# Progress Made in Water Conservation in Texas

*Report and Recommendations to the 88th Texas Legislature*

**Submitted by the**

**Water Conservation Advisory Council**

**www.savetexaswater.org**

**Karen Guz, Presiding Officer**

**December 1, 2022**

Water Conservation Advisory Council

December 1, 2022

The Honorable Greg Abbott
Governor of Texas

The Honorable Dan Patrick
Lieutenant Governor of Texas

The Honorable Dade Phelan
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 eighth biennial report on progress made in water conservation in Texas.

The Council serves as a professional forum for the development of water conservation resources, expertise and progress evaluation for the benefit of Texas. The 23 members of the Council, their designated alternates and interested stakeholders have voluntarily dedicated countless time and effort to council charges described in this report.

As part of our charge to recognize usage trends impacting the state water plan, we noted how high temperatures and extended dry periods impact consumption patterns. Water use over the past five years have revealed a need to emphasize conservation during dry periods. To realize the full benefit of water conservation and reduce the need for new supplies, we must be able to moderate usage even when it is hot and dry. The report contains suggestions on future work needed in this area.

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 Water, Agriculture, and Rural Affairs

The Honorable Tracy O. King
Chairman, House Natural Resources Committee

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# Executive Summary

In 2007, the 80th Texas Legislature created the Water Conservation Advisory Council (Council) to provide a resource of a select group of professionals with expertise in water conservation and operate 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 Council 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 eighth report to state leadership summarizes the Council's recent activities in relation to their seven statutory charges. The Council has put forward four 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.

## 1. *Continue funding for Agricultural Water Conservation Grant and Loan programs*

The Council recommends that the Texas Legislature replenish funding in Agricultural Water Conservation Fund sufficient to support the Texas Water Development Board (TWDB) Agricultural Water Conservation Grant and Loan programs for the next ten years, including continued grant funding at or above the current level of $1.2 million per year. The Council further supports an expansion of this program through an increase in funding and additional TWDB staff to support program expansion.

## 2. *Incorporate a statewide evapotranspiration network into the TexMesonet Program*

The Council recommends that the Texas Legislature provide the TWDB with authority and financial resources sufficient to incorporate a statewide evapotranspiration network into the mission of the existing TWDB's TexMesonet Program, subject to available state revenue for the 2024-2025 biennium. Key aspects of this program expansion should include

- grant the TWDB the statutory authority as the lead agency to ensure the longevity and reliability of the statewide TexMesonet earth observation network;
- grant the TWDB the statutory authority to incorporate reference evapotranspiration in its mission to further develop and expand the TexMesonet;
- grant the TWDB the statutory authority to collaborate and contract with local, state and/or federal agencies and other entities, at the TWDB's discretion, to provide technical assistance, and to develop and disseminate products to maximize the impact of the TexMesonet and a statewide evapotranspiration network for the people of Texas; and
- increase appropriations by $900,000 for the biennium to the TWDB to provide sufficient funding for additional staff, resources, and grants for partnerships to develop and support a statewide evapotranspiration network within the TexMesonet.

## 3. *Creation of a statewide water conservation awareness campaign*

The Council recommends that, subject to available state revenue for the 2024-2025 biennium, the Texas Legislature appropriate up to $3 million per year to the TWDB to implement or contract with another entity for the statewide water conservation public awareness program that was created by the 80th Texas Legislature in 2007 with the passage of Senate Bill 3 and House Bill 4.

## 4. *Allow the Water Conservation Advisory Council to meet virtually*

The Council recommends that the Texas Legislature add Texas Water Code Section 10.007(c) to clarify that the Council may hold an open or closed meeting by videoconference call in accordance with Texas Government Code Section 551.127(c).

# Introduction

In 2007, the 80th Texas Legislature with passage of Senate Bill 3 and House Bill 3 created the Council to provide a resource of a select group of professionals with expertise in water conservation and operate 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 Council is composed of 23 members appointed by the TWDB to represent each of the specified entities or interest groups. Each entity or interest group may recommend one or more persons to fill the position on the Council. If one or more persons are recommended for a position, the TWDB shall appoint one of the persons recommended to fill the position.

The Council was given seven charges relating to the development and the evaluation of progress regarding water conservation efforts in Texas:

1. Monitor trends in water conservation implementation
2. Monitor new technologies for possible inclusion by the TWDB as best management practices (BMPs) 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 TWDB and Texas Commission on Environmental Quality

The Council shall submit a report that includes (1) progress made in water conservation in Texas; and (2) 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. The report is due to the governor, lieutenant governor, and House speaker no later than December 1st of each even-numbered year. This report is the eighth report in series to address each charge and marks the completion of 16 years of advancing conservation in Texas.

# Charge 1. Monitor trends in water conservation implementation

The Council has 23 members, appointed by TWDB, who represent major water use sectors and stakeholders in our state. The members representing agricultural, commercial and intuitional, manufacturing and electric power generation, municipal, and wholesale water conservation have summarized findings and progress in their respective areas.

## *Agricultural water conservation*

Agricultural irrigation conservation represents the state's best opportunity to achieve significant water use savings because it uses the largest volume of water in Texas. Irrigation of crops accounted for an estimated 53 percent of all water use in the state in 2020 (TWDB, 2021). The 2022 State Water Plan includes data suggesting that agricultural irrigation demand will decrease to only 39 percent of demand by 2070 due to improved efficiencies (TWDB, 2021).

Agricultural producers in Texas have achieved dramatic improvements in water use efficiency over the past several decades. This progress can be attributed to advances in plant genetics to produce higher yields with less water, adoption of conservation tillage practices and improvements in the efficiency of irrigation technology.

### Adoption of efficient advanced irrigation technologies

High efficiency, low pressure pressurized systems, including low pressure center pivot irrigation (low energy precision application, low elevation spray application; and mid-elevation spray application) and micro-irrigation (subsurface drip irrigation; surface drip irrigation and micro-spray irrigation) are widely practiced in Texas, particularly in the Texas High Plains. Center pivot low energy precision application irrigation is by far the widely practiced method in this region. Low pressure center pivots are used on over 75 percent of the irrigated area in the region. Subsurface drip irrigation, which can achieve 97 percent water use efficiency, has been installed on more than 500,000 acres with the majority on cotton fields in the South Plains. Well over 90 percent of the subsurface drip irrigation adoption has occurred since the year 2000. Adoption of efficient irrigation technologies is attributable to several factors, including economic justification for efficient use of regionally limited and declining water resources (need for high rate of return for irrigation inputs); commercially available equipment and technical support (local irrigation designers, dealers, installers); locally relevant applied research and extension programs (United States Department of Agriculture -Agricultural Research Service and Texas A&M AgriLife Research and Extension Service); "critical mass" of agricultural producers successfully adopting the technologies; and effective collaboration among these programs.

### Soil water monitoring

Commercially available sensors, especially soil water sensors, are aggressively marketed to irrigators, and they are promoted through cost-share programs, including the United States Department of Agricultural-Natural Resources Conservation Service Environmental Quality Incentives Program. Adoption of these tools has increased, but use of the data for irrigation in practice remains relatively low. It is estimated that fewer than 10 percent of producers were using these tools for irrigation scheduling as of 2018 (Taghvaeian and others, 2020). Applied research programs are evaluating and comparing commercially available sensors for accuracy, ease of use, and reliability.

### Evapotranspiration weather station networks and weather data-based irrigation scheduling

From before 2001 to 2015, the Texas High Plains Evapotranspiration (TXHPET) Network provided data free of charge to support weather-based irrigation scheduling, primarily for agricultural irrigation management throughout the region. The TXHPET Network was estimated to have saved producers $22 million dollars annually, primarily in reduced pumping energy costs. The data also supported regional and state water planning activities, research programs, and other applications. The Texas Evapotranspiration Network (TexasET.tamu.edu) and WaterMyYard.org Program provide data support for primarily urban turf and landscape irrigation management, with over 21,600 participants with an estimated total water savings of 1,770 billion gallons per year, which equates to a water cost savings of $6.4 million[1].

Continuing the progress in agricultural water conservation will require an ongoing commitment to publicly funded research to develop and evaluate new technology and plant genetics as well as funding for education and demonstration projects that promote adoption of BMPs.

## *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:

- Institutional 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
- 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. Many now include multi-family as a commercial operation

[1] cdn-ext.agnet.tamu.edu/wp-content/uploads/2020/12/Water-My-Yard-Program_2020.pdf

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 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 United States Department of Energy. The two systems can be cross-referenced so that data sets can be combined for analysis.

Research on this sector is also beginning to focus on developing water efficiency metrics. This has not yet been accomplished because of the diversity inherent in 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 to ensure that the metrics selected fairly and accurately provide a water efficiency metric.

The Commercial and Institutional Workgroup plans to work on five projects during the next year:

1. Train certified water efficiency auditors - The energy sector has training for and certification for commercial and intuitional facilities. No such programs currently exist for commercial and institutional water efficiency audits. Water efficiency audit training material has been developed and courses are being taught in other States. Texas needs to implement such a program. There are several consulting firms in Texas capable of such audits, but this needs to be made into a professional status service.
2. 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. Current efforts in Texas and many across the nation is underway to use either North American Industrial Classification System or the United States Environment Protection Agency EnergyStar Portfolio Manager facility coding system.
3. Enhance understanding of water use categories patterns - Recruit utilities to share anonymized usage data that has already been coded by one of the accepted user categories. This will enhance understanding of commercial usage needs and trends.

4. Develop efficiency metrics and benchmarks 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.
5. Gather information from audits to help utility water conservation coordinator understand how water is being used - This would require funding current auditor firms to provide information by facility type of where and what percent of water is used in their various operations.

## *Manufacturing and electric power generation water conservation*

Texas ranks first in the nation in electric power production[2] and second for manufacturing output.[3] 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[4]. Because the sustainability of the Texas manufacturing sector is so highly dependent on water, manufacturers closely track and manage their water usage, file water conservation plans if required by the Texas Commission on Environmental Quality, 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.

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 BMPs 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

[2] Information can be found at the United States Energy Information Administration: www.eia.gov/state/

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

[4] Information can be found at the United States Energy Information Administration: www.eia.gov/electricity/annual/

successes and water metrics through case studies posted to the Council's online resource library to potentially accelerate efficiency gains.

## *Municipal water conservation*

Municipal conservation annual reports demonstrate increased investment in conservation across Texas. There was a 13 percent growth over this period in the number of utilities reporting on conservation plans, an increase in the number of conservation best practices implemented by reporting utilities, and an increase in the number of utilities providing conservation education to their customers (Table 1).

**Table 1. Water conservation annual report activities (based on annual reports reviewed for quality assurance)**

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| **Meters replaced*** | 259,175 | 230,911 | 230,128 | 298,092 | 392,234 |
| **Utilities with automated meter reading** | 193 | 225 | 212 | 220 | 259 |
| **Leaks repaired** | 83,684 | 72,937 | 100,217 | 64,850 | 90,948 |
| **Utilities implementing an education program** | 305 | 287 | 297 | 280 | 314 |
| **Best management practices implemented** | 304 | 324 | 285 | 294 | 326 |

Note: *1 ½ inches or smaller

While conservation investment is up, the Gallons per Capita per Day (GPCD) trends of the past five years present a confusing pattern (Table 2). In some years total and residential per capita declines and in other years it goes up. The most likely cause of the GPCD fluctuation is unpredictable and changeable Texas weather. While it is challenging to characterize weather across our large state, the comparison of GPCD in 2020 and 2021 helps illustrate the impact of weather on water usage patterns. During 2020, the weather became increasingly hot and dry across Texas until by November the United States Drought Monitor estimated that 97 percent of Texas was either in drought or abnormally dry. The hot and dry summer conditions across Texas resulted in a spike up in 2020 total GPCD and in residential GPCD. Dry conditions lingered into the start of 2021, but during summer, weather shifted to comparatively cooler and wetter conditions. By October of 2021 only 19 percent of the state was in some level of drought. As a result of the milder weather, 2021 total GPCD and residential GPCD dropped significantly. The weather-induced increase in average and median reported total GPCD in 2020 underscores the need to deploy water conservation strategies that help mitigate usage during hot, dry periods.

**Table 2. Water conservation annual report data (based on annual reports reviewed for quality assurance)**

| | 5-year goal* average/ median | 2017 average/ median | 2018 average/ median | 2019 average/ median | 2020 average/ median | 2021 average/ median |
|---|---|---|---|---|---|---|
| **Total GPCD** | 127/120 | 126/118 | 133/123 | 132/122 | 137/126 | 130/116 |
| **Residential GPCD** | 75/69 | 70/65 | 75/69 | 75/69 | 78/72 | 72/66 |
| **Water Loss GPCD** | 18/14 | 21/17 | 24/17 | 21/17 | 22/18 | 20/15 |
| **Commercial, Institutional, & Other GPCD** | NA | 35/36 | 34/37 | 36/36 | 37/36 | 38/35 |
| **Percent water reused** | NA | 5 | 6 | 5 | 5 | 6 |
| **Number of water conservation plans or annual reports submitted** | 379 | 444 | 501 | 526 | 506 | 510 |

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

While it is expected that heat and lack of rain will result in higher discretionary water usage in municipal areas, the extent of the dry year increases will determine the level of need for future water supplies. 2022 has brought record-breaking summer heat and a severe lack of rain to many areas of Texas. Discussions with Texas utilities reveal that the resulting increase in customer demand has been dramatic in many places. The drought of 2011 brought similar significant increases in per capita consumption across Texas. Because regional water plans focus on needs during dry years, this pattern of increased use during drought years will drive the need for more water supply projects.

Texas will get the greatest benefit from conservation efforts when they are effective in dry years as well as during normal and wet years. There is a growing recognition among conservation practitioners that an effective drought plan depends on preparations made through the conservation plan. Customers with resilient landscapes, efficient irrigation and efficient habits are better positioned to use reasonable amounts of water when Texas weather heats up.

Fortunately, there are Municipal Conservation BMP available that help mitigate high dry year demand. These BMPs include:

- *Water Conservation Pricing,*
- *Residential Landscape Irrigation Evaluation,*
- *Outdoor Watering Schedule,*
- *Water Wise landscape Design and Conversion Program,*

- *Prohibition of Wasting Water, and*
- *Enforcement of Irrigation Standards*.

The Municipal Work Group of the Council will focus on several projects during the next two years that will provide more tools to utilities that are looking to moderate outdoor use in dry periods. These projects will include

- landscape transformation case studies,
- updating the BMP on water wise landscaping,
- creation of a BMP on customer engagement best practices to be prepared for drought,
- creation of BMP using advanced meter infrastructure investments to achieve conservation results,
- creation of a BMP connecting a conservation plan to a drought plan, and
- analysis of seasonal and weather-influenced increases in per capita demand.

## Water loss

Water loss from potable water systems is a complex topic. In an ideal world every drop of water produced by water utilities would make it to a customer meter, be accounted for by the meter and used appropriately. In reality, water systems are complex infrastructure not capable of this perfection. Even newly built water systems will experience some water loss. Water loss can be categorized into two categories, real loss and apparent loss. Real losses are physical water losses (leakage) from the water distribution system which can range from small yet constant leaks throughout a water distribution system to the losses from catastrophic main breaks. The principal consequences of real losses are water resource depletion and excessive water pumping and treatment costs. Apparent losses represent non-physical losses — water which is actually consumed, but not properly tabulated or billed. These losses are the result of meter inaccuracies, billing system errors and water theft (unauthorized consumption). The principal consequence of apparent losses is lost revenue for the utility. Finally, some water is used but not billed because it is used for necessary line flushing, fire line maintenance or firefighting. Water loss audits account for all unbilled water by allocating it to real losses from the system, apparent losses from measurement errors, or authorized use necessary for operations or safety.

Texas has several requirements related to water loss tracking and reporting:

- Texas requires all utilities submit a water loss audit at minimum every five years through statute
- Utilities with loans for water infrastructure or having more than 3,300 connections must conduct water loss audits annually
- Utilities that make an application to TWDB for loans that have water loss that exceed thresholds defined by TWDB rule making must use some funds to reduce water losses

- The requirement that the person completing the water loss audit must be trained was passed by the 85th Texas Legislature in 2017 (House Bill 1573)

While the TWDB Water Loss Audit Program has been continually improving, it's clear that Texas utilities can save more water by reducing water losses. The reported per capita water loss levels have not substantially changed over the past five years (Table 2). The Council's Water Loss Committee has collaborated with TWDB staff on two issues that have resulted in substantial recent progress.

### Water loss thresholds associated with the TWDB financial applications

The water loss thresholds at which water utilities must include water loss improvements in their planned water supply project is being reviewed. The TWDB approved initial water loss thresholds in 2014 after the 83rd Texas Legislature passed HB 3605 that established the program. Those thresholds were based on statewide data from 2010 water loss audits. Setting water loss thresholds requires identifying the appropriate water loss metric and determining the threshold for action. Since those initial thresholds were approved, new performance indicators for water loss have evolved. As a result, TWDB staff reexamined the existing thresholds using quality-controlled data from the 2015 to 2020 water loss audits and by using new industry performance indicators developed by the American Water Works Association's Water Loss Control Committee, water industry leaders in water loss. At the time of this report, TWDB staff has discussed revising water loss thresholds and methodology with the Water Loss Workgroup and has initiated discussion with the full Council.

### Water loss audit validation

A water loss audit validation is a process endorsed by the water industry consisting of the third-party review of a utility's water loss audit. This process provides an additional level of review and confidence in the audit results. Water loss audit validation goals include

- identify and appropriately correct for inaccuracies in water audit data;
- evaluate and communicate the uncertainty inherent in water audit data; and
- help ensure that water audit data validity grades reliably represent the operations and practices of the water utility during the audit year;

Water loss audit validation is currently used by several states across the country and is gaining increased interest within the water industry. Recently, the TWDB funded a pilot water loss audit validation study that included ten Texas utilities. The study found that utilities had a clearer picture of the operational aspects of data collection for their water loss audits after validation, and all participating utilities had some change in their data. Studies in other states have found that the validation process provides utilities and financial assistance program providers, such as

the TWDB, insight into how to better direct funds toward water loss mitigation projects. Recently the TWDB approved funds through the Fiscal Year 2023 Intended Use Plan to use state drinking water allocations to provide additional resources to expand the water loss program. At the time of this report, the TWDB is considering requiring validation of water loss audits for certain water utilities.

## *Wholesale water conservation*

Wholesale water suppliers submit water conservation plan updates every five years and implementation reports every year. Table 3 provides a summary of 43 wholesale supplier's water conservation activity in 2021 as reported to TWDB.

**Table 3. Wholesale water supplier water conservation annual report data for 2021**

| Population served | System input* (million gallons) | Water conserved (million gallons) | Water recycled (million gallons) | Water savings (dollars) | Education and public awareness programs | Leak detection and water loss programs |
|---|---|---|---|---|---|---|
| 11,734,179 | 624,601 | 22,945 | 16,632 | 53,487,108 | 30 | 18 |

Note: *System input = volume of water produced plus volume of water purchased

Wholesale water suppliers continue to make gains in water conservation and strive to do more. Per the Texas Administrative Code, wholesale suppliers require their customers, and any subsequent customers, to have a water conservation plan. Additionally, some are requiring their customers to incorporate their own conservation requirements into those plans with new contracts or renewals and some provide technical assistance or a draft plan for easy adoption.

Actions wholesale water suppliers have taken to increase their own water conservation, water loss actions, and reuse supply options include

- improved system monitoring with alerts from changes in delivery rates and water pressure to help locate and repair leaks faster;
- regular inspection, maintenance, and repair programs of pipelines and pump stations to reduce water loss from leaks;
- adoption of a conservation rate structure with a demand charge to cover infrastructure costs and a volume charge for actual water use;
- regional wholesale suppliers working together on shared projects to save money and increase reach. Examples include outreach campaigns and conservation symposiums for customer city staff; and
- evaluating new water reuse supply opportunities. Examples include exploring unpermitted return flows with other regional water suppliers, studying reuse opportunities within wholesale customer areas, building additional wetland systems,

exploring off-channel storage of reuse water, advancing aquifer storage and recovery system projects, developing a "One Water Master Plan" to include a reuse strategy, expanding existing reuse system to add capacity, developing a non-potable reuse system to a central business district, and construction of direct potable treatment plant to help meet future demand;

Suppliers have developed conservation programs and resources for their wholesale customers and examples include

- dedicated staff to provide technical assistance and resources to advance conservation efforts in their community;
- institutional, commercial, and industrial water use sector analysis programs;
- public outreach and awareness campaigns, educational content and resources for social media, webpages, and newsletters;
- financial reimbursements for distribution system upgrades to reduce water loss
- assist with water loss audits for its customer municipal utility districts;
- development of youth education programs and performances at schools, community centers, libraries, and events; and
- provide large quantity of promotional giveaways, and brochures for distribution in their community;

Some wholesale suppliers have developed incentive and education programs for direct consumers served by the wholesale customer and examples include free or cost-share residential sprinkler system check-ups, effective weekly watering recommendation services, and conservation classes, workshops, and public presentations in-person and virtual.

Challenges to advance wholesale supplier conservation efforts vary across the state and many continue to document the challenges:

- Difficult to connect importance of conservation and program opportunities directly with consumers
- Lack of budget, interest and staff, especially limited resources of small systems, to support proactive conservation programs
- Limited work experience, knowledge, and difficulty replacing workforce within wholesale supplier and wholesale customer
- Budget and time impact to update upcoming 5-year water conservation plan requirement
- Uncertainty of effectiveness and documenting savings from conservation programs
- Limited ability of wholesale supplier to influence enforcement of watering restrictions by wholesale customer

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

The Council has chosen to highlight two technologies with the potential to enhance conservation outcomes in the future: a statewide Evapotranspiration (ET) network and customer engagement associated with Advanced Meter Infrastructure (AMI).

## *Statewide evapotranspiration network potential*

In the Council's report to the 87th Texas Legislature in December 2020, it stated, "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." It also specified, "…access to ET data across the state is uneven and increasing the availability would have significant water conservation benefits." Since the previous report, the Council has reviewed additional research, held many workgroup meetings, and conducted a survey to provide a legislative recommendation found towards the end of this report. The following is additional information describing the importance and benefits of advancing a reliable ET network across the state.

ET is a measurement of the total amount of water needed to grow plants and crops. This term comes from the word's 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.

ET is widely used in both the agricultural and municipal sectors. Agricultural irrigation is currently the largest water use sector at an estimated 9.4 million acre-feet (2020), with a projected decrease of 19 percent by 2070. One reason of declining agricultural irrigation demand is the expected improvement of more efficient irrigation systems. Those improvements will occur through improved technology and data, including ET data. ET is also used by municipal water providers to help encourage more efficient outdoor landscape watering. This includes programs such as the Water My Yard Program, discussed below. Municipal water use is the second largest using 31 percent of total water in Texas with an estimated 4.42 million acre-feet. Municipal water demand is expected to steadily increase and surpass agricultural irrigation as the largest water use sector by 2060. Outdoor landscape watering can account for over 30 percent of total municipal water use, with some areas of the state reaching over 60 percent.

## *Evapotranspiration networks in Texas*

ET networks are made up of local or regional weather stations to provide information to support irrigation and water management activities. 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. Historically, there have been regional ET networks created across the state, with some of the networks initially funded from Agriculture Water Conservation Grants from the TWDB but have since shut down due to lack of long-term funding. The TexasET Network was started by Dr. Guy Fipps with the Texas A&M AgriLife Extension Service in 1994 and is the only remaining ET network in the state. It currently includes over 80 weather stations located across Texas. The TexasET Network is self-funded through training courses and contracts. It also relies on local sponsors, typically water providers and municipalities, to purchase, locate, and operate the stations.

One use of TexasET Network data is to provide weekly irrigation recommendations to homeowners with yards and landscapes. The TexasET Network provides the "backbone" for the Water My Yard Program (WaterMyYard.org) that is used by many cities and water/groundwater districts throughout the state. With over 44,000 individual users of the program, it is estimated to save close to two billion gallons of water per year with a water cost savings of close to $6.5 million. Additionally, other public services throughout the state rely on TexasET Network data to provide weekly irrigation recommendations. They include San Antonio Water System, Woodlands Water Agency, and the Water is Awesome Weekly Watering Advice in North Texas.

As successful as the TexasET Network is, there is still uncertainty with the longevity and feasibility of the program continuing without a long-term, reliable support system. Additionally, access to ET data across the state remains limited. A dedicated, dependable method to properly operate, maintain, and secure a statewide ET network is important to advancing agriculture, municipal, and wholesale water related BMPs.

## *Support for evapotranspiration data*

There is widespread agreement on the value of ET data for Texas among water providers, water users, regional water planning groups, and other state entities. The Texas Groundwater Protection Committee recommendations to the 88th Legislature include establishing a statewide ET network and providing funding for its operation and maintenance. The Texas Groundwater Protection Committee is made up of 10 statewide agencies and organizations and water conservation of groundwater sources, particularly from agricultural irrigation, is one area of shared interest with the Council. The Groundwater Issues Subcommittee has also prepared a white paper titled, "ET Networks and the Protection of Groundwater Supplies and Quality."

Regional water planning groups have similarly identified the importance of ET data in their 2021 regional water plans:

- The *2021 Panhandle Water Plan* states, "Irrigation scheduling based on crop evapotranspiration reported by ET networks in the region is also an important weather-based irrigation scheduling method since this data references the climatic demand, which varies annually and can vary substantially within the season." Furthermore, Region A water planning analysis previously indicated that use of ET based irrigation scheduling is one of the most cost-effective water conservation strategies identified.
- The *Region B Regional Water Plan* and the *2021 Region F Water Plan* include, "For irrigated agriculture, the primary strategies identified to address irrigation shortages are demand reduction strategies (conservation)… In addition to these practices, the region encourages… implementation of a region-wide evapotranspiration and soil moisture monitoring network to aid farmers in irrigation scheduling… without technical and financial assistance it is unlikely that aggressive irrigation conservation programs will be implemented."
- The *2021 Region C Water Plan* includes "evapotranspiration irrigation recommendations" as an existing water conservation measure.
- The *2021 Brazos G Regional Water Plan* provides an example drought plan with, under certain circumstances, a measure to, "Limit water use to activities necessary to maintain public health, safety and welfare and any computer-controlled irrigation systems that incorporate evapotranspiration data in setting irrigation run times."

Studies[5] have also recognized the value of ET networks, the potential of having a statewide network, and the recommendation to have the TWDB become a consistent manager and provider of ET information. These studies have documented the economic benefit irrigation scheduling has provided to agricultural areas within Texas and other states with ET networks. One state showed $43 million per year could be saved by using ET network data for crop management, pesticide application, and drought mitigation. Another state reported a benefit to cost ratio of $1 invested to $55 in savings and increased productivity along with a 13 percent drop in agriculture water use with an 8 percent increase of crop yield. Additionally, a study showed that the previous Texas High Plains ET Network, once located in the panhandle, saved irrigated producers an estimated $22 million annually from energy savings related to pumping.

[5] Assessment of Texas Evapotranspiration (ET) Networks Final Report:
www.twdb.texas.gov/publications/reports/contracted_reports/doc/0903580904_evapotranspiration.pdf
Feasibility Study for Development of Statewide Evapotranspiration Network Final Report:
www.twdb.texas.gov/publications/reports/contracted_reports/doc/1613581995.pdf
Extension Portal for Higher Integration Networking for Coordination of Training, Information and Research:
www.twdb.texas.gov/publications/reports/contracted_reports/doc/1213581481_extensionportal.pdf

## *Advanced metering infrastructure Technology*

During the past five years there has been a 34 percent increase in the number of water utilities reporting that they have implemented automated meter reading (Table 4). Many additional water utilities have implemented Advanced Metering Infrastructure (AMI). This is an exciting acceleration in the adoption of this technology. However, it is important to note that it is likely that many of the early adopting utilities are not yet using this data to help customers use less water. A recent AMI study completed by the American Water Works Association found that only 40 percent of AMI capable water utilities across the United States are presenting the data to customers through a portal. This finding is less surprising if it is taken into account that many of the early adopters of AMI were smaller and mid-sized utilities with resource limitations.

**Table 4. Utilities with automated meter reading systems**

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| **Utilities with automated meter reading** | 193 | 225 | 212 | 220 | 259 |

The study on conservation impacts from AMI highlighted key strategies to help water utilities maximize the savings potential from an AMI investment. Some of the findings included

- plan to invest in a user-friendly customer portal and in customer engagement around AMI. There is no water savings without this additional investment of a portal;
- ensure that your contract with AMI vendors keeps the utility as an owner of the data. Some vendors will make it challenging to obtain the data and may charge for use of it without this provision;
- tie the AMI portal to any online tools frequently visited by customers. Online payment location is one of the key places to place AMI related information;
- use customer interactions around billing, drought, or other concerns to drive customer engagement with AMI portals. AMI portals can exist with very little customer engagement (as little as two percent) or with extremely high engagement (90%) depending on how utilities work to engage customers with the information; and
- savings from portals depends on customers signing up for options such as continuous flow alerts, high usage alerts, and on having analytic tools to determine which customers may be irrigating excessively;

During the next two years, the Municipal Work Group will be working with experts from American Water Works Association and the Alliance for Water Efficiency to develop a new conservation best practice guide pertaining to maximizing savings from AMI and to explore how AMI early adopters can use low-interest loans to upgrade their customer portal software and engagement tools.

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

Water conservation continues to be the most cost-effective water supply to meet the state's growing needs. Water conservation success can be measured at the individual household level, at the utility or regional level, or in the statewide budget of our State Water Plan. With over 29 percent of our future water supply identified as needing to come from conservation, it is imperative that Texans at the local, regional, and statewide levels are committed to water conservation.

Water awareness campaigns are an effective pathway to making that connection. Several successful water conservation campaigns exist in Texas at a local or utility level. San Antonio Water System, El Paso Water, and the North Texas Municipal Water District are examples of campaigns that have been effective in connecting public awareness and their community's commitment to a water secure future. At the statewide level, the TWDB provides important educational resources on the source of your water and water use. A statewide water conservation awareness campaign, however, as envisioned by the passage of Senate Bill 3 and House Bill 4 in 2007 (80th Texas Legislature) has not yet been funded or implemented.

In order to test the efficacy of a campaign, Texas Water Foundation has advanced a statewide water campaign concept for two years. Through philanthropic funding, three pilot markets were established to test how statewide message and local water priorities could be combined. Statewide polling conducted in January 2020 confirmed that a statewide campaign is successful when it combines a sense of local pride with action, and that respondents are more likely to react to messages that impact them on an individual, or local basis. Texas Water Foundation's initiative is continuing to build in new parts of the state and offers a case study for what a successful statewide campaign could be.

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

The Council regularly develops and updates BMPs for municipal and wholesale providers and for agricultural, commercial, and industrial users. These BMPs, 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. In addition to those BMPs, the Council has considered the development of a resource library through www.savetexaswater.org that could include additional resource documents and case studies on water conservation and efficiency.

While the Council continues to believe a centralized resource library could be helpful, it also recognizes that the administrative burden of updating and maintain an online repository may extend beyond what is practically feasible. Further, it recognizes that several important resources exist behind paywalls, and may make public availability challenging. A statewide dialogue on the creation of a centralized repository for water data continues to be underway, and several similar efforts have been attempted in the past few years. Rather than duplicate efforts, the Council may consider collaborating in this effort in the future.

In the meantime, recognition by the Texas Legislature of BMPs on the Save Texas Water website (www.savetexaswater.org) would help water providers and users know where to learn more about efficient practices for long-term water supply.

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

In 2010, the Council established the Blue Legacy Awards to recognize those exemplifying outstanding water conservation efforts in the agricultural, manufacturing, and municipal sectors. While the awards have historically been presented at the biennial Texas Water Day at the Capitol event, the 2021 awards were presented as part of the Texas Water conference, in partnership with the Texas Section of the American Water Works Association.

Solicitation of applications for the award is labor intensive for the volunteer-based members of the Council. Leadership changes have impacted how that process has occurred in years past and may require the Council to reexamine how it continues to exist moving forward.

As of November 2022, 54 awards have been bestowed on individuals, companies, and other entities for their commitment to preserving our most precious resource. Through efforts in updating system water efficiency, public awareness and education, and demonstration projects the Blue Legacy Award not only serves to recognize those committed to water conservation, but as a reminder that conserving water is an investment that benefits all Texans (Figure 2).

**Figure 1.** **Three of the six awardees for the 2021 Blue Legacy Awards. Left to right: Amarillo Water Management Team (Agriculture – Innovative Projects); Brushy Creek MUD (Municipal – Population: 10,000 – 50,000); North Plains GCD (Agriculture – Non-Producer)**

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

The Texas Legislature requires regional water planning groups to consider water conservation practices to meet each water user group's identified water needs and document recommendations in a subchapter of each regional water plan.[6] Although water user groups are not required to act upon regional water planning group recommendations, evaluating whether the recommended water conservation strategies in regional water plans are being implemented is critical since the 2022 State Water Plan estimates that 25 percent of future municipal water supply needs in Texas by 2070 are to be met through conservation.[7]

Since 2012, the TWDB, as directed by the Texas 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,[8] 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.

The 2022 State Water Plan includes a new chapter (Chapter 8 - Conservation) similar to Chapter 5 of each regional water plan submitted in 2021. This new chapter aggregates and highlights statewide water conservation information. The following paragraphs highlight some of the observations made in Chapter 8.

## *Progress on legislative-directed TWDB initiatives for conservation*

According to the 2022 State Water Plan, the TWDB undertook the following legislative-directed initiatives during the planning cycle:

- Developing a statewide conservation quantification project
- Creating a municipal water conservation planning tool
- Conducting a water loss validation study
- Continuing to provide funds to support agricultural water conservation programs

[6] 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.
[7] 2022 State Water Plan, available online at www.twdb.texas.gov/waterplanning/swp/2022.
[8] Title 31, Part 10 of the Texas Administrative Code, Rule 357.45: Implementation and Comparison to Previous Regional Water Plan

- Implementing training for those conducting water loss audits

Patterns in Setting Required Per Capita Targets. A new statutory requirement (HB 807 enacted by the 86th Texas Legislature) became effective in June 2019 requiring each regional water planning group to "set one or more specific goals for gallons of water use per capita per day (GPCD) in each decade of the period covered by the [regional] plan for the municipal water user groups in the regional water planning area…".

As a result, the 2022 State Water Plan is the first plan to contain this information. Every 2021 regional water plan includes these GPCD goals, and the subsequent round of regional water planning will measure progress on municipal water conservation by comparing actual GPCD numbers to the GPCD goals set for the municipal water user groups. A few observations regarding these goals:

- GPCD goals are not necessarily the same as goals set by utilities as part of their water conservation plans, which are often based on multi-year averages
- Some of the regional water planning groups set per capita goals specifically intended as goals for dry-year use, which is consistent with the underlying benchmark of the water planning process. This is a logical process to consider in the context of considering new supply projects, but if there is no effort to mitigate the dry-year usage, the practice of defaulting to the most recent dry-year GPCD is problematic.
- About half of the planning groups used a GPCD goal of 140 for municipal water users which they derived from the 2004 Water Conservation Task Force. This is an unfortunate pattern given that the statewide average total per capita being reported through Municipal Conservation Reports is under 140.

## *Conservation represents a significant source of future water*

Municipal water conservation strategies plus water efficiency standards in place during the State Water Plan's development (such as showerheads, toilets, clothes washers, and dishwashers) are estimated to reduce the municipal water demand by 517,000 acre-feet in 2020 and 1,866,000 acre-feet in 2070. A few observations from the 2022 State Water Plan related to municipal water conservation strategies:

- Many water utilities do not describe their conservation activities in water conservation plans in terms of formalized BMPs
- All utilities' water conservation plans included a minimum of three BMPs including metering all new and existing connections, controlling system loss, and providing public education
- Municipal water conservation is a recommended in all regional water plans and is associated with over 1,200 water user groups statewide

- BMPs for outdoor landscape watering were included for municipal water conservation strategies in 13 of the16 regional water plans
- For municipal water users with identified needs, 26 percent of the 2020 needs and 25 percent of the 2070 needs are addressed by recommended water conservation strategies alone
- Eight planning groups determined thresholds for recommending water loss audits and leak repair strategies in their plans for entities with significant water loss, and three planning groups established targets for voluntary action
- Each 2021 regional water plan includes a region-specific model water conservation plan to be used as a resource by water users

Assessing which municipal water conservation strategies are being implemented in the region is helpful to evaluate their effectiveness so other water user groups can learn from the successes of others and potentially use a similar strategy as one of their conservation tools.

## *Agricultural and industrial conservation in regional plans*

Agricultural conservation is important because irrigation for agriculture production is the largest water demand sector in the state estimated to account for 40 percent of the 2070 annual statewide water use. A few observations from the state water plan related to agriculture water conservation strategies:

- Agriculture conservation includes water usage for livestock and crops, but livestock demand is very small compared to crop irrigation demand
- Conservation is the primary strategy recommended to address identified crop irrigation needs in most regions
- Irrigation conservation strategies include changes to irrigation methods, equipment, and crops

Other water user group water conservation strategies discussed in regional water plans include steam-electric, manufacturing, and mining. Recommended conservation measures for these groups are typically implemented by private interests based on industry specific BMPs.

## *Disconnect on GPCD in regional plans and median reported data*

Recent trends make it clear that regional water planning groups should eliminate 140 as a total GPCD target. Having a target that is higher than recently reported GPCD figures is not logical. If the concern is that plans should reflect the potential for increased demand such as what occurred in much of Texas in 2011, then analysis should be done to suggest a lower figure in the

future given progress in water efficiency since that time. A suggested methodology reducing the planning year GPCD by one percent each year is outlined in the next section of this report.

## *Implementation and Policy in Plans*

The state water plan defines conservation strategies as measures that do not require infrastructure and conservation projects as measures that do require infrastructure. Chapter 8 of the 2022 State Water Plan provides an assessment of water conservation strategy and project implementation throughout the state:

- Measuring and tracking water conservation implementation is challenging due to a large number of factors that impact seasonal water use such as the weather
- Each utility is best suited to track its own progress on implementing its programs
- Data used for planning purpose show that statewide average municipal GPCD has generally declined from 175 in 2000 to 138 in 2020
- Based on water users surveyed (representing 55 percent of the 2017 State Water Plan conservation strategies) by water planning groups during the 2021 planning cycle, 81 percent of the strategies were implemented and 5 percent were in progress
- Based on water users surveyed (representing 56 percent of the 2017 State Water Plan are from the conservation projects) by water planning groups during the 2021 planning cycle, 61 percent of the strategies were implemented, and 4 percent were in progress

Each regional water planning group is required to provide policy recommendations in their regional water plans. For the 2022 State Water Plan some of these recommendations included water conservation topics such as conservation planning, GPCD goals and calculations, project funding, program support, and data collection. More specifically, some regions recommended:

- continued support of the state's Water Conservation Advisory Council and its recommendations,
- funding for additional data collection to support analysis of conservation implementation in various sectors of water use, and
- continued funding of conservation initiatives at the state level.

# 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 establishment of conservation goals in the form of GPCD is a critical aspect of water planning. Per capita consumption combined with population projections sets the amount of future water needs for every region of our state.

As early as 2010 in its legislative report, the Council questioned if 140 GPCD was an appropriate default long-term GPCD goal. The fact is that the 2014 and 2019 Five-Year Conservation Targets turned in by hundreds of utilities provided targets significantly less than 140 GPCD. It is less encouraging that in regional water planning the use of the 140 GPCD planning target is still sometimes set as a default. While setting a single goal for every part of our geographically diverse state is not a reasonable exercise, it is clear that goals lower than 140 should be considered across most of Texas

There are two sets of targets that the Water Conservation Advisory Council would like to highlight: GPCD and setting dry year targets in conservation plans.

## *Gallons per capita per day use in regional water planning*

The TWDB provides GPCD planning figures to regional planning groups, which gives them a historical perspective on GPCD and in particular GPCD achieved during extremely dry years like 2011. The figures also take into account the likely "passive savings" that should occur in the future from statewide fixture standards. However, it is also important that each region consider their ability to manage demand through reasonable drought plan implementation and through proactive conservation programs every year.

There are several BMP documents that provide guidance on how to implement conservation programs that will be particularly effective at moderating consumption during extremely dry years. These documents include

- *Landscape Conservation & Incentives*,
- *Residential Landscape Irrigation Evaluations,*
- *Outdoor Watering Schedules*,
- *Prohibition on Wasting Water*,
- *Conservation Ordinance Planning & Development*, and

- *Enforcement of Irrigation Standards.*

Incorporating conservation interventions aimed at moderating discretionary water usage during extremely dry years is critical to drought-management success and ultimately to success moderating per capita increases during times of high heat and low precipitation. The Council recommends that municipal utilities and regional water planning groups take the long-term success of these BMP opportunities into account.

A recommendation regarding how to estimate long-term savings during dry years would be to take the dry-year planning GPCD estimated for the region and decrease it by one percent for each year since 2011. This takes into account the long-term gains in irrigation and landscape practices as well as community education. For example, if the prior dry year figure were 140 GPCD in 2015 then at a one percent reduction for each successive year the 2025 number would be 134.4 GPCD. This suggested, simple exercise combined with strong consideration of appropriate BMP interventions may help set regionally appropriate long-term per capita targets.

## *Dry year gallons per capita per day targets in conservation plans*

The current practice in conservation planning is to set per capita goals based on "normal" weather conditions. This is a logical practice as it allows consideration of how customers will use water during most years. However, the variable nature of Texas weather and its tendency to turn hot and dry cannot be ignored in water planning.

Analysis of how much municipal GPCD increases during extremely hot and dry periods should be included in future conservation plans. It is likely that the increases are largely due to increased residential and commercial landscape watering when lack of rain and heat is hard on aesthetic landscape plants. Understanding how much outdoor landscape watering increases will help utilities plan conservation interventions to mitigate this challenge. The goal should be to develop resilient landscapes, efficient irrigation methods, and reasonable water use practices that all moderate the level of increased water usage when it is exceptionally hot and dry.

The potential current increase in per capita based on patterns during extreme weather conditions should be outlined in conservation plans. A goal should be set for reducing this level of increase using specific conservation best practices and drought plan implementation.

There are substantial cost savings to utilities that address dry-year GPCD increases. It is extremely expensive to plan for additional supplies that may be needed only once every decade or more. A focus on mitigating the need for the excess water through a combination of proactive conservation best practices and reasonable drought plan regulations will reduce the need for costly new supply projects.

# 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 four legislative recommendations for consideration that represent the majority opinion of the Council members and are in no particular order.

## *1. Continue funding for Agricultural Water Conservation Grant and Loan programs*

**The Council recommends that the Texas Legislature replenish funding in the Agricultural Water Conservation Fund sufficient to support the TWDB's grant and loan program for the next ten years, including continued grant funding at or above the current level of $1,200,000 per year. The Council further supports an expansion of this program through an increase in funding and additional TWDB staff to support program expansion.**

The Agricultural Water Conservation Fund, created by the 69th Texas Legislature, will not be able to sustain its current level of grant and loan activities after 2025. The program supports the implementation of strategies and practices that improve agricultural irrigation water use efficiency. In addition to demonstration and education projects, the program has funded irrigation equipment upgrades, metering devices, and construction projects that improve infrastructure, equipment, and efficiency of irrigation delivery.

Since the fund's initial bonding authority of $200 million in 1985, the fund has provided over $113,100,100 in agricultural grants and low interest loans. It is estimated that since 2004 the program has funded projects that have resulted in over 923,019 acre-feet of water saved.

Without these funds, irrigation districts, groundwater conservation districts, and agricultural producers will not have access to cost-efficient funds and training about new irrigation technology and practices. Texas irrigators will have to find alternative sources of funding for their conservation efforts, and there may be a potential reduction in adoption of irrigation water management strategies and technologies, which are an important component in the state water plan.

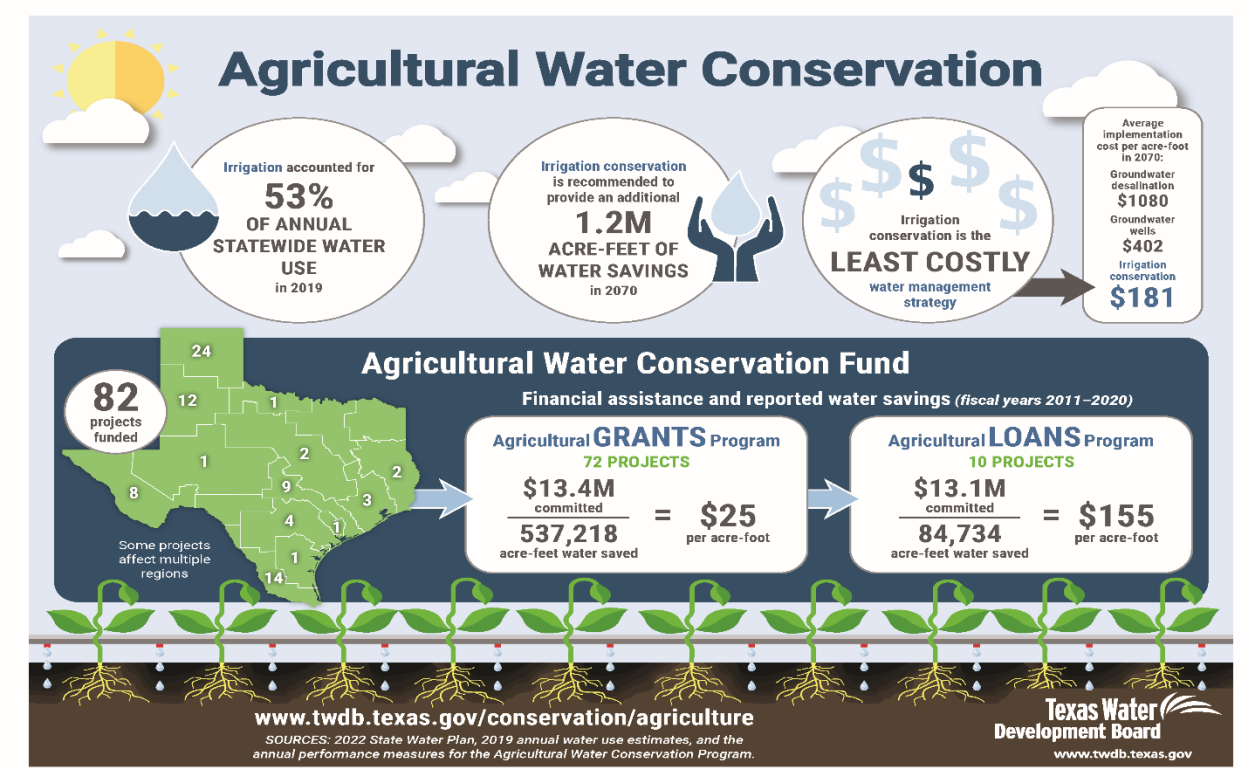


**Figure 2. Agricultural water conservation in Texas**

Approximately 73 percent of all groundwater and 29 percent of surface water is used for agricultural irrigation making it the largest water use category (TWDB, 2021). As the largest use of water, agricultural irrigation presents the state's best opportunity to achieve significant water use savings through conservation. According to the 2022 State Water Plan, irrigation conservation represented 70 percent of the state's total water conservation strategies for 2020.

Based on the TWDB water use estimates for 2019, just a 1.5 percent reduction in irrigation water use through conservation would save 112,000 acre-feet of water, which is more than the estimated annual municipal use in Lubbock, Potter, and Randall counties combined. If conservation produced a 2.5 percent reduction in irrigation, the savings (187,000 acre-feet) would exceed the estimated annual municipal use in Travis County with more than 1.3 million population. And a 5 percent reduction (375,000 acre-feet) would far exceed the annual municipal use of Bexar County.

These percentage reductions in agricultural water use are clearly realistic and achievable. Recent research in Texas found that irrigation scheduling, which allows for the efficient allocation of

irrigation water according to crop requirements based on meteorological demands and field conditions, can produce water savings of 10 percent.[9]

The state's population growth and the continuing loss of agricultural land due to urban expansion will require agricultural producers to grow more food using less water and less land which can only be achieved through water conservation and greater irrigation efficiency. This merits consideration of expanding the agricultural water conservation grant and loan program beyond its current level of $1.2 million per year which would also require additional staffing to administer the application process and monitor the contracts.

For 37 years, the Agricultural Water Conservation Fund has provided a vital source of funding for agricultural research, demonstration projects, technology improvements, and educational programs to conserve water by increasing agricultural water use efficiency and promoting adoption of BMPs. Legislative action to renew the funding in the Agricultural Water Conservation Fund would be an investment to help ensure Texas has adequate water supplies in the future for agricultural production and to serve the needs of the state's rapidly growing population.

## *2. Incorporate a statewide evapotranspiration network into the TexMesonet Program*

**The Council recommends that the Texas Legislature provide the TWDB with authority and financial resources sufficient to incorporate a statewide ET network into the existing TexMesonet program mission, subject to available state revenue for the 2024-2025 biennium.**

Key aspects of this program expansion should include

- grant the TWDB the statutory authority as the lead agency to ensure the longevity and reliability of the statewide TexMesonet earth observation network;
- grant the TWDB the statutory authority to incorporate reference evapotranspiration in its mission to further develop and expand the TexMesonet;
- grant the TWDB the statutory authority to collaborate and contract with local, state and/or federal agencies and other entities, at TWDB's discretion, to provide technical assistance and to develop and disseminate products to maximize the impact of the TexMesonet and a statewide evapotranspiration network for the people of Texas; and

[9] Analyzing potential water conservation strategies in the Texas Panhandle, Crouch, MariKate; Guerrero, Bridget; Amosson, Steve; Marek, Thomas; Almas, Lal, Irrigation Science, Volume 38 (5-6): 9 – July 31, 2020.

- increase appropriations by $900,000 for the biennium to the TWDB to provide sufficient funding for additional staff, resources and grants for partnerships to develop and support a statewide ET network within the TexMesonet.

In 2016, the TWDB started the TexMesonet earth observation network to provide high quality data to support flood monitoring and flood forecasting efforts. The goal is to create a "network of networks" from existing weather station networks and fill in areas throughout the state lacking coverage. Over 3,000 existing stations owned by other entities and 90 stations owned and operated by TWDB are displayed within the TexMesonet. Stations and collected data within the TexMesonet are mostly used to observe and track weather events for flood monitoring and forecasting.

In its September 2021 self-evaluation report to the Texas Sunset Advisory Commission, the TWDB identifies the operation of the TexMesonet earth observation network, "would benefit from more clearly defined statutory authority and purpose." There are concerns that without official authority, the TexMesonet could experience issues with staffing and budget, data quality and loss of users that rely on reliable data. One solution describes how legislation defining the TWDB as the lead agency for operating the TexMesonet can provide longevity and reliability certainty to continue to provide and expand data products for the state of Texas. The Council recommends legislation directing the TWDB as the lead agency to develop the TexMesonet into a statewide earth observation data collection network.

With established TexMesonet program direction, data could be used to create products for additional economic sectors such as irrigation scheduling recommendations. Based on current budget and staff, approximately 20 TexMesonet stations are scheduled to be installed each year that are supported by the TWDB. Incorporating ET data collection in this process is possible by adjusting siting and installation parameters of new stations and potentially modifying existing stations. However, current direction and resources for the TexMesonet is limited. The Council recommends granting the TWDB the statutory authority to incorporate reference ET in its mission to further develop and expand the TexMesonet. The Council also recommends granting the TWDB the statutory authority to collaborate and contract with local, state and/or federal agencies and other entities, at the TWDB's discretion, to provide technical assistance and to develop and disseminate products to maximize the impact of the TexMesonet (discussed below) and a statewide evapotranspiration network for the people of Texas.

The TWDB's TexMesonet program can play a vital role in important water savings, but it is under-resourced. Additional funds are needed to expand the feasibility and reliability of supporting statewide ET data long-term. The Council recommends increasing appropriations by $900,000 for the biennium to the TWDB to provide sufficient funding for additional staff,

resources and grants for partnerships to develop and support a statewide ET network within the TexMesonet.

Outdoor water use for growing crops and maintaining landscapes is significant. Efficient irrigation BMPs and technology improvements have proven to be effective tools with quantifiable water saving results. The use of ET data through dedicated weather stations and connected networks is critical to maintaining current BMPs and advancing future conservation success.

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 supporting water conservation efforts and meeting the future water needs of Texas.

## *3. Creation of a statewide water conservation awareness campaign*

**The Council recommends that, subject to available state revenue for the 2023-2024 biennium, the Texas Legislature appropriate up to $3 million per year to the TWDB to implement or contract with another entity for the statewide water conservation public awareness program that was created by the Texas Legislature in 2007 with the passage of Senate Bill 3 and House Bill 4.**

At local, regional, and statewide levels, water conservation and efficiency continue to be a crucial strategy for meeting our growing water demands. Conservation and efficiency targets can be advanced through various strategies such as water loss reduction, plumbing and fixture codes, etc., but must also be addressed through public awareness and behavioral/cultural changes. While some entities are working to advance water conservation public awareness through localized campaigns, Texas has not yet funded a statewide, coordinated approach to water conservation public awareness.

The need for a statewide water awareness campaign is not new, and the legislative recommendation that it be funded by the Texas Legislature was first recommended by the Council in 2016. A history of actions towards establishing a statewide water campaign is included below:

- **2004**: Water Conservation Implementation Task Force discusses the need for a coordinated, statewide water conservation public awareness campaign. Texas Water Foundation initiates and funds statewide polling to identify how different population segments value water. This data leads to the creation of the TWDB's Water IQ in 2007, a public awareness program aimed to increase knowledge of drinking water.
- **2007**: Texas Legislature formalized the need for a public awareness campaign by adding it to Texas Water Code, which reads "The executive administrator shall develop and

implement a statewide water conservation public awareness program to educate residents of this state about water conservation. The program shall take into account the differences in water conservation needs of various geographic regions of the state and shall be designed to complement and support existing local and regional water conservation programs." (Texas Water Code §16.401)

- **2013**: The Legislative Budget Board staff in the Government Effectiveness & Efficiency Report , suggested a $6 million appropriation for the biennium for Water IQ as part of its recommendations to "Enhance State Participation in Municipal Water Conservation," noting that the program could help lower water use by Texans. The Legislative Budget Board staff calculated in 2013 that a reduction in water consumption of just one gallon per capita per day by all Texans could avoid $407.2 million of the $53.1 billion in capital costs that had been projected by the 2012 State Water Plan.
- **2019**: Council made a legislative recommendation that the Texas Legislature appropriate up to $3 million per year to the TWDB to implement a statewide water conservation public awareness program, as directed by the Texas Legislature in 2007 with the passage of Senate Bill 3 and House Bill 4.

Although there is a need to increase the public's knowledge of water efficiency and its relationship in meeting current and future water demands, there were no funds specifically appropriated to the TWDB for the program in 2005 or in subsequent legislative sessions. Since then, some local and regional entities have worked to advance water awareness within their respective service areas. Recognizing the need to support entities without a formal campaign and have a more coordinated (or unified) approach statewide, nonprofit Texas Water Foundation has worked to advance a statewide water awareness campaign, piloting a framework in three different markets.

## *4. Allow the Water Conservation Advisory Council to meet virtually*

**The Council recommends that the Texas Legislature add Texas Water Code Section 10.007(c) to clarify that the Council may hold an open or closed meeting by videoconference call in accordance with Texas Government Code Section 551.127(c).**

Existing requirements of the Texas Open Meetings Act as applied to the Council are unclear, and the Council currently adheres to in-person quorum requirements. The Council represents statewide interests, and many Council members and stakeholders travel great distances to attend and participate in its meetings. With the current limitations adhering to the requirement to have a physical in-person quorum can be resource intensive with finding a date for 23 unique schedules, as well as finding a host room. The in-person requirements may also have the

unintended impact of discouraging people from participating as future council members. Amending Texas Water Code Section 10.007(c) to clarify that the Council or any of its committees may hold an open or closed meeting by videoconference call in accordance with Texas Government Code Section 551.127(c) would allow the Council to conduct business as long as the chairperson (rather than a full quorum of members) is physically present at a meeting location that is open to the public with the addition of two-way communication capabilities.

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