Progress Made in Water Conservation in Texas

Report and Recommendations to the 87th Texas Legislature

Submitted by the

Water Conservation Advisory Council

www.savetexaswater.org

Karen Guz, Presiding Officer

December 1, 2020

Water Conservation Advisory Council

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December 1, 2020

The Honorable Greg Abbott
Governor of Texas

The Honorable Dan Patrick
Lieutenant Governor of Texas

The Honorable Dennis Bonnen
Speaker of the Texas House of Representatives

Dear Sirs:

It is our honor as members of the Water Conservation Advisory Council (Council) to provide you with the seventh biennial report on progress made in water conservation in Texas.

The Council serves as a professional forum for the continuing development of water conservation resources, expertise, and progress evaluation of the highest quality for the benefit of Texas. In addition to their professional endeavors, the 23 members of the council, their designated alternates, and interested stakeholders have voluntarily dedicated countless time and effort to protecting water resources, reducing the consumption of water, eliminating the loss or waste of water, improving water use efficiency, and increasing the recycling and reuse of water.

Respectfully submitted on behalf of the 23 members of the Council,

Karen Guz
Presiding Officer, Water Conservation Advisory Council

c: The Honorable Charles Perry
Chairman, Senate Committee on Agriculture, Water, & Rural Affairs

The Honorable Lyle Larson
Chairman, House Natural Resources Committee

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Executive Summary

In 2007, the 80th Texas Legislature created the Water Conservation Advisory Council (WCAC) to provide a resource of a select group of professionals with expertise in water conservation. The Water Conservation Advisory Council operates under the following mission:

> *to establish 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 the general public*.

The WCAC cultivates collaboration between council members and stakeholders focused on key opportunities in water efficiency in Texas. The Council utilizes volunteer expertise to expand awareness of the importance of water stewardship by:

- expanding the Texas Water Development Board (TWDB) Best Management Practices Guides on conservation so that they include the most current technology and efficiency opportunities;
- monitoring implementation of water conservation strategies by water users included in regional water plans;
- presenting the Blue Legacy Awards showcasing champions of water conservation in Texas;
- posting white papers and guidance documents as online resources; and
- inviting efficiency experts to present at council meetings.

This seventh report to state leadership summarizes the Council's recent activities in relation to their seven statutory charges.

The Council has put forward five legislative recommendations, summarized below in no particular order. These recommendations represent the majority opinion of council members, but do not necessarily reflect the views of each entity or interest group. Detailed information on each legislative can be found on page 24.

Council recommendations were formulated prior to the economic upheavals that occurred in 2020. The Council recognizes that the legislature will be mindful of budget limitations during this session. While this is always prudent, it is also important to remember the long-term economic gains made possible by maintaining progress on the Texas state water plan. Conservation is the least expensive option to meet the needs of our growing state. Recent analysis also confirms that water efficiency investments pay dividends economically by creating jobs in many sectors and increasing gross economic output (Texas Water Foundation, 2017).

1. Groundwater Conservation: Continue funding for the Texas Alliance for Water Conservation.

The Council recommends that, subject to available state revenue for the 2022–2023 biennium, the Texas Legislature fund the Texas Alliance for Water Conservation promoting water conservation through best management practices and new technologies at $475,000 per year, through general revenue appropriations deposited to the Agricultural Water Conservation Fund and distributed through the TWDB's Agricultural Water Conservation Grants Program, and establish this level of annual funding through baseline general revenue appropriations to the TWDB in future years.

2. Surface Water Conservation: Restore funding for the Texas Ag Water Efficiency Education and Demonstration Project Facility.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, the Texas Legislature fund the Texas Project for Ag Water Efficiency for the education, research and development of agricultural water conservation initiatives at $200,000 per year, through general revenue appropriations deposited and distributed through the TWDB's Agricultural Water Conservation Grants Program, and establish this level of annual funding through baseline general revenue appropriations to the TWDB in future years.

3. Maintain level of funding for TWDB's Agricultural Water Conservation Grant Program.

The Council recommends that, subject to available state revenue for the 2022–2023 biennium, the Texas Legislature maintain the current level of $1,200,000 per year for Texas Water Development Board's Agricultural Water Conservation Grant Program, in addition to any funds appropriated specifically for the Texas Alliance for Water Conservation and the Texas Project for Ag Water Efficiency.

4. Advance use of data to understand trends in water use.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, $200,000 be appropriated to the TWDB to advance the understanding of water and use trends using available annual reporting data. This includes

- long term analysis of per capita data;
- long term Statewide trends in industrial water use efficiency;
- seasonal use by both utilities and industrial users; and
- the development of analytical methods to determine the effectiveness of utility indoor and outdoor water conservation measures.

5. Establish Level 1 Validation Program for Water Loss Audits.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, the Texas Legislature appropriate $605,000 for the biennium to the TWDB to establish a program building on a water audit validation study being conducted by the TWDB. Under the guidance of the TWDB, Level 1 validations would be conducted of water loss audits submitted by a group of 50 utilities volunteering to participate, establish a methodology for conducting Level 1 validations, and establish a training program to certify validators. Preference for participation would be given to those utilities with a financial obligation to the State requiring that they complete a water loss audit. If more than 50 utilities apply to this program TWDB will work to ensure that a representative group of utilities is selected (ex. geographical, population, urban/rural, financial obligation).

Legislative charges

Introduction

The WCAC was established in 2007 via passage of Senate Bill 3 and House Bill 4 and given seven charges relating to the development and the evaluation of progress regarding water conservation efforts in Texas. This is the seventh report to state leadership briefly addressing each charge and identifying key findings and recommendations.

Charge 1. Monitor trends in water conservation implementation

The WCAC has 23 members, appointed by TWDB, who represent major water use sectors and stakeholders in our state. The members representing the areas listed below have summarized findings and progress in their respective areas.

Agricultural Water Conservation

Irrigation of crops accounts for an estimated 54 percent of all water use in Texas, making it by far the largest water use category. Approximately 74 percent of all groundwater and 33 percent of surface water is used for agricultural irrigation (TWDB, 2018). As the largest water user, agricultural irrigation presents the state's best opportunity to achieve significant water use savings.

Over the past several decades, the major trends in agricultural water use efficiency have included: advances in plant genetics to produce higher yields with less water; improvements in the efficiency of irrigation systems; and, widespread adoption of conservation tillage practices. While these trends are expected to continue, an emerging movement is irrigation scheduling, which employs a variety of techniques to apply water more precisely when and where it is needed.

Widespread adoption of best management practices (BMPs) like irrigation scheduling is key to agricultural water conservation. This requires education and demonstration projects to inform farmers about the new technology and practices and convince them these practices will have a positive impact on their net income.

Groundwater Conservation Trends

- Highly efficient low-pressure center pivot irrigation is now used on 78.9 percent of groundwater-irrigated acres in Texas (USDA 2018 Irrigation and Water Management Survey).

- Improved irrigation management and scheduling tools are being developed using location targeted weather-based evapotranspiration estimates and in-field monitoring of soil and plant water stress.

- Drought tolerant crops such as cotton, sorghum, and wheat are being included in rotation and "split pivot" strategies to balance with higher water demand crops.

- Variable rate irrigation systems are being developed which allow for in-field adjustment of water application according to localized soil water capacity and crop yield ability.

- Field trials of deficit irrigation for cotton have shown significant promise.

Surface Water Conservation Trends

- In the Lower Rio Grande Valley, there is a slow conversion of flood/furrow irrigation to drip irrigation when the value of crops can justify the investment and where irrigation districts can provide smaller volumes of water over a longer time period.

- There is slow adoption of integrated data dashboards, raised beds, drip systems, and plastic mulch in new citrus groves.

- In the Upper Rio Grande Valley, irrigation scheduling using soil moisture sensors in some pecan fields around El Paso has resulted in reduced number of irrigations.

Water Conservation through Brush Control

The Texas Legislature, in 2011, replaced the state's brush control program with the Water Supply Enhancement Program, administered by the Texas State Soil and Water Conservation Board (TSSWCB). However, the state has not provided funding for the program since Fiscal Year 2018 appropriations of $2.47 million, even though TSSWCB is statutorily required to operate the program.

Invasive brush increases evapotranspiration and rainfall runoff resulting in water being lost from aquifer recharge and the growth of grasses for grazing. Brush control is a proven best management practice[1] for conserving rainfall for beneficial uses[2] with the additional benefits of improving water quality in streams and reducing sedimentation in reservoirs that provide water for residential, commercial and industrial uses.[3] Continued funding of the Water Supply Enhancement Program would assist private landowners with the cost of maintaining their land in ways that provide public benefits to all Texans.

Commercial and Institutional Water Conservation

The complexity of the Commercial and Institutional sector creates some challenges in measuring and tracking water efficiency progress. One-way Texas is ahead of most of the United States is in having clear definitions for commercial and institutional use. Texas Administrative Code §288.1 provides the following definitions

> **Commercial** use is the use of water by a place of business, such as a hotel, restaurant, or office building but does not include multi-family residences or agricultural, industrial, or institutional users.
>
> **Institutiona**l use is the use of water by an establishment dedicated to public service, such as a school, university, church, hospital, or government facility, regardless of ownership.

Although these definitions are in place, the billing systems used by utilities are often unable to separate these uses from other user categories. An important priority is encouraging the adoption of these definitions and maintaining the ability to track customers by them as utilities upgrade billing systems or adopt data management platforms.

Beyond the ability to identify non-residential customers by broad categories, it is also important to have a way to organize them in categories such as food service, office buildings, churches, hotels and more. Two coding systems for businesses are already in use for this purpose. Several Texas utilities have used the North American Industrial Classification System (NAICS) to code their non-residential customers. Other utilities have their customer base entered into the ENERGY STAR Portfolio Manager Tool which is part of the Better Buildings Challenge from the U.S. Department of Energy. The two systems can be cross-referenced so that data sets can be combined for analysis.

[1] http://www.twdb.texas.gov/conservation/BMPs/Ag/doc/4.1.pdf?d=9043.330000014976
[2] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_002329.pdf
[3] https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1254946.pdf

Research on this sector is also beginning to focus on developing water efficiency metrics. This has not yet been accomplished because of the inherent diversity of how water is used at commercial and institutional locations. In some cases, water use per person served will be logical. In other cases, it may be that usage per patient or usage per meal produced will make sense. It will be important to work with stakeholders within the business communities represented on the council to ensure that the metrics selected fairly and accurately determine water efficiency.

The WCAC Commercial and Institutional workgroup seeks to develop three projects during the next year:

1. **Improve Utility Coding of Customers:** Increase awareness of water sector definitions adopted in Texas so that these can be incorporated accurately into future utility databases.
2. **Enhance Understanding of Water Use Categories Patterns:** Recruiting utilities to share anonymized usage data that has already been coded by one of the accepted user categories.
3. **Develop Efficiency Metrics by Sector:** Work with the interested parties to come to agreement on efficiency metrics (use per pupil, use per meal served etc.) for some of the largest water use sectors.

Manufacturing and Electric Power Generation Water Conservation

Texas ranks first in the nation in electric power production[4] and second for manufacturing output.[5] In 2018 almost 17 percent of the electric power produced was from renewable sources, which use little to no water in the generation process. Most of the renewable energy is from wind generation, where Texas ranks first nationally as well[6]. Because the sustainability of the Texas manufacturing sector is so highly dependent on water, manufacturers closely track and manage their water usage, file the required water conservation plans, complete the TWDB's annual water use survey, and seek out opportunities to conserve water on a consistent basis. As an example, over the last two decades, Texas refiners have reduced water usage by as much as 30 percent while output revenue has increased steadily. The combination of economic gains and water use efficiency is the result of innovation by many Texas industries.

[4] Information can be found at the U.S. Energy Information Administration online at: https://www.eia.gov/state/

[5] State Manufacturing Data can be found at: http://www.nam.org/Data-And-Reports/State-Manufacturing-Data/

[6] Information can be found at the U.S. Energy Information Administration online at: https://www.eia.gov/electricity/annual/

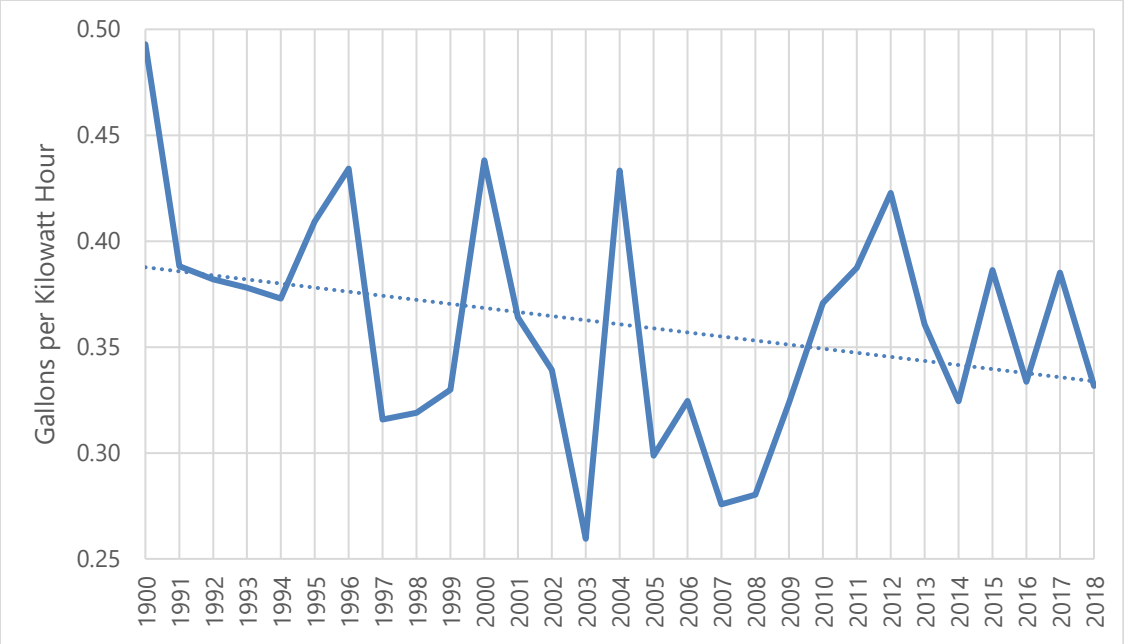

Figure 1. Electric Power Generation Water Use per Kilowatt Hour (Gallons per kWh). Prepared by Bill Hoffman using TWDB and U.S. Dept. of Energy data[7].

Though each of the state's 27 complex and multi-operational refineries is unique, with distinct water needs and operations, water conservation has resulted from:

- evolving water management practices;
- water treatment and technology development;
- utilization of alternative sources;
- collaboration within the industrial sector; and
- cooperation at the local, regional, and state level.

Water consumption within different industries is highly variable, making it difficult to compare one water user to another. Future efforts should continue to explore opportunities for improved efficiency and development of water conservation best management practices appropriate for each facility. Industrial firms should consider sharing non-proprietary information within their respective trade groups as a way of encouraging water conservation. The Council welcomes water users to share their successes and water metrics through case studies posted to the Council's online resource library to potentially accelerate efficiency gains.

[7] Data can be found at: https://www3.twdb.texas.gov/apps/reports/WU/HistoricalByNAICS and https://www.eia.gov/electricity/state/texas/, respectively.

Municipal Water Conservation

Municipal water demands are expected to grow by as much 62 percent by 2070, eventually accounting for 39 percent of water used in Texas. This increase is primarily driven by strong population growth in several key regions in our state. Municipal water conservation is one of the key recommended management strategies for addressing future water needs in the 2017 State Water Plan. If the recommended municipal conservation actions are implemented, they are projected to account for 9.6 percent of water supply for the state by 2070. Thus, meeting the municipal water conservation targets is critical.

Municipal water use is highly diverse and includes single family, multi-family, commercial, institutional, and light industrial water use in cities, utilities, and aggregated county areas. Fortunately, a wealth of data on municipal water use and water conservation efforts is generated by retail public water utilities in Texas and submitted to TWDB as a result of various state statutory planning and reporting requirements enacted by the Legislature over many years. Review of this data allows for an assessment of both the potential municipal water savings and the progress being made in achieving that potential.

Among the relevant reports required of those utilities serving 3,300 water connections or more (about 10,000 people) are Water Conservation Plans (which must be revised every five years) and Annual Conservation Reports to document implementation of those plans. Those utilities are also required to conduct and submit annual Water Loss Audits, which detail any real or apparent losses of water in utility distribution systems as a result of various factors, including leaking pipelines, metering problems, and other issues. Smaller retail water utilities must conduct and submit a Water Loss Audit to TWDB every five years.

Updated Water Conservation Plans: Under the five-year review and revision cycle, 510 water utilities submitted their updated water conservation plans in 2019, detailing how they would implement water conservation efforts for approximately 21,257,066 municipal customers across Texas. For the first time, these plans included designating a person as the Conservation Coordinator for the utility. Designation of a coordinator was a requirement adopted by the Legislature in 2017 as a result of a recommendation from WCAC. A new, free Water Conservation Planning Tool was available to assist utilities during preparation of their 2019 Conservation Plans in selecting best management practices and in making accurate savings estimates over time.

Texas Water Conservation Scorecard: The data from the 2019 Water Conservation Plans and the most recent Annual Conservation Reports and Water Loss Audits provided the basis for a full update of the Texas Water Conservation Scorecard that the Texas Living Waters Project

released in June 2020 (the initial Scorecard was released in 2016). The Texas Living Waters Project is a joint water education and water policy partnership of the National Wildlife Federation, Lone Star Chapter of the Sierra Club, Galveston Bay Foundation, and Hill Country Alliance. Advancing water conservation is one of the priority activities of the Living Waters Project.

The updated Texas Water Conservation Scorecard was an evaluation of 356 retail public water utilities in Texas – those providing service to 3,300 or more water connections – on ten water conservation and related criteria. Those criteria included: submission of the required water conservation plans, annual conservation reports, and water loss audits to TWDB; total water loss percentages; online accessibility of a utility's water conservation plan and other water conservation information; achievement of per-capita water use reduction targets; setting future per-capita water use reduction targets; number of conservation best management practices implemented; limitations on outdoor landscape watering; and setting water rates that encourage water conservation.

Among the findings from the updated Texas Water Conservation Scorecard were the following:

- Nearly three-fourths of the retail public water utilities serving a population of 25,000 or more achieved or exceeded their five-year targets for per capita water use reduction set in their 2014 Water Conservation Plans.
- Based on the most recent annual conservation reports available when the Scorecard research was conducted, many water utilities have the opportunity to dramatically ramp up their water conservation efforts by adopting more conservation BMPs. Of the over 20 BMPs described in the Conservation Best Management Practices Guide at the time of the research (more BMPs have recently been added), only 57 percent of the utilities serving a population of 25,000 or more, and less than a quarter of the smaller utilities serving 3,300 connections or more reported using five or more conservation BMPs.
- Water loss continues to be a significant challenge for water utilities, with roughly a third of utilities reporting (as of 2018 data) a total water loss (real and apparent) of 13.9 percent or more. The number of water utilities submitting the required annual Water Loss Audits has jumped dramatically as a result of increased outreach by TWDB and legislative requirements for audit training, but about 30 percent of the audits submitted in 2019 had possible errors or other issues. (The WCAC notes that there is disagreement about whether water loss percentages are the best metric for assessing water loss because of numerous factors that may affect calculation of those percentages, but WCAC agrees that water loss is a significant issue for water utilities, as discussed below.)

The complete findings and recommendations from the updated Texas Water Conservation Scorecard are available to the public in an interactive format and as a written report at www.texaswaterconservationscorecard.org.

Conservation Best Management Practices Guide: WCAC volunteers have been hard at work updating the Conservation Best Management Practices Guide so that the latest in conservation programming options could be included in municipal plans and reports.

- **Outdoor Watering Schedule** was added to encourage communities to consider reasonable year-round limits on operation of irrigation systems which yield significant water savings.
- **Custom Rebate** was added to guide incentives for commercial, institutional and industrial customers.
- **Enforcement of Irrigation Standards** was added to remind communities that enforcement of Texas Commission on Environmental Quality (TCEQ) irrigation efficiency standards provide consumer protections and water savings.
- **Utility Water Audit & Water Loss** was added to update with the latest international best practices including seeking outside expertise for validity of audit data.
- **Plumbing Assistance for Economically Disadvantaged Customers** was added to provide guidance on how to simultaneously save water and provide assistance for those most in need.

Table 1. Water conservation annual report activities

	2015	2016	2017	2018	2019
Meters replaced	369,020	315,617	348,973	315,882	404,386
Leaks repaired	116,761	117,497	110,313	103,515	126,052
Utilities implementing an education program	308	401	418	396	441
Drought plans activated	148	65	44	74	42
Best management practices implemented	1,215	2,202	2,139	2,203	2,252
Retail population served	16,267,142	19,097,281	19,102,324	21,040,647	21,257,066

Table 2. Water conservation annual report data (based on annual reports received as of 9/2/2020)

	5-year goal* average/ median	5-year goal** average/ median	2015 average/ median	2016 average/ median	2017 average/ median	2018 average/ median	2019 average/ median
Total GPCD	139/129	127/120	132/119	128/115	129/119	134/120	129/115
Residential GPCD	95/85	75/69	85/73	73/67	73/66	76/69	73/67
Water Loss GPCD	19/16	18/14	23/16	20/15	19/14	22/14	21/14
Commercial, Institutional, & Other GPCD	NA	NA	24/30	35/33	37/39	36/37	35/34
Percent water reused	NA	NA	9	6	6	7	7
Percent water saved	NA	NA	13	13	11	9	9
Number of water conservation plans or annual reports submitted	377	379	409	441	445	500	510

GPCD = gallons per capita per day; ; *based on 2014 water conservation plans; ** based on 2019 conservation plans; NA = not applicable

Water Loss Workgroup Efforts: Municipal water loss improvement represents a significant opportunity for both water savings and improved financial outcomes for utilities. In addition to updating the Water Loss Audit & Water Loss BMP, the group pursued two projects:

Water Audit Training Requirement Progress: It is a new requirement that water loss audits be completed by someone who has attended an approved TWDB Water Loss Audit Training. Since 2017 TWDB staff have offered 60 workshops throughout Texas that were attended by approximately 1,534 individuals representing 782 unique utilities. Training sessions were popular in every region and resulted in strong participation and engagement. An online training module was also launched to support this requirement.

Audit Data Validity Pilot Recommendation: A legislative recommendation from the WCAC is that Texas pursue a Data Validity Pilot Program engaging volunteer utilities in efforts to improve their water loss audits by working with outside experts who review data inputs and conclusions. The goal of this effort is to ensure that our water loss audit

reports are accurate and that audit conclusions guide investments that yield the best return on investment for citizens.

Wholesale Water Conservation

Wholesale water suppliers are entities that sell water to another water provider for resale to the public for human consumption. Wholesale water suppliers face the task of making progress in conservation without having direct retail customers. As a result, suppliers frequently focus conservation efforts on public outreach through dedicated advertising campaigns, websites, social media, and newsletters. Some suppliers develop programs and materials that directly support and assist their wholesale customers' conservation program efforts. However, support for wholesale customers from the supplier can vary based on the dedicated resources and needs of the customer.

Suppliers continue to encourage their customers to adopt and implement water conservation programs to reduce per capita and peak use demands. Wholesale water suppliers must comply with Texas Administrative Code 30 Section 288.5 to require their customers, and their subsequent wholesale customers, to have a water conservation plan. Many require their customers to submit the plan to the supplier for review and documentation.

Wholesale water suppliers do have challenges with water conservation progress. Many smaller wholesale water suppliers and wholesale customer utilities have limited resources and do not have dedicated conservation staff. Some do not support water conservation as an important water supply strategy to help meet their long-term needs. Wholesale water suppliers also find it difficult to effectively document water savings from conservation programming. Many must rely on their utility customers, who have a direct connection with end-use water users and the data to track significant conservation progress.

Table 3 provides a summary of 40 wholesale suppliers' conservation activity in 2019 as reported to TWDB.

Table 3. Wholesale water supplier water conservation annual report data for 2019.

Population Served	Million Gallons of Water Produced	Million Gallons of Water Conserved	Million Gallons of Water Recycled	Water Savings Dollars	Education and Public Awareness Programs	Leak Detection and Water Loss Programs
9529,267	701,109	31,175	10,596	63,129,554	32	21

Examples of Conservation Efforts from Wholesale Water Suppliers[8]

- Many wholesale water suppliers proactively meet monthly, quarterly or yearly with their customers to communicate and focus conservation efforts in their service area.

- Suppliers frequently provide resources for their customers, such as brochures, giveaways and event participation to share in their communities.

- Suppliers support school education programs in various ways. Many utilities support the TWDB's Major Rivers program, some collaborate with local partner agencies on programs and a few have dedicated education teams with specific curriculum and resources for teachers and students in their service area.

- Many wholesale water suppliers conduct and coordinate regional conservation outreach through digital advertising, videos, billboards, social media, newsletters, email subscriptions, etc. Some of these campaigns and programs include, Water IQ: Know Your Water, Water My Yard, Water is Awesome, and Make Every Drop Count.

- Suppliers support their wholesale customers with on-going education and learning opportunities. Some allow wholesale customer employees to participate in facility trainings. Many suppliers support regional conservation symposiums that are held annually or biennially for customer city employees.

[8] Contributing wholesale water providers include: Brazos River Authority, Central Texas Water Supply Corporation, City of Dallas Water Utilities, El Paso Water, Guadalupe-Blanco River Authority, Greater Texoma Utility Authority, Gulf Coast Water Authority, Houston County Water Control Improvement District #1, North Texas Municipal Water District, Red River Authority of Texas, Sabine River Authority, San Jacinto River Authority, Tarrant Regional Water District, Upper Trinity Regional Water District, West Central Texas Municipal Water District

- Wholesale water suppliers also work on their internal conservation efforts. Third-party verification calibrations on water plant meters, meter replacements and water recycling efforts are being implemented and considered.

- Suppliers are also promoting conservation with their agricultural customers. Many promote conservation recommendations, and some provide financial incentives.

Charge 2. Monitor new technologies for possible inclusion in the Best Management Practices Guide

Statewide ET Network Potential

The use of evapotranspiration (ET) data through dedicated weather stations and connected networks is critical to maintaining current best management practices and advancing future conservation success. Outdoor water use for growing crops and maintaining landscapes is significant. Agriculture irrigation is the state's largest water use sector accounting for 54 percent of total water use in 2018. Municipal water use is the second largest using 30 percent of total water in Texas. Outdoor landscape watering can account for over 30 percent of total municipal water use, with some areas of the state reaching over 60 percent. Efficient irrigation best management practices and technology improvements have proven to be effective tools with quantifiable water saving results. One technology the Council is interested in monitoring the progress of is the potential advancement of ET networks, specifically the TexasET Network, across the state. (See Appendix for additional description and historical information.)

The Council recognizes that the Texas Groundwater Protection Committee (TGPC) recommended funding for a regional High Plains ET Network in support of the statewide ET network in their report to the 86th Legislature in January 2019. It is the council's understanding that the TGPC will once again recommend sustainable funding in support of progress towards a statewide ET network in their next legislature report. A statewide ET network approach is currently underway in other states. Several states, such as Oklahoma and Florida, have seen the benefits of having a statewide ET network including:

- regional and municipal water planning;
- regional and municipal wastewater planning;

- direct application for agricultural and municipal water users;
- forestry management; and
- efficient management and use of water resources.

The historical piecemeal approach of grant-funded regional ET networks has proven to be unsustainable. Previous studies have recognized the value of ET networks, the potential of having a statewide network, and the recommendations to have the TWDB become a consistent manager and provider of ET information.[9] The TexasET Network may provide a model to build upon across the state, and the Council is interested in monitoring this potential for a sustainable future. Advancing ET information is critical to agricultural, municipal, and wholesale water managers, and is necessary to maintain current recommended best management practices. Serious concerns would arise if ET information and data were not available in the future. The council is charged with advancing water conservation throughout the state, and a full expansion of an ET network, available to all water users, is vital in helping to meet the future water needs of Texas.

Advanced Metering Infrastructure (AMI) Technology

The market penetration of AMI technology has made significant inroads into the United States water sector in the past few years. Having more frequent and more detailed consumption data has great appeal to customers and utilities alike. The barriers to adoption of this technology have included cost, complex contracting relationships with AMI vendors, and the complexity of the transition necessary to achieve the desired result. There is increased desire to quantify the potential water savings of AMI deployments because water savings can be a critical part of making the business case for the significant investment AMI adoption requires. There have not been national studies on this topic, but water efficiency stakeholders are organizing to begin analysis of AMI water savings. The WCAC will be monitoring this exciting development with the goal of developing future BMP guidance on how to maximize water savings from AMI investments.

[9] Assessment of Texas Evapotranspiration (ET) Networks Final Report: http://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0903580904_evapotranspiration.pdf
Feasibility Study for Development of Statewide Evapotranspiration Network Final Report: https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/1613581995.pdf

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

Water conservation is the most cost-effective water management strategy to meet the state's water needs. Water conservation success, however, is achieved by end users who are equipped and willing to conserve. With a significant portion of Texas' future water supplies identified as coming from conservation, it is imperative that the public, or end users, become more aware of their source water supply, the need to conserve, and the motivations to practice water conservation in their daily routines.

While several successful water conservation campaigns exist in Texas at a local or utility level, and TWDB's Water IQ program provides important educational resources, a statewide water conservation public awareness campaign that was envisioned by the passage of SB 3 and HB 4 in 2007 has neither been funded, developed, nor implemented.

In a recent initiative by Texas Water Foundation, the need for a statewide water awareness campaign has been further discussed. Through philanthropic funding, statewide polling was conducted to determine the efficacy of a statewide campaign that engages and complements local efforts. Statewide surveys conducted in January 2020 confirm that a statewide campaign is successful when it combines a sense of pride with action, and that respondents are more likely to react to messages that impact them on an individual or local basis. The Texas Water Foundation's initiative has developed into a prototype statewide water awareness campaign that will be piloting in local test markets in 2020.

Recognizing the importance that water conservation will play in Texas' future, and a need to engage the public to achieve successful water conservation, the council supports the development and implementation of a statewide water awareness campaign. Funding the development of a statewide campaign would mark a significant contribution and complement to local efforts that were inspired by the potential for a statewide water conservation public awareness program called for by the Texas Legislature in 2007 with the passage of Senate Bill 3 and House Bill 4.

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

The Council continues to develop and update best management practices for municipal and wholesale providers and for agricultural, commercial, and industrial water users. These best management practices, available at www.savetexaswater.org, are voluntary efficiency measures that save a quantifiable amount of water, either directly or indirectly, and can be implemented within a specified timeframe. Recognition by the Texas Legislature of these best management practices on the Save Texas Water website would show water providers and users where to learn more about efficient practices for long-term water supply. The Council also seeks to develop a resource library through their website, including resource documents and case studies.

In addition to developing and maintaining our online resources, several members of the Council are involved in statewide dialogue regarding the creation of a centralized repository for water information and data. Rather than duplicate efforts, the Council may consider collaborating in this initiative in the future. One opportunity for collaboration exists with Texas Water Foundation's development of an online, publicly available water resources library. This effort seeks to collect water related research, BMPs, educational tools and guides, which could provide the Council with an online repository of resources.

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

Water conservation is critical to ensuring all Texans have an adequate water supply today and into the future. The efficient use of current water supplies is the most cost-effective water management strategy to meet water demands. The development and implementation of successful programs are critical to ensure the estimated 30 percent of future water supplies achieved through conservation and demand management indicated by the 2017 State Water Plan.[10]

[10] The 2017 State Water Plan can be found at: www.twdb.texas.gov/waterplanning/swp/2017/doc/SWP17-Water-for-Texas.pdf?d=67380

Conserving water is an investment that benefits all Texans.

To showcase examples of effective water stewardship occurring throughout Texas, the Water Conservation Advisory Council established the Blue Legacy Awards to recognize responsible management of our water resources. Members of the municipal, agricultural, and manufacturing water use sectors who have demonstrated a commitment to water conservation celebrated were for their efforts as a recipient of this distinguished award. The Blue Legacy Awards are presented at premier events to elevate the importance and awareness of water conservation related practices. Their success stories and photographs, as well as nomination packets, can be found on www.savetexaswater.org. The council presented the 2019 awards as part of Texas Water Day at the Capitol on March 13, 2019.

Figure 2. Karen Guz, Presiding Officer of the Council, and Dir. Kathleen Jackson, TWDB Board member, present three of the seven Blue Legacy Awards given out at Texas Water Day at the Capitol on March 13, 2019. Left to right: Hodges Farm (Agriculture – Producer); Mr. Jesus Reyes with El Paso Water Improvement District #1 (Agriculture – Non-Producer); BVWaterSmart (Municipal – Population 100,000 - <50,000).

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

The TWDB requires regional water planning groups to consider water conservation to meet any identified water supply need by a water user group,[11] and conservation has become a recommended water management strategy in all regional plans. However, recommendations do not automatically translate into actions by water users.

Evaluating whether the recommended water conservation strategies in regional water plans are being implemented is critical since the regional and state water plans project that

[11] Title 31, Part 10 of the Texas Administrative Code, Rule §357.34: Identification and Evaluation of Potentially Feasible Water Management Strategies and Water Management Strategy Projects.

approximately 30 percent of future water supply needs in Texas by 2070 are to be met through conservation.[12] Three sources of information for this evaluation in recent years have been the regional water plans themselves, a Statewide Water Conservation Quantification Project report done under contract to the Texas Water Development Board and released in 2017,[13] and reports such as the Texas Water Conservation Scorecard prepared and recently updated by the organizations participating in the Texas Living Waters Project.[14]

Although, the latter two sources are not comprehensive reviews of *all* water user groups with recommended water conservation strategies in *all* regions of the state, the reports still provide useful information about progress or problems with implementation of conservation. Potentially, the most complete source of such information would be the regional water plans.

Since 2012, the TWDB, as directed by the Legislature, has required that each regional water plan, updated and revised every five years, include information on the implementation of water management strategies recommended in the previous water plan adopted for the region. This rule,[15] first applied to the 16 regional water plans submitted to the Board in 2015 (known as the 2016 plans), required reporting on the implementation of conservation and other water management strategies proposed in the 2011 water plans.

A previous review of a selected sample of the 2016 plans found that they varied "widely in the level of detail, comprehensiveness, and usefulness of their…discussions of the implementation of water conservation strategies recommended in the 2011 plan.[16]" In its biennial report, *Progress in Water Conservation in Texas: Report and Recommendations to the 85th Texas Legislature*, the Water Conservation Advisory Council concluded that "the overview of conservation implementation found in most [2016] plans is minimal.[17]"

The 2021 regional water plans being finalized this year (2020) provide an opportunity to assess implementation of water conservation strategies that were recommended in the 2016 plans. Unfortunately, the timing of the preparation of this *Progress in Water Conservation: Report and Recommendations to the 87th Texas Legislature*, precluded a definitive assessment of the manner in which the 2021 plans discuss and evaluate implementation of water conservation strategies in previous plans.

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[12] 2017 State Water Plan, available online at www.twdb.texas.gov/waterplanning/swp/2017.
[13] Averitt and Associates, Inc.: Statewide Water Conservation Quantification Project, prepared for the Texas Water Development Board, available online at: https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/1600012030_Water%20Conservation.pdf
[14] Texas Water Conservation Scorecard, available online at: www.texaswaterconservationscorecard.org
[15] Title 31, Part 10 of the Texas Administrative Code, Rule 357.45: Implementation and Comparison to Previous Regional Water Plan
[16] Available online at: https://savetexaswater.org/resources/doc/Kramer_rwpg_implementation_2016.pdf
[17] Report available online at: https://savetexaswater.org/resources/doc/2016_WCAC_Lege_Report.pdf

As of this writing, the 2021 plans have been released only in draft form (known as "initially prepared plans") for public review and comment. In many of the plans, completion of the sections discussing implementation of previously recommended strategies is currently underway by the planning groups and their consultants. These sections do not have to be completed until the final plans are due to be submitted to the TWDB in October 2020 (by which time this Council's report to the Legislature will have been finalized).

However, a review of some of the 2021 plans for which the discussion of the implementation of water management strategies is complete or near completion, combined with communications with consultants to some of the planning groups, and TWDB planning staff, yields a few observations:

- Since conservation is often a recommended strategy only for user groups with a projected water need in a particular decade, the fact that many water user groups did not have projected water needs for 2020 means that some of them would not have begun implementation of certain water conservation strategies in time to be evaluated in the 2021 regional plans.
- Most of the regional water plans appear to be relying primarily on a spreadsheet template provided by the TWDB to report brief information on implementation of conservation, but some plans utilize other strategies in the form of tables, rather than providing detailed evaluations of implementation.
- In many cases, the information in these tables is being populated by responses to surveys of water user groups distributed by the planning groups and their consultants, but the response rate to these surveys has been low – leading to incomplete information that undermines a comprehensive assessment of implementation, even if planning group consultants attempt a labor-and time-intensive effort to obtain that data by other means.
- One exception to these general observations is that Region C (North Texas) has done a more detailed look at the implementation of at least some of the conservation strategies in its previous plan, which indicates progress on conservation in the region.[18]

This preliminary look at regional water plans and their discussion of implementation of previously recommended water conservation strategies suggests that thus far most of the regional water plans are not providing a comprehensive evaluation of whether water

[18] Chapter 5-B, Volume 1, 2020 Initially Prepared Region C Water Plan, available online at: http://www.twdb.texas.gov/waterplanning/rwp/plans/2021/Region%20C/RegionC_2021DraftRWPV1.pdf?d=11457.140000071377

conservation strategies are achieving their projected roles in addressing water supply needs. The Council intends to engage with the new Interregional Planning Council (representing regional water planning groups) and the Texas Water Development Board staff during the next two years to discuss how to enhance the current evaluation of the implementation of water conservation strategies to improve the prospects for meeting the conservation goals in future regional and state water plans.

One new development in the regional planning process that may assist in evaluating the rate of municipal water conservation progress in different regions is a new statutory requirement (enacted as part of HB 807 in the 86th Texas Legislature) that each regional water planning group "set one or more specific goals for gallons of water use per capita per day in each decade of the period covered by the [regional] plan for the municipal water user groups in the regional water planning area….". HB 807 became effective in June 2019, and TWDB moved expeditiously to implement the requirement via guidance to the regional water planning groups prior to the adoption of formal rules (which occurred in June 2020). As a result, each of the 2021 regional water plans will include these GPCD goals, and the subsequent round of regional water planning will be able to measure progress on municipal water conservation by comparing actual GPCD numbers to the GPCD goals set for the municipal water user groups. However, assessing which municipal water conservation strategies are being implemented in the region will continue to be important in order to evaluate the contribution of those strategies to the GPCD levels experienced. That, in turn, will allow consideration of possible refinements to those strategies, if necessary, to further enhance prospects for achieving the municipal conservation volumes envisioned in regional 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

There are two sets of targets that the Water Conservation Advisory Council would like to highlight: total GPCD and water loss metrics.

Total GPCD

Total GPCD is a measure of all water used by a utility divided by the total permanent population/days of the year. It is an important metric to measure and track water use over time, but two issues must be clarified:

1) Total GPCD Comparisons Between Communities Are Not "Apples to Apples" Comparisons

Total per capita includes ALL water used by a utility including residential, commercial, industrial, institutional and water loss. For some water utility service areas, the majority of the total usage may be residential while other communities may have a significant commercial and industrial demand. The specific mix of water uses within a utility service area thus affects the calculation of GPCD and makes comparison of GPCD among water utilities problematic. For example, a utility with a large industrial water customer using major volumes of water will result in a higher GPCD than that for a utility serving primarily residential customers.

Each utility should be able to plan for reductions in their total GPCD over time using a variety of conservation best management practices. WCAC encourages water utilities to set strong per capita water use reduction goals tailored to their specific mix of water uses and to implement those practices that are most likely to achieve their goals.

2) GPCD Targets Can Often Go Below 140 GPCD

In 2004, the Water Conservation Implementation Task Force, the predecessor to the WCAC, debated appropriate municipal total GPCD targets and recommended the following for municipal water utilities:

> "A minimum annual reduction of 1 percent in total [GPCD], based upon a five-year rolling average, until such time as the entity achieves a total [GPCD] of 140 or less."

A minority report from the Task Force recommended a target of 125 GPCD. Many municipal water providers have already achieved total per capita water use targets well below 140 GPCD. The WCAC notes that after a decade and a half of conservation progress since the work of the Task Force, municipal water utilities have options and role models for achieving a lower GPCD than 140 and should strive to do so.

Water Loss Metrics

While there is little disagreement that water loss is a significant water efficiency challenge, there is disagreement over the emphasis on water loss percentages as the primary metrics to assess water loss. The American Water Works Association (AWWA) Water Loss & Control Committee recently produced a metrics document which was unequivocal on the subject: "AWWA no longer supports any form of Non-Revenue Water percentage indicators." Some experts on water loss have offered several additional metrics (volume/service connection/day, value/service connection/day) that provide perspective on losses while staying away from the

challenges that variation in annual water production and other factors cause when reviewing simple percentage of water lost. However, others, such as the organizations preparing the Texas Water Conservation Scorecard, have raised concerns that these other metrics are not easily understood by the general public and water utility customers and may not adequately convey the magnitude of water loss, which in turn may dampen public support for the funding and actions to reduce that loss. In the next few years, the WCAC expects to have increased emphasis on water losses, with the development of appropriate and effective metrics as a key focus.

Recommendations for legislation to advance water conservation in Texas

In 2015, the 84th Texas Legislature passed Senate Bill 551, directing the Council to include in their report "recommendations for legislation to advance water conservation in this state, which may include conservation through the reduction of the amount of water lost because of evaporation." Included herein are five legislative recommendations for consideration that represent the majority opinion of the council members, but do not necessarily reflect the views of each entity or interest group.[19]

1. Groundwater Conservation: Continue funding for the Texas Alliance for Water Conservation

The Texas Alliance for Water Conservation, located at Texas Tech University, is a state-supported, agricultural producer demonstration and education project promoting groundwater conservation through best management practices and technologies to improve sustainability and profitability in the Texas southern high plains. This project began in 2004 and received initial grant funding of $6.2 million through 2013. In 2014, the Texas Legislature appropriated an additional $3.6 million from the Agricultural Water Conservation Fund for a 5-year period (2014-2019). Current funding has been extended to December 31, 2020 with a contract expiration date of August 31, 2021.

[19] At the August 6, 2020 Council Meeting, nineteen members voted to accept the report with some revisions while two members (Ms. Jennifer Allis, Texas Commission on Environmental Quality, Mr. Kevin Kluge, Texas Water Development Board) abstained from voting, and two members (Ms. Maria Martinez, Federal Agencies, and Ms. Sarah Schlessinger, Professional Organizations Focused on Water Conservation) were absent.

The Texas High Plains is one of the most important agricultural regions of the United States, but it is highly dependent on water for irrigation from the Ogallala Aquifer, at unsustainable rates of use. Approximately 90 percent of the water withdrawn from the aquifer is used for agricultural irrigation. TAWC education and demonstration projects are located in the heart of this region. Research efforts are constantly producing advances in technology and agricultural practices to conserve water. In order for those advances to result in more efficient or reduced water usage, users must be made aware of and implement new technologies and practices. TAWC is a vital link between researchers and agricultural water users. TAWC recruits agricultural producers to implement specific practices and technologies, keeps detailed multi-year records of costs and yields, and then demonstrates the results to other producers. This peer-to-peer sharing of experience, data and results is highly effective in increasing the adoption rate of water conserving best management practices. TAWC demonstration projects provide compelling proof of new methods that not only reduce water usage but also increase profitability for producers, which is a key factor in promoting adoption.

Much of TAWC's education and demonstration efforts have focused on conservation of the Ogallala Aquifer and irrigation technologies that only deliver what the crop needs at specific stages of development, thus creating significant water savings on real farm scenarios.

Renewed funding will allow TAWC to continue promoting water conservation and launch new thrusts to include 1) field-scale demonstrations of minimum tillage and multi-species cover crops to enhance soil water retention, and 2) options and guidelines for conversion from irrigated to rainfed cropping systems. TAWC will also communicate options in contract cattle grazing of cover crops and rainfed forages to enhance the value of land retired from irrigation. New investment in TAWC will expand the impact of technology transfer for water savings through tighter linkage with soil health and value-added land management. TAWC estimates $475,000 per year would support the core operations and personnel to carry on administration, producer relations, education, event programing, and demonstrations. Supplementary grants can then be obtained to support specific outreach objectives.

The Council recommends that, subject to available state revenue for the 2022–2023 biennium, the Texas Legislature fund the Texas Alliance for Water Conservation promoting water conservation through best management practices and new technologies at $475,000 per year, through general revenue appropriations deposited to the Agricultural Water Conservation Fund and distributed through the TWDB's Agricultural Water Conservation Grants Program, and establish this level of annual funding through baseline general revenue appropriations to the TWDB in future years.

2. *Surface Water Conservation: Restore funding for the Texas Ag Water Efficiency Education and Demonstration Project facility.*

From 2004 to 2015, the Texas Water Development Board funded the Texas Project for Ag Water Efficiency to demonstrate and assist farmers in implementing surface-water irrigation practices on farms in the Lower Rio Grande Valley that would conserve water and maintain the economic viability of their farming practices. Out of these demonstrations, a number of operations were converted to more efficient irrigation practices both by farmers and irrigation districts.

A component of the project was the construction of a meter calibration and educational center, named the Texas Center for Ag Water Efficiency, for the demonstration, education and research of agricultural water conservation measures, tools, and technologies. This facility is the only one of its kind in Texas and one of only a handful nationwide. Water managers and employees from across the state used these facilities to educate personnel on the refinement of agricultural water measurement and delivery.

The Center produced multiple developments that have been adopted by irrigation districts, including:

- efficient, low-cost canal gates for controlling water delivery;
- a Supervisory Control and Data Acquisition (SCADA) system for the automation of multiple gates throughout a district's delivery system to maximize the efficient delivery of water to farmers and cities served by the district;
- new telemetry hardware and software to meet the unique needs of monitoring and operation of delivery systems that are common for the surface water irrigation systems of Texas;
- meter calibration for various types of metering devices and demonstration of new devices to determine whether they will withstand the harsh raw water conditions typically faced by water diverters across the state; and
- education and demonstration programs to encourage the use of improved irrigation practices in partnership with Texas A&M AgriLife Extension Service, Texas soil and water conservation districts and the USDA Natural Resource Conservation Service.

Restored funding will enable the maintenance, improvement and expansion of the mechanical and technological components of the facility and expansion of educational and research opportunities. As innovative water conservation technologies continue to evolve, the Rio Grande

Center for Ag Water Efficiency can serve as a hub to demonstrate effective on-farm and district delivery systems and educate agricultural producers, water providers, and project developers on proven water conservation technologies that are available to modernize their operations, with the Harlingen Irrigation District continuing to provide "in-kind" support in the form of labor, materials, and administrative oversite.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, the Texas Legislature fund the Texas Project for Ag Water Efficiency for the education, research and development of agricultural water conservation initiatives at $200,000 per year, through general revenue appropriations deposited and distributed through the TWDB's Agricultural Water Conservation Grants Program, and establish this level of annual funding through baseline general revenue appropriations to the TWDB in future years.

3. Maintain level of funding for TWDB's Agricultural Water Conservation Grant program.

The TWDB's Agricultural Water Conservation Program supports the implementation of the conservation water management strategies identified in the state and regional water plans by funding projects and programs throughout the state. During the 86th Legislative Session, the appropriations act increased authorized dispersals through the Agricultural Water Conservation Grant Program from $600,000 to $1,200,000 per fiscal year.

The grant program offers funding through a competitive process at least once a year to state agencies and political subdivisions for agricultural water conservation programs and projects. Grant topics vary from year to year to address current issues in agricultural water conservation. Projects awarded funding must further water conservation in the state and support the implementation of water conservation management strategies in the state water plan. Specific evaluation criteria are listed in the request for applications.

Previously funded activities include demonstrations of conservation practices, educational outreach, purchase and installation of water use monitoring equipment, and irrigation-efficiency improvements. Funding recipients must report improvements in water use efficiency or water savings. The success of the program is quantified through annual water savings estimates reported by grant and loan recipients for five years after equipment installation and/or construction completion.

The program has collectively saved

- 496,000-acre feet of water reported through 74 grant projects over the past 10 years
- 79,000-acre feet of water reported through 10 loan projects over the past 10 years

Examples of successful projects that implement irrigation conservation strategies include

- irrigation scheduling via the use of real-time soil moisture monitoring, remote system shutoff devices, and other conservation tools in Regions A and O;
- irrigation conservation demonstrations and outreach through the Texas Alliance for Water Conservation project, identified as a strategy in the Region O plan;
- irrigation system improvements such as canal lining, canal-to-pipeline projects, SCADA systems, and automated canal gates in Region E, Region K, and Region M and
- irrigation water use measurement throughout the state

The Council recommends that, subject to available state revenue for the 2022–2023 biennium, the Texas Legislature maintain the current level of $1,200,000 per year for Texas Water Development Board's Agricultural Water Conservation Grant Program, in addition to any funds appropriated specifically for the Texas Alliance for Water Conservation and the Texas Project for Ag Water Efficiency.

Table 4. Agricultural Water Conservation Fund Projected Balance[20]

Fiscal Year	Fund Balance	Investment Projections	Loan Origination	Total Loan Repayments	Grants Payable	Annual Grants	Fund Balance
2020	$7,826,581	$117,399	$2,000,000	$1,284,262	$3,670,885	$1,200,000	$2,357,357
2021	$2,357,357	$35,360	$-	$1,181,117	$-	$1,200,000	$2,373,834
2022	$2,373,834	$35,608	$1,000,000	$1,319,863	$-	$1,200,000	$1,529,305
2023	$1,529,305	$22,940	$-	$1,067,348	$-	$1,200,000	$1,419,592
2024	$1,419,592	$21,294	$1,000,000	$1,211,904	$-	$1,200,000	$452,791
2025	$452,791	$6,792	$-	$973,034	$-	$1,200,000	$232,616
2026	$232,616	$3,489	$-	$833,375	$-	$1,069,481	$-
2027	$-	$-	$-	$305,576	$-	$305,576	$-
2028	$-	$-	$-	$305,472	$-	$305,472	$-
2029	$-	$-	$-	$155,280	$-	$155,280	$-
2030	$-	$-	$-	$152,640	$-	$152,640	$-
2031	$-	$-	$-	$-	$-	$-	$-

[20] Data as of 8/31/2019; Assumptions: offer up to $1,200,000 in annual grants; annual administrative costs associated with the program continue to be covered by general revenue; outstanding balance of $3,670,885 committed through existing grant project encumbrances; assumed demand for the agricultural loan program is $1,000,000 every other year after fiscal year 2020; and, 1.50 percent invest earnings rate.

4. Advance use of data to understand trends in water use.

A wealth of data is available from annual reports and other public sources that could be utilized to enhance understanding of usage trends. Some of the data can be derived from annual reports turned in to TWDB. While the TWDB presents much of the annual data online, monthly volumes of water pumped and purchased are collected from surveyed utilities and other water users. Monthly and seasonal variation is not currently part of the agency's water use analysis. There is more that could be understood with targeted analysis. Other public sources of information such as Energy Information Administration, US Department of Commerce, and the Texas Comptroller may also be used to clarify trends in usage and usage within sectors and provide economic output data for industrial production. This effort provides input necessary for the WCAC to accomplish its charge to *monitor trends in water conservation implementation*. The work will also provide better input data to regional water planning groups as they set long-term projections of water needs and assess potential for conservation as a supply strategy.

The work can be completed by a qualified contractor (consultant or university). The selection process to award the project should include a realistic proposal for analysis that will build on analysis already completed by TWDB or other entities and which will significantly improve understanding of water use patterns and trends.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, $200,000 be appropriated to the TWDB to advance the understanding of water and use trends using available annual reporting data. This includes

- **long term analysis of per capita data;**
- **long term statewide trends in industrial water use efficiency;**
- **seasonal use by both utilities and industrial users; and**
- **the development of analytical methods to determine the effectiveness of utility indoor and outdoor water conservation measures.**

5. Establish Level 1 Validation program for Water Loss Audits.

Level 1 validation of water loss audits is a process by which the data used in a water loss audit is reviewed by a third party working with the submitting utility. Assessment scores are scores given to 20 different data inputs in the water loss audit that indicate how much confidence a utility or governing agency should have in the accuracy of that input. Level 1 validation works to ensure those scores are accurate, bringing in fresh eyes to review the audit.

This accuracy is crucial since water loss audits are used to make funding decisions, both by the State and by utilities. The validation ensures that best practices are being followed per industry guidance, thus increasing the efficacy of spending on reducing water loss and helping to ensure that cost-effective water loss measures are targeted.

The funding for this initiative includes all costs required to have a third party, hired by the TWDB, perform the validations, building on completed water loss audits from the participating utilities.

This program is intended to build upon a study currently underway by the TWDB to perform Level 1 validations on at least six utilities of varying sizes. That study is exploring the framework required to establish a Level 1 validation process in Texas. For the proposed initiative, the TWDB would be encouraged to include a variety of utilities, with consideration given to utility size, type, and whether the utility is rural or urban.

When California implemented Level 1 validation of water loss audits, the percentage of submitted audits that contained unrealistic results, such as negative water losses, fell by over ten percent. Reported data validity scores also dropped by a median number of 13 points. Thus, the data accuracy improved, while overconfidence in the results of those audits decreased.

Level 1 validation would require training on proper validation methodology according to the TWDB validation scoring matrix and would be separate from the training that the TWDB currently requires for submission of water loss audits. The validator cannot be the same person who completes the audit in order to prevent bias and to minimize unintentional omissions. For this recommendation, validation would be conducted by third party contractors. This funding would establish a framework for an ongoing validation effort.

The Council recommends that, subject to available state revenue for the 2022-2023 biennium, the Texas Legislature appropriate $605,000 for the biennium to the TWDB to establish a program building on a water audit validation study being conducted by the TWDB. Under the guidance of the TWDB, Level 1 validations would be conducted of water loss audits submitted by a group of 50 utilities volunteering to participate, establish a methodology for conducting Level 1 validations, and establish a training program to certify validators. Preference for participation would be given to those utilities with a financial obligation to the State requiring that they complete a water loss audit. If more than 50 utilities apply to this program TWDB will work to ensure that a representative group of utilities is selected (ex. geographical, population, urban/rural, financial obligation).

Table 5. Budged outline for Level 1 Validation program.

Task	Cost
Program Announcement/Recruitment	$20,000
Provide on-going management of the program, including the development of a program management plan and associated schedule, marketing and outreach plan, regular team coordination calls for program management and documentation, internal progress tracking, internal task assignments and accountability, program management plan amendments, and course corrections as warranted.	
Development of a recruitment and retention plan, development of all communication materials in support of the recruitment plan.	
Manage water system recruitment and retention for the program.	
Level 1 Validation Process	$175,000
Receipt and review of supporting documentation	
Level 1 Validation session	
Utility-specific documentation	
Compilation and reporting of validation results	$40,000
Validation Certification	$250,000
Texas specific Level 1 Validation certification criteria	
Scheduling and administration of certification workshops	
Certification workshops	
Proctor/examinations/compilation of results	
Participation notification and reporting	
Training of TWDB staff for follow-on certification training	$20,000
Conduct "train the trainer" classes with TWDB staff	
TWDB staffing during validation and certification process	$100,000
On-going administration of the Program including ongoing management for training and technical assistance, subject matter experts, and regular progress reporting.	
Kickoff call to begin the process of Validation Training Program design.	
Host a webinar to prepare attendees for Level 1 Validation Process.	
Provide direct outreach to training participants to ensure they will bring appropriate representation of utility staff to events.	
Total	**$605,000**

References

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Appendix

Appendix A: Statewide ET Network Potential

ET networks are made up of local or regional weather stations to provide information to support irrigation and water management activities. ET is a measurement of the total amount of water needed to grow plants and crops. This term comes from the words *evaporation* (evaporation of water from the soil) and *transpiration* (transpiration of water by plants). Different plants have different water requirements, so they have different ET rates. Calculating ET requires the measurement of solar radiation, wind, relative humidity and temperature with specific sensors, and it is widely used for irrigation water management and crop production. ET network weather stations are equipped to measure data, a system to calculate plant water requirements, and a method to share this information to end users. Currently, access to ET data across the state is uneven, and increasing the availability would have significant water conservation benefits.

There have been a few regional ET networks created across the state including in the Lower Rio Grande Valley and West Texas High Plains areas. Some of the networks were initially funded from Agriculture Water Conservation Grants from TWDB but have since shut down due to lack of long-term funding. The TexasET Network, a project started by Dr. Guy Fipps with the Texas A&M AgriLife Extension Service in 1994, currently has over 50 weather stations located statewide with the sole purpose of calculating local ET-related data. It is self-funded through revenue from short courses, contracts, grants, and local sponsors that cover the costs of the weather stations. Local sponsors not only purchased the station itself, but also provided the location site for the station, performed all maintenance of the station and the site, and covered communication costs.

The TexasET Network displays daily weather and determines ET values, offers interactive, easy-to-use calculators that allow users to determine the irrigation water requirements of crops and landscapes, and provides several other tools for downloading data and setting up automatic email notifications of customized weather data and irrigation recommendations. TexasET data is also being used as a basis to provide weekly irrigation recommendations to residential properties. The first such program in Texas was the "Seasonal Irrigation Program" by the San Antonio Water System. The TexasET Network provides the "backbone" for the "Water My Yard" program (http://WaterMyYard.org) that is used by many cities and water districts. Extensive urban ET weather station networks have been established in the Dallas/Ft. Worth, Austin, and greater Houston areas.

Recently, there has been an expansion of the TexMesoNet network, developed and managed by TWDB, and it is important to note its difference from an ET network. A mesonet is a network of weather stations spaced close enough to each other to observe and track meso-scale weather events, such as individual super-cell thunderstorms. Mesonet systems typically collect data on atmospheric conditions, solar energy, soil moisture, and soil temperature. This data is used for weather forecasting, alternative energy development, agriculture, and for fire, flood, and freeze warnings. The primary goal of the TexMesoNet is to provide high quality data to support flood monitoring and flood forecasting efforts. Both networks are useful but have different goals and associated equipment.

Water Conservation Advisory Council