and recognition program is to acknowledge excellence in and the contribution of individuals and entities pursuing rainwater harvesting. A first of its kind in the state, the competition is open to all individuals, companies, organizations, municipalities, and local and state government entities in Texas.

The Texas Water Development Board also supports the advancement of rainwater harvesting technology by funding research projects such as the study presently being conducted by the University of Texas at Austin on the effect of different roof materials on harvested rainwater (scheduled completion date, December 2010).

Despite the growing popularity of rainwater harvesting in Texas and increasing effort by Texas Water Development Board staff in this activity, challenges remain. As yet, the agency does not have an explicit mandate for conducting rainwater harvesting in Texas and state funding for demonstration projects is not presently available. Additionally, the lack of statewide standards, codes, and certification programs for installers of rainwater harvesting systems may be inhibiting the growth of this practice.

High Plains Agricultural Demonstration Initiative

The initiative called “An Integrated Approach to Water Conservation for Agriculture in the Texas Southern High Plains” began in 2005 and includes 30 cooperator demonstration sites covering over 4,000 acres in Hale and Floyd counties. The goal of the initiative is to demonstrate how to reduce total water required by agricultural production while ensuring a level of profitability to sustain producers, families, and area communities. The project is now known as the Texas Alliance for Water Conservation and is a unique partnership of Floyd and Hale county producers, data collection technologies, and collaborating partners that include individual industries, universities, and government agencies. The project utilizes on-farm demonstration sites, including cropping and livestock systems, to identify the various production practices, technologies, and systems that help maintain individual farm profitability while improving water usage efficiency. One of the main goals of this project is to extend the life of the Ogallala Aquifer while maintaining the viability of local farms and communities.

The project is designed to connect today’s producers with the latest research information through a shared experience that draws on our knowledge-building traditions of demonstration sites and field days. The Texas Alliance for Water Conservation began the second phase of their project in 2010 with select farmers working with consultants and researchers and the latest water management technologies. The goal of this phase is to determine the extent farmers can aggressively conserve their water resources while remaining economically viable.

The project was made possible through a grant from the Texas Water Development Board. For more information, please visit the official Web site of the project: <http://www.depts.ttu.edu/tawc/>

Lower Rio Grande Valley Agricultural Demonstration Initiative

The Texas Water Development Board sponsors the Agriculture Water Conservation Demonstration Initiative implemented through the Harlingen Irrigation District in the Lower Rio Grande Valley. The project began in 2005 and is expected to run through 2014. The primary objective is the demonstration and evaluation of on-farm water conservation technologies in a real world setting. Approximately 30 growers across the Lower Rio Grande Valley irrigated section cooperate by implementing conservation technologies on a portion of their farms in a multi-year setting. The District provides monitoring equipment in the form of meters, soil moisture monitors and in some cases actual irrigation equipment as well as trained personnel to help the cooperator make informed decisions on his irrigation methods. The program also follows up with providing the cooperator access to the Texas A&M Agrilife Extension's Farm Assist Program which works through the economics of the individual projects as they apply to the overall economic health of the farming operation. The goal of this project is to develop data over the term of the initiative to give farmers the tools to make water conservation a viable part of his farming operation in the future.

The project has also established a Flow Meter Calibration facility that is used for calibration and demonstration of various types of metering devices typically used in irrigation applications. This facility is also used to provide instruction to water managers, canal riders, and farmers in water delivery management. Several classroom and hands-on events are scheduled each year to promote methods of water conservation in water delivery management. This facility has also been used to develop and demonstrate the use of low cost automatic gates, water level sensors, and soil moisture sensors all targeted to saving water from the district delivery system all the way through to the farmer and his needs for specific crops.

The Texas Water Development Board sponsored project has demonstrated cooperation from the state agency, Texas A&M System, various local irrigation districts and multiple farmers. For more information, please visit the official Web site of the project: <http://www.hidcc1.org/node/41>

USDA Natural Resources Conservation Service

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

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

Contracted amounts of federal funds for fiscal year 2009 and fiscal year 2010 (as of July 1, 2010) are as follows:

2009: \$64.1 million in 3,070 contracts
2010: \$63.9 million in 3,556 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 the Environmental Quality Incentives Program, the Agricultural Water Enhancement Program operates through contracts with producers to plan and implement conservation practices to conserve ground and surface water and improve water quality in project areas established through partnership agreements. Producers may participate individually in the Agricultural Water Enhancement Program or collectively through a partnership project.

Contracted amounts of federal funds for fiscal year 2009 and fiscal year 2010 (as of July 1, 2010) are as follows:

2009: \$11.1 million in 237 contracts
2010: \$4.1 million in 143 contracts

- The Wildlife Habitat Incentives Program provides financial incentives to develop habitat for fish and wildlife on private lands. Participants agree to implement a wildlife habitat development plan and the Natural Resources Conservation Service agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. Natural Resources Conservation Service and program participants enter into a cost-share agreement for wildlife habitat development. The cost-share agreement typically lasts a minimum of five years from the date that the contract is signed. Practices available are those needed to restore and maintain the planned habitat. Examples of common practices include range planting, brush management, prescribed grazing, and Upland or Wetland Wildlife Habitat Management.

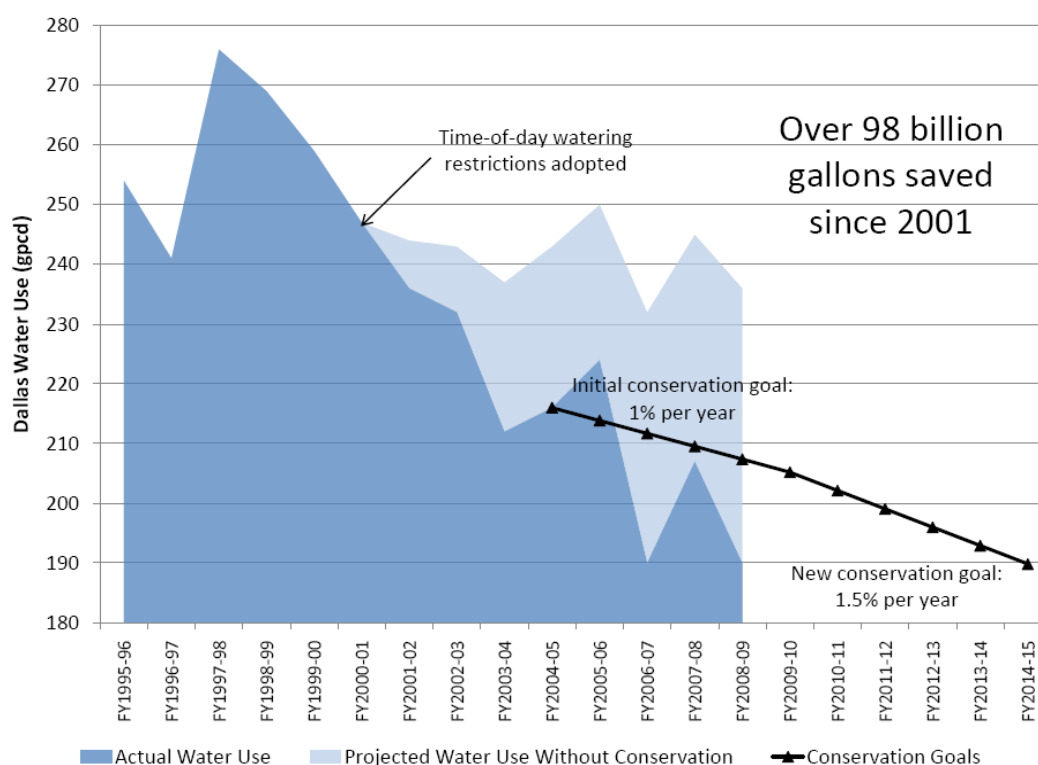
Contracted amounts of federal funds for fiscal year 2009 and fiscal year 2010 (as of July 1, 2010) are as follows:

2009: \$3.9 million in 105 contracts

2010: \$4.6 million in 162 contracts

City of Dallas Water Utilities

Water conservation is an important element of Dallas's long range water supply strategy. In 2005, the Dallas City Council adopted a Water Conservation Five-Year Strategic Plan (Strategic Plan) that defined water conservation goals for fiscal years 2004-05 through fiscal years 2008-09 and recommended water conservation strategies and budgets to achieve these goals. From 2001-02 through 2008-09, ongoing water conservation efforts and implementation of the Strategic Plan has helped Dallas to save approximately ninety-eight billion gallons (300,751 acre-feet) of water.



The Water Conservation Implementation Task Force recommended standard methodologies for calculating total per capita water use (in gallons per capita per day, or gpcd) and residential per capita water use. Using this methodology, total per capita water use for the City of Dallas (including billed retail water use, unbilled authorized consumption, and water loss) was calculated for the last eleven years. Total per capita water use has steadily declined from its fiscal years 1999-00 peak to present.

Some of the variability in annual water use can be attributed to differences in weather from year to year. To better filter out the impact of weather on the annual data, five-year trailing averages were calculated for total retail water use and total residential water use. By the Task Force Method, the five-year trailing average total water use has steadily declined from about 249 gallons per capita per day in fiscal years 2001-02 to about 205 gallons per capita per day in

fiscal years 2008-09, a total reduction of 17.7 percent, or 2.75 percent per year. During the same period, the five-year trailing average residential water use has declined from about 123 gallons per capita per day to about 102 gallons per capita per day, a total reduction of 16.7 percent, or about 2.6 percent per year.

“Total Water Use” includes water use by Dallas Water Utilities industrial customers. However, Dallas also uses other metrics to track the effectiveness of its water conservation efforts, including:

- **Non-industrial per capita water use.** Exclusive of water use by industrial customers, the five-year rolling average per capita water use in fiscal year 2008-09 was 194 gallons per capita per day.
- **Residential per capita water use.** Including single-family and multi-family residential uses, the five-year rolling average per capita water use in fiscal year 2008-09 was 102 gallons per capita per day.

In the 2007 Texas Water Use Survey Summary Estimates, the most recent water use figures reported, the Texas Water Development Board began tracking residential per capita water use. The most recent annual figure for Dallas was 92 gallons per capita per day. This figure is included in the five-year rolling average reported above.

Free Irrigation System Inspections

Dallas Water Utilities added two licensed irrigators to its water conservation division staff and began providing free irrigation system inspections in fiscal years 2006-07. The inspectors serve residential and commercial customers and work with other city departments on proper maintenance and operation of city irrigation systems. The inspections may include identification of potential system leaks, diagnosis of equipment malfunctions, and recommendations for equipment upgrades to enhance efficiency. More than 840 inspections have been performed since 2008. These inspections are estimated to save more than thirty-one million gallons annually at city facilities alone.

ICI Cooling Tower Audits

The industrial-commercial-institutional cooling tower audit program is an outreach effort to assist large users of cooling water in finding ways to operate more efficiently, save water and energy, and lower their costs. Water savings are realized as the customers implement audit recommendations. The first cooling tower audit was conducted in March 2007. To date, sixty audits have been performed. If all audit recommendations are implemented, the cooling tower audit program is projected to save 242 million gallons per year.

El Paso Water Utilities

Faced with finite groundwater resources and a growing population, El Paso Water Utilities (EPWU) began its water conservation program in 1991. Combining enforcement, incentives, and education has reduced average per capita water use, which was 200 gallons per day, to 135 gallons per day in 2009.

Mandatory Restrictions

El Paso's water conservation ordinance prohibits water waste and contains year-round restrictions on certain water-use activities. Under the ordinance, landscaped areas can be watered up to three days each week on designated days based on even/odd addresses, but watering is prohibited from 10 a.m. to 6 p.m. from April through September. Allowing water to spray or flow into a street or public right-of-way violates the ordinance, and leaks must be repaired within five working days of notification. Violating the water conservation ordinance is a Class C misdemeanor and fines range from \$50 to \$500; however, the initial notification is usually in the form of a warning, which presents opportunities for public education.

Car washing is permitted when using a bucket and/or a hand-held hose equipped with a shut-off nozzle, and all fund-raising car washes must be held in commercial establishments. Also, using a hose to wash driveways, patios, and other non-porous surfaces is prohibited except when eliminating dangerous conditions. The plumbing code requires swimming pools to be equipped with filtration or recycling systems and to be covered when not in use. Covers reduce the amount of water loss through evaporation.

Education

Public awareness is increased through messages on the El Paso Water Utilities monthly statement bill and envelope; bill stuffers; outdoor, television, radio and print advertising; booths at shows, fairs and festivals; and presentations throughout the city. Publications include activity books and book covers for children, brochures on water-efficient landscapes, and pamphlets on conservation tips and rebates. Additionally, free indoor and outdoor water use reviews are offered to customers to help them understand water use practices.

Collaborating with other agencies leads to innovative methods of educating customers. Examples include Desert Blooms, a multimedia "edu-tainment" package that provides landscaping tips for El Pasoans. This CD was produced with help from local universities and contains information on more than 400 trees, shrubs, groundcovers, grasses, and flowers that are native or adapted to El Paso's desert environment. Other projects include collaborating with Head Start to develop an interactive water exhibit for preschoolers and working with El Paso Electric Company to develop a water and energy conservation curriculum for middle-school students. In 2009, El Paso Water Utilities and the North American Development Bank sponsored a binational water conservation conference. The utility's 2010 events include a workshop on water and energy efficiency in commercial kitchens for food industry professionals and a binational conference on managing reclaimed water and stormwater.

The Tech₂O Water Resources Learning Center contains an auditorium, classroom-style meeting rooms and interactive displays, exhibits, and demonstration projects on conservation and water resources. Materials are produced in English and Spanish and lesson plans can be downloaded at tech2o.org. The center is open to the public on Saturdays and hosts school field trips, workshops, seminars, and conferences during the week. Staff also holds workshops for local teachers. Tech₂O is the site of the annual three-day Water Festival, where hundreds of students in grades 4-6 learn about conservation and environmental stewardship. Since opening in 2007, nearly 500 events have attracted 17,000 local, national and international visitors. El Paso Water Utilities is now collaborating with the El Paso Zoo to finalize the production of exhibits, curricula, and docent programs for the Discovery Center. Children in grades K-3 will be able learn about water resources while visiting the zoo.

Incentive Programs

- **Cash for your Commode Rebate:** Up to \$50 for replacing a high-volume toilet with an ultra-low-flow toilet. More than 53,000 have been replaced.
- **Showerheads:** More than 200,000 free low-flow showerheads were distributed. An evaluation showed a 1-billion gallon reduction in wastewater flows due to this program in the first year.
- **Evaporative Cooler Bleed-off Line Clamps:** Evaporative coolers account for 15 percent of residential water use, and El Paso Water Utilities mailed more than 9,000 clamps to customers who use evaporative coolers for air conditioning. Restricting the bleed-off flow from the coolers saves millions of gallons of water.
- **Central Refrigerated Air Rebate:** El Paso Water Utilities and El Paso Electric Company. offered \$300 rebates to residential customers and home builders who installed refrigerated air. More than 10,000 rebates were processed.
- **Water-Efficient Washing Machine Rebate:** More than 15,000 rebates were processed for residential (\$200) and commercial (\$300) customers who installed water-efficient washing machines. Stimulus funds are financing the current rebate program, which offers \$100 to residence customers.
- **Turf Rebate Program:** A \$1 per square foot rebate led to the removal of more than 11 million square feet of grass from 3,000 sites. Established turf areas were converted to water-efficient landscapes that incorporate low-water-use plants and common-sense horticultural practices.
- **Waterless Urinals:** Free urinals were provided to schools, city government offices, restaurants, and nightclubs.

Reclaimed Water

El Paso Water Utilities supplies customers with 5.25 million gallons per day of reclaimed water. This drought-proof resource, which is billed at 80 percent of the potable water rate, offsets potable water demand and decreases peak day demand during the summer. Automated dispensing stations provide around-the-clock service to water haulers in the construction and maintenance industries. Haulers are not required to drive to a wastewater plant for reclaimed water, and companies can avoid paying expensive fees to install standpipes off of fire hydrants and the higher price of potable water.

Rate Structure

El Paso Water Utilities has adopted an inclining rate structure; the unit price increases as water use increases. This management tool provides a pricing signal that decreases non-discretionary uses of water. However, local government turf irrigation accounts are billed for water use based on monthly allotment levels. The levels are based on evapotranspiration measurements and allow for enough watering to replenish evaporation loss.

Summary

Sunny El Paso is located in the Chihuahuan Desert. It receives only eight inches of rainfall in an average year. However, El Paso Water Utilities' water conservation program helps El Pasoans make the most of the region's water resources. It is essential to the city's economy, environment, and quality of life.

San Antonio Water System

San Antonio Water System (SAWS) is the largest water and wastewater provider in the San Antonio area. SAWS updated its Water Management Plan in 2009 to include aggressive conservation goals. It is recognized that conservation will continue to play a key role in long term water management plans with a per capita goal of 116 gallons per capita per day (gpcd) by the year 2016.

It is possible for San Antonio to build conservation goals into water management plans because prior conservation goals have been met and exceeded. The community's gallons per capita per day has dropped more than 100 gallons since the early 1980's to 124 in 2009. San Antonio Water System has more than 50 percent more customers in 2010 than it did in the 1980's, but meets their needs with the same amount of water.

The investment in water conservation programs has been consistent in San Antonio since San Antonio Water System was formed. Each year ratepayer investments in diverse conservation programs have yielded new supplies for the community at a reasonable cost. The steady investment has led to a conservation ethic in the community that has made it possible to weather drought conditions and rainy periods without a fluctuation in the citizen expectation that water should be used frugally.

Future conservation investments will continue with annual goals of yielding one billion gallons of new savings each year to drive down gallons per capita to the long term goal. Programs will include every class of customer using water. Evaluation programs will determine which programs remain and which are replaced. Citizens will remain involved in guiding the process through the Community Conservation Committee. While San Antonio has enjoyed its conservation success to date, the community recognizes that it cannot afford to relax its efforts and that there are many more opportunities for savings.

Texas Legislation and Standards

81st Legislature: House Bill 2667

An act relating to performance standards for plumbing fixtures sold in Texas.

In summary, Section 372.002, Health and Safety Code, was amended as follows:

The water saving performance standards for plumbing fixtures are the following standards:

- (1) a sink or lavatory faucet or a faucet aerator, maximum flow may not exceed 2.2 gallons of water per minute at a pressure of 60 pounds per square inch;
- (2) a shower head, maximum flow may not exceed 2.5 gallons of water per minute at a constant pressure over 80 pounds per square inch.

If these fixtures are sold before January 1, 2014:

- (1) a urinal and the associated flush valve, maximum flow may not exceed an average of one gallons of water per flush;
- (2) a toilet 's maximum flow may not exceed an average of 1.6 gallons of water per flush.

If these fixtures are sold after January 1, 2014:

With some special exceptions, a toilet sold, offered for sale, or distributed must be either:

- 1. a dual flush water closet that meets the following standards: the average flush volume of two reduced flushes and one full flush may not exceed 1.28 gallons; or
- 2. a single flush water closet that meets the following standard of the average flush volume may not exceed 1.28 gallons;

A urinal and the associated flush valve, maximum flow may not exceed an average of 0.5 gallons of water per flush.

A drinking water fountain must be self-closing.

The Texas Commission on Environmental Quality shall make and maintain a current list of plumbing fixtures that are certified by the manufacturer to meet the water saving performance standards.

There are some exceptions provided to these requirements and there is a required phase in period for the implementation of the toilets and urinals before January 1, 2014.

80th Legislature: House Bill 1656

An act relating to the regulation by municipalities of irrigation systems and irrigators.

In summary, Section 1. Chapter 401, Local Government Code, is amended by adding Section 401.006 to read as follows:

Sec. 401.006. IRRIGATION SYSTEMS. (a) A municipality with a population of 5,000 or more by ordinance shall require an installer of an irrigation system:

(1) to hold a license issued under Section 1903.251, Occupations Code; and
(2) to obtain a permit before installing a system within the territorial limits or extraterritorial jurisdiction of the municipality.

(b) The ordinance shall include minimum standards and specifications for designing, installing, and operating irrigation systems in accordance with Section 1903.053, Occupations Code, and any rules adopted by the Texas Commission on Environmental Quality under that section.

(c) A municipality may employ or contract with a licensed plumbing inspector or a licensed irrigator to enforce the ordinance.

(d) This section does not apply to an on-site sewage disposal system, as defined by Section 366.002, Health and Safety Code.

SECTION 2. Not later than January 1, 2009, a municipality with a population of 5,000 or more shall adopt an ordinance under Section 401.006, Local Government Code, as added by this Act.

SECTION 3. This Act takes effect immediately if it receives a vote of two-thirds of all the members elected to each house, as provided by Section 39, Article III, Texas Constitution. If this Act does not receive the vote necessary for immediate effect, this Act takes effect September 1, 2007.

APPENDIX E:

A Brief Synopsis of Water Conservation Public Awareness Programs

The following pages provide brief descriptions of a selection of water conservation public awareness programs throughout the state.

- Texas Water Development Board
- Texas Water Foundation
- Lower Colorado River Authority
- North Texas Municipal Water District
- Panhandle Groundwater Conservation District
- Sandy Land Underground Water Conservation District
- Tarrant Regional Water District
- City of Dallas
- San Antonio Water System

Texas Water Development Board

Water IQ Program

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

Outreach

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

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

Wateriq.org

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

If the consumer's zip code is not located (or the water provider is not listed on the drop down menu) the consumer is directed to the Texas Water Development Board water conservation public awareness Web pages. At the time of preparation of this report, there are 915 zip codes (out of a potential of approximately 4,140) and 34 agreements with various Texas cities and water providers.

Texas Water Foundation–Texas Association of Broadcasters–Water IQ

The Texas Water Foundation is a nonprofit organization established for the purpose of generating a heightened public awareness among all Texans regarding the vital role water plays in our daily lives. The Texas Association of Broadcasters is an Austin-based trade association representing the interests of Texas' 1,200 free, over-the-air radio and television stations.

The Association strives to promote and educate its members and the public at large about the opportunities available and advances possible through the efforts of free, over-the-air broadcast operations. The Texas Association of Broadcasters offers a Non-Commercial Sustaining Announcement Program which offers:

- Nonprofit and government agency partners with the ability to extend the reach of public education messages
- Program can distribute the message to every radio and television station in Texas
- Broadcasters generously donate airtime to the campaign and send in reports
- Sponsor receives documented airtime in all Texas markets – at a minimum 3:1 of the fee paid to the Association

In 2010, the Texas Water Foundation initiated a fund raising effort to support a statewide media campaign to help Texas consumers to understand the need for sustainable use of water. Fund raising efforts were successful and \$30,000 was raised to develop and produce two television and radio spots in both English and Spanish. The Foundation then joined with the Texas Association of Broadcasters to air a water conservation public awareness campaign. The campaign featured Water IQ spots on radio and television in English and Spanish giving water conservation tips which were played statewide during hours when the public are more likely to be tuned to the media broadcasts.

During the summer of 2010 effort, this activity resulted in the Water IQ spots receiving a lot of air-time by over 130 radio and television stations across Texas who reported playing over 12,556 spots valued at \$737,636. The Texas Water Foundation's investment, made possible through donations, was \$80,000, a return-ratio of more than six-to-one compared to the \$80,000 investment! Airtime was especially high in Abilene-Sweetwater, Beaumont-Port Arthur, Bryan-College Station, El Paso, Harlingen-Weslaco, San Angelo, San Antonio, Tyler-Longview, Waco-Temple-Killeen, and Wichita Falls markets.

This public awareness effort has helped to educate Texans about water resources and the importance of protecting, conserving, and enhancing these resources for the use and enjoyment of future generations of Texans.

Lower Colorado River Authority

Water IQ: Water Conservation Program

The Water IQ program is a comprehensive water awareness and education campaign that is focused to change attitudes and behaviors about water use. The Lower Colorado River Authority began the program in Central Texas in 2006. The cities of Austin and Cedar Park are partners on the program.

The program is aimed at people who use the most water. The campaign leverages fun and upbeat messages, often in humorous ways, with the goal of changing the way people think about water and changing their water-use habits. The Water IQ campaign helps make people aware of the source of their water, educates them on the importance of water for our future, and offers simple tips to help people save water in their homes and businesses. Results of a 2005 survey of residents in the Colorado River basin indicated that the vast majority of people were willing to save water if it did not mean sacrifice or changing their lifestyle.

Campaign components

Since 2006, the Lower Colorado River Authority's Water IQ campaign has used a diverse set of tools to reach the audience with water-saving tips and information including:

- Television, radio, print and online ads
- billboards
- gas station pump-toppers
- water-saving tip sheets
- Web site
- pledge cards
- news conferences and media opportunities
- community outreach with key audiences

2009 campaign results

- Billboards in three locations: 9.3 million impressions
- 10- and 15-second radio announcer reads on six stations, co-branded with Austin and Cedar Park: 3.2 million impressions
- Online ads promoting the watering schedule, co-branded with Austin and Cedar Park: 10.1 million impressions
- Outreach events at 15 community events: 751 pledges and more than 8,600 impressions
- Media relations partnership that featured a Lower Colorado River Authority conservation expert with a local meteorologist: 1.3 million impressions for story posted on news website
- **TOTAL IMPRESSIONS: nearly 30 million**

2009 Drought-Focused Campaign

- The Lower Colorado River Authority used its Water IQ campaign to provide urgent awareness and messaging about severe drought conditions in summer 2009. Messages included the role in managing the Highland Lakes and the need for water conservation, as well as providing tips for eliminating outdoor water waste.

Drought Campaign Components

- Customer toolkit including flyers, posters, and ads
- Radio ad and online ad focused on the urgency of the drought conditions

TOTAL IMPRESSIONS: 6.6 million

North Texas Municipal Water District

Implementation of a Successful Public Water Conservation Awareness Campaign

With continuing population growth, the possibility of droughts, and the lengthy and expensive costs associated with future water supplies, the North Texas Municipal Water District advocates and supports water efficiency and conservation efforts, improved water conservation practices, and the continued implementation of a water awareness and education campaign. Since 2006, the North Texas Municipal Water District has implemented **Water IQ**, the state's recognized water awareness campaign within its service area. The District provides potable water supplies to over 1.6 million consumers through its 13 member cities and over 57 customers which include cities, utility districts, and water supply corporations in the North Texas area. By 2060, the population of the service area is anticipated to exceed 3.1 million.

The District acknowledges the need to redirect consumer water use behaviors through education and public awareness. To date, the District has committed over \$6.7 million bringing awareness, increasing education, and providing resources through the use of **Water IQ**. The focus for **Water IQ** over the past five fiscal years has been to: increase awareness of the need to conserve our water supplies both in times when the reservoirs are full and in times when drought conditions exist; to provide homeowners and businesses with easy, sensible tips that help them reduce both outdoor and indoor water usage during normal daily activities; to advance awareness of local water sources; to educate consumers that water is a finite resource and each person should do his/her part to use water wisely and extend our natural resource; and to provide water planning initiatives to meet anticipated demands.

The North Texas Municipal Water District's **Water IQ** campaign messaging is strategically developed based upon consumer research conducted within the service area that provides the attitudes towards water efficiency and conservation, the motivating reasons, and values relating to water knowledge and the need to use our water resource wisely and efficiently, and the type of messaging that will motivate consumers to change their water use behaviors. Research results show that the most motivating reason for consumers to change their water use habits is to save water for the future.

The following describes some of the components of the District's **Water IQ** campaign:

Advertising

Broadcast Media - Through a series of television commercials and radio spots, the messaging for the campaign persistently communicates the need for consumers to alter water use behaviors to save water inside and outside the home. Reiteration and recall of the **Water IQ** messages facilitates the reinforcement water efficiency in the minds of consumers. The television commercials have also been made available to Member Cities and Customers for use on local government or school district channels as available for further outreach opportunities.

In addition, the commercials have been utilized by Texas Water Foundation for statewide broadcasting and utilized by the San Antonio Water System.

Print Media - Newspaper advertisements, online print, and outdoor billboards are strategically placed within the service area media markets.

Community Outreach Programs

Community and business outreach events provide the opportunity to interact with consumers and businesses to heighten the awareness for the need to conserve our finite resources of water and to promote participation in conservation. During these events, creative displays draw interest for participants to take a **Water IQ** quiz, pledge to implement water conservation strategies, and to sign up for monthly conservation tips and newsletters.

Web Site

As part of the District's program, an interactive **Water IQ** Web site has been developed which focuses specifically on providing education and resources to encourage and improve water use indoor and outside the home. The Web site messaging ties in to the local television advertising themes used each year to reaffirm the conservation messaging.

Through the District's continued implementation of the public awareness program and the water management strategies implemented by the North Texas Municipal Water District, its member cities, and customers, the District estimates that a reduction of 200 million gallons daily during the peak summer months was achieved. It is estimated that an annualized reduction in water deliveries is between 10-12 percent, which equates to approximately 8.8 billion gallons per year.

North Texas Municipal Water District 2010 Quantitative Research Results

Research Description

In August 2010, North Texas Municipal Water District conducted a quantitative survey of 403 adult residents in the North Texas Municipal Water District service area and 409 adult residents in Dallas-Fort Worth area.

Goals of the research included:

- Measure awareness and recall of water conservation messages
- Assess water conservation habits and willingness to conserve
- Gauge residents' attitudes and behaviors around water use

Key Findings

North Texas Municipal Water District is effectively cutting through the clutter and reaching its target audience.

- 43% of North Texas Municipal Water District residents surveyed have recently seen, read, or heard water conservation messages.
- 34% of North Texas Municipal Water District residents surveyed have seen, read, or heard Water IQ
- 79% of North Texas Municipal Water District residents surveyed recall at least one water conservation ad or message (total recall – aided recall included).
- Aided recall of North Texas Municipal Water District's Water IQ ad, "Drop at least one bad habit," was at 40% within North Texas Municipal Water District's service area.
 - 37% of North Texas Municipal Water District residents surveyed recall this ad very clearly or somewhat clearly.
 - 34% of Dallas-Ft. Worth residents surveyed recall this ad very clearly or somewhat clearly.
 - 30% of Dallas-Ft. Worth residents surveyed recall other conservation ads very clearly or somewhat clearly.

Conclusion: Water conservation media campaigns are effective in changing behaviors and reducing water use.

Water conservation media campaigns are effective in reducing water use.

- North Texas Municipal Water District and DFW Metroplex residents who recall at least one conservation message or ad are more likely to conserve water than respondents who have no recall of any conservation messages/ads.
- North Texas Municipal Water District residents who recall the Water IQ "Drop at least one bad habit" TV spot are more likely to track their water use than those who do not.
- Residents who recall any conservation message or ad are more likely to read their water bill: 95% of respondents who have seen a message/ad read their bill, while only 80% of respondents who have seen no message/ad read their bill.

Panhandle Groundwater Conservation District

The Panhandle Groundwater Conservation District provides a number of different programs for public awareness and education on water conservation. Each program takes a different approach in order to affect the largest group of people of different ages. The education and public awareness programs provided by the District are meant to encourage conservation and educate the public about the importance of our water and the serious issues facing us.

4th Grade Major Rivers Program

The fourth grade curriculum consists of the *Major Rivers* program developed by the Texas Water Development Board. The *Major Rivers* kits include a teacher's guide and student packets which are delivered to all district schools during September of each year. During the 2009-2010 school year, the District delivered 2,424 student packets.

5th Grade Water Conservation Presentation

The fifth grade program is comprised of a water conservation presentation, an indoor water saving kit, and a water wheel. The presentation lasts about one hour during which we discuss water conservation, the water cycle, aquifer knowledge, where water comes from, and playa lakes. An underground flow model is used to show the students visually how wells work, what the aquifer looks like, and how water flows beneath the earth. The program helps students better understand what an aquifer actually is by giving them a visual of the layers of the aquifer. During the 2009-2010 school year, the District reached 2,267 fifth grade students in 44 schools.

Book Covers

Water conservation book covers are delivered to schools for students of all ages within the District. These book covers contain water facts and conservation tips.

Scholarship Program

The scholarship program is in place to provide funding for graduating seniors college education. Applicants are required to write an essay about groundwater conservation with the exact topic changing from year to year. Several other qualifications are considered by the committee to select three qualified students every year. The scholarship is distributed over four years at the college of the student's choice. The first place winner receives \$4,000, second place receives \$3,000, and third place receives \$2,000, each year for up to four years.

Public Awareness Events

The Panhandle Groundwater Conservation District participates in varying county agriculture and health fairs around the District. These are typically sponsored by Texas Agri-Life Extension and a 10-15 minute presentation is given about aquifers and conserving our water for future generations. The District participates in the Amarillo Farm Show, High Plains Irrigation Conference, and other agriculture awareness events throughout the district.

Water IQ Advertisement

The television advertising began in 2007 with the start of **Water IQ**, and the District continues to air these commercials through the summer months ever since. The television commercials are aired on three local and major news channels from May until August. The District started circulation of radio commercials in 2010. These commercials encourage the public to conserve water during this peak usage time and highlight the importance of our water.

Newsletter

The District also keeps the public informed of activities and public services through their quarterly newsletter. The newsletter contains information about board meetings, upcoming events and meetings, and the July newsletter contains depletion map information for the District's aquifers.

Other Public Information

The District also gives several public informational meetings that are requested from organizations throughout the year. The District also provides information to local newspapers on current water issues.

Sandy Land Underground Water Conservation District

Not only is Sandy Land Underground Water Conservation District (SLUWCD) concerned with the technical side of water issues, education has also become a top priority. With the knowledge that the Ogallala Aquifer has been depleting over the last few years, SLUWCD believes that it has an obligation to help educate the residents of Yoakum County in water conservation. Specific programs, carried out in the Sand Land Underground Water Conservation District, are listed below.

Book Covers

Water conservation book covers are delivered to schools for students of all ages within the District. These book covers contain water facts and conservation tips.

Calendar Art Contest

The Sandy Land Underground Water Conservation District sponsors an art contest for fourth and fifth grade students. A detailed presentation, over water conservation, is given to approximately 2,000 4th and 5th grade students in Yoakum County. Students are then asked to draw a picture about what they learned from the presentation, and thirteen winners are selected. Winning artwork is featured in a calendar published by the District and offered free to the public.

The first place winner receives a \$50 cash prize, a certificate of recognition, and has his or her artwork featured on the cover of the calendar. Twelve second place winners each receive a \$25 cash prize, a certificate of recognition, and have their artwork featured on one month inside the calendar.

Conservation Jamboree

The Conservation Jamboree is an educational fun day for fourth and fifth grade students located in the District. Students are involved in activities including water conservation, bug/pest management, and ranching. Other presentations are given by the Texas Peanut Producers and Texas Dairy Producers. This Conservation Jamboree highlights concepts similar to the Children's Groundwater Festival in Grand Island, Nebraska. This activity is a cooperative effort provided by the District, Texas AgriLife Extension Service, and the Natural Resources Conservation Service.

Curriculum & Instruction

The Education Cooperative provides all 4th & 5th grade teachers in the program with professional teacher development. Workshops are offered for Major Rivers, **Water IQ** and others at TEA's Education Service Centers. Teaching materials and special projects are provided on a regular basis to those school districts who participate in workshops or career advancement seminars.

Education Cooperative

Sandy Land Underground Water Conservation District is a member of the Underground Water Conservation District Education Cooperative of West Texas. The cooperative is made up of four UWCD in West Texas that include; Llano Estacado UWCD, Permian Basin UWCD, Sandy Land UWCD and South Plains UWCD.

This joint effort maximizes the efficiency of each District's resources and reaches a large number of water users within the program. Programs and learning activities are performed by the Cooperatives Education Coordinator and are offered to school districts, civic organizations, public libraries, and youth groups within each underground water conservation district.

Newsletter

Several times throughout the year the District publishes a newsletter to update the residents of Yoakum County on various issues and events. The newsletter includes information on various programs, water conservation tips, a calendar of events, and other services that are provided by the District.

Public Speaking Opportunities

SLUWCD staff has many public speaking opportunities throughout the year at various conferences and meetings. Staff members speak to numerous groups and organizations in Yoakum County and in other counties within the State of Texas. The SOAR staff also gives presentations at events focusing on the District precipitation enhancement program.

Scholarship Program

The District began awarding scholarships to Plains and Denver City high school seniors in 1991. These scholarships are based on essays written by these students on the topic of current water situation in our area and proposals for future conservation of that water. Two scholarships are given to Denver City and Plains High Schools graduating seniors. Over the past 19 years, District has awarded \$51,500 in scholarships to students of Yoakum County through these scholarships.

Other Public Information

The District maintains a district Website as well as an Education Cooperative Website, in order to provide information to the public. The District also provides information to local newspapers on current water issues.

Tarrant Regional Water District

Regional Water Conservation and Public Awareness Program: “SAVE WATER. Nothing can replace it.”

The Tarrant Regional Water District (TRWD) is one of the largest water suppliers in the State of Texas. It provides untreated surface water to more than 70 cities and other water user groups across eleven North Texas counties. The TRWD service area includes nearly two million people. Most are located in Tarrant County. Primary customers include the cities of Arlington, Fort Worth, Mansfield, and the Trinity River Authority.

The Challenge

Limits on surface water supplies, a growing population, and a drought-prone climate have led to some phenomenal changes in how the water district is responding to the need to reduce water demands and cut water waste. The result is a regional approach to conserve water in North Texas. Today, the District’s water conservation education, media, and public outreach program revolves around partnerships. And their efforts to save water come in all shapes and sizes.

Prior to 2005, the District’s conservation education and public outreach program was a blip on the radar screen. Efforts to promote water efficiency were scattered and inconsistent with a small budget to match. That changed during the drought of 2005-06, which served as a wakeup call for the District and its customers.

Public Awareness Partnership Opportunity

This led to teaming up with the Dallas Water Utilities in 2007 to promote water conservation across North Texas through an extensive media campaign titled, “**SAVE WATER. Nothing can replace it.**” The water saving messages reach water users through number of media avenues including radio, television, newspapers, magazines, and billboards. The campaign is now the cornerstone of a regional public outreach effort encouraging responsible water use among millions.

Spreading the word to conserve – rain or shine – is one of the primary goals of both agencies. The partnership unifies the message to save water. And the one-voice approach means no more mixed signals. By joining forces, both agencies are able to blanket the Dallas-Fort Worth area with an eye-catching, entertaining, and effective water conservation campaign in a way that maximizes awareness and minimizes advertising costs.

Dallas-Fort Worth is the largest metropolitan area in Texas. Together, Dallas Water Utilities and Tarrant Regional Water District serve more than four million people, representing about 17 percent of the state’s population. The campaign is a great example of how two agencies with a common goal can team up to share costs and tackle the challenge to conserve together.

Conservation Supporting Programs

The media campaign offers a peek at the glamorous side of water conservation. But behind the scenes TRWD is working with its municipal water utility customers to make conservation inroads in other ways:

- **Water Conservation Symposium:** In 2007, the District initiated the North Texas Regional Water Conservation Symposium as a way to show its customers strategies they could use to save water, save money, and reduce demands. Now in its fourth year, the Symposium features top-notch professionals in the water conservation field sharing their experience and expertise.
- **Legislative Summit:** In 2008, the District coordinated a Legislative Summit as a way to provide North Texas state and local lawmakers information on water supply and water conservation issues.
- **Conservation Committee Meetings:** Also in 2008, TRWD held its first water conservation coordinator meeting. The quarterly meetings provide municipal representatives from Tarrant County communities an opportunity to share water saving ideas and strategies.
- **Award-winning Conservation Brochure:** The water district developed an award-winning water conservation brochure in 2008 to share with its customers. The eight page booklet features tips on saving water in the bathroom, in the kitchen, on the lawn, outside the house, and in the laundry room.
- **SaveTarrantWater.com:** TRWD created a water conservation Web site in 2009 as a way to provide water saving tips and information to online viewers: www.savetarrantwater.org.
- **Strategic Water Conservation Plan:** In 2009, the water district hired Alan Plummer Associates, Inc. to develop a Five Year Strategic Water Conservation Plan to evaluate current initiatives and provide a roadmap to guide the implementation of future conservation policies.
- **Kids' Kiosks and Web site:** Educating the next generation of water users is a priority. And reaching them in an engaging way can be difficult in the age of video games and ipods. That's why the District created and packaged a series of interactive multimedia modules on water conservation, water reuse, water quality, watersheds, and ecosystems. The collection of educational tools is now the basis of our kid's Web site and some portable educational kiosks that are being shared with local schools and libraries.

Savings Add Up

Since summer 2006, water conservation policies – such as 10 – 6 outdoor watering restrictions, tiered water rates (the more you use, the more you pay) – and more recently a stepped up public outreach program – have led to an average 10 percent reduction in anticipated water demands among TRWD customers. That's approximately 30,000 acre-feet or 10 billion gallons in water savings each year.

From a budget of \$50,000 in 2005 to one eclipsing \$1.0 million in 2010, the District is taking on the responsibility of making sure there's enough water to go around now and 50 years from now. It's more than education. It's more than public outreach. It's more than a fancy media campaign. It's a regional effort that involves teaming up with dozens of communities across North Texas to show people why it's important to **"SAVE WATER. Nothing can replace it."**

City of Dallas Water Utilities

Dallas Water Utilities has implemented a number of public education and outreach strategies including an award winning Public Awareness Campaign, the Environmental Education Initiative for K-12 students, a water conservation mascot, free irrigation system inspections, industrial-commercial-institutional cooling tower audits, water-wise landscape events, and other public education initiatives.

Public Awareness Campaign

In 2002, Dallas launched the first full-scale multi-media campaign in the north Texas region **“SAVE WATER. Nothing Can Replace It.”** The initiative promotes water conservation with television ads on major stations, radio ads during peak traffic periods, billboards on heavily traveled thoroughfares, and print ads in the *Dallas Morning News* and minority publications. An updated Web site featuring the “Save Water” logo contains information about water conservation programs, the water conservation ordinance restrictions, and various events sponsored by the city.

Although the Dallas-Fort Worth area receives water service from many different water providers, it is a single media market. As a result, the public awareness campaign delivers messages within other water service areas, and the water service area receives water conservation messages from other water providers. In 2009, Dallas Water Utilities partnered with the Tarrant Regional Water District to leverage its public awareness campaign budget and to minimize the potential for customer confusion by providing uniform water conservation messages to the entire media market. The public awareness program budget has grown from \$1,150,000 in fiscal years 2003-04 to \$1,380,000 in fiscal years 2009-10.

Environmental Education Initiative for K-12 Students

In 2007, Dallas Water Utilities augmented its existing school education programs with an Environmental Education Initiative in a collaborative effort with the city’s Department of Sanitation to provide programs for grades kindergarten through twelve in the Dallas Independent School District and the Richardson Independent School District. The Environmental Education Initiative Web site is an online resource for teachers with links to videos on outdoor water use, indoor water use, watersheds, and surface-groundwater interactions. The Web site also has a description of recycling lessons and water lessons for kindergarten through fifth grade children. Teachers can also register for a free in-class presentation through this Web site. To date, the effort includes programs for more than forty-one thousand students, and over nine hundred teachers have participated in the staff development program.

Water Conservation Mascot

In 2006, Dallas Independent School District students elected Dallas’ official water conservation mascot. “DEW” debuted in July 2006, with a seven-day tour at seven recreation centers. Nearly seven hundred children participated. As part of the kick-off, Dallas Water Utilities water

conservation staff and local artists taught children about water conservation and provided comic strip drawing lessons encouraging children to participate in the educational campaign by creating their own cartoons for a competition. The winner of the competition became a creative director for the animated commercial based on her concept. The DEW commercial aired in 2007 in English and Spanish. The video “DEW Helps Kids Save Water” received the 2007 Watermark Award for Communications Excellence from the Texas Section of the AWWA and the Water Environment Association of Texas. DEW spots aired on Nickelodeon and the Cartoon Network in the summer of 2007, and DEW now has his own Facebook web page. DEW information can also be accessed through the “Kids Corner” link on the city’s water conservation website http://www.savedallaswater.com/kc_dew_news.html.

Water-Wise Landscape Events

The water-wise landscapes program is designed to raise public awareness and save water by publicizing demonstration gardens, recognizing water-wise award winners, and promoting the replacement of water-thirsty yards with landscaping that requires minimal maintenance. The city has “water-wise” landscapes and demonstration gardens at the historic White Rock Lake Pump Station and Fair Park. Dallas Water Utilities also promotes the use of water-wise landscaping with annual water-wise awards, tours of homes, and semi-annual water-wise seminars. Water-wise landscaping is also presented on the city’s water conservation Web site, including a list of water-wise landscape locations and virtual tours. During fiscal years 2003-04 through fiscal years 2007-08, the utility held ten water-wise events. It is difficult to quantify water savings achieved specifically from these events. However, these events heighten public awareness on the importance of water conservation and provide tools for landscape conversion and proper maintenance.

Other Public Education

Dallas Water Utilities also uses other approaches to public education including water bill inserts, brochures, speaking engagements, special events and promotions, and conservation-oriented signs in city facilities.

San Antonio Water System

PR/Outreach

Nearly two decades ago the community attitude in San Antonio toward water was very different. Endangered species concerns and the subsequent Federal lawsuit prompted pumping limits to be established on the Edwards Aquifer – the primary source of drinking water for San Antonio and much of the region. Citizens were understandably concerned. There were fundamental questions regarding whether or not humans and other species could manage to share the Edwards resource and if San Antonio could reduce its use of the aquifer without major economic and lifestyle hardships. San Antonio Water System (SAWS) has worked for over a decade to change these perceptions and to develop a conservation ethic among citizens. A public education campaign has been a critical component of our success.

Evolution of conservation messaging

A survey of San Antonio residents completed in 1996 helped identify public preferences and attitudes regarding water management as well as measure public perception on water issues. Results showed that the majority of respondents (75.7 percent) were concerned that San Antonio would face major water supply problems in the near future. However, almost 4 in 10 people didn't know that SAWS was the agency responsible for managing water resources for the vast majority of citizens in the region.

Armed with this knowledge, the organizations initiated a commitment to a long-term effort in raising the level of awareness of SAWS role in managing the city's water supply and to reduce water use. Since then, SAWS has combined public outreach and education with a number of incentive and investment programs for commercial and residential properties to involve customers in water conservation. Conservation programs include free high-efficiency toilet and fixture retrofits; rebates for commercial projects such as condensate collection and industrial retrofits; rebates for residential and commercial irrigation redesign; free home/commercial and irrigation audits; and rebates for high-efficiency washing machines and hot-water-on-demand systems.

Through continued awareness efforts, the community has come to see SAWS as not only the local water provider, but also the local source of information on water conservation and drought management. SAWS is charged with communicating and enforcing year-round watering rules as well as drought restrictions, and works throughout the year to identify new ways to save water. The community is rallying behind the conservation message – in a recent survey (May 2010), more than 80 percent of respondents had a positive impression of SAWS.

Recent Campaign Example: CNSRV

Recently, SAWS launched a new multi-media campaign in spring 2009. The campaign was designed to be flexible enough to include communicating key information to follow Stages 1 through 3 of the city's drought restrictions, including days and watering times.

The key strategy for SAWS conservation campaign was using text messaging to tell the story, expressing the story using only a minimum of letters with a tagline of *Get the message? Save water.* The campaign communicated ideas with simple copy such as *cnsrv, b a wtr svr and wtr 1x wk*. Simple but bold, the meanings may not be immediately evident but engage people to think about the message to understand its meaning. An extra benefit of the campaign is its appeal to young people, who – along with residents who have recently moved to the city – are prime targets for conservation messaging.

Media elements of the conservation campaign include paid advertisements via television, local radio and newspaper, covering traditional conservation as well as critical drought messaging. Other elements include outdoor billboards; city bus wraps; email and direct mail campaigns; Internet banner advertisements; and a variety of promotional materials distributed during community outreach events.

Paid advertising was accompanied by extensive Public Relations elements with a tour of local media, frequent press releases, and press conferences at City Hall to announce each level of drought restrictions. SAWS Conservation Director did numerous interviews and briefings with the media, and the Conservation staff played host to both local and national reporters as they toured neighborhoods looking for drought restriction violators and issuing tickets.

The campaign was a resounding success. Water use by SAWS customers in June 2009 was 23 percent less than June 2008, a savings of billions of gallons that helped keep the community out of progressively more serious restrictions. In 2010, the campaign has focused on reinforcing the conservation message as well as reminding the community of year-round watering rules.

Summary

The changes in public attitude from many years of public education on conservation are evident. During the drought of 2009 citizens complied in large numbers with drought restrictions and had high expectations that SAWS would correct those who did not. Citizens participate in conservation programs in record numbers. Every conservation ordinance that has gone before the city council has passed with broad support.

APPENDIX F:

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

Selection of 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 (BMP), 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 modification, 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 on 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 that 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 to use in monitoring water conservation strategy implementation would be to use reporting tools with standardized metrics and sector based analysis. 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. The 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 that there is a need for technical assistance and guidance. There are several small entities that will need training and resources for using the tools. Development of 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 is very limited data and few consistent methodologies.

Through review of literature, review of the Best Management Practices Guide (BMP Guide), and other studies, the regional water planning groups utilized data to estimate the savings. Figures and data from the Texas Commission on Environmental Quality (TCEQ) and Texas Water Development Board (TWDB) were also used.

Concerns and limitations relating to monitoring implementation and estimating savings

Regional water planning groups expressed the following areas of concern 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 to be charged with the effort of monitoring strategy implementation. From past experiences, when a regional water planning group surveys

entities for information that the entities are 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 are using 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 improvements and 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 conservation. 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. 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.
- 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 the same for all.

APPENDIX G:

Calculation of Water Purveyor Service Population

Calculation of Water Purveyor Service Population

There is great variability in the characteristics of water purveyors in the State of Texas. Some purveyors are small with limited staff and resources, while others have hundreds of employees and extensive resources. Given this reality, it would be unfair to establish a “one size fits all” approach to the population calculation of any given purveyor. Instead of just one option, there should be a few that can address data and resource challenges and yet provide a means of providing a more sophisticated analysis option for growing urban areas.

Listed below are three methodologies that could be acceptable for the calculation of a service population based upon resources available. Each of the methods are common to one another in that they rely on Census data and they rely on a persons-per-connection ratio formula to calculate populations in non-Census years. Below are descriptions of each of the methods.

Method A – Baseline Decennial Census Data

This method is best suited for purveyors that are very limited in their resources (staff, technology, etc.) and have only limited Census data available.

This is the base method of population estimation for all municipal water purveyors in the state. The baseline/base year for population is the year of the Decennial National Census. The purveyor would use the available Census data as it best fits within the service area of the purveyor. This population estimate is then divided by the number of water connections as supplied on the Water Use Survey for the same year as the Census. This yields a person-per-connection ratio, which can be used in subsequent years (between decennial Census years) to estimate service population based on any updated service connection counts.

Method B – Baseline Decennial Census Data with Intra-Census Updates

This method is best suited for purveyors that may have more internal and data resources available at the time of the Census and in the years in between.

In some communities, the Census Bureau issues special reports containing updated population data that may be beneficial in upgrading population figures from estimates to actual. This may include such data as general population counts and specific proxy ratios for single family and multi-family type connections. The baseline/base year would remain the year of the decennial Census and the establishment of a person-per-connection ratio would be identical to Method A. In the years between decennial Censuses, the purveyor may use available population count data that is acceptable to the Texas Water Development Board to “reset” the person-per-connection ratio. An example of such a dataset would be the Census Bureau’s American Community Survey. This additional step will yield a more accurate population over time as compared to the decennial count alone. With this new data, the purveyor would recalculate the ratio and proceed forward in time as if it were the decennial Census again.

Method C – Census Tract Data with Intra-Decadal Updates and GIS analysis

This method is best suited for purveyors that have extensive resources (including GIS resources) and complex and rapidly expanding and changing service area characteristics.

Purveyors that have highly detailed information on customer account type and customer location can develop highly precise persons-per-connection ratios by census tract and by customer type. Similarly to Methods A and B, the purveyor would gather all Census data for its service area. Instead of using the gross Census count for a larger region, individual tract counts would be used. Where the entire tract falls within the service area, all connections and the total Census population are used. Where the tract is intersected by the service boundary, only part of the population and connections would be used. These partial tracts would have to be analyzed separately and individually in order to get the best population estimates. Once all connections and population counts are determined, a general person-per-connection ratio is developed much like in Methods A and B.

By using Census tracts in highly complex service areas, it may be possible to determine customer-specific person-per-connection ratios. For example, a tract may be entirely multi-family connections. Another tract may be entirely single family. Yet another may be entirely commercial. In each case, there may be a population count greater than zero, and thus a ratio can be developed. The advantage to the purveyor is that future population estimates can be tailored to what types of connections are added and whether they are added in the service area. At the very minimum, the use of Census tract data can yield a much more accurate general person-per-connection ratio.

For the years between the decennial Census, the specific ratios can be used in the same way as in Methods A and B for estimating new populations. As in Method B, a “reset” of the population can occur when new data becomes available and new ratios can be calculated.