THE TEXAS SENATE COMMITTEE ON WATER, AGRICULTURE, AND RURAL AFFAIRS

Interim Report to the Senate of the 89th Texas Legislature

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Senator Kelly Hancock
Vice Chairman

Senator César Blanco

Senator Pete Flores

Senator Roland Gutierrez

Senator Nathan Johnson

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Senator Kevin Sparks

Senator Drew Springer

December 1, 2024

Acknowledgements

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Austin Water
South Plains Water Supply Corporation
Texas 2036
Texas Rural Water Association
Texas Water Foundation
National Wildlife Federation
Texas Farm Bureau
Texas Chemistry Council
Texas Water Infrastructure Network
Texas Veterinary Medical Association
Texas Pacific Water Resources

Texas Produced Water Consortium
Texas Department of Information Resources
Public Utility Commission of Texas
Texas Department of Licensing & Regulation
Texas Parks & Wildlife Department
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Texas Public Policy Foundation
Texas Water Conservation Association
Environmental Defense Fund
The Nature Conservancy
Texas Association of Manufacturers
Texas Oil & Gas Association
Texas Association of Water Companies
IDE Technologies
NGL Water Solutions

Natura Resources

Senate Committee on Water, Agriculture, and Rural Affairs

Senator Charles Perry, *Chairman*

Members: Senator Kelly Hancock, Vice-Chair; Senator César Blanco; Senator Pete Flores; Senator Roland Gutierrez; Senator Nathan Johnson; Senator Lois Kolkhorst; Senator Kevin Sparks; Senator Drew Springer

December 1, 2024

The Honorable Dan Patrick
Lt. Governor of Texas
Capitol Building, Suite 2E.13
Austin, Texas 78701

Lt. Governor Patrick,

On April 11, 2024, you charged the Senate Committee on Water, Agriculture, and Rural Affairs with reviewing water system reliability and monitoring the implementation of four items of legislation during the interim period following 88th Regular Session of the Texas Legislature and subsequent called sessions. We submit the following report to the Senate of the 89th Texas Legislature in satisfaction of your charges.

Respectfully,

Senator Charles Perry, Chairman

Senator Kelly Hancock, Vice Chairman

Senator César Blanco

Senator Pete Flores

Senator Roland Gutierrez

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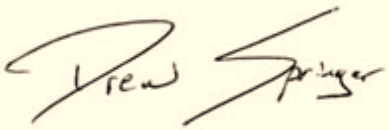
Senator Nathan Johnson

Senator Lois Kolkhorst

Senator Kevin Sparks



Senator Drew Springer

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Senate Committee on Water, Agriculture, and Rural Affairs

Senator Charles Perry, *Chairman*

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December 1, 2024

The Honorable Dan Patrick
Lt. Governor of Texas
Capitol Building, Suite 2E.13
Austin, Texas 78701

Lt. Governor Patrick,

On April 11, 2024, you charged the Senate Committee on Water, Agriculture, and Rural Affairs (WARA Committee) with reviewing water system reliability and the implementation of four items of legislation during the interim period between the 88th and 89th Regular Sessions of the Texas Legislature.

I appreciate the charges you chose to issue for the WARA Committee, most importantly the charge relating to water system reliability and the factors which affect it, namely water supply. There is no resource so vitally important to human survival and prosperity as water. For centuries, mankind has developed individual settlements and, ultimately, entire civilizations in the places where it found water available. Conversely, those settlements have often dried up when their water sources have done the same. Our history has borne out a simple truth: no human activity can flourish without water. I believe that providing reliable access to ample volumes of clean water is one of government's most sacred responsibilities, second only to securing the natural, inalienable rights of our citizenry.

In this respect, your charge could not have been more aptly timed. As the attached interim report explains, the 2022 State Water Plan (2022 SWP) projects severe water supply shortages in Texas that will materialize by 2050—and have already materialized for many regions of the state. In the vast majority of our state's river basins, our surface water supplies have been fully appropriated or will be in the near future. Our state's non-saline groundwater has been depleted to the point that the water table in many regions of the state has fallen below most water well depths. Very few of our state's proposed water reservoirs are on schedule to meet the completion deadlines outlined in the 2022 SWP.

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Past legislatures have taken bold action with respect to long term water planning. Most notably, the 75th Legislature enacted 75(R) SB 1 to formalize the state water planning process in 1997.[1] The process inculcated by the 75th Legislature emphasized a regionally driven water planning approach characterized by the compilation of regional water plans generated by 16 regional water planning groups into a single state water plan. Each of those plans, and ultimately the colligated statewide plan, utilizes water availability data gathered during a drought of record as the standard condition around which water planning occurs; in essence, our state's water planners determine future water needs assuming the worst-case scenario.

In areas where our water planners cannot identify a developable source of new water sufficient to meet anticipated needs during the drought of record—such as West and South Texas, the regions of our state primarily responsible for the production of our food, fiber, and fuel—they choose instead to employ conservation and management strategies necessitating drastic, unrealistic curtailments of water supply to water users. Those reductions inevitably result in a tremendously harmful impact to our state's economy, our state's culture, and our national security. As the attached report details, they have already begun to cost the state—and they will cost Texas far more in the future if we do not act to preempt them. We cannot consider our water systems reliable when water scarcity is already harming our economy and will do more harm absent a deliberate, serious effort at corrective action.

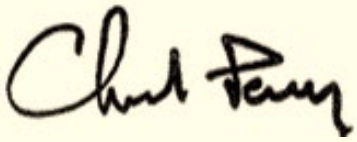
The current water planning model was a necessary product of its time. I take no issue in principle with regionally driven approaches that plan for the worst-case scenario and have no intent to change the state water planning process. I do, however, recognize the limitations of our process: the lack of cohesive coordination between regions, ultimately causing them to miss larger, more efficient, more effective solutions which might achieve savings and serve more water users through economies of scale; the delegation of the primary or sole financial responsibility for such projects to local entities with no hope of being able to meet that burden, too often resulting in projects that never proceed beyond the planning stage; and the economic consequences that stem from water scarcity which may have otherwise been averted.

[1] *See generally* S.B. 1, 75th Leg., Reg. Sess. (Tex. 1997).

For these reasons, I believe the time to act to secure ample water supply sufficient to meet the future needs of Texas is now; that it is time to start planning for our growth, not just for our droughts; and that the state must lead the way. Water infrastructure is critical infrastructure. With respect to other types of critical infrastructure, such as our transportation network and our power grid, state leadership in recent years have taken critically important steps to ensure both that our infrastructure is durable in emergencies, and that it grows to meet the growing needs of a growing state. We have demonstrated our commitment to providing substantial funding and stable, continuous, constitutionally dedicated revenue streams that ensure the viability of long-term infrastructure projects. This report proposes to do the same for our water infrastructure.

I wish to express my appreciation to you for your leadership on water, power, and transportation infrastructure issues of critical importance to the future of Texas; to the other members of the WARA Committee for their diligence and dedication in researching the water-related challenges Texas now faces and identifying viable solutions; to all of the involved Senate staff for their countless hours of hard work in support of myself, the other committee members, and ultimately, our constituents; and to the dozens of witnesses and other stakeholders who provided the committee with significant volumes of informative testimony, data, and other evidence, ultimately informing our recommendations.

God Bless Texas,



Senator Charles Perry, Chairman
Texas Senate Committee on Water, Agriculture, and Rural Affairs

CP:ap

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I. Introduction

For the interim session of the 88th Texas Legislature, the Texas Senate Committee on Water, Agriculture, and Rural Affairs (WARA Committee) was assigned one subject matter charge and one monitoring charge relating to four pieces of legislation,[1] reprinted below:

> **Water System Reliability:** Evaluate water systems in Texas and identify opportunities to better equip those systems to serve the public. Review the coordination of relevant state agencies dealing with Texas water issues and identify opportunities for improved coordination and effectiveness.
>
> **Monitoring:** Monitor the implementation of legislation addressed by the Senate Committee on Water, Agriculture, and Rural Affairs passed by the 88th Legislature, as well as relevant agencies and programs under the committee's jurisdiction. Specifically, make recommendations for any legislation needed to improve, enhance, or complete implementation of the following:
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> - Senate Bill 28, relating to financial assistance provided and programs administered by the Texas Water Development Board;
> - Senate Bill 1289, relating to the disposal of reclaimed wastewater;
> - Senate Bill 1414, relating to the temporary regulation of the practice of veterinary medicine by the Texas Department of Licensing and Regulation; and
> - Senate Bill 1648, relating to the Centennial Parks Conservation Fund.[2]

The WARA Committee convened two interim hearings on May 15 and September 3, 2024, respectively, during which it received 50 statements from 46 individual witnesses who offered invited testimony on thirteen panels, and public testimony from an additional fifteen witnesses.[3]

The WARA Committee interpreted the water system reliability charge to be narrow in focus but broad in scope. Many crucial factors directly affect the ability of Texas water utilities and other stakeholders to obtain, treat, and deliver sufficient water of appropriate quality to residential, commercial, industrial, and agricultural users. Likewise, many factors affect the ability of utilities to treat wastewater and safely discharge it back into the natural environment.

Under existing law, multiple state agencies hold responsibilities relating to various subsets of Texas water policy. In effect, there are subject matter silos centered upon specific points of water policy, within which certain agencies frequently interact regarding water.

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[1] Press Release, Tex. Lt. Governor Dan Patrick, Lt. Gov. Dan Patrick Releases 2024 Interim Charges to the Texas Senate (Apr. 11, 2024) (on file with the Off. of the Lt. Governor of Tex.).

[2] All items of legislation referenced in this document were passed by the Texas Legislature during the 88th Regular Session unless otherwise noted.

[3] Tex. S. Comm. on Water, Agric., and Rural Affs. Minutes, 88th Leg., Interim (May 15, 2024); Tex. S. Comm. on Water, Agric., and Rural Affs. Minutes, 88th Leg., Interim (Sept. 3, 2024).

In order to thoroughly investigate the reliability charge, the WARA Committee divided the charge into six directly related sub-topics. As necessary, individual sub-topics were assigned one to three panels. Well qualified testimony was obtained from agency personnel, representatives of political subdivisions, private industry, trade associations, academic experts, members of the public, and independent policy aficionados representing think tanks and other non-governmental organizations.

With respect to the monitoring charges, one panel was assigned for each item of legislation. Testimony was sought from state agency leadership regarding the status of implementation of each item, including any associated proposed or amended administrative rules, and from key, external stakeholders involved in the development, passage, and implementation of each item.

Altogether, the WARA Committee secured a rich body of testimonial and other evidence, and conducted a thorough analysis ultimately resulting in 20 legislative recommendations for consideration by the Senate. Hereinafter, this report summarizes the facts presented to the committee that it found relevant in developing its recommendations, and posits each recommendation with a detailed explanation of the underlying rationale.

II. Water System Reliability

The WARA Committee analyzed the interim charge relating to water system reliability through the prisms of the following subtopics:

- water supply;
- water infrastructure cybersecurity;
- current water infrastructure conditions;
- water workforce issues;
- agency coordination of water-related responsibilities; and
- small water system consolidation.

A. Water Supply

The WARA Committee invited fifteen witnesses to testify on three panels relating to water supply issues at its May 15 hearing.[4] The first panel, intended to articulate the state's future water supply needs and emphasize the critical significance of water to the Texas economy, featured testimony from the Texas Water Development Board (TWDB), Texas 2036, the Texas Farm Bureau, the Texas Association of Manufacturers (TAM), and the Texas Chemistry Council (TCC).

TWDB presented data indicating that dozens of Texas municipalities across every region of the state will likely face shortages in excess of 25% of their water needs under drought conditions in 2050.[5] TWDB projected shortages of similar significance affecting agricultural irrigation, manufacturing, and steam-electric power generators across the state under the same conditions.[6] By 2050, TWDB data indicate that Texas will face a total water shortfall of up to 5.74 million acre feet, depending on the state's ability to develop new water sources consistent with the 2022 State Water Plan (SWP).[7] By 2070, TWDB projects a statewide shortfall of up to 6.86 million acre-feet.[8] Here again, the shortfall will be most significantly impact municipal systems, agricultural users, manufacturing facilities, and steam-electric power generators.[9]

TWDB provided an update on the status of water reservoir projects incorporated into the 2022 SWP.[10] As of January 1, 2023, of the thirteen reservoirs scheduled to come online by the end of the 2030s, only one had completed construction, only one more had started construction, only three total had received the necessary federal permit, and only four total had started the process

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[4] Hearing on Interim Charge Before the Tex. S. Comm. on Water, Agric., and Rural Affs., 88th Leg., Interim (May 15, 2024) (tape available from Senate Staff Services).
[5] Interim Hearing, *supra* note 4 (statement of Temple McKinnon, Dir. of Water Supply Planning, Tex. Water Dev. Bd.); *see also* Ex. A-1 at 6.
[6] Interim Hearing, *supra* note 5; *see also* Ex. A-1 at 7-9.
[7] Interim Hearing, *supra* note 5; *see also* Ex. A-1 at 11-12.
[8] Interim Hearing, *supra* note 5.
[9] *Id*.
[10] *Id*.

of acquiring the necessary land.[11] TWDB communicated the possibility that several reservoirs contained in the SWP will need to have their expected deadlines for completion delayed.[12]

Regarding brackish groundwater as a possible water supply source, TWDB testified that an estimated 3.2 billion acre-feet of brackish groundwater currently sit within aquifers spread under the vast majority of the state's land area.[13] Additional data later obtained by the committee indicate that of the 23 Texas river basins in which water rights are permitted, 17 had less than 100,000 acre feet of water available for appropriation adjusting for drought of record conditions as of May, 2024.[14] Two of those 17 basins had no remaining water available for appropriation.[15]

Texas 2036 offered testimony indicating, based on historical and scientific evidence, that the Texas climate is trending toward lower rainfall totals and greater rainfall variability more akin to the Texas climate of the 19th Century than the Texas climate of the 20th Century.[16] In tandem with the state's booming population growth and expected additional population gains largely attributable to continued growth in the state's energy sector, Texas 2036 opined that the growth in the gap between available water supplies in Texas and demand for water in Texas is likely to accelerate beyond what has been projected to date.[17] Texas 2036 pointed out that a water supply deficit will place drag on the state's population and economic growth, and conversely, that investment in the state's water infrastructure with emphasis on new supply will yield tangible economic benefits.[18]

A report published in October, 2024, by Texas 2036 and obtained by the WARA Committee corroborated and substantiated the concerns expressed by Texas 2036 in the May 15 hearing with far greater detail.[19] In the report, Texas 2036 estimated that, if current trends continue, at least 13.3 million Texas residents will have less than half the needed water supplies from their municipal providers by 2070, pointing to the various types of restrictions and moratoria on growth enacted in recent years by the cities of Conroe, Magnolia, and Dripping Springs as harbingers of the water supply hardships the state will face absent action to address its long-term water supply needs.[20] The report drew on various data points, including an estimated $12 to $17 Billion in agricultural losses suffered by the Texas economy as a result of the 2011 drought, to project potential losses to the Texas economy of 785,000 jobs and $160 Billion in gross domestic product (GDP) by the end of the 2030s, and 1.4 million jobs and $192 Billion in GDP by the end of the 2070s, attributable to water scarcity if left unaddressed.[21] Texas 2036 found that such

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[11] *Id*; *see also* Ex. A-1 at 16.
[12] Interim Hearing, *supra* note 5.
[13] *Id*; *see also* Ex. A-1 at 17.
[14] Ex. C-1 at 2.
[15] *Id*.
[16] Interim Hearing, *supra* note 4 (statement of Jeremy Mazur, Dir. of Nat. Res. & Infrastructure Pol'y, Tex. 2036); *accord* Ex. A-2.
[17] Interim Hearing, *supra* note 16.
[18] *Id*.
[19] *See generally* Ex. C-2.
[20] *Id*. at 12, 18.
[21] *Id*. at 19.

losses would generally exceed those suffered by the Texas economy during the Great Recession of 2007-09 and the COVID-19 Pandemic of 2020-21.[22]

Texas 2036 argued in its report that the state's power grid and power generators are especially vulnerable to water scarcity; the report found that approximately 82,100 megawatts (MW), or 53.9%, of the approximately 152,200 MW worth of total Texas electric generation capacity relies on significant amounts of water for cooling purposes.[23] This figure includes virtually all of the state's dispatchable electric generation capacity, meaning future water supply shortages in Texas will likely result in power shortages for the state as well.[24]

The Texas 2036 report estimated that the state needs at least $59 Billion to develop new water supply sources.[25] Perhaps unsurprisingly in light of the other facts and figures in its report, a Texas 2036 poll found that 65% of Texas voters are either "very" or "extremely concerned" Texas will not be able to meet a significant amount of the state's water needs during a severe drought.[26]

Conversely, the Texas 2036 report found that every 100,000 acre-feet of new water supply developed for the state can potentially support up to $30 Billion in new economic activity.[27] Drawing upon the common thread between the economic drawbacks Texas is likely to suffer unless its looming water supply shortages are addressed and the economic benefits of new water supply development, the Texas 2036 report suggested to address the Texas water supply problem: a large, one-time appropriation to the Texas Water Fund to recapitalize the fund and jump-start water infrastructure development in the state; a constitutionally dedicated revenue stream for the Texas Water Fund to support water infrastructure projects in perpetuity; and increased legislative oversight of the Texas Water Fund via the consolidation of existing legislative advisory committees and the expansion of their collective jurisdiction in order to ensure the judicious, responsible use of monies in the fund.[28]

The Farm Bureau offered testimony regarding an acute water shortage situation in the Rio Grande Valley (RGV), resulting from Mexico's failure to deliver water from Mexican tributaries to the Rio Grande in volumes sufficient to satisfy its obligations under a 1944 treaty between Mexico and the United States.[29] Of particular note, the Farm Bureau shared that the only sugar mill in Texas, located in the RGV, was forced to close in early 2024 due to declining sugar cane

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[22] *Id*. at 20-21.
[23] *Id*. at 25-26.
[24] *Id*. at 26.
[25] *Id*. at 30.
[26] *Id*. at 7.
[27] *Id*. at 46.
[28] *Id*. at 41-43.
[29] Interim Hearing, *supra* note 4 (statement of Brian Jones, Dist. 13 State Dir., Tex. Farm Bureau); *accord* Ex. A-3; *see generally* Treaty relating to the utilization of waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., Nov. 14, 1944, T.S. 994.

yields caused by the lack of available water in the Rio Grande, costing the state over 600 jobs.[30] In tandem with reduced yields of other crops owing to a total lack of water for irrigation from the Rio Grande, the Farm Bureau estimated the total agricultural impact of Mexico's failure to deliver sufficient water to be approximately $993 Million annually.[31]

The Farm Bureau pointed out that Mexico has constructed nine dammed reservoirs on its Rio Grande tributaries since the ratification of the 1944 treaty, and that these dams intercept water that would otherwise flow freely into the Rio Grande.[32] Per the Farm Bureau, Mexico appears to have no intent of releasing water from these dams to fulfill its treaty obligations.[33]

More broadly, the Farm Bureau pointed to water shortages in the Panhandle and along the lower Colorado River that have affected the cotton and rice industries.[34] Though agricultural water conservation efforts have proved effective at mitigating water shortages, the Farm Bureau firmly stated conservation alone will not resolve Texas agriculture's water problem, and asserted that Texas "must be self-reliant" with respect to its water supply to ensure continued agricultural viability.[35]

TAM testified that water is essential to sustaining and growing manufacturing in Texas.[36] In particular, TAM testified that water is critical to the attractiveness of Texas for new business investment.[37] Per TAM, site selection professionals—the consultants who assist large corporations with identifying optimal locations for potential industrial sites based on a variety of economic, regulatory, and other conditions—have recently begun to express concern over the security of Texas's water supply, threatening the state's ability to attract investment and, ultimately, grow its economy.[38] Despite the industry's best efforts to conserve existing water supplies, TAM is concerned that lacking water supply may cost Texas as much as $55 Billion worth of economic development opportunities and 400,000 manufacturing jobs if the problem is not adequately addressed.[39] Upon questioning by the WARA Committee, TAM reasserted that water supply is "becoming a major issue" in site selection processes.[40]

TCC testified that water is "critically important for the business of chemistry."[41] TCC specifically identified a "sustainable supply of affordable water" as being necessary both to

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[30] Interim Hearing, *supra* note 29; *see also* Max Massey, *Texas' only sugar mill shuts down after 50 years due to water shortage*, KSAT, Mar. 1, 2024, https://www.ksat.com/news/local/2024/03/01/texas-only-sugar-mill-shuts-down-after-50-years-due-to-water-shortage/.
[31] Interim Hearing, *supra* note 29.
[32] *Id*.
[33] *Id*.
[34] *Id*.
[35] *Id*.
[36] Interim Hearing, *supra* note 4 (statement of Wroe Jackson, Vice President & Gen. Couns., Tex. Ass'n of Manufacturers).
[37] *Id*.
[38] *Id*.
[39] *Id*.
[40] *Id*.
[41] Interim Hearing, *supra* note 4 (statement of Hector Rivero, President, Tex. Chemistry Council).

sustain current petrochemical manufacturing in Texas and to attract new manufacturing development.[42] TCC noted as concerns for the petrochemical industry that the water rights in the Brazos River are fully appropriated and that the last available water right in the Nueces River was, as of the time testimony was taken, set to be appropriated in 2024.[43] Notably, TCC emphasized the petrochemical industry's interest in desalination as a long term water supply solution and in small modular nuclear reactors (SMRs) as a power source for desalination.[44] TCC noted the significance of Texas's water security in the development of the state's petrochemical sector, and that it was particularly crucial to the approximately $100 Billion in new petrochemical industry investment enjoyed in Texas between 2010 and 2020.[45] TCC concluded by stating that "the success of [Texas] being able to attract new [petrochemical industry] investment is going to be very dependent on water."[46] Upon questioning by the WARA Committee, TCC stated that water supply has been an issue for the Texas petrochemical sector "for over a decade," and noted that lacking water supply nearly preempted a $6 Billion project by the Dow Chemical Corporation in the Freeport area around 2012.[47]

The second panel focused on the desalination of seawater and brackish groundwater. This panel featured testimony from the City of Corpus Christi, IDE Technologies, El Paso Water (EPW), and the San Antonio Water System (SAWS).

Corpus Christi offered testimony indicating that the total amount of water currently stored in the four reservoirs upon which approximately 500,000 Coastal Bend residents rely for drinking water is the lowest ever recorded, substantiating the need for a marine desalination plant in the region.[48] As of the time testimony was taken, water restrictions resulting from this supply issue had been in place for exactly 700 days.[49] Corpus Christi is currently planning a marine desalination plant designed to provide 30 million gallons per day (MGD) of freshwater, at a total, projected construction cost of $758 Million and a projected operational cost of approximately $7.95 per thousand gallons.[50] Additional documentation later obtained by the committee indicated that approximately 18% of the operational costs of the facility will be attributable to its power needs.[51] Corpus Christi asserted that the length of time involved in the various permitting processes through which a desalination project must obtain approval constitutes "the greatest risk to this project."[52] Of particular note, Corpus Christi stated that each additional week of delay in

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[42] *Id*.
[43] *Id*; *see also* Dylan Badour, *Water scarcity and clean energy collide in South Texas*, TEXAS TRIBUNE, April 12, 2024, https://www.texastribune.org/2024/04/12/texas-corpus-christi-water-shortage-hydrogen-clean-energy/.
[44] Interim Hearing, *supra* note 41.
[45] *Id*.
[46] *Id*.
[47] *Id*.
[48] Interim Hearing, *supra* note 4 (statement of Drew Molly, Chief Operating Officer, City of Corpus Christi, Tex., Off. of Water); *see also* Ex. A-4.
[49] Interim Hearing, *supra* note 48.
[50] *Id*.
[51] Ex. C-3.
[52] Interim Hearing, *supra* note 48.

the project attributable to the permitting processes adds $700,000 of additional cost to the project.[53]

IDE testified that it is working together with another private corporation, Invenergy, to design and build a marine desalination plant in Freeport to meet municipal and industrial water needs in the lower Brazos River basin.[54] IDE suggested that the availability of a consistent, drought-proof water source in the lower Brazos River basin would likely free up Brazos River water for use in the rest of the basin and reduce pressure on local groundwater sources, ultimately mitigating local subsidence.[55] Per IDE, the project is in the early stages of the of permitting with the Texas Commission on Environmental Quality (TCEQ), Texas General Land Office (GLO), and US Army Corps of Engineers (USACE).[56] As a means of reducing the length of time involved with permitting and, ultimately, making permitting a shorter, more efficient process, IDE suggested action to encourage coordination of the various permitting processes involved with marine desalination projects between the involved local, state, and federal regulators.[57]

EPW testified that brackish groundwater desalination first became a goal of local leadership in the early 1990s, when depleting freshwater aquifers necessitated a conversation about alternative water supply sources.[58] In 2007, EPW opened the Kay Bailey Hutchison Desalination Plant (KBHDP), the largest inland desalination plant in the world.[59] At present, the plant produces 27 MGD, which will increase by 6 MGD following a planned expansion in the near future.[60] EPW noted that its desalination operation effectively constitutes a drought-proof water supply source, aiding in the management of other water supply sources including freshwater aquifers and surface water.[61] EPW further noted the criticality of the reliable water supply its desalination plant provides to Fort Bliss for military preparedness purposes.[62]

EPW testified that KBHDP cost $93 Million to build.[63] EPW noted that the permitting processes for KBHDP took approximately five years and cost over $1 Million in environmental consulting fees.[64] EPW suggested increased funding for membrane research as a means of improving membrane lifespans and reliability, ultimately reducing the cost of this key aspect in the desalination process.[65] EPW also suggested grants and loan forgiveness programs for desalination plants through the Texas Water Fund (TWF) to subsidize and incentivize future

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[53] *Id*.
[54] Interim Hearing, *supra* note 4 (statement of Mark Ellison, Reg'l Sales Dir., IDE Tech.); *accord* Ex. A-5.
[55] Interim Hearing, *supra* note 54.
[56] *Id*.
[57] *Id*.
[58] Interim Hearing, *supra* note 4 (statement of Gilbert Trejo, Vice President of Operations & Tech. Servs., El Paso Water); *accord* Ex. A-6.
[59] Interim Hearing, *supra* note 58.
[60] *Id*.
[61] *Id*.
[62] *Id*.
[63] *Id*.
[64] *Id*.
[65] *Id*.

desalination projects.[66] EPW further suggested simplifying and expediting the involved permitting processes for the same reason.[67]

SAWS testified that it brought the first phase of its brackish groundwater desalination project online in December, 2016.[68] That phase, per SAWS, produces 12 MGD of freshwater.[69] SAWS added that, as currently planned, the second and third phases of the facility will increase the total production to approximately 29.5 MGD.[70] Like EPW, SAWS pointed to financial and regulatory incentives to encourage further development of brackish groundwater desalination facilities in Texas.[71] SAWS also pointed out the role of energy costs in the desalination process, owing to the large quantities of energy needed for desalination facilities to operate.[72] Upon questioning by the committee, SAWS testified to a cost per acre-foot produced by its desalination facility of approximately $1,800, or roughly $5.52 per thousand gallons, but noted that at least one of its freshwater sources is more expensive.[73] SAWS also testified to increased public confidence in its brackish desalination operations gained through years of safe and reliable operation.[74]

The third panel offered testimony regarding the status of efforts to filter the produced water biproduct of oil and gas extraction to a quality usable for purposes other than injection well disposal. The Texas Produced Water Consortium at Texas Tech University (TPWC), NGL Water Solutions, Texas Pacific Water Resources (TPWR), Natura Resources, the Texas Oil & Gas Association (TXOGA), and the Texas Railroad Commission (RRC) each offered testimony on the subject.

TPWC testified that the Texas oil and gas industry is projected to produce up to 14 million barrels of produced water per day in the coming years.[75] Excluding industry efforts to recycle produced water, TPWC estimates that approximately half a million acre-feet of produced water per year could be filtered yielding approximately a quarter of a million acre-feet of useable water per year.[76] Using TWDB projections, TPWC estimates that this recovered produced water would cover the growth in the water supply needs of Water Planning Regions E and F, the two water planning regions that bisect the lion's share of the Permian Basin, through 2070.[77] Currently, TPWC is partnering with Aris, Chevron, ConocoPhillips, and other key industry stakeholders to

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[66] *Id*.
[67] *Id*.
[68] Interim Hearing, *supra* note 4 (statement of Donnovan Burton, Sr. Vice President of Water Res. & Gov't Rels., San Antonio Water Sys.).
[69] *Id*.
[70] *Id*.
[71] *Id*.
[72] *Id*.
[73] *Id*.
[74] *Id*.
[75] Interim Hearing, *supra* note 4 (statement of Dr. Shane Walker, Faculty Co-Dir., Tex. Prod. Water Consortium); *see also* Ex. A-7.
[76] Interim Hearing, *supra* note 75.
[77] *Id*.

review proposed produced water treatment methods for their efficacy and economic viability, with an eye toward eventual peer review and blind sampling programs.[78]

NGL testified that its parent company, NGL Energy Partners, currently manages approximately 2.5 million barrels of produced water per day.[79] NGL predicted that produced water will be able to be filtered to potable water standards in the near future.[80] NGL first built a facility to filter produced water to drinking water quality standards or better and discharge it into the upper Green River basin in Wyoming in 2008, with approval from the US Environmental Protection Agency (EPA).[81] Since that time, the NGL facility in Wyoming has safely discharged over 60 million barrels of treated produced water.[82] NGL has since treated produced water from Texas to a level proven safer than the drinking water in Denver, Colorado, through rigorous testing by the Colorado School of Mines.[83] NGL testified that it was preparing to test large scale produced water treatment operations at its current saltwater disposal site in Orla starting in June, 2024.[84] At the time testimony was taken, NGL specifically intended to test the viability of its treated produced water for agricultural purposes by irrigating sorghum in a test pit at the Orla facility.[85]

TPWR, a subsidiary of Texas Pacific Lands Trust, testified to its ability to filter out all particulates in produced water.[86] In fact, of 380 individual analytes identified in produced water, TPWR testified it had proven its capabilities to filter out 241 altogether and to remove polyfluoroalkyl substances (PFAS), specifically, to meet or exceed EPA standards.[87] TPWR pointed out the necessity of a thermal treatment process to filter produced water due to the inability of traditional desalination methods, such as reverse osmosis, to treat water in their own right.[88] TPWR stated it had already tested its treated produced water on crops, and was receiving data resulting from that experiment.[89] Interestingly, TPWR testified that the assessed feed values of the crops grown by TPWR using its treated produced water generally exceeded the feed values of counterpart crops grown in a control group using ordinary irrigation water.[90]

Natura Resources offered testimony regarding a SMR currently in development that may be able to provide an adequate supply of affordable electricity to power the energy-intensive produced water treatment and desalination processes.[91] As of the time testimony was taken, Natura was

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[78] *Id*.
[79] Interim Hearing, *supra* note 4 (statement of Doug White, Exec. Vice President—Water Sols., NGL Water Sols.); *accord* Ex. A-8; *see also* Ex. A-9.
[80] Interim Hearing, *supra* note 79.
[81] *Id*.
[82] *Id*.
[83] *Id*.
[84] *Id*.
[85] *Id*.
[86] Interim Hearing, *supra* note 4 (statement of Robert Crain, Exec. Vice President, Tex. Pacific Water Res.); *see also* Ex. A-10.
[87] Interim Hearing, *supra* note 86.
[88] *Id*.
[89] *Id*.
[90] *Id*.
[91] Interim Hearing, *supra* note 4 (statement of Doug Robison, Chief Exec. Officer, Natura Res.); *see also* Ex. A-11.

engaged with a consortium of universities to research and develop a molten salt SMR that includes Abilene Christian University (ACU), The University of Texas at Austin, Texas A&M University, and Georgia Tech University.[92] Natura expressed its expectation that a permit to construct its prototype SMR in a research facility at ACU would be issued in the fall of 2024, and that construction would be completed in 2026.[93] The WARA Committee later obtained documentation indicating that construction permit was issued on September 16, 2024.[94] Importantly, Natura testified that the high temperatures at which molten salt reactors operate make those reactors particularly well suited to deliver high process heat critical to the desalination and produced water treatment processes.[95]

The RRC testified about its efforts to develop a regulatory structure for recycling produced water.[96] The RRC published an initial framework for produced water recycling pilot projects in January, 2024, with an eye toward establishing long term standards and processes using data and experience gathered through this framework.[97] At the time testimony was taken, the RRC had received six pilot project applications, approved three, and was still reviewing the remaining three.[98] The RRC emphasized the importance of developing viable produced water treatment methods to the future of the Texas oil and gas industry, notwithstanding its significance as a new source of water supply.[99]

TXOGA articulated the longstanding efforts of Texas oil and gas industry stakeholders to reduce their dependence on freshwater via alternatives including produced water and brackish groundwater.[100] Examples offered by TXOGA included: one group of TXOGA members using treated produced water for agricultural research, low energy hydrogen production, and direct carbon dioxide capture; one TXOGA member company using recycled produced water instead of freshwater for industrial cooling equipment; and one TXOGA member testing treated produced water on winter wheat and cotton.[101] TXOGA pointed out barriers to the use of treated produced water by its members, including insufficient infrastructure necessary to move produced water and contractual agreements with landowners controlling the use of water by oil and gas producers.[102] To facilitate further development of produced water as a resource in Texas, TXOGA stressed the need for a reasonable regulatory framework, continued testing of produced water treatment technologies, and public education regarding the benefits of recycled produced water.[103]

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[92] Interim Hearing, *supra* note 91.
[93] *Id*.
[94] Ex. C-4
[95] Interim Hearing, *supra* note 91.
[96] Interim Hearing, *supra* note 4 (statement of Jim Wright, Comm'r, Tex. R.R. Comm'n); *accord* Ex. A-12.
[97] Interim Hearing, *supra* note 96.
[98] *Id*.
[99] *Id*.
[100] Interim Hearing, *supra* note 4 (statement of Tulsi Oberbeck, Vice President of Gov't & Regul. Affs., Tex. Oil & Gas Ass'n).
[101] *Id*.
[102] *Id*.
[103] *Id*.

B. Water Infrastructure Cybersecurity

The WARA Committee invited three witnesses to testify on a panel regarding cybersecurity issues in Texas water systems during its May 15 hearing. Those three witnesses represented the City of Muleshoe, the Texas Department of Information Resources (DIR), and the Texas Public Policy Foundation (TPPF), respectively.

Muleshoe testified about an incident on January 18, 2024, during which the cyber infrastructure Muleshoe uses to operate its water system was compromised by a hacker group known as the Cyber Army of Russia (CAR).[104] Specifically, the CAR changed settings in Muleshoe's system, causing a water tower to overflow.[105] The CAR was able to access the water systems of several communities in the Panhandle region using the same hacking method it deployed against Muleshoe.[106] Luckily, there was no release of private data and no interruption of service resulting from the breach of Muleshoe's firewall.[107] Nonetheless, Muleshoe testified that the community was "rattled" by the incident, particularly after national media drew attention to the situation.[108] Muleshoe responded to the situation by: replacing compromised equipment; replacing old passwords with newer, stronger ones; implementing multi-factor authentication protocols for system users; and reducing the general internet exposure of its water system.[109]

DIR testified to the "increasing size and scope of the cybersecurity threats facing Texans" over the last several years.[110] Though state leaders have taken action to protect state entities from such vulnerabilities, DIR pointed out that smaller governmental entities such as counties, municipalities, and water districts are not as favorably positioned to combat the growing threat.[111] DIR noted that cyberattacks are carried out by foreign nation-state and non-state actors alike, often sophisticated, well-trained and well-funded, and that federal security agencies have raised concerns about the ability of water utilities, among other entities, to defend against such attacks.[112] DIR expounded upon a letter sent by the EPA and the National Security Council to state governors on March 14, 2024, asking the governors to take steps to improve the security of water and wastewater systems against cyberattacks and noting the particularly acute vulnerability of such systems to attacks on account of their lacking resources, basic protections, and expertise in this area.[113]

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[104] Interim Hearing, *supra* note 4 (statement of Ramon Sanchez, City Manager, City of Muleshoe, Tex.).
[105] *Id*.
[106] *Id*.
[107] *Id*.
[108] *Id*.
[109] *Id*.
[110] Interim Hearing, *supra* note 4 (statement of Tony Sauerhoff, Deputy Chief Info. Sec. Officer & Cybersecurity Coordinator, Tex. Dep't of Info. Res.); *accord* Ex. A-13; *see also* Ex. A-14.
[111] Interim Hearing, *supra* note 110.
[112] *Id*.
[113] *Id*; *see also* Ex. C-5.

DIR pointed out that, with respect to water utilities and other local entities, its role is largely advisory, limited to sharing information and best practices without much authority to investigate incidents or enforce requirements.[114] For example, as of the May 15 hearing, DIR was collaborating with the Department of Public Safety (DPS) and the Texas Commission on Environmental Quality (TCEQ) on a letter to Texas water utilities advising them of current cybersecurity threats and the available countermeasures.[115] DIR was also working through the Texas A&M Engineering Extension Service to offer a cybersecurity training program to water utility employees.[116] To that date, DIR had established three regional security operations centers (RSOCs) across Texas in partnership with various institutions of higher education to provide cybersecurity preparation and response services in support of local entities, namely by providing network and endpoint monitoring and cybersecurity education, preparation, and response services.[117] DIR planned to open nine additional RSOCs over time.[118]

DIR pointed to the endpoint detection and response and network detection and response services water utilities can contract for through DIR at reduced rates under existing DIR contracts.[119] DIR suggested implementing multi-factor authentication for water utility information technology (IT) systems as a cost-effective measure to improve water utility cybersecurity.[120] DIR further suggested implementing the same cybersecurity standards for water utilities that are applicable to state entities under existing law, and eliminating exemptions from required cybersecurity trainings for employees who use a computer to perform less than 25% of their job-related duties.[121] Lastly, DIR pointed out that public water utilities are eligible to procure DIR services, but other types of water utilities are not, and suggested expanding the scope of eligibility to include all water utilities.[122]

Upon questioning by the WARA Committee, DIR agreed that separating the IT infrastructure used by water utilities to operate water-related equipment—known as supervisory control and data acquisition (SCADA) networks—from the IT infrastructure used for externally oriented functions (e.g., billing, customer relations, etc.), and isolating the SCADA networks from the internet altogether, is an effective means of preempting cyberattacks that compromise water utility operations.[123] DIR noted, however, that while this was once a common practice, water utilities today are more often connecting their entire IT infrastructure to the internet either directly or indirectly for "ease of management."[124] DIR also noted that while local government entities are required to report cyberattacks, including those against water utilities, to DIR under SB 271, the requirement does not apply to water utilities not operated by local governments,

[114] Interim Hearing, *supra* note 110.
[115] *Id*.
[116] *Id*.
[117] *Id*.
[118] *Id*.
[119] *Id*.
[120] *Id*.
[121] *Id*; *see also* Tex. Loc. Gov't Code § 2054.5191(a-1).
[122] Interim Hearing, *supra* note 110.
[123] *Id*.
[124] *Id*.

such as investor-owned utilities (IOUs).[125] DIR stated a general belief that larger numbers of local governments contracting for cybersecurity services through DIR would reduce the cost to individual entities via economies of scale.[126]

TPPF characterized the Russian cyberattacks on Muleshoe and neighboring cities in West Texas as "Russian cyber-terroris[m]" and an example of the "new digital warfare landscape that [the United States is] seeing."[127] To emphasize the scale of the cyberattacks in West Texas, TPPF pointed out that approximately 37,000 attempts were made to penetrate the firewall for the City of Hale Center before Russian actors were able to successfully break through.[128] Perhaps most concerning of all, TPPF characterized the Russian cyberattacks as "prepositioning"—in other words, practice attempts that equipped the Russians with "new insights on vulnerabilities [with which to] refine their tactics, techniques, and protocols for future attacks."[129]

Pointing to a prior cyberattack on Oldsmar, Florida, as an example, TPPF noted the potential for cyberterrorists to poison drinking water by hacking into a water utility's cyber infrastructure.[130] TPPF testified to its own research showing that approximately 60% of critical infrastructure cyberattacks are committed by hostile foreign actors like Russia, Iran, China, North Korea, and others.[131] Per TPPF, approximately 74% of such cyberattacks result from human error and roughly 33% of attacks are enabled by internal personnel of the victimized entities.[132] TPPF shared a startling statistic indicating that with respect to ransomware attacks (i.e., cyberattacks by hostile actors who demand ransom be paid to restore the hacked system to its ordinary condition), some 48% of victims now pay the ransom, up from a mere 2.9% in 2012.[133] Similarly, TPPF shared that in 2023, cyberattacks caused $12.5 Billion in damages, versus only $18 Million in 2000.[134] TPPF believed that the severity and frequency of cyberattacks are likely to increase as artificial intelligence is integrated into cyberterrorism.[135]

TPPF submitted a report regarding water infrastructure cybersecurity published by the organization in accompaniment to its testimony.[136] In the paper, TPPF made numerous policy suggestions to improve water infrastructure cybersecurity, including: creating requisite statewide cybersecurity standards implemented by DIR; investing in cybersecurity-related career and technical education to generate a larger cybersecurity workforce from which water utilities can hire cybersecurity professionals; requiring water utilities to hire a qualified cybersecurity

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[125] *Id*; *see also* S.B. 271, 88th Leg., Reg. Sess. (Tex. 2023).
[126] Interim Hearing, *supra* note 110.
[127] Interim Hearing, *supra* note 4 (statement of David Dunmoyer, Campaign Dir. for Tech. Pol'y, Tex. Pub. Pol'y Found.).
[128] *Id*.
[129] *Id*.
[130] *Id*.
[131] *Id*.
[132] *Id*.
[133] *Id*.
[134] *Id*.
[135] *Id*.
[136] Ex. A-15.

manager; increasing cybersecurity training and educational opportunities for water utility personnel; implementing a cybersecurity audit program for water utilities; requiring the strongest possible cybersecurity standards for equipment procured by water utilities; and establishing a grant program or other financing mechanism for water utilities to implement cybersecurity improvements.[137] Upon questioning by the WARA Committee, TPPF agreed that foreign actors are likely using cyberattacks on smaller, more vulnerable local governments like Muleshoe as practice to improve their capabilities in advance of attacks on larger, more sophisticated entities.[138]

C. Current Water Infrastructure Conditions

The WARA Committee invited five witnesses to testify on a panel regarding the current condition of Texas water infrastructure in general during its May 15 hearing. Two witnesses testified on behalf of TWDB, followed by one apiece on behalf of the Texas Rural Water Association (TRWA), the Texas Water Conservation Association (TWCA), and the Texas Water Infrastructure Network (TXWIN), respectively.

TWDB began its testimony with an overview of ten financing programs administered by the agency to address infrastructure issues such as leaky pipes.[139] These programs included partly or primarily federally funded financial assistance programs such as the Clean Water and Drinking Water State Revolving Funds (CWSRF and DWSRF, respectively), and state funds such as the State Water Implementation Fund for Texas (SWIFT), the State Water Implementation Revenue Fund for Texas (SWIRFT), the Texas Water Development Fund (D-Fund), and the Economically Distressed Areas Program.[140] These programs offered a range of benefits to the recipients of their assistance, including principal forgiveness, grants, and no- and low interest loans.[141] Upon questioning by the WARA Committee, TWDB testified that some TWDB programs could reduce interest rates by up to 50% versus the market rate.[142] Since 1957, TWDB had made nearly 6,000 commitments totaling approximately $36 Billion in support of local water infrastructure projects.[143]

TWDB next testified to the current estimated water losses suffered by Texas water systems.[144] To best track water loss in Texas, 4,051 retail water providers are were, as of the time testimony was taken, required to submit water loss audit reports to TWDB at least once every five years, including 771 such providers who are required to submit said reports annually.[145] Of the 771

[137] *Id*. at 10-13.
[138] Interim Hearing, *supra* note 127.
[139] Interim Hearing, *supra* note 4 (statement of Jessica Peña, Deputy Exec. Adm'r for Water Supply & Infrastructure, Tex. Water Dev. Bd.); *see also* Ex. A-16 at 1-9.
[140] Interim Hearing, *supra* note 139.
[141] *Id*.
[142] *Id*.
[143] *Id*.
[144] Interim Hearing, *supra* note 4 (statement of Sam Hermitte, Asst. Deputy Exec. Adm'r for Water Science & Conservation, Tex. Water Dev. Bd.); *see also* Ex. A-16 at 10-17.
[145] Interim Hearing, *supra* note 144.

systems submitting water loss audit reports annually, 364 were subject to the annual requirement due to active financial obligations to TWDB, 293 were required to submit annually because they had more than 3,300 retail connections, and the remaining 114 met both criteria.[146] In 2022, the most recent year for which TWDB had available data at the time testimony was taken, median water loss among Texas water systems was slightly less than 35 gallons per connection per day (GCD).[147] Large water systems (i.e., water systems serving a population of 150,000 residents or more) showed substantially higher median water losses, averaging slightly less than 50 GCD in 2022; however, TWDB noted upon questioning by the WARA Committee that the elevated average may be partly attributable to data errors and a small sample size of audit reports from these systems.[148] To better ensure the accuracy of the available data, TWDB was implementing various water loss validation measures.[149]

Testifying on behalf of more than 900 member water and wastewater utilities and drawing upon a wealth of survey data and individual interactions, TRWA asserted that rural water systems were generally more likely to replace above-ground infrastructure than below-ground water lines.[150] Per TRWA survey results, most of their member systems' water lines were well beyond their intended service life and in need of replacement.[151] Many water systems were still primarily using the same water lines originally installed when the systems were first incorporated 50 years or more prior to testimony.[152] Owing to their age and conditions, many such water lines did not comply with modern standards; for example, many lines were only 1" in diameter, were made of asbestos concrete, or were fragile and prone to breaking when the ground shifts amid drought conditions, among other issues.[153]

According to TRWA's survey data, many rural water systems were suffering from administrative deficiencies, such as lacking records of the precise locations of water lines and not having recorded easements for water lines, all resulting from past administrative negligence.[154] Interestingly, TRWA testified to the logistical complications urban and suburban growth have presented for rural water systems.[155] Examples included the construction of new homes, buildings, roads and other infrastructure over previously unknown water lines, and the disturbance of water lines by newly installed utilities such as power lines and fiber optic cables.[156]

Drawing upon TWDB's water loss testimony, TRWA suggested that installing modern water meters for many rural water system customers would present an effective means of identifying

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[146] *Id*.
[147] *Id*.
[148] *Id*.
[149] *Id*.
[150] Interim Hearing, *supra* note 4 (statement of Lara Kent, Exec. Dir., Tex. Rural Water Ass'n); *accord* Ex. A-17.
[151] Interim Hearing, *supra* note 150.
[152] *Id*.
[153] *Id*.
[154] *Id*.
[155] *Id*.
[156] *Id*.

water loss and easing the process of locating leaks.[157] TRWA further suggested making resources available to better train rural water system personnel as a means of improving proactive maintenance and planning.[158]

TWCA testified that, generally speaking, Texas water infrastructure is "aging and in need of repair."[159] Per TWCA, Texas water and flood infrastructure received a grade of "C-" from the Texas Section of the American Society of Civil Engineers, and Texas wastewater infrastructure received a "D."[160] A comprehensive estimate of water infrastructure repair, replacement, and upgrade needs in Texas produced by the EPA posited a total cost of $80 Billion.[161] Similarly, TWCA reported that Texas flood planning groups recommended "thousands of strategies" to implement flood infrastructure with a total cost of $55 Billion, noting that flood mitigation projects present unique financing challenges due to the cross-jurisdictional nature of many such projects and the lack of local funding sources.[162]

TWCA testified to the "enormous pressures" Texas water providers were facing to develop new water infrastructure in order to meet the water supply needs of the rapidly growing Texas population and economy.[163] TWCA echoed prior testimony offered regarding the state's looming water supply shortages in noting an estimated negative economic impact of $153 Billion to the state's economy put forth by the 2022 SWP if new water supply strategies are not implemented to meet said demand.[164] TWCA specifically noted that many of its members "report that business and industry requests for large water supplies are very difficult to meet in the short term."[165]

To meet the state's long term infrastructure, water supply, and flood mitigation needs, TWCA suggested "continued investment in the state water planning process."[166] Noting that the most significant challenge to the state water planning process is the lack of meaningful participation by small and rural communities, TWCA emphasized measures to increase their input.[167] In the same vein, TWCA suggested that the state eliminate unnecessary administrative barriers to the implementation of water infrastructure projects that too often lead to delays, increased project costs, and an impact to TWDB's ability to distribute funds to recipients.[168] Of particular note on this point, TWCA suggested that TWDB implement the recommendations made by the Texas Sunset Advisory Commission (TSAC) to streamline approval processes for funding requests.[169]

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[157] *Id*.
[158] *Id*.
[159] Interim Hearing, *supra* note 4 (statement of Sarah Kirkle, Dir. of Pol'y & Legis. Affs., Tex. Water Conservation Ass'n).
[160] *Id*.
[161] *Id*.
[162] *Id*.
[163] *Id*.
[164] *Id*.
[165] *Id*.
[166] *Id*.
[167] *Id*.
[168] *Id*.
[169] *Id*.

Lastly, TWCA suggested that the state augment the financial tools available to incentivize water infrastructure projects, offering as examples: increasing interest rate reductions for TWDB loans for the development of water infrastructure; longer financing terms for said loans to reduce the cost of individual payments; eliminating gaps in existing financing programs that leave out general repair and replacement needs; and TWDB or other state participation in individual projects.[170]

TXWIN testified that the current demand for water infrastructure-related construction in Texas constitutes the largest of any state in the country.[171] TXWIN noted that a key challenge to implementing water infrastructure projects in Texas is the increasing unpredictability of federal funding for such projects.[172] TXWIN expressed that many of its member organizations have experienced "sticker shock" at the increasing costs of water infrastructure projects over the last several years.[173] TXWIN identified several contributing factors responsible for those increases, including: population growth; inflation, particularly with respect to labor and material costs; supply chain disruptions; workforce shortages; and scheduling conflicts and other administrative delays, often related to procurement challenges.[174] TXWIN pointed to one particularly eye-opening example of the difficulty of obtaining electrical components in noting that switch gears have sometimes taken six months or more to procure.[175]

TXWIN expounded about the increased costs associated with risk allocation in water infrastructure projects, noting that more risk and ambiguity perceived by contractors in a potential project directly impacts both the likelihood that those contractors will respond to solicitations and the prices they will offer in their responses.[176] In particular, TXWIN asserted that contract terms and conditions inhibiting fair negotiations among stakeholders drive up costs and reduce the pool of contractors willing to compete for a particular project.[177] As examples, TXWIN pointed to contractual provisions: prohibiting damages for project delays caused by project owners; prohibiting excessive liquidated damages; prohibiting waivers of conditional damages; and placing allocating risk to contractors for site conditions without offering compensation for related geotechnical surveys or subsurface utility engineering.[178] TXWIN noted that these specific issues have resulted in unsuccessful contract negotiations that have directly affected the pool of competition, thereby raising the prices contractors charge.[179]

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[170] *Id*.
[171] Interim Hearing, *supra* note 4 (statement of Perry Fowler, Exec. Dir., Tex. Water Infrastructure Network); *accord* Ex. A-18.
[172] *Id*.
[173] *Id*.
[174] *Id*.
[175] *Id*.
[176] *Id*.
[177] *Id*.
[178] *Id*.
[179] *Id*.

TXWIN believed addressing these issues will reduce contractor costs and result in the more efficient use of the funding available to address water infrastructure issues.[180]

The report published by Texas 2036 spoke to water infrastructure maintenance, repair, and replacement needs in addition to water supply shortages.[181] Specifically, the report projected that, over the next 50 years, Texas water systems will need $73.7 Billion and $21.1 Billion in financial assistance to rehabilitate and replace deteriorating water and wastewater infrastructure, respectively.[182] The report found that aging and deteriorating water infrastructure has resulted in an average of 2,883 boil water notices each year since 2019, perhaps partly explaining why a Texas Lyceum poll found that 59% of Texas voters are "somewhat" or "very concerned" about the reliability of their communities' water supply.[183]

In its report, Texas 2036 predicted that Texas could endure up to $317.9 Billion in cumulative GDP losses by 2040 attributable to aging and deteriorating water and wastewater infrastructure.[184] Conversely, the report computed the economic returns to the Texas economy of fixing aging and deteriorating water and wastewater infrastructure over the next 20 years to be up to $489 Billion, and calculated that approximately 15.5 net new jobs would be created in Texas for every $1 Million invested in the state's water and wastewater infrastructure.[185]

D. Water Workforce Issues

The WARA Committee invited five witnesses to testify on a panel regarding the workforce shortages affecting Texas water systems during its May 15 hearing. Witnesses testified on behalf of the Texas Water Foundation (TXWF), the Texas Association of Water Companies (TAWC), TCEQ, Texas State Technical College (TSTC), and the Texas Association of Community Colleges (TACC), respectively.

TXWF testified that the water workforce in Texas is aging.[186] Elaborating further, TXWF highlighted three core causes of water workforce issues in Texas: generational turnover; non-competitive wages; and reduced state agency licensing capacity on account of agency staffing shortages.[187] TXWF offered EPA data indicating that 30% of water and wastewater utility operators in Texas are expected to retire in the near future, and that Texas pays said operators some of the lowest average wages of any state in the nation.[188] As an example, TXWF pointed to

[180] *Id*.
[181] *See generally* Ex. C-2.
[182] *Id*. at 30.
[183] *Id*. at 7, 14.
[184] *Id*. at 28.
[185] *Id*. at 47.
[186] Interim Hearing, *supra* note 4 (statement of Sarah Schlessinger, Chief Exec. Officer, Tex. Water Found.); *accord* Ex. A-19.
[187] Interim Hearing, *supra* note 186.
[188] *Id*.

one Houston-area water system executive who lost critical front-line workers during the COVID-19 pandemic to competing employers like Buc-ee's and HEB on account of better wages.[189]

Per survey data from approximately 270 water systems collected by TXWF in 2023, 70% of respondents indicated that workforce shortages were a serious issue.[190] Generally speaking, respondents considered workforce shortages to be a challenge as significant as severe weather, aging infrastructure, and financing.[191] TXWF offered examples of efforts water systems have undertaken to meet their workforce needs, including developing academic partnerships with institutions that offer applicable training to facilitate newly hired employees and offering wraparound services such as child care, transportation, and upskilling to employees.[192]

TAWC testified to data from TCEQ indicating that over two thirds of licensed water system operators in Texas were eligible for retirement, meaning that, in theory, up to 20,000 Texas water operators could be lost to retirement instantaneously.[193] TAWC added that its members were finding non-operator positions (e.g., billing and customer service roles) increasingly difficult to fill as well.[194]

TAWC discussed HB 1845, a bill that created a pipeline program for current high school students and adults who never obtained a high school diploma to become water system operators via a provisional certification program yielding a Class D (i.e., entry level) license.[195] Drawing upon this example, TAWC suggested the Legislature take additional measures to streamline access to water system operator and other positions, such as providing funding for water systems to cover training expenses for prospective or provisional employees and to build relationships with Texas high schools to better take advantage of HB 1845's provisions.[196]

TCEQ testified that there were 8,216 active wastewater operator licensees in Texas as of May, 2024, that approximately 1,800 renewals occur every year, and that the total number of such licensees increased by approximately 4% from 2014 to 2023.[197] Similarly, TCEQ testified that there were 17,362 drinking water operator licensees in Texas as of May, 2024, following a 12% increase in the number of such licensees from 2012 to 2023.[198] On average, TCEQ testified the agency has seen approximately 3,800 renewals of such licenses each year.[199]

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[189] *Id*.
[190] *Id*.
[191] *Id*.
[192] *Id*.
[193] Interim Hearing, *supra* note 4 (statement of Ashley Myers, Exec. Dir., Tex. Ass'n of Water Co.).
[194] *Id*.
[195] *Id*; *see also* H.B. 1845, 88th Leg., Reg. Sess. (Tex. 2023).
[196] Interim Hearing, *supra* note 193.
[197] Interim Hearing, *supra* note 4 (testimony of Kelly Keel, Exec. Dir., Tex. Comm'n on Env't Quality); *accord* Ex. A-20.
[198] Interim Hearing, *supra* note 197.
[199] *Id*.

Drawing upon prior testimony from TAWC, TCEQ noted that three provisional licenses had been issued and five more applications were under review pursuant to HB 1845 as of the time of testimony.[200] TCEQ further noted that, at the time testimony was taken, the agency was in the process of implementing HB 2453, authorizing licensing agencies to issue digital licenses, and SB 422, requiring TCEQ to issue occupational licenses within 30 days to veterans and their spouses who maintain an equivalent license in another state, all to expedite its occupational licensing processes and, ultimately, licensee entry into the workforce.[201]

TSTC offered testimony regarding its partnership with the Texas State Board of Plumbing Examiners (TSBPE).[202] Beginning in 2021, TSTC partnered with TSBPE to send plumbing students into the field in response to the sharp increase in demand for plumbers following Winter Storm Uri.[203] TSTC worked with TSBPE to increase the number of TSBPE testing sites for prospective plumbers across the state, thereby reducing a pre-existing backlog of applicants for various plumbing licenses and expediting their entry into the workforce.[204] At time testimony was taken, over 1,500 prospective licensees had been tested through TSTC's Waco campus alone, and TSTC was developing mobile testing centers to expand the impact of the program.[205]

TSTC suggested the Legislature consider appropriate amendments to state law to encourage additional partnerships of this type between academic institutions and state agencies with occupational licensing responsibilities.[206] TSTC was developing similar partnerships to benefit other occupations with the Texas Department of Transportation and the Texas Workforce Commission.[207]

TACC testified to the wide array of programs offered by multiple Texas community colleges to train water system technicians and operators.[208] A survey of TACC members conducted immediately prior to the May 15 hearing revealed that approximately 37% of respondent colleges either already offered or were considering offering programs to produce new members of the Texas water workforce, including water and wastewater treatment operators.[209]

Grayson College in Denison, for example, offered training for water and wastewater treatment facility operators and hosted applicable TCEQ licensure examinations.[210] Since 2022, Grayson College had awarded 123 water treatment- and water supply-related credentials, largely thanks to

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[200] *Id*.
[201] *Id*; *see also* H.B. 2453, 88th Leg., Reg. Sess. (Tex. 2023); S.B. 422, 88th Leg., Reg. Sess. (Tex. 2023).
[202] Interim Hearing, *supra* note 4 (statement of Cledia Hernandez, V. C. & Chief External Rel. Officer, Tex. State Tech. Coll.).
[203] *Id*.
[204] *Id*.
[205] *Id*.
[206] *Id*.
[207] *Id*.
[208] Interim Hearing, *supra* note 4 (statement of Jeremy McMillen, President, Grayson Coll., on behalf of Tex. Ass'n of Cmty. Colls.); *accord* Ex. A-21.
[209] Interim Hearing, *supra* note 208.
[210] *Id*.

state funding disbursed through the Texas Reskilling and Upskilling through Education (TRUE) Program created by 87(R) SB 1102.[211] Grayson College frequently hosted TCEQ examinees at its Denison location from the Dallas-Fort Worth Metroplex.[212]

Interestingly, TACC noted that it had seen increased interest in its water-related programming on account of reduced tuition costs attributable to TRUE assistance, particularly from current and prospective employees of small and rural water systems.[213] TACC also noted the example of Amarillo College's partnership with the Texas Water Utility Association and the City of Amarillo to offer an annual regional water school featuring more than a dozen water-related courses often ending with TCEQ licensure examinations.[214]

TACC expressed the belief that increased alignment between workforce needs and community college offerings fostered by HB 8 will expand water-related programmatic offerings at Texas community colleges in the future, noting not only significant demand for water system employees but expanded water needs among Texas industrial users such as the semi-conductor industry.[215] Upon questioning by the WARA Committee, TACC further noted that HB 8 will incentivize community colleges to produce students with two year or lesser credentials in water-related fields such as engineering who then transfer to four year institutions to obtain four year degrees and more in relevant fields.[216]

E. Agency Coordination of Water-Related Responsibilities

The WARA Committee invited five witnesses to testify on two panels relating to the coordination of water-related responsibilities by state agencies during its September 3 hearing.[217] The first panel focused on agency responsibilities relating to water rates, including rate-making, and featured testimony from TCEQ, the Public Utility Commission of Texas (PUC), the Office of Public Utility Counsel (OPUC), and TWDB.

TCEQ gave an of overview of its history with water rate-making and the modern role it plays in that process in coordination with the PUC.[218] TCEQ originally began regulating water and wastewater utilities in 1986.[219] Pursuant to 83(R) HB 1600 passed in 2013, TCEQ transferred its water rate-making and certificate of convenience and necessity (CCN) functions to the PUC, but retained regulatory authority over the water and wastewater treatment processes carried out by water utilities.[220] A memorandum of understanding executed between TCEQ and the PUC in

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[211] *Id*; *see also* S.B. 1102, 87th Leg., Reg. Sess. (Tex. 2021).
[212] Interim Hearing, *supra* note 208.
[213] *Id*.
[214] *Id*
[215] *Id*; *see also* H.B. 8, 88th Leg., Reg. Sess. (Tex. 2023).
[216] Interim Hearing, *supra* note 208.
[217] Hearing on Interim Charges Before the Tex. S. Comm. on Water, Agric., and Rural Affs., 88th Leg., Interim (Sept. 3, 2024) (tape available from Senate Staff Services).
[218] Interim Hearing, *supra* note 217 (statement of Kelly Keel, Exec. Dir., Tex. Comm'n on Env't Quality).
[219] *Id*.
[220] *Id*; *see also* H.B. 1600, 83d Leg., Reg. Sess. (Tex. 2023).

2013 specifies both the particulars of the transfer of responsibilities between the agencies and the nature of continued coordination between the agencies at the intersections of their respective duties.[221] Those continuously coordinated activities center around non-functioning utilities, setting water quality standards, appointing temporary managers for water systems, providing notice of wholesale supply contracts, and exchanging data.[222] Of particular note are utility inventory data, investigation and compliance reports, and information regarding enforcement activities related to utility performance, all provided by TCEQ to the PUC to support the PUC's rate-making activities.[223]

The PUC testified that its mission, with respect to water, wastewater, electric, and telecommunication utilities alike, is to protect customers, foster competition, and promote high quality, reliable infrastructure via economic regulation.[224] With respect to water, the PUC's responsibilities include: regulating rates for IOUs; hearing certain rate appeals; issuing CCNs for IOUs and water supply corporations (WSCs); and approving sale, transfer, or merger (STM) transactions for IOUs and WSCs.[225] The PUC regulates rates for 382 IOUs serving approximately 300,000 of the 10 million retail water connections in Texas.[226] The size of individual IOUs regulated by the PUC varied significantly between providers serving over 10,000 connections and providers serving less than 500 connections, forming the basis of the classification system used to regulate IOUs.[227] As of the time testimony was taken, the vast majority of the regulated IOUs—332 of the 382—fell in the smallest classification, serving less than 500 connections apiece.[228]

The PUC testified that its rate-making process, though complicated, was designed to ensure customers pay just and reasonable rates for continuous and adequate service.[229] The process includes discovery, opportunities for intervenors to file recommendations, PUC staff recommendations, hearings and proposals for decisions facilitated by the State Office of Administrative Hearings (SOAH) in contested cases, and, ultimately, orders from the commissioners.[230] The PUC aptly noted that navigating this process is easier for the larger IOUs that typically have access to attorneys, accountants, and other key staff available to manage their rate cases, and much more burdensome for the far greater number of smaller IOUs that lack such resources.[231]

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[221] Interim Hearing, *supra* note 218.
[222] *Id*.
[223] *Id*.
[224] Interim Hearing, *supra* note 217 (statement of Kathleen Jackson, Comm'r, Pub. Util. Comm'n of Tex.); *see also* Ex. B-1.
[225] Interim Hearing, *supra* note 224; *see also* Ex. B-1 at 2.
[226] Interim Hearing, *supra* note 224.
[227] *Id*.
[228] *Id*.
[229] *Id*.
[230] Ex. B-1 at 4.
[231] Interim Hearing, *supra* note 224.

While the Legislature and the PUC have made efforts to improve the efficiency of the rate-making process, the PUC identified several complicating factors that continue to slow that process, namely: the increasing volume and general complexity of rate cases; that the rate case workflow is still managed manually; the lack of resources available to small utilities to assist in navigating the rate-making process; the growing number of at-risk utilities; that the expedited STM process for acquiring non-functioning utilities available to IOUs acting as temporary managers is not available to other utilities acting as temporary managers, such as WSCs, municipalities, river authorities, water control and improvement districts (WCIDs), municipal utility districts (MUDs), and special utility districts (SUDs); and that the process of approving system improvement charges (SICs) applied for by IOUs too often extends beyond the 120 day deadline currently incorporated into PUC rules.[232]

Accordingly, the PUC made the following legislative suggestions to streamline the rate-making process: funding new, full-time positions at the PUC to allow more rate change applications and rate cases to be processed concurrently; funding the implementation of a digital case management system to automate the rate-making process to the extent practicable; enhancing the financial, managerial, and technical assistance (FMT) program designed to assist smaller utilities in navigating the rate-setting process; setting a 60 day time limit for SIC applications to be processed by the PUC and deferring related prudency reviews to the next rate case by statute; and expanding the authorization for the expedited STM of troubled utilities by temporary managers to include WSCs, municipalities, river authorities, WCIDs, MUDs, and SUDs.[233] The PUC asserted its belief that the suggested changes would "improve every step in the [rate-making] process."[234] The PUC closed its testimony with an itemized list of the various ways in which the PUC coordinates rate-setting with its sister agencies.[235]

Upon questioning by the WARA Committee, the PUC explained that the implementation of a digital case management system would provide a "dashboard" both for individual cases and for the aggregated workflow process with respect to both power and water utilities.[236] The PUC testified that having that data would allow it to: better track the progress of each case; more efficiently allocate manpower and resources throughout the process; and better report PUC workflow metrics to the Legislature.[237] The PUC also stated a belief that implementing the system would eliminate duplicative and redundant data entry currently being carried out manually by individual PUC staff at multiple stages of the various PUC regulatory processes.[238] The PUC pointed to the prior, successful implementation of a digital project management system at TWDB to substantiate the resulting benefits.[239]

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[232] *Id*.
[233] *Id*.
[234] *Id*.
[235] *Id*; *see also* Ex. B-1 at 9.
[236] Interim Hearing, *supra* note 224.
[237] *Id*.
[238] *Id*.
[239] *Id*.

The PUC also explained that temporary managers of troubled IOUs must demonstrate financial, managerial, and technical competencies to achieve temporary manager status.[240] For that reason, the existing, expedited STM process for IOUs acquiring other IOUs they are already temporarily managing exists to eliminate the duplicative, redundant requirement of separately demonstrating the same competencies during the acquisition, thereby reducing the time and cost required for the STM.[241] The PUC agreed that expanding the eligibility for the expedited STM process to include other classes of temporary managers that have likewise already demonstrated their competencies to become temporary managers would ultimately be "very helpful" to the acquired IOU's retail customers.[242]

OPUC opened its testimony by stating that OPUC and the PUC work well together to ensure the interests of residential and small commercial consumers in Texas are represented during the rate-making and other processes carried out by the PUC.[243] In particular, OPUC noted that it was collaborating with the PUC to identify and address rate-making process issues in order to improve efficiencies, ensure the law and PUC rules are working as the Legislature intends, and balance the growth and advancement of the utilities industry with the interests of individual rate-payers.[244] OPUC paid similar praise to TCEQ in noting that the agency has "bent over backwards" to ensure the process works efficiently in cases where its involvement in the rate-making process has been necessitated, namely with respect to permitting.[245]

OPUC explained its role in the rate-making process as representing residential and small commercial consumers in proceedings before the PUC, SOAH, and state courts regarding water, wastewater, electricity, and telecommunications rates.[246] Generally speaking, OPUC's work results in lower costs for those ratepayers throughout the state; in Fiscal Year (FY) 2023, for example, the agency achieved approximately $623 Million in such savings.[247]

Upon questioning by the WARA Committee, OPUC stated that it has seen an increase in its caseload, particularly with respect to SIC and STM cases.[248] OPUC expressed its appreciation of the PUC's rule-making authorizing phased-in rate increases in such cases to mitigate rate shock for individual consumers.[249]

TWDB testified that it uses the data and information relating to rates provided by its sister agencies, in tandem with certain other information, to determine the eligibility of an entity for financial assistance from TWDB specified for economically disadvantaged areas, namely grant

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[240] *Id*.
[241] *Id*.
[242] *Id*.
[243] Interim Hearing, *supra* note 217 (statement of Chris Ekoh, Deputy Pub. Couns., Off. of Pub. Util. Couns.).
[244] *Id*.
[245] *Id*.
[246] *Id*.
[247] *Id*.
[248] *Id*.
[249] *Id*.

assistance and principal forgiveness, and whether an entity receiving a loan from TWDB receives rate and other revenues sufficient to meet its debt obligations.[250] In giving a thorough overview of the elaborate scoring system TWDB uses to prioritize applications for financial assistance and to evaluate a recipient's ability to repay loans, TWDB stated that it calculates the minimum rate necessary for a potential recipient to meet a future debt obligation to the agency, researches the recipient's rate history, and reviews the rate-setting procedures adopted by the recipient, if any.[251] TWDB testified that a recipient must submit documentation at the time of closing certifying that it has implemented a rate sufficient to meet its obligations before receiving a commitment of financial assistance from the agency.[252] Rate and other revenues are thereafter monitored by the agency to ensure continued sufficiency to meet outstanding obligations.[253]

The second panel invited to testify regarding state agency coordination of water-related responsibilities during the WARA Committee's September 3 hearing focused its testimony on the coordination of agency responsibilities relating to produced water. This panel featured testimony from the RRC and TCEQ.

In sync with prior testimony, the RRC again emphasized the need for oil and gas producers to have produced water disposal alternatives to injection available for deployment.[254] The RRC aptly pointed out that its reduction of the number and scale of injection well permits in the face of pressurization and seismicity issues has necessarily reduced the ability of producers to extract oil and gas due to the resulting inability to dispose of the produced water biproduct.[255] Therefore, the RRC asserted, developing safe, alternative disposal methods is a "critical necessity" for the oil and gas industry in Texas to operate at full capacity.[256]

The RRC testified that the standards to which produced water must be treated to be useable for beneficial purposes are established by the EPA and implemented in Texas by TCEQ.[257] Accordingly, while the RRC conducts permitting for injection well disposal, alternative produced water disposal methods which could result in produced water runoff into surface waters of the state fall within TCEQ jurisdiction.[258] Similarly, treated produced water which may be sold as a commercial product falls within TCEQ jurisdiction.[259] Pointing to produced water's legal and regulatory classification as "waste" as an impediment to innovation, the RRC suggested that establishing an alternative classification to waste for treated produced water would "be extremely helpful to allowing for exploration of alternative disposal methods."[260]

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[250] Interim Hearing, *supra* note 217 (statement of Jessica Peña, Deputy Exec. Adm'r for Water Supply & Infrastructure, Tex. Water Dev. Bd.).
[251] *Id*.
[252] *Id*.
[253] *Id*.
[254] Interim Hearing, *supra* note 217 (statement of Christi Craddick, Chairwoman, Tex. R.R. Comm'n).
[255] *Id*.
[256] *Id*.
[257] *Id*.
[258] *Id*.
[259] *Id*.
[260] *Id*; *see also* Tex. Nat. Res. Code § 122.001(2).

TCEQ testified that it received delegated authority from the EPA to issue permits for the discharge into surface waters of produced water, hydrostatic test water, and gas plant effluent resulting from certain oil and gas extraction activities in January, 2021.[261] The surface water quality standards applied to the produced water discharge permitting process by TCEQ are commensurate with those applied to other types of discharge permits.[262] In general, such discharge permits are designed by TCEQ to ensure that discharges will not: result in in-stream aquatic toxicity; cause a violation of state surface water quality standards; result in the endangerment of drinking water supply; or result in aquatic bioaccumulation that threatens human health.[263]

TCEQ developed two types of permits for produced water discharge east of the 98th Meridian: one that authorizes discharge from oil stripper well facilities, coastal facilities, and territorial seas facilities within three miles of the Texas coast; and one that authorizes discharge from outer continental shelf facilities into the Gulf of Mexico from three to 10.357 miles offshore.[264] As of August, 2024, TCEQ had authorized 18 such permits for stripper wells and six permits for offshore discharge.[265] West of the 98th Meridian, oil and gas producers are able to obtain a permit for produced water discharge into surface waters from TCEQ only for the beneficial use, namely for the benefit wildlife or agriculture.[266] At the time testimony was taken, TCEQ had renewed one such permit originally issued by the EPA and the RRC prior to delegation of permitting authority to TCEQ and was reviewing three applications for such permits.[267]

Upon questioning by the WARA Committee, TCEQ clarified that the RRC retains permitting authority with respect to the land application of produced water.[268] The RRC clarified that the water quality standards that must be met for discharge to be permitted in land application contexts are set by the TCEQ and followed by the RRC during the permitting process.[269] TCEQ noted upon further questioning by the committee that the water quality standards the agency follows are set by the EPA, and that the EPA oversees the TCEQ permitting process such that objections expressed by the EPA to permits proposed by TCEQ must be resolved before the permits may be issued.[270] TCEQ expressed the belief that the EPA will thoroughly review permits stemming from the three produced water discharge applications currently under review by TCEQ, and expressed concern that EPA standards applicable to produced water discharge likely were not designed with the volume of produced water needing to be discharged in Texas in mind.[271]

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[261] Interim Hearing, *supra* note 218.
[262] *Id*.
[263] *Id*.
[264] *Id*.
[265] *Id*.
[266] *Id*; *see also* 40 C.F.R. § 435.50 (2024).
[267] *Id*.
[268] *Id*.
[269] Interim Hearing, *supra* note 254.
[270] Interim Hearing, *supra* note 218.
[271] *Id*.

In response to additional questions from the WARA Committee, the RRC testified that oil and gas producers do generally report the constituent chemicals used in their respective fracking processes, though they withhold the specific proportions of each chemical in their fracking formulas for proprietary reasons.[272] Both the RRC and TCEQ felt the existence of that information enabled them to know what to test for in determining whether treated produced water would meet the water quality standards necessary for discharge to be authorized.[273]

F. Small Water System Consolidation

The WARA Committee invited three witnesses to testify on a panel regarding the consolidation of small water systems in Texas during its September 3 hearing. Witnesses testified on behalf of the Angelina & Neches River Authority (ANRA), the Water Finance Exchange (WFX), and the South Plains Water Supply Corporation (SPWSC).

ANRA testified that 507 public water systems, including 329 with fewer than 500 connections, fall within its approximately 8,500 square mile jurisdiction encompassing all or part of 17 counties.[274] ANRA first consolidated a water system into its operations through a process that ran from 1994 to 1998, and has consolidated multiple additional systems into its operations since that time.[275]

ANRA gave the WARA Committee a comparative overview of its experiences with two recent consolidations, one being the consolidation of the Prairie Grove Water Supply Corporation (PGWSC) that took approximately a year and a half to complete beginning in 2020, and the other being the consolidation of Central Heights Utilities (CHU) that took approximately three months in 2023.[276] ANRA attributed the disparity in the lengths of time taken to consolidate these two systems to the different natures of their respective consolidation processes; PGWSC was consolidated into ANRA through ordinary regulatory channels, whereas CHU was consolidated into ANRA via legislative action.[277]

Despite being an uncontested STM, ANRA noted significantly more regulatory difficulty in the process of consolidating PGWSC into its operations owing to the required PUC regulatory approval via unavoidable rate cases concerning critical SICs.[278] Because PGWSC had no board of directors and was essentially defunct at the time of consolidation—as is often the case when dealing with small systems needing consolidation, ANRA pointed out—ANRA was effectively "stuck between a rock and a hard place," unable to make any system improvements until after

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[272] Interim Hearing, *supra* note 254.
[273] *Id*.
[274] Interim Hearing, *supra* note 217 (statement of Kelley Holcomb, Gen. Manager, Angelina & Neches River Auth.); *accord* Ex. B-2.
[275] Interim Hearing, *supra* note 274.
[276] *Id*.
[277] *Id*; *see also* S.B. 1305, 88th Leg., Reg. Sess. (Tex. 2023).
[278] Interim Hearing, *supra* note 274.

the associated rate cases were resolved.[279] To exemplify the degree of improvements and repairs needed to the PGWSC during that time period, ANRA testified that it repaired 112 water leaks in the system responsible for 5.5 million gallons of water loss.[280]

To improve the consolidation process, ANRA suggested: developing streamlined PUC regulatory and administrative processes for uncontested STMs involving retail public utilities and qualified entities that do not incorporate administrative law judges; the development of "safe harbor" provisions against drinking and clean water violations for entities consolidating smaller systems by TCEQ in tandem with the EPA; the development of a streamlined process of deploying TWF monies in support of small system consolidation processes; and generally favoring small system consolidation in the various PUC, TCEQ, and TWDB processes involved with it.[281]

WFX began its testimony by painting the recent emphasis on water infrastructure improvements in rural and disadvantaged communities as an opportunity for collaboration among stakeholders, including non-profit groups and private entities like WFX.[282] As a non-profit group, WFX partners with small and rural communities to help those communities finance sustainable and affordable water and wastewater systems.[283] At the time testimony was taken, WFX was working with over 50 Texas communities and other entities, including ANRA and SPWSC, which WFX had assisted in raising over $100 Million in capital for water infrastructure projects.[284]

WFX testified that there are over 6,000 water systems in Texas serving less than 3,000 people, many of which are financially and operationally challenged.[285] WFX shared two observations from its experiences working with such communities: first, that the needs are large, complex, and will take time to address; and second, that many such communities do not lack the willpower to address their needs, but simply lack the expertise to fully understand the programs available to assist them in doing so.[286] Similarly, WFX identified two critical areas of need to facilitate better participation in financial assistance programs among such communities: technical assistance in navigating those programs; and regional collaboration, as a means of expediting the process of addressing the needs of small communities by bundling them together instead of addressing them one at a time.[287]

WFX expressed a belief that many such communities are located in regions with significant economic potential, but that such potential is unachievable without adequate water supply and affordable water infrastructure.[288] In that vein, WFX identified Presidio County as a region of the

[279] *Id*.
[280] *Id*.
[281] Ex. B-2 at 3.
[282] Interim Hearing, *supra* note 217 (statement of Hank Habicht, Managing Co-Founder, Water Fin. Exch.); *accord* Ex. B-3.
[283] Interim Hearing, *supra* note 282.
[284] *Id*.
[285] *Id*.
[286] *Id*.
[287] *Id*.
[288] *Id*.

state where greater economic development activity has been facilitated as a result of improved water infrastructure.[289]

To facilitate greater participation in financial assistance programs by small communities, WFX suggested that TWDB create a "window" of particular focus and attention for communities with 3,000 or fewer residents to receive targeted assistance in applying for the various forms of TWDB assistance, with an eye toward improved collaboration with the PUC and TCEQ along these lines.[290] WFX further suggested a grant program geared toward urgent needs in small communities, and funding for TWDB to carry out the heretofore mentioned efforts.[291]

To facilitate more small system consolidation in the future, WFX suggested: expanding the expedited acquisition process for certain types of temporary managers enacted via SB 1965 to include all types of utilities serving as temporary managers; clarifying that the existing "safe harbor" provisions for regional water systems integrating smaller water systems into their operations enacted via HB 3232 apply regardless of whether the involved systems are IOUs; and expanding the existing Water Utilities Technical Assistance Program via increased funding.[292]

SPWSC testified that it was created to serve as the temporary manager and, ultimately, the owner and operator of four individual, small water systems serving approximately 300 total connections and operating under the umbrella of a now defunct IOU in an unincorporated area of Lubbock County.[293] In short, mounting neglect, damage from natural disasters, and insufficient funding for maintenance and repairs led to deteriorating system conditions, compliance issues, customer frustration, and serious water quality concerns including "elevated levels of arsenic, fluoride, nitrate, selenium, and [per- and polyfluoroalkyl substances]."[294] The decision to transfer the four systems from an IOU to a WSC was motivated by the need to access TWDB financial assistance reserved for the benefit of public water systems.[295] SPWSC noted that the final transfer of the assets was approved by the PUC the week before testimony was taken.[296] In that vein, SPWSC, expressed appreciation for "the fantastic cooperative efforts of [TWDB], the [PUC], and [TCEQ]" and stated that "its achievements in its first twelve months of existence… were possible only with the assistance of dedicated employees of these agencies."[297]

SPWSC drew upon its experiences to suggest that the state, in order to assist water systems similarly situated to SPWSC, should: establish an imminent endangerment funding assistance program for water systems the state places under temporary management or receivership;

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[289] *Id*.
[290] *Id*.
[291] *Id*.
[292] *Id*; *accord* Ex. B-3 at 3-4; *see also* S.B. 1965, 88th Leg., Reg. Sess. (Tex. 2023); H.B. 3232, 88th Leg., Reg. Sess. (Tex. 2023).
[293] Interim Hearing, *supra* note 217 (statement of Ken Rainwater, S. Plains Water Supply Corp.); *accord* Ex. B-4.
[294] Interim Hearing, *supra* note 293.
[295] *Id*.
[296] *Id*.
[297] *Id*.

broaden the applicability of pertinent "safe harbor" provisions to encompass more water systems seeking regionalized solutions for problems like those experienced by SPWSC; add flexibility for funding decisions consistent with intended use plans to ensure funding for systems transitioning from a privately owned, non-functioning state into a public and compliant status; expand the applicability of the PUC's expedited process for STM applications by temporary managers to include all types of utilities, not just IOUs; consider increasing funding for technical assistance to water systems in small, disadvantaged, and underserved communities; and generally encourage regional collaboration yielding solutions for water and wastewater issues.[298]

[298] *Id*.

III. Monitoring Charges

The WARA Committee reviewed the implementation of the following legislation:

- Senate Bill 28, relating to financial assistance provided and programs administered by the Texas Water Development Board;
- Senate Bill 1289, relating to the disposal of reclaimed wastewater;
- Senate Bill 1414, relating to the temporary regulation of the practice of veterinary medicine by the Texas Department of Licensing and Regulation; and
- Senate Bill 1648, relating to the Centennial Parks Conservation Fund.

A. Senate Bill 28

The WARA Committee invited four witnesses to testify on a panel regarding the implementation of SB 28 at its September 3 hearing.[299] Witnesses represented TWDB, TXWIN, and TRWA.

TWDB testified that SB 28 created the TWF and the New Water Supply for Texas Fund (NWSTF), and allocated $1 Billion to support water infrastructure projects in Texas, following the passage of Proposition 6 by Texas voters in November, 2023.[300] TWDB "had a mandate from Senate leadership, House leadership, and [Governor] Greg Abbott [to] get the dollars out fast, ensure those dollars are spent responsibly, address water loss and conservation, save some room… for the big, regional projects, and make those dollars last."[301] TWDB developed a plan to address each element of that mandate, incorporating feedback obtained from stakeholders via surveys and stakeholder meetings.[302] TWDB further endeavored to "spread the love," i.e., to ensure that communities of different sizes spread throughout the state benefitted from the funds authorized by SB 28, and to utilize the full breadth of pre-existing TWDB financial assistance programs the TWF is intended to support.[303]

TWDB explained the process it used to distribute the $1 Billion appropriation tied to SB 28.[304] Through solicitations for applications applicable to the CWSRF and DWSRF, TWDB identified 68 water conservation and water loss projects requiring approximately $607.3 Million in assistance that were eligible to receive TWF monies via the Rural Water Assistance Fund (RWAF) and Water Loan Assistance Fund (WLAF), two pre-existing funds supported by the TWF.[305] Of those 68 projects: 18 with a total cost of approximately $43.2 Million were submitted by communities of 1,000 residents or less; 40 with a total cost of approximately $330.7 Million were submitted by communities with populations of 1,001 to 10,000 residents;

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[299] *See generally* S.B. 28, 88th Leg., Reg. Sess. (Tex. 2023); *see also* S.J.R. 75, 88th Leg., Reg. Sess. (Tex. 2023).
[300] Interim Hearing, *supra* note 217 (statement of Brooke Paup, Chairwoman, Tex. Water Dev. Bd.).
[301] *Id*.
[302] *Id*.
[303] Interim Hearing, *supra* note 217 (statement of Bryan McMath, Interim Exec. Adm'r, Tex. Water Dev. Bd.).
[304] *Id*.
[305] *Id*; Ex. B-5 at 5.

nine with a total cost of approximately $108.4 Million were submitted by communities with 10,001 to 150,000 residents; and one with a cost of $125 Million was submitted by a community with more than 150,000 residents.[306]

From the $1 Billion initially appropriated to the TWF, TWDB targeted for eventual transfer to RWAF $45 Million to fully fund the 18 projects for "tiny" communities through grants, and $130 Million to fund 22 of the 40 projects for "small" communities through grants covering 90% of project costs and requiring a loan or local match commitment to cover the remaining 10%.[307] In accordance with the applicable law, priority was given to grants in support of projects benefitting economically disadvantaged communities and to so-called "shovel-ready" projects that can begin construction quickly upon receipt of the assistance.[308] In the same vein, TWDB targeted $20 Million for eventual transfer to RWAF for grants covering all expenses relating to six projects deemed high risk or need.[309] TWDB targeted $90 Million for eventual transfer to WLAF to finance projects for mid-sized communities through grants covering 70% of associated costs and requiring a 30% loan or local match commitment.[310] The lone project application received from a large community was set aside to be considered for financial assistance through the SWIFT.[311]

Of the remaining $715 Million initially appropriated to the TWF, TWDB targeted: $300 Million for eventual transfer to the SWIFT to support large, regional projects, supplanting funds that will remain in the SWIRFT for continued investment instead of being transferred to the SWIFT per usual practice; $250 Million to the NWSTF, in accordance with applicable law; $150 Million to various, existing TWDB programs (e.g., the CWSRF, DWSRF, D-Fund, etc.) to support bond-leveraged funding; and $15 Million to support a statewide water public awareness program.[312]

Upon questioning by the WARA Committee, TWDB admitted that congressional earmarks are siphoning federal funds away from the CWSRF and DWSRF, reducing the funding available for water and wastewater projects in rural and economically disadvantaged communities in particular.[313] TWDB stated that it "cannot overemphasize the need for infrastructure dollars right now," pointing to the necessity of water infrastructure and the requisite funding to support it to sustaining the state's current population growth rate of "almost 1,300 citizens a day" and maintaining the continued desirability of Texas as a venue for economic development.[314]

TXWIN testified to the results of a survey of 246 of its members that identified three areas of the most significant need for capital assistance: water treatment; water main rehabilitation, repair, or

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[306] Interim Hearing, *supra* note 303; Ex. B-5 at 5.
[307] Interim Hearing, *supra* note 303; *accord* Ex. B-5 at 6; *see also* S.B. 30, 88th Leg., Reg. Sess. (Tex. 2023), at 53:8-17.
[308] Interim Hearing, *supra* note 303; *see also* Tex. Water Code §§ 15.101(b)(1), 15.504(c), and 15.994(b).
[309] Interim Hearing, *supra* note 300; *accord* Ex. B-5 at 6.
[310] Ex. B-5 at 6-7.
[311] *Id*. at 7.
[312] Interim Hearing, *supra* note 300; TEX. CONST. art. III., § 49-d-16(e); *accord* Ex. B-5 at 6-8.
[313] Interim Hearing, *supra* note 300.
[314] *Id*.

replacement; water supply development; and wastewater treatment.[315] Of particular note, the TXWIN survey indicated that 75% of respondents wish to pursue funding for water infrastructure projects from the TWF, and 81% support a constitutional dedication of state tax revenues in support of the TWF similar in concept to the funding streams constitutionally dedicated to the State Highway Fund (SHF).[316] Some 70% of survey respondents feel the Legislature has not allocated sufficient resources or attention to address water policy issues or facilitate investment in Texas water infrastructure.[317]

Similarly, TRWA testified to a survey of 342 of the state's approximately 4,700 rural water systems across the state which, collectively, serve approximately 1 million Texans.[318] The results indicated that approximately 52% of respondents collectively serving over half a million Texans expect to exhaust their current water supplies within 20 years; indeed, 6% of respondents expect to exhaust their supplies within two years, and another 15% expect to exhaust those supplies in two to ten years.[319] Respondents identified as the causes of their concern: the state's rapid population growth; groundwater depletion; lack of funding; water loss; contract limitations; and limited surface and groundwater right availability.[320] TRWA included in its survey several illustrative quotes from respondents expressing serious concerns that generally contextualize the survey's findings and reinforce its testimony.[321]

Its survey aside, TRWA raised the subject of data in the 2022 SWP indicating that statewide water supplies will fall by 18% while statewide demand will grow 9%, all by 2070.[322] TRWA stated its belief that the 9% expected demand increase is likely "a conservative measure" given the state's accelerating, sometimes "shock[ing]" pace of population growth and economic development.[323] TRWA admitted that "fixing the water loss issue is not going to be enough to keep up with the expected [water supply] deficit."[324]

B. Senate Bill 1289

The WARA Committee invited four witnesses to testify on one panel regarding the implementation of SB 1289.[325] Those witnesses represented TCEQ, Austin Water, the National Wildlife Federation (NWF), and the Environmental Defense Fund (EDF).

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[315] Interim Hearing, *supra* note 217 (statement of Perry Fowler, Exec. Dir., Tex. Water Infrastructure Network); *accord* Ex. B-6.
[316] Interim Hearing, *supra* note 315; *see, e.g.,* TEX. CONST. art. VIII, §§ 7-a and 7-c.
[317] Interim Hearing, *supra* note 315.
[318] Interim Hearing, *supra* note 217 (statement of Jason Knobloch, Dep. Exec. Dir., Tex. Rural Water Ass'n); *see also* Ex. B-7.
[319] Interim Hearing, *supra* note 318; Ex. B-7 at 2.
[320] Interim Hearing, *supra* note 318; Ex. B-7 at 2.
[321] Ex. B-7 at 3-4.
[322] Interim Hearing, *supra* note 318.
[323] *Id*.
[324] *Id*.
[325] *See generally* S.B. 1289, 88th Leg., Reg. Sess. (Tex. 2023).

TCEQ testified that, prior to the passage of SB 1289, TCEQ rules required that entities seeking to construct or refit a wastewater plant to produce domestic, reclaimed wastewater for reuse purposes also seek a discharge or land application permit to provide an alternative means of reclaimed wastewater disposal when the reclaimed wastewater cannot otherwise be used.[326] SB 1289 authorized entities reclaiming wastewater to instead dispose of said water via a wastewater collection system without obtaining a separate permit provided the operator(s) of the collection system and the wastewater facility that will ultimately treat the reclaimed wastewater consent.[327]

At the time testimony was taken, TCEQ staff had drafted proposed revisions of existing rules necessary to implement SB 1289 and was planning to present those revisions to the agency's commissioners for consideration by the end of September, 2024.[328] Provided the commissioners approved the revisions, TCEQ expected to publish them for public comment in the Texas Register in October, 2024, and to convene a public hearing regarding the rules in November, 2024, all with a target date for final adoption of the revisions set for March, 2025.[329]

Austin testified that SB 1289 facilitates voluntary, public-private partnerships for wastewater mining within a utility's service area for the purpose of treating and reusing wastewater for non-drinking water purposes (e.g., landscape irrigation, cooling, toilet flushing, etc.).[330] With passage of SB 1289, Austin is able to enter into agreements with other entities wishing to perform treatment for wastewater reuse without obligating itself to joint ownership or joint permitting for the other party's reuse system, thereby reducing the cost and complexity of the permitting process for wastewater reuse without compromising environmental quality or public health.[331] At the time testimony was taken, Austin was finalizing its first such agreement to facilitate a private sector development that will operate its own reclaimed wastewater production facility for toilet flushing and cooling water usage.[332] Austin estimates that such projects could potentially save its operation up to 60 million gallons of drinking water per year.[333]

Additionally, Austin planned to expand its centralized reclaimed wastewater production system as of the time testimony was taken.[334] That system was then providing approximately 1.6 billion gallons of reclaimed wastewater per year to 185 properties, including city office buildings and the campus of The University of Texas at Austin.[335] Through expansion, Austin anticipated providing approximately 4.3 billion gallons of reclaimed wastewater per year by 2040.[336] Austin incentivized reclaimed wastewater use by offering discounted rates for the use of reclaimed

[326] Interim Hearing, *supra* note 217 (statement of Robert Sadlier, Dep. Dir. of Water Quality Div., Tex. Comm'n on Env't Quality).
[327] *Id*.
[328] *Id*.
[329] *Id*.
[330] Interim Hearing, *supra* note 217 (statement of Shay Ralls-Roalson, Dir. of Austin Water, City of Austin, Tex.).
[331] *Id*.
[332] *Id*.
[333] *Id*.
[334] *Id*.
[335] *Id*.
[336] *Id*.

wastewater versus rates for potable water, and offering incentives for commercial, mixed use, and multi-family properties to either connect to the existing Austin reclaimed wastewater system or implement onsite reclaimed wastewater production systems.[337] To exemplify the efficiency of using reclaimed wastewater for non-drinking water purposes, Austin pointed to one city office building that offset up to 75% of its potable water needs using reclaimed wastewater.[338]

Drawing upon Austin's example, NWF testified that the passage of SB 1289 created "huge potential" for reclaimed wastewater to reduce potable water needs across the state by reducing the regulatory complexities involved in growing the practice.[339] NWF pointed to estimates in the 2022 SWP projecting reclaimed wastewater use to grow from approximately 120,000 acre-feet per year in the 2020s to over 1 million acre-feet per year by 2070, at which point reclaimed water is expected to account for approximately 15% of Texas water supplies used by over 400 water users in all water use categories.[340] To further facilitate the development of reclaimed wastewater, NWF suggested: incorporating reclaimed wastewater components into newly constructed state facilities, both to serve as a demonstration of reclaimed wastewater's viability and to provide further data regarding the cost-effectiveness of reclaimed wastewater; and providing additional funding to the TWF in support of its various program delivery funds that can finance reclaimed wastewater projects.[341]

EDF characterized reclaimed wastewater use as, at least with respect to onsite production systems, buildings becoming their own source of water.[342] Leading with that example and drawing upon prior testimony from TRWA, EDF explained that reclaimed wastewater use offers a way to offset growing freshwater needs in urban areas, thereby leaving water from traditional, groundwater sources available for use in rural communities and agriculture.[343] EDF explained that its own research from 2019 identified the regulatory impediments removed by SB 1289 as the primary roadblock against implementing reclaimed wastewater production systems through developer feedback.[344] Like NWF, EDF suggested that all new state facilities incorporate reclaimed wastewater equipment.[345]

C. Senate Bill 1414

The WARA Committee invited three witnesses to testify on one panel regarding the implementation of SB 1414.[346] Those witnesses represented the Texas Department of Licensing

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[337] *Id*.
[338] *Id*.
[339] Interim Hearing, *supra* note 217 (statement of Jennifer Walker, Sr. Dir. of Tex. Coast & Water Program, Nat'l Wildlife Found.); *accord* Ex. B-8.
[340] Interim Hearing, *supra* note 339.
[341] *Id*.
[342] Interim Hearing, *supra* note 217 (statement of Vanessa Puig-Williams, Sr. Dir. of Climate-Resilient Water Sys., Env't Def. Fund).
[343] *Id*.
[344] *Id*.
[345] *Id*.
[346] *See generally* S.B. 1414, 88th Leg., Reg. Sess. (Tex. 2023).

and Regulation (TDLR), the Texas Board of Veterinary Medical Examiners (TBVME), and the Texas Veterinary Medical Association (TVMA).

TDLR testified that it had just completed the first year following the administrative attachment of TBVME to TDLR, which TDLR characterized as "definitely a partnership."[347] In practice, TDLR provides oversight to TBVME regarding its rule-making, administrative, and enforcement functions, while TBVME carries out its day-to-day operations.[348] The TBVME board serves in an advisory capacity to the Texas Commission on Licensing & Regulation, which ultimately approves orders and dismissals.[349] TDLR commissioned an internal audit of TBVME with an expected completion date in Fall, 2024.[350] Additionally, TDLR sought public input regarding TBVME in formulating the legislative recommendations TDLR is required to make by December 1, 2024.[351] Of the nine recommendations made by TSAC beginning in June, 2017, the State Auditor's Office (SAO) reports that four have been fully implemented, one has been substantially implemented, and the implementation of the remaining four is ongoing.[352] TDLR intends to prioritize the implementation of the remaining four recommendations.[353]

TBVME expressed sincere appreciation to TDLR for what it called a "very successful partnership."[354] TBVME asserted that it made substantial improvements over the preceding two years, namely by: reducing staff turnover from a high of 60% in FY 2022 to approximately 10%; performing a record number of 1,630 on-site compliance inspections in FY 2024, roughly doubling the prior record and putting the agency on track to inspect licensees at least once every eight years as per TSAC recommendations; procuring and implementing a new, online licensing system with assistance from TDLR and DIR, which began operation in August, 2024; and developing a public-facing licensee search function which was then expected to come online in Fall, 2024.[355]

TVMA characterized the relationship between TDLR and TBVME since the administrative attachment took effect as "collaborative and cooperative."[356] TVMA stated its belief that "TDLR has provided much-needed resources and guidance as TBVME works to remediate the systemic issues identified by [TSAC] in recent sessions."[357] Likewise, TVMA lauded the TBVME's new

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[347] Interim Hearing, *supra* note 217 (statement of Courtney Arbour, Exec. Dir., Tex. Dep't of Licensing and Regul.); *see also* Ex. B-10 at 1-15.
[348] Interim Hearing, *supra* note 347.
[349] *Id*.
[350] *Id*.
[351] *Id*; *see also* S.B. 1414, *supra* note 346, at 5:11-16.
[352] Interim Hearing, *supra* note 347; *see also* STATE AUDITOR'S OFFICE, REPORT NO. 24-022, LEGISLATIVE REQUIREMENT: AN AUDIT REPORT ON THE BOARD OF VETERINARY MEDICAL EXAMINERS 6-7 (2024).
[353] Interim Hearing, *supra* note 347.
[354] Interim Hearing, *supra* note 217 (statement of Brittany Sharkey, Exec. Dir., Tex. Bd. of Veterinary Med. Exam'rs); *see also* Ex. B-10 at 16-20.
[355] Interim Hearing, *supra* note 354.
[356] Interim Hearing, *supra* note 217 (statement of Troy Alexander, Exec. Dir., Tex. Veterinary Med. Ass'n); *accord* Ex. B-11.
[357] Interim Hearing, *supra* note 356.

online licensee management database, noting its members' optimism despite early challenges to the system's implementation.[358]

TVMA expressed concerns regarding the increase in TBVME licensing fees from $195 per year to $340 per year, noting that licensing fees already netted TBVME more revenue than the agency receives in appropriations at the lower rate and stressing earlier assurances that an increase of that magnitude would not be necessary.[359] TVMA stressed the desire of its members to ensure that the nature of the administrative attachment between TDLR and TBVME remain temporary such that TBVME will regain independence from TDLR in 2027.[360]

Upon questioning by the WARA Committee, TBVME testified that the fee increase highlighted by TVMA is intended to be temporary in order to cover the one-time, large capital outlay associated with the new licensee database, and that the fee is intended to be reduced to a more reasonable level in the near future.[361] TVMA expressed its opinion that TBVME has made "huge strides" in processing the backlog of existing complaints in need of resolution by TBVME.[362] TDLR clarified that the TSAC recommendation SAO found to be substantially implemented would be considered fully implemented but for a minor data conversion issue which was being resolved at the time of testimony.[363]

D. Senate Bill 1648

The WARA Committee invited two witnesses to testify on a panel regarding the implementation of SB 1648, representing the Texas Parks and Wildlife Department (TPWD) and the Nature Conservancy (TNC), respectively.[364]

TPWD testified that the creation of the Centennial Parks Conservation Fund (CPCF) ushered in a "new golden age for our state parks."[365] At the time testimony was taken, the CPCF was invested in the state's treasury pool but remained outside the state treasury, and had accumulated $28.6 Million in interest through July, 2024, adding to the initial $1 Billion appropriation by the Legislature at an average rate of $4.1 Million per month.[366]

TPWD's intended use for the fund is to acquire land in areas of the state either do not currently have any state parks, or do not have sufficient existing parks to meet recreational demand, all to maximize the beneficial impact for current and future citizens of the state.[367] In effect, this

[358] *Id*.
[359] *Id*.
[360] *Id*.
[361] Interim Hearing, *supra* note 354.
[362] Interim Hearing, *supra* note 356.
[363] Interim Hearing, *supra* note 347.
[364] *See generally* S.B. 1648, 88th Leg., Reg. Sess. (Tex. 2023).
[365] Interim Hearing, *supra* note 217 (statement of Rodney Franklin, State Parks Div. Dir., Tex. Parks and Wildlife Dep't); *accord* Ex. B-12.
[366] Interim Hearing, *supra* note 365.
[367] *Id*.

strategy pays particular emphasis to the so-called "Texas Triangle" (i.e., the region of the state bound by the Dallas-Fort Worth Metroplex, the greater Houston area, and the Austin and San Antonio areas, in which approximately 70% of the state's population currently resides) and the Rio Grande Valley.[368] Additionally, the strategy emphasizes the creation of "destination parks" centered around "awe-inspiring" Texas landscapes and natural features.[369]

TPWD developed a system for identifying and evaluating tracts of land to serve as potential new state parks or additions to existing state parks, which includes consideration of the tracts' resource and recreation values, locations, economic development feasibility, involved legal complications, and stakeholder support.[370] At the time of testimony, 40 such tracts had completed the first phase of the evaluation process, and 30 such tracts had hosted on-site visits by TPWD staff following completion of the second phase of the evaluation process.[371] Ten properties were identified by TPWD as being top priorities for acquisition.[372]

TPWD noted certain complications that may slow certain acquisitions, such as pre-existing infrastructure on individual tracts.[373] Nonetheless, TPWD stated its intent to secure approval from the Texas Parks and Wildlife Commission (TXPWC) and the Legislative Budget Board (LBB) to close on the first tract procured with CPCF monies in FY 2025, and to continuously update appropriate members of the Legislature, the LBB, and the Governor's office throughout the process.[374]

Upon questioning by the WARA Committee, TPWD stated that it is currently using an endowment-style, "interest-only" approach to utilizing CPCF monies (i.e., only spending the interest accrued from the $1 Billion corpus without dipping into the initial principal).[375] TPWD noted, however, that it may spend some portion of the original corpus in the future under special circumstances, reemphasizing that all land acquisitions using CPCF monies will require TXPWC and LBB approval.[376] TPWD also stated that it has the flexibility to use CPCF monies to acquire "bolt-on" tracts: tracts of land located adjacent to existing state parks that, by incorporation into the parks, halts encroachment upon the parks' natural beauty and features by development.[377] TPWD clarified that CPCF monies cannot be used for the post-acquisition maintenance or operations of parks, whether new or existing.[378]

TNC testified first to its long history of assisting TPWD in acquiring new state parks, most notably Enchanted Rock State Natural Area in the 1970s at the behest of former First Lady of the

[368] *Id*; *see also* Ex. B-12 at 5-6.
[369] Interim Hearing, *supra* note 365.
[370] *Id*; *accord* Ex. B-12 at 3.
[371] Interim Hearing, *supra* note 365.
[372] *Id*.
[373] *Id*.
[374] *Id*.
[375] *Id*.
[376] *Id*.
[377] *Id*.
[378] *Id*; *see also* Tex. Parks & Wild. Code § 21A.005.

United States Claudia "Lady Bird" Johnson.[379] In that vein, TNC testified that land acquisitions for purposes of new state parks prior to the creation of CPCF were "opportunistic," (e.g., acquired using funds resulting from the sale of other TPWD lands, federal funds, etc.).[380] Therefore, TNC argued, the creation of the CPCF allowed TPWD to take a more proactive approach to land acquisition for purposes of opening or expanding state parks.[381]

[379] Interim Hearing, *supra* note 217 (statement of Jeff Francell, Assoc. Dir. of Land Prot., The Nature Conservancy).
[380] *Id*.
[381] *Id*.

IV. Recommendations

Upon careful consideration of the testimony and other evidence presented, the WARA Committee makes the following 20 legislative recommendations.

A. Additional Appropriations Principally in Support of New Water Supply Projects

No water system can be considered reliable if it does not have a sufficient supply of raw water to treat and deliver to its customers. Tolerating prolonged periods of insufficient supply in multiple regions of the state inevitably means risking substantially disrupting water system operations and, ultimately, interrupting the provision of water and wastewater services to millions of Texans. Accordingly, the WARA Committee considers the state's existing and anticipated water supply shortages to be the most serious risk to the long-term reliability of Texas water systems.

In light of the increasingly frequent, increasingly severe drought conditions the state has experienced in recent years, the WARA Committee is concerned about the projected shortages of water under drought conditions presented by TWDB. The committee is especially concerned about shortages projected to affect: irrigators, which would ultimately affect the state's food and fiber supplies; municipal water providers, upon which the vast majority of the state's homes and businesses rely; steam-electric power generators, which provide the lion's share of the state's dispatchable generation capacity; and manufacturers, which play a key role in the state's economy by employing much of the state's workforce and producing goods essential to meet the everyday needs of the state's citizens. Based on the current statuses of reservoir projects in the 2022 SWP presented by TWDB, the WARA Committee has little confidence that most of the state's new reservoirs will come online by their intended deadlines or in time to meet the anticipated needs they are intended to address.

Moreover, the WARA Committee agrees with Texas 2036 that TWDB's projected water supply shortages are likely underestimated in light of accelerating population growth and other economic factors. The committee was alarmed by the Texas 2036 report's predicted harms to the state's economy resulting from water scarcity and the continuing deterioration of the state's water and wastewater infrastructure, if unaddressed. Similarly, the committee recognizes the significance of the proverbial "canaries in the coal mine" exemplified by the effects water scarcity is already having on communities across the state, as pointed to by the Texas 2036 report and the Farm Bureau. Based on the testimony provided by the Farm Bureau, TAM, and TCC, it is clear to the committee that both existing water shortages and the looming threats of new or worsening water shortages in the future are already placing drag on the Texas economy which will become more cumbersome in time if the state does not develop new water supply sources.

The survey data provided by TRWA and TXWIN make clear that many of the state's water systems are concerned about both existing water shortages and shortages they believe will materialize in the near future. The polling data provided in the Texas 2036 report make clear the vast majority of Texas voters share that sentiment. The WARA Committee further agrees with the

Farm Bureau that conservation alone will not satiate the state's growing thirst, and that Texas must find a way to provide water in the Rio Grande Valley without relying on intermittent, insufficient deliveries from Mexican tributaries.

Taking all of the foregoing together, the WARA Committee feels that the Senate must act to address water supply shortages soon in order to avert serious consequences with respect to the state's long term economic development and population growth. Fortunately, the committee believes the Senate need not look far for solutions, as the tools to address these shortages already exist.

Based on the testimony provided by TWDB, Corpus Christi, IDE, EPW, and SAWS, the WARA Committee believes seawater and brackish water desalination are the foremost opportunities for the development of new water supplies sufficient to meet the anticipated water needs in most regions of the state. Based on the testimony provided by TPWC, TPWR, NGL, TXOGA, the RRC, and TCEQ, the committee believes treated produced water can provide a significant source of water sufficient to meet most water needs in West Texas, either directly or by offsetting ordinary freshwater use in the agricultural sector. The surface water data provided by TCEQ in response to questions posed during the May 15 interim hearing make clear that sufficient surface water exists in East Texas to meet its future needs with significant excess remainder.

The NWSTF provides a financial mechanism for the state to support marine, brackish, and produced water desalination projects, surface water purchases through the water bank, and the development of the infrastructure necessary to convey water from those new sources to the water systems that will ultimately treat and sell it to retail customers.[382] As one of the subsidiary funds of the TWF, the NWSTF is part of a financial structure the WARA Committee feels TWDB has demonstrated its ability to administer capably, responsibly, and effectively. It is apparent from TXWIN's survey data that the vast majority of the state's water systems desire to pursue funding for water infrastructure from the TWF and its program delivery funds, and it is apparent to the committee from the Texas 2036 report that the state will reap substantial economic benefits by investing in water infrastructure via that means. For these reasons, the committee generally agrees with the Texas 2036 report's suggestion that making additional appropriations to the TWF, subject to legislative oversight, is the most appropriate, immediate, efficacious, and beneficial course of action the Senate can take to develop new water supplies for the state, provided, however, that priority is given for distributions from the TWF in support of new water supply projects via the NWSTF.

Based on the testimonies of the same slates of witnesses, the WARA Committee recognizes that developing these types of new water supply sources and the associated infrastructure for distributing the water is a lengthy process that involves years of planning, permitting, and construction, virtually always stretching well beyond the biennial terms of the state budget cycle. In light of that reality, it is no surprise to the committee that TXWIN's survey found an

[382] Tex. Water Code § 15.153(d); *see also* Tex. Water Code Ch. 15, Subch. K.

overwhelming majority of the state's water systems would prefer a long term, dedicated revenue source for the TWF similar to those dedicated to the SHF, or that Texas 2036 suggested just such a dedication of revenue in its report, subject to legislative oversight. A dedicated revenue source would provide financial assurances necessary for the long term planning inextricably intertwined in water infrastructure development and maintenance. For these reasons, the committee agrees that the Senate should constitutionally dedicate a revenue source of appropriate size to the TWF.

The WARA Committee further recognizes, based on the testimony of TWDB, TRWA, TWCA, and TXWIN regarding the current state of existing water infrastructure in Texas, and on the Texas 2036 report, the need to upgrade and repair water infrastructure in order to mitigate water loss and ensure the most efficient delivery possible of the state's new and existing water supplies alike. Here again, the committee took particular notice of the substantial financial needs associated with water infrastructure repairs, upgrades, and replacements the Texas 2036 report tabulated. Ergo, the committee believes that, while additional monies deposited in the TWF should prioritize new water supply development to resolve the most immediate issue in the near term, the Senate should ensure sufficient flexibility for new TWF appropriations to support water loss mitigation, water conservation projects, and general water infrastructure repairs, upgrades, and replacements over the long term.

Lastly, the WARA Committee recognizes that developing marine desalination, brackish groundwater desalination, produced water treatment, and likely other sources of new water supply for the state will require significant amounts of electricity and high process heat, as made clear by the testimony and evidence submitted by Corpus Christi, SAWS, TPWR, and Natura Resources. To ensure a sufficient volume of power generated using reliable methods and equipment, such as the SMR concept pioneered by Natura, is available to provide the energy the state needs for its new water supply sources, other water infrastructure, and in general, the committee believes the Senate should appropriate additional monies in support of SMR development and deployment in Texas.

Therefore, the WARA Committee recommends that the Senate enact legislation to:

(1) make a significant appropriation to the TWF for the 2026-27 Biennium, and direct most of the appropriation to support new water supply projects via the NWSTF by rider;

(2) constitutionally dedicate a continuous revenue stream to support the TWF in perpetuity beginning in the 2028-29 Biennium, and direct most of the revenue stream to support new water supply projects via the NWSTF through the end of the 2042-43 Biennium, with appropriate sunset, transparency, and legislative oversight requirements; and

(3) make a significant appropriation for the 2026-27 Biennium in support of the development and deployment of SMR technology to provide the power necessary to meet the needs of both the state's water infrastructure and its power grid at large.

B. General Improvements to Water Infrastructure Cybersecurity

Ensuring the security of the IT infrastructure of the state's water systems is critical to ensuring their uninterrupted operations and, ultimately, the continuous, reliable provision of water and wastewater services to the general public. The cyberattacks on Muleshoe and other water systems in West Texas demonstrate their disruptive potential to water system operations and, ultimately, the serious threats potential, future cyberattacks pose to the public safety and well-being of every Texas community. Therefore, the WARA Committee feels the Senate must take action to address these threats before additional cyberattacks occur.

The WARA Committee found many of the recommendations for improvements to water system cybersecurity made by DIR and TPPF to be meritorious, partly based on the precautions and recovery measures Muleshoe testified it had taken in the wake of the Russian cyberattack experienced there. Separating the water systems' SCADA networks from the IT infrastructure they use to support externally-oriented functions, such as customer billing, and isolating the SCADA networks from the world wide web struck the committee as the most effective means possible of insulating water system operations from cyberattacks. The logic of Muleshoe's decision to do so immediately following the cyberattack it suffered is self-evident; if the SCADA systems aren't connected to the internet, then additional cyberattacks by hostile actors originating from offsite locations will be virtually impossible. Because this was once common practice, and because Muleshoe was able to do so quickly following its cyberattack, the committee does not anticipate that requiring the sequestration of SCADA systems from the internet will pose an onerous or particularly costly burden on the state's water systems.

The RSOCs proposed by DIR have piqued the WARA Committee's interest. It seems apparent to the committee that establishing the additional RSOCs contemplated by DIR would provide much-needed cybersecurity assistance to communities across the state, especially small, rural, and disadvantaged communities lacking the resources, manpower, and expertise to navigate cybersecurity issues independently. In a similar vein, the committee agrees in principle with TPPF's suggested cybersecurity audit program for water utilities. The committee believes delegating DIR the authority to conduct cybersecurity assessments of public water systems would allow the agency to directly evaluate the cybersecurity preparedness of those systems, and to make helpful, well-tailored recommendations for improvements when appropriate.

The WARA Committee believes that requiring multi-factor authentication protocols for access to SCADA networks, and perhaps all other water system IT infrastructure, is a simple and cost-effective way to improve water system cybersecurity. Expanding eligibility for the procurement of cybersecurity-related services through or from DIR to include all water systems, not solely public water systems, stood out to the committee as a way to improve water system cybersecurity at no cost to the state, and one which may in fact achieve cost savings for public water systems already utilizing such services by increasing economies of scale. Similarly, expanding the cybersecurity training requirement to encompass all public water system employees, as opposed to only those requiring use of a local government computer system or database for at least 25%

of their required duties, is one more way the committee believes the Senate can improve public water system cybersecurity without imposing a cost burden on local governments.

Lastly, the WARA Committee believes it is necessary for DIR to have the most complete overview possible of cyberattacks against water systems in Texas. Accordingly, the committee believes it appropriate to expand the existing requirement for water systems operated by local governments to report to DIR security incidents involving the breaches resulting in the unauthorized acquisition of sensitive personal information or introduction of ransomware to apply to all water systems, and to encompass security incidents that disrupt the operations of water systems. The committee does not believe doing so will impose any additional cost upon the affected water systems.

Therefore, the WARA Committee recommends that the Senate enact legislation to:

(1) require all Texas water systems to isolate their SCADA networks or, if applicable, equivalent operational IT infrastructure from the internet;

(2) support the expeditious establishment of the additional RSOCs DIR is currently developing plans for;

(3) grant DIR the authority to conduct cybersecurity assessments of public water systems;

(4) require all Texas water systems to utilize multi-factor authentication protocols for users to obtain access to their SCADA networks or, if applicable, equivalent operational IT infrastructure, and grant DIR authority to update that requirement by rule as multi-factor authentication technology advances;

(5) expand access to cybersecurity-related services procured through or from DIR to include private water systems in Texas;

(6) eliminate the effective exemption from required cybersecurity training for public water system employees who use local government computer systems or databases for less than 25% of their required duties; and

(7) require all Texas water systems to report to DIR all security incidents resulting in the unauthorized disclosure of sensitive personal information, the introduction of ransomware, or the disruption of water system operations.

C. Growing the Water Workforce

It is intuitively understood that shortages in the water workforce translate to an elevated risk of disrupted, reduced, and inferior water and wastewater services for the general public. In short, if a water system cannot keep enough employees, it cannot operate at peak efficacy or efficiency.

Given the data presented by TXWF and TAWC indicating the water workforce in Texas is now mostly eligible for retirement and that water systems are facing increasing difficulty finding new employees, the WARA Committee believes the Senate must take action to encourage growth in the Texas water workforce in order to stave off the unreliability that will inevitably result from mass numbers of unfilled operational positions in Texas water systems.

It is clear to the WARA Committee from TACC's testimony that funding distributed to Texas technical and community colleges through TRUE grants since that program's inception has aided in water workforce development. Likewise, the committee was impressed with the examples offered by TSTC and TACC of successful partnerships among two-year colleges, state agencies and water workforce employers. The results of the partnership with TSBPE proffered by TSTC (i.e., over 1,500 licensed plumbers entering the workforce more quickly via the additional TSBPE testing sites at TSTC locations over approximately two years), and between TCEQ, Grayson College, and Amarillo College proffered by TACC, speak for themselves. The committee believes continuing to support the TRUE program at least insofar as it spurs additional water-related workforce education at two-year colleges in Texas, and expanding partnerships between those institutions and the agencies that license the occupations they train students to fill, are the two best available options to address water workforce woes in Texas.

In the same vein, the WARA Committee took note of TXWF's admonition that staff turnover at those licensing agencies has resulted in a backlog of applications for occupational licensure that is itself discouraging participation in the water workforce. The committee believes it is unwise to allow a state agency workforce shortage to exacerbate the statewide water workforce shortage. Ergo, the committee feels it is necessary to take action to reduce turnover at the involved agencies as a means of streamlining the licensure process.

Therefore, the WARA Committee recommends that the Senate enact legislation to:

(1) support the continued operation of the TRUE grant program;

(2) encourage additional partnerships between Texas water systems, state agencies responsible for licensing occupations in the Texas water workforce, and Texas technical and community colleges that train students for those occupations; and

(3) reduce staff turnover at the state agencies responsible for licensing the occupations in the Texas water workforce.

D. Improving Agency Coordination & Effectiveness Relating to Water Policy

The WARA Committee feels it is imperative to address breakdowns in the regulatory and administrative processes administered by and coordinated between the PUC, TCEQ, the RRC, OPUC, and TWDB. Too often, inefficiencies and incongruities within and between these processes directly affect the financial capability of Texas water systems to repair, maintain,

upgrade and replace their infrastructure, and cause confusion and uncertainty among providers that stifle progress and innovation within the industry—ultimately impeding the ability of the affected systems to meet the water and wastewater needs of the retail customers they serve.

With respect to water rates, the WARA Committee recognizes the necessity of both sufficient revenues for water systems to continue and expand their operations and reasonable rates charged to retail customers. The committee believes the rate-making role the PUC plays is central to achieving and maintaining this balance anywhere a retail water provider is not held accountable to the public via an elected governing board or similar means. The committee also recognizes the integral nature of those rates in enabling PUC-regulated water systems to maintain compliance with TCEQ requirements and access financial assistance from TWDB. Accordingly, when inefficiencies slow the PUC's rate-making process, the committee believes that it ultimately complicates the ability of PUC-regulated water systems to draw the necessary revenues and assistance to grow and maintain their operations consistent with the needs of their customers—thereby affecting their reliability. Based on the testimony provided by the PUC and OPUC, the committee believes this strain is most acute when inefficiencies slow the review of a proposed SIC given its direct tie to water system improvements, or the review of a proposed STM when the system to be acquired is under temporary management due to managerial neglect and infrastructure conditions.

The WARA Committee was surprised to learn that the PUC is still processing its rate cases manually, and found the PUC's explanation of how a manual process slows the progress of each case to be well-founded. The committee agrees with the PUC's analysis of the various ways in which a digital case management system would improve rate-making in general. Based on the PUC's itemization of the numerous ways in which TCEQ, OPUC, and TWDB either participate in or rely upon its rate-making process, it seems self-evident to the committee that digitizing case management at the PUC would likely allow for a more efficient and expeditious exchange of information between the agencies during rate-making as well, ultimately yielding more timely results.

The WARA Committee also agrees with the PUC's suggestion that eligibility for participation in the expedited STM process for troubled IOUs under temporary management should be expanded to include all types of temporary managers seeking to acquire such IOUs, as opposed to other IOUs serving as temporary managers alone. Here, the testimony of ANRA, WFX, and SPWSC made it apparent to the committee that small, neglected IOUs are being acquired and improved by temporary managers of all types. It seemed substantively unfair to the committee to give IOU-temporary managers, in effect, preferential treatment during the STM process when all temporary managers seeking acquisition of the systems they're managing have demonstrated the same competencies to manage those systems. Additionally, expanding the expedited STM process struck the committee as a way to streamline a PUC process simply by eliminating redundancy. Lastly, it is apparent to the committee from the above-referenced testimony that the more quickly a troubled IOU can be acquired by its temporary manager, the more quickly

permanent improvements can be implemented that ultimately increase the reliability of the acquired system.

Finally, the WARA Committee agrees with the PUC's suggestion that the process for the approval of proposed SICs be capped by statute at 60 days. The committee recognizes that SICs, by their very nature, play a crucial role in improving the reliability of PUC-regulated water systems; SICs are, quite literally, a dedicated revenue source for water system improvements. Ergo, the more quickly the PUC approves meritorious SIC applications, the more quickly improvements can be made to the involved water systems. The committee recognizes that, as indicated by the PUC, prudency reviews would need to be deferred until the affected water system's next rate case to facilitate the expedited SIC review process; however, prudency reviews would already occur during an ordinary rate case, anyway. Here again, the committee sees an opportunity to improve a PUC process by reducing redundant requirements.

With respect to the regulation of produced water, the WARA Committee sees the RRC's point that the existing legal classification of produced water as "waste" may impede the beneficial use of treated produced water. The committee agrees with the RRC that establishing post-treatment legal classifications for produced water that has been treated to a quality such that it can be used for a beneficial purpose would likely facilitate greater development of produced water treatment methods and, ultimately, the actual use of the treated water.

Therefore, the WARA Committee recommends that the Senate enact legislation to:

(1) support the acquisition and implementation of a digital case management system for the PUC;

(2) expand eligibility to carry out the expedited STM process for temporary managers of PUC-regulated water systems to apply to all types of temporary managers, as opposed to only IOUs;

(3) set a 60 calendar day time limit for consideration of an administratively complete SIC application by the PUC; and

(4) establish an alternative, post-treatment legal classification to waste for treated produced water.

E. Facilitating Further Consolidation of Small Water Systems

The WARA Committee was impressed by the examples of successful water system improvements resulting from the consolidation of small, dilapidated systems presented in the testimonies of ANRA, WFX, and SPWSC. In one consolidated system alone, ANRA was able to repair over a hundred leaks and halt the loss of approximately 5.5 million gallons of water. SPWSC is already taking substantive action to address the presence of potentially dangerous

contaminants in the water supply of the four systems the corporation has consolidated. WFX's work in Presidio County has enabled local economic development. The facts make it clear to the committee that consolidating small systems is an effective means of improving the quality of water-related services across the state. Therefore, the committee believes it would be wise for the Senate to take action to encourage further consolidation.

The WARA Committee agrees with the recommendation made by ANRA, WFX, and SPWSC regarding "safe harbor" provisions, namely that such provisions originally enacted by HB 3232 should apply to all systems involved in a small system consolidation. The intent of the safe harbor provisions is to provide a shield against potential enforcement actions taken by TCEQ against a larger, regional system for issues arising out of a recently acquired, smaller system, thereby encouraging larger systems to integrate small systems with pre-existing compliance issues. If, as asserted by WFX and SPWSC, there is confusion as to whether those safe harbor provisions apply to all types of systems or only to certain types, such confusion undermines the incentivization of consolidation the Legislature intended when HB 3232 was originally passed.

The WARA Committee also agrees with the general sentiment of WFX and SPWSC that small systems need greater FMT assistance from the state when navigating the consolidation process and the various financial assistance programs consolidation affords the involved systems eligibility to participate in. The committee agrees in particular with WFX's assessment that too many small, rural, and disadvantaged communities lack the expertise necessary to successfully take advantage of such programs or navigate the consolidation process. The committee notes that the PUC expressed a similar sentiment regarding the ability of small systems to navigate the rate-making process, and made the same suggestion as a potential solution.

Lastly, the WARA Committee is sympathetic to the need articulated by SPWSC for some type of emergency assistance program for situations involving the imminent endangerment of retail customers of water systems under temporary management. The committee could not identify any existing mechanism for water systems of any size to access such assistance when catastrophe strikes. In light of the testimony provided by TRWA and TWCA to the effect that much of the water infrastructure in the state is outdated and deteriorating, it is clear to the committee that the risk of emergency situations arising in water systems is increasing. Similarly, it is self-evident to the committee that said risk is likely the highest for the systems most in need of consolidation—and likely discourages larger systems from acquiring them. Thus, the committee agrees that implementing an emergency assistance program for that narrow set of circumstances would likely encourage additional small system consolidation.

Therefore, the WARA Committee recommends that the Senate enact legislation to:

(1) clarify that the safe harbor provisions first enacted by HB 3232 apply to all types of water systems;

(2) expand existing FTM programs to provide more assistance to small, disadvantaged, and rural water systems; and

(3) establish an emergency assistance program for water systems under temporary management to resolve issues that imminently endanger their retail customers.

Appendix A: May 15, 2024, Interim Hearing Materials

Exhibit A-1	Presentation by Temple McKinnon, Dir. of Water Supply Planning, Tex. Water Dev. Bd.
Exhibit A-2	Written Testimony of Jeremy B. Mazur, Dir. of Nat. Res. & Infrastructure Pol'y, Tex. 2036
Exhibit A-3	Written Testimony of Brian Jones, Dist. 13 State Dir., Tex. Farm Bureau, w/ Attachments
Exhibit A-4	Presentation by Drew Molly, Chief Operating Officer, City of Corpus Christi, Tex., Off. of Water
Exhibit A-5	Written Testimony of Mark Ellison, Reg'l Sales Dir., IDE Tech.
Exhibit A-6	Written Testimony of Gilbert Trejo, Vice President of Operations & Tech. Servs., El Paso Water
Exhibit A-7	Presentation by Dr. Shane Walker, Faculty Co-Dir., Tex. Prod. Water Consortium
Exhibit A-8	Written Testimony of Doug White, Exec. Vice President—Water Sols., NGL Water Sols.
Exhibit A-9	Presentation by Doug White, Exec. Vice President—Water Sols., NGL Water Sols.
Exhibit A-10	Presentation by Robert Crain, Exec. Vice President, Tex. Pacific Water Res.
Exhibit A-11	Presentation by Doug Robison, Chief Exec. Officer, Natura Res.
Exhibit A-12	Written Testimony of Jim Wright, Comm'r, Tex. R.R. Comm'n.
Exhibit A-13	Written Testimony of Tony Sauerhoff, Deputy Chief Info. Sec. Officer & Cybersecurity Coordinator, Tex. Dep't of Info. Res.

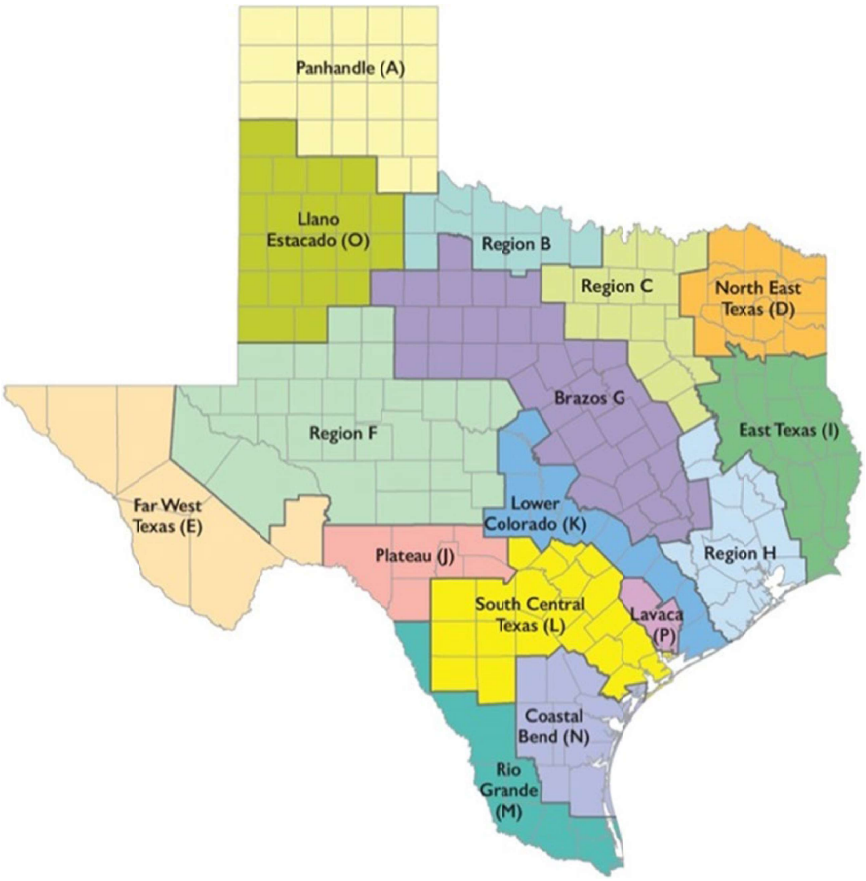
Exhibit A-14	Presentation by Tony Sauerhoff, Deputy Chief Info. Sec. Officer & Cybersecurity Coordinator, Tex. Dep't of Info. Res.
Exhibit A-15	DAVID DUNMOYER, TEX. PUB. POL'Y FOUND., MODERNIZING TEXAS' WATER INFRASTRUCTURE CYBERSECURITY (2024)
Exhibit A-16	Presentation by Jessica Peña, Deputy Exec. Adm'r for Water Supply & Infrastructure, Tex. Water Dev. Bd., & Sam Hermitte, Asst. Deputy Exec. Adm'r for Water Science & Conservation, Tex. Water Dev. Bd.
Exhibit A-17	Written Testimony of Lara Zent, Exec. Dir., Tex. Rural Water Ass'n
Exhibit A-18	Written Testimony of Perry Fowler, Exec. Dir., Tex. Water Infrastructure Network
Exhibit A-19	Written Testimony of Sarah Schlessinger, Chief Exec. Officer, Tex. Water Found., w/ Attachments
Exhibit A-20	Written Testimony of Kelly Keel, Exec. Dir., Tex. Comm'n on Env't Quality
Exhibit A-21	Written Testimony of Jeremy McMillen, President, Grayson Coll., on behalf of Tex. Ass'n of Cmty. Colls.

Texas Water Supply Planning: Demands & Needs (Potential Shortages) under Drought Conditions

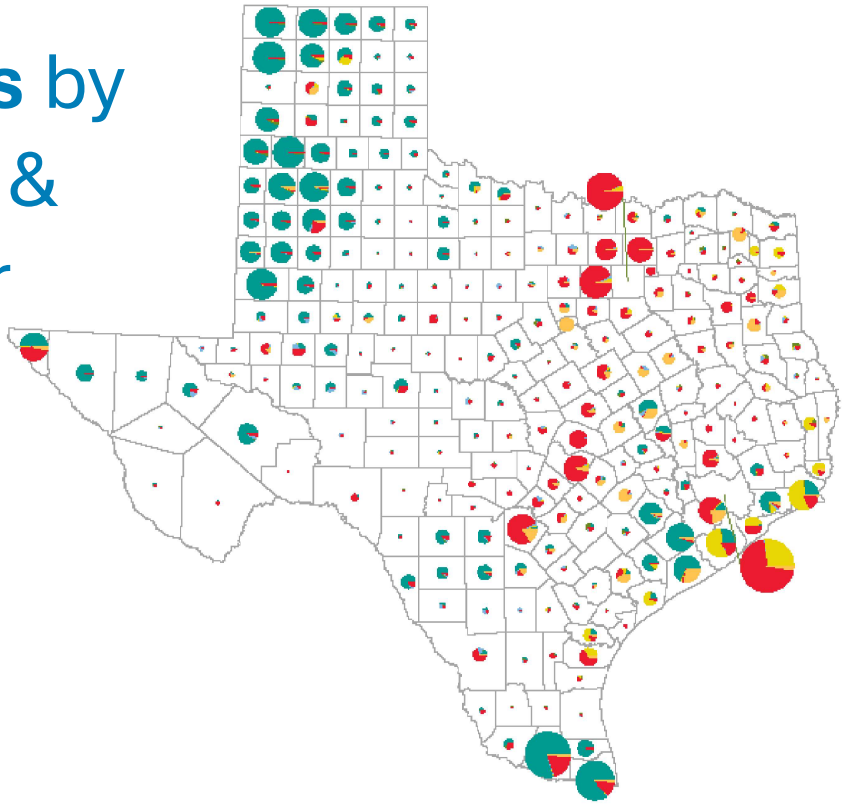
Senate Water, Agriculture & Rural Affairs Committee
May 15, 2024

Temple McKinnon, Director of Water Supply Planning
Texas Water Development Board

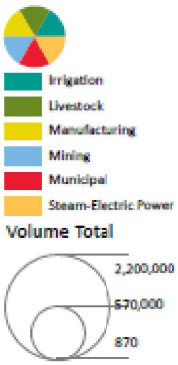
Regional water supply planning areas



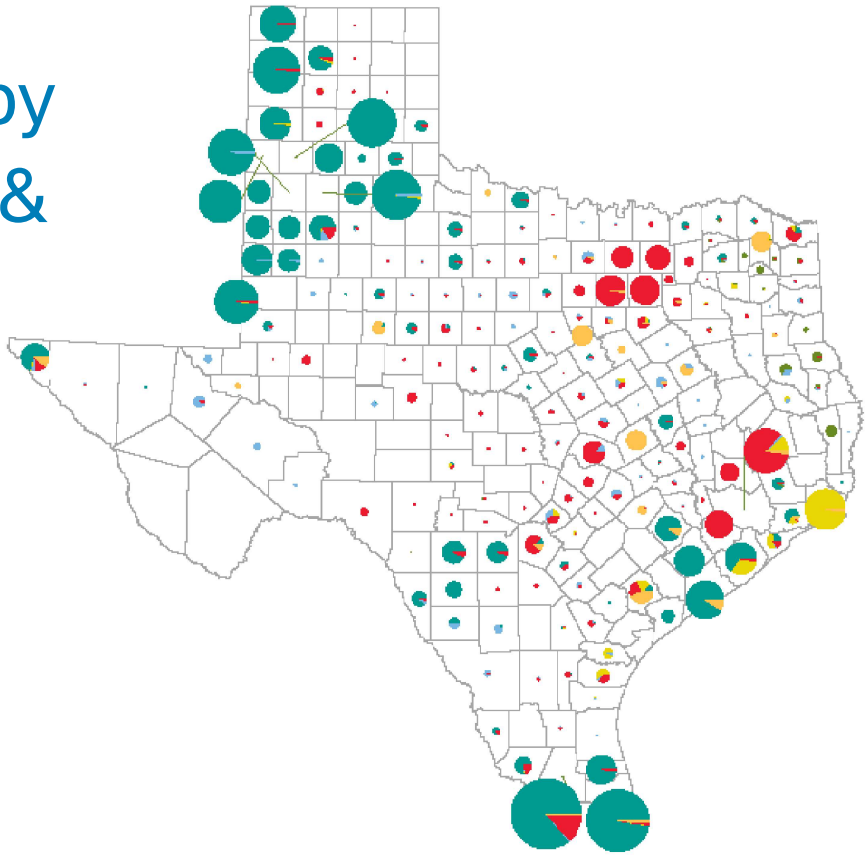
2020 **Demands** by County & Sector



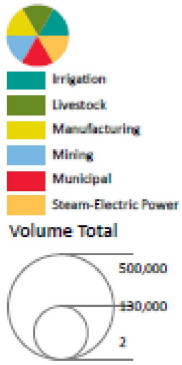
2022 State Water Plan
Planning Decade 2020
Projected Water Demands
(acre-ft/yr)



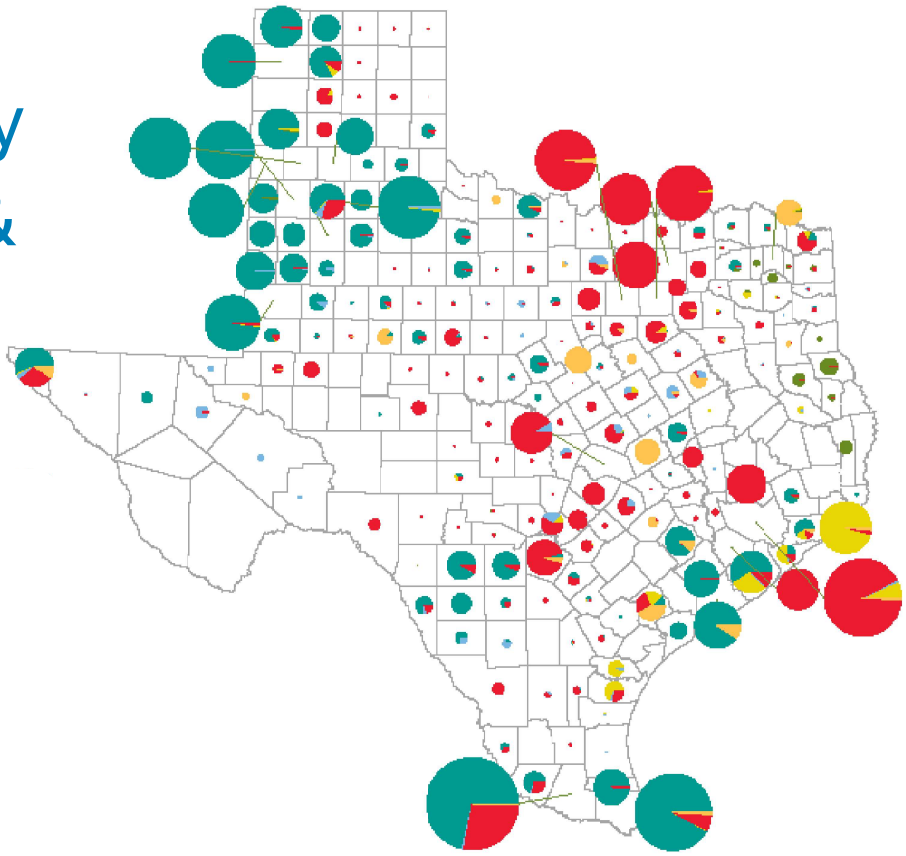
2030 **Needs** by County & Sector



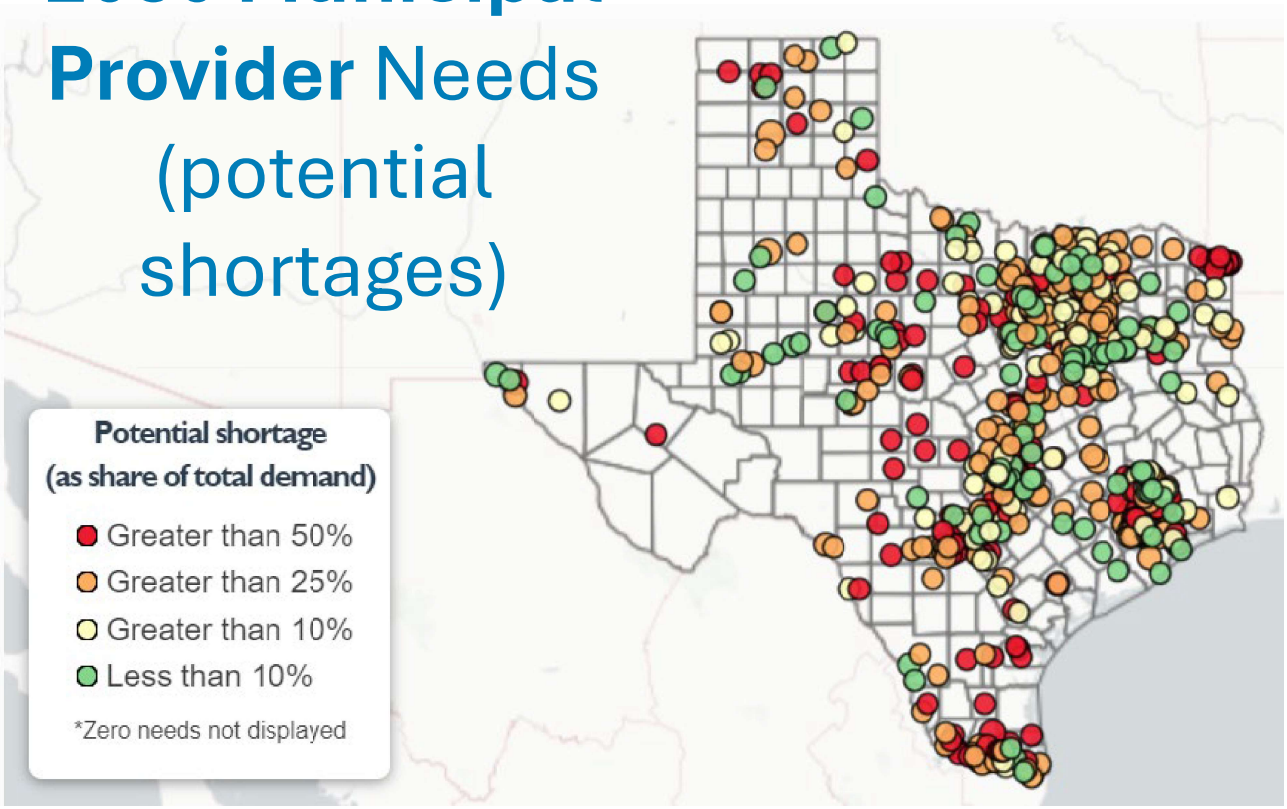
2022 State Water Plan
Planning Decade 2030
Water Supply Needs
(acre-ft/yr)



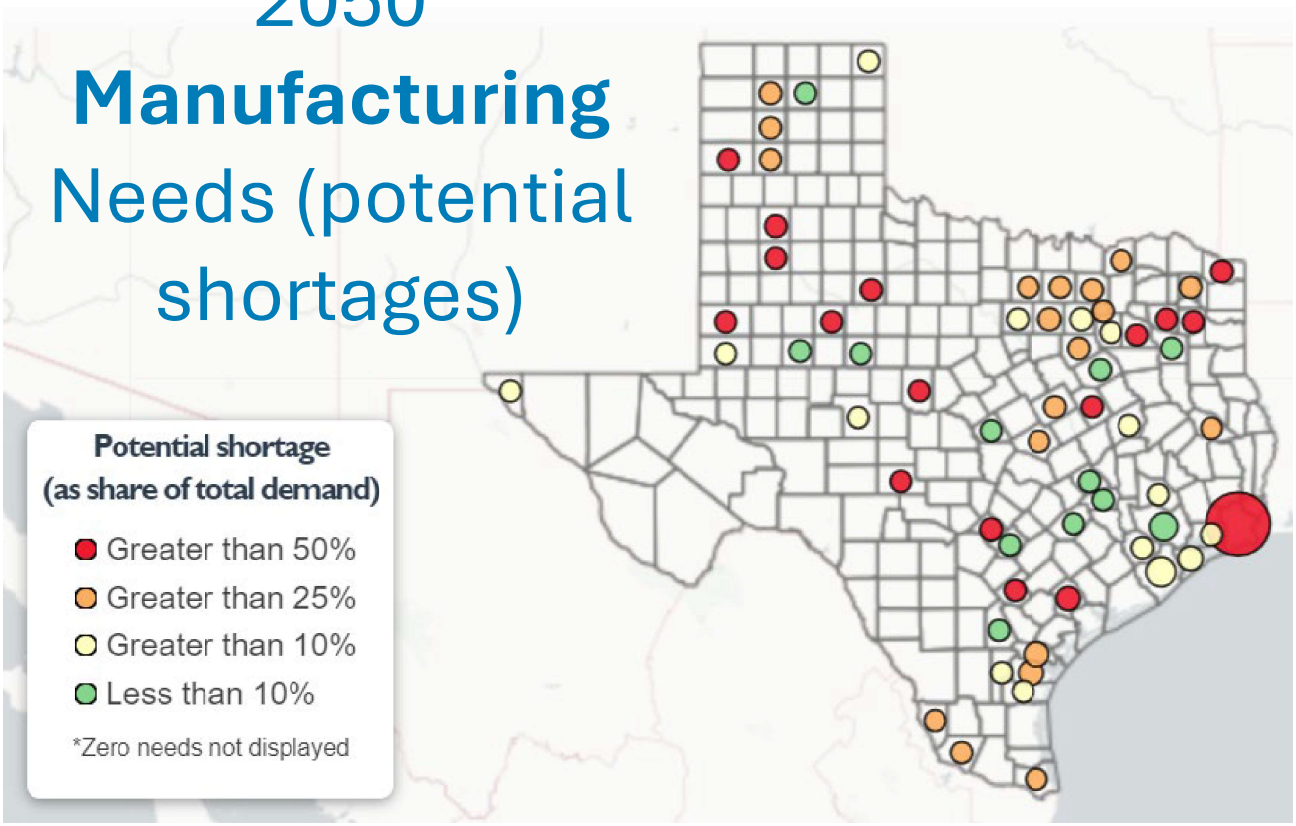
2050 **Needs** by County & Sector



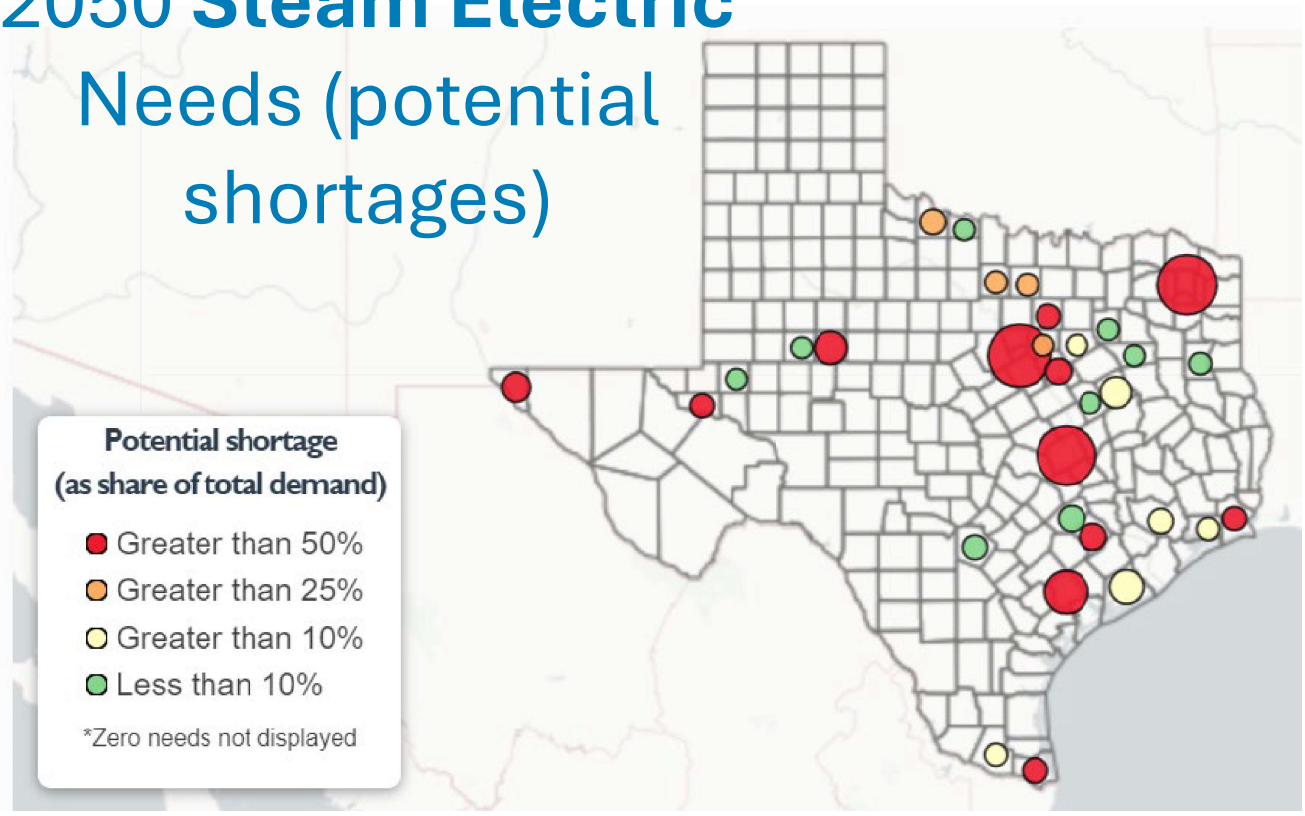
2050 **Municipal Provider** Needs (potential shortages)



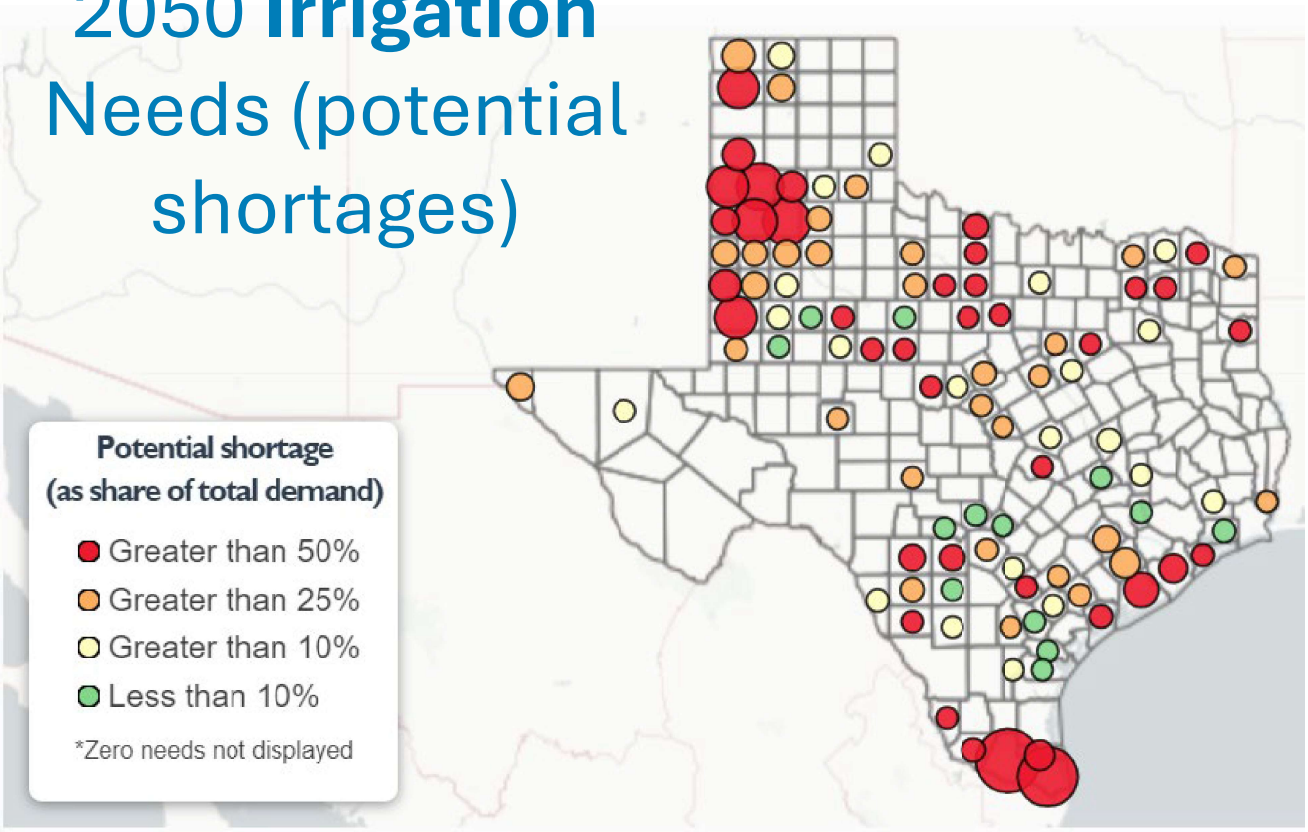
2050 **Manufacturing** Needs (potential shortages)



2050 **Steam Electric** Needs (potential shortages)



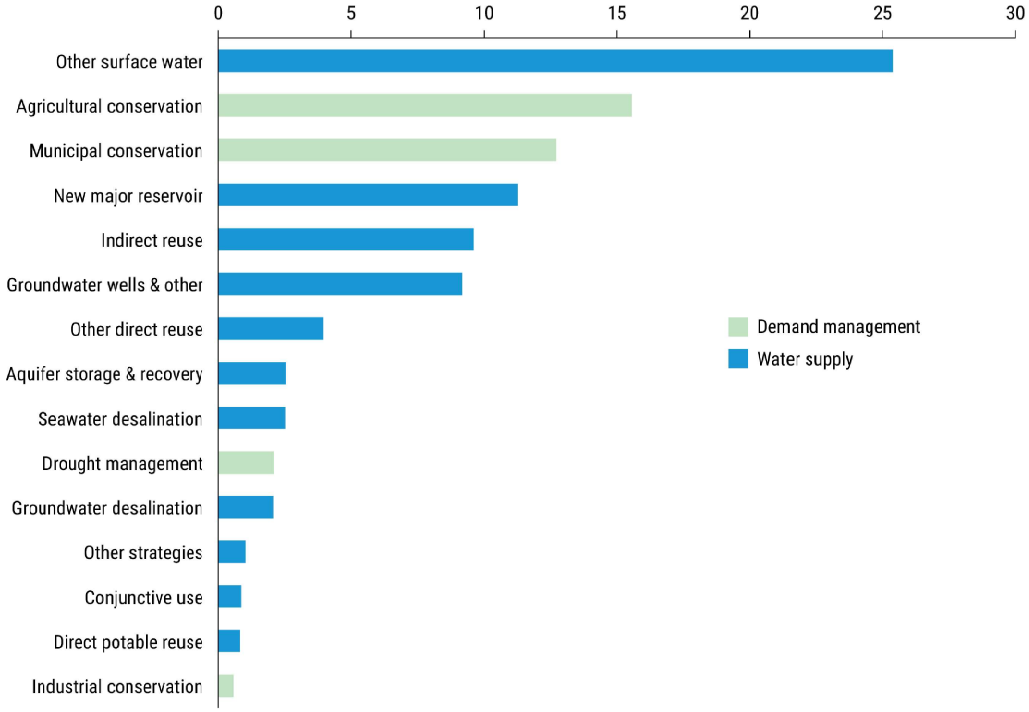
2050 **Irrigation** Needs (potential shortages)



https://2022.texasstatewaterplan.org/statewide

2070 Water Management Strategies

(percent share of total volume)



2070 Statewide Needs*
(acre-feet)

Water use category	2020	2030	2040	2050	2060	2070
Irrigation	2,396,000	3,319,000	3,280,000	3,188,000	3,094,000	3,046,000
Municipal	215,000	802,000	1,371,000	1,912,000	2,502,000	3,144,000
Steam-electric	187,000	192,000	196,000	199,000	201,000	203,000
Manufacturing	159,000	264,000	275,000	286,000	295,000	301,000
Mining	119,000	123,000	111,000	102,000	96,000	101,000
Livestock	40,000	44,000	48,000	54,000	60,000	63,000
Texas	**3,116,000**	**4,744,000**	**5,281,000**	**5,741,000**	**6,248,000**	**6,858,000**

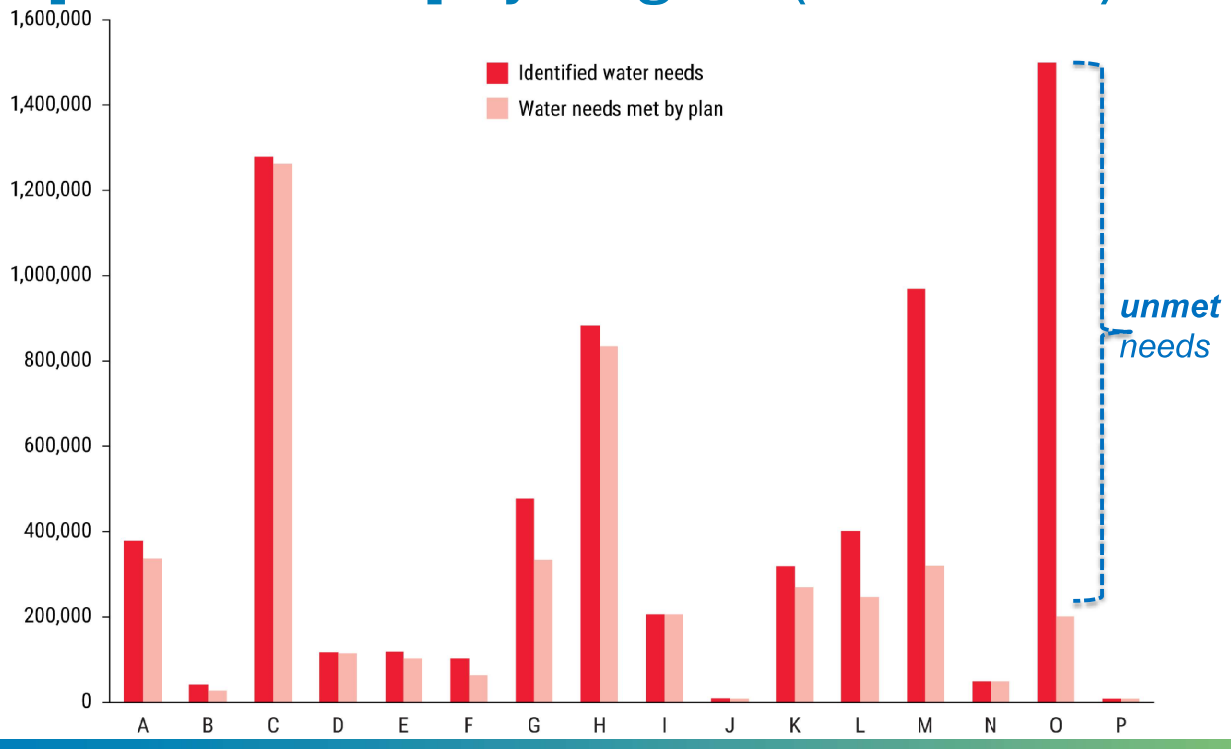
*prior to implementing the recommended strategies & projects

2070 Statewide Unmet Needs*
(acre-feet)

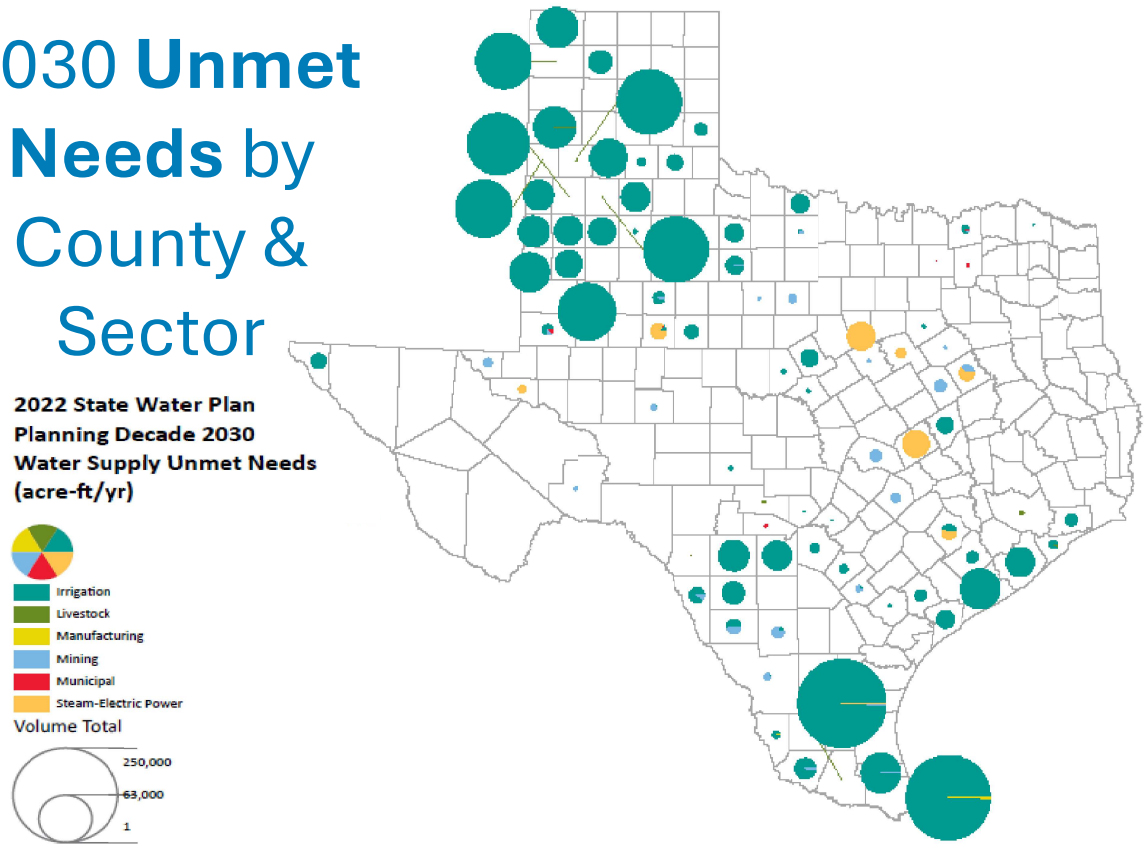
Water use category	2020	2030	2040	2050	2060	2070
Irrigation	1,917,000	2,724,000	2,512,000	2,421,000	2,377,000	2,336,000
Steam-electric	122,000	94,000	94,000	94,000	95,000	95,000
Manufacturing	110,000	1,000	1,000	1,000	1,000	1,000
Mining	52,000	46,000	41,000	35,000	29,000	32,000
Municipal	18,000	1,000	2,000	3,000	4,000	6,000
Livestock	9,000	2,000	3,000	4,000	5,000	7,000
Total	**2,228,000**	**2,868,000**	**2,653,000**	**2,558,000**	**2,511,000**	**2,477,000**

*needs that would remain assuming all recommended strategies & projects are implemented

2070 Needs and needs met [and **unmet**] by Region (acre-feet)

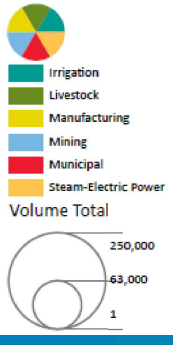


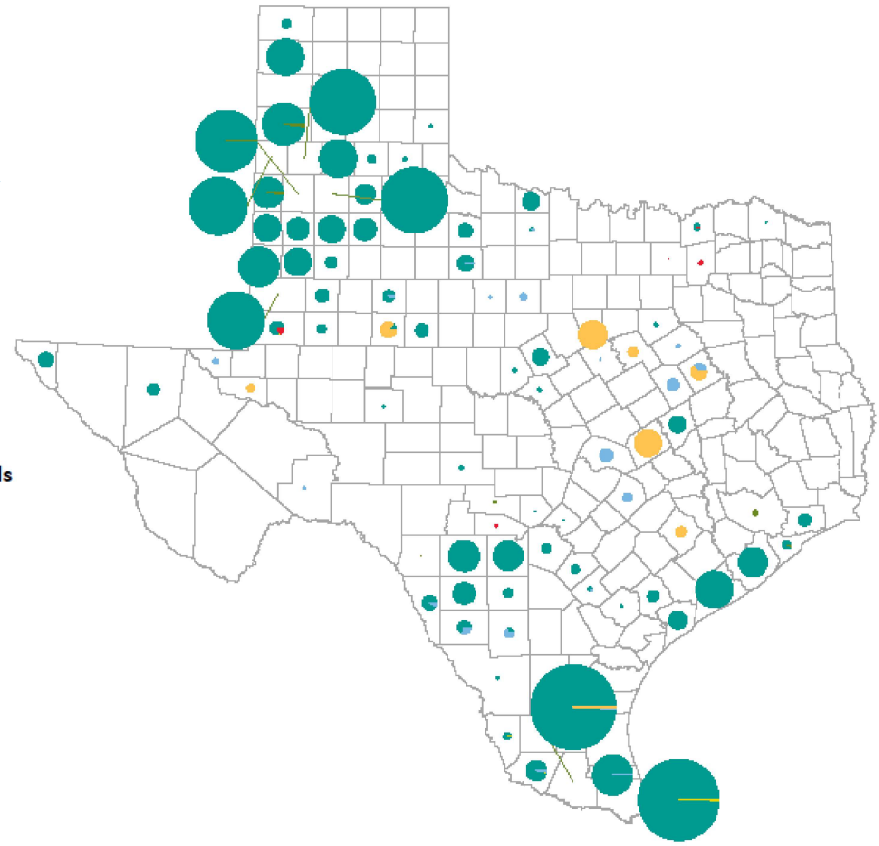
2030 **Unmet Needs** by County & Sector



2050 **Unmet Needs** by County & Sector

2022 State Water Plan
Planning Decade 2050
Water Supply Unmet Needs
(acre-ft/yr)





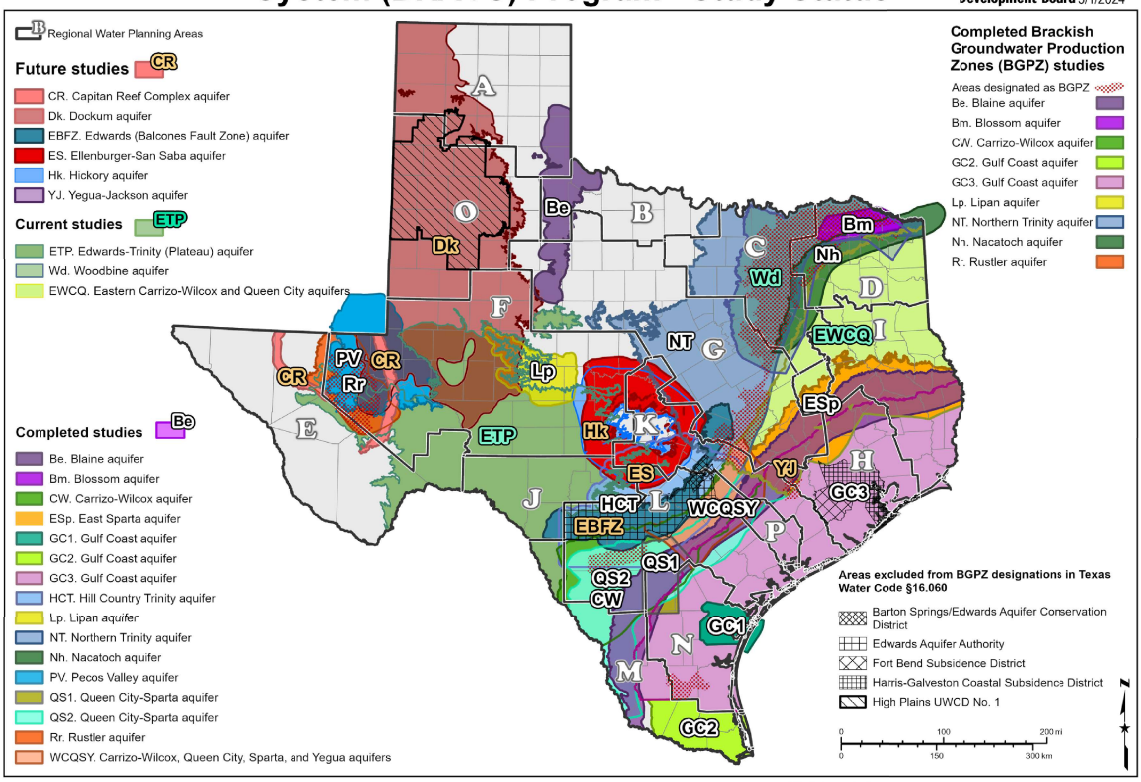
CURRENT PROGRESS/STATUS OF PROJECT MILESTONES AS REPORTED BY PROJECT SPONSORS AS OF JANUARY 1, 2023*

		Sponsor Actions		State WR Permitting		Land Acquisition		Federal Permitting		Construction	
Reservoir name	Water plan online decade	Local action taken	Sponsor funds spent	Apply for WR	WR granted	Begin	Complete	Apply for 404	404 permit issued	Begun	Complete
BEAUMONT WEST REGIONAL LAKE/RESERVOIR	2020										
BOIS D'ARC LAKE/RESERVOIR	2020										
CEDAR RIDGE LAKE/RESERVOIR	2020										
GBRA LOWER BASIN OFF-CHANNEL LAKE/RESERVOIR	2020										
DCW HARRIS RESERVOIR EXPANSION	2030										
GBRA LOWER BASIN NEW APPROPRIATION OFF-CHANNEL RESERVOIR	2030										
COLUMBIA LAKE/RESERVOIR	2030										
NCTMWA LAKE CREEK LAKE/RESERVOIR	2030										
RALPH HALL LAKE/RESERVOIR	2030										
LCRA NEW OFF-CHANNEL RESERVOIR (2030 DECADE - Excess Flows)	2030										
LCRA NEW OFF-CHANNEL RESERVOIR (2030 DECADE)	2030										
NEW THROCKMORTON LAKE/RESERVOIR	2030										
TURKEY PEAK LAKE/RESERVOIR	2030										
ALLENS CREEK LAKE/RESERVOIR	2040										
BAYLOR CREEK LAKE/RESERVOIR	2040										
BRUSHY CREEK LAKE/RESERVOIR	2040										
LAKE 7 (JIM BERTRAM LAKE/RESERVOIR	2040										
RINGGOLD LAKE/RESERVOIR	2040										
LAVACA RIVER OFF-CHANNEL LAKE/RESERVOIR	2040										
TEHUACANA LAKE/RESERVOIR	2040										
DWU MAINSTEM BALANCING RESERVOIR	2050										
MARVIN NICHOLS LAKE/RESERVOIR	2050										
AUSTIN OFF-CHANNEL LAKE/RESERVOIR	2070										

**Colors indicate milestones achieved. Activities are shown in a generalized order of execution but are not sequential and may occur simultaneously.*

Brackish Resources Aquifer Characterization System (BRACS) Program - Study Status

Texas Water Development Board 3/1/2024



Study boundaries shown include freshwater extents of the aquifers

Questions?

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Bryan.McMath@twdb.texas.gov
(512) 851-9988

Kellen McMurry, Government Relations Specialist
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Senate Agriculture, Water, & Rural Affairs Committee Hearing
Water Supply Panel Comments
Jeremy B. Mazur
Texas 2036

Mr. Chairman, members of the committee, my name is Jeremy Mazur, and I am a Senior Policy Advisor for Texas 2036. Thank you for this opportunity to offer comments on this interim charge on water system reliability.

Texas' Water Supply Deficit

The State Water Plan prepared by the Texas Water Development Board projects that Texas faces a long-term water supply deficit of 6.9 million acre-feet of water in 50 years if we do not expand our water supply portfolio and are hit by another long, severe drought.

The reason for this potential deficit is simple: we live in a drought-prone state where our population will grow as our available water supplies diminish.

I'd like to discuss several factors that could aggravate this water supply deficit.

On Population Growth

First, we know that Texas' population is projected to grow significantly over the next 50 years. A larger state population, combined with expanded economic activity, will increase and accelerate the demand for more water supplies.

Our data suggests that the path that our state's energy sector takes could significantly affect rates of population growth.

Earlier this year Texas 2036 released a study modeling how different energy pathways could affect state demographics, economic growth, and energy production. These pathways include a renewable-heavy energy transition, a more aggressive use of oil and gas, and an "all of the above" energy expansion.

What we found was that an "all-of-the-above" energy expansion policy would contribute to greater levels of population growth by year 2050 when compared to other energy future scenarios. This is due to lower wholesale electricity prices, increased oil and gas production, greater exports to domestic and international markets fostering greater economic growth that, in turn, leads to to higher population growth.

I say this to highlight the fact that the growth and evolution of our energy sector could both accelerate and heighten the long-term need for additional water supplies.

Future Droughts

Then there is the issue of drought and what it means for our future water supplies. Looking back in history, we know from paleoclimatic records that Texas endured droughts that were longer and more severe than the Drought of Record of the 1950s. These occurred during the 19th century between the time of the Texas Revolution and the Civil War and the early 18th century.

Last month, Texas 2036 and the Office of the State Climatologist at Texas A&M University released an updated report on observed and projected extreme weather trends.

While the report does not make any specific predictions, it does project "increased drought severity" due to warmer temperatures and greater rainfall variability. This rainfall variability will contribute to more erratic runoff into our surface water resources. On top of this, warmer temperatures increase the rate of summertime evaporative losses from our lakes and reservoirs by 7 percent.

The good news here is that the Legislature recently gave regional water planners the green light to plan for droughts worse than the Drought of Record of the 1950s.

The bad news here is that the famous saying that "Texas is the land of perpetual drought, visited by the occasional biblical flood" will continue to hold true, with the prospects of future droughts being worse.

I should add that we are working on another study with the State Climatologist of how greater rainfall variability combined with warmer temperatures will affect surface water availability. We plan to release that report by this summer.

The Economic Impact

The data suggests that Texas' water supply challenges will certainly grow in the coming decades. Simply put, we will need a broad, diversified water supply portfolio in order to prepare for the challenges ahead. This is in addition to the other – but somewhat related –

challenge of fixing our aging, deteriorating, and leaking water and wastewater systems.

The long-term solution here involves state and local investment in water infrastructure, including water supply projects. The state water plan already includes forecasts of what the economic consequences will be if we don't develop the water supplies needed for the next big drought. There will be GDP loss, jobs gone, and people will leave Texas for elsewhere.

If we were to invert this problem, we recognize that investment in water infrastructure supports continued economic growth and development in this state. We're looking closer at this issue at Texas 2036. This summer we plan to release another report that describes the economic benefits of water infrastructure investment. This includes how much GDP and job growth would be supported through investments in new water supplies

Of course, I plan on sharing these findings with the committee when the report is complete. With that, I close, and welcome any questions you may have.

###

Mr. Brian Jones
Texas Farm Bureau – State Director, District 13
Senate Comm. on Water, Agriculture & Rural Affairs
Hearing on Water System Reliability Interim Charge
May 15, 2024

Mr. Chairman and committee members, my name is Brian Jones. I am a Rio Grande Valley farmer and serve on Texas Farm Bureau's Board of Directors. I represent farmers and ranchers from Corpus Christi to Brownsville.

I am here today to testify on Mexico's blatant disregard of the 1944 Water Treaty that prescribes how Mexico is supposed to share water in the Rio Grande River with the United States.

The treaty calls for Mexico to deliver an average volume of 350,000 acre feet of water annually, on 5-year cycles for a total volume of 1,750,000 acre feet after 5 years.

The treaty also stipulates that shortfalls in one 5-year cycle must be repaid during the following 5-year cycle.

Unfortunately, Mexico and the U.S. State Department seem to interpret this as giving Mexico the flexibility to withhold all water deliveries for 4 years and 364 days, or even 9 years and 364 days, provided Mexico delivers 3.5 million acre feet of water by the last day of a second 5-year cycle.

This interpretation is having a devastating effect on farmers in the Rio Grande Valley.

Texas' 51 year-old sugar mill closed in March because sugarcane could not be dependably grown. This resulted in the loss of 600 jobs. Unless something changes, Texas' citrus industry will be next on the chopping block. Additionally, thousands of acres of vegetables and other irrigated crops were not planted due to lack of water, including my own farm. This year I only planted half of

my acreage because for the first time ever in 38 years, I have zero irrigation water.

Texas A&M AgriLife estimates the total economic value lost by not having irrigation water is roughly $993 million annually.

In addition to the issue created with this current interpretation of the treaty, Mexico has constructed 9 major reservoirs that are used primarily to store water for agricultural irrigation. These reservoirs intercept water that once freely flowed to help satisfy Mexico's obligations under the treaty.

There is no indication that Mexico ever intends to release water captured by these reservoirs to repay the water they owe.

To illustrate this point, please see figure 1.

The current 5-year cycle began in October 2020. In September 2022, tropical storms filled Mexico's reservoirs.

Despite being 350,000 acre feet behind in year 2 of this current cycle, Mexico did not pay off their debt. The only water that the Rio Grande Valley received in September 2022, was water that Mexico could not capture.

Over the next 12 months Mexico used 1.5 million acre feet of that stored water.

Entering year 4 of the 5-year cycle, Mexico is now more than 850,000 acre feet behind and Texas farmers are out of water.

Unfortunately, this is not a new problem. Farmers have dealt with this for decades.

The bottom line is that relying on a foreign country for water is not a good water supply strategy. The actions that need to be taken to force compliance with the treaty is simply not something our government seems to be willing to do.

Texas must be self-reliant. We must invest in building additional water infrastructure for the Rio Grande Valley. Otherwise, ruby red grapefruits will not be on HEB shelves.

Unfortunately, the Rio Grande Valley is not the only major agricultural area facing challenges.

Unlike other water use sectors, due to the economics of Texas agriculture, we cannot afford to finance infrastructure projects or compete with other users that can pay more for stored water.

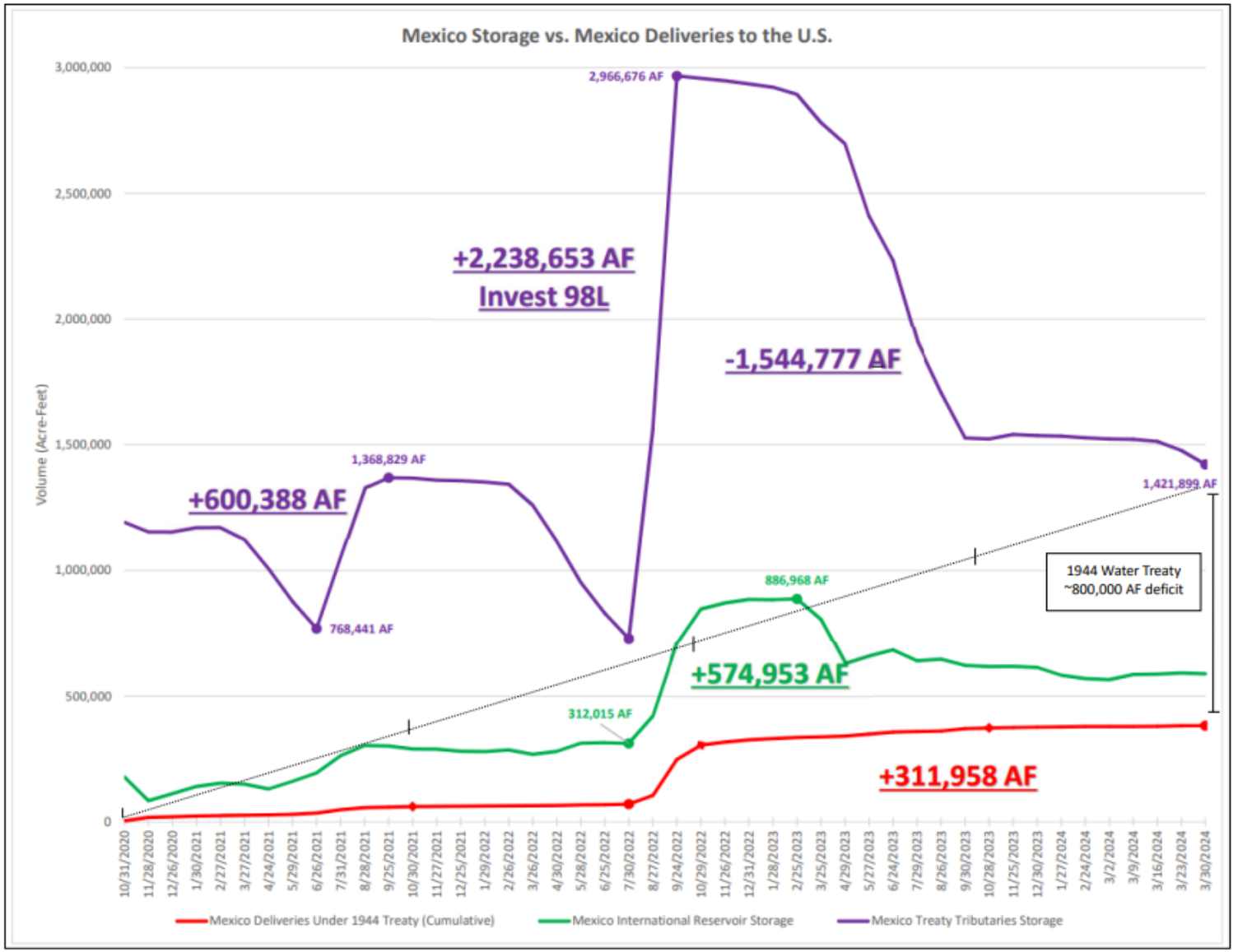
Instead, farmers and ranchers have focused on conservation and water use efficiency. But, that only goes so far.

It has helped to extend the life of the Ogallala aquifer. In some areas farmers will have groundwater for years to come, but others have run out or are quickly running out of water. And, there is no easy inexpensive option to provide new water.

As Senator Kolkhorst is well aware, in the Lower Colorado River basin, competing upstream demands forced the reallocation of reservoir storage in the Highland Lakes. And, along with the rising cost of surface water have had a devastating impact on the rice industry.

Thank you for this opportunity to provide the committee with this testimony. I'd be happy to answer any questions.

FIGURE 1. Mexico Water Delivery, Mexico Reservoir Storage, and Treaty Obligations (Oct 2020-Mar 2024)



Senate Committee on Water, Agriculture & Rural Affairs

May 15, 2024

Drew Molly, P.E.
Chief Operations Officer
Corpus Christi Water

Corpus Christi Water℠
Serving the Coastal Bend

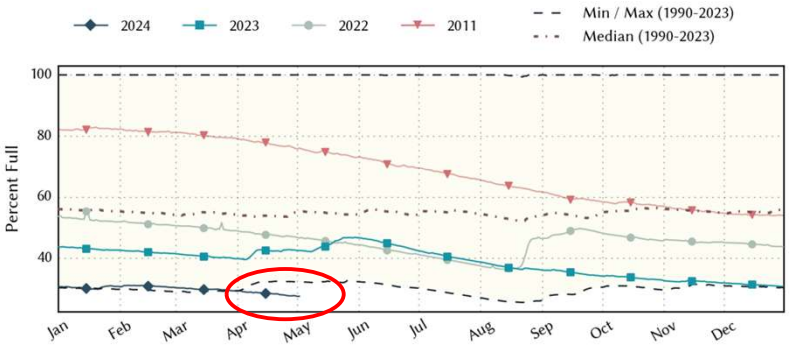
1

About Corpus Christi Water

- Regional water provider for seven counties and 500,000 people

Surface Water in the Coastal Bend

- Drought susceptible
- Stage 1 Water Restrictions since June 14, 2022
- Stage 2 Water Restrictions since March 12, 2024



Historical Combined Lake Levels of Choke Canyon and Lake Corpus Christi

2

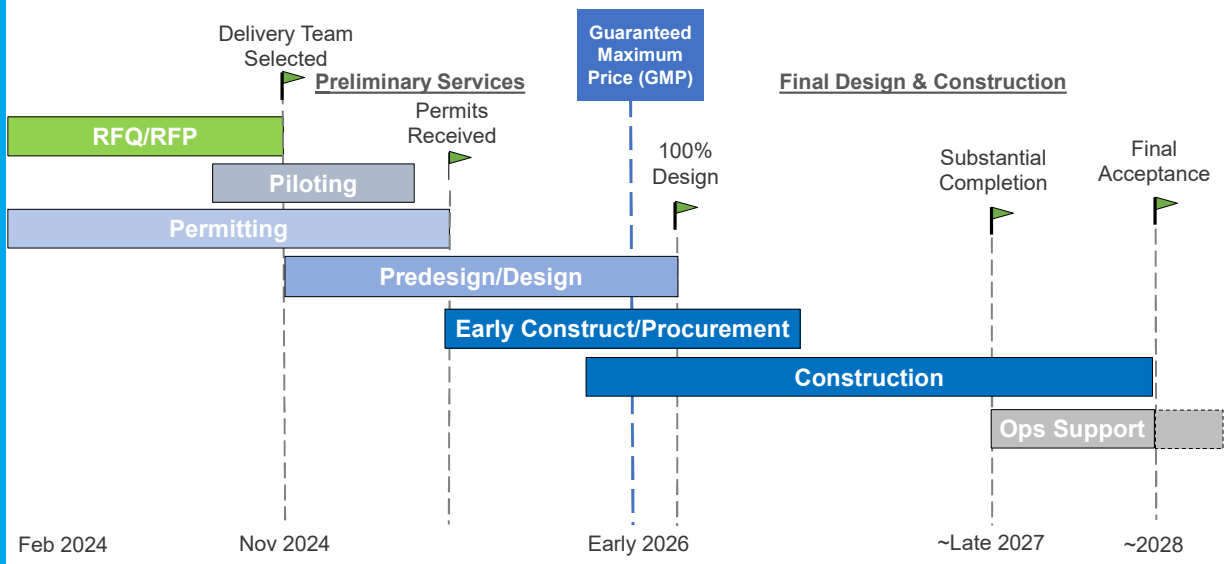
City of Corpus Christi Water Supplies

1. Nueces River Basin
   a) Choke Canyon Reservoir (CCR)
   b) Lake Corpus Christi (LCC)
2. Lake Texana (Mary Rhodes Pipeline Phase I)
3. Colorado River (Mary Rhodes Pipeline Phase II)

3

4

Inner Harbor Seawater Desalination Plant
Timeline



5

Permitting
Agencies Involved

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

US Army Corps of Engineers®

U.S. FISH & WILDLIFE SERVICE

EPA United States Environmental Protection Agency

NOAA FISHERIES

TEXAS HISTORICAL COMMISSION
REAL PLACES TELLING REAL STORIES

TXGLO

TEXAS PARKS & WILDLIFE

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

6


Thank you!
CCW
Corpus
Christi Water℠
Serving the Coastal Bend

7

Testimony of Mark Ellison, IDE Technologies
Senate Committee on Water, Agriculture and Rural Affairs
Interim Hearing: Water System Reliability
March 15, 2024

IDE Technologies and Invenergy LLC are working together to design, build, own and operate a seawater desalination plant in Freeport, Texas. When finished this plant will supply both municipal drinking water customers and industrial water customers in the lower Brazos River basin. The plant will be designed and constructed in a fashion that will allow an increase in volume supplied to future municipal and industrial growth.

While the plant will be positioned to supply drought proof, uninterruptable and subsidence proof water to counties in the area we belief it will also improve the water supply readiness and resilience for the region and the entire Brazos River basin.

We are working in close cooperation with the Brazosport Water Authority (BWA), the Port of Freeport, the Economic Development Alliance for Brazoria County, and regional industrial companies to treat and distribute the quality of water they will need. We have worked with BWA in updating the Regional Water Plan that incorporates this project with up-to-date water supply and demand projections. The Water Development Board has confirmed that this project is listed in the State Water Plan, under the name Freeport Desalination.

A site has been selected adjacent to the Port of Freeport and permitting work has begun. IDE and Invenergy are funding this work on their own as part of their commitment to take the risk of designing, building, and operating this plant.

We began working on this project in 2015 after identifying the Brazosport area as an ideal location for a seawater desalination plant. The existing demand for both drinking water and industrial water combined with the rapid growth in the area were the key decision factors in our decision. We strongly believe that the addition of a large seawater desalination plant at the coast to the existing surface and groundwater sources in the Brazos basin will make the region “water ready”. The “New Water” supplied by this plant will also help preserve already strained

ground and surface water supplies up the Brazos basin, preventing subsidence and increasing drought resiliency.

While progress has been made, we still have work to do. Product water distribution is one of the key factors that must be addressed. A plan to deliver the desalinated water to the end customer and to the points where it can be blended with existing water supplies has yet to be finalized. This key component of the project will require cooperation among local, regional, and state entities.

Permitting is a key component of any water project. We are nearing the end of the due diligence and evaluation process that will determine strategies for permit submissions to TCEQ and other agencies including the US Army Corps of Engineers and the General Land Office. One aspect of the permitting process that we feel needs to be addressed is cooperation among local, state, and federal permitting agencies. We request your assistance in establishing a process that allows and encourages regulatory agencies to work simultaneously in their respective areas of permitting. This streamlining could greatly improve what we call our "time to water".

IDE and Invenergy have brought our financial commitment to this project and will also bring our proven expertise to the table. Invenergy has a strong record of project development in Texas and has unmatched expertise in energy supply management to large projects like this.

IDE has designed over 400 desal plants around the world. We believe our expertise in designing and operating desalination plants can help enhance the economic competitiveness of the State of Texas by providing diversity and resilience to the state's water portfolio.

IDE and Invenergy look forward to continuing our work to help make Texas "Water Ready".

TESTIMONY OF GILBERT TREJO

Vice President of Operations & Technical Services, El Paso Water

Before the

Senate Committee on Water, Agriculture and Rural Affairs

Texas Senate

10 a.m. May 15, 2024

Texas Capitol, Room E1.012

Good morning, Chairman Perry and members of the Committee. My name is Gilbert Trejo. I am the Vice President of Operations & Technical Services for El Paso Water (EPWater). I am also the past chair and former board member of the Water Reuse Association and the Water Research Foundation.

Thank you for the opportunity to share my insights on desalination in El Paso and prospects for desalination as a growing water supply source for Texas.

As background, El Paso Water provides water, wastewater and stormwater services to 95% of El Paso County through retail and wholesale services. The County population is nearing 900,000 residents. EPWater also provides approximately 25% of the needed water supply to Fort Bliss through a wholesale contract.

Just 30 years ago, water scarcity alarm bells were going off in El Paso with concerns over depleting aquifers. Urgency inspired ambitious and innovative water supply strategies that shaped a long-term diversified water plan. Starting in the early 1990s, El Paso Water became a leader in water conservation, water reclamation and aquifer replenishment, and that's when the utility also became serious about desalination as a water-supply option.

It took more than a decade of planning and development, but in 2007, El Paso opened the doors of the Kay Bailey Hutchison Desalination Plant, which is the largest inland desalination plant in the world. El Paso has vast brackish (or salty) groundwater resources that were previously unusable. The plant removes salts and creates a new supply of water. The plant was built, in part, to increase the water resilience of Fort Bliss.

The plant currently produces up to 27 million gallons per day of water, and we currently have an expansion underway that will increase that number to 33 million gallons per day. We want to express our appreciation to the Texas Military Preparedness Commission for providing a portion of the funding for the expansion through the Defense Economic Adjustment Assistance Grant program.

Based on our experiences, I would like to offer insights on both benefits and challenges with desalination.

Benefits

- **Drought-proof:** El Paso is perennially under drought or near-drought conditions with average rainfall of less than 10 inches annually. But the drought that affects us most is river drought. If there's little or no snow in Southern Colorado and Northen New Mexico, that means Rio Grande flows will be low and reservoir storage will remain low. Over the past 20 years, the Elephant Butte Reservoir, located in Southern New Mexico, has averaged no more than 25% (or 75% empty). That translates into a short river water season for us. This year, we have the rare situation of having a full river supply – which gives us access to about 5-6 months of river water. When river supply is limited – as low as 6-8 weeks on several occasions ─ we lean on the desal plant. The desal plant is a drought- proof water supply that enables us to manage our freshwater aquifer more sustainably.
- **Fresh water buffer:** One of the most significant benefits of the desalination plant – beyond the additional drought-proof water supply – is that the current brackish wells provide a buffer that protects the fresh water supply for both our utility wells and Fort Bliss freshwater wells. Our brackish source wells are strategically placed to provide a buffer that has been very effective in protecting our fresh water supply by preventing saltwater intrusion. El Paso plans to continue utilizing both freshwater resources and the desalinated resources conjunctively.
- **Fort Bliss partnership:** The desalination plant has served to strengthen our ties to Fort Bliss. Fort Bliss provided land leases and permissions to access 16 blend wells, 22 miles of concentrate pipeline, 10 miles of collector line piping and the plant itself. We provide wholesale water to supplement Fort Bliss wells, and as they expand to an area they call East Bliss, EPWater will be providing more water. The desalination plant has become integral to Fort Bliss' water resiliency strategy. We even built a direct pipeline from the desalination plant to the Fort Bliss system in case it's ever needed. Our desalination plant gives Fort Bliss the confidence to expand and sustain missions because they see it as a water insurance policy for the installation. The ties forged through collaboration over the desal plant have also led to other collaborations, including the signing of an Intergovernmental Support Agreement and the completion of a Military Installation Resilience Review, whereby we jointly rank water, wastewater and stormwater infrastructure priorities that may lead to potential DoD funding opportunities.
- **Research lab:** At the time the plant was built, we created a designated research lab within the site, where university or other researchers can perform experiments, usually using our brackish source water. Frequent users of the lab are regional universities, including Texas A&M, Texas State and the University of Texas at El Paso, but we have hosted researchers from universities across the country.
- **Membrane technology:** A decade ago, membrane technology limitations might have been listed as a challenge. However, we have generally had a positive experience and have seen significant progress in membrane efficiencies. Our original membranes survived 15 years – longer than expected. When we performed a major upgrade in 2022, we saw significant improvements to membranes including to the size. We originally worked with 400-square-foot, fabric-like membranes, and the size has since increased to 440 square feet, which was particularly valuable because our source water had become saltier. I also want to commend our plant staff, who takes great pride in the plant and has

helped preserve and protect the membranes by using sand strainers and cartridge filters to remove unwanted particulates before they reach the membranes. As technology continues to improve and become more efficient, it will benefit other desalination adopters.

Challenges

- **Cost:** One key challenge of desalination is related to cost. The upfront capital cost is relatively high. Our plant was built almost 20 years ago with a $93 million investment, and Senator Hutchison and then-Congressman Silvestre Reyes helped secure a federal grant from the EPA that covered about a quarter of the cost. Operating costs are higher too, in large part because of energy costs – although energy costs for inland desalination are far less than for ocean plants. In assessing operating costs for our various water supplies, desalination is double the cost of O&M for well water O&M and about 50% higher than our river treatment plant O&M costs. To keep costs down for our customers, we operate the plant similar to how electric companies operate natural gas peaking plants. When demand is up, or river water is down, we lean on desalination. However, as newer and even more expensive water supplies are brought into service to meet our growing demand, desalination will be less expensive than newer alternatives, especially importation. It is worth noting that while cost can be a challenge, water infrastructure investments also yield significant economic benefits that far exceed the infrastructure costs.
- **Managing the Concentrate:** Concentrate management in desalination refers to the disposal or treatment of the concentrate left behind after the desalination process. For inland brackish desalination, the concentrate is about 15,000 Total Dissolved Solids (TDS) or half as salty as ocean desalination, which is about 33,000 TDS. It remains one of the biggest challenges for any new desalination plant. Even once ideal options are identified that meet environmental criteria, it's another challenge to navigate the regulatory hurdles. In El Paso Water's case, it took about 5 years and $1 million in consulting fees for modeling to obtain a Clean Water Act exemption. As background, we pump the concentrate 22 miles northeast of the plant where it is disposed via deep-well injection into a geological formation, where there is brackish water (8000 TDS) already present. Initially, both the Environmental Protection Agency and the Texas Commission on Environmental Quality (TCEQ) considered the brackish water in the geologic formation worthy of being a protected as a freshwater aquifer even though it would require significant treatment to be used as potable water. Finally, after five years, EPWater received a permit and an "exempt aquifer" determination – an existing exemption within the Clean Water Act that was requested early in the process and met the criteria. This regulatory process and the cost to navigate the regulatory process may be a barrier to expanding desalination because of time and cost.

Looking ahead: Desalination Opportunity for Texas

With the frequency of drought and growing challenges across Texas, it is becoming increasingly important to diversify, invest in innovative projects, and continue research that makes use of brackish and marine desalination to meet freshwater needs across Texas. In forging this path, Texas will be a leader for the nation.

The biggest hurdle to expanded inland desalination is concentrate management. There are three key associated challenges:

- **Environmental impact:** Discharging concentrate back into the environment can harm ecosystems by increasing salinity and pollutant levels and disrupting the ecosystem balance. Human health and the environment must be protected.
- **Cost and energy consumption:** Many conventional methods of concentrate disposal, such as deep-well injection, evaporation ponds or treatment through the wastewater system require significant infrastructure investments or real estate as well as additional energy input for conveyance, all of which increase the overall cost of desalination.
- **Regulatory challenges:** Discharging concentrate into the environment is subject to strict regulations to protect water quality and ecosystems. Meeting these regulations can be complex and costly. Navigating the regulatory process to get permit approvals can be a prolonged and difficult process.

To help overcome the regulatory hurdles, we would offer that the state legislature evaluate options to simplify the bureaucratic processes to expedite approvals. We would propose that the state continue to be protective of human health and the environment while allowing a customized, case-by-case approach that recognizes the particular needs of utilities, districts or regions.

Where desalination is not an option, water reuse deserves more state focus

Although desalination holds tremendous promise across Texas, not every community has easy access to brackish groundwater or ocean water. However, every community and city across Texas has another source of water, and that is wastewater that can be cleaned and reused again and again.

El Paso has been reclaiming water since the 1960s, and since the 1980s, we have been cleaning reclaimed water to drinking water standards and putting some of that water back into the aquifer. Later this year, we will break ground on our most ambitious project to date: taking wastewater that has been reclaimed, treating it to drinking water standards and putting it directly into the drinking water system.

El Paso Water conducted a successful pilot program several years ago and has received permissions from the TCEQ to move forward with our Advanced Water Purification project.

The project will be one of the largest direct potable reuse projects in the country at 10 million gallons per day. This project will be very expensive, too – more than double the capital cost of our desalination plant. However, it is another drought-proof water source that we see as an important decision to our water portfolio.

Closing

In closing, desalination holds great promise for many communities that have access to brackish and ocean water resources. The biggest hurdle will be identifying cost-effective solutions for

concentrate management that works for inland and marine desalination projects and a regulatory framework that allows flexibility while still providing protections for human health and the environment.

I want to express my appreciation to Chairman Perry and the Committee for your leadership in Texas by advocating for and passing legislation that will support water infrastructure investments, promote conservation and ensure the availability of clean and reliable water for Texans now and in the future.

El Paso Water stands ready to be a resource for this Committee, if we can be of further assistance.

Texas Produced Water Consortium
Texas Senate Committee on Water, Agriculture and Rural Affairs

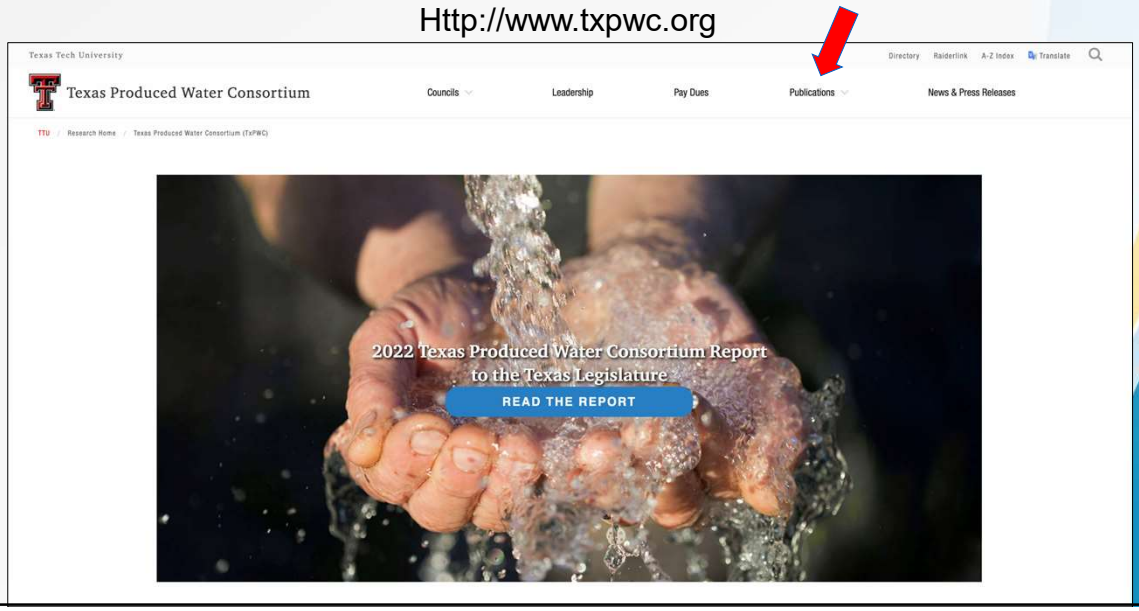
May 15, 2024

Presentation by: Shane Walker, Ph.D., P.E.
Faculty Co-Director, Texas Produced Water Consortium

1

Accessing the Report

Http://www.txpwc.org



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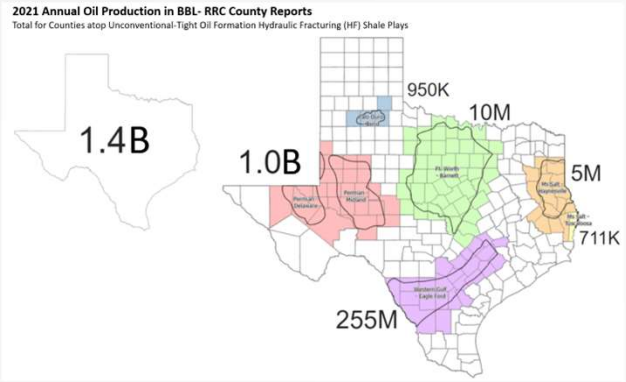
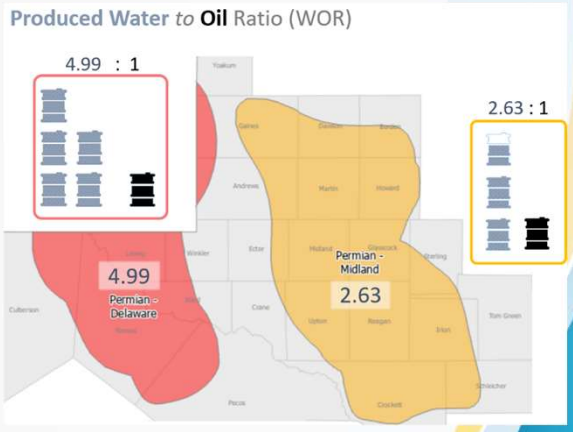
Substantial Produced Water Available





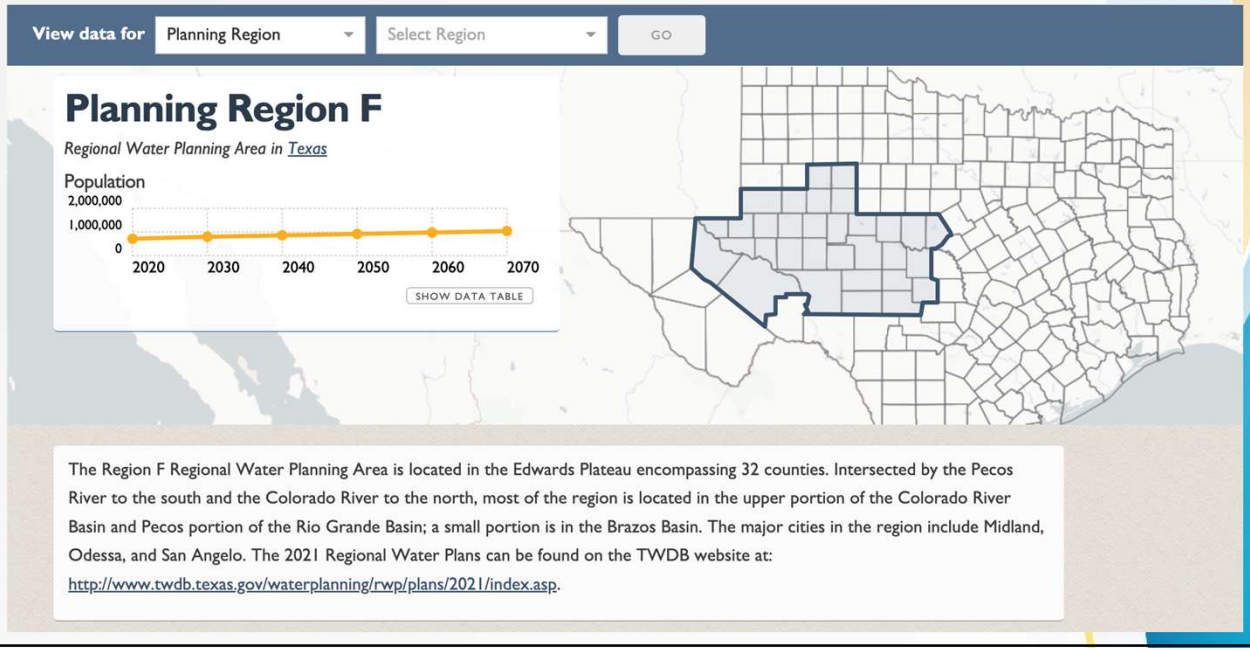
TXPWC Projected 38-year Average PW Volume: **~10-14MM bbl/day**

Volume projection less industry reuse: **~8-11MM bbl/day, or 500,000-515,000 acre-feet/year**

Current Technically Recoverable Estimate @ 50% Recovery: **~250,000-260,000 acre-feet/year**

3

Region F



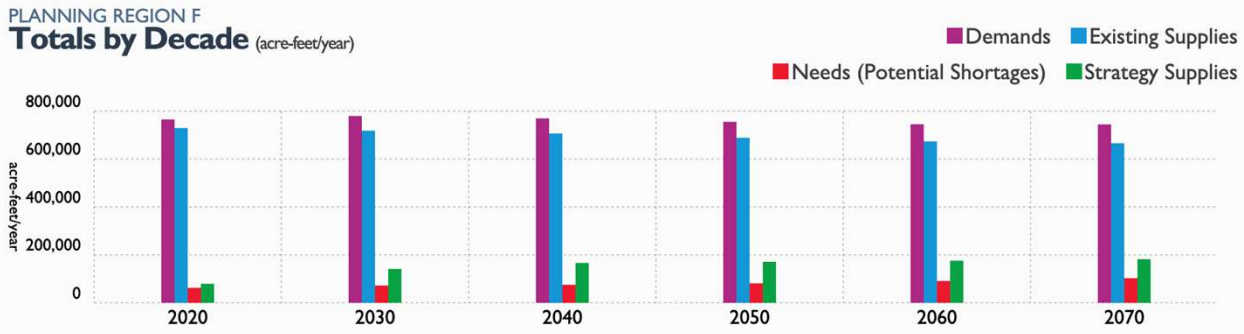
The Region F Regional Water Planning Area is located in the Edwards Plateau encompassing 32 counties. Intersected by the Pecos River to the south and the Colorado River to the north, most of the region is located in the upper portion of the Colorado River Basin and Pecos portion of the Rio Grande Basin; a small portion is in the Brazos Basin. The major cities in the region include Midland, Odessa, and San Angelo. The 2021 Regional Water Plans can be found on the TWDB website at: http://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp.

4

Region F

PLANNING REGION F

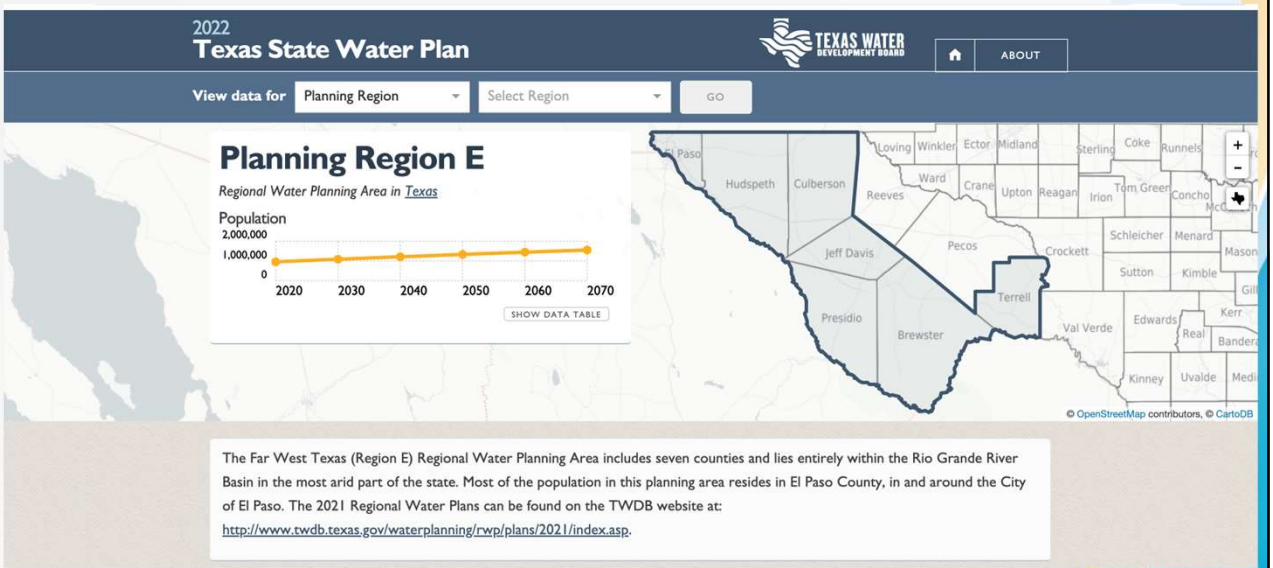
Totals by Decade (acre-feet/year)



	2020	2030	2040	2050	2060	2070
Demands	765,150	779,505	769,525	755,112	744,947	744,366
Existing Supplies	729,263	718,312	706,607	688,587	673,716	665,624
Needs (Potential Shortages)	62,592	71,866	75,088	81,200	90,974	102,788
Strategy Supplies	79,345	141,281	166,483	171,034	175,868	181,964

5

Region E



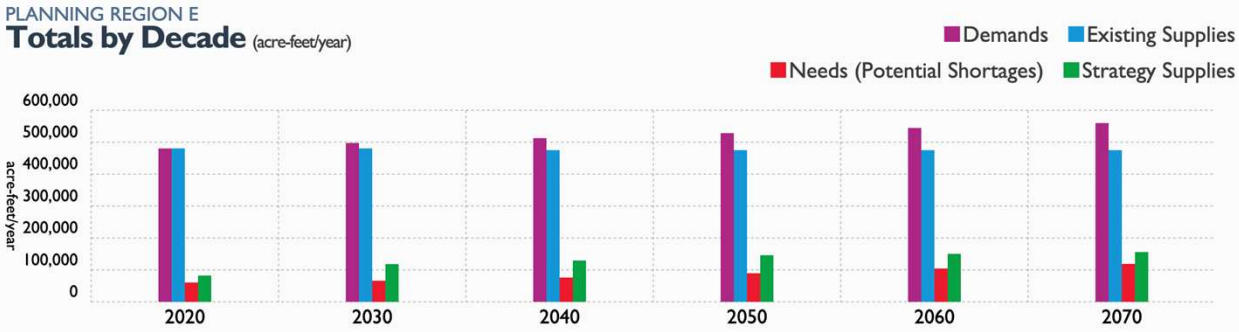
The Far West Texas (Region E) Regional Water Planning Area includes seven counties and lies entirely within the Rio Grande River Basin in the most arid part of the state. Most of the population in this planning area resides in El Paso County, in and around the City of El Paso. The 2021 Regional Water Plans can be found on the TWDB website at: http://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp.

6

Region E

PLANNING REGION E

Totals by Decade (acre-feet/year)



	2020	2030	2040	2050	2060	2070
Demands	480,424	497,577	512,732	528,470	544,473	559,976
Existing Supplies	480,643	480,643	475,118	475,118	475,118	475,118
Needs (Potential Shortages)	60,629	66,141	76,037	89,394	104,373	118,844
Strategy Supplies	82,433	118,338	129,532	146,107	150,363	155,989

7

Second Report to the Legislature

Senate Bill 1047, 88R Session

Not later than October 1, 2024, the consortium shall submit to the legislature a report regarding:

(1) the status of the pilot project or program selected under Subsection (b) of this section; and

(2) any suggested policy, regulatory, or legislative changes resulting from an analysis of the implementation of the pilot project or program selected under Subsection (b) of this section.

8

Pilot Projects

Phase 1: Immediate Focus

- Announcing coordinating with the Joint Industry Partnership (Aris, Chevron, ConocoPhillips, other key partners) in the Delaware Basin
  - Utilizing Eurofins America as a third-party, NELAP accredited laboratory to support testing for constituent analysis on treated produced water samples.
  - This information is critical to allow the Consortium to review technological treatment capabilities in conjunction with existing standards to provide any guidance or recommendations to regulators and the Legislature.

Phase 2: Operated as Funding and Consortium Member Interest Allows

- Establish bench scale "plug-and-play" testing facility to focus on innovative technologies and treatment-train efficacy research.
- Site analysis of existing non-Texas based produced water treatment facilities.
- Contained and monitored application testing of treated produced water on native rangeland, cotton, and/or regional edible crops to further aid in overall system knowledge regarding human and environmental hazard and risk assessment.

9

Looking Ahead

Blind Sampling Program

- Allowing companies to anonymously submit treated produced water samples utilizing our Eurofins contract for testing and analysis.
  - Designed to assuage proprietary concerns while still achieving data needs of the Consortium.

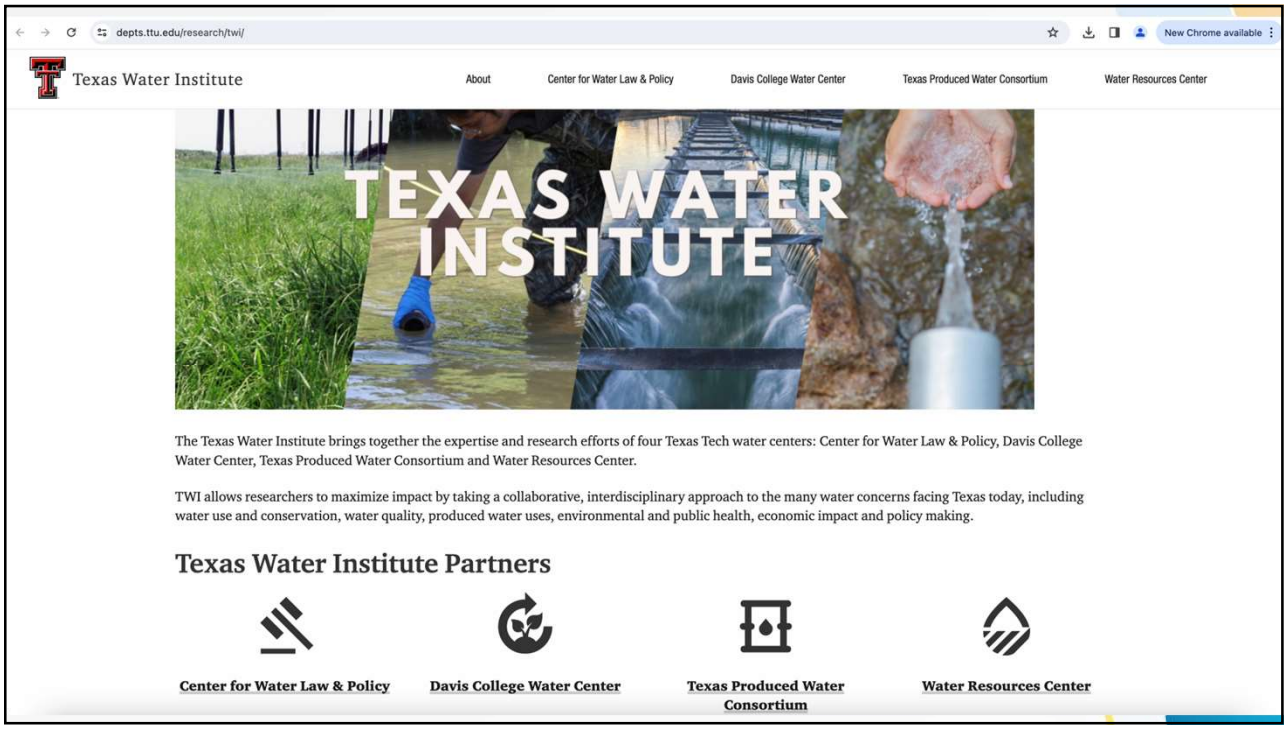
Consortium "Peer Review" Program

- For companies who do not wish to participate as a pilot project or blind sampling participant but still desire third party "peer review" from Consortium membership.
- Companies will be able to submit reports on their projects and results for review and input by TXPWC.

Laboratory Instrumentation Purchase

- TXPWC has begun acquiring lab equipment for detailed testing in-house at TTU.
  - Includes Gas Chromatography, Thermal Desorption, Cation & Anion Chromatography, Pyrolosis, and Liquid Chromatography.
  - This equipment will support our ongoing pilot project testing/programs and be available for continuing regulatory testing needs moving forward.

10



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Contact

- **Rusty Smith, Executive Director**
- **Texas Produced Water Consortium**
- **Website: http://www.txpwc.org**
- **Email: txpwc@ttu.edu**

Texas Produced Water Consortium

12

Good morning, Chairman Perry and Members.

I am Doug White, Executive Vice President of NGL Water Solutions, a subsidiary of NGL Energy Partners, a publicly traded company.

NGL is a diversified midstream company that provides services to the oil and gas sector, including solutions for produced water treatment, disposal, recycle and discharge.

We operate in the Permian Basin which generates approximately 18 million barrels of produced water per day. We are managing 2.5 million of those barrels, which is almost 15% of that total.

Chairman Perry, I want to thank you and the committee for all you have done to help usher forward technologies like the recycling of produced water that will ultimately provide new water sources for Texas.

Your foresight and leadership in establishing the statutory structure that will safely remove barriers for industry to help meet Texas' long-term water needs is commendable.

The actions you have taken over the last few sessions are why I am able to join you today to tell you that water produced from oil and gas operations in Texas will be able to recycle to potable water standard in the next two years.

NGL shares your interest in ensuring that we can help provide long-term access to water for future Texans and we are grateful to be a part of the solution.

I will give you a brief history of our experience around produced water recycling:

In 2008, NGL built a Recycle and Discharge Facility in Wyoming that discharged produced water treated to better than potable standard into the Upper Green River Basin, a tributary to the Colorado River System. This project was permitted by the EPA and operated successfully under their oversight for almost 15 years. We have discharged 60 million barrels since the project's inception.

That successful project has led to an opportunity for a similar project in Texas' Permian Basin.

Over the past four years, NGL has collaborated with Colorado School of Mines to perform lab scale testing at the CSM Produced Water Research Lab with produced water from the Delaware Basin portion of the Permian Basin.

Treated produced water was tested through robust Risk and Toxicology modeling and analysis by EPA labs.

CSM also submitted blind samples of municipal water to the EPA for human cell line testing, and the results of the treated Delaware Basin water tested safer than Denver Colorado's municipal drinking water.

The next step is to perform a closed loop field pilot of our treatment process train at a NGL saltwater disposal site in Orla, Texas using NGL's infield produced water. We are in the process of deploying the pilot in June.

The pilot will function under the regulatory oversight of the Railroad Commission and will process approximately 400 barrels of water per day for 100 days.

In addition, a specially designed pit will be utilized to grow crops irrigated with our treated produced water under direction of Dr. Thomas Borch with Colorado State University, a research professor who has conducted a decade of plant studies utilizing produced water irrigation.

Data from the field scale pilot will be used in NGL's TPDES permit application to TCEQ for approval to discharge treated produced water in the future. We have a complete application and are in public comment period.

More importantly, a white paper will be generated from the pilot so we are able to share our results with the public and tell the story of treated produced water as a viable solution for addressing water needs across the state.

We have been on the statewide circuit, sharing our progress and plans with stakeholders so they are aware that this technology is quickly becoming available and will provide a source of new water for the state.

We have witnessed the excitement around the potential for solutions from our pilot and others like it, particularly with municipal governments and large west Texas landowners.

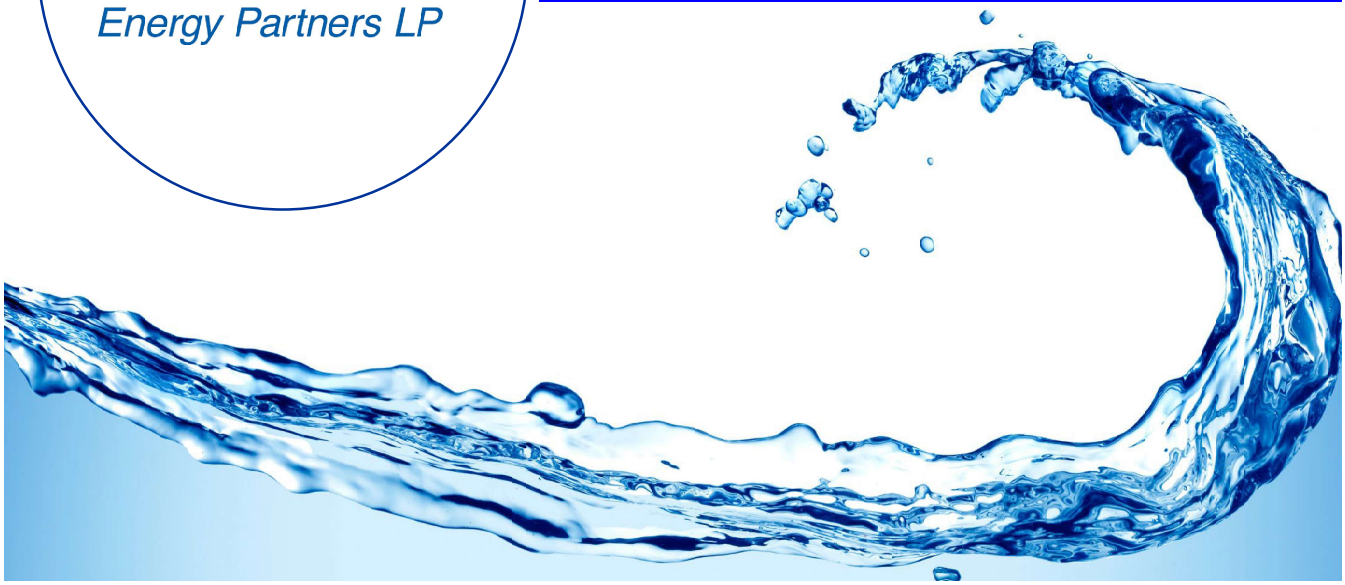
We expect to publish our white paper by the end of this year and look forward to sharing those results with you.

In the meantime, do not hesitate to call on us to be a resource to you as you continue to explore ways to address the state's water needs.

Thank you for the time today. I am happy to answer any questions.

NGL Water Solutions
Business Discussion Materials

MAY 15, 2024



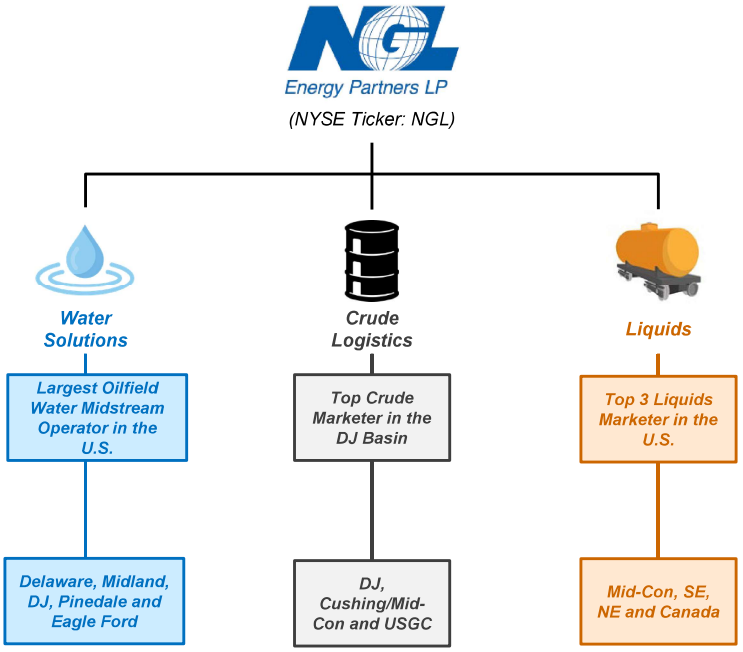
Who is NGL Energy Partners?

NGL Energy Partners

NGL Energy Partners LP is a publicly traded Master Limited Partnership (NYSE: NGL)

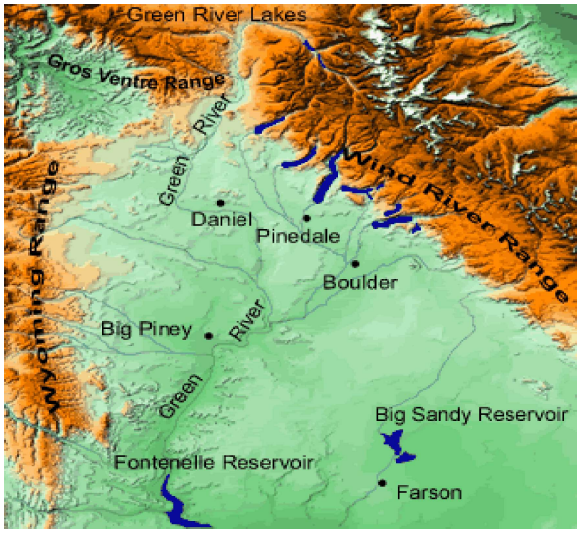
NGL is an industry leader in each of its 3 business segments: Water Solutions, Crude Logistics and Liquids

Services

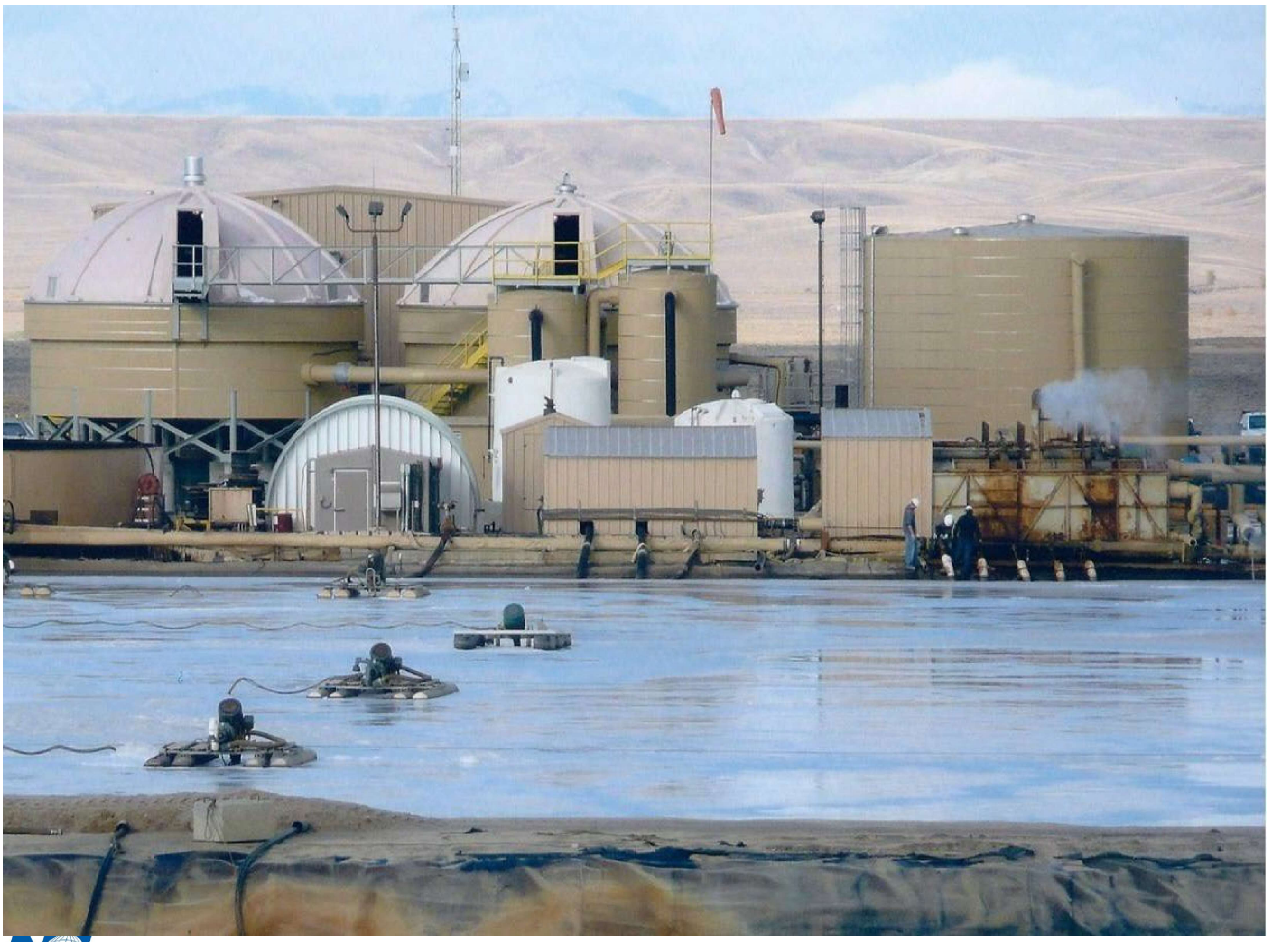


Anticline Recycle & Discharge Facility

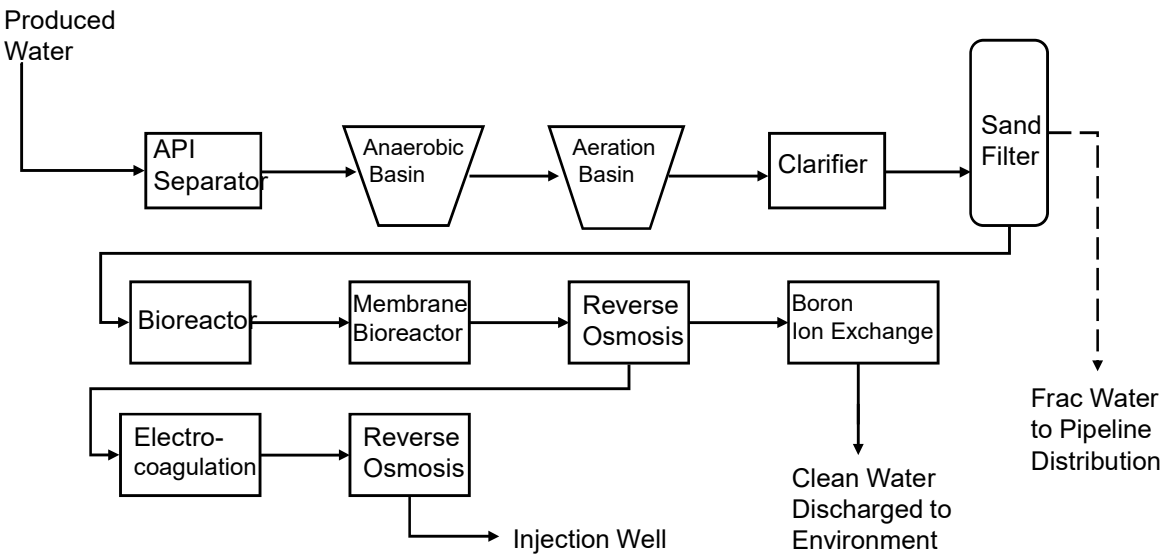
Upper Green River Basin



+ 17% WY total land area
+ Largest tributary of Colorado River
+ Federal, state & private land



Anticline Disposal Discharge Process



Texas Desal Field Pilot

Orla Pilot and TPDES Permit Application:

a) There exists very limited complete treatment train data on Permian basin produced water

b) NGL and PWR successfully performed lab scale testing at The Colorado School of Mines Lab utilizing NGL's produced water from the Delaware Basin

c) Portions of treated produced water went through robust Risk and Toxicology modeling and analysis by EPA Labs

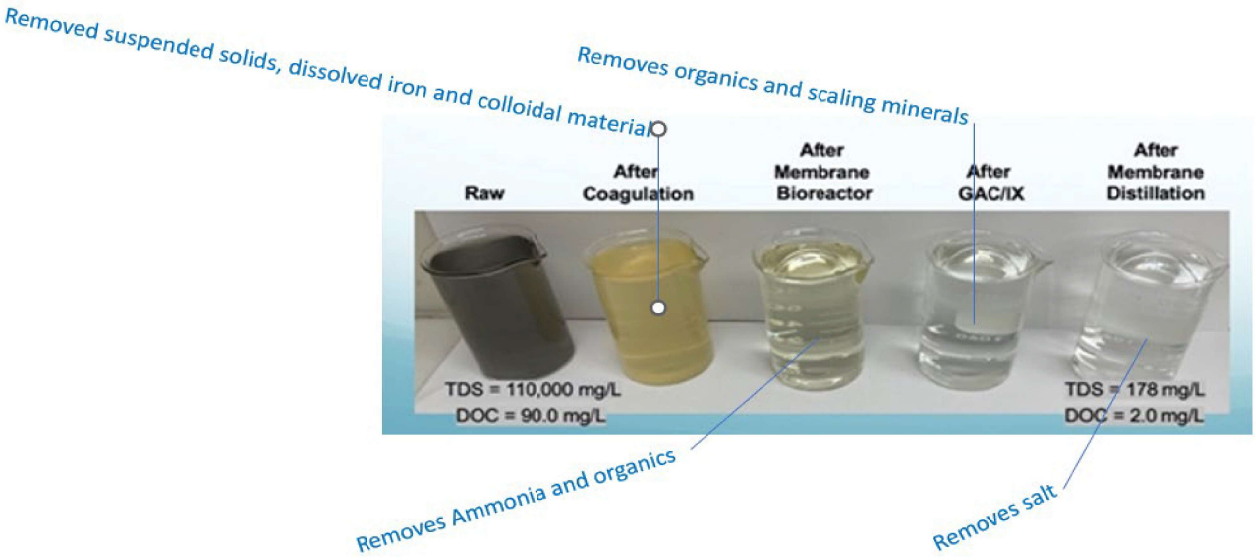
d) The next step is to perform a closed loop field trial of the treatment process train in Orla Texas using NGL's infield produced water. The Pilot will process approximately 400 bpd for 100 days.

e) A specially designed pit will be utilized to grow crops irrigated with the clean finished treated water from the pit. Toxicological and physiological data will be gathered and documented to assess any impact on the plants.

f) Data from the field scale pilot will be used for NGL's TXPDES permit application

Lab Scale Test

- Samples of NGL's Delaware Basin produced water were treated through the Colorado School of Mines lab scale desalination treatment process



Pilot Testing Lab Scale Test Data Analysis

- ❑ The Colorado School of Mines submitted blind samples to the EPA for human cell line testing
- ❑ Treated Produced Water results were better than municipal drinking water

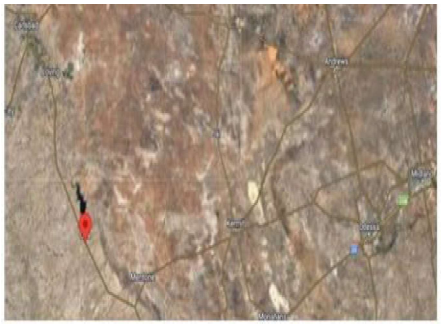
Section 408(p)(1) of the Federal, Food, Drug and Cosmetic Act (FFDCA) requires EPA to "develop a screening program, using appropriate validated test systems and other scientifically relevant information, to determine whether certain substances may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen, or such other endocrine effects as [EPA] may designate." Pursuant to that authority, in 1998, EPA introduced the Endocrine Disrupter Screening Program (EDSP) including the use of a two-tiered *in vitro* and *in vivo* screening framework (63 FR 42852 and 63 FR 71542). EPA validated a battery of five (5) *in vitro* and six (6) *in vivo* assays (EDSP Tier 1 battery) for screening chemicals in 2008 (74 FR 54415). The purpose of Tier 1 screening is to identify chemicals that have potential biological activity ("bioactivity") in the estrogen, androgen or thyroid hormone pathways using a battery of assays. Tier 1 screening data is subjected to a weight-of-evidence (WoE) analysis where an assessment is made on the need for Tier 2 testing. The purpose of Tier 2 testing is to identify and establish a dose-response relationship for any adverse endocrine (estrogen, androgen, or thyroid) effects.

The chemical substances covered by the EDSP include approximately 1,200 pesticide active ingredients, 2,500 pesticide inert ingredients, and 6,000 drinking water contaminants, with some overlap between these lists. Because of the cost (EPA estimated industry costs in conducting a full Tier 1 battery to be approximately $1 million per chemical, largely due to the *in vivo* laboratory animal testing, 78 FR 35903) and time (up to six years) involved in conducting and reviewing the full battery of Tier 1 assays, EPA has been able to evaluate only a fraction of the thousands of chemicals that fall within the scope of the EDSP.

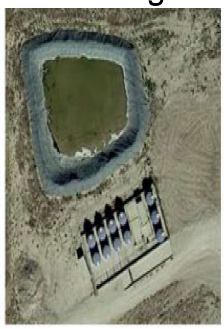
Field Pilot Proposal

- NGL's Field pilot will occur at NGL's Reeves 25 SWD in Orla Texas
- We will utilize existing tanks, Conex boxes, concrete containment, adjacent freshwater wells and class II SWD's to complete the pilot project.

Orla Texas



Existing Pit

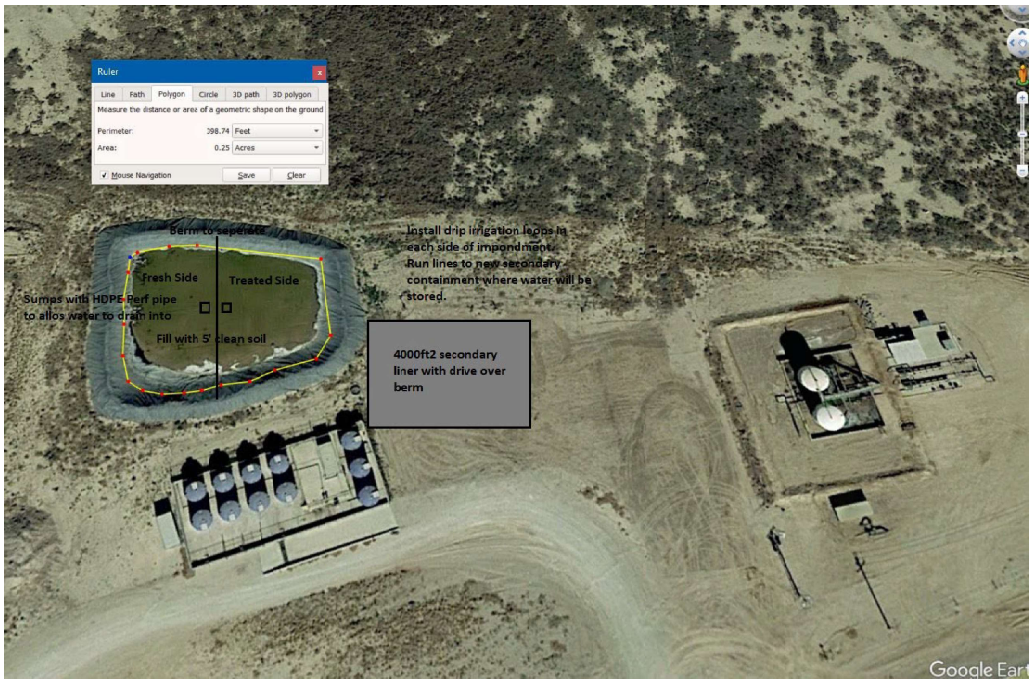


Existing Tanks

Cement Containment

The Authorized Pit

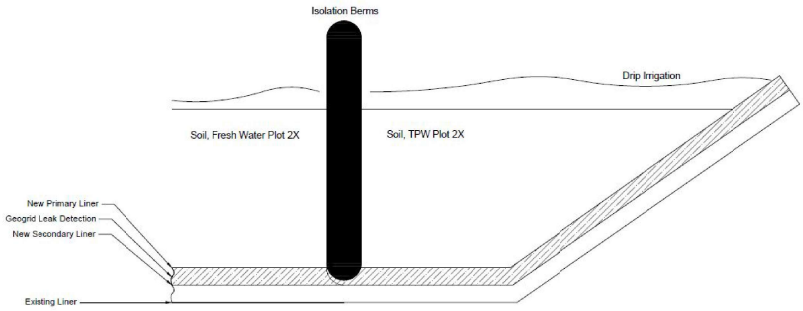
- Treated Water will be used to irrigate crops in newly lined impoundment, under direction from Dr. Thomas Borch with Colorado State University



Authorized Pit Specification

1.00	Dirtwork Sub - Liner	Dirtwork to build berm/spread 5' of fill across the floor
1.00	Dirtwork Sub - Liner	Loading of fill dirt at the ranch
125.00	Freight - Liner	Trucking to haul fill dirt
40,250.00	60 Mil Smooth	60 Mil Smooth
40,250.00	Labor - Liner	60 Mil SMooth Install
900.00	Labor - Liner	Anchor Trench
250.00	Sandbags Liner	Sandbags
1.00	Poly Pipe Sub - Line	Poly Pipe(2-12in lines)
1.00	Poly Pipe Sub - Line	Poly Pipe Labor (2-12in lines capped, perforated.
1.00		72'x72' containment
36.00	Misc Cont Supplies	2'x8' Poly Wall w/clips
4.00	Misc Cont Supplies	Corner pieces
8,464.00	60 Mil Smooth	60 Mil Smooth
8.00	Labor - Liner	Labor to install 60mil Liner and set containment
8,464.00	8 oz Geo	8 oz Geo
8,464.00	Labor - Liner	8 oz Geo Install

- Two new 60 MIL Liners
- Leak Detection
- Berms to isolate grow plots
- Soil Placement (from NGL Ranch)
- Sump in each grow plot for “groundwater” sampling
- Drip irrigation



Plant Study

- ❑ Treated Water will be used to irrigate crops in relined impoundment, under direction from Dr. Thomas Borch

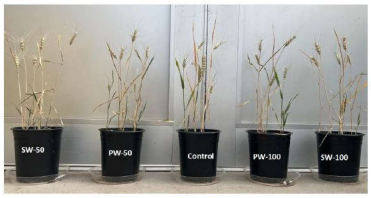
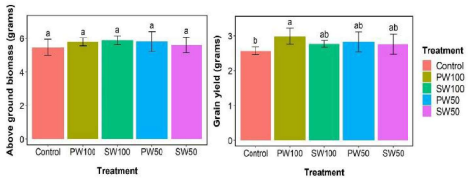


Figure 1: Wheat plant growth comparison 105 days after planting for all five water treatments: Tap Water Control (Control), 100% Produced Water (PW100), 50% Produced Water (PW50), 100% Salinity Control (SW100), 50% Salinity Control (SW50)



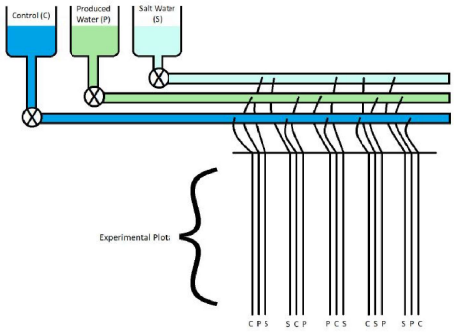


Figure 6: Schematic layout of the field experiment under drip irrigation

OILFIELD-PRODUCED WATER AS ALTERNATIVE SOURCE FOR AGRICULTURAL IRRIGATION: IMPACT ON SOIL AND CROP HEALTH

Project Summary:

The management of large volumes of produced water (PW) presents a significant challenge for the oil and gas (O&G) industry, necessitating the development of sustainable management solutions. One alternative to conventional disposal practices is the reuse of PW for irrigation in agricultural industry grappling with severe water shortages. However, PW has been reported to contain contaminants of concern from the irrigation standpoint. Hence, this field study will thoroughly investigate the influence of irrigation with treated PW on different facets of soil and crop health to provide a comprehensive overview of the potential risks associated with irrigation. Four research objectives (ROs) are accordingly designed to **RO1**: Evaluate the effects of treated produced water (PW) irrigation on soil microbial community composition, **RO2**: Identify the impact of PW irrigation on soil health, **RO3**: Asses the effects of PW irrigation on the agronomic traits of the wheat crop, and **RO4**: Investigate the impact of PW irrigation on biofuel crop (e.g., corn, canola, switch grass) metabolome using Gas Chromatography Mass Spectrometry (GC-MS) metabolomics.

TDES Permit Application

- Discharge will be via pipeline from the NGL Red Bluff facility
- Two potential routes for discharge pipeline have been identified
- NGL Red Bluff SWD is outside the 1% and 0.2% flood hazard areas

TEXAS PACIFIC WATER RESOURCES

TRANSMISSIVE WATER SERVICES

PRODUCED WATER AS A RESOURCE FOR THE STATE OF TX

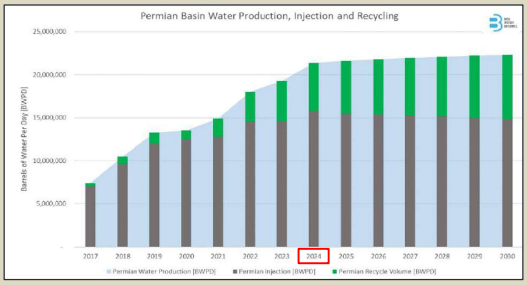
Presented by:
Robert Crain, EVP

TEXAS PACIFIC WATER RESOURCES, LLC

TEXAS PACIFIC WATER RESOURCES

PERMIAN PRODUCED WATER VOLUMES

- **The Permian generates approximately 20 million barrels of produced water per day. (graph below)**
  - *This equates to roughly 840 million gallons of water per day.*
  - To put this into perspective, the city of Austin uses approximately 273 million gallons of water per day. (120 gal per day, per capita).
- 5.5 million barrels of this water are recycled within the industry daily, leaving an excess of 14.5 million barrels of water with the potential to change the water outlook for Texas.
  - **That 5.3 billion barrels, or 222.6 billion gallons of produced water annually!**



The term produced water refers to the natural brine water that is a co-product from a producing oil and gas well.

- Water to oil ratio or water cut:
  - Midland – **2.4BBL PW to 1 BBL of oil**
  - Delaware- **3.8BBL of PW to 1 BBL of oil**

Produced water has limited uses outside of oil & gas due to its quality which requires specific treatment technologies that target the unique contaminants present.
Produced water treatment technology & research are advancing at a rapid pace that can capture up to 70% of the surplus produced water, and create a usable supply of fresh water.

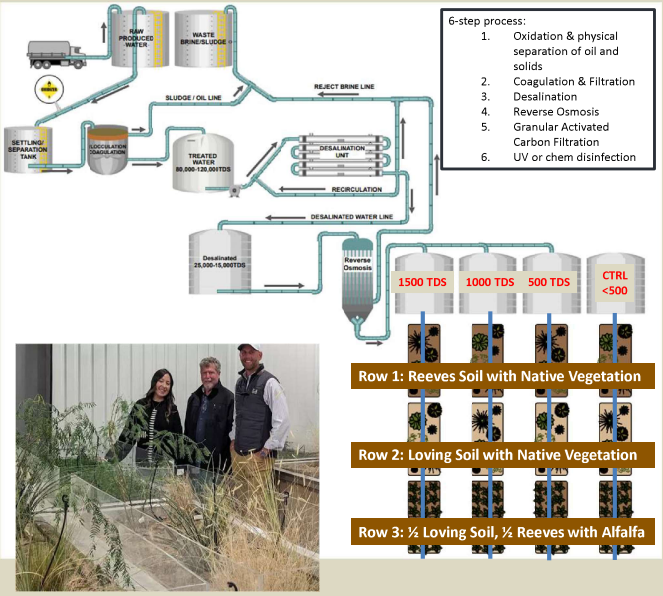
The key differences between PW and wastewater include:

- **Oil traces ranging from (100-1000parts per million, ppm, or mg/L)**
- **Salinity ranges (60,000-150,000 ppm)**
  - **3-4x that of seawater**
- **Heavy metals in varying concentrations**
- **Chemical additions from the oil extraction process**
- **Naturally occurring radioactive material and Bacterial species**

The good news:
The H2O molecule remains unchanged when mixed with oil, metals, chemicals, salts, etc.
This means the water molecule can be preserved and extracted from almost any solution to produce pure clean water, and leftover brine.

TEXAS PACIFIC WATER RESOURCES

PRODUCED WATER TREATMENT



6-step process:

1. Oxidation & physical separation of oil and solids
2. Coagulation & Filtration
3. Desalination
4. Reverse Osmosis
5. Granular Activated Carbon Filtration
6. UV or chem disinfection

Texas Pacific, as well as many other Oil & Gas companies have been handling, treating, and recycling produced water for upwards of 10 years.
We are familiar with the contaminants present, as well as the means required to remove them.

- **Reverse Osmosis is the most widely used desalination method but requires a salinity of less than 30,000 to operate.**
- Produced water must be reduced from >100,000ppm in total dissolved solids(TDS), to <30,000ppm.
  - For this reason, produced water desalination is more expensive than traditional desalination methods.
- TPWR & others have developed and researched methods to desalinate down to levels that traditional treatment methods can handle(<30,000 TDS).
- These methods have been validated through extensive testing in accordance with existing TCEQ surface water discharge requirements and additional contaminants commonly present in O&G waste.

Pilot 1 Project Details:

Project was designed to collect data for RRC Land Application and Surface Water Discharge capabilities. Focus was water quality & proof of concept.

- PW was trucked in, 80-150k TDS over a 6-month period
- Recovered ~60% of starting volume.
- 16 total plant, soil, and water combinations. (Included native vegetation and alfalfa.)
- Analysis performed for Raw PW, Treated PW, soil, and plants.
- In house analysis- Daily, weekly KPI, energy consumption, performance.
- Third party analysis – 30 & 90 day intervals with TCEQ regulated contaminants & RRC recommended analysis taken into consideration.

TEXAS PACIFIC WATER RESOURCES

PRODUCED WATER ANALYSIS

WATER - 380 Analytes Tested

- Analytes were chosen based on standard O&G KPIs, TCEQ regulated contaminants, and RRC recommended List.
- Water was collected via non-biased 3rd party from TPWRs in-house produced water treatment pilot facility and tested by an accredited laboratory.
- Of the 380 that were analyzed, 241 were non-detect (in Effluent sample).

ANALYTICAL CHALLENGES – The "unknowns"

- Standard and EPA accepted methods for analysis of many regulated contaminants are suitable for testing wastewater with a total dissolved solids(TDS) content <15,000-20,000ppm.
  - This makes analysis of raw PW unreliable because many contaminants are unable to identify in such dirty water. Hence, there are "unknowns."
- Water must be reduced in solids concentration prior to determining exactly what is/was present in the original sample.
- This accurate analysis of water <15,000 TDS water allows treatment providers to tailor treatment to the individual contaminants present.

TEXAS PACIFIC WATER RESOURCES

PILOT #1 WATER QUALITY RESULTS

Water Quality Results

- SVOC & VOCs – 224 total, were almost all reduced to the part per billion range
- PFAS meets current EPA regulation.
- Radionuclides reduced by 99.6%.
- Metals reduced by 95.9%
- Working with academia to include analytes that may not be traditionally analyzed for, specific to oil and gas.
- Water analysis performed for 250 ppm TDS water with no blending.

- Plant and Soil: Plant and soil data have shown minimal changes to soil and no obvious signs of damage to plant health.
- Chloride increase detected. Data will be used to extrapolate effects overtime.
- Tissue to be analyzed at end of trial. Q2.
- TPWR has submitted analysis recommendations to RRC based on availability of capable laboratories, contaminant origin, and results from Pilot #1.

Anions - 6 tested
4 detected
Average removal - 99.4%

Metals - 34 tested
16 detected in raw
Average Reduction - 95.9%

General Parameters - 19 tested
Ammonia removal - 99.3%
Solids removal - 99.3% reduction
Surfactants- 76% red. (0.58 to 0.14)
TOC- 98.2% reduction
COD-99.8% reduction

Organic SVOC - 103 tested
8 detected in Raw, 0 detected in Efflunet
Raw contaminants all below 0.03ppm

Explosive SVOC – 14
all non-detect

Pesticide VOC - 20 tested
Non-detect for all

PAH (poly nuclear aromatic comp) SVOC - 30 tested
7 detected in Raw, ND in effluent

Organic Acid SVOC - Methanol & Ethanol
Methanol - 32 to ND

VOCs - 55 Tested
6 detected in Raw, 2 in effluent
Average reduction 99.6%

TPH- incoming variable
Effluent- <0.16ppm (ND)

Radionuclides
Radium 226 & 228 - 99.6% reduction

Inf/Efl - Ra226(pCi/L)	96.1	0.428
Inf/Efl - Ra228(pCi/L)	315	0.557

Gross alpha/beta - 99% reduction

Inf/Efl – Alpha(pCi/L)	2580	11.6
Inf/Efl – Beta(pCi/L)	816	8.37

PCBs - 7 tested
No PCBs detected above 0.0005ppm

PFAS - 39 tested

Detected:	INF	EFL
PFHxA (ppt or ng/L)	0.69	0
PFPeA	1.7	0
PFOS	1.2	0.45
PFOA	0.58	0

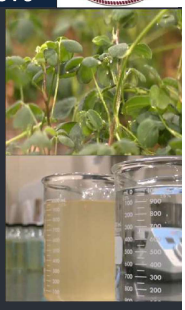
**EPA Guidance suggest - 4.0 ng/l*

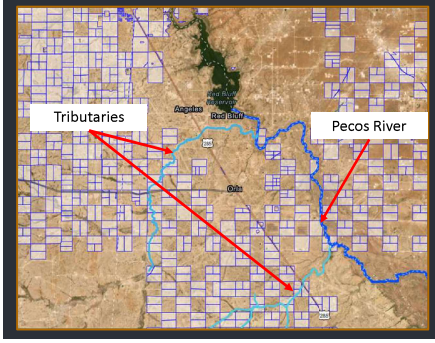
Date Collected: 11/20/2023		True INF	True EFF	Regulated RRC	RRC (Water)
DISSOLVED SOLIDS	mg/l	111000	824	Y	1000
SUSPENDED SOLIDS	mg/l	42	<2.50	N	
HARDNESS	mg/l	12800	75.8	Y	150
OIL & GREASE (HEXANE EXTR)	mg/l	7.36	<5.71	Y	35
ALKALINITY	mg/l	279	<20.0	Y	100
CHLORIDE	mg/l	101000	528	Y	100
NITRATE	mg/l	<1.00	0.426	Y	45
SULFATE	mg/l	701	5.01	N	
AMMONIA NITROGEN	mg/l	661	4.65	Y	30
PH	su	6.62	7.01	Y	6.5-8.4
SULFIDE	mg/l	0.159	<0.0500	N	
ARSENIC	mg/l	<0.100	<0.0100	Y	0.1
BARIUM	mg/l	3.58	0.0204	N	
BORON	mg/l	42.3	1.18	Y	0.75
CADMIUM	mg/l	0.00547	<0.00200	Y	0.01
CHROMIUM	mg/l	<0.100	<0.0100	Y	0.1
IRON	mg/l	33	0.0462	Y	5
LEAD	mg/l	<0.0600	<0.00600	Y	5
MANGANESE	mg/l	0.973	0.00933	Y	0.2
PHOSPHORUS	mg/l	6.59	0.0576	Y	5
POTASSIUM	mg/l	802	5.43	N	
SELENIUM	mg/l	<0.100	<0.0100	Y	0.02
SILVER	mg/l	<0.0500	<0.00500	N	
SODIUM	mg/l	55600	309	Y	100
MERCURY	mg/l	<0.000200	<0.000200	N	
BENZENE	mg/l	1.09	<0.00100	N	
GROSS ALPHA	pCi/l	2580	11.6	Y	15
GROSS BETA	pCi/l	816	8.37	Y	15
RADIUM-226	pCi/l	96.1	0.428	Y	30
RADIUM-228	pCi/l	315	0.557	Y	30

TEXAS PACIFIC WATER RESOURCES

PRODUCED WATER PROJECTS

- TPWR has been granted a Land Application Pilot permit from the RRC of TX.
- The trial is taking place on a 2500 sq. ft plot of land in the Midland Basin at the Pilot #1 location, TPWR's R&D facility.
- Alfalfa only trial, farming (Seeding, Irrigation, Harvesting) will be done by a 3rd party agriculture consultant to assure highest quality crop.
- Trial will use a drip irrigation system to minimize water loss.
- Planting will take place in April, crop cultivated April-Oct.
  - Irrigation with treated PW will begin early May.
- Analysis of water and soil will be done in-house weekly, validated by 3rd party monthly, and all data will be shared with RRC, TCEQ & Consortia.
- Crops will be sent for analysis at each harvest.
  - Testing will include standard nutrient availability and RFV, custom toxicological analysis & bioaccumulation.
- Concentrated PW waste will be analyzed for critical minerals and disposal considerations.
- Economic & electrical data will also be used to calculate a true cost per BBL on a full-scale site.





- TPWR applied for a TPDES permit through TCEQ to discharge treated desalinated produced water into the upper region of the Pecos River and has been deemed administratively complete.
- Review and approval process: Minimum of 330 days.
- Submitted mid Jan 2024 with plans to discharge up to 20,000BPD by mid '25, with discharge increasing to up to 100,000BPD in subsequent years.
- Permit valid for 5 years.
- The site will discharge into a tributary which flows into the Upper Region of the Pecos River (15,000 TDS average water quality).
- Water quality will be set by TCEQ and is specific to current conditions, aquatic life, and existing regulation. (will be around 5000-7000 TDS).
- Analytes specific to produced water may be added to the list of regulated contaminants.
- TPWR will be utilizing their current 6-step desalination process and will add back salt and alkalinity after reaching a superior quality to assure all trace contaminant removal.
- The site will utilize a batch release system to thoroughly analyze all water prior to environmental release.

TEXAS PACIFIC WATER RESOURCES

ALFALFA RESULTS AND FURTHER CONSIDERATION

ALFALFA

- TPWR tested a total of 8 growing combinations (soil/water) on round up ready alfalfa.
- Significantly higher RFV were observed in the highest concentrations of PW likely due to excess nutrient availability.

- Control
  - RFV – 160.5 & 142.84
  - Crude Protein – 19.10 & 17.85
- 500 TDS
  - RFV – 146 & 142.8
  - Crude Protein(%) – 18.42 & 18.55
- 1000 TDS
  - RFV – 175.4 & 189.9
  - Crude Protein(%) – 19.09 & 21.67
- 1500 TDS
  - RFV – 164 & 176.2
  - Crude Protein(%) – 17.66 & 18.88

RESEARCH ONGOING

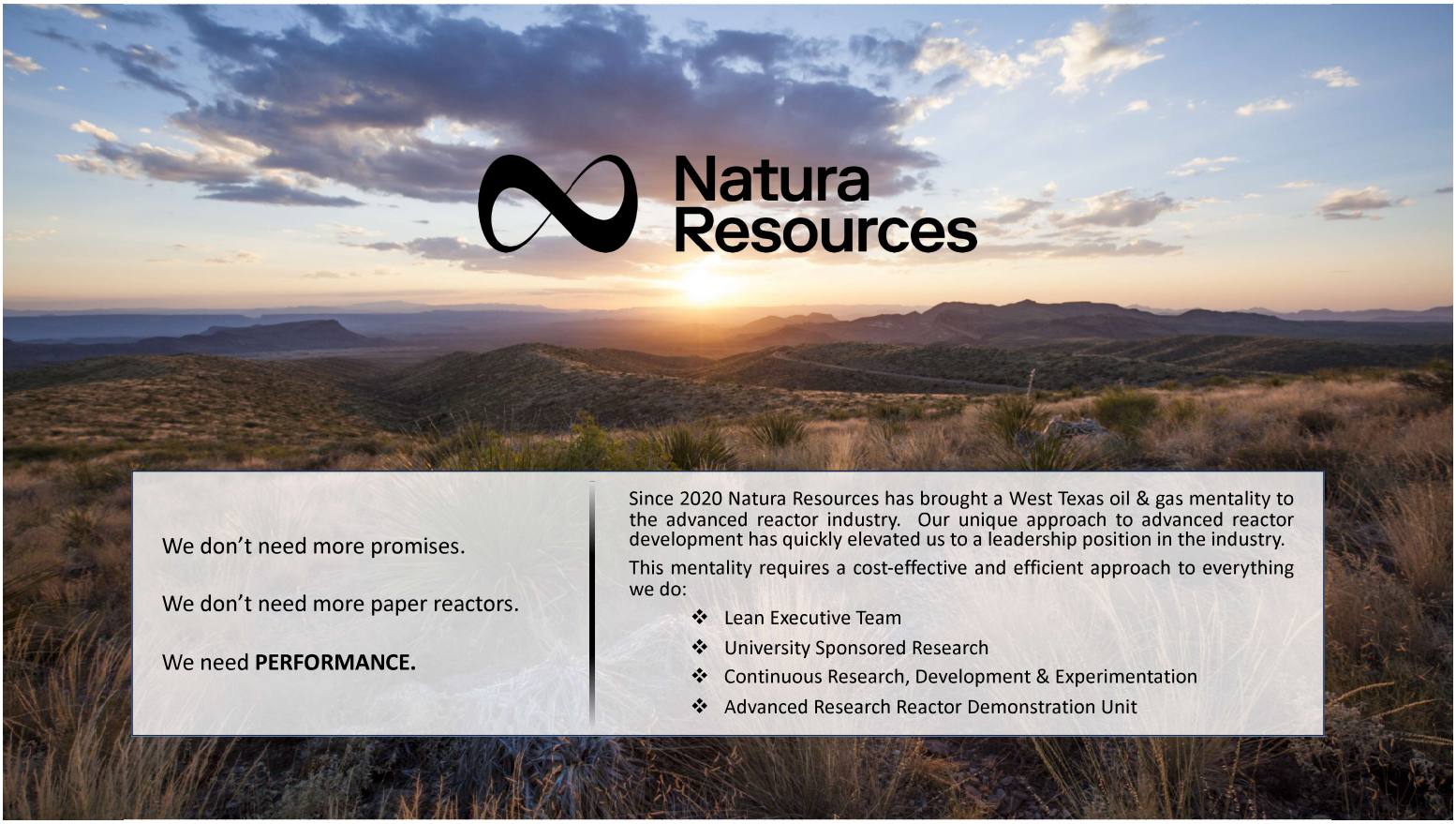
- Review of current available methods to analyze plant and root samples for toxicity.
- Bioaccumulation studies in plants & aquatic species
- Addition of contaminant analysis specific to produced water.
- Soil health studies over time.
- Comprehensive safety and viability of irrigation with produced water on edible and non-edible crops.
- Energy consumption
- Alternative uses for treated water & standard required for each.

REPORTS

- Sharing of final reports for Pilot #1 Greenhouse Study with soil, water, and plant findings.
- Following Reports to contain:
- Water characterization post treatment, contaminants specific to produced water, and review of current regulatory frameworks depending on end use.

- Irrigation use scenario evaluation and considerations.

- Surface water discharge considerations and recommended analysis.

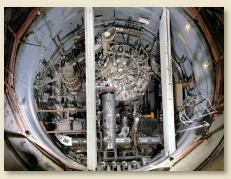


Project Milestones & Development

PRE-PROJECT & EARLY ENGAGEMENT

1954-1969 MSR HISTORY

- (Nov 1954) Aircraft Reactor Experiment (ARE) at Oak Ridge National Laboratory (ORNL) is the first reactor to demonstrate the feasibility of molten-salt fuel.
- (1964) Molten Salt Reactor Experiment (MSRE) is constructed at ORNL.
- (June 1965) MSRE goes critical utilizing uranium-235.
- (Oct. 1968) MSRE goes critical utilizing uranium-233.



2016 - 2019 EARLY ENGAGEMENT

- (2016) Nuclear Energy eXperimental Testing (NEXT) Lab established at Abilene Christian University (ACU).
- (2017) **Douglass Robison** commits **$3.2M** gift to the NEXT Lab to support molten salt research.
- (Dec. 2018) **Secretary of Energy, Rick Perry,** sends representatives from the **Department of Energy (DOE) Office of Nuclear Energy (NE)** to visit NEXT Lab at ACU.
- (Jan. 2019) Robison and ACU representatives visit the DOE in **Washington D.C.**
- (Nov. 2019) **DOE** encourages the development of a **Molten Salt Research Reactor (MSRR)** at ACU and provides **Programmatic Letter of Support.**

NATURA RESOURCES MSR PROJECT

2020 – 2021 PROJECT INITIATION

- (2020) **Natura Resources** is established to develop the MSRR at ACU and commercialize MSR technology.
- (Feb. 2020) Natura enters into **$30.5M of Sponsored Research Agreements** (SRAs) with four universities:
  - Abilene Christian University
  - The University of Texas at Austin
  - Texas A&M University
  - Georgia Institute of Technology
- (Sep. 2021) Natura Resources and Research Alliance receive **Resolutions of Support** from the **Texas Senate** and **Texas House of Representatives**.

2022-2024 RAPID PROJECT DEVELOPMENT

- (March 2022) Groundbreaking takes place for the **Advanced Research Reactor Demonstration Site** for the Natura Resources 1MW$_{th}$ system, the Science and Engineering Research Center (SERC) at ACU.
- (Aug. 2022) **Construction Permit (CP)** application is submitted to and docketed for formal review by the **Nuclear Regulatory Commission** with anticipated May 2024 approval.
- (Oct. 2022) **Teledyne Brown Engineering** completes Front End Engineering & Design (FEED) of MSRR.
- (July 2023) **Zachry Nuclear Engineering (ZNE) is** contracted to complete **Detailed Design Engineering (DDE)** of the first Natura MSR system.
- (Sep. 2023) **Advanced Research Reactor Demonstration Site** at ACU opens (SERC).

Natura Resources Technology Development

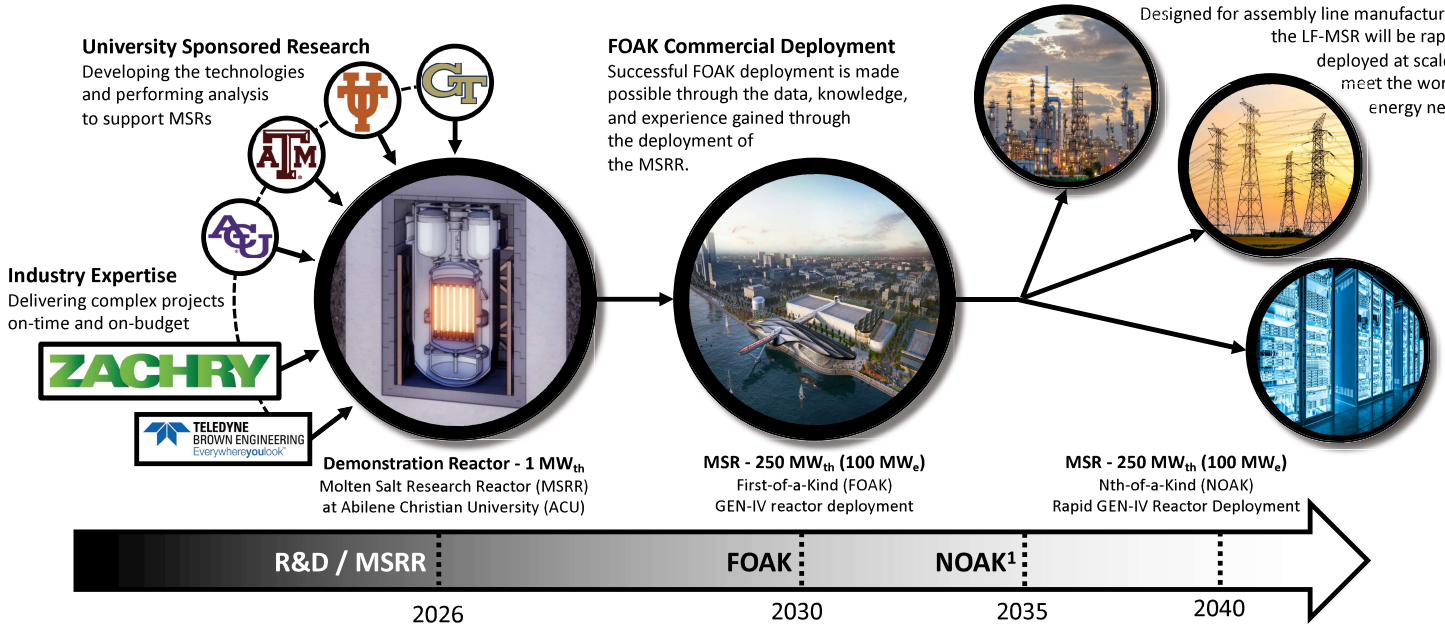
Natura Resources has taken a unique path to developing and deploying MSR technology that **reduces costs, schedule and regulatory risk**. We are on track via the MSRR demonstration reactor to **deploy the first GEN-IV advanced reactor in the U.S.**, and then begin **rapidly deploying commercial LF-MSRs at scale, to meet the world's energy needs.**

University Sponsored Research
Developing the technologies and performing analysis to support MSRs

Industry Expertise
Delivering complex projects on-time and on-budget

FOAK Commercial Deployment
Successful FOAK deployment is made possible through the data, knowledge, and experience gained through the deployment of the MSRR.

Rapid Deployment
Designed for assembly line manufacturing, the LF-MSR will be rapidly deployed at scale to meet the world's energy needs



Demonstration Reactor - 1 MW_{th}
Molten Salt Research Reactor (MSRR) at Abilene Christian University (ACU)

MSR - 250 MW_{th} (100 MW_e)
First-of-a-Kind (FOAK)
GEN-IV reactor deployment

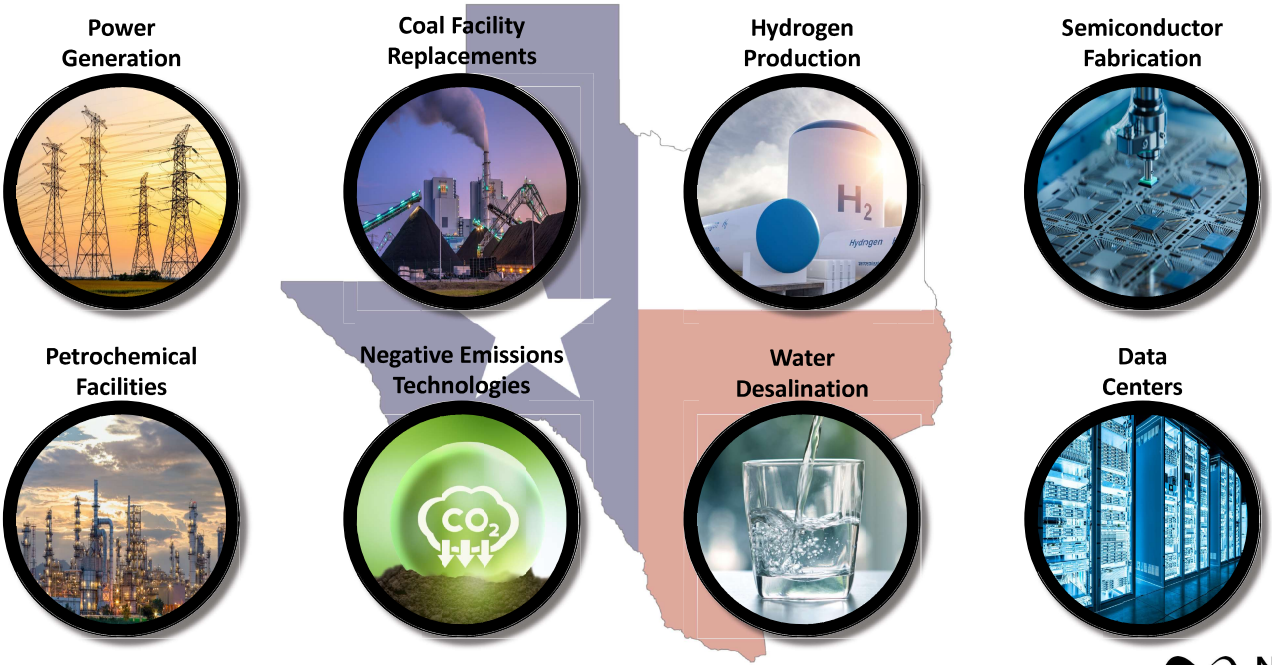
MSR - 250 MW_{th} (100 MW_e)
Nth-of-a-Kind (NOAK)
Rapid GEN-IV Reactor Deployment

1. With minimal changes to the FOAK design, NOAK deployments can be achieved after 3-5 reactor builds. Full NOAK cost savings will be driven by the capital deployed toward the development of large-scale manufacturing facilities and commodity development/security.

Natura Resources

Opportunities for Texas to Capture Industries

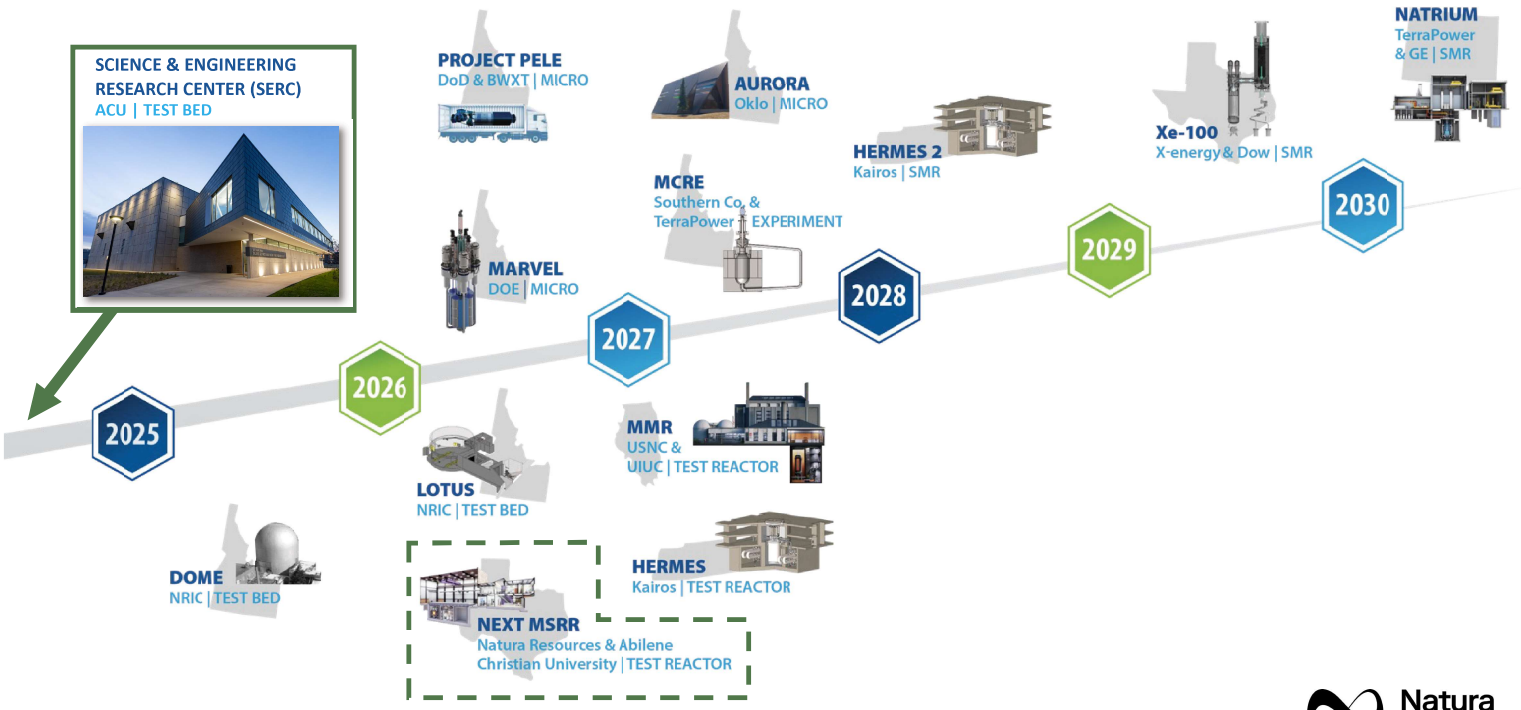
Natura Resources is engaged with a variety of potential commercial partners that present opportunities to capture significant markets in Texas that need significant quantities of clean electricity.



Natura Resources

Department of Energy (DOE)

Idaho National Laboratory (INL) Advanced Reactor Timeline - 2024



Natura Resources

Texas Advanced Nuclear Working Group (TANWG)

GOVERNOR GREG ABBOTT

August 16, 2023

Kathleen Jackson, P.E.
Interim Chair, Public Utility Commission of Texas
1701 North Congress Avenue, 7th Floor
Austin, Texas 78711

Dear Ms. Jackson:

As our state grows, so must our electric power generation. To maximize power grid reliability, the Public Utility Commission of Texas (PUCT) should consider all forms of dispatchable power, including nuclear energy. In particular, the PUCT should evaluate advanced nuclear reactors to determine if they can provide safe, reliable, and affordable power to our grid.

I instruct the PUCT to establish a working group to study and plan for the use of advanced nuclear reactors in Texas. This working group should focus on understanding the state's role in deploying and using advanced nuclear reactors; consider all potential financial incentives available; determine nuclear-specific changes needed in the Electric Reliability Council of Texas (ERCOT) market; identify any federal or state regulatory impediments to development; and identify how the state can streamline and accelerate permitting for the building of advanced nuclear reactors in Texas. The working group should also engage Texas supply chain manufacturers to foster homegrown development of this technology in our state.

The working group should include and coordinate with stakeholders with applicable experience, relevant state agencies and institutions of higher education, appropriate federal agencies, and current and potential future market participants in order to best understand how Texas can encourage the timely implementation of advanced nuclear reactors. Further, I direct the working group to identify any federal incentives available for the state and stakeholders to access and utilize. Additionally, the working group should coordinate with ERCOT to begin solving the technical challenges of incorporating advanced nuclear energy into the ERCOT grid.

Foundational to these charges is the safety of Texas communities, and it is critical that this report address advanced nuclear reactor safety. Finally, I charge the working group to submit a plan and recommendations to my office by December 1, 2024, outlining how Texas will become the national leader in using advanced nuclear energy.

The Honorable Kathleen Jackson, P.E.
August 16, 2023
Page 2

Nuclear energy is a proven, reliable, and dispatchable generation resource. It will become even more critical as Texas' need for reliable power continues to grow. The State of Texas must plan now to best harness these new advanced technologies and ensure the future of the Texas grid and our position as the energy capital of the world.

Specifically, I ask Commissioner Jimmy Glotfelty to lead this effort as he is already a leader in this area. Please coordinate closely with my office as your work progresses. Thank you for your commitment and service to Texas.

Sincerely,

Greg Abbott
Governor

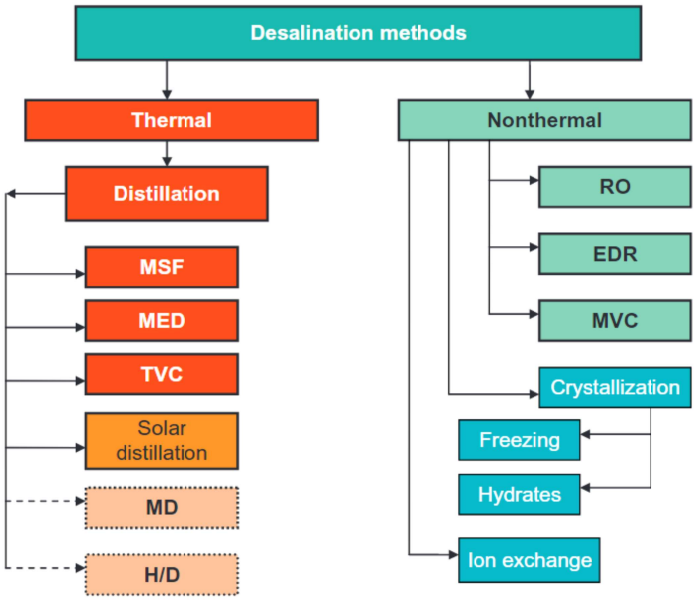
GA:tb

Natura Resources

Desalination Methods

HEAT

Thermal Driven Processes:
Thermal desalination processes employ heat to evaporate the water from a salt solution, and the water vapor is then condensed and recovered.



ELECTRICITY

Non-Thermal Processes (includes membrane driven processes):
Membrane-based desalination processes typically employ mechanical pressure, electrical potential, or a concentration gradient as the driving force across a semi-permeable membrane barrier to achieve physical separation.

Source: American Water Works Association

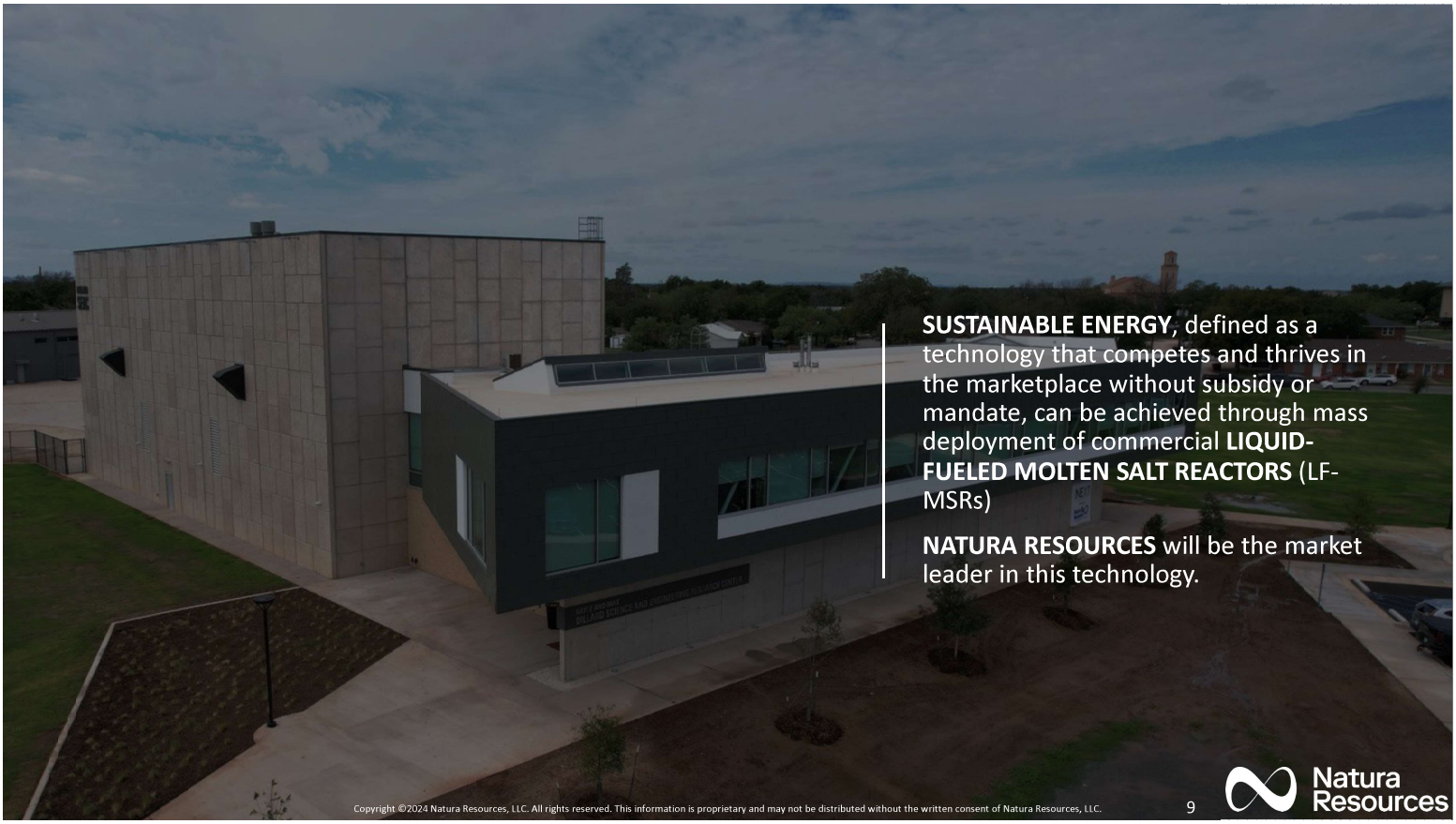
Natura Resources

Multistage-Flash (MSF) Desalination Example

Waste Heat Used (MW)	Electricity Supplied (kW)	Water Produced (gal/day)
10	20	660,000
25	50	1,660,000
50	100	3,300,000
75	150	4,980,000
100	200	6,600,000

Results produced using Desalination Economic Evaluation Program (DEEP) from the International Atomic Energy Agency (IAEA)

Natura Resources



SUSTAINABLE ENERGY, defined as a technology that competes and thrives in the marketplace without subsidy or mandate, can be achieved through mass deployment of commercial **LIQUID-FUELED MOLTEN SALT REACTORS** (LF-MSRs)

NATURA RESOURCES will be the market leader in this technology.

Natura Resources

Texas Railroad Commissioner Jim Wright
Prepared Testimony
Senate Committee on Water, Agriculture, & Rural Affairs Interim Hearing
May 15, 2024

Thank you, Chairman Perry and members of this committee for inviting me here today.

As both a South Texas Rancher and a Railroad Commissioner, I applaud the committee's work to ensure Texas has the water our state needs to develop and prosper. I would like to provide you with an update on the Railroad Commission's recent work with respect to the treatment of produced water and how our efforts today will help Texas meet its vastly growing need for additional water resources.

Finding alternative uses for produced water is a priority for the commission, as I know it is for the members of this panel and the legislature.

Following directives passed in the 87th legislative session, the commission began working on a framework for produced water recycling. In which we began sharing the framework for guidance purposes, seeking feedback and comments from industry, the water consortium, and others regarding the proposed outline.

In January of this year, the Railroad Commission published the framework for produced water pilot programs detailing the scope, procedures, and methodology which the commission views as necessary in keeping with the RRC's obligations and mission with respect to health and human safety, environmental considerations, and the economic vitality of our state.

Simply stated, this framework provides operators with a regulatory pathway to assess the effectiveness and the suitability of applying treated produced water for beneficial purposes.

Under the framework adopted by the commission, operators first apply for authorization to conduct pilot studies. After reviewing the application for assurance of ensure proper methods for gathering, storing, testing, and documenting how treated water quality evolves and is controlled in each pilot facility, the Railroad issues a letter of authorization.

This pilot project program represents an important first step to reaching the long-term goal of establishing standards and rules for large scale treatment of produced water to be a resource.

Importantly, the data collected through these pilot projects will help inform the Railroad Commission's understanding of treatment methods and levels which are protective of human health and the environment and will serve as a starting point for the commission as beneficial reuse becomes more widely utilized by the oil and gas industry.

I am happy to report that industry has been receptive to the framework developed under the Railroad Commission. To date, we have received six applications, three of which have been approved and three that are in the authorization or application process.

I should note that a pilot study for a closed loop system in which water does not touch the ground does not require Railroad Commission permit or other approval. So, while the number I mentioned above may seem low, it does not fully encapsulate the significant work and research being conducted by industry as a whole.

The pilot projects approved through the commission have been diverse with respect to technologies utilized, the treatment methods, and the potential end use, but they all share a few common characteristics, including:

1st - Oil Field Expertise – Providing the produced water, the storage of water, and any necessary residual disposal.

2nd Laboratory Expertise - Analyze the produced water feed, the treated water, the soil testing analysis, both before and throughout the growing season.

3rd - University/Academic Expertise - To help quantify the data produced and verify laboratory findings.

4th Agricultural Expertise - Manage irrigation levels, fertilization, insect & disease management.

As regulator, the Railroad Commission's goal is to see further development in this space, and we want to encourage participation through this new pilot project framework.

To that end, staff has been directed to work with interested parties as they develop their applications so that both sides understand the scope of the project and the data collection methods necessary to properly assess and validate the results of the project.

I would sum up our approach as "Cautious, but casting a wide net".

It is important that I emphasize that the beneficial use of produced water is both extremely promising and uniquely challenging.

This is a new frontier both for the industry from a technical and market perspective and for us at the Railroad Commission as their regulator.

This is a new concept and there is no playbook for us to follow based on other's experiences. The State of Texas is leading, we're writing that playbook today. And as a regulator, I want to assure this committee the Railroad Commission is committed to doing so both safely and efficiently.

Beneficial reuse of produced water is a multi-discipline challenge, but one that I believe our state is more than capable of safely and successfully navigating to unlock a significant source of water for industrial, agricultural, and ultimately human needs. This is not only desired but necessary for the continued development of our Texas natural resources and for the long-term economic vitality of our great state.

Thank you again for inviting me here to testify. I would be happy to answer any questions.

Texas Department of Information Resources
Transforming How Texas Government Serves Texans

Texas Department of Information Resources Testimony to the Senate Committee on Water, Agriculture and Rural Affairs

May 15, 2024

Mr. Chairman and members, my name is Tony Sauerhoff and I serve as the State Deputy Chief Information Security Officer and Cybersecurity Coordinator at the Department of Information Resources.

Thank you for allowing me the opportunity to address the committee today. Over the past five plus years, there has been a significant uptick in the size and scope of the cybersecurity threat facing Texans. To its credit, the Texas Legislature has been responsive to this threat and has prioritized the needed resources for state entities to prepare and respond to that threat. Unfortunately, most smaller entities, —such as municipalities, school districts or water districts— are not positioned as favorably. The lack of technical sophistication, maturity, capability, and other resources at these entities has made them prime targets for bad actors and we are seeing the effects of this in the news each month.

We used to joke about hackers as guys on computers in their mother's basement; today we see extremely sophisticated nation-state actors and organized criminal groups perpetrating relentless attacks across the landscape of the internet. These groups are patient, well-trained, and well-funded. They probe continuously for weaknesses in a system and once identified, set about exploiting that weakness. It is against these sophisticated, motivated, well-funded, and patient opponents that very small water utilities in tiny rural communities find themselves attempting to keep their systems safe and running for your constituents.

Federal agencies are raising concerns around these threats facing the nation's water systems – and these systems' ability to respond to the threats. On March 14, the Environmental Protection Agency and National Security Council wrote a letter to state governors asking them to ensure water systems are taking measures to improve their posture.

In that letter, the federal agencies say drinking water and wastewater systems are an attractive target for cyberattacks because they are a lifeline critical infrastructure sector, but often lack the resources and technical capacity to adopt rigorous cybersecurity practices. The federal agencies note that many of these water systems do not have in place even basic cybersecurity precautions—such as resetting default passwords or updating software to address known vulnerabilities. These basic measures can mean the difference between business as usual and a disruptive cyberattack.

Over time these entities have added to their IT landscape by automating processes, which has only exacerbated the problem of lots of internet -facing parts without the levels of security necessary to protect them. Given the sophistication of some cybersecurity adversaries and the drastic gap of available funding and sophistication that varies on each individual water system,

this sector of critical infrastructure are soft targets. And the problem is worsened by the fact that the bad guys only have to get through once but, we, the good guys, have to be right every time.

DIR's role in cybersecurity for the state has historically been largely advisory, setting policies and sharing best practices. DIR provides security for the state's network and provides incident response assistance directly and through DIR's Managed Security Services (MSS) vendor. We also deploy tools to stop unauthorized access into systems, such as Endpoint Detection and Response (EDR), Network Detection and Response (NDR), and Multi-Factor Authentication (MFA), to state and educational entities.

While DIR has some oversight over state agencies and higher education, it does not have authority over local governments, quasi-governments, or the private sector. We do work to assist those entities with information and best practices sharing. For instance, DIR operates an ISAO, an Information Sharing and Analysis Organization, which governments and businesses can join to stay up to date on cyber threats. Our ISAO currently has over 2,000 members. The Texas Cybersecurity Council under DIR also provides a forum for both public and private sector to work together to prepare for the changing cybersecurity threats.

Cybersecurity is a team sport, and we are always collaborating with other state and federal agencies. Currently, DIR is currently working with the Department of Public Safety (DPS) and the Texas Commission on Environmental Quality (TCEQ) on a letter to advise water and wastewater entities of the extent of the cyber threat and how to deal with it. Through Texas A&M Extension Center, DIR is providing a training for utilities to understand the basics of how to handle a cybersecurity incident.

Lastly, through partnerships with institutions of higher education, we have three Regional Security Operations Centers (RSOCs) in Texas with plans to eventually have 12 covering the entire state. The RSOCS can provide local entities network and endpoint monitoring as well as cybersecurity incident education, preparation, and response. This program is in its early stages but is expanding and we hope to continue that expansion.

As most of these systems struggle with limited resources, the Legislature funds DIR to provide many services that are of no cost to water utilities, including: signing up for the ISAO so they are aware of threats others are facing. Signing up for Multi-State Information Sharing and Analysis Center, or ISAC, and Water ISAC are virtually free and provide additional tools and sources of information. Putting in place the standard practices contained in our Incident Response RedBook and in the coming letter (a draft of which is in your packet) would help tremendously.

While not a free service, setting up a water utility's network and endpoints with EDR and NDR, given the rates available through DIR's MSS contract, could be economical. Instituting multi-factor authentication to access a utility's SCADA system would also be a cost-effective counter measure to swing the threat balance more in a utility's favor.

Additionally, requiring water utilities to comply with the same minimum standards the state requires of itself is a good start. Another recommendation is to remove the exemption from the state's mandatory annual cybersecurity training requirement for employees who use a computer less than 25 percent of the time. These folks are often the most vulnerable employees, given they do not spend their life in front of a screen.

While public water utilities are eligible for DIR services, the remaining cooperatives are not. Changing the statute so they may avail themselves of services like EDR and NDR, as well as MSS participation, would provide more access to reasonably priced services. While cybersecurity assessments and penetration tests have a cost, requiring them once every two years may be a reasonable option.

In all areas of cybersecurity, there is no single solution, but rather overlapping layers of prevention, protection, and recovery. As state actors target water utilities throughout our nation, there is a greater risk of serious consequences like contamination or the public's water supply being cut off. cut off public water supplies grows. DIR stands ready to work with this committee and our state and local partners to protect this vital sector.

Thank you and I am available to answer any questions.

Cybersecurity Concerns in Water/Wastewater Sector

Tony Sauerhoff
Texas Cybersecurity Coordinator
Deputy Chief Information Security Officer

Texas Department of Information Resources
Transforming How Texas Government Serves Texans

dir.texas.gov | @TexasDIR | #DIRisIT

Our Mission and Vision

DIR Mission

To serve Texas government by:

- Leading the state's technology strategy,
- Protecting state technology infrastructure, and
- Offering innovative and cost-effective solutions for all levels of government.

DIR Vision

Transforming How Texas Government Serves Texans

Environmental Protection Agency and National Security Council Letter to Governors – March 14, 2024

Warned of disabling cyberattacks on U.S. water and wastewater systems.

Identified recent foreign threats from:

- Iranian Government Islamic Revolutionary Guard Corps (IRGC)
- The People's Republic of China (PRC) state-sponsored cyber group AKA Volt Typhoon

Noted many US water systems do not have basic cybersecurity precautions in place.

Requests that states ensure that all water systems:

- Comprehensively assess their current cybersecurity practices to identify significant vulnerabilities
- Deploy practices and controls to reduce cybersecurity risks where needed.
- Exercise plans to prepare for, respond to, and recover from a cyber incident.

DIR

Scope of Problem

- Lifeline critical infrastructure is an attractive target for cyber attackers
- Basic cybersecurity precautions are not in place
- PRC quietly pre-positioning themselves to disrupt operations

DIR

Actions for Water Systems to Reduce Risk

Cybersecurity & Infrastructure Security Agency, Environmental Protection Agency, Federal Bureau of Investigations Joint Fact Sheet

- Reduce Exposure to the Public-Facing Internet
- Conduct Regular Cybersecurity Assessments
- Change Default Passwords Immediately
- Conduct an Inventory of OT/IT Assets
- Develop and Exercise Cybersecurity Incident Response and Recovery Plans
- Backup OT/IT Systems
- Reduce Exposure to Vulnerabilities
- Conduct Cybersecurity Awareness Training
- Free resources are available for most, but not all these recommendations. Entities without cyber-experienced staff are unable to utilize many free resources.

DIR

Cybersecurity Threats and Incidents

Cyber Threats to Texas Water Systems

Some of the attack vectors and potential impacts include:

Disruption of Operations	Ransomware Attacks	Data Breaches	Denial-of-Service (DoS)
Hackers can gain access to a facility's water system controls, pumps, valves, and chemical dosing, and manipulate these to disrupt water flow and pressure; contaminate water supplies by altering chemical levels; or attempt to shut down treatment plants.	Threat actors can deploy ransomware to encrypt a facility's data and systems, essentially holding them hostage. While dealing with a ransomware attack, facilities may face operational disruptions and attempts to force the facilities to pay a ransom to regain control.	Water utilities may store customer data (such as billing information) or operational data (such as treatment plant schematics). Threat actors could steal or expose this data for malicious purposes.	DoS attacks can overwhelm a facility's systems with internet traffic, making them inaccessible to legitimate users. This disruption could prevent operators from monitoring or controlling critical systems.

DIR

Texas Water System Cyber Incidents

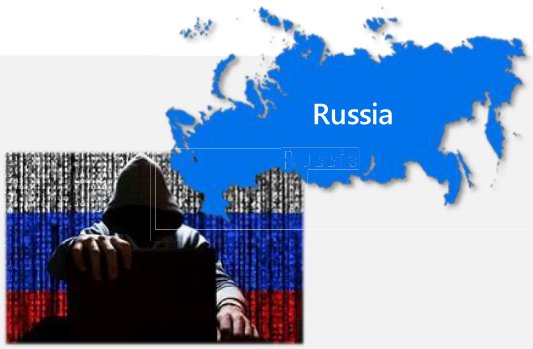
Muleshoe	Hale Center	Lockney	Abernathy	North Texas Municipal Water District
• Hackers caused water system to overflow. • System was shutdown and operated manually.	• 37,000 attempts in four days to log into firewall. • City unplugged the system and operated it manually.	• Experienced issues same day as Muleshoe and Hale Center. Took systems offline as a precaution.	• Experienced issues same day.	• Business network and phone system impacted by attack.

DIR

Nation State "Proxy" Activities

Cyber Army of Russia

- Attacked the supervisory control and data acquisition (SCADA) water systems of 2 Texas cities.
  - No impact on drinking water.
  - Systems switched to manual mode.
- Performed a brute force attack against the firewall of a third Texas city but failed to get access.



Cyber Av3ngers

- Targeted Unitronics-brand programable logic controllers (PLCs).
- Successfully exploited multiple systems in Texas.
  - Resulted in a "defacement" of the user interface.

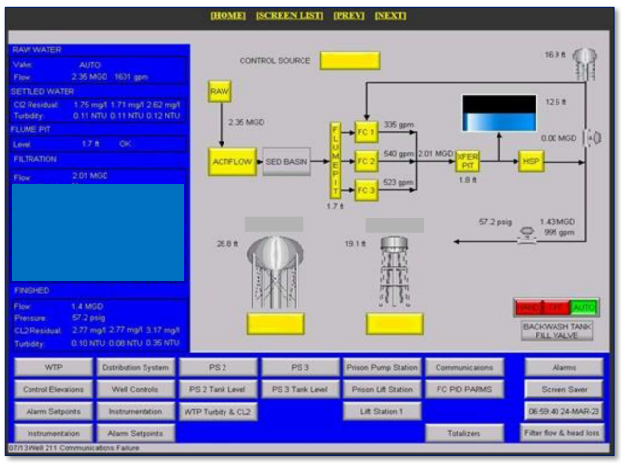
DIR

Industry Control System Interference

Public Access to Critical Infrastructure Control Systems

- DIR identified this exposed SCADA system in a Texas city.
- After verifying that this was an exposed SCADA system, the CIRT contacted the city, explained the finding, outlined the risks, and provided guidance to correct this issue.
- Based on the notification from the CIRT, the city corrected the issue and reduced their risk of exploitation.

Security experts recommend *not* exposing SCADA systems to the internet because of the increased risk of exploitation, which could result in physical consequences impacting the public (such as tampering with drinking water chemical levels or water pressure/flow rates).



Internet-exposed SCADA system identified by the CIRT.

DIR

Other State Water System Cyber Incidents

New Jersey – Long Beach Township

- Russian Cyber Army claims credit for a breach of the water utilities and posted screenshots.

Indiana – Tipton Wastewater Treatment Plant

- Hackers were able to interact with control systems. Facility staff transitioned systems to manual control.

Pennsylvania – Municipal Water Authority of Aliquippa

- A station that monitors and regulates water pressure for two townships was overtaken with an anti-Israel message.

Texas Statewide Cybersecurity Incident

Ransomware incident in August 2019 impacted 23 local governmental entities.

Impacts:

- Residents could not pay water and other bills
- No payroll services
- No processing of licenses and certificates
- No check printing
- Police had no access to records
- Bodycam footage encrypted
- Could not buy/sell houses or perform title searches
- Vital records (birth and death certificates) unavailable
- Water treatment controls at one facility impacted, had to be performed manually

DIR's Role, Initiatives, and Resources

Texas Department of Information Resources Role

- **Advisory:** Recommendations to the Legislature
- **Policy:** Sets rules for state agencies but no authority over local entities or private sector.
- **Leadership:** Chief Information Officer, Chief Data Officer, Accessibility, Cybersecurity Programs.

DIR Stakeholders

We serve entities that serve the public:

Government Agencies
- Texas State Agencies
- Local Government
- The Legislature and Legislative Agencies
- Out-of-State Government Entities

Judiciary
- The Texas Supreme Court
- Court of Criminal Appeals
- Court of Appeals

Utility Organizations

Education
- Public and Private K-12
- Charter Schools
- Public and Private Institutions of Higher Education

Public Service Entities
- Assistance Organizations
- Public Safety Entities
- Volunteer Fire Departments
- Public Hospitals

DIR

DIR Initiatives and Resources

Currently partnering with Department of Public Safety and Texas Commission on Environmental Quality to develop letter to all water systems in Texas. Includes:

- Description of problem
- Recommendations of top cyber actions for securing water systems
- List of state and federal resources

DIR

Texas Information Sharing and Analysis Organization (TX-ISAO)

TX-ISAO is a forum for state agencies, local governments, public and private institutions of higher education, and the private sector to share information about cybersecurity threats, best practices, and remediation strategies.

Monthly Membership Briefings
- Education
- Threat intelligence
- Tabletop resources

Alerts, Newsletters, and Events

Discussion Module

Intelligence Sharing

Growing Membership
- 1,600+ entities
- 2,000+ individuals across Texas
- Representing a variety of sectors

While TCEQ reports over 7,000 water systems in Texas, only 46 ISAO members are from sector.

Join the TX-ISAO: dir.texas.gov/information-security/tx-isao

DIR

Regional Security Operations Centers (RSOCs)

Who We Work With

- Cities, counties, and other local government entities.
- K-12 school districts and local education authorities.
- Higher education, junior colleges, and regional state agencies.

What We Provide

- Cybersecurity support on a local scale.
- Resources for smaller, underserved entities.
- Geographically accessible support.

How We Help Secure Texas

- Providing regional cybersecurity response and preparedness services.

DIR

DIR's Managed Security Services

Managed Security Services (MSS) provides strong and consistent management of state data security.

IT security is an increasingly critical priority for state and local governments, requiring heightened awareness to malicious threats and an expanded focus on the technology protecting sensitive information. MSS offers eligible entities, such as public water systems, can receive Endpoint Detection & Response (EDR) and Network Detection & Response (NDR) to help protect against cyber attacks.

Available Services:

- Security monitoring and device management
- Incident response
- Risk and compliance

DIR

DIR Initiatives and Resources

Texas Cybersecurity Council

- DIR created and oversees this group, which is focused on developing enduring partnerships between public and private sector entities to ensure that critical infrastructure and sensitive information are protected.

DIR is partnering with Texas A&M Engineering Extension Service (TEEX) to develop a 4-hour cyber training program focused on water system employees

DIR Incident Response Team Redbook (including planning templates)

DIR

Other Resources

Texas Infrastructure Liaison Officer Program

Water Information Sharing and Analysis Center (WaterISAC)

Cybersecurity and Infrastructure Security Agency/Environmental Protection Agency Joint Water Sector Cybersecurity Toolkit

- Free Cyber Vulnerability Scanning for Water Utilities
- EPA Water Resilience Cybersecurity Help Desk
- EPA Free Cybersecurity Assessment Service

National Institute of Standards and Technology Tips and Tactics for Control System Cybersecurity

Texas A&M Engineering Extension Service Business and Cyber Solutions Course: Cybersecurity Resiliency in Industrial Control Systems

Annual Cybersecurity Awareness Training

- House Bill 3834 (86R) established statewide security training for all state and local government entities.
- House Bill 1118 (87R) aligned local government employee training requirements with state government requirements.
- Local government employees and officials must take training only if they use a computer to complete 25% of their duties.
- Many water systems report that many or all their employees use a computer less than 25% of the time.
- Those that use a computer less than 25% of the time are likely the employees in most need of awareness training.

Thank You

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Texas Department of Information Resources

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BETTER TECH FOR TOMORROW

MODERNIZING TEXAS' WATER INFRASTRUCTURE CYBERSECURITY

WRITTEN BY
David Dunmoyer
May 2024

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MODERNIZING TEXAS' WATER INFRASTRUCTURE CYBERSECURITY

WRITTEN BY **David Dunmoyer**

KEY POINTS

- **Recent cyber attacks** on water infrastructure systems throughout the nation demonstrate the frailty and inadequacy of existing defenses.
- **As state water systems** become more digitalized, the attack vectors are growing without commensurate growth in cyber security and preparedness.
- **The history of public policy** for critical infrastructure cybersecurity is punctuated by a reactionary, fragmented system of governance.
- **The Texas Legislature** should consider seven policy recommendations in the 89th Legislature to position the state as a national leader in water infrastructure cybersecurity.

EXECUTIVE SUMMARY

This paper examines prominent areas of Texas' critical infrastructure and reports on best practices and cybersecurity management procedures that have worked well in other industries and argues that such policies ought to apply to water. Following an analysis of the policy, workforce, and technological needs for critical water infrastructure, this paper proposes seven concrete recommendations that the Texas Legislature and relevant state agencies should consider to equip stakeholders with the tools and resources necessary to lead proactively.

INTRODUCTION

In January of 2024, three small towns in the Texas panhandle were hit with a virulent series of cyberattacks, believed to be levied by a Russian hacktivist group. One such Texas town, Muleshoe, was overwhelmed by the cyber infiltration of their water systems, resulting in their water tank overflowing. This event ultimately forced the city to take their systems offline and revert to manual operations (Lyngaas, 2024). In Hale Center, Texas, authorities noted 37,000 unique attacks in a series of four days, each one attempting to inflict harm on the water supply for this small community of 2,000 residents (Miller, 2024). While these recent attacks highlight the vulnerability of water systems throughout Texas—particularly those in more rural regions of the state—an older and well-documented incident in the state of Florida provides more context for the nature of cyber warfare launched by nefarious actors.

Over the last decade, Oldsmar, Florida, has modernized its water infrastructure, including the use of digital technologies available to water treatment facilities to improve efficiency, accuracy, and economics. Renovation reduced wastewater pollutants and improved the delivery of clean water to its approximately 15,000 residents. However, it created a new threat vector for cyberattacks, as the facility did not include the IT systems, knowledge, or tools

leaving it vulnerable. In February 2021, Oldsmar's water treatment facility was hacked by criminals who adjusted the levels of sodium hydroxide to a toxic concentration (Greenberg, 2021). Were it not for a vigilant employee who spotted the intrusion as it was happening, this could have proved fatal for an unthinkable share of its residents.

The Oldsmar incident was not merely the consequence of failure to prepare. This is just one example of such an attack, propelling numerous cybersecurity experts to sound the alarm. Municipal water systems can be easy targets for hackers because a local government's computer infrastructure is often underfunded and ill-prepared (The Detroit News, 2021). While cybersecurity challenges persist throughout the entire utility sector, the water industry is emerging as the bigger target, with threats to its security and safety increasing daily (Segal, 2022).

The Federal Energy Regulation Commission and the North American Electric Reliability Corporation have had a long-term goal of securing the electric grid against cyber criminals. Both organizations have codified cybersecurity rules that are applicable to each electric utility provider.

For its part, the oil and gas industry adopted a more reactive approach, tightening cybersecurity after the 2021 Colonial Pipeline attack (Jones, 2022). However, "there are no set standards or enforced guidelines for the cybersecurity standards in the water and wastewater sector. This has been mostly governed through the [Cybersecurity and Infrastructure Security Agency] CISA and [the National Institute of Standards and Technology] NIST" (D. Wallace, personal communication, March 1, 2022).

At the federal level, a finer point was placed on the urgency to modernize water infrastructure cybersecurity preparedness in a letter warning state governors from the Environmental Protection Agency Administrator Michael Regan and National Security Advisor Jake Sullivan. The letter underscored the rise in threat from attackers—namely the Iranian Government Islamic Revolutionary Guard Corps—exploiting water facilities that neglect to change default passwords as well as state-sponsored attacks from the People's Republic of China that indicate a pre-positioning to wreak destructive havoc on water infrastructure in the event of military conflicts (The White House, 2024). The letter goes on to encourage governors to take immediate action to ensure cybersecurity best practices and consider advancing policy and practices that will better fortify their critical water infrastructure systems.

This paper serves as a resource to accomplish these very goals and position Texas as a national leader in critical water infrastructure cybersecurity.

THE WATER INFRASTRUCTURE CYBERSECURITY PROBLEM

Densely populated cities across the world are capitalizing on emerging technologies to improve service delivery and management. Such cities are eagerly adopting the title "smart city" which is characterized as a municipality that leverages information and communication technologies (ICT) to enhance the efficiency of operations and management, while improving information sharing for the purpose of benefitting citizen welfare and government services (digi.city, n.d.). As the world population increasingly shifts from rural to urban areas, smart city features are seen as a necessity to effectively manage scarce resources with ever-growing communities and urban footprints.

While there is no concrete threshold for what makes a city "smart," numerous cities throughout Texas have publicly committed to incorporating smart city tenets and technology into their respective ecosystems, including, Austin, Houston, Dallas, San Antonio, and Fort Worth, among others. Each city has taken steps to define an actionable vision of what their smart city future could become, with robust goals over time to leverage data and emerging technology to benefit citizens. While it will certainly be some time before these cities adopt all manner of smart city capabilities, there is an important reality at play that introduces an unavoidable tension: the reality that technology moves faster than policy.

Table 1

Smart city water management examples

1	Computers and software can be used to assess water composition, determine the amount of chemicals needed to treat water, the delivery ofchemicals to treat water, and other routine water system actions.
2	Modeling, simulation, and predictive analysis can be used in critical water infrastructure to develop more sustainable water distribution networks, water collection systems, and flood protection systems.
3	Smart water meters can improve user and technician convenience as well as autonomously collect information to instantaneously generate error reports when consumption anomalies are detected.
4	Automated alarm mechanisms can report malfunctions as soon as they occur, potentially stopping the flow through any given network to avoid wasted water in the event of broken pressurized pipes.
5	Detection systems can monitor and analyze pollutants even prior to reaching a treatment plant, ensuring that the contents and concentrations of the water will be known before it even reaches the plant.

Note. Data from https://www.sae.org/blog/sae-j3016-update

Consider the city of Austin. In December 2015, the U.S. Department of Transportation (USDOT) launched its Smart City Challenge for cities to "develop ideas for an integrated, first-of-its-kind smart transportation system that would use data, applications, and technology to help people and goods move more quickly, cheaply, and efficiently" (U.S. Department of Transportation, 2017). Seventy-eight cities entered the challenge, submitting plans that outlined problems specific to their city and proposed solutions if awarded the $40 million winning prize. While Austin did not win the challenge, it was one of seven finalists. Following this competition, stakeholders throughout Austin committed to operationalizing some of the goals outlined in the plan. Given the tremendous resources, stakeholder time and expertise, and vision-casting that went into this plan, then-mayor Steve Adler and the Austin City Council codified many elements of this plan into their strategic planning and vision documents. Such elements include automation, connected vehicles, smart grids, enmeshed ICT, and more. Despite the exhaustive detail incorporated into the 70-page proposal, there is only one mention of cybersecurity—an aside that Austin will base its security practices off NIST Cybersecurity and Risk Management Frameworks (Letter from Austin Mayor Steve Adler to Secretary Foxx, 2016). As mentioned previously, there are no robust NIST cybersecurity standards or enforced guidelines for the water and wastewater sector. Naturally, this reveals a significant gap in the consideration of resiliency and safeguards for just one of Texas' major cities with a commitment to becoming a smart city. Unfortunately, this gap in Austin's preparation against a cyberattack on its water infrastructure exists across the urban centers of Texas and the nation.

These five examples are just some of the water sector's smart city components either already underway or being considered by cities throughout Texas. And as a recent Polaris Research report notes, the global smart water management market was a $13.73 billion industry in 2021, and is expected to grow to $31.73 billion by 2030 (Kite-Powell, 2022). As computing power has increased and the cost of processing power, memory, and batteries have

decreased, the tangible and digital worlds are melding into one. Digital devices that are on the edge of critical infrastructure are most commonly linked to the core IT networks that are in turn connected to the wider internet. This means that, as physical infrastructure becomes enmeshed with the digital realm, almost every piece and facet of our water infrastructure may introduce a new cybersecurity threat vector that motivated criminals can exploit .

The Rural Problem

While rural regions of the state are less inclined to fully embrace the "smart city" revolution, they face unique challenges that put their water infrastructure at risk of cyberattack. As noted by the United States Agency for International Development (USAID), "[rural] government institutions frequently lack the budgets, technical capacity, and professional management capabilities" to deliver on the types of services needed for robust critical infrastructure security (United States Agency for International Development, 2022, p. 14). Thus, many rural systems suffer from outdated technology, inadequate cybersecurity expertise and education, funding constraints on prioritizing physical security, and a limited awareness of cybersecurity relative to larger, urban systems and teams.

THE CHALLENGE

There are 7,000 public water systems in Texas. Each system is vulnerable to cybersecurity risks, challenges, and opportunities for enhanced security (Carver & Salhorta, 2023). The problems are broad in number, with Texas being home to various urban, suburban, and rural environments with different needs, regions with a shortage of a cybersecurity workforce, and divergent technological infrastructure and capabilities.

Despite the vastness and diverseness of Texas, the state's water infrastructure cybersecurity needs largely reflect that of the United States at-large. As revealed by a survey conducted by the Water Sector Coordinating Council (WSCC)[1], the utility industry identified four key needs:

1. Water sector specific training and education,
2. Technical assistance, assessments, and tools,
3. Cybersecurity threat information, and
4. Federal loans and grants (2021, p. 5).

The WSCC survey asked respondents to identify the frequency of organizational risk assessments, which include threat and vulnerability analyses, downsides to information processing, and risk mitigation stemming from security and privacy controls. Of the 606 water and wastewater utilities that responded, 27% of utilities conduct threat evaluations less frequently than annually, 24% annually, 17% don't conduct them, and 16% don't know. Further, 71% of respondents noted they have 0 – 2 full-time employees (including contractors and municipal or county staff) dedicated to Information Technology (IT) cybersecurity, and 73% noted 0 – 2 full-time employees dedicated to Operational Technology (OT) cybersecurity. The WSCC survey identified a finding of great consequence: fully 67% of water utilities report that cybersecurity is either not a priority or a low priority (Water Sector Coordinating Council, 2021).

Texas has an agency tasked with overseeing critical infrastructure cybersecurity: the Texas Department of Information Resources (DIR). In 2013, the Texas Legislature passed Senate Bill 1102 to create the Texas Cybersecurity Council, a program overseen by DIR, which facilitates partnerships between private industry and public sector organizations to safeguard the cybersecurity of Texas' critical infrastructure (2013). In 2020, DIR adopted the Texas Cybersecurity Framework, based on the NIST Framework for Improving Critical Infrastructure Security. DIR published a report in 2020, acknowledging current shortfalls in Texas' cybersecurity preparedness. The DIR report provides information on tips and tools across the entire critical infrastructure ecosystem,

1 The Water Sector Coordinating Council is a "policy, strategy and coordination mechanism for the US Water and Wastewater Systems Sector in interactions with the government and other sectors on critical infrastructure security and resilience issues…[it] coordinates and collaborates with EPA, the Department of Homeland Security, state primacy administrators and other government agencies" (NACWA, 2022).

but without a direct mention of water infrastructure. The DIR report concludes with a lengthy list of legislative recommendations, suggesting new laws to address the direct concerns and needs of water infrastructure across the state (Texas Department of Information Resources, 2020).

Immediately, this reveals the more quantifiable challenge of water infrastructure security. Water utility providers acknowledge specific needs to improve the security of their systems, but they lack the resources, knowledge, workforce, or drive to make action a priority. While the trade associations might declare that cybersecurity is a top priority for the water and wastewater sector, this has yet to translate into needed policy or substantive downstream change (Germano, 2019). Considering the potential human and financial toll of sluggish target hardening and cybersecurity enhancements, it has become evident that the clock is ticking to ensure state lawmakers make security the state water infrastructure a priority.

Cyberattacks constantly evolve to identify new vectors, vulnerabilities, and tactics to disrupt water infrastructure systems and wreak dangerous and costly havoc. As an abstract example, chemotherapy is accepted as an effective means of fighting cancer. But what would happen if cancer cells learned to adapt to evade chemotherapy and attack its host more virulently, rendering chemotherapy ineffective? This is how cyber criminals operate. While a security system might have been effective in defending against a common cyberattack levied in 2022, criminals constantly identify new security systems, evaluate bugs or gaps to penetrate, adapt, and find new methods to exploit vulnerabilities, necessitating constant reevaluation of cyber defense processes and systems (Burt, 2023).

The water and wastewater sector remains a soft target for cyber criminals. It has been under a barrage of attacks in the last decade, ranging from ransomware attacks, tampering with industrial control systems, manipulative valve and flow operations, chemical treatment formulations, and efforts to destroy operations and inflict monetary and human life damages. Attacks attempting to contaminate water supply, bring system operations offline, or induce outages can have devastating effects, including casualties, delays in emergency response by healthcare, police, or firefighters, hamstringing transportation systems, and affecting food supply (Germano, 2019).

Identity theft is also a real concern. Much of the water sector store highly sensitive information—for both customers and employees—ranging from billing information, personal identifying information, and sensitive employee information. In 2018, the Federal Bureau of Investigation (FBI) and the U.S. Department of Homeland Security (DHS) made clear that Russian state-sponsored cyber attackers are specifically targeting the U.S. water sector due to its vulnerabilities and the opportunity to inflict cataclysmic harm (Cybersecurity & Infrastructure Security Agency, 2018). Further, in 2024, FBI Director Christopher Wray testified that China's targeting of critical American infrastructure—including water—was happening at an unprecedented scale, with the PRC inserting "offensive weapons within our critical infrastructure poised to attack whenever Beijing decides the time is right" (Parkinson & Hinshaw, 2024).

Despite these dangers, the water sector remains vulnerable and underprepared for this era of digital warfare. As noted by the DHS and the FBI, in many of the successful Russian attacks on the water sector, penetration occurred in networks where multi-factor authentication was not used (Cybersecurity & Infrastructure Security Agency, 2018). Single factor authentication, which remains a common practice across the sector, is a susceptible vulnerability that rogue criminals will continue to exploit. The American Water Works Association (AWWA) identified some underlying inefficiencies in cybersecurity preparedness that increase the risks of attack as illustrated in **Table 2**.

Table 2

Existing inefficiencies in cybersecurity preparedness for water infrastructure

1	Insufficient antivirus, integrity-maintenance, and other security tools, particularly for network devices used by small businesses and operating on residential-class routers.
2	Manufacturers build and distribute the devices with exploitable services to make them easier to install, operate, and maintain.
3	Failure to change vendor default settings, enhance security, and regularly patch systems and software.
4	Failure to remove or update antiquated or outdated equipment that is no longer being supported by the manufacturer or vendor.
5	Overlooking network devices when assessing risk or recovering from a cyber intrusion.

Note. Information from *Cybersecurity Risk & Responsibility in the Water Sector*, American Water Works Association, 2019 (https://www.awwa.org/Portals/0/AWWA/Government/AWWACybersecurityRiskandResponsibility.pdf).

The Texas Commission on Environmental Quality (TCEQ)—in conjunction with the Environmental Protection Agency (EPA) and the Water Information Sharing and Analysis Center—notified public water systems across Texas that cyberattacks are a critical threat that continue to increase due to the Russian-Ukrainian conflict (Betts, 2022). This TCEQ notice came on the heels of the EPA announcement of its Industrial Control Systems Cybersecurity Initiative—Water and Wastewater Sector Action Plan (Action Plan). The Action Plan was directly associated with President Biden's Industrial Control Systems Initiative, which established a joint effort between the critical infrastructure sector and the federal government to streamline the utilization of technologies created to increase the visibility, indicators, detections, and warnings associated with cyber threats (Evironmental Protection Agency, 2022). Unfortunately, the Action Plan lacks adequate funding, enforcement, or strong, actionable goals that are needed to drive the critical water infrastructure sector to a position of strength and compliance. Indeed, the Action Plan creates a task force of water sector leaders, introduces pilot projects for incident monitoring, seeks to improve information sharing, and looks to find ways to provide technical support to water systems. However, it does not provide training, federal loans and grants, or additional tools that AWWA and its members have requested. While reasonable minds can differ on the most prudent and beneficial investments to make in target hardening for critical infrastructure, the bipartisan nature of federal cybersecurity proposals highlights the reality that domestic security and the general welfare of Americans—vis-à-vis cybersecurity—is an apolitical priority.

Cost remains a key animating challenge shared by water infrastructure operators, leaders in Texas, and agencies and elected officials in Washington. During a Congressional hearing in the House Committee on Homeland Security in late 2022, members concluded that fortifying cybersecurity protocols and technology for water infrastructure was a top issue facing critical infrastructure nationwide (Kelley, 2022). Witnesses from municipal water districts were quick to point out that while cybersecurity is no longer optional in the

water sector, budget challenges mean the only way they can make moderate improvements is through increasing utility costs. This practice may be resisted by utility customers. For states with large rural areas like Texas, many districts do not have the money or the means for raising funds for basic technology (Mulverhill, 2019). While witnesses at the hearing pleaded for more federal money, the only response thus far has been the Infrastructure Investment and Jobs Act (IIJA), which authorized $1 billion in funding for a state and local cybersecurity grant program for critical infrastructure (U.S. Department of Homeland Security, 2022). Texas was allocated approximately $40 million through the State and Local Government Cybersecurity Grant Program, and at the time of this publication, the request for applications for year one is closed and awaiting review. It has yet to be seen what priority state and local governments will place on critical water infrastructure over other critical infrastructure through this program (Texas Department of Information Resources, n.d.).

OTHER CRITICAL INFRASTRUCTURE

Cyber threats to critical infrastructure are not new. In 1996, President Bill Clinton issued Executive Order 13010 (1996) which both defined critical infrastructure and established the National Commission on Critical Infrastructure and issued protections (Mariani et al., 2022). Since then, there have been both broad national efforts to address critical infrastructure, as well as sector-specific efforts to harden targets. Given the rate at which technology has progressed since 1996, and the glacial pace of policy related to the same, many of the industry-specific efforts have been in response to crises.

Take for example the success of the 2021 Colonial Pipeline attack attributed largely to lack of preparation. Cyber criminals hacked into the system using ransomware, shutting the entire 5,500-mile system down for five days (Government Technology, 2021). The China-based criminals rendered the pipeline inoperable, stopping the flow of gasoline and jet fuel to customers across the country. Due to the severe damage caused by the security breach and an inability to expeditiously bring systems back online, Colonial opted to pay a $5 million ransom to the criminal group (Wilkie, 2021). This successful blackmail prompted change for the cybersecurity of critical oil and gas infrastructure in the U.S. The White House issued an executive order (2021a) and a national security memo (2021b) which mandated better disclosures of cyber incidents, created a federal playbook for incidents, required the upgrade of cybersecurity technology, established a review board, and promoted a system of cyber-intelligence sharing between government agencies and the private sector (Anscombe, 2022). In addition, DHS established new regulations that require the following: pipelines must designate a "cybersecurity coordinator" who is always available to report cybersecurity threats to the Transportation Security Administration (TSA) and CISA; pipelines must review cybersecurity practices and address new risks and submit monthly reports on these reviews to TSA and CISA; and what were once voluntary guidelines became mandatory, with violations subject to considerable fines (Hendricks & Sessler, 2021). The same vulnerabilities that allowed criminal enterprise to succeed in attacking the largest pipeline system for refined oil products in the U.S. plagues much of America's critical infrastructure and its staff, particularly our water systems.

Electric grids represent another example where the cybersecurity of critical infrastructure was enhanced in the U.S. in reaction to a catastrophic attack. While there have yet to be any successfully executed cataclysmic attacks on America's grid, the 2015 Russian attack on Ukraine's electric grid captivated the attention of leaders across the world. Amidst conflict between the two nations, a Russian threat actor took Ukraine by surprise when a hacker successfully utilized malware to remotely compromise the information systems of three large energy distribution companies. Without any warning, more than 230,000 Ukrainian customers were left without power for hours in the blisteringly cold month of December (Council on Foreign Relations, 2015).

The successful attack in Ukraine demonstrated a tangible threat to America, catalyzing the federal

government into action to harden the cybersecurity preparedness for electric grids. Electric utility grids have adopted numerous cybersecurity improvements over the last decade. The North American Electric Reliability Corporation (NERC) introduced robust cybersecurity standards that have become new requirements on all U.S. electric utilities, including risk assessments, incident reporting, and security controls. In addition, as the U.S. Department of Energy (DOE) acknowledged that the electric grid was developed decades ago using outdated technology that posed cybersecurity risks, electric utilities were required to implement advanced technologies such as intrusion detection systems, firewalls, and security information and event management systems to better defend against cyber threats (U.S. Department of Energy, 2021). The U.S. government now conducts regular simulated cyberattack exercises as a means of testing system readiness. The U.S. government also stepped up to lead efforts in information sharing and public-private partnerships to provide accountability, synergy in adopting best practices, and real-time, industry-wide threat sharing.

These examples illustrate two important realities related to cybersecurity efforts for critical infrastructure systems in the U.S. First, improvements have largely been reactionary. While one could make the case that industry lobbying and advocacy efforts from the electric and oil and gas industries has resulted in securing improvements for their industries over water, their case is made more compelling and urgent because they can point to demonstrable harm, with critical infrastructure cybersecurity measures largely reactive in nature.

Second, it underscores the reality that the U.S.—and states like Texas—address cybersecurity through a sector-specific regulatory scheme. For example, at the federal level, cybersecurity regulations with actual teeth are created and enforced by an agency germane to that industry. The DOE oversees the electric grid and power plants, DHS imposes requirements on pipelines, and EPA is the body responsible for regulating water plants. Consequently, substantive changes to cybersecurity for critical infrastructure are both siloed and driven largely by the fears following a costly attack.

POLICY RECOMMENDATIONS

Federal action can motivate cybersecurity preparedness for water infrastructure in the short term, but ultimately industry stakeholders must adopt similar requirements and mandates that have been imposed by DHS and DOE on the pipeline and electric grid infrastructure, respectively. However, the State of Texas should take the lead and not wait for the federal government or a national water infrastructure cyber crisis to begin adopting policies that will position this key component of Texas' critical infrastructure ready to withstand the digital threats of the 21st century. Below are the policy recommendations that the 89th Texas Legislature should strongly consider adopting if it is to protect our most critical resource.

Create Requisite Statewide Cybersecurity Standards under the Texas Department of Information Resources

DHS implemented two critical steps to standardize cybersecurity requirements that could be emulated in Texas for its water infrastructure. First, the Texas DIR cybersecurity standards and best practices that are currently voluntarily imposed on water infrastructure must be mandated by law, with financial penalties for noncompliant actors. These standards include everything from basic cybersecurity hygiene—such as multi-factor authentication—to certified training programs for specific employees. Second, DHS imposed its cybersecurity standards by clearly defining itself as the chief water infrastructure cybersecurity authority in a parallel manner to how DHS regulates pipeline cybersecurity. DIR could also create a new department with the sole responsibility of overseeing water infrastructure cybersecurity. This will establish a more active relationship between stakeholders in the water space and gives DIR both the stick of enforcement and the carrot of aid —with aid provided both informationally and financially where appropriate. Importantly, while DIR would oversee these standards, they should continue to

partner with the private sector, the Texas Legislature, the Texas Commission on Environmental Quality, and other key stakeholders to make revisions and updates to these standards when necessary.

Prudent Investments in Career Technical Education

Texas must raise the number and quality of IT and OT professionals at water infrastructure sites across the state in order to increase cybersecurity readiness. Unfortunately, there is a looming workforce shortage of these highly sought out professionals. Initially, there was a 41.3% increase in Texas' cybersecurity industry employment from 2013 to 2018, with an expected 35% growth rate over the next decade (Texas Comptroller, n.d.). However, alongside this growth and demand has been a decrease in supply: there is a global shortage of 3.4 million workers in the field of cybersecurity, with more than 700,000 unfilled cybersecurity jobs in America (Lake, 2022). Texas alone has approximately 36,000 cybersecurity job openings that remain unfilled (CyberSeek, n.d.).

The Texas Legislature must invest in comprehensive IT career and technical education opportunities. Texas could develop a policy that better aligns the incentives of CTE funding with outcomes, so programs throughout the state are incentivized to provide more IT programs that can generate high-paying jobs for graduates. If the Texas Legislature passes a law that allocates existing state funding to programs in a weighted fashion—i.e., more money for programs that generate high-paying jobs for CTE students and less for those with lower earnings and outcomes—the market of CTE programs will provide more opportunities for students to earn higher income as cybersecurity professionals for an education that is a fraction of the cost of a four-year college degree.

The benefit to this workforce investment would have a two-fold benefit to the security of the state's critical water infrastructure. Initially, there would be a positive spillover effect. With more IT and cybersecurity professionals in Texas, there would be better cyber standards developed for water infrastructure, better

There is a global shortage of 3.4 million workers in the field of cybersecurity, with more than 700,000 unfilled cybersecurity jobs in America. Texas alone has approximately 36,000 cybersecurity job openings that remain unfilled.

educational cybersecurity training and content for staff working in the industry, and a larger pool of talent to fill IT and OT staffing shortages. An additional benefit is wage normalization for cybersecurity professionals. By creating more employees who can fill the shortage of cybersecurity jobs in Texas, the average salary level will gradually normalize across the board, making the currently noncompetitive salary offered by water infrastructure facilities much more competitive.

Require that Each Water District in Texas Have a Qualified Cybersecurity Manager

The Texas Legislature considered several bills in the 88th Legislature that would have required one person at each Independent School District (ISD) to serve as the point person for instituting the required cybersecurity plan and liaising with Texas' chief ISD cybersecurity officer. A similar model should be applied to water districts throughout the state.

In practice, each water district would designate either an existing full-time employee (FTE) or a new FTE as the manager of DIR-issued cybersecurity standards. These managers would be required to complete additional cybersecurity training (on top of the quarterly training outlined below) and monitor their facility to ensure cyber standards and hygiene are adhered to. Managers would be the party responsible for reporting any cybersecurity threats or attacks made on their facility. Overseeing these "cybersecurity managers" would be DIR, a natural candidate for a central reporting agency that could review, oversee, and respond to cyber reports.

With repeated studies showing that almost 90% of all data breaches and cybersecurity attacks are caused by an employee mistake, human error continues to be a main vulnerability for all sectors at high risk for cyberattacks.

Of important note, this would be a herculean lift for each of the approximately 400 water districts—as well as more than 950 municipal utility districts—to each have their own experts. To avoid one expert overseeing a very small water operation, legislation could be considered that assigns one cybersecurity expert to a collection of water districts based on a set population count.

Increase Cybersecurity Training and Educational Opportunities for Water Districts in Texas

DIR currently requires an annual statewide cybersecurity awareness training for employees at all government entities. While this is an important start, the training infrequency minimizes the efficacy of this program. To increase individual awareness and education of cybersecurity hygiene for employees working in water infrastructure, the frequency of this training should be conducted quarterly. Extensive studies show that employees tend to forget their training after six months, with cybersecurity experts agreeing that employees should receive quarterly training to maximize the cybersecurity benefits. With repeated studies showing that almost 90% of all data breaches and cybersecurity attacks are caused by an employee mistake, human error continues to be a main vulnerability for all sectors at high risk for cyberattacks (Sjouwerman, 2020). Incorporating such training mitigates against the risks that social engineering, ransomware, malware, phishing, and other similar attacks will be successful in water utilities throughout Texas. While the cybersecurity manager will play an important role in creating a culture of cyber hygiene at their water districts, offering expertly crafted, complimentary required trainings from DIR will address a significant oversight currently persisting in Texas.

Conduct Regular Critical Water Infrastructure Cybersecurity Audits

Each water district, at the leadership of its cybersecurity manager, should be required to conduct a cybersecurity audit twice annually. The specifics of the audit's requirements would be issued by DIR, whom the cybersecurity manager would then submit for approval. This would accomplish several important goals. First, required audits would create a mechanism of transparency to ensure that each water district throughout Texas adheres to the uniform DIR standard. Second, audits generate more buy-in from water districts to take the standards and requirements issued by the cybersecurity manager seriously, as they would run the risk of penalties associated with noncompliance. Audits could be a valuable tool for DIR to obtain data on the cybersecurity needs of the entirety of Texas' critical water infrastructure, as well as needs associated with water districts located in specific regions or of certain sizes. Moreover, this could inform state policy and appropriations by identifying targets for Texas to focus its cybersecurity investments for maximum impact, while helping to identify emerging themes on threats, system vulnerabilities, or underdeveloped technologies that DIR should prioritize for training, education, and technological investments.

Ensure Procured Technology Comes Equipped with the Strongest Cybersecurity Options

DIR should develop standard procurement contract language to ensure that in all vendor agreements and technology procurement contracts, strong security filters, storage, and software are incorporated as a default. Many cybersecurity incidents across America are caused by government bodies working with vendors that employ weak security controls (Keating, 2022). By ensuring all vendor agreements are adopted conditioned upon DIR-imposed security standards, the threat of vulnerabilities for systems, information, or data stored with third parties would be greatly mitigated. Language that requires any purchased technology from a vendor for a water

district to come equipped with the strongest security options will increase uptake of readily accessible software designed to protect critical systems. Standard contractual terms represent a simple change that could be readily adopted and provide a strong safety benefit for all critical infrastructure in Texas.

Create a Grant Program or Financing Mechanism for Broader Cybersecurity Improvements

Costs have been the barrier to substantive change to cybersecurity. Yet as this paper lays out, the status quo requires the assumption of significant risk, in the form of extensive human and economic devastation. There is no easy way to estimate the cost of cybersecurity unpreparedness for Texas' water infrastructure. But were one to imagine the consequence of a successful remote poisoning of treated water flowing into the homes of Austin residents, tens, if not thousands, of Austinites could die within minutes of such an attack. Imagine the cost and consequence if the largest dam in Texas—the Mansfield Dam in Austin—were to be hacked and the floodgates left open in this dam that impounds the 369-billion-gallon Lake Travis. There would be incredible damage to the homes, businesses, and infrastructure of the surrounding area, and we would have squandered a precious, scarce, and large resource that all of Texas relies upon.

The Texas Legislature should evaluate the availability of existing state and federal funding for the purpose of operationalizing the cybersecurity policies outlined above. Any additional state funding should be based on verifiable, demonstrated need, and be targeted, prudent, and cost-effective investments. From this fund, low- or no-interest loans should be made available to eligible water districts throughout Texas. Water districts would be required to make repayments into the fund, ensuring that this serves as a resource to fund cybersecurity improvements in critical water infrastructure in perpetuity.

CONCLUSION

Fortunately, Texas has yet to suffer the extensive damage caused by a successful cyberattack on its water infrastructure, but it is carrying the risk. Texas should lead, rather than wait for economic or political heat to take action to make this critical infrastructure more secure. The Legislature should heed the warning calls and pleas from water infrastructure professionals to provide the assistance to fill existing gaps. The call to action can be summed up as follows: the water sector needs more cybersecurity professionals, funding, expert support and guidelines, and standardization to keep their essential services running smoothly and safely. To effectively accomplish this, Texas can pass an omnibus critical water infrastructure cybersecurity bill in the 89th Legislative Session to address this in a manner that is appropriately proactive, protective of this critical resource, and dynamic and long-term oriented to stay abreast of new threats in this sector. ■

REFERENCES

Almar Water Solutions. (n.d.). *Water management in smart cities*. Retrieved April 11, 2024, from https://almarwater.com/water-management-in-smart-cities/

Anscombe, T. (2022, December 6). *What will it take to secure critical infrastructure?* DARK Reading. https://www.darkreading.com/ics-ot-security/what-will-it-take-to-secure-critical-infrastructure

Betts, E. (2022, February 23). *TCEQ and EPA emphasize cybersecurity for water and wastewater utilities*. Texas Rural Water Association. https://www.trwa.org/blogpost/1539239/450385/TCEQ-and-EPA-Emphasize-Cybersecurity-for-Water-and-Wastewater-Utilities

Burt, A. (2023, May 16). The digital world is changing rapidly. Your cybersecurity needs to keep up. *Harvard Business Review*. https://hbr.org/2023/05/the-digital-world-is-changing-rapidly-your-cybersecurity-needs-to-keep-up

Carver, J., & Salhorta, P. (2023, May 3). Everything you need to know about Texas' beleaguered water systems. *The Texas Tribune*. https://www.texastribune.org/2023/05/03/texas-water-infrastructure-broken-explained/

Council on Foreign Relations. (2015). *Compromise of a power grid in eastern Ukraine*. https://www.cfr.org/cyber-operations/compromise-power-grid-eastern-ukraine

Cybersecurity & Infrastructure Security Agency. (2018, April 20). *Russian state-sponsored cyber actors targeting network infrastructure devices*. https://www.cisa.gov/news-events/alerts/2018/04/16/russian-state-sponsored-cyber-actors-targeting-network-infrastructure

CyberSeek. (n.d.). *Cybersecurity supply/demand heat map*. Retrieved April 11, 2024, from https://www.cyberseek.org/heatmap.html

digi.city. (n.d.). *Smart city definitions*. Retrieved April 11, 2024, from https://www.digi.city/smart-city-definitions

Environmental Protection Agency. (2022, January 27). *EPA announces action plan to accelerate cyber-resilience for the water sector* [Press release]. https://www.epa.gov/newsreleases/epa-announces-action-plan-accelerate-cyber-resilience-water-sector

Exec. Order No. 13010, 61 Fed. Reg. 37,347 (July 15, 1996). https://www.govinfo.gov/content/pkg/FR-1996-07-17/pdf/96-18351.pdf

Germano, J. (2019). *Cybersecurity risk & responsibility in the water sector.* American Water Works Association. https://www.awwa.org/Portals/0/AWWA/Government/AWWACybersecurityRiskandResponsibility.pdf

Goddard, W. (2021, August 2). *What are the features of a smart city to look for?* IT Chronicles. https://itchronicles.com/smart-city/what-are-the-features-of-a-smart-city-to-look-for/

Government Technology. (2021, July 8). *Back to basics: A deeper look at the Colonial Pipeline hack*. https://www.govtech.com/sponsored/back-to-basics-a-deeper-look-at-the-colonial-pipeline-hack

Greenberg, A. (2021, February 8). A hacker tried to poison a Florida city's water supply, officials say. *Wired*. https://www.wired.com/story/oldsmar-florida-water-utility-hack/

Hendricks, A., & Sessler, J. (2021, May 31). New cybersecurity rules for pipelines are good. Now let's secure all the other critical infrastructure. *The Dallas Morning News*. https://www.dallasnews.com/opinion/commentary/2021/05/31/new-cybersecurity-rules-for-pipelines-are-good-now-lets-secure-all-the-other-critical-infrastructure/

Jones, D. (2022, May 17). *How the Colonial Pipeline attack instilled urgency in cybersecurity.* Cybersecurity Dive. https://www.cybersecuritydive.com/news/post-colonial-pipeline-attack/623859/

Keating, M. (2022, August 23). *Local governments stay vigilant to cyber threats when acquiring technology*. American City & County. https://www.americancityandcounty.com/2022/08/23/local-governments-stay-vigilant-to-cyber-threats-when-acquiring-technology/

Kelley, A. (2022, September 21). *Federal cyber mandates for water infrastructure are too costly to implement, experts say*. Nextgov. https://www.nextgov.com/cybersecurity/2022/09/federal-cyber-mandates-water-infrastructure-are-too-costly-implement-experts-say/377474/

Kite-Powell, J. (2022, November 27). How technology can mitigate flooding and secure water infrastructure. *Forbes*. https://www.forbes.com/sites/jenniferhicks/2022/11/27/how-technology-can-mitigate-flooding-and-secure-water-infrastructure/?sh=418509875d88

Lake, S. (2022, October 20). The cybersecurity industry is short 3.4 million workers—that's good news for cyber wages. *Fortune*. https://fortune.com/education/articles/the-cybersecurity-industry-is-short-3-4-million-workers-thats-good-news-for-cyber-wages/

Letter from Austin Mayor Steve Adler to Secretary Foxx. (2016, May 20). https://www.transportation.gov/sites/dot.gov/files/docs/Austin-SCC-Technical-Application.pdf

Lyngaas, S. (2024, April 17). *Russia-linked hacking group suspected of carrying out cyberattack on Texas water facility, cybersecurity firm says.* CNN. https://www.cnn.com/2024/04/17/politics/russia-hacking-group-suspected-texas-water-cyberattack/index.html

Mariani, J., Li, T., Weggeman, C., & Kishani, P. (2022, March 8). *Incentives are key to breaking the cycle of cyberattacks on critical infrastructure*. Deloitte Insights. https://www2.deloitte.com/us/en/insights/industry/public-sector/cyberattack-critical-infrastructure-cybersecurity.html

Miller, K. (2024, April 18). *Rural Texas towns report cyberattacks that caused one water system to overflow.* Associated Press. https://apnews.com/article/texas-muleshoe-water-systems-cyberattacks-russia-5f388bf0d581fc8eb94b1190a7f29c3a

Mulverhill, L. (2019). *Texas' digital divide*. Texas Comptroller. https://comptroller.texas.gov/economy/fiscal-notes/archive/2019/oct/divide.php

NACWA. (2022, May 26). *Water sector coordinating council discusses cybersecurity with EPA, DHS*. https://www.nacwa.org/news-publications/news-detail/2022/05/26/water-sector-coordinating-council-discusses-cybersecurity-with-epa-dhs

Parkinson, J., & Hinshaw, D. (2024, February 18). FBI Director says China cyberattacks on U.S. infrastructure now at unprecedented scale. *The Wall Street Journal*. https://www.wsj.com/politics/national-security/fbi-director-says-china-cyberattacks-on-u-s-infrastructure-now-at-unprecedented-scale-c8de5983

SB 1102. Enrolled. 83rd Texas Legislature. Regular. (2013). https://capitol.texas.gov/tlodocs/83R/billtext/pdf/SB01102F.pdf#navpanes=0

Segal, E. (2022, February 13). Biden administration seeks to bolster defenses against cyberattacks on water systems. *Forbes*. https://www.forbes.com/sites/edwardsegal/2022/02/13/bidden-administration-seeks-to-bolster-defenses-against-cyberattacks-on-water-systems/?sh=6a0498491ff9

Sjouwerman, S. (2020, March 4). *Stanford research: 88% of data breaches are caused by human error.* KnowBe4. https://blog.knowbe4.com/88-percent-of-data-breaches-are-caused-by-human-error

Texas Comptroller. (n.d.). *Cybersecurity: Statewide overview*. Retrieved April 11, 2024, from https://comptroller.texas.gov/economy/economic-data/cybersecurity/texas.php

Texas Department of Information Resources. (2020, November 15). *2020 cybersecurity report*. https://dir.texas.gov/sites/default/files/2021-03/2020%20DIR%20Cybersecurity%20Report_0.pdf

Texas Department of Information Resources. (n.d.). *State and Local Government Cybersecurity Grant Program (SLGCP)*. https://dir.texas.gov/information-security/state-and-local-cybersecurity-grant-program-slcgp

The White House. (2021a). *FACT SHEET: President signs executive order charting new course to improve the nation's cybersecurity and protect federal government networks*. https://www.whitehouse.gov/briefing-room/statements-releases/2021/05/12/fact-sheet-president-signs-executive-order-charting-new-course-to-improve-the-nations-cybersecurity-and-protect-federal-government-networks/

The White House. (2021b). *National security memorandum on improving cybersecurity for critical infrastructure control systems*. https://www.whitehouse.gov/briefing-room/statements-releases/2021/07/28/national-security-memorandum-on-improving-cybersecurity-for-critical-infrastructure-control-systems/

The White House. (2024, March 18). *Environmental Protection Agency and National Security Affairs letter to governors*. https://www.epa.gov/system/files/documents/2024-03/epa-apnsa-letter-to-governors_03182024.pdf

The Detroit News. (2021, February 8). *In Florida city, a hacker tried to poison the drinking water.* https://www.detroitnews.com/story/news/nation/2021/02/08/florida-water-treatment-hack-lye/115453008/

United States Agency for International Development. (2022). *Technological innovations for rural water supply in low-resource settings*. https://www.globalwaters.org/sites/default/files/4dec_technological_innovations.pdf

U.S. Department of Energy. (2021). *Spotlight: Advancing cybersecurity to strengthen the modern grid*. https://www.energy.gov/sites/default/files/2021/01/f82/OTT-Spotlight-on-Cybersecurity-final-01-21.pdf

U.S. Department of Homeland Security. (2022, September 16). *Biden-Harris administration announces $1 billion in funding for first-ever state and local cybersecurity grant program*. https://www.dhs.gov/news/2022/09/16/biden-harris-administration-announces-1-billion-funding-first-ever-state-and-local

U.S. Department of Transportation. (2017, June 29). *Smart city challenge*. https://www.transportation.gov/smartcity

Water Sector Coordinating Council. (2021). *Water and wastewater systems: Cybersecurity 2021 state of the sector*. https://www.waterisac.org/system/files/articles/FINAL_2021_WaterSectorCoordinatingCouncil_Cybersecurity_State_of_the_Industry-17-JUN-2021.pdf

Wilkie, C. (2021, June 9). *Colonial Pipeline paid $5 million ransom one day after cyberattack, CEO tells Senate.* CNBC. https://www.cnbc.com/2021/06/08/colonial-pipeline-ceo-testifies-on-first-hours-of-ransomware-attack.html

ABOUT THE AUTHOR

David Dunmoyer is the campaign director for Better Tech for Tomorrow at the Texas Public Policy Foundation. In this role, he publishes research and commentary, provides expert testimony, and advocates for responsible technology policy in the Texas legislature. His portfolio includes data privacy, cybersecurity, kids' online safety, AI, broadband, and other emerging technology issues. Prior to this role, he served as Chief of Staff to the executive team at TPPF after spending several years working in public affairs and digital marketing. David received undergraduate degrees at Texas Christian University and graduated with a Master of Public Affairs from the University of Texas at Austin's LBJ School of Public Affairs.

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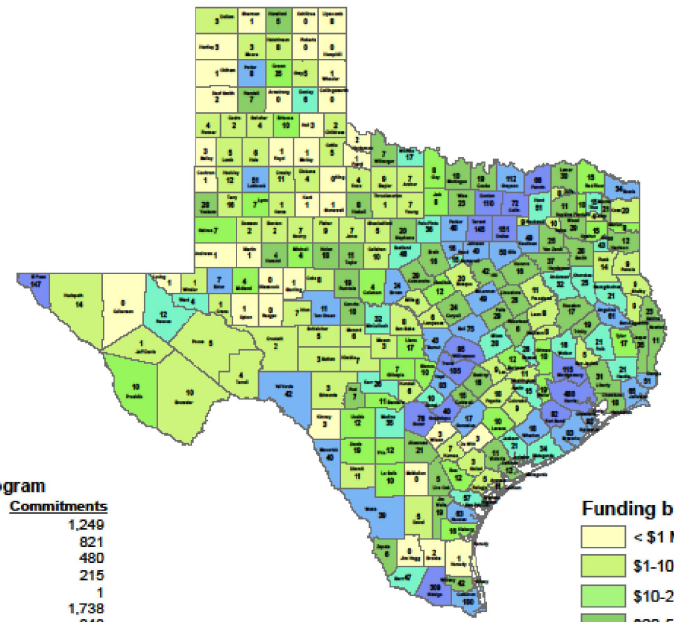
TWDB Financial Assistance Programs

Senate Water, Agriculture & Rural Affairs Committee
May 15, 2024

Jessica N. Peña
Deputy Executive Administrator, Water Supply and Infrastructure
Texas Water Development Board

TEXAS WATER DEVELOPMENT BOARD

Funding Commitments Since Inception
1957 - February 2024

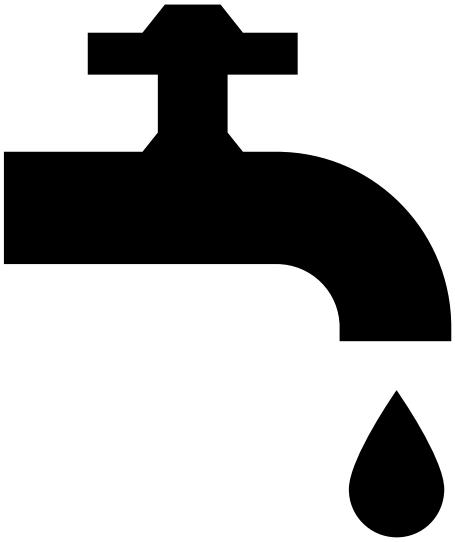


Funding and Commitments by Program

Program	Amount Committed	Commitments
CWSRF	$11,437,435,136	1,249
DWSRF	3,815,303,053	821
EDAP	998,729,100	480
FIF	551,179,306	215
FLOOD	30,000,000	1
STATE	5,551,574,358	1,738
SWIFT	11,468,030,000	343
WIIN	3,346,000	1
Historical Federal Program	1,879,279,687	1,075
Total	**$35,734,876,640**	**5,923**

Notes: The Amount Committed and the number of Commitments represent the total amount and number of initial commitments made since the Agency's inception. These amounts have not been reduced for any projects that did not close on the TWDB's financial assistance. The Historical Federal Program referenced was the Construction Grant Program, a federal grant program created to fund wastewater projects prior to the CWSRF.

Federal Financial Assistance Programs



Drinking Water State Revolving Fund (DWSRF)

- Authorized by the Safe Drinking Water Act in 1996
- Low-cost financial assistance including principal forgiveness

General

- $435 million available
  - $95 million in principal forgiveness
  - Subsidized interest rates
  - Up to 30-year loan terms

Special Allocations

- Disadvantaged communities
- Green projects
- Very small systems
- Urgent need

DWSRF

Lead Service Line Replacement Fund	DWSRF eligible
	Inventories, planning, design and replacement
	Approximately $354 million in funding is available
	49% principal forgiveness/ 51% loan/bond
	35% interest rate reduction
Emerging Contaminants	Must address emerging contaminants in drinking water with a focus on PFAs or contaminants on EPAs Contaminant Candidate Lists.
	Approximately $58 million in funding is available
	100% principal forgiveness

Clean Water State Revolving Fund (CWSRF)

- Authorized by the Clean Water Act in 1986
- Low-cost financial assistance including principal forgiveness

General

- $460 million available
  - $55.3 million in principal forgiveness
  - Subsidized interest rates
  - Up to 30-year loan terms

Special Allocations

- Disadvantaged communities
- Green projects
- Very small systems
- Urgent need

Emerging Contaminants

- Construction activities
- $3,026,000 in funding is available
- 100% principal forgiveness

State Financial Assistance Programs

State Water Implementation Fund for Texas (SWIFT)

- SWIFT/SWIRFT Program
  - Created in 2013
  - SWIFT initially funded with $2 billion
  - State Water Plan projects funded through the SWIRFT
  - SWIFT is used as incentive capital to buy-down interest rates in the SWIRFT

Low interest loan	Deferred loans	Board Participation
• Subsidies up to 50% • Terms up to 30 years	• Up to 8 years or end of construction • Terms up to 30 years	• Temporary TWDB ownership interest in excess capacity • 34-year loan term

State Funded Programs

Texas Water Development Fund

Water, Wastewater and Flood Control projects are eligible

Water Supply projects must be consistent with the current State Water Plan

Loans terms up to 30 years

Economically Distressed Areas Program

Inadequate systems

Adjusted median household income (AMHI) 75% or below the state average

Established residential subdivision prior to June 1, 2005

Model Subdivision Rules

Grants up to 70% per project

- Grants greater than 50% must have a nuisance determination

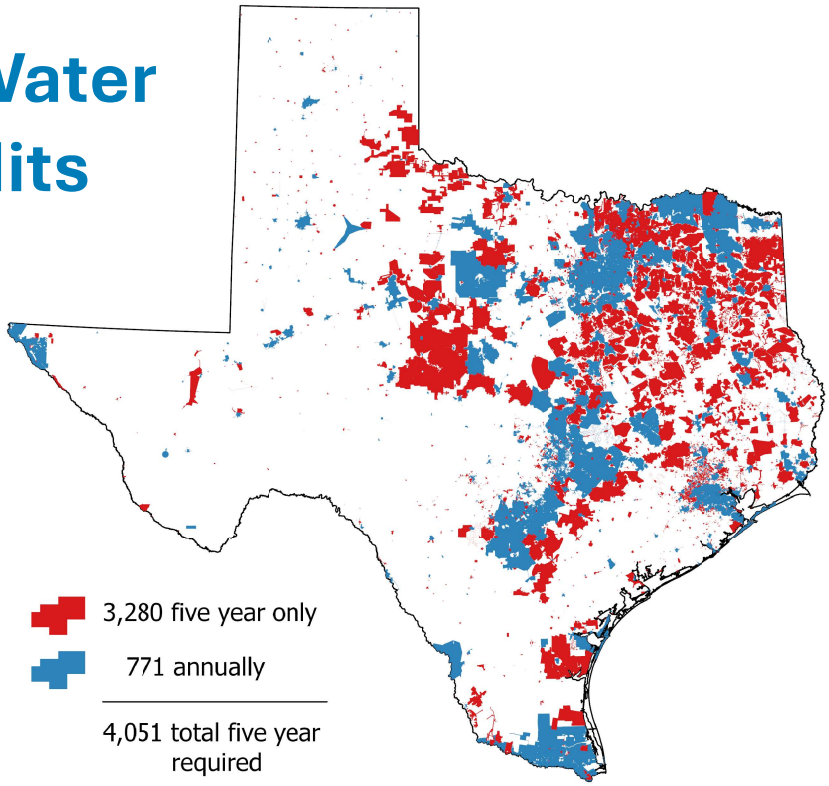
Water Loss

Sam Marie Hermitte
Assistant Deputy Executive Administrator,
Water Science & Conservation
Texas Water Development Board

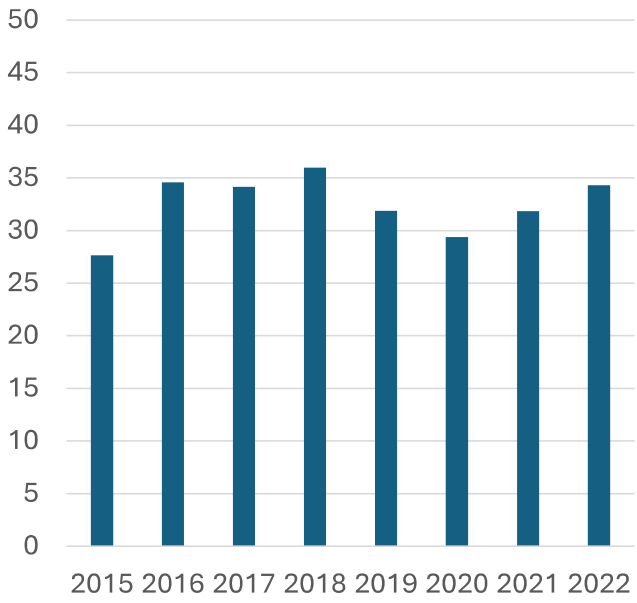
Water loss

- System Input — Authorized Use = **Water Loss**
- **Water Loss** = Apparent Loss + Real Loss
  - Apparent Loss = customer meter inaccuracy + data handling errors + unauthorized consumption
  - Real Loss = reported breaks and leaks + unreported loss
- Water Loss **Audit** - a standardized self-review of the volumes of water supplied, consumed, and lost.
- Water Loss Audit **Validation** - the process of examining audit inputs to identify and correct inaccuracies in audit data.

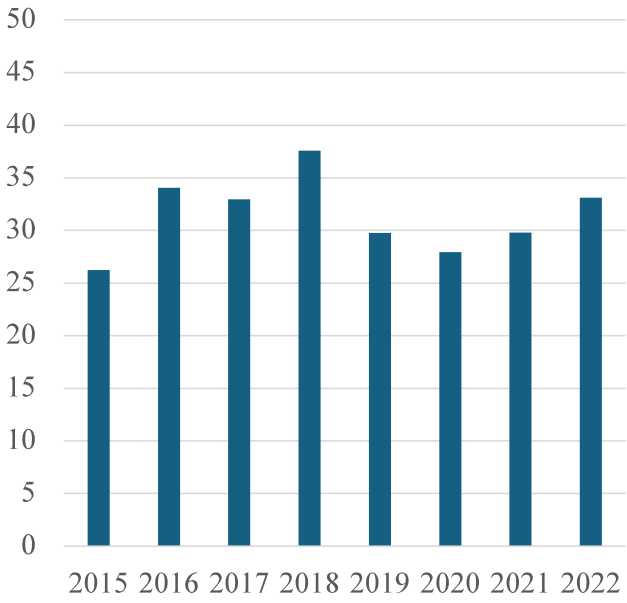
Required Water Loss Audits



Statewide Median Real Loss GCD



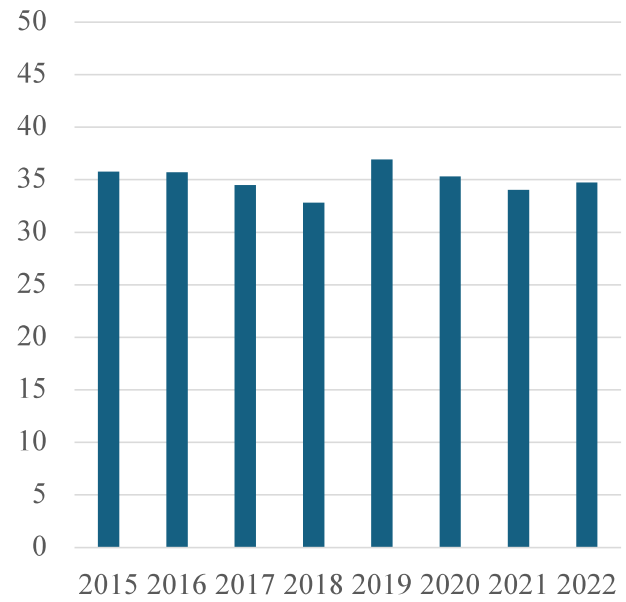
Small System Median Real Loss GCD



Population = 10,000 or less

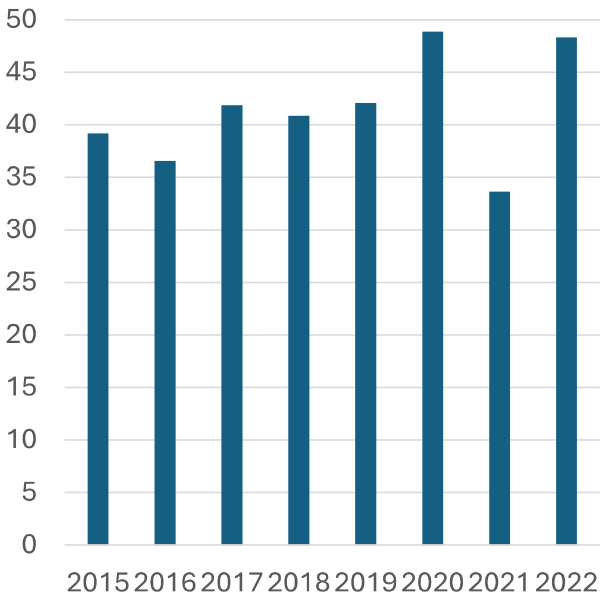
GCD = gallons per connection per day

Medium and Large System Real Loss GCD



Population = 10,001 to 149,999

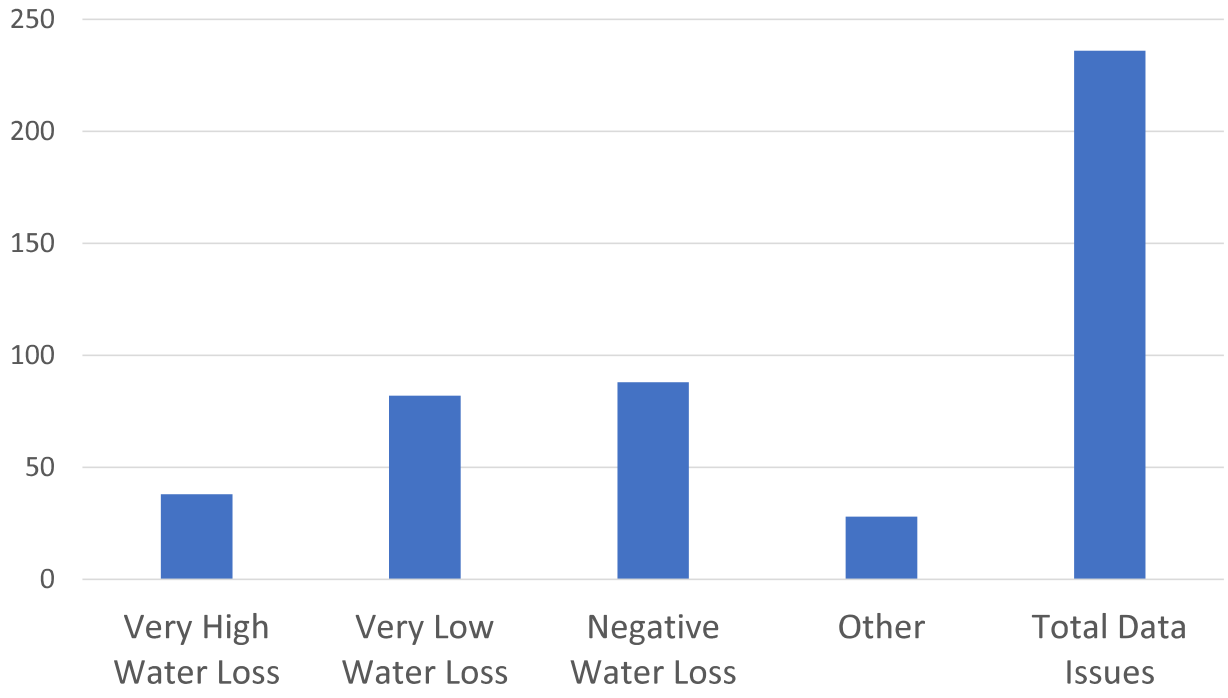
Very Large System Median Real Loss GCD



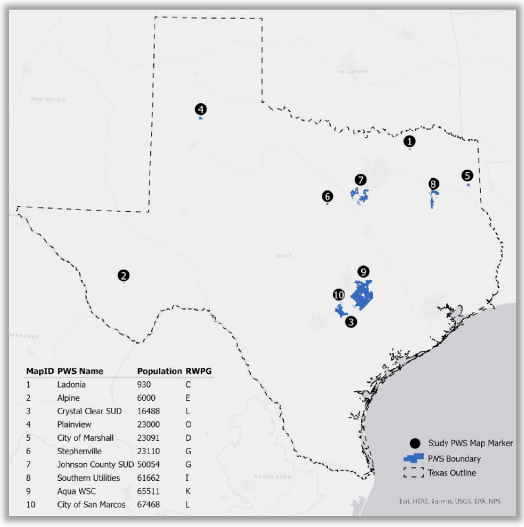
Population = 150,000 or more

GCD = gallons per connection per day

2022 DATA ISSUES



Validation Study



Pre- and Post-Validation Values

Utility	Apparent Loss GCD	Real Loss GCD	Infrastructure Leakage Index	Assessment Score
1	6.8 / 6.8	117.3 / 117.3	3.8 / 3.8	***79.5 / 75.5***
2	2.4 / 2.4	23.0 / 23.0	1.0 / 1.0	***84.5 / 67.0***
3	16.1 / 16.1	14.6 / 14.6	***1.4 / 1.0***	***78.0 / 70.0***
4	**blank / 7.1**	**blank / 74.2**	**blank / 3.6**	**blank / 47.5**
5	3.6 / 3.6	73.0 / 73.0	na / na	***44.0 / 35.0***
6	5.8 / 5.8	***45.7 / 48.7***	1.4 / 1.4	***65.0 / 66.0***
7	***14.4 / 4.8***	***92.0 / 85.6***	***2.0 / 2.7***	***81.5 / 78.5***
8	6.7 / 6.7	75.6 / 75.6	na / na	***79.0 / 73.0***
9	***19.5 / 19.4***	***140.0 / 138.1***	***6.9 / 6.8***	***41.5 / 51.0***
10	5.3 / 5.3	***15.4 / 13.9***	***0.9 / 0.8***	***71.0 / 74.0***
Avg	**9.0 / 7.8**	**73.5 / 66.4**	**2.5 / 2.6**	**69.3 / 65.6**

GCD = gallons per connection per day

Water Loss Validation

- Rule enhancements
  - Approved February 2, 2023
  - Effective January 1, 2025

- Required for active/proposed financial obligations
  - Within 3 months of audit submittal (active)
  - Prior to consideration (proposed)

- TWDB staff to provide validation
  - Free
  - 1:1 service to the utility

Questions?

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Texas Rural Water Association

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Senate Water, Agriculture & Rural Affairs Committee Hearing
Testimony on Interim Charge: Water System Reliability
May 15, 2024

- My name is Lara Zent, and I'm the Executive Director and General Counsel of the Texas Rural Water Association (TRWA).
- TRWA is a trade association with a membership of approximately 900 water and wastewater utilities. The majority of our members are non-profit water supply corporations, districts, and small cities.
- Our team of 42 provide assistance to small Texas water systems every day. As the contractor for the Texas Commission on Environmental Quality's Financial, Managerial, and Technical Assistance Program, our team of licensed water and wastewater utility operators provide on-site technical assistance and training on a variety of issues including the latest regulatory requirements, locating leaking water lines, better treatment technologies, and best practices for board governance. As one of the contractors for the Texas Water Development Board's Asset Management Program, we work with utilities on asset management, GIS mapping, and establishing sustainable water and wastewater rates. Through our national organization, National Rural Water Association (NRWA), TRWA has subcontracts with the United States Department of Agriculture-Rural Development (USDA-RD) and with the Environmental Protection Agency. These programs fund 8 staff positions that provide on-site technical assistance on issues such as energy efficiency assessments, safe drinking water compliance, utility policies & procedures, rate studies, and a wide range of technical and managerial issues.
- In addition, TRWA provides operator certification training through live classroom and online instruction. We also provide legal counsel.
- I'm relying on these daily interactions with small rural water systems across our state to inform my comments today. I'm also drawing upon information from a Water Line Infrastructure Survey and Report TRWA put together two years ago upon Chairman Perry's request.
- Water utilities are more likely to replace their above-ground infrastructure than their water line infrastructure and what we found in our Survey is that most of

the water lines in Texas are well past their useful life and in need of replacement.

- In rural areas, most systems are now reaching their 50- or 60-year anniversary and still have a lot of their original water lines that were installed when the systems were first built. Many of these lines are not in compliance with current regulations. For example, there are still 1" lines in use throughout the state. There are also lines made from asbestos concrete that are fragile and break easily when the ground shifts due to drought or changing temperatures.
- Small systems are overwhelmed with the enormity of the task of replacing all their old water lines. One challenge is that they may not know where all their lines are located. TRWA started offering GIS services to our members for this reason. It's hard to plan a project for line replacement if you don't know where the lines are.
- Another challenge many small systems face is that they do not have recorded easements in place. The original handshake deals they made to get service out to their community don't hold up in court with new owners, so the systems must condemn property in order to fix or replace a water line, which is an expensive barrier to system-wide upgrades.
- When it comes to leaking lines, it's often difficult to pinpoint where the lines are leaking. Early rural operators would run lines across 100-acre pastures, down the side of a pond, across a creek, or through the woods; and didn't record the locations. One of our larger rural water members that serves a high growth area east of Bastrop employs several full-time staff and a leak detection dog dedicated to finding leaks and they still can't find them all.
- Homes and businesses are moving out to areas that were once rural. When buildings, concrete, and asphalt are constructed over water lines, it becomes difficult to access the lines for repair and to detect leaks. Water lines also get disturbed by other utilities. Fiberoptics and electrical lines going in the ground make it a challenge to address water leaks and line replacements; and the installation of these other utilities often cause line breaks. In an ideal world, utility installation is coordinated with the local water utility, but that doesn't always happen.
- Installing new metering devices, including customer meters and production meters, may be an easier lift for small systems to better measure their customer's water use, understand their water loss, and even pinpoint where it is occurring.
- TRWA and other technical assistance providers are needed to help small systems with a variety of issues, including:

    - Accessing funds through the Texas Water Development Board and USDA-RD that provide low interest loans and grants. The paperwork can be daunting for small staff who are busy working to keep the water flowing.
    - Training in creating budgets, asset management plans, and future planning continues to be needed. Many small systems don't track the useful life of their assets or invest in replacing aging infrastructure – it's the replace it when it breaks mentality.
    - Training in setting rates. Often water and wastewater rates are lower than they should be to maintain the system properly because the leaders who represent the community want to keep rates affordable. Most of the government financing programs require a rate study and often an increase in rates to qualify for funding.
- Small systems also struggle with manpower shortages; and we need to attract new water and wastewater operators to our industry. TRWA is addressing this through our apprenticeship program, through partnerships with high school vocational programs, and we are discussing partnerships with several community colleges.
- This concludes my testimony, and I am happy to answer any questions.

Texas Senate Committee on Water, Agriculture and Rural Affairs

May 15, 2024

Invited Testimony of The Texas Water Infrastructure Network

Panel Five: *The Current State of Texas Water Infrastructure*

Provided by Perry L. Fowler, Executive Director TXWIN

Chairman Perry, Vice Chairman Hancock and fellow esteemed committee members, my name is Perry Fowler, and I am here on behalf of the Texas Water Infrastructure Network (TXWIN) where I serve as Executive Director. Our members appreciate the invitation and opportunity to provide our viewpoints on the important topic of "The Current State of Water Infrastructure" here today.

TXWIN is a 501c (6) trade association founded in 2013 representing companies that construct water & wastewater treatment plants, pipelines, flood control and other projects for municipal and regional water utilities, industrial and commercial clients, and federal entities. In addition to some of the most respected Texas-based and national construction companies, the TXWIN membership includes leading state and national suppliers, fabricators, manufacturers, and construction law firms in the water infrastructure construction sector.

Over the eleven-year history of our organization TXWIN has spearheaded numerous reforms and initiatives to improve public procurement law, improve competition, accountability and transparency in government contracting. We have worked to ensure fair treatment of businesses that are building your water infrastructure, and we actively work with our public and private partners in the water infrastructure sector to pursue sound public policy and raise awareness about key issues impacting the water infrastructure construction industry in Texas.

During the 88th Regular Session of the Texas State Legislature TXWIN worked closely with other leaders in the water stakeholder community and the Legislature to contribute to policy discussions related to SB 28. TXWIN also supported raising awareness about the need for funding to enact this legislation and subsequently promoted passage of Proposition 6 with other stakeholders in November 2023.

We would like to share our thanks and appreciation to Chairman Perry and Chairman King for their vision and leadership, the Texas Water Development Board, and everyone else who contributed to the crafting and passage of this historic legislation.

The topic of this panel "The State of Texas Water Infrastructure" is one which our members are uniquely qualified to address. TXWIN members have executed billions of dollars in projects in communities across the state of `Texas to shore up water supplies, provide safe clean drinking water, as well as wastewater treatment and flood control projects. Our members represent the tip of the spear to implement water infrastructure strategies which require good public policy, significant planning, and investment.

Texas water infrastructure impacts public health, safety, economic development, our environment, and ultimately our quality of life. It is also noteworthy to mention that the water infrastructure construction sector in Texas represents the largest and most active state market in the nation. Our members were awarded over a billion dollars in projects just last month with several billion dollars of active projects currently underway just in the greater Central Texas and Capitol region alone.

Unfortunately, we continue to see high profile infrastructure failures as recently as this past Mother's Day weekend where the entire community of Odessa, Texas lost water service due to failing aging infrastructure. The Rio Grande Valley is experiencing dire water supply conditions due the ongoing drought and the failure of Mexico to meet its obligations. Parts of Central and South Texas that have not benefitted from recent rainfall which has filled up reservoirs elsewhere Communities that have neglected to reinvest in infrastructure or invest in alternative water supplies are seeing significant rate increases to address aging infrastructure and insufficient water supplies creating a significant financial burden for many of your constituents.

Federal funding has become less reliable and predictable with more strings attached. New costly and stringent regulatory requirements from the U.S. EPA such as recently announced limits and monitoring for per and polyfluoroalkyl substances or "PFAS" treatment and mitigation are going to add considerable costs and pressure on water utilities. It was recently announced that over 50 communities in Texas have identified PFAS in their water supplies and honestly and we still don't know the extent to which this is an issue or how it will impact the cost of water and wastewater treatment in Texas.

I would like to touch on a few items including data that we have collected with our water partners in our Texas Water Capital Needs Survey, which provides a snapshot of the general state of the water infrastructure market in Texas. This survey captures noteworthy trends relevant to the discussion today including the increasing cost of water infrastructure, market demand and dynamics that are relevant for your consideration.

On December 6, 2022, TXWIN released results from its 2022 Texas Water Capital Needs Survey (TWCNS) with Collaborative Water Resolution LLC, an Austin-based water research and public opinion consultancy led by Dr. Todd Votteler.

This was the third survey conducted by TXWIN and Dr. Votteler, which was originally used to identify key trends and challenges in water infrastructure needs and decisions factors driving investment in Texas water infrastructure during the height of the COVID pandemic. The survey has evolved over time to capture more key data points relevant to water infrastructure investment needs with key input from policy makers and Texas water stakeholders.

TXWIN launched the 2024 survey last week which will provide an updated snapshot of current and anticipated Texas water infrastructure needs. We are grateful to have the assistance of our key water partners assisting us with our survey again this year including AWWA Texas Section, the Water Environment Association of Texas (WEAT), the Texas Rural Water Association, the Texas Water Foundation, and the Texas Water Conservation Association (TWCA), the Texas chapter of the Association of Water Board Directors and others. We could not collect this data without the assistance of the Owner community, and we look forward to an even larger pool of respondents this year.

Responses to the survey will be accepted until May 31, 2024, and findings of the survey will be released this fall. Now I would like to share some highlights of the 2022 survey which are pertinent to our discission today.

- 70% of respondents indicated that the number of customers that they served were growing. A similar number of utilities implemented water conservation plans and drought related restrictions during 2022.
- 68% of respondents said they were concerned about current and future workforce needs.
- By areas of need the most significant capital needs were repair and replacement of water lines, and water treatment, followed by developing new or additional water supplies and wastewater treatment.
- Greatest drivers for future infrastructure and capital investments included aging infrastructure, demands of population growth and regulatory compliance.
- 30% of respondents indicated they needed to replace or rehabilitate 25-50% of water mains with 20% indicating the need was 50-75% of water mains.
- Over the next 10 years 33% of respondents indicated capital needs of $10-50 million, 8% will require $50-100 million, and 28% of respondents indicated needs more than $100 million.
- The Texas Water Development Board was by far the first choice and most frequently used source of financial assistance by approximately 70% of respondents.
- 90% of respondents indicated they would seek non-federal funding from TWDB if more funding was made available.
- 57% of respondents indicated they had delayed, cancelled or re-bid projects due to inflation and increasing costs.
- 63% of respondents indicated concerns about the reliability of the Texas energy grid.
- 50% of respondents indicated that their water rates were insufficient to fund capital projects.
- Texas Water Development Board continues to be the most significant source of funding sought by Texas water utilities.

The survey captures several other significant data points that are relevant to policy makers and the industry. The full results of our 2022 survey are available at TXWIN.ORG.

I would like to personally encourage all the water infrastructure owners in Texas to participate in our current survey, which is being distributed presently by our water partners, and can also be accessed by contacting us directly or by visiting the TXWIN LinkedIn page.

Now I would like to share some insights and few key areas of concern from our members that are trends the committee and the public should be aware of to get a more comprehensive understanding of some of the issues driving up costs and creating challenges in the water infrastructure construction sector. Ultimately these issues impact the end users in our communities from cost standpoint, and delay delivery of needed projects in a timely manner.

Projects are becoming larger, more complex, and more expensive.

Over the past few years, the owner community has experienced sticker shock where bids and actual project costs have exceeded estimates. There are several factors that have contributed to this situation which we have shared before with the Committee such as inflation and supply chain challenges. The good news is project estimates are becoming more accurate, but costs continue to steadily increase, and we are still seeing inflation impacting several key inputs. Budgets are trending more in line with actual costs, but many communities are struggling with the actual cost of delivering these projects which are being driven by competitive market forces, labor and material costs, and project risk profiles.

Schedule issues are consistently driving up project costs and getting projects out on the street for bids or proposals in a timely manner has been challenging. We are seeing significant delays from the length of time it takes to conduct procurement processes to award of contracts, some of which require extensive negotiations, checking regulatory boxes and finally getting an actual notice to proceed. This lag time from procurement to commencement of construction makes it increasingly difficult to lock in prices on key systems, secure qualified subcontractors and the allocation of resources and personnel.

When projects are finally awarded, we are seeing project durations are reduced to account for the time spent during the design/pre-bid and procurement phase. The time it takes to build projects

has also increased due to the amount of time needed to procure materials. The market has eased up some on the long lead times for most items, but electrical components vital for a plant operation continue to be a challenge.

Attracting and maintaining a qualified skilled workforce continues to be an area of concern for our industry, similar to concerns expressed by our clients in the owner community. The labor market is very tight, and finding good, qualified personnel to build these projects is a big challenge.

Fair and reasonable risk-allocation can also be a significant cost driver. The more risk and ambiguity contractors perceive in a project has a direct impact on whether qualified firms respond to solicitations and ultimately what a project costs. There are several points in the pre-construction process where contractor input can and should be solicited to align with budgets and project requirements more accurately. Engineers and owners need to listen to contractors and help answer questions that may arise about project in the pre-construction phase. Details and clarity are key to achieving the more accurate projects costs.

On larger more technically complex projects we are seeing more qualifications based best-value procurements to ensure contractors have the personnel, track record and experience to deliver projects and our members are among these sought after firms which is a positive trend. Cost is certainly will always be a significant factor in awarding projects, but quality and past performance are also critical considerations. Better procurement processes translate into less risk and more value for public investment in water infrastructure.

Finally, regarding risk I would like to point out that we are experiencing situations where contract terms and conditions are not conducive to fair contract negotiations have the unintended effect of driving up project costs and limiting the pool of qualified contractors willing to compete. It’s an active robust market and good contractors can pick and choose which projects, and owners best suit their capabilities and will provide better prices when they can expect fair treatment.

We have already mentioned schedule and procurement process as project risk factors which can ultimately lead to project delays and have significant project cost implications. In some situations, we also seeing public owners refusing to accept responsibility for damages for owner caused delays. As a result of this some bonding companies are simply refusing to underwrite risk on some large projects, even for financially sound highly skilled and established contractors. This has led to several failed contract negotiations further diluting the competitive field leading to increased project costs because of unfair risk allocation.

Some of the other risk factors artificially driving up project costs include excessive liquid damages, prohibitions on waivers of conditional damages, and contract clauses that place an undue risk on contractors for differing site conditions where contractors are assigned risk without offering sufficient compensation for the cost of extensive geotechnical surveys and subsurface utility engineering. Some of these items are an issue of fundamental fairness where the unwillingness to share risk is leading to more expensive projects and less competition.

There was legislation last session in HB 2265 which in its original form would have prohibited public owners from excluding "damages for delays" provisions in their contracts which was amended behind closed doors to exclude "critical infrastructure." TXWIN supported this legislation in its original form, however the broad exclusion of "critical infrastructure" would have completely taken the expectation of fair treatment away from contractors building water projects in your communities for damages and delays caused by owners.

If HB 2265 would have passed as amended in the House committee substitute which was eventually considered in the Senate Business and Commerce committee, it would have effectively stated that the heavy civil side of the industry was somehow not entitled to fair treatment because we are building infrastructure deemed "critical" which makes zero sense.

This lack of fairness and accountability is already resulting in increased risk, decreased competition and increased project costs to account for unfair risk allocation. I am happy to visit with you and your staff about specific examples offline and discuss the correct and fair way to

address the issue of damages for delays from a policy perspective. This is a policy area that should be addressed by the Legislature and we as an industry need to have an open and deliberate dialogue among stakeholders on this topic before we get to the 2025 legislative session.

While challenges exist, opportunities for Texas water infrastructure abound and the industry and the members of TXWIN are up to the task. We highly value our relationship with the water community, and I want to be very clear that there are many public owners that are making fair, reasonable, and responsible decisions when it comes down to making investments with fair project risk allocation, good procurement processes, and streamlined project execution in the spirit of collaboration and partnering.

The eyes of the State and this legislative body have never been so keenly focused on water infrastructure issues and we are proud to be a part of the solution to build the future of Texas water. Once again, I would like to urge our partners in the water community to participate in the 2024 Capital Water Needs Survey and thank you for the opportunity to testify here today.

We look forward to continuing to work with water stakeholders and members of this committee, and I am happy to answer any questions you may have and can be reached at (512)810-3069 or via email at plf@txwin.org.

TEXAS WATER FOUNDATION

Water Workforce Woes Written Testimony
May 15, 2024

While Texas has many unique water supply and demand challenges, the state of our built infrastructure and human infrastructure is following closely with national trends. In the midst of visible signs of Texas' aging and deteriorating infrastructure, water workforce is an emerging policy challenge for Texas and the nation.

There is a growing national shortage of water sector professionals who do everything from operate local water and wastewater treatment plants, to manage regional distributions systems, and administer state-wide programs. Over the next 10 years, the Environmental Protection Agency projects that over 30% of water and wastewater utility workers will retire. The Bureau of Labor Statistics projects the national water operator workforce will decline by at least 7%. Studies by the Environmental Protection Agency, Government Accountability Office, and Brookings Institute all point to concerning trends in an aging water workforce nearing retirement and emerging workforce gaps. Those challenges are exacerbated by non-competitive wages and low recruitment of younger workers.

In a survey conducted by the Texas Water Foundation and Houston Advanced Research Center in 2023, 60% of the 128 managers and executives at water and wastewater utilities reported they were facing workforce challenges, and that talent attraction and competitive pay were their most common challenge. They ranked workforce challenges as equal risk to their organizations as repairing, maintaining, and financing water infrastructure.

From a statewide perspective, specific challenges in Texas' water workforce include:

- **High concentrations of retirement eligible workers, which poses operational risks for water utilities.** According to the Texas Commission on Environmental Quality (TCEQ), more than 15% of water operators and 13% of wastewater operators are above the age of 64. A 2022 Texas Water Infrastructure Network survey of 90 water entities in Texas found more than 80% were concerned about their current and or future ability to maintain their needed workforce.

- **Staffing shortages at state agencies challenge capacity to execute on core planning, monitoring, and technical assistance responsibilities.** TCEQ, which provides water quality monitoring and technical assistance to rural communities, reported 442 unfilled positions in 2023, more than 15% of its workforce in its funding request to the state legislature.

- **The worker shortage is compounded** by the additional challenge of retaining staff with non-competitive wage levels and increasingly complex job demands due to aging infrastructure and increasingly complex regulations. According to the Texas Workforce Commission, the median annual wage for the 10,880 water operators in Texas is $37,600. This is below the $39,000 median wage for all Texas workers and below the national water operator median of $47,760.

Without an adequate workforce to plan, build, manage, monitor, and operate the water systems in Texas, the systems will become increasingly vulnerable to breakdowns, cost overruns, and avoidable failures. Other potential impacts include: slower response times for repairs, higher risk for service disruptions, missed opportunities for collaboration and more efficient systems, and less capacity for preventative maintenance.

On the Policy Horizon: expected discussion around efforts to

1. Increase water workforce training across the state through community and technical colleges.
2. Raise water workforce compensation levels in order to compete with other industries and provide incentives for skilled workers to serve in rural communities.
3. Incorporation of wraparound services like childcare, transportation, and skill development opportunities as retention approach.
4. Hire, retain, and train skilled employees at key state water agencies that support water planning, monitor water quality, provide technical assistance to communities, and enable water planning and monitoring across Texas.

Who is working on water workforce issues:

One of the challenges of assessing the water workforce issue is that the water sector is broad, diverse, and needed skills extend further than water and wastewater operators. While there is good data on the state of the water workforce nationally, and good data on specific sector data in Texas, we do not have a comprehensive view of how these unique water workforce challenges exist across sectors or statewide data from which to build solutions.

While various sectors or individual employers have workforce pipeline projects, and there are dozens of private individuals, companies, and community colleges approved by TCEQ to offer training, a comprehensive statewide approach has not yet been developed.

Examples of water workforce initiatives on the national and statewide scale are included below. This list is representative and not complete.

National Water Workforce Programs:

1. EPA: **water workforce initiative**
2. AWWA: Work for Water Program
3. US Water Alliance: Workforce and Capacity Building Toolkit

Texas Water Workforce Programs:

Texas Section of American Water Works Association has a project to help high school students prepare for the D license test in partnership with Texas A&M Engineering Extension Service (TEEX)) with pre approval of TCEQ that is based on videos posted to the internet.

- This is supported by TEA and the Texas Department of Agriculture. The program leans heavily and blatantly on recruiting from minority, foreign born, and underprivileged populations.

Texas Rural Water Association is working to address workforce challenges through various programs and partnerships:

- High School career fairs, FFA events, 4-H Water Ambassador Program
- The Consortium/Skilled Trades Academy: local collaborations between school districts and employers for high school students.
- Apprenticeship Program: a two-year program with partner employers.
- Partner Colleges – working towards getting partner colleges to recognize apprenticeship program so students receive credit towards a degree.

Texas Water Utilities Association has a very large training program with online classes and rotating regional in person classes offered across Texas.

Water Environment Association of Texas has a US Department of Labor designated Apprenticeship Program that works with regional Texas Workforce Solutions Boards.

Trust for the Americas, North American Development Bank, Microsoft, STTE Foundation, Western Tech, and El Paso Water collaborated to launch a binational program called Skills for Sustainability. It addresses the critical shortage of skilled professionals in the water management industry in the US-Mexico border region.

El Paso Water Utility: Recompete Workforce Program

Texas Water Journal article on Texas Water Workforce efforts to work with state colleges and universities from 2018

News/Media on Water Workforce

- Muleshoe Cybersecurity and Workforce article
- Texas Tribune article.
- NPR Marketplace segment
- Texas 2036 article

Additional Workforce Resources:

EPA: America's Water Sector Workforce Initiative: A Call to Action
Brookings Institute Study on Water Workforce
Bureau of Labor Statistics
TCEQ Report on Water and Wastewater Operator Shortage
Texas Water Foundation Water Workforce Challenges Study
Texas Rural Water Association Survey
Texas Water Infrastructure Network Survey
Water security for Texas: a post-secondary education pathway for water workforce readiness
Texas Water Development Board funding request and sunset report
Texas Commission on Environmental Quality funding request, sunset report, self evaluation of major issues
Public Utility Commission Funding request and sunset report
US Water Alliance Toward a Strong and Equitable Water Workforce

Texas Water Foundation Contact:

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sarah@texaswater.org
www.texaswater.org

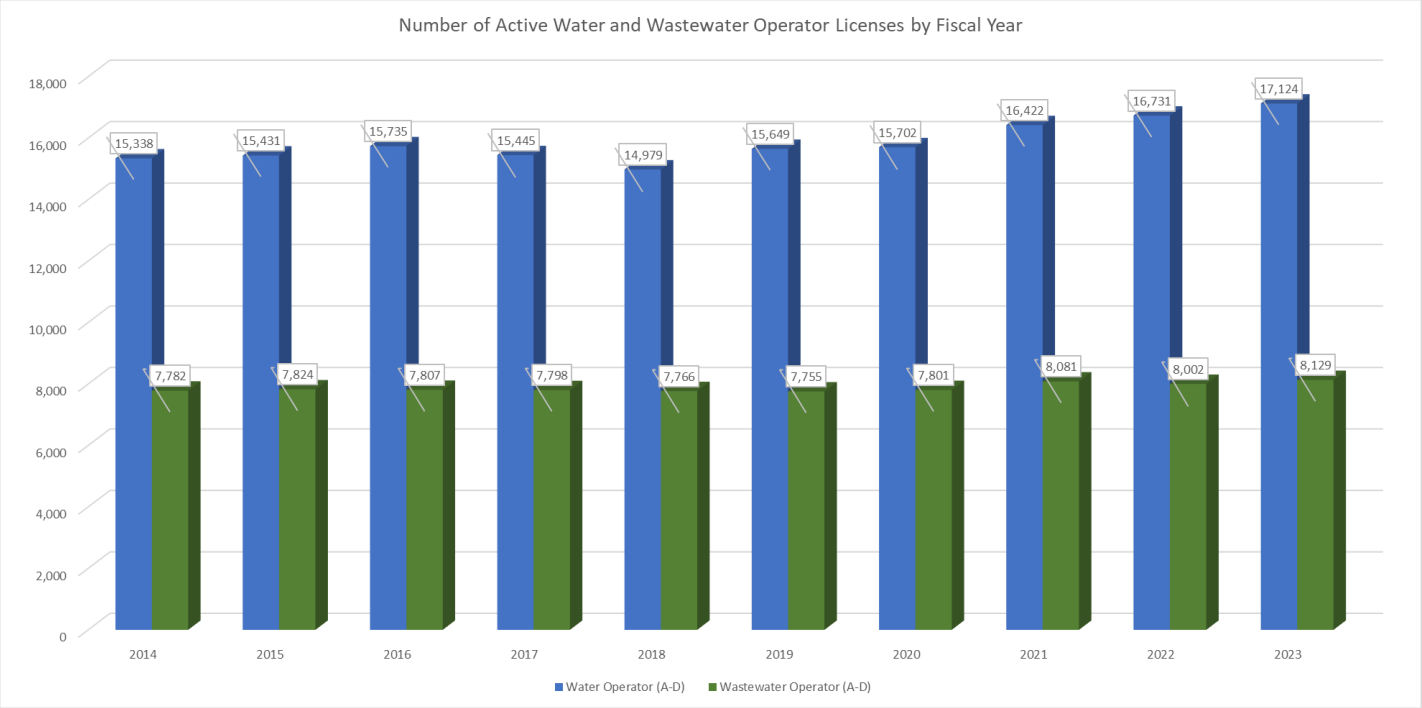
TCEQ- Occupational Licensing Background Information

The Texas Commission on Environmental Quality (TCEQ) protects our state's human and natural resources by ensuring operational competency of individuals licensed by the TCEQ. The TCEQ issues occupational licenses for 10 environmental occupations as listed below. Workforce surveys are developed to identify critical tasks required for each licensed occupation to develop effective examinations and to provide a basis for approving licensing courses.

- Backflow Prevention Assembly Tester
- Customer Service Inspector
- Landscape Irrigation
- Leaking Petroleum Storage Tank (LPST) Corrective Action Specialist and Project Manager
- Municipal Solid Waste Operator
- On-Site Sewage Facilities
- Underground Storage Tank Contractors and On-Site Supervisors
- Wastewater Operators and Collection Operators
- Water Operators
- Water Treatment Specialist

As of the end of Fiscal Year 2023, there were almost 58,000 licensed environmental professionals. In Fiscal Year 2023, approximately 18,000 examinations were processed, and almost 21,000 licenses were issued.

The table below shows the number of active water and wastewater operator licenses for fiscal years 2014-2023. Over this period of time, the number of active water operator licenses increased by almost 12% while the number of wastewater operator licenses increased by over 4%.



Operator licenses must be renewed every three years. On average, approximately 3,800 water operator licenses and 1,800 wastewater operator licenses are renewed each year.

House Bill (HB) 1845 - Provisional Licenses

- House Bill 1845, passed during the 88th Legislative Session (2023), created a provisional license for water and wastewater operators for individuals without a high school diploma or equivalent.
- As of September 1, 2023, an individual without a high school diploma or equivalent that has completed the required training, passed the applicable exam, and passed the criminal history review, is eligible for a non-renewable Provisional Water D or Provisional Wastewater D license valid for 2 years. An individual with a provisional water or wastewater license must act under the direct supervision of a licensed operator.
- The main goal of the provisional licenses is to allow individuals to enter the workforce while working on their high school diploma or equivalent. Once the individual has their diploma, they can then apply for a D license (or a C license if they meet the 2 year-experience requirement, one of which must be "hands-on").
- TCEQ began accepting applications in October 2023. To date, 3 provisional licenses have been issued (one wastewater and two water) and an additional 5 applications are under review (all water operator licenses). Rulemaking is underway to memorialize the requirements in Title 30 Texas Administrative Code (TAC) Chapter 30.

30 TAC Chapter 30, Rulemaking

- The TCEQ is proposing to amend 30 TAC Chapter 30, Occupational Licensing and Registration, to implement statutory changes made during the 88th Legislative Session (2023) and to incorporate additional TCEQ staff recommended changes.
- The proposed rulemaking would implement the following three legislative bills:
    - House Bill (HB) 1845, which requires TCEQ to establish provisional licenses for Class D wastewater operators and public water system operators for persons without a high school diploma or equivalent;
    - HB 2453, which allows licensing agencies to issue a digital license in lieu of a paper license; and
    - Senate Bill (SB) 422, which requires that TCEQ processes applications and issues the license for qualified military service members, veterans, or spouses, within 30-days of receipt.
- TCEQ hosted a stakeholder meeting on March 7, 2023, to discuss the proposed changes and receive informal comments. Rule proposal is planned for late summer/early fall of 2024.

High School Program

- Texas American Water Works Association (TAWWA), with support from the Texas Education Agency (TEA) and TCEQ, is creating a state-wide program for high schools to encourage students to pursue careers in the water field and to reduce barriers to employment.
- TAWWA has created TCEQ approved training videos that will be offered to high schools across the state for classes taught by TEA-certified teachers. Pilot testing will occur this summer, with statewide implementation this fall.
- High school students who complete the core training will be eligible to sit for the exam and may apply for and obtain a Provisional Water Operator D license. Once they graduate, they can apply for a D license or if they have the two years of experience, they can apply directly for a C license.

Texas Association of Community Colleges

Testimony for Senate Committee on Water, Agriculture, and Rural Affairs

Dr. Jeremy McMillen, President, Grayson College

May 15, 2024

Good afternoon, Chairman (Charles) Perry, Vice Chairman (Kelly) Hancock, and Committee Members. I am Dr. Jeremy McMillen, President of Grayson College and a member of the Executive Committee of the Texas Association of Community Colleges (TACC). Today, I represent Grayson College and TACC, an association encompassing 48 community colleges across Texas. Thank you for this opportunity to speak on an issue critical to our state.

Like all community colleges in Texas, Grayson College is an open-enrollment institution. We are located north of the Metroplex and based in Denison, where we serve Grayson County and portions of Fannin County. We are a premier learning college that transforms individuals, builds communities, and inspires excellence. Grayson College serves over 5,000 students yearly in various programs, including academic transfer, career training, credit and non-credit certificate programs, customized training programs, and continuing education. Our Center for Workplace Learning gives students convenient access to a wide selection of noncredit courses that can help them learn the skills to launch a new career.

Over my 12-year tenure as President of Grayson College, I've witnessed the crucial role of water from Lake Texoma in our region's economic expansion. The pressing need for a reliable water supply in our region has led to the development of Bois D'Arc Lake, the first new lake in Texas in nearly 30 years, and the upcoming Lake Ralph Hall scheduled to complete in 2026. These developments underscore the urgent need to address water system reliability.

Role of Community Colleges in Addressing Water System Reliability

Community colleges play a pivotal role in equipping Texas with a skilled workforce capable of addressing water system reliability. At Grayson College and across several other community colleges, we offer specialized programs designed to train technicians and operators essential for maintaining and expanding our water infrastructure. Texas community colleges contribute significantly to workforce development in technical fields and offer access to the credentials needed for a career in the water supply and treatment industry.

Programs and Credentials

In response to the Committee's interim charge, TACC conducted a survey to identify water and wastewater treatment programs across our member colleges. The survey revealed that seven out of nineteen respondents either offer, or are exploring offering, programs in this domain. These programs include:

- Landscape Irrigator
- Class A Water Operator
- Wastewater Treatment Facility Operator
- Municipal Solid Waste Facility Supervisor
- Wastewater Class A, B, C, and D licenses
- Class D license - Basic Water Works Operations & Basic Wastewater Operations

At Grayson College, for example, we provide Continuing Education Training for Wastewater Treatment Facility Operators and host TCEQ licensing exams in partnership with the state agency.

Funding and Legislative Support

The state has wisely created grant opportunities for colleges working with industry partners on short-term credentials. Established through legislation in 2021, the Texas Reskilling and

Upskilling through Education (TRUE) program is one such initiative that has allowed our colleges, including Grayson College, to use this funding to update our facilities and curriculum, aligning our training with what business and municipal partners need for their employees. Since 2022, Grayson has trained 123 people in water supply and treatment-related programs. Under such arrangements, we were able to lower the tuition cost for that education to $50.

In addition to Grayson College, other community colleges across Texas have established partnerships with local governments and industry to align education with workforce needs. My time is limited but one quick example is Amarillo College, which partners with the City of Amarillo and the Texas Water Utility Association's Panhandle Region to offer a Regional Water School each year with more than a dozen classes offered, several of which conclude with TCEQ exam administration.

Future Directions and Coordination

With the recent legislative reforms in House Bill 8, community colleges are even more focused on ensuring the alignment of regional and statewide workforce needs of employers and industry. This enhanced focus positions us to better meet the specialized technical training needs of the water sector. We actively engage with the Higher Education Coordinating Board, the Texas Workforce Commission, businesses, and policymakers to ensure our programs align with state and regional workforce demands.

Indeed, our team at Grayson College is already having discussions and thinking about how our college will be using its educational resources on regional water projects like those I mentioned earlier. This demand even extends to private industry, which in recent years has become more focused on wastewater reuse and has been competing with utilities and water companies for credentialed operators.

Conclusion

In conclusion, community colleges are integral to addressing Texas's water system reliability. We provide the necessary workforce training, foster partnerships with local entities, and benefit from state-supported initiatives. Moreover, House Bill 8 has provided tremendous momentum across all 50 community colleges to further serve the state's workforce needs and ensure that the Texas economy remains strong and vibrant.

On behalf of my colleagues at TACC, I want to thank each of you for your continued support of House Bill 8 and to extend our readiness to collaborate with you, Chairman Perry, and members of this Committee to address our state's workforce needs related to water system reliability.

Thank you once again for including community colleges in this vital discussion. That concludes my testimony, and I'm available to answer any questions.

Appendix B: September 3, 2024, Interim Hearing Materials

Exhibit B-1	Presentation by Kathleen Jackson, Comm'r, Pub. Util. Comm'n of Tex.
Exhibit B-2	Written Testimony of Kelley Holcomb, Gen. Manager, Angelina & Neches River Auth.
Exhibit B-3	Written Testimony of Hank Habicht, Managing Co-Founder, Water Fin. Exch.
Exhibit B-4	Written Testimony of Ken Rainwater, S. Plains Water Supply Corp.
Exhibit B-5	Memorandum from Kathleen Ligon, Interim Exec. Adm'r, Tex. Water Dev. Bd. to Tex. Water Dev. Bd. Members Re: Tex. Water Fund Implementation Plan (July 23, 2024)
Exhibit B-6	Written Testimony of Perry Fowler, Exec. Dir., Tex. Water Infrastructure Network, w/ Attachments
Exhibit B-7	Tex. Rural Water Ass'n Water Availability Surv.
Exhibit B-8	Written Testimony of Jennifer Walker, Sr. Dir. of Tex. Coast & Water Program, Nat'l Wildlife Found.
Exhibit B-9	Written Testimony of Vanessa Puig-Williams, Sr. Dir. of Climate-Resilient Water Sys., Env't Def. Fund
Exhibit B-10	Presentation of Courtney Arbour, Exec. Dir., Tex. Dep't of Licensing and Regul., & Brittany Sharkey, Exec. Dir., Tex. Bd. of Veterinary Med. Exam'rs
Exhibit B-11	Written Testimony of Troy Alexander, Exec. Dir., Tex. Veterinary Med. Ass'n
Exhibit B-12	Written Testimony of Rodney Franklin, State Parks Div. Dir., Tex. Parks and Wildlife Dep't, w/ Attachments

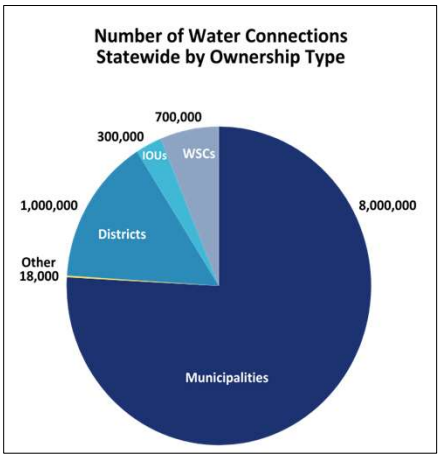
Senate Water, Agriculture & Rural Affairs Interim Hearing

Kathleen Jackson, P.E.
Commissioner
Public Utility Commission of Texas
September 3, 2024

1

Public Utility Commission of Texas

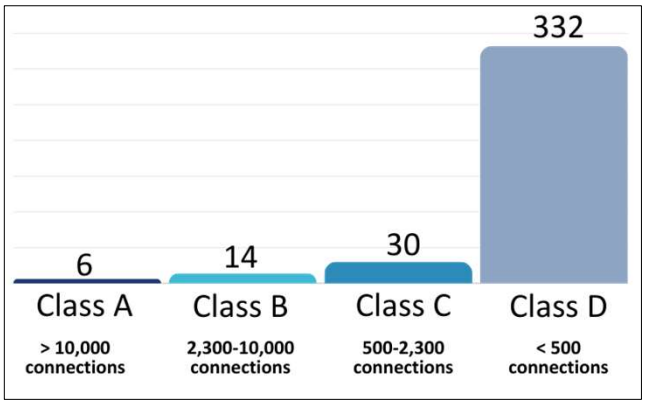
- **Mission**: Protect customers, foster competition, and promote high quality infrastructure
- **Responsibility**: Economic regulator of Texas' electric, telecommunication, and water & wastewater utilities. Water responsibilities:
  - Set rates (IOUs)
  - Issue Certificates of Convenience and Necessity (IOUs, WSCs)
  - Approve Sale, Transfer or Merger (IOUs, WSCs)
  - Hear rate appeals (WSCs, MUDs, SUDs, River Authorities, WCIDs)



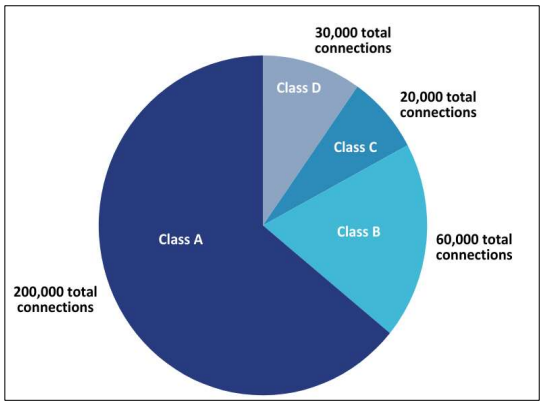
2

Regulated Investor-Owned Utilities

Number of Utilities



Distribution of Customers

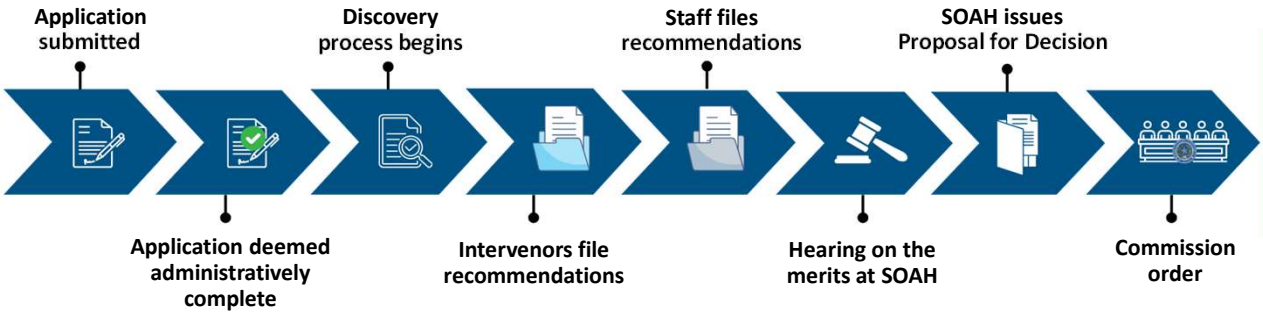


Public Utility Commission of Texas

3

3

Rate Making Process



Public Utility Commission of Texas

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4

Recent Process Efficiencies

System Improvement Charge (SB 700, 86R)
- Incentivizes infrastructure investment by ensuring timely recovery.

Repeal of Substantial Similarity (HB 2373, 88R)
- Enables utilities to consolidate more than one system under a single rate.

Expedited STM Process (SB 1965, 88R)
- Expedited STM when the acquiring utility is the temporary manager.

Initial Rates Upon Acquisition (HB 1484, 87R)
- Allows acquiring utility to request one of their previously approved rates immediately upon acquisition.

Enhanced Consumer and Utility Outreach
- Conduct customer meetings to explain rate making process (Office of Public Engagement)
- Broader outreach to entities about rules and regulatory requirements (Division of Utility Outreach)
- Assist retail water utilities with regulatory compliance (Division of Utility Outreach)

5

Case for Action

Rate cases are increasing in volume and complexity.

Case workflow is managed manually.

Small utilities have few resources to fully complete rate applications in a timely manner.

Number of At-Risk Utilities is growing.

Expedited STMs to acquire a non-functioning utility are not available to municipalities, WSCs, MUDs, SUDs, River Authorities or WCIDs.

Actual SIC proceedings are extending well beyond 120 days.

6

Recommendations

- PUCT staffing increase to process caseload growth (LAR Exceptional Item Request)
- Case Management System (LAR Exceptional Item Request)
- Opportunities for enhanced financial, managerial, and technical assistance (revisit current contract scope of work)

Statutory Recommendations:

- Expedite the System Improvement Charge (SIC) proceedings by shortening the deadline to 60 days
- Expand the existing expedited STM process for temporary managers to include municipalities, WSCs, MUDs, SUDs, River Authorities or WCIDs

7

Rate Making Process

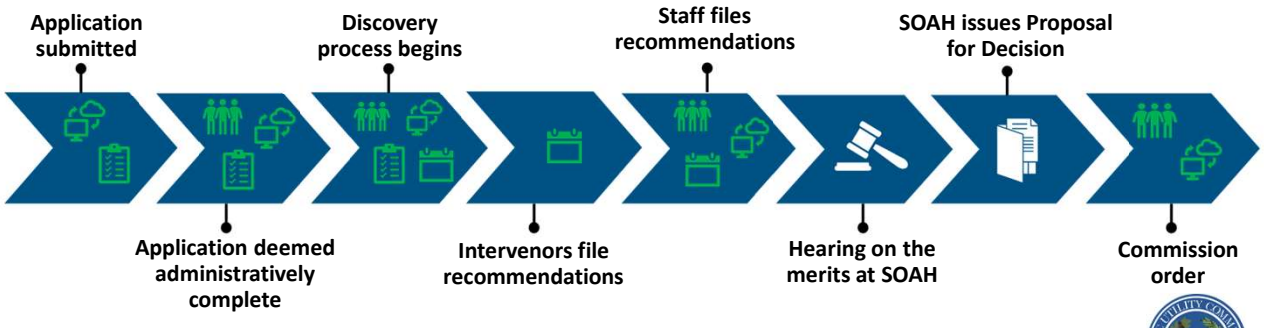
Process Improvement Outcome pending Legislative Action

PUCT staffing increase

Enhanced Financial, Managerial, Technical Assistance

Case Management System

Expedited SIC timeline



8

Agency Coordination

Texas Commission on Environmental Quality (TCEQ)

- Memorandum of Understanding between PUCT and TCEQ (HB 1600 & SB 567, 83R)
- Monthly meeting with Executive Directors of PUCT, TCEQ, TWDB and RRC
- Monthly meeting with PUCT and TCEQ water staff
- Quarterly Texas Water Infrastructure Coordination Committee (TWICC) meetings
- Both the PUCT and TCEQ have the authority to appoint a temporary manager; only PUCT may approve a temporary rate
- Data sharing to identify new retail public utilities
- Receive plans and specs review as part of CCN process
- Receive compliance data from TCEQ as part of our FMT review
- Communicate and coordinate directly with each other on matters relating to enforcement.

Office of Public Utility Counsel (OPUC)

- Refers consumer rate inquiries to PUCT for resolution
- Serves as a party to our proceedings on behalf of residential and small commercial consumers
- Participates in PUCT rulemakings

Texas Water Development Board (TWDB)

- Quarterly TWICC meetings
- Coordinate with CCN and STM applications when needed for financial assistance

9

Contact Information

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10

Appendix

11

Key Water/Wastewater Ratemaking Legislation

SB 700, Senator Nichols, Representative Geren (86th Legislature)

- Created a new Class D classification for retail water and sewer utilities with less than 500 connections and allowed for alternative ratemaking methodologies including the introduction of a new customer class, the cash needs method, and phased and multistep rate changes. It also allowed for a system improvement charge to allow for more timely recovery of infrastructure investments.

HB 2373, Representative Harris, Senator Nichols (88th Legislature)

- Repealed the requirement to prove that systems are substantially similar in terms of facilities, quality of service, and cost of service ("the substantial similarity test") to allow for a simplified method of applying for a consolidated tariff.

SB 1965, Senator Alvarado, Representative Senfronia Thompson (88th Legislature)

- Provides for a process for a Class A or Class B utility to acquire a utility in temporary management or receivership through an expedited Sale/Transfer/Merger (STM) application process. The acquiring entity can recover all used and useful invested capital and just and reasonable operations and maintenance cost as a regulatory asset in the next full rate case.

HB 1484, Representative Metcalf, Senator Springer (87th Legislature)

- Authorizes acquiring utilities to use previously approved rates immediately after acquiring another utility without filing a new rate change application.

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ANGELINA & NECHES RIVER AUTHORITY

Senate Committee Hearing
Water, Agriculture and Rural Affairs
Senator Charles Perry, Chair
Small System Consolidation
September 3, 2024

The Angelina & Neches River Authority's (Authority) jurisdictional service area includes all or part of seventeen counties in East Texas and encompasses approximately 8,500 square miles. There are 507 water systems that provide retail water and/or sewer service in the Authority's service area with populations ranging from as little as 25 people up to 104,798 people. Of these systems, 234 have a total service connection count of 250 or less, while an additional 95 systems have a service connection count between 251 and 500. The Authority estimates that greater than 25 percent of these systems are at risk of failure.

Since 1994, the Authority has regionalized four rural water systems via a non-traditional regionalization process, as well as five rural wastewater systems with pipe-to-pipe connections via the creation and expansion of the Authority's North Angelina County Regional Wastewater Facility, which was constructed in 2003. The act of physically merging these systems into the Authority has exposed a common theme – that at some point during each system's past, it was a viable functioning system.

The operational reasons for each system's failure are different, however, one common point of failure almost exclusively comes back to the fact that the governing body is unable or unwilling to raise rates to generate sufficient revenue to maintain the system. This, coupled with a rapidly expanding regulatory environment that has seen a steady increase in very complex requirements over the past three decades, has rendered many small rural water and wastewater systems incapable of meeting the increasing demands for regulatory compliance.

In an effort to reverse the trend of failed and failing water and wastewater systems in its service area, the Authority is working to identify and develop solutions for these systems. The first step is to develop a definition for an "at risk" system, then develop a methodology for identifying these systems within our service area before they fail.

Once a system has failed, there are few options available to regulatory agencies to ensure continuous and adequate service for the system's customers while in failure mode. There are even fewer options available for regionalizing these systems. In today's regulatory environment, there are regulatory requirements that act as disincentives for regionalizing small rural water and wastewater systems, especially those systems that have a Certificate of Convenience & Necessity (CCN) associated with them.

The State of Texas has long held the CCN sacrosanct, and correctly so. However, in doing so, this has made the transfer of a CCN-based system extremely laborious and time-intensive. Based on the Authority's recent experiences with a Sale, Transfer or Merger (STM) process, an uncontested STM took 19 months to complete. The STM application was submitted on December 18, 2020 and the final certification of the new CCN was received on July 28, 2022. In this case, the water supply corporation had failed and was days away from having electric service disconnected at its water treatment plant for non-payment.

In the Authority's most recent water system acquisition, SB 1305 88(R) was the vehicle used to expedite the transfer of ownership interests, territory (CCN) and assets, collectively referred to as "the system." SB 1305 essentially directed the Public Utilities Commission of Texas and the Texas Commission on Environmental Quality (TCEQ) to transfer the system to the Authority. The documentation required in SB 1305 was submitted on December 12, 2023, and the transfer of the system was finalized on March 19, 2024.

Once a regional provider steps in as the new owner, they are faced with several immediate operational challenges with regard to day-to-day operations of the system, 1) locating water meters that probably haven't been read for a long period of time, 2) recreating customer records from old documents, 3) recreating the system's operational records, 4) initiating interim repairs to all of the system's aging and neglected infrastructure, and 5) beginning the planning process for making improvements system-wide to achieve short and long-term regulatory compliance.

As difficult as the immediate operational challenges are, the regulatory challenges for administratively transferring all of the elements of the system to the new owner are even more challenging. The complexity of regulatory requirements and the time it takes to navigate all facets of the individual requirements of each state agency can range from months to years before the system has been officially brought into compliance.

Once the system's assets and CCN have been officially transferred, there are numerous ongoing operational challenges the system faces before long-term regulatory compliance can be achieved. In every system acquisition in which the Authority has been involved, it has taken three to five years or longer to bring those systems into long-term regulatory compliance after system acquisition has been completed. During that interim period, those systems had limited capacity because of the degraded physical condition of the infrastructure.

There are three state agencies predominantly involved in the acquisition, regionalization and rebuilding of rural water and wastewater systems. They are:

- Public Utility Commission of Texas (PUC)
- Texas Commission of Environmental Quality (TCEQ)
- Texas Water Development Board (TWDB)

Each of these agencies has a pivotal, but unique role, in successfully transferring the old system to the new owner, as well as the ability of the new owner to operate the system on an interim basis as it's being brought into compliance with state and federal regulations.

Below is a list of recommendations for change within agencies that exercise oversight for the regionalization of retail public utilities.

1) The PUC should develop a streamlined path for the uncontested transfer of a retail public utility to another qualified entity.
2) The PUC should develop rules for a streamlined administrative process for an uncontested STM process, rather than utilization of an Administrative Law Judge.
3) The TCEQ should engage the Environmental Protection Agency seeking to build safe harbor provisions into their enforcement criteria for violations of primary drinking water standards.
4) The TWDB should develop streamlined administrative procedures that allow for expedited review, deployment, and use of funds from the Texas Water Fund for systems that are being regionalized or are under active enforcement.
5) The PUC, TCEQ, and TWDB should heavily favor the regionalization of retail public utilities in an STM process.

The Authority, its Board of Directors, and staff, continue to search for opportunities to develop solutions that benefit rural water and wastewater systems within its jurisdictional service area.

Thank you for the opportunity to submit written comments.

Kelley Holcomb, General Manager
Phone: 936-632-7795
Email: khoolcomb@anra.org

WFX
WATER FINANCE EXCHANGE
NO COMMUNITY LEFT BEHIND

Senate Water, Agriculture and Rural Affairs Committee
Interim Session Hearing
September 3, 2024

Comments from Water Finance Exchange
Hank Habicht, Managing Co-Founder

Honorable Chairman Perry and Members of the Committee

My name is Hank Habicht, and I am a co-founder of Water Finance Exchange (WFX). WFX (www.waterfx.org) is a non-profit entity focused on partnering with smaller and rural communities to finance affordable and effective drinking water and wastewater systems. I appreciate the opportunity to provide invited testimony on how small water systems in Texas can benefit from dedicated and accessible funding, the availability of technical assistance to navigate funding processes, effective implementation of needed projects, and real-world efficiencies that can be achieved by regional cooperation.

We appreciate the Chairman and Committee's focus on the critical role water infrastructure plays in promoting economic health and quality of life in Texas. The legislative focus of the last session and historic achievements such as the creation of the Texas Water Fund have established a platform for supporting our smaller and rural communities and we are honored to share with the Committee ideas on how to efficiently build on that platform and bring sustainable water infrastructure and economic opportunity to the largest possible number of small Texas communities and residents.

WFX believes water infrastructure is more than pipes and pumps; it is a catalyst for economic development and a cornerstone for public and environmental health. All communities should have water and sanitation that is affordable and sustainable. In three years, we have built active relationships with more than 50 communities in Texas and have helped them develop plans and access funds well in excess of $100 million.

In our work with many Texas communities, we are seeing that regional cooperation can create economies of scale and improved performance. This regional cooperation can take many forms, which can include consolidation, but it can also take the form of neighboring communities sharing technical assistance services to meet regulatory requirements. Regional cooperation can also present as in the case of Presidio County, where the various incorporated and unincorporated areas of the county and their dedicated representatives have banded together to pursue a county wide water approach to address their water needs. Presidio County, through its Commissioner's Court, is an integral facilitator of the project.

We are also developing effective regional collaborations with committed leaders at the South Plains Water Supply Corporation, Angelina and Neches River Authority, Crystal City, Carrizo Springs, the City of Del Rio, South Texas Water Authority, Green Acres Mobile Home Park and others. From our work with these communities, I am confident that Presidio County, and the other systems we are assisting are deeply appreciative of the significant investment by the state of Texas in establishing the Texas Water Fund and enabling them to pursue long-term water infrastructure sustainability.

A critical component of the funding made available last session is already being successfully implemented by the Texas Water Development Board for technical assistance. WFX is proud to be among the first entities selected for the newly created Water Utilities Technical Assistance Program or WUTAP.

Attractive and competitive funding from the state as well as federal capitalized programs such as the State Revolving Fund (SRF) go a long way to assist utilities in addressing capacity enhancements, line loss reduction, treatment system upgrades and compliance. Yet, with all the funding available, we recognize that much more is needed. State and federal funding must be a sustainable source of replenishment for these and other programs. Available funding must be wisely invested in projects that efficiently and timely deliver the needed and desired goal.

More often than not, limited funding and a complex funding process coupled with compliance challenges disproportionately hinder small, rural and disadvantaged communities. The legislature recognized this in enacting Senate Bill 28 in the last session and specifically called for assistance to be focused on communities of 150,000 people or less.

We have learned much from our partners and communities we assist. With that in mind, and our commitment to ensure effective and meaningful project delivery we, respectfully, have a few recommendations to share with the committee for your consideration:

1. **Funding Window for Smaller Communities**. Due to the urgency of the need and the size of the opportunity, the legislature should increase operating resources at TWDB to enhance focus on underserved communities. In turn, the legislature should direct and the TWDB should implement an open window of funding that targets smaller more challenged communities that may not have the administrative staff and history to produce the required documentation typically required for the state SRF program. This could include a smaller grant fund to address less costly but critical needs for communities who can't afford to pursue SRF funding. In WFX's experience, these needs are often acute stressors for the health of the water system, and can be remedied by solutions as simple as a new pump or chlorinator. The proposed expanded open window for small, disadvantaged communities could also address longer-term funding needs by allowing for additional time for communities to meet the strenuous documentation requirements for state funding. In creating this window, the Legislature could call

for TWDB and TCEQ to provide criteria for identifying “at risk” communities, which will encourage development of approaches for meeting their needs.

2. **Incentives for Regional Solutions**. In the last session, the legislature took some very important steps to encourage regionalization, including the acquisition of smaller utilities with compliance challenges. These legislative achievements include SB 1965, to promote accelerated processing of STM applications especially involving troubled utilities, and HB 3232 which provides “safe harbor” incentives for larger utilities to absorb and assist smaller challenged utilities. These larger entities are often willing to help but deterred by the potential to be held responsible for past violations by the smaller utility. In the field, there is some question whether these two laws apply to all systems as opposed to Investor-Owned Utilities (IOUs) only.

   In order to seize the opportunity to build on this progress and to accelerate sound regional solutions, the following actions are respectfully proposed:

   - Enact the simple clarification that SB 1965 and HR 3232 apply to transactions involving all categories of water systems, utilities and water service providers and not only IOUs.
   - Regulatory and funding agencies and utilities, including TWDB, the PUC and TCEQ, should work together towards promoting the benefits of regional solutions by maximizing the points available to be awarded for regionalization efforts in the Project Information Form, or PIF. Currently, scoring of projects on regionalization tends to be more in line with one system taking over another system. However, we have observed through the provision of technical assistance services and the convening of workshops across the State that regionalization opportunities are collaborative in nature. They tend to start slow, with shared services or operations. Encouraging these entry steps into regional collaborations through the points in the application can incentivize more utilities to seek out partnerships. This more transparent point accumulation opportunity may also increase the likelihood of a larger system’s willingness to take on a neighboring system.
   - Expand the extremely promising Texas Water Fund and call for incentives and accelerated funding opportunities for qualifying regional proposals especially those involving noncompliant or at-risk communities.

3. **Additional WUTAP Funding**. The WUTAP has enhanced focus on formal Technical Assistance (TA) and brought utilities together with Technical Assistance providers, to assist utilities in a diverse set of tasks, such as rate studies, water conservation plans and completion of financial assistance applications that are not typically endeavored by infrastructure implementors. This formalization by TWDB helps TA gain recognition as a service for under-resourced utilities pushing the widely shared goal that more

communities utilize these services to address needed water system improvements.

4. **Defining Technical Assistance**. It is understood that effective financing depends on addressing and mitigating risk. Effective Technical Assistance (TA) is essential to building community financial capacity and system improvements which are affordable for all citizens. While Texas communities face similar challenges to other states across the country such as water scarcity, increasing water demand, and aging infrastructure, there are unique factors in Texas for TA providers to consider, including watershed context and stressors, the high number of rural communities and small systems, and increased demand for economic development. What defines TA also impacts available funding. Last but not least, Texas TA must emphasize community financial health and water affordability. A more comprehensive definition of TA is needed so that these much-needed efforts may be appropriately recognized, quantified, and funded.

Closing comments:

The Water Sector is experiencing historic but limited funding opportunities for small, rural, and underserved communities to address decades of underinvestment in sustainable infrastructure. For many underserved communities, this marks their first opportunity to secure state and federal funding to address failing infrastructure, plan for future growth and consider holistic watershed management in the long-term.

However, many of these communities do not have the resources to fully and competitively take advantage of this funding due to common shortages of capacity in administration, finances, operations and governance. The funding process is complex and requires a level of documentation and data analysis that many small communities do not have. Funding application prerequisites of financial audits, engineering plans, conformity to environmental and legal requirements, and compliance initiatives are elements that smaller underserved communities have sparsely prioritized due to costs and now are struggling to quickly meet these requirements.

The limited recommendations respectfully offered today, we believe, will result in gaining “more bang for the buck” of limited funds invested in much needed water infrastructure and “water as a service” efforts. Wise investment in water infrastructure is a catalyst for community development. As we seek to promote healthy expansion of economic opportunity to all corners of Texas, we must recognize that water is a prerequisite for Texas advancements. Without water, there can be no economic development. Investing in water is an Investment In continuing the Texas miracle. More importantly, investing in water, as WFX firmly believes, assists in ensuring that no community is left behind.

WFX stands ready to work with the Committee on these critically important issues and policy proposals and to continue to assist community partners as they pursue identification of most pressing water challenges and funding to address the same. Thank you and I am happy to address any questions you have.

Senate Water, Agriculture and Rural Affairs Committee
Interim Session Hearing
September 3, 2024

Comments from South Plains Water Supply Corporation
Ken Rainwater – System Engineer

Honorable Chairman Perry and Members of the Committee

For the record, my name is Ken Rainwater, and I am here today representing the South Plains Water Supply Corporation from Lubbock County. I presently serve as the System Engineer for the SPWSC. I appreciate this opportunity to provide invited testimony on how the SPWSC has stepped up to meet the challenges faced by many small water systems in Texas and how these systems can benefit from dedicated, accessible funding and facilitated state agency cooperation.

I submitted my prepared remarks to the Committee Clerk accompanied by an area map.

The SPWSC is proud of its achievements in its first 12 months of existence. The SPWSC would also like to acknowledge the fantastic cooperative efforts of the Texas Water Development Board, the Public Utility Commission, and the Texas Commission on Environmental Quality. Without question, the SPWSC's accomplishments were possible only with the assistance of dedicated employees of these agencies.

The SPWSC was formed out of necessity and frustration.

The four subdivisions, with approximately 300 connections in northwest Lubbock County, endured years of unreliable water delivery with significant water quality concerns. The locations of the systems are highlighted in the included map.

Our four subdivisions are outside of the city limits of Lubbock and Shallowater. These areas were privately developed, and the four public water systems were eventually taken over by the Marion Smith family doing business as Smith Management Services. These privately held public water supply entities were subject to TCEQ regulation but ineligible for state funding assistance.

A combination of singular reliance on wells for each of the systems, rudimentary treatment works, coupled with maintenance and funding challenges resulted in continued decline in service delivery and water quality degradation for the residents of Plott Acres, Cox Addition, Town North Village, and Town North Estates.

Water quality concerns include elevated levels of arsenic, fluoride, nitrate, selenium and PFAS.

Mr. Smith undertook some steps to maintain the systems. As with many small systems, funding for needed upkeep, operation, and improvements was challenging. In early 2021, after Mr. Smith passed away, followed by devastating damage from winter storm Uri, the residents of all four subdivisions were left with four inoperable and abandoned water utilities.

The PUC subsequently appointed several temporary managers to maintain the systems. The SPWSC agreed to become the latest and last temporary manager.

The State of Texas is aware of the compliance histories of the systems and their maintenance problems.

A group of dedicated volunteers from Communities Unlimited, Texas AWWA, Water Finance Exchange, Winstead, and Anser Advisory, among others, diligently worked with the TWDB to seek funding for much needed infrastructure improvements. I am proud to be part of this largely volunteer effort.

The Air Force Civil Engineer Center office at the former Reese AFB is our partner for addressing PFAS concerns.

The TWDB has set aside and dedicated funding for small systems – but the money was not available to privately held entities.

The SPWSC and area residents understood the challenge and initiated efforts to create a public entity as a WSC to acquire the systems and thus qualify for TWDB funding. Consolidation of the four systems required PUC cooperation, and I am happy to report that we just last week gained final PUC approval from the PUC for the asset transfer from the Smith family estate to the SPWSC. We hope to receive the TWDB funding very soon.

These actions will require increased rates to ensure the viability and sustainability of the SPWSC systems.

With our history and experience, I would like to offer some recommendations to assist similarly situated systems throughout Texas.

1. Texas should establish and make available a special imminent endangerment funding assistance program for systems the state places under temporary management or receivership.
2. Texas should revisit the safe-harbor provisions enacted during the last session to make them applicable to a wider set of utilities that are trying to do the right thing, seeking regional solutions and returning systems to a compliant state.
3. Texas should consider adding flexibility to funding decisions that have been found to be eligible and appropriate in the Intended Use Plan even while systems, such as ours, are transitioning from private nonfunctioning status to public subdivision of the state and compliant status.

4. SB 1965 provisions for expedited PUC processing of STM applications should be expanded for all system sales or acquisitions, not just IOUs.
5. Texas should consider increasing funding and eligibility for much needed technical assistance for small, disadvantaged and underserved communities and systems.
6. Texas should encourage regional cooperation and solutions as it relates to water and wastewater system improvements.

In closing, I want to again express how proud I am of the SPWSC's achievements. The SPWSC represents the many small, troubled utility systems in rural parts of Texas looking for better ways to serve their customers. Regional cooperation and solutions have provided us with an opportunity to improve our current condition.

And again, I want to acknowledge the great work and assistance provided by the PUC, TWDB and TCEQ.

I am happy to address any questions you may have.

TEXAS WATER DEVELOPMENT BOARD

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

September 3, 2024

Senate Water, Agriculture, and
Rural Affairs Committee
Texas Senate
P.O. Box 12068
Austin, Texas 78711

Dear Chair Perry, Vice Chair Hancock, and Members of the Committee:

Thank you for the opportunity to testify today regarding the implementation of the Texas Water Fund, pursuant to Senate Bill 28 and Senate Joint Resolution 75, 88th Legislature, Regular Session. As you know, communities throughout the state of Texas face significant water and wastewater infrastructure needs, and the Texas Water Fund offers an incredible opportunity to address these challenges for years to come.

Please see the attached memo detailing the Texas Water Development Board's Texas Water Fund implementation plan, which was presented at our July 23 Board meeting. Our testimony will correspond with this attachment.

If you have any questions, please don't hesitate to contact Haley Hutcherson at Haley.Hutcherson@twdb.texas.gov and 512-317-2311.

Sincerely,

Brooke T. Paup
Chairwoman

Bryan McMath
Interim Executive Administrator

Attachment

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AGENDA ITEM MEMO

BOARD MEETING DATE: July 23, 2024

TO: Board Members

THROUGH: Bryan McMath, Interim Executive Administrator

FROM: Kathleen Ligon, Interim Assistant Executive Administrator

SUBJECT: Texas Water Fund Implementation Plan

ACTION REQUESTED

This item is a briefing and discussion on the Executive Administrator's Texas Water Fund implementation plan. No action is requested.

BACKGROUND

Texas Water Fund Legislation

In 2023, the 88th Texas Legislature passed Senate Bill (SB) 28 and Senate Joint Resolution (SJR) 75 providing for the creation of the Texas Water Fund. In addition, SB 30 authorized a one-time, $1 billion supplemental appropriation of general revenue to the Texas Water Fund, contingent on enactment of SB 28 and approval of SJR 75 by voters. Proposition 6 (the proposition for SJR 75), creating the Texas Water Fund to assist in financing water projects in Texas, passed on November 7, 2023, with more than 77 percent in favor.

The Texas Water Fund is a special fund created in the state treasury outside the general revenue fund to be administered by the Texas Water Development Board (TWDB). SB 28 directs that the TWDB may only use the Texas Water Fund to transfer money to the following funds or accounts administered by the agency:

- The Water Assistance Fund, an existing fund.
- The New Water Supply for Texas Fund, a new fund created by SB 28.
- The State Water Implementation Fund for Texas (SWIFT) and the State Water Implementation Revenue Fund for Texas, which support the SWIFT financial assistance program that provides low-cost financing for projects in the state water plan.
- The Clean Water or Drinking Water State Revolving Funds (SRFs), existing financial assistance programs that provide low-cost financial assistance for planning, acquisition, design, and construction of water, wastewater, reuse, and stormwater infrastructu.re.

- The Rural Water Assistance Fund, an existing financial assistance program designed to assist small rural utilities in obtaining low-cost financing for water and wastewater projects.
- The statewide water public awareness account, a newly created account that will direct funds toward a statewide public awareness program.
- The Texas Water Development Fund II water financial assistance account, an existing program.
- The Texas Water Development Fund II state participation account, an existing program that enables the TWDB to provide funding and assume a temporary ownership interest in a regional water, wastewater, or flood control project when the local sponsors are unable to assume debt for an optimally sized facility.

Of the initial amount appropriated to the Texas Water Fund, the TWDB must allocate no less than 25 percent ($250 million) to the New Water Supply for Texas Fund. The TWDB must also ensure that a portion of the money transferred from the fund is used for the following:

a) water infrastructure projects, prioritized by risk or need, for
    a. rural political subdivisions; and
    b. municipalities with a population less than 150,000;
b) projects for which all required state or federal permitting has been substantially completed, as determined by the Board
c) the statewide water public awareness program
d) water conservation strategies
e) water loss mitigation projects

Financial Assistance Program Demand

The TWDB continues to experience high demand across the agency's financial assistance programs. Since 2013 (considered as a reference year due to creation of the landmark SWIFT program), the agency has seen a significant increase in key performance metrics related to these programs. Total assets managed over that timeframe have increased three-fold from $6.9 billion to $20.9 billion, and the number of construction contracts managed has nearly doubled. From 2016 to 2023, the TWDB has delivered on average more than $1.8 billion per year in financial assistance, a many-fold increase in the average annual amount compared with years past. Of the almost $36 billion in financial assistance commitments since the agency's inception in 1957, nearly $20 billion has been committed since 2013.

SWIFT Program Demand

To date, the TWDB has committed almost $11.5 billion in SWIFT program funding in support of 57 state water plan projects estimated to produce more than 1.7 million acre-feet of water supply. As of end of 2023 (the ninth funding cycle), we have closed on $9.8 billion in funding. The original goal of closing on $8 billion in state water plan project funding in the first decade of the SWIFT program has been exceeded by nearly $2 billion. If all projected

closings occur in 2024, that goal will have been exceeded by approximately $3.5 billion—or over 40 percent of the entire original 50-year goal of $27 billion—in the first decade of the program.
The estimated capital costs to implement the 2022 State Water Plan are $80 billion. About 977,000 acre-feet in municipal conservation strategies is recommended in 2070, of which 320,000 acre-feet is associated with water loss reduction activities at a capital cost of approximately $3.8 billion.

SRF Program Demand

For the last several years the Clean Water and Drinking Water SRF programs, both designed to meet regulatory compliance objectives, have been significantly oversubscribed, meaning that program demand has consistently exceeded the available program capacity.

	Clean Water State Revolving Fund		Drinking Water State Revolving Fund	
	Program Capacity	**Funding Requested**	**Program Capacity**	**Funding Requested**
2023	$ 408,000,000	$ 2,895,650,206	$ 342,000,000	$ 2,457,463,719
2024	$ 460,382,300	$ 3,113,517,275	$ 435,066,830	$ 3,255,535,628

Drinking Water and Clean Water SRF State Fiscal Year 2025 Solicitation

To potentially meet the statutory directives in SB 28, in December 2023 the TWDB encouraged water and wastewater systems to submit Project Information Forms that included water conservation and water loss projects in response to the agency's Drinking Water and Clean Water SRF State Fiscal Year 2025 solicitation. The intent was to use the solicitation to gauge demand for assistance that could be provided through the SRFs or other financial assistance programs eligible for Texas Water Fund funding. Information on responses to the solicitation is included below.

KEY ISSUES

Stakeholder Feedback

To inform rulemaking and other implementation efforts, the TWDB sought informal stakeholder feedback through surveys, invitations for public comment at four regular Board meetings, and a dedicated Texas Water Fund email from January 18 to April 30, 2024.

The surveys included:

- Survey 1: Financial Assistance for Water Infrastructure Projects
- Survey 2: New Water Supply for Texas Fund
- Survey 3: Statewide Water Public Awareness Program

Additionally, we hosted a stakeholder meeting on March 20 in Austin as well as a Board work session in Lubbock on April 10.

In total, we received 127 responses to Survey 1; 97 responses to Survey 2; 88 responses to Survey 3; more than 60 email responses; and several comments at Board meetings and the Board work session. The feedback received was instrumental in drafting the plan below.

Specific stakeholder feedback related to general financial assistance and the statewide public awareness campaign included the following:

- Average median household income, rural designation, and household cost factor were the top three factors that should be considered when offering financial assistance in the form of a grant.
- Rural designation, "green" projects (including those that reduce energy or water usage), and household cost factor were the top three factors that should be weighed the most heavily when considering grant funding.
- Risk of loss of service for water systems, water conservation/water loss mitigation, and regulatory compliance for water systems were identified as the greatest non-flood water infrastructure-related risks or needs for rural communities.
- Water conservation/water loss mitigation, risk of loss of service for water systems, and regulatory compliance for wastewater systems were identified as the greatest non-flood water infrastructure-related risk or needs for municipalities with a population less than 150,000.
- Affordability was identified as the greatest challenge or barrier that rural and small communities face in implementing water infrastructure projects.
- Beyond a statewide water public awareness campaign, data visualization tools and K-12 educational resources and programming were identified in Survey 3 and comment letters as initiatives that should receive the highest priority in a statewide water conservation program.

Administrative Rules

Administrative rules are not required to implement the Texas Water Fund itself; however, some rulemaking is necessary in programs that are eligible to receive funding. This rulemaking includes the following:

- Minor changes to the Rural Water Assistance Fund rules in 31 Texas Administrative Code Chapter 365
- Minor changes to the Water Loan Assistance Fund rules in 31 Texas Administrative Code Chapter 363

Also, new rules for the New Water Supply for Texas Fund, as a new subchapter in 31 Texas Administrative Code Chapter 363, will be proposed later this year.

Response to Drinking Water and Clean Water State Revolving Fund State Fiscal Year 2025 Solicitation

The TWDB received 68 Project Information Forms for water conservation and water loss projects, totaling over $607 million, in response to the 2025 solicitation. Two of these were in the Clean Water SRF with the remainder in the Drinking Water SRF. These included:

Population of Entity	Number of Eligible Projects	Amount of Funding Requested
1,000 or less	18	$43,229,060
1,001 to 10,000	40	$330,675,639
10,001 to 150,000	9	$108,415,710
Greater than 150,000	1	$125,000,000
Grand Total	**68**	**$607,320,409**

All projects proposed would address water loss, which is generally considered a subset of "water conservation" activities. For water supply planning purposes (31 Texas Administrative Code § 357.10), water conservation is defined as practices, techniques, programs, and technologies that will protect water resources, reduce the consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water that may be presented as water management strategies, so that a water supply is made available for future or alternative uses.

Implementation Plan

The Executive Administrator recommends the following Texas Water Fund implementation plan. The plan is intended to meet statutory directives and be responsive to stakeholder feedback; however, given the high number of demands for financial assistance, we would like to acknowledge that it does not address all needs for funding. This plan is intended to be flexible and is subject to change.

The Executive Administrator proposes to distribute Texas Water Fund funding as follows:

Funding Description	Target Amount
Rural Water Assistance Fund	
100 percent grant for conservation/water loss projects from SRF solicitation (under 1,000 population)	$45,000,000
90 percent grant/10 percent loan or local match for conservation/water loss projects from SRF solicitation (1,000 to 10,000 in population)	$130,000,000
High risk or need projects (100 percent grant)	$20,000,000
Rural Water Assistance Fund subtotal	**$195,000,000**
Water Loan Assistance Fund	
70 percent grant/30 percent loan or local match for conservation/water loss projects from 2025 SRF solicitation (10,001 to 150,000 in population)	$90,000,000
Statewide water public awareness program	$15,000,000
SWIFT program support	$300,000,000
Potential bond leveraged funding through existing financial assistance programs	$150,000,000
New Water Supply for Texas Fund	$250,000,000
Grand total	**$1,000,000,000**

The plan includes seven components:

1. Rural Water Assistance Fund
    a. $45 million in financial assistance in the form of a grant for all water conservation/water loss projects that responded to the 2025 SRF solicitation for communities under 1,000 in population.
    b. $130 million in financial assistance in the form of 90 percent grant and 10 percent local match or SRF-comparable rate loan for water conservation/water loss projects that responded to the 2025 SRF solicitation for communities between 1,001 and 10,000 in population.
        i. Projects will be prioritized by disadvantaged and technical criteria identified in Attachment 1; this prioritization will be posted for public comment on July 23 and the Board will consider adoption of the final prioritized list at the August Board meeting.
        ii. $50 million in funding will be reserved for construction-ready projects that have substantially completed all state or federal permitting (see Attachment 1). The Board may bypass a higher scoring project, if necessary, to fulfill this allocation goal.
    c. $20 million in funding for projects identified through other financial assistance program applications as high risk or need based on following:

i. Legislative mandates
ii. TWDB's financial risk scoring criteria
iii. Regionalization of deteriorating systems
iv. Start-up systems
v. Population of service area less than 1,500
vi. Household cost factor greater than 3 percent or qualifies as disadvantaged
vii. Significant compliance issues/regulatory agreed orders

2. Water Loan Assistance Fund
    a. $90 million in financial assistance in the form of 70 percent grant and 30 percent local match or SRF-comparable rate loan for water conservation/loss projects that responded to the 2025 SRF solicitation for communities between 10,001 and 150,000 in population.
        i. Projects will be prioritized by disadvantaged and technical criteria identified in Attachment 1; this prioritization will be posted for public comment on July 23 and the Board will consider adoption of the final prioritized list on August 15. [Note: The prioritization does not include the single project received from an entity over 150,000 in population since the Board will be considering the same project for a commitment through the SWIFT program.]
        ii. $25 million in funding will be reserved for construction-ready projects that have substantially completed all state or federal permitting (see Attachment 1). The Board may bypass a higher scoring project, if necessary, to fulfill this allocation goal.

3. SWIFT Program Support
    a. A transfer from the Texas Water Fund to SWIFT not to exceed $300 million to allow the financing of nearly $1.7 billion through State Water Implement Revenue Fund for Texas bonds to be issued this fall. The ability to transfer money from the Texas Water Fund represents an opportunity to approve and provide commitments to all eligible applicants while letting the SWIFT balance remain at its current level to generate additional investment return for future leveraging capacity. It will also help meet Texas Water Fund statutory priorities by supporting water infrastructure projects for rural political subdivisions and municipalities with a population less than 150,000, along with water conservation strategies.

4. Statewide Water Public Awareness Program
    a. $10 million in grant funding for a contracted campaign
    b. $5 million reserved for future TWDB-led opportunities to invest in K-12 educational resources and programming, data visualization tools, or other related initiatives.

5. New Water Supply for Texas Fund
    a. $250 million for financial assistance to be determined upon adoption of rules by winter 2024/2025.

6. Potential bond-leveraged funding through existing state or federal financing assistance programs
    a. $150 million

7. Administrative costs
    a. Up to 2 percent of the fund may be used by the TWDB to pay the necessary and reasonable expenses of administering the fund.
    b. Authority to pay or reimburse administrative costs could be delegated the Executive Administrator with a requirement to report those costs to the Board.

Implementation Timeline

July 23, 2024
- Briefing and discussion on the Texas Water Fund Implementation Plan
- Board consideration of adoption of Rural Water Assistance Fund (RWAF) rules
- Board consideration of SWIFT program commitments for financial assistance
- Board consideration of Texas Water Fund transfer to SWIFT
- Invitations to apply sent to entities with high risk projects
- Draft prioritization of RWAF and Water Loan Assistance Fund (WLAF) water loss projects posted for public comment

August 2024 Board meeting
- Board consideration of WLAF rule proposal
- Board consideration of adoption of RWAF and WLAF water conservation/water loss project prioritization
- Invitations to apply sent to RWAF water conservation/water loss projects
- Board consideration of first high risk project commitments

Fall 2024
- Board consideration of adoption of WLAF rules
- Invitations to apply sent to WLAF water conservation/water loss projects
- Board consideration of New Water Supply for Texas Fund rule proposal
- Board consideration of statewide water public awareness campaign contract

Winter 2024/2025
- Board consideration of RWAF and high risk project commitments
- Board consideration of adoption of New Water Supply for Texas Fund rules

Spring 2025
- Board consideration of WLAF project commitments

RECOMMENDATION
This item is for briefing and discussion only.

Attachment(s):
1. Water Loss Project Prioritization and Construction-Ready Reserve

Attachment 1: Water Loss Project Prioritization Criteria and Construction-Ready Reserve

Criteria **Points**

1. Annual Median Household Income (AMHI)

Service Area AMHI is less than or equal to 50% of the State AMHI 40

Service Area AMHI is less than or equal to 65% but not less than 50% of the State AMHI..... 30

Service Area AMHI is less than or equal to 75% but not less than 65% of the State AMHI..... 20

Service Area AMHI is greater than 75% of the State AMHI 0

2. Household Cost Factor

Household Cost Factor of the project is equal to or above 2% 5

Household Cost Factor of the project is below 2% 0

3. Project Addresses Real Water Loss

Project addresses any real water loss..... 20

4. Type of Water Loss Addressed

Project addresses the type of water loss identified as above the threshold (31 TAC § 358.6 (e)) in the water loss audit 15

5. Rural Applicants 5

(A) a nonprofit water supply or sewer service corporation created and operating under Chapter 67 of the Texas Water Code or a district or authority created under Section 52, Article III, or Section 59, Article XVI, Texas Constitution, no part of the service area of which is located in an urban area with a population of more than 50,000;

(B) a municipality:

(i) with a population of 10,000 or less no part of the service area of which is located in an urban area with a population of 50,000 or more; or

(ii) located wholly in a county in which no urban area has a population of more than 50,000;

(C) a county in which no urban area has a population of more than 50,000; or

(D) an entity that:

(i) is a nonprofit water supply or sewer service corporation created and operating under Chapter 67 of the Texas Water Code, a district or authority created under Section 52,

Article III, or Section 59, Article XVI, Texas Constitution, a municipality, county, or other political subdivision of the state, or an interstate compact commission to which the state is a party; and

(ii) demonstrates in a manner satisfactory to the Board that the entity is rural or the area to be served by the project is a wholly rural area despite not otherwise qualifying under Paragraph (A), (B), or (C).

Maximum Number of Points **85**

6. Tiebreaker

In the event of a tie in the scoring, priority will be given to the system serving the fewest number of service connections.

Construction-Ready Reserve

Projects are considered construction-ready if

1. an applicant requests funding only for construction activities (i.e., they are not seeking planning and design funding from the TWDB) and can submit an approvable Engineering Feasibility Report (EFR) with their financial application; or,
2. an applicant has all applicable permitting aspects of the project (e.g., acquisition of water rights, Certificate of Convenience and Necessity (CCN), TCEQ approval and completion of piloting for the project, TCEQ wastewater discharge permit for wastewater treatment plant construction or wastewater reuse authorization) and an environmental review has been substantially completed[1].

The Board may bypass a higher scoring project, if necessary, to fulfill this allocation goal. If an applicant's financial application does not meet this definition of construction-ready, and the project was brought in under this bypass provision, TWDB staff will hold completing the application review of this project until other higher scoring projects have been invited to apply are committed. The project will be reconsidered in priority order, provided funds remain available.

[1] Applicant will submit sufficient information with the financial application to support one of the three potential responses: 1) a Finding of No Significant Impact (FNSI), Categorical Exclusion (CE), a Record of Decision (ROD), or an environmental determination prepared by another entity; 2) the project meets the criteria to receive a categorical exclusion in compliance with TWDB rules; or 3) the applicant can submit an environmental report that documents coordination with other agencies has proceeded sufficiently to determine that no major issues remain.

Texas Senate Committee on Water, Agriculture & Rural Affairs

September 3, 2024

Invited Testimony of The Texas Water Infrastructure Network

Panel IV: Senate Bill 28 (Texas Water Fund)

Provided by Perry L. Fowler, Executive Director TXWIN

Chairman Perry, Vice Chairman Hancock and fellow esteemed committee members, my name is Perry Fowler, and I am here on behalf of the Texas Water Infrastructure Network (TXWIN) where I serve as Executive Director. I am here to share the results of our most recent Texas Water Capital Needs Survey (TWCNS) which provides us with a complete picture of Texas' near-term water infrastructure needs and related trends. This is a timely topic as we start preparing for the next legislative session and we appreciate the ability to present some of our survey findings to help provide some additional context on issues driving the need for investment in our water infrastructure.

TXWIN, a nonprofit 501c (6) trade association, was founded in 2013. TXWIN represents companies that build water & wastewater treatment plants, pipelines, flood control and other projects for municipal and regional water utilities, industrial and commercial clients, and federal entities. TXWIN membership includes some of the most respected Texas and national construction companies as well as leading state and national suppliers, fabricators, manufacturers, and construction law firms. TXWIN members build the water infrastructure that serves the communities you represent across the State of Texas,

This year marks the 4th survey conducted with the assistance of Collaborative Water Resolution LLC, an Austin-based water research and public opinion consultancy led by Dr. Todd Votteler a respected voice in Texas water. The survey has evolved over time to capture more key data points relevant to water infrastructure investment needs with key input from policy makers and Texas water stakeholders.

The first Texas Water Capital Needs survey was conducted in 2020 with the initial goal of identifying key trends and challenges in water infrastructure needs. It was a uniquely challenging time, and we wanted to identify trends in Texas water infrastructure during the height of the COVID pandemic. In the initial survey we discovered that that market demand for water infrastructure and construction activity was not diminishing. Due to our designation as an "essential" industry we worked through the pandemic it in its entirety because Texas could not afford to delay investments in our water infrastructure. We are still experiencing many of the same market dynamics associated with the pandemic marketplace such as inflation and decreased material availability. The good news is some of those factors are easing, but some challenges persist.

Survey Process

In terms of process, I would like to explain how we formulated the survey which involves Texas collaboration with water stakeholders in the owner, design and construction community and our TXWIN members. We partner with all the major water groups soliciting their feedback and input to ensure that we are capturing key data points, once they have all had the opportunity to review content and provide feedback. We also depend on these groups to assist us with disseminating the survey to their members in the water infrastructure owner community.

I want to personally thank our valued partners including the AWWA Texas Section, the Water Environment Association of Texas (WEAT), the Texas Rural Water Association, the Texas Water Foundation, and the Texas Water Conservation Association (TWCA), the Texas chapter of the Association of Water

Board Directors and numerous other organizations that contributed to our data pool this year. We had approximately 250 respondents this year, which was the largest response rate to date. We accepted responses to the survey this past May and have been analyzing the data over the last several months.

Survey Methodology

The current 2024 survey conducts a much deeper dive into data based on population demographics. We thought that it was especially critical to look at how of infrastructure needs and drivers, impact on economic development data, funding and procurement trends differed based upon population demographics. The survey targeted top management of water utilities who have familiarity with the survey subject matter.

As opposed to the 50-year planning cycles in the State Water Plan and State Flood Plan, we asked respondents to identify their capital need projections in the next ten and twenty- year periods. We also include wastewater in our study which is essential to our water stewardship and deserves more attention as there is not presently a state “Clean Water Plan”.

Currently our state planning does not take the cost of clean water infrastructure into account and we don’t have a good inventory of these needs other than the Clean Water SRF Intended Use Plan. This is important when we consider the actual scope, costs, and demand for capital investment.

This survey hits all the key data points and paints a more complete picture of Texas' near-term water infrastructure needs and related trends. In addition to the topline responses received, we have conducted further analysis based on population demographics because the size of communities, and types of respondents can differ significantly. Therefore, the survey gathered data on economic development issues, size of needs and procurement preferences.

In addition to the topline responses received, we have conducted further analysis based on population demographics which is important because although many of the trends in water infrastructure needs are similar, the size of communities and types of respondents differ significantly, so there are certain aspects of the survey that we thought were important to differentiate especially when it comes down to economic development issues, size of needs and procurement preferences.

We had a large pool of MUD respondents this year which was welcomed, but it is noteworthy that the creation of MUDs is in fact a function of economic development so that the number of those entities which responded to the survey had the potential to dilute the results from the larger entities that responded, specifically with respect to economic development. This was a key area where we thought it was important to distinguish how responses differed among the types and sizes of water systems.

We don't have enough time here today to do a deep dive into all the survey results, but I would like to highlight some of the top line and population specific results that we captured this year especially those that are the most relevant to the discussion today.

2024 Texas Water Capital Needs Survey Findings

The majority of respondents indicated that their revenues were stable or increasing. The majority of respondents also indicated that the number of connections in their service areas were stable or increasing which reflects the tremendous growth we are experiencing as a state.

In terms of the most significant water infrastructure needs the top four results were:

1. 27% Water Treatment
2. 24% Water main replacement and rehabilitation
3. 23% New or alternative water supplies
4. 15% Wastewater treatment

The drivers for these investment needs are also significant as we identify forces related to funding. Aging infrastructure represented the top driver of with 55% of respondents indicating this was the chief factor, followed by population growth demands at 21%, and regulatory compliance as a driver of infrastructure needs for 12% of the respondents.

We also included 2 new questions on economic development in this year's survey because we are increasingly looking at water availability and infrastructure conditions, their relevance and impact as an economic force in the Texas economy.

Economic Development by Population Demographic

We are increasingly becoming more aware that water is a driving force of the Texas economy. Here are some population specific data samples on impact of water supply infrastructure and wastewater infrastructure impacts on economic development. Over the last several years from nearby Dripping Springs to Conroe we have seen moratoriums on development due to water supply and treatment

constraints, so we thought it was noteworthy to take a closer look at how current economic conditions have influenced decisions regarding water infrastructure.

For entities serving populations between 1,000-5000:

Water Supply Infrastructure

- 10% cancelled, halted or hindered economic development projects.
- 17% concerned about future economic activities.
- 65% indicated there were no impacts or concerns

Wastewater Infrastructure

- 5% cancelled, halted or hindered economic development projects.
- 6% concerned about future economic activities.
- 43% indicated there were no impacts or concerns

For entities serving populations between 25,000-50,000:

Water Supply Infrastructure

- 59% cancelled, halted or hindered economic development projects.
- 38% concerned about future economic activities.
- 31% indicated there were no impacts or concerns

Wastewater Infrastructure

- 7% cancelled, halted or hindered economic development projects.
- 46% concerned about future economic activities.
- 30% indicated there were no impacts or concerns

These numbers are fairly consistent with some small deviations until we examined the 250,000 - 500,000 population bracket. These are our larger cities, areas with suburban growth and increasing numbers in our rural areas adjacent to population centers. What we see demonstrated here is the majority of respondents indicating that they either had cancelled or delayed economic development or were concerned about future impacts.

For entities serving populations between 250,000 - 500,000 :

Water Supply Infrastructure

- 25% cancelled, halted or hindered economic development projects.
- 33% concerned about future economic activities.
- 38% indicated there were no impacts or concerns

Wastewater Infrastructure

- 29% cancelled, halted or hindered economic development projects.
- 29% concerned about future economic activities.
- 42% indicated there were no impacts or concerns

The uptick continues in the 500,000 to 1 million plus population bracket, which seems to be the most heavily impacted population economic development impact, so we do see a definite trend here correlating with population demographics.

For entities serving populations between 500,000-1million:

Water Supply Infrastructure

- 60% concerned about future economic activities.
- 40% indicated there were no impacts or concerns

Wastewater Infrastructure

- 20% cancelled, halted or hindered economic development projects.
- 40% concerned about future economic activities.
- 40% indicated there were no impacts or concerns

For entities serving populations over 1 million:

Water Supply Infrastructure

- 27%% cancelled, halted or hindered economic development projects
- 27%% concerned about future economic activities.
- 40% indicated there were no impacts or concerns

Wastewater Infrastructure

- 27% cancelled, halted or hindered economic development projects.
- 9 % concerned about future economic activities.
- 63% indicated there were no impacts or concerns

To summarize this data, we can deduce that that economic development concerns and impacts increase with population size and growth are more prevalent in our larger cities and larger service areas. Water infrastructure and water supplies for that matter can help or hinder growth and we now have the data to prove it.

Financial Assistance Preferences

Some 19% of respondents indicated current inflationary/economic issues impacted or had impaired their ability to access affordable financing, bonds, or commercial paper from private sector providers, with 39% indicating they were presently concerned about the cost of financing, and/or our ability to access affordable debt financing in the future.

Fifty percent of the respondents indicated that they preferred funding capital programs with a mix of debt/financing and revenues charged to customers, with 34% indicating that the majority of their capital expenditures are paid for by water user fees and reserves, followed by 16% indicating a preference for debt financing.

Some 57% of respondents indicated that their water rates were sufficient to fund current and future capital programs, while 43% of respondents indicating their current rate structure were not sufficient to meet demands.

Some 98% of respondents indicated that the Texas Water Development Board (TWDB) was the top government that they had either applied or intended to apply to for financial assistance in the current year.

Some 48% of respondents indicated that they had received funding from TWDB in the past five (5) years. USDA was ranked second with 14%.

Only 9% of respondents indicated that they had project in the FY24 in either the Clean Water or Drinking Water State Revolving Fund (SRF) Intended Use Plans.

Of the 87% respondents who indicated they had not applied to TWDB for SRF funds indicated that they had not applied for SRF funding because the application process and administrative requirements are too cumbersome (30%).

Some 45% of respondents indicated that they preferred to self-fund or utilize other funding programs, 14% indicated they intended to apply for SRF funds in FY25', with 23% of respondents citing other reasons they elected not to apply for federal assistance.

Some 32% of respondents with projects in the FY24 IUPs indicated that they were concerned about increased costs due to increased domestic sourcing requirements included in the IIJA, "build America Buy American Act (BABA) inclusion with 41% indicating they were uncertain of BABA Cost impacts.

A footnote here – if current federal funding trends continue the capacity of EPA SRF programs administered by the TWDB will be greatly diminished after this year due to congressional earmarks and cuts in funding. This phenomenon is presently staved off somewhat with the current infusion of IIJA funds, but this program may fall off the cliff in coming years unless these trends are reversed. This is a disturbing trend that highlights the fact that we cannot depend on DC to solve Texas' water needs.

Capital Needs

While the survey does not identify a topline figure for total capital investment needs, we can surmise that these figures over the next 10 and 20 year periods range are well in excess of current state and federal projections. Some noteworthy cumulative responses included:

- In terms of areas of greatest need ranked by respondents, water treatment represented the greatest infrastructure needs (26.8%) followed closely by water main replacement or repair (23.6%), developing new water supplies (23.3%), and wastewater treatment (15 %).
- Aging infrastructure was identified as the most significant investment driver in Texas at 55.2%, followed by demands associated with population growth at 21.1 % and regulatory compliance 12.1%.

- Flood control, developing new or alternative water supply facilities, wastewater conveyance or rehabilitation, and Climate Change represented the least significant drivers of capital investment needs, however it should be noted that this likely due to the fact that most of the responses came from small utilities.
- 23.5% of respondents indicated that 25-50%, of their water mains needed repair or replacement and 15.6 % indicated 50-75% of their water mains were also in need of repair or replacement.

We have population specific data (attached) showing the types and range of needs across populations including drivers for investment. I strongly encourage Committee members to look at this data.

Texas Water Fund SB 28 & Prop 6

Some 75% of respondents indicated they were interested in pursuing funding from the new Texas Water Fund, or the new Texas Water Supply Funds passed by voters in Proposition 6 once these programs become available.

In terms of the structure of funding desired in these new programs 86% of respondents indicating interest in these new funds noted a preference for grants, followed by low-interest loans (56%) and principal forgiveness (51%).

Approximately 56% of respondents indicated that they would prefer a “state only” fund, such as the Rural Water Assistance Fund, SWIFT etc., to avoid additional federal requirements such as American Iron & Steel (AIS), BABAA or NEPA federal environmental reviews.

Some 82% of respondents indicated that they support the State dedicating a portion of annual tax revenues or fees similar to the way highways are funded in Texas to ensure a consistent reliable revenue stream to assist with funding future water infrastructure projects.

Finally, notably 70% of respondents indicated that the Texas Legislature has not allocated sufficient resources and attention to address water policy and facilitate investment in Texas water infrastructure and water supplies.

Conclusion

We are hopeful that the data collected in the 2024 Texas Water Capital Needs survey will assist all of us as we build on the progress accomplished in SB 28.

The eyes of the State and this legislative body have never been so keenly focused on water infrastructure issues and our TXWIN members are proud to be a part of the solution to build the future of Texas water. If you or your staff would like access to the full data set or would like to discuss specific aspects of the data collected, we are happy to share it with you.

Thank you again for the opportunity to be here today on behalf of the Texas Water Infrastructure Network. We look forward to continuing to work with water stakeholders and members of this committee, and I am happy to answer any questions you may have and can be reached at plf@txwin.org.

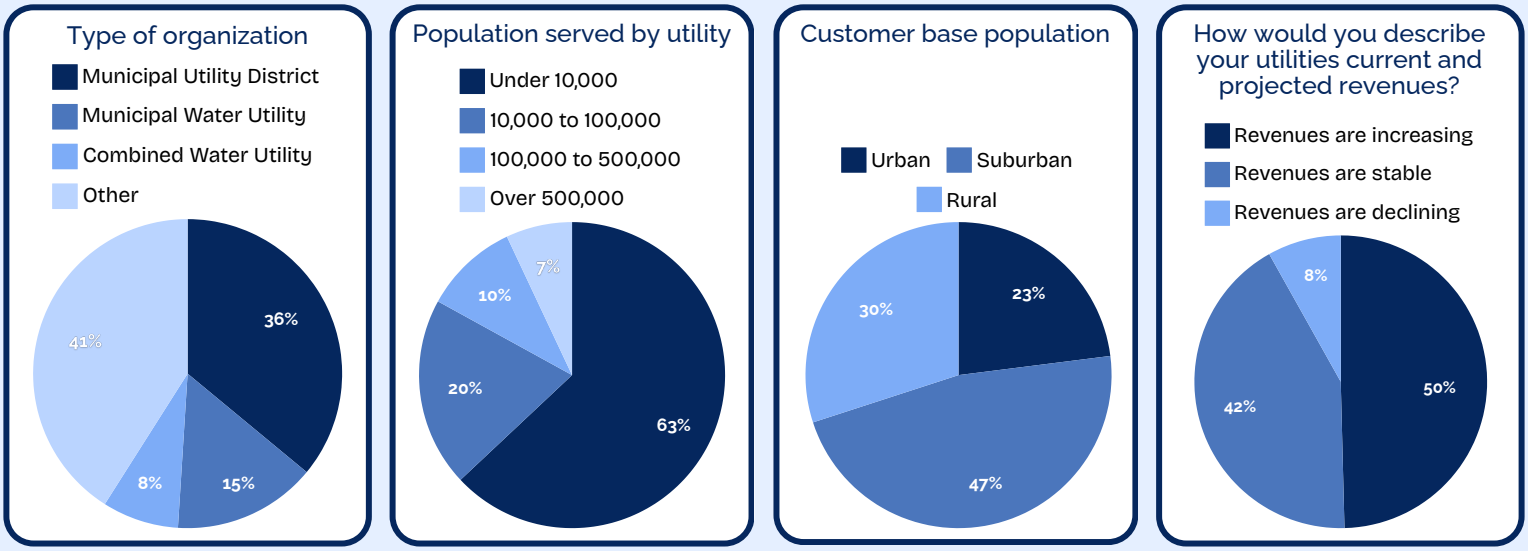
Texas Water Capital Needs Survey

Identifies Keys Trends and Demonstrates Demand for Water Infrastructure Investment

The 2024 Texas Water Capital Needs Survey underscores the critical importance of addressing aging infrastructure as the primary driver for investment in Texas water systems. With significant capital needs estimated over the next decade and beyond, it is evident that sustained investment is essential to meet the growing demands of population growth and ensure regulatory compliance.

This year's survey received a record 246 respondents from water utilities across the state sharing information about their water needs. A plurality of responses came from municipal water districts with 5,000 customers or less and have stable or growing customer bases.

Survey Demographics



Top Water Infrastructure Needs

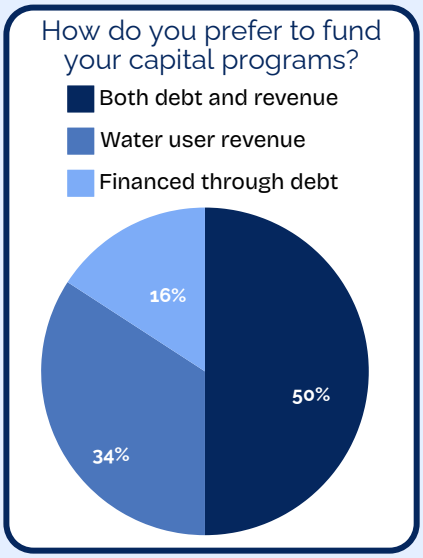
1. **Water treatment**
2. **Water main rehabilitation, repair, or replacement**
3. **Water supplies**

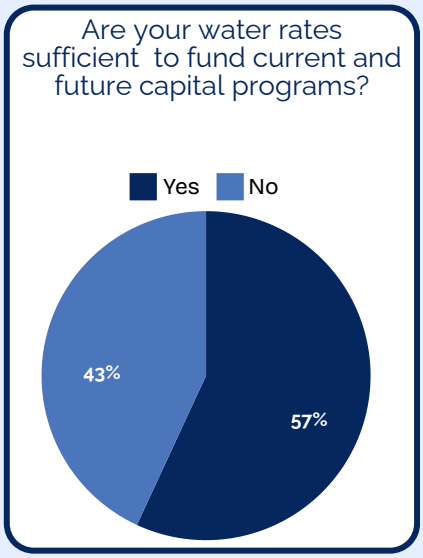
The greatest **driver of future infrastructure projects** was identified as being the **need to replace aging infrastructure**.

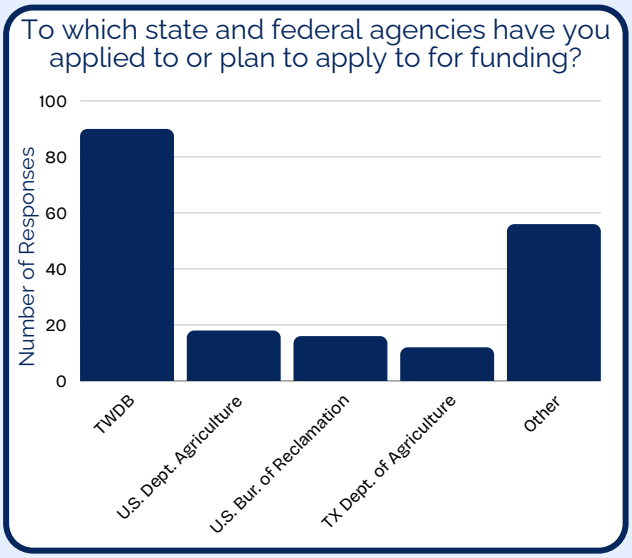
Revenue and Project Finance

- **92%** reported that their current or projected revenues were stable or increasing.
- **76%** had increased their budgets for construction costs due either to inflationary or supply chain issues.
- **63%** had delayed projects.
- **75%** are interested in pursuing funding from the new Texas Water Fund or the new Texas Water Supply Funds.
- **81%** support dedicated revenues for water similar to transportation.

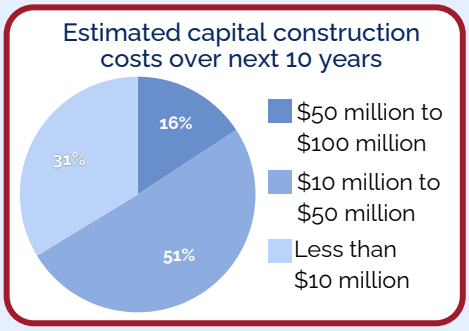
70% of water utilities DO NOT think the Texas Legislature has allocated sufficient resources and attention to address water policy and facilitate investment in Texas water infrastructure and water supplies.







Water Utilities with 5 thousand to 10 thousand customers



Top water infrastructure needs

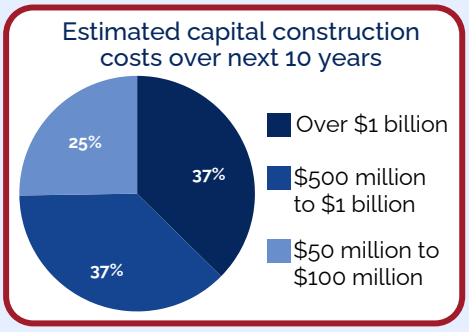
1. Water treatment
2. Wastewater treatment
3. Water main rehabilitation

Top drivers of future projects

1. Aging infrastructure
2. Regulatory compliance
3. Population growth

Over the next 20 years, 52% of water utilities with 5-10 thousand customers indicated estimated capital needs of $10-50 million, 13% $50-100 million, 7% 100-500 million, 2% $500 million-$1Billion, and 2% indicated investment needs in excess of $1 billion. **70% of respondents indicated they have implemented drought restrictions in the last two years.**

Water Utilities with 250 thousand to 500 thousand customers



Top water infrastructure needs

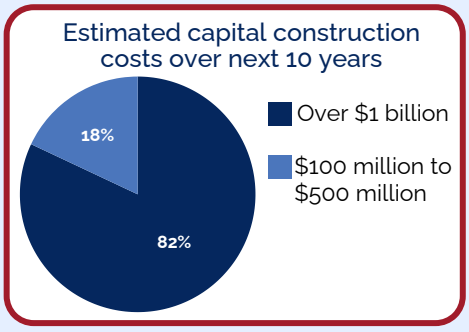
1. Water supplies
2. Water treatment
3. Wastewater treatment

Top drivers of future projects

1. Population growth
2. Diversifying water supplies
3. Regulatory compliance

70% of water utilities with 250-500 thousand customers indicated they were interested in pursuing Aquifer Storage & Recovery (ASR) projects to increase water supplies. 100% indicated they have applied for funding from the Texas Water Development Board. 50% indicated that their water rates were insufficient to fund current and future capital programs

Water Utilities with over 1 million customers



Top water infrastructure needs

1. Water supplies
2. Water treatment
3. Wastewater treatment

Top drivers of future projects

1. Population growth
2. Aging infrastructure
3. Regulatory compliance

55% of water utilities with over 1 million customers indicated an **economic development project in their area was turned away, hindered, or altogether halted due to an inability to meet water supply needs** or are concerned about future projects being turned away due to water supply needs.

Collaborative Water Resolution LLC

TXWIN Texas Water Infrastructure Network

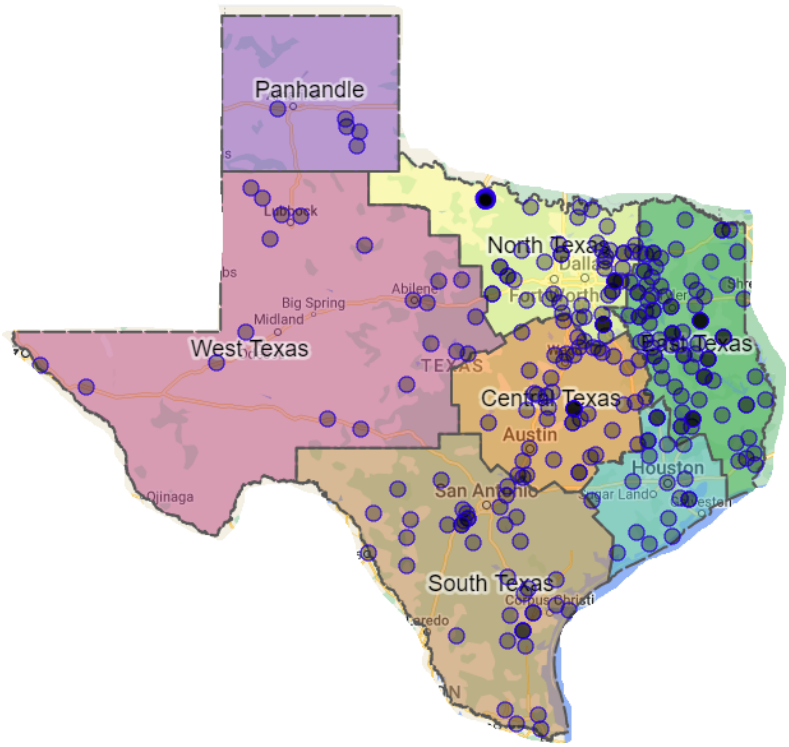
TRWA
Texas Rural Water Association

Water Availability Survey

Texas Rural Water Association (TRWA) conducted a survey of Texas water utilities from May 14, 2024, through August 7, 2024, to understand how long their current water supply is expected to be available to serve their communities (the "Survey"). The information captured through the Survey provides a timeframe for when rural Texas public community water systems (CWS)[1] project that they will run out of water and the inducing factors. This voluntary survey information was based upon the best estimates of the CWS representatives.

As of August 2024, there are a total of 4,692 CWS in Texas.[2] The Survey received 342 responses from Texas CWS including water supply corporations, districts, privately-owned utilities, and cities. The Survey focused upon five (5) primary factors; CWS location, CWS size as determined by number of water connections, water source, projected water availability, and the projected cause of water shortage. It was conducted by both direct phone contact, in person, and online.

The Survey requested information on projected water availability in 7 Texas regions: East Texas, Upper Gulf, North Texas, Panhandle, Central Texas, West Texas and South Texas. The largest numbers of CWS are in East Texas, North Texas, Central Texas, South Texas and the Upper Gulf.



The distribution of the Survey responses reflects this with most of the Survey responses coming from these regions. The above map illustrates a geographical representation of the Survey information received from around the state.

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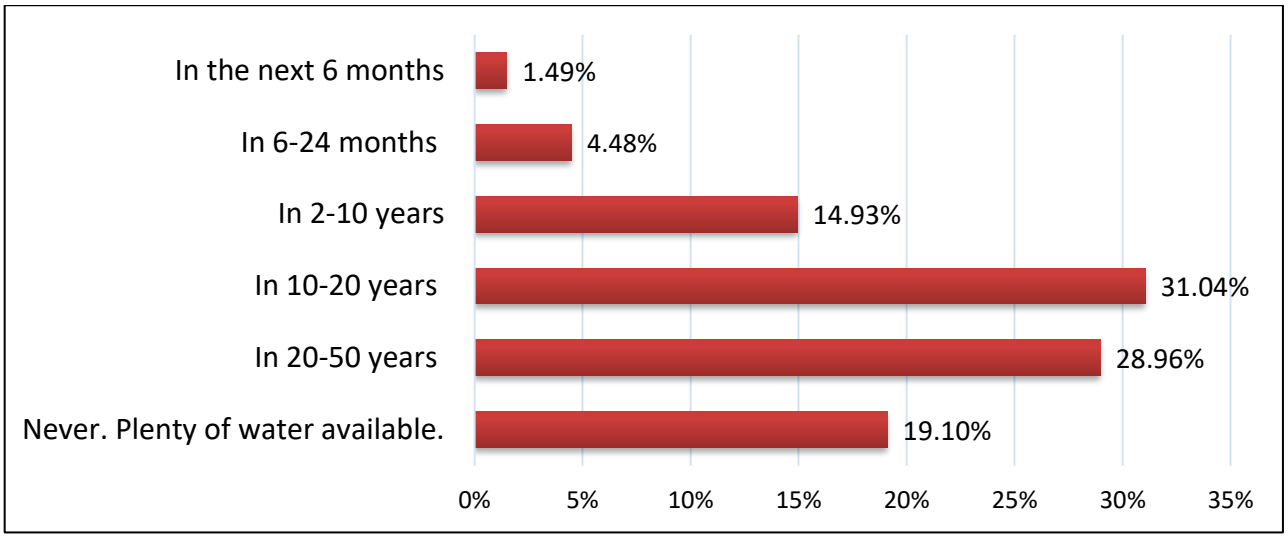
[1] Texas Commission on Environmental Quality (TCEQ) defines a community water system as a public water system which has a potential to serve at least 15 residential service connections on a year- round basis or serves at least 25 residents on a year-round basis [30 TAC §290.38(17)].

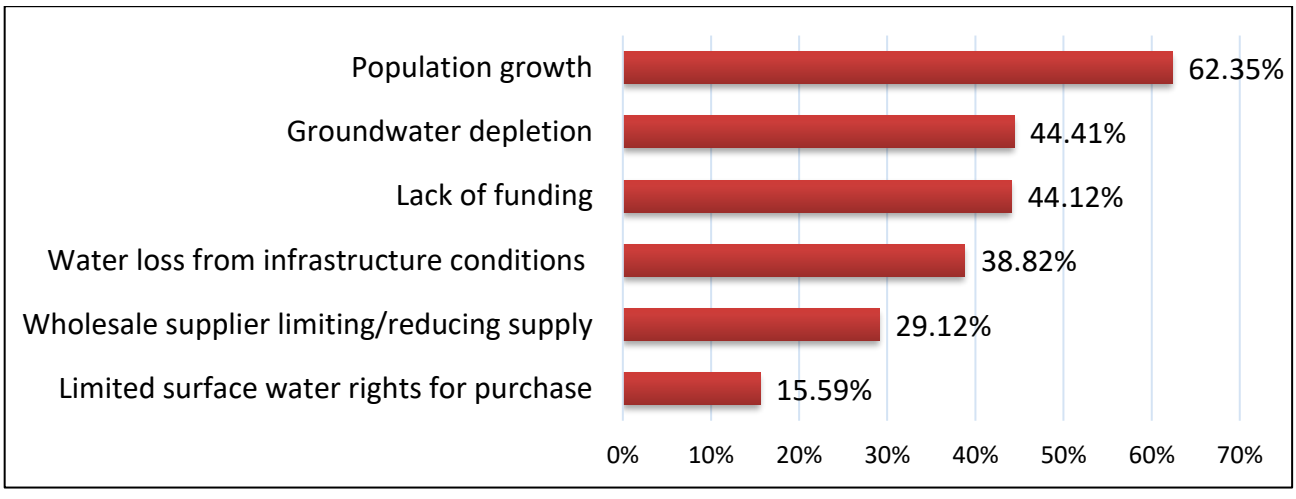
[2] TCEQ Texas Drinking Water Watch. https://dww2.tceq.texas.gov/DWW/

The CWS that responded to the Survey provide water to approximately 1 million Texans.[3] The 342 Survey responses provide a representative sample of CWS water availability information based upon region, connections, and water type. The majority of the CWS surveyed (74.57%) serve between 251-5,000 connections, which translates into populations ranging from 750 to 15,000. Of the CWS surveyed, 65.79% rely upon groundwater and 34.74% rely upon surface water.

According to the Survey results, approximately 6% of the CWS expect to run out of water within 2 years, 20.9% expect to run out of water within 10 years, and 51.94% expect to run out of water within 20 years. Over 80% of the CWS surveyed expect to run out of water within 50 years. Only 19.10% of CWS reported that they have plenty of water to meet their current and future needs. The below chart illustrates this data:



The top cited contributing factors expected to cause a CWS to run out of water are population growth, groundwater depletion, lack of funding, and water loss from infrastructure conditions. The below chart depicts these and other contributing factors:



[3] Based upon an assumption of an average of 3 persons served per connection.

The top factor contributing to the water shortage is population growth. The surveyed CWS concern about population growth is consistent with data in the Texas Water Development Board (TWDB) 2022 State Water Plan (SWP). According to the SWP, Texas' population is projected to increase by more than 70 percent, from 29.7 million in 2020 to nearly 51.5 million in 2070.[4]

TRWA's Survey also confirms the water shortage concerns raised in the SWP. The SWP projects that approximately one-quarter of Texas' population will face municipal[5] water shortages by 2070 if water supplies are not increased.[6] Further, if no additional water supplies are accessed, Texas will face economic losses resulting from drought of record water shortages, from approximately $110 billion in 2020 to $153 billion in 2070.[7]

Texas' water shortage is not going away and CWS will need more water than is currently available. The SWP projects that by 2070 the Texas water supply will decrease by 18% while overall water demand will increase by 9%.[8] Irrigation will remain the largest water demand category through 2050, but municipal demand, which includes CWS, is projected to surpass irrigation demand by 2060.[9] In fact, municipal/CWS water needs are projected to become the highest water use category in Texas by 2070.[10]

Illustrative quotes from the Survey include:

> *"Our District is [experiencing] high growth. The District is projected to double our connection(s) in the next 10 years (over 44,000 connections). While the District is currently working on additional water supply sources, funding is the next factor."*
>
> *"The area is growing quickly, and we have been having issues with water loss for awhile due to the old infrastructure."*
>
> *"With the number of daily water inquiries we receive from developers in our area, there will not be enough water to supply their request without major infrastructure and the amount of time it will take to build it."*
>
> *"[…] turned down our request for more water because they don't have any water to sale. There is no more water available in Lake Tawakoni."*
>
> *"[We] are currently at max capacity, trying to get more wells. [We are] having to try to politely curtail service to keep up with demand during droughts and if/when a well goes down."*
>
> *"Nacogdoches County is expected to experience more growth over the next 10-20 years. Our area is projected to handle the majority of the growth. With a higher demand on ground*

[4] Texas Water Development Board (TWDB) 2022 State Water Plan (SWP) at page 48.
[5] Municipal water demand includes water used by a variety of consumers in Texas communities, ranging from single and multi-family residences to nonresidential establishments (commercial, institutional, and light industrial)
[6] Id. at page 83.
[7] Id.
[8] Id. at page 47
[9] Id.
[10] Id. at page 86.

water and cost of increasing infrastructure, our area could see limiting connections."

"We have been applying for grant funds to repair our fragile infrastructure for years. We are never chosen despite the urgent need."

"We are a wholesale water supply. We have customers requesting additional water allocations due to their high growth. The aquifers are depleted due to extreme growth in [the] area. All surface water rights have been spoken for. Many pipelines need to be increased in size and replaced due to age."

"[We are] over capacity, need two new well sites, additional elevated storage tanks and pressure tanks. [We are] working on funding, unable to service new subdivisions."

"The population of our area is booming. We are doing a GW study now to try to and find a new place to drill for a well. It's hard in our area because of the aquifers and other high-water users."

Texas CWS have already tapped into the most cost-effective water resources that are close to their service areas that require the least amount of treatment. The next available water resources will require a larger investment of funds and will take time to secure. Securing new water supplies often involves a twenty-to-thirty-year planning window which, depending on the source, may involve purchasing water rights, purchasing land, constructing a water treatment plant, drilling wells, constructing pipelines, securing easements, obtaining permits, and other measures. To be prepared for future demand, the time to start obtaining additional water supply is now.

Texas Rural Water Association is a non-profit educational and trade association that represents the full spectrum of the rural water community. Our over 900 utility members provide water and wastewater services to communities across Texas. TRWA supports its members with on-site technical assistance, operator certification training, leadership training, annual conferences, legal services, advocacy before the legislature and regulatory agencies, apprenticeship and student scholarship programs, a trade magazine, and emergency assistance. TRWA is a member of the National Rural Water Association and part of a nationwide network of State Rural Water Associations that includes all 50 states.

September 3, 2024

Interim Hearing - Senate Committee on Water, Agriculture and Rural Affairs

Testimony by Jennifer Walker, Director, Texas Coast and Water Program, National Wildlife Federation

Panel Five: Senate Bill 1289 (Reclaimed Wastewater Disposal)

Chairman Perry and members of the committee. My name is Jennifer Walker and I am the Director of the Texas Coast and Water Program at National Wildlife Federation. Thank you for the opportunity to join my fellow panelists, as we discuss the interim charge related to the implementation of SB 1289.

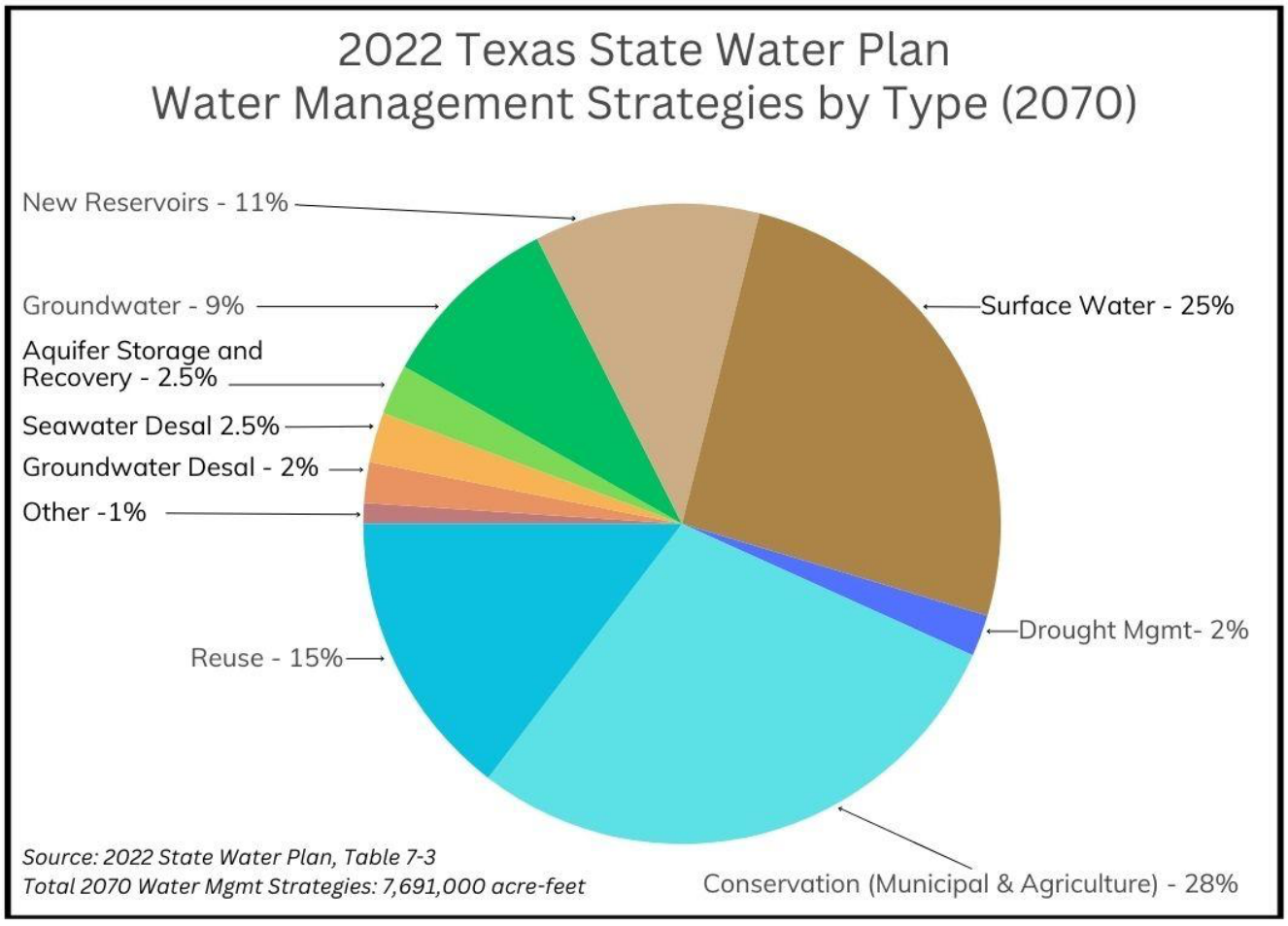
National Wildlife Federation, along with our Texas Living Waters coalition partners have been deeply engaged in supporting water supply strategies that build resilience for Texas communities while also protecting and preserving our state's natural resources. Texas is growing rapidly and water supply challenges are something that we are all working to solve. Water Reuse, in all its forms, is an important tool in our tool chest.

Thanks to the leadership of Chairman Perry and the passage of SB 1289, we are on the path to creating a clear pathway for the expansion of onsite blackwater reuse. With these new rules in place, we will have readily available, another source of water to meet our needs. Projects like the successful system that you heard about from the city of Austin will be utilized by more entities, thus offsetting demands on our potable water supplies.

SB 1289 facilitates increased utilization of a reuse strategy known as onsite blackwater reuse. In simple terms this means intercepting water from a building that would otherwise enter the sewer and directing it to a water treatment system located on the same property as that building. That water is then cleaned and used on that property and inside the building for non-potable uses such as flushing toilets and irrigating the landscape. This practice reduces the need for potable (drinking) water from a city's centralized water treatment system so that water can be used to meet other needs in that community. It helps a community's drinking water go further. Currently, this practice is not widespread, but it can start to grow with the passage of SB 1289.

Onsite blackwater reuse, which SB 1289 focuses on, is only one type of reuse. Reuse water supply strategies include onsite capture and reuse of different types of water, centralized and decentralized reuse, and even potable reuse. The State Water Plan describes the growth of these various sources. The plan shows that Texas will see an almost 10-fold increase in the

utilization of reuse from 2020 to 2070, with estimates for Water Management Strategies increasing from 121,000 acre-feet per year to over 1 million acre-feet per year (1,106,000 MAFY). Put another way, the State Water Plan projects that 15% of our future water supply strategies will come from Reuse (Direct Potable Reuse, Indirect Reuse, Other Direct Reuse). These strategies will be implemented by 400 Water User Groups representing all water use categories (Municipal, Irrigation, Manufacturing, Electric Power Generation, Livestock, and Mining). Any way you slice it, this is a huge increase and is one of our fastest growing water management strategies. With this in mind it is important that the legislature and state agencies continue to take steps to ensure that the rules and regulations governing the development and utilization of water reuse, in all its forms, reflects the times that we are in and where we are headed.



Senator Perry and this Committee have made great progress on supporting reuse in past sessions with SB 1289 and other initiatives. We have work to do to support the further development of this important water supply strategy. We commit to working with you all to do that. Here are some suggestions for future actions and areas that merit focus:

- Demonstration Projects: We need good examples of reuse in practice to show that these systems work, to gather data, and for training purposes. State Buildings and Higher Education Facilities are already required to include water conserving features in

new construction or major renovation project. It would be great if new construction could include reuse components and serve as demonstrations for this practice. *Example: Austin's 200,000 sq/ft Central Library has done this and 90% of the water needed to operate the building is generated onsite. That is 1.5 million gallons we are not pulling from potable water sources.*

- SB 28 created the Texas Water Fund. This investment is vitally important and will significantly help Texas communities become water resilient. More investment is needed and reuse should get special attention.
- We need to understand what the potential for reuse is. How much water supply can actually be met utilizing all the forms of reuse and how can this strategy help meet our water supply deficit? It will be important to account for downstream water users as well ensuring that we have sufficient water flowing in our rivers and into our bays to support fish and wildlife habitats.
- Specialized staff at our state agencies is crucial. We already have knowledgeable staff at TCEQ and TWDB, additional specialized staff may be needed as this strategy continues to grow.
- TCEQ does not expressly regulate some of the more innovative water reuse strategies and their policy is to permit those projects on a case-by-case basis as they come through. As innovative water reuse strategies continue to grow in popularity the agency should consider creating clear regulatory guidance for these strategies. Cataloging these strategies and determining which are in need of attention (regulations and/or guidance) is worthy of focus.
- Incentive programs to support the development of water reuse throughout the state.

Thank you for your leadership in prioritizing water reuse as a key strategy in planning for our future water supply and for the opportunity to testify today. I am happy to answer any questions.

Jennifer Walker
Senior Director, Texas Coast and Water Program
National Wildlife Federation
walkerj@nwf.org , 512-610-7776

Resources:
Regulatory Impediments to Implementing One Water in Texas, Meadows Center for Water and the Environment
City of Austin Onsite Reuse Case Studies: Austin Community College, Austin Central Library, Travis County Courthouse, Austin Permitting and Development Center
EPA: Water Reuse and Recycling & National Water Reuse Action Plan

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September 3, 2024

Interim Hearing - Senate Committee on Water, Agriculture and Rural Affairs

Testimony by Vanessa Puig-Williams, Senior Director Climate Resilient Water Systems, Environmental Defense Fund

Panel Five: Senate Bill 1289 (Reclaimed Wastewater Disposal)

Chairman Perry and Members of this Committee, my name is Vanessa Puig-Williams. I am a Senior Director on the Climate Resilient Water Systems team at Environmental Defense Fund (EDF). I appreciate the opportunity to testify today on Senate Bill 1289, which is an important piece of legislation advancing wastewater reuse in Texas. My testimony will provide background for why this legislation was necessary and why it is important.

EDF's work centers on improving water management in Texas, particularly as Texas becomes drier and drought is now a way of life in many parts of the state. As you all know, there is not one magic solution that will solve our state's water insecurities. It takes integrated water planning and management, a diverse set of water supply solutions, sustained funding, and robust science to ensure that Texas will have enough water in the future. Senator Perry, your leadership in this arena has obviously been instrumental.

We have all seen the graph in the state water plan that shows that by 2070 municipal water use will exceed agricultural water use. Our cities are growing. The 1200 people a day that are moving to Texas are moving to urban and suburban areas, and cities are urgently looking at where the water will come from to support this growth. We cannot allow water to be siphoned away from rural Texas and agriculture, the backbone of Texas' economy.

SB 1289 opens the door for cities to produce their own water supplies by enabling buildings to treat and reuse wastewater on site for non-potable purposes like toilet flushing or irrigation. In this time of water scarcity, we should not be flushing toilets or irrigating plants with water that we can drink. Buildings can be designed to capture wastewater that would otherwise be disposed and treat and reuse this wastewater right where it is generated. Buildings can become a source of water in our growing cities.

Studies have found that "[r]eplacing the demand for toilet and urinal flushing with non-potable water can offset approximately 25 percent of the total potable water use in a residential building, and up to 75 percent in a commercial building." (National Blue Ribbon Commission, Making the Utility Case for Onsite

Non-potable Water Systems), leading to substantial cost savings over time; treating wastewater as a valuable resource to be reused rather than simply discharged.

Before passage of SB 1289, TCEQ rules only permitted the construction of these building-scale wastewater treatment and reuse systems if the entity also had a discharge permit or land application permit as an alternate means of disposal during times when the wastewater may not be able to be reused.

In 2019, I co authored a report with Dr. Robert Mace at the Meadows Center for Water and the Environment, which evaluated regulatory impediments to water reuse and other innovative net zero water or one water solutions in Texas. The requirement that an entity must have a discharge or land application permit to treat and reuse wastewater onsite was by far the biggest regulatory impediment to municipal water reuse that we identified in our research. Developers are not willing to assume the cost and delays of obtaining a discharge permit from TCEQ, and in urban areas, there is not enough land available for a land application permit to be possible.

SB 1289 permits an entity to treat and reuse wastewater without obtaining a discharge or land application permit if the alternate means of disposal is to an existing sewer system. This means that buildings can be dual plumbed, using internally generated reclaimed water to offset freshwater use, and if necessary, when treated wastewater cannot be reused, the wastewater can be disposed like it would ordinarily be disposed – in a city's existing sewer system. The intent of the bill is to encourage non-potable, onsite wastewater reuse within urban environments, and it directs TCEQ to implement rules to enable these types of systems.

Prior to passage of SB 1289, I co-chaired a subcommittee on reuse at the Texas Water Conservation Association (TWCA). The subcommittee worked with attorneys and engineers to submit draft rules to TCEQ, which remove the regulatory impediments in Chapter 210 and 321(P) of TCEQ's rules. We have submitted these rules to TCEQ and hope to see TWCA's recommended language incorporated into the proposed rules, as the draft had extensive stakeholder input.

These types of innovative solutions are obviously not going to be the only answer to addressing Texas' future water demands, but they should be part of the toolbox. And thanks to passage of SB 1289, we have taken an important step. To develop sustainable and resilient water systems, we must treat all water within an urban environment as a resource, where buildings and communities become the water source.

Respectfully,

Vanessa Puig-Williams
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Environmental Defense Fund
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512-826-1026

Implementation of Senate Bill 1414

Courtney Arbour

Executive Director, Texas Department of Licensing & Regulation

Brittany Sharkey

Executive Director, Texas Board of Veterinary Medical Examiners

Senate Committee on Water, Agriculture, and Rural Affairs
Senator Charles Perry, Chairman
Senator Kelly Hancock, Vice-Chair

September 3, 2024

TDLR Oversight of TBVME

How We Got Here

Development of Senate Bill 1414

Senate Bill 1414 was filed on March 1, 2023. During March, TDLR staff were asked to meet with legislative staff and Sunset senior leadership to discuss TDLR's role in SB 1414, followed by a meeting with the Comptroller's appropriations control officers to discuss maintaining separate accounting functions of both agencies.

Open lines of communication between all parties were established early in this process. Throughout the 88th Session, TDLR leadership met with TBVME Executive Director Brittany Sharkey to discuss the progress of Senate Bill 1414 and its potential impact on both agencies. In addition to these discussions, senior staff at both agencies began establishing a productive working relationship.

In May 2023, TDLR made introductions of key staff to veterinary stakeholders and to Steven Golla, DVM, TBVME President.

Senate Bill 1414

- On June 18, 2023, Governor Greg Abbott signed Senate Bill 1414 into law, with an effective date of September 1, 2023. The bill administratively attached TBVME to TDLR for a four-year period scheduled to end on August 31, 2027, with another Sunset review of TBVME at its conclusion.
- TDLR is charged with assisting TBVME with policymaking and administrative oversight, guidance, and support.
- During the temporary attachment, the TBVME is an advisory board to TDLR.
- All day-to-day licensing and regulatory functions of the TBVME – such as processing new applications, renewals, and complaints - remain with the TBVME during the temporary attachment, as well as administration of financial services, human resources, and workforce development duties.

SB 1414: Law and Rule Changes

No later than December 1, 2024, TDLR will submit to the Sunset Advisory Commission and each standing committee of the legislature with primary jurisdiction over TBVME any legislative recommendations necessary to improve the board's operations.

- During TDLR's strategic planning sessions in the spring, we asked staff and the public for their feedback on how TBVME could be improved. TDLR created a TBVME section of our website which includes an email address where the public can submit comments about changes to current veterinary laws and the TBVME.
- Comments will be accepted through **September 15, 2024**.
- These ideas and the ideas of our staff and the TBVME staff and board will inform TDLR's legislative recommendations. At this point, we anticipate submitting legislative recommendations by **November 1, 2024**.
- During the temporary attachment, TDLR will conduct a thorough review of TBVME's rules and propose necessary amendments or repeals no later than **December 1, 2026.**
- We will continue to engage with TBVME license holders and the public to solicit their ideas and feedback throughout this process.

Audit Oversight

Internal Audit Services

- On July 27, 2023, TDLR met with our internal auditor and determined a full risk assessment of TBVME would be conducted as part of FY 2024 Internal Audit Plan. At their October 2023 meeting, the Texas Commission of Licensing and Regulation approved the FY 2024 Internal Audit Plan. The audits include reviewing licensing processes; administration and prosecution of inspections and enforcement; budget and planning processes; and procurement. The audit is expected to be completed in Fall 2024.

State Auditor Report

- The Texas State Auditor's Office (SAO) has completed their draft report on TBVME. Management's formal response was submitted August 20. The final report is expected in Fall 2024.

Enforcement Support and Oversight

- TDLR's Enforcement Division reviewed TBVME's investigative, inspection, and prosecution policies in conjunction with the audits of those sections performed by Weaver during February 2024. In those meetings, Enforcement asked questions to help the auditors understand the full nature of potential issues the TBVME may be facing. TDLR staff have also attended multiple emergency temporary license suspension hearings conducted by TBVME Staff and Board members.
- Under this attachment, **the Texas Commission of Licensing and Regulation (TCLR) ultimately has final approval authority for orders and dismissals**. TDLR Enforcement began reviewing TBVME's agreed orders, dismissals, and default orders prior to their submission to the TBVME Board to ensure that legal sufficiency and consistent application of penalties and sanctions is being administered by TBVME.
- This has included going to the TBVME's offices and collaborating with staff to review each document and the justifications for the decisions the TBVME came to before signing off and allowing those documents to move forward in the process.
- Additionally, we invited the TBVME staff attorneys to participate in Enforcement's pre-Commission meetings for cases the TBVME are presenting to the TCLR. In these meetings we provide feedback and insights on their presentations. The goal is to ensure the TBVME staff attorney has the best chance at a successful outcome when presenting those cases before the TCLR.

Legal Support and Oversight

Office of General Counsel

TDLR's Office of General Counsel has met extensively with TBVME throughout the temporary attachment to provide guidance and counsel on several issues, including:

- Procurement of a new licensing system
- The contested case process and the role of the Texas Commission of Licensing and Regulation as the final decisionmaker in these cases
- Rulemaking relating to fees and implementation of recent legislation
- Compliance with the Administrative Procedure Act, Open Meetings Act, and Public Information Act

The Office of General Counsel has also had a consistent presence at TBVME's public meetings and has advised and informed the Board in executive session regarding TBVME processes and contested case matters.

Human Resources Assistance

Human Resources and Operational Support

- TBVME provided their personnel manual to TDLR's Director of Human Resources and Director of Compliance for review and comment. An initial review was completed and suggested changes to the manual were provided. A secondary review of the manual will take place in September 2024.
- On August 12, 2024, TDLR requested position descriptions of the staff at TBVME. A staff list with job descriptions was provided, which will also be reviewed and recommendations made as part of TDLR's job shadowing and advising role.
- TDLR's Director and Deputy Director of Human Resources have consulted with Executive Director Sharkey on personnel issues including a recent FMLA Employee Consult.

Open Government Training

Board Training to Ensure Compliance with Open Government

- TDLR hosted an Advisory Board Training Summit for the TBVME on September 20, 2023. TDLR regularly provides similar mandatory training to each of our 32 advisory boards, with training covering Open Meetings Act, Administrative Procedures Act, Public Information Act, and best practices for ensuring openness and transparency in all public board functions.

- All TBVME public meetings are now supported by TDLR staff and technology at TDLR's office in North Austin and streamed live via YouTube.

TDLR Assistance With New Licensing System

- Pursuant to SB 1414, Department of Information Resources (DIR) was responsible for establishing a plan for the procurement and acquisition of a new licensing system for TBVME. DIR took a two-pronged approach, issuing a Request for Quotation (RFQ) to vendors, while simultaneously submitting an Idea ticket to Data Center Services (DCS).
- TDLR and DIR met with TBVME in November 2023 to review TBVME's current licensing system specifically to assess backup capabilities. TDLR was given an account to TBVME's system and built a data model based on the system, which was then provided to TBVME and DIR. TDLR also began building queries (based on the data model) to perform exports as a means of backing up TBVME data.
- DIR's RFQ, a pared-down version of DIR's "Needs Assessment," primarily focused on data, was sent to approximately 500 vendors. Two responded with questions, and TDLR supported TBVME in answering the questions. One vendor submitted a bid and provided a demonstration.
- Simultaneously, DIR submitted an Idea ticket to DCS asking for an estimate, or Rough Order of Magnitude (ROM). Deloitte is the vendor in the DCS program that supports and responds to Idea tickets. TDLR, DIR, and Deloitte met in December 2023 to discuss major assumptions and the proposed solution.
- TBVME approved a proposal for a new licensing system on **March 5, 2024**.
- The agreed-upon software solution, Salesforce, was implemented with TBVME staff and went live in **August 2024.**

TBVME Improvements

New Licensing Database

- TBVME's new licensing database went live in early August 2024 and is currently operational.
- TBVME is requesting exceptional item funding for the 2026-27 biennium to supplement the database with enforcement and compliance modules to better track enforcement actions and data.
- This new platform will improve TBVME's data collection and analysis, help the agency fully utilize data-driven decision-making.
- In the interim, the agency is working with the licensing system developers to ensure that all current disciplinary orders and cease and desist orders are available on the public facing website.

Enforcement Improvements

- TBVME is working to improve its enforcement processes by introducing defined enforcement procedures and monitoring controls.
- Internal policies and procedures for enforcement are now in accordance with state law. TBVME has written policies and procedures for performing inspections of licensees and for conducting and documenting investigations of complaints, items which Sunset had identified for correction.
- TBVME staff are taking steps to educate licensees about controlled substances.
- TBVME is in the process of hiring and onboarding a systems administrator and one of the initial tasks for that role is a comprehensive redesign of the website, including updating the information available to complainants.

Inspections Improvement

- **TBVME is now exceeding its performance measures for inspections performed from September 1, 2022 through February 29, 2024.**
- In FY 2023, TBVME performed 768 inspections, exceeding its performance measure of 750. As of August 20, 2024 TBVME had performed 1,630 inspections for FY 2024, exceeding the performance measure of 1,600.
- TBVME is now performing inspections more consistently than prior to the temporary attachment and has established uniform case management procedures.

TDLR and TBVME Collaboration

Adjusting Fees to Meet Revenue Requirements

- As an Article VIII agency, TBVME is required to collect sufficient fees to cover the cost of their appropriations (Article VIII, Sec. 2 of the General Appropriations Act, Appropriations Limited to Revenue Collection, or ALRC).
- TBVME received $1.1 million in their budget from the 88th Legislature for the acquisition of a new licensing database. **This money was not exempt from the ALRC requirement.**
- TBVME worked with TDLR's budget and policy analyst to develop a new fee schedule to cover this cost that resulted in temporary fee increases for most license types. The largest cost was borne by the largest pool of licensees, regular veterinary license renewals.

Timeline of Outreach and Training

Below are some highlights of the collaborative work done by TDLR and TBVME staff since summer 2023:

- On August 21, 2023, TDLR staff attended the Prescription Monitoring Program (PMP) Interagency Workgroup Meeting held at the Pharmacy Board. TDLR and TBVME are two of the seven Article VIII licensing agencies that participate in the PMP.
- TBVME staff and TDLR's Public Information Officer collaborated on an email notice sent to all TBVME licensees on September 1, 2023, explaining the temporary attachment. The notice informed licensees that board meetings will be held at TDLR's North Campus throughout the four-year attachment, and provided links and information on renewals, complaints, and how to stay informed.
- On February 29, 2024, Steve Bruno, TDLR Deputy Executive Director, and Charlotte Melder, TDLR Director of Compliance, presented to the Texas Veterinary Medical Association in Arlington, Texas, and explained how the temporary attachment was working.
- Starting in March 2024, Brittany Sharkey, TBVME Executive Director, and Charlotte Melder began meeting weekly to discuss issues and upcoming plans.
- In March 2024, TDLR created a new webpage related to TBVME on their website. This page includes information related to the attachment, a link to the TBVME website, and a location for people to send in suggestions for statutory or rule changes related to TBVME. A GovDelivery notice was sent out notifying subscribers of the new page.

Timeline of Outreach and Training

- TDLR assisted TBVME with their Strategic Planning sessions on April 18, 2024, and May 2, 2024. The April 18th session was virtual, and Charlotte Melder led the session and Brittany Sharkey shadowed. The second session was led by Brittany Sharkey. All comments were gathered by TDLR and shared with TBVME for use in their strategic plan.
- On April 19, 2024, TDLR met with Mike Tacker, Director of Enforcement, to start collaboration with TDLR Field Inspections.
- One May 23, 2024, TDLR met with the Health Professions Council about suggested fixes to the TBVME website. TDLR provided a list of suggested changes to HPC.
- On July 26, 2024, TDLR Field Inspections Director Chris Russey and Field Inspector James McEachern met with Mike Tacker to discuss TDLR attending the TBVME led controlled substance course; shadowing TDLR employees on inspections; and TDLR shadowing TBVME staff on inspections.
- On August 2, 2024, TDLR staff received the TBVME draft LAR Administrative Statement and provided feedback and suggestions.

Contact Us

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Testimony on Implementation of S.B. 1414, Relating to the Temporary Regulation of the Practice of Veterinary Medicine by the Texas Department of Licensing and Regulation

September 3, 2024

Committee Members,

My name is Troy Alexander, and I am the Executive Director of the Texas Veterinary Medical Association, a statewide trade association representing the interests of more than 13,000 veterinarians and affiliated professionals. I am here to testify regarding the progress our members have seen regarding the temporary attachment of the Texas Board of Veterinary Medical Examiners (TBVME) to the Texas Department of Licensing and Regulation (TDLR) as required by S.B. 1414.

In the year since the temporary attachment began, we have been encouraged by the collaborative and cooperative relationships we have observed between TBVME and TDLR. We are thankful for the diligence and focus that Ms. Sharkey has brought to the agency as Executive Director as well. Along with the additional funding the legislature appropriated to TBVME during the 88th Legislative Session, TDLR has provided much-needed resources and guidance as TBVME works to remediate the systemic issues identified by the Sunset Advisory Commission in recent sessions.

The agencies, with assistance from the Texas Department of Information Resources (DIR), have made substantial progress toward fixing perhaps the most critical of those systemic issues—the TBVME's lack of a functioning licensee management database. While the database implementation has encountered challenges common to any project of its size and scope, our members are encouraged that the project is expected to be fully functional soon. We appreciate the hard work of all those involved in making this major improvement close to a reality.

We are concerned, however, by a significant increase in licensing fees since the attachment began. Veterinarians have seen their license renewal fees increase from $195 per year to $340 per year, a sharp 75-percent increase. TVMA was assured multiple times during last session that a fee increase of this size would not be necessary, and veterinarians already contributed more to the state in fees—even at the lower rates—than the agency received in appropriations. While licensees understand that some increase is necessary to cover additional agency costs, many are concerned that the state has shifted the entire cost of TBVME's attachment and remediation onto them. This is especially troubling during a period of unprecedented surplus in the state's budget.

Finally, while the relationship between TBVME and TDLR has been beneficial, licensees support the temporary nature of the attachment. At the current pace of improvement, we look forward to the Texas Board of Veterinary Medical Examiners once again being a stand-alone agency in 2027. We remain hopeful this committee will ensure that outcome as it considers action on the agency in the future.

Thank you for giving me this opportunity to testify.

Founded in 1903, the Texas Veterinary Medical Association represents the interests of more than 13,000 veterinarians and paraprofessionals across the state of Texas. TVMA's mission is to promote, advocate for, and protect the veterinary medical profession and to advance animal health for the well-being of animals and humans.

State Parks Division Director, Rodney Franklin

Centennial Parks Conservation Fund

Senate Water, Agriculture, and Rural Affairs Committee Hearing

September 3, 2024 - 10:00am Capitol E1.012

Good morning, Chairman Perry and members of the Committee. For the record, I am Rodney Franklin, State Parks Division Director at Texas Parks and Wildlife Department. Today, I will provide information about the Centennial Parks Conservation Fund.

I'll begin by thanking Senator Parker and Representative Walle, who authored and sponsored Senate Bill 1648 and Senate Joint Resolution 74, as well as Chairs Ashby, Bonnen, Huffman, and you, Chairman Perry; the Senate Water, Agriculture and Rural Affairs committee; the Governor's, Lieutenant Governor's and Speaker's offices; every member of the legislature that advanced the opportunity for voters to make their voices heard on Proposition 14; and especially the voters for expressing their overwhelming support for the fund and the state parks system. It is undeniable that this historic legislation will usher in a new golden age for our state parks, ensuring that unique natural and cultural treasures across the state will be protected and available for public enjoyment for generations to come.

We are very happy with where we are in implementation of the bills, and we have confidence in our land acquisition strategy and park planning processes.

The Centennial Fund is currently invested in the state's treasury pool, but remains outside of the state treasury. The balance of the Fund includes the $1 billion appropriation made in House Bill 1 as well as $28.6 million in interest accrued as of the end of July. Interest for the fund is currently accruing at approximately $4.1 million per month.

Our goal for the fund is simple: acquire land in strategic areas to develop new state parks and expand existing parks to have the most beneficial impact for current and future generations of Texans. Strategic areas include geographic areas that are currently absent of state parks or regions that do not have enough existing parks to meet recreational demand.

According to the Texas Demographic Center in 2023, over 70% of Texans reside in the Texas Triangle and more than 1.3 million Texans live in the Rio Grande Valley. Consequently, our park planners have identified these areas as the priority regions for additional parks. We provided a map of the Texas Triangle in our information packet on page 6.

In addition to creating more parks near population centers and the valley, we also seek to develop destination parks that will protect vast Texas landscapes and their features – providing an Awe-Inspiring – "WOW" factor – for park visitors as they engage or recreate in outdoor space.

Finding the land to meet these goals is the first step, and we have several methods of discovery. We have received emails, letters, and phone calls from a wide variety of stakeholders – land realtors, local government leaders, private landowners, land trusts and various conservation and/or recreation stakeholders. Since January, we have received over 80 nominated tracts for consideration. As you would expect, not all of them meet the criteria for a state park.

Our scoring criteria for evaluating the nominated tracts is deliberate and thorough and is included in our packet on pages 12 and 13. Phase One includes a series of considerations which result in prioritizing (or eliminating) nominated lands. Of the nominated properties received since January, 40 have completed Phase 1 review.

If a nominated tract meets minimum scoring in Phase One, it will enter Phase Two which includes "mission critical categories" for consideration. The mission critical categories highlight the property's characteristics and scrutinize the tract's resource and recreation value, location, economic and development feasibility, legal considerations, and stakeholder support. If a property scores high through Phases 1 and 2, we initiate additional site investigations as necessary to confirm facts, limitations, and potential restrictions of the property. To date, we have participated in over 30 site visits for potential Centennial Parks.

We have worked diligently to rank potential sites based on their review scores and relative risks. We hope to seek the Texas Parks and Wildlife Commission's and LBB's approval to close on the first property in FY25. The disbursement request template that will be submitted to the LBB when seeking to acquire Centennial properties is included on page 14 of our packet. Other properties that have scored high in their evaluations will continue to be assessed through due diligence. When we are ready, we will pursue entering into contracts to purchase those properties as well.

The acquisition process is deliberate and structured, but we experience fluidity in our prioritized list based on discoveries during our site surveys, or negotiations with the landowners. In all, ten properties have been identified as "top priority".

After acquiring a property, the next step is to design and construct. There is no one-size-fits-all template. Some properties we acquire may have infrastructure and facilities already in place (utilities, pump stations, buildings, ranch roads, etc.) so the conversion to a public use park may be simpler and cost less. On the other hand, some do not have all or some of the infrastructure in place which results in a more comprehensive design and construction project with much higher costs.

Similarly, some properties may already have trails and park-like features in place, and the way they are designed compliment the topography or landscape perfectly or they may not and have to be reengineered.

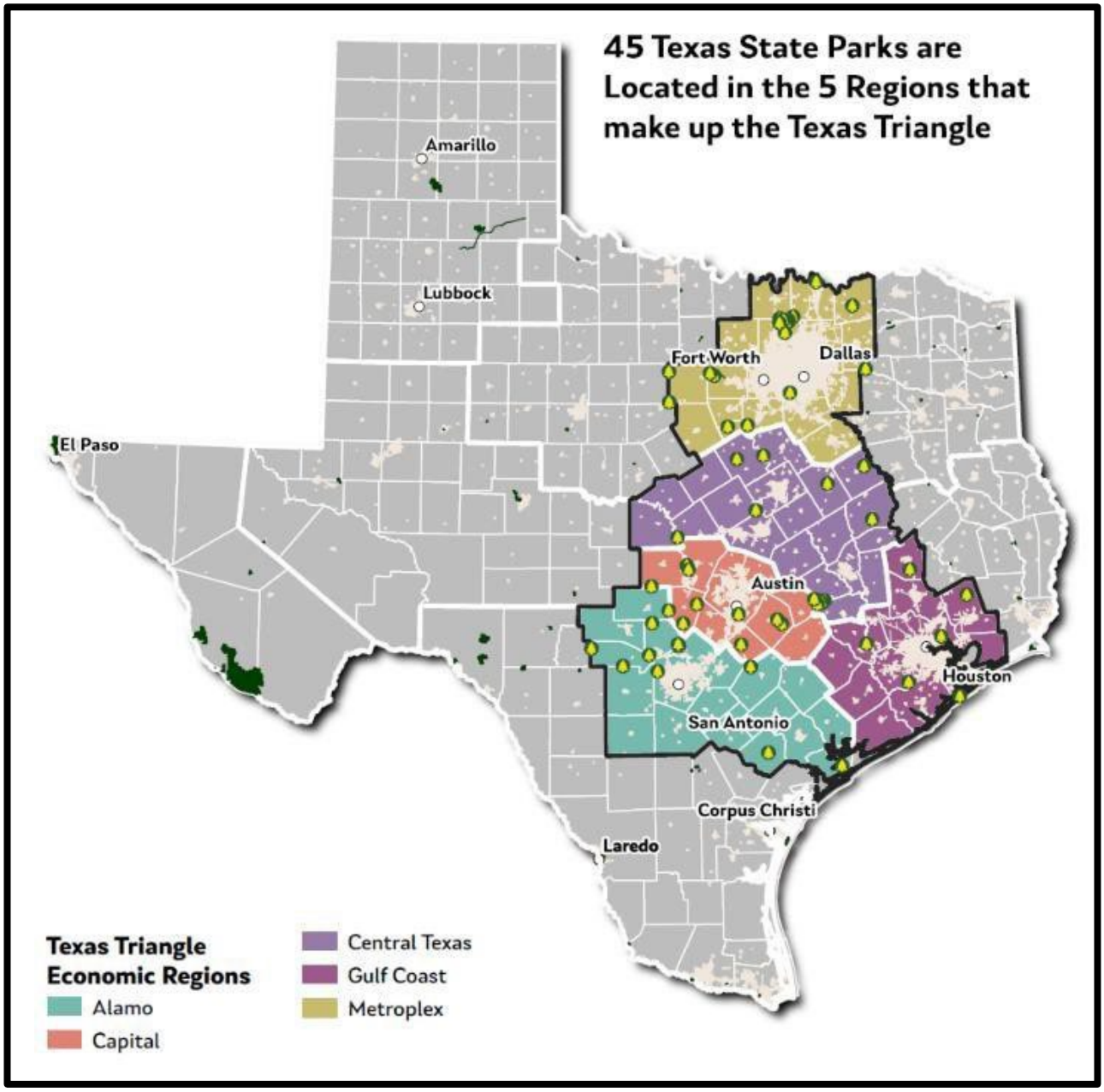
Each property we acquire presents unique variables for consideration and assessment which brings me back to our evaluation process and due diligence. We have to fully understand all characteristics of each property – and conceptualize the possibilities and potential – BEFORE we close on the property. It takes time and does not always happen as fast as we would want.

Regardless, we are moving forward with acquiring and developing the new Centennial Parks with spectacular features and recreational experiences. We will continue to work with and to regularly update legislative leadership, the Legislative Budget Board, and the Governor's Office as we move through the acquisition and development of Centennial properties.

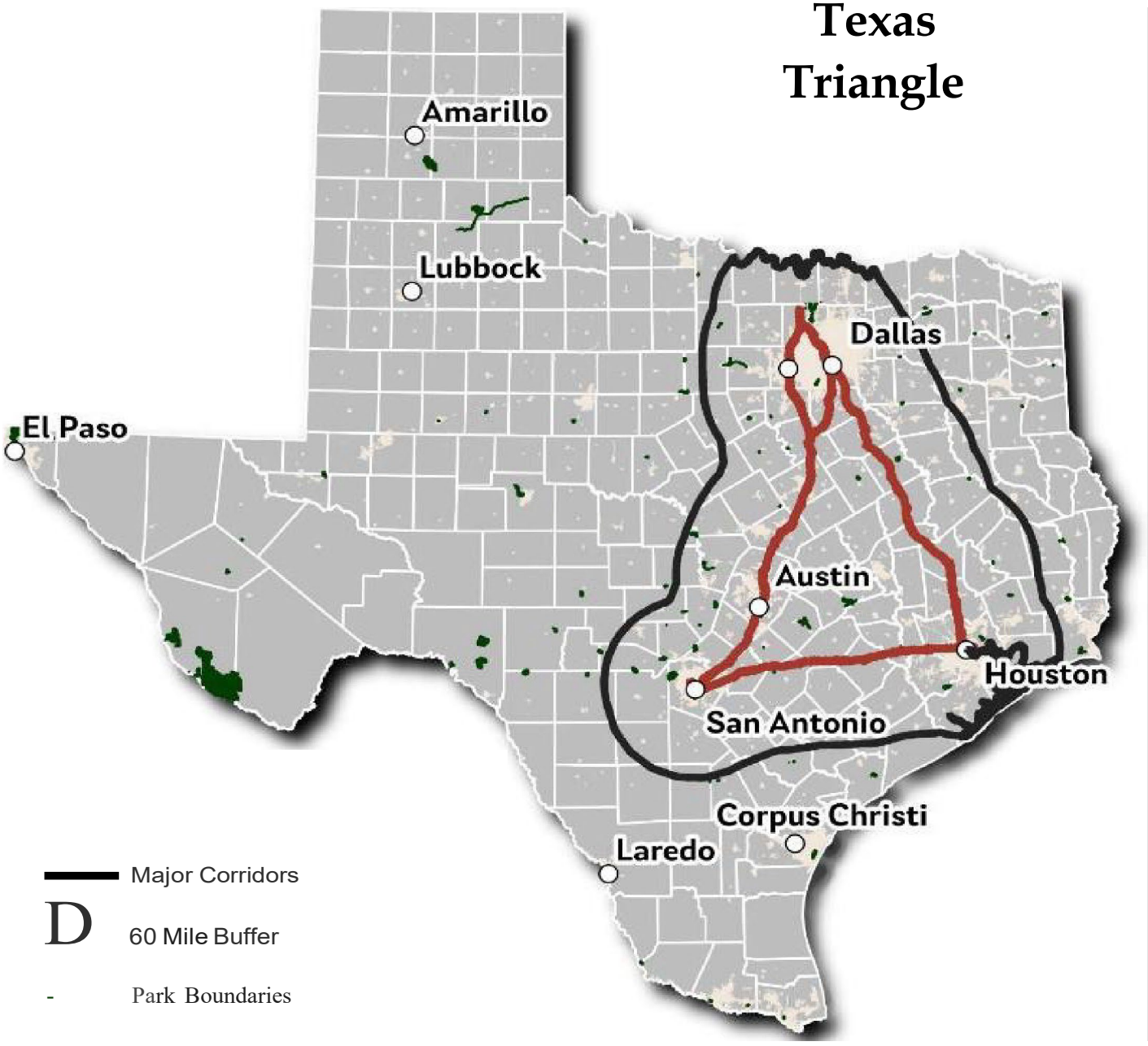
Thank you for your time this morning, and for the opportunity to share this update about the Centennial Parks Conservation Fund. I am happy to answer any questions that you may have.

Summary of Region Analysis using Baseline Metrics

- **Texas Triangle**: ~70% of Texans live within the area known as the "Texas Triangle", which accounts for only ~25% of the total state park acreage.
- **Big Bend Ranch SP (BBRSP) Impact:** BBRSP makes up half the acreage in Texas' State Parks System at 311,000 acres and is more than a 6-hour drive for 75% of Texans. When BBRSP acres are removed from the analysis, the existing state ratio drops from 21 acres to 11 acres of parkland per 1,000 residents.
- **Rio Grande Valley (RGV)**: The RGV has a population of ~1.4 million that live 1.5 hours from four relatively small state parks that total ~3,135 acres.



Texas Triangle



Texas Parks and Wildlife (TPWD)

Centennial Park Conservation Fund

Updated: 8/19/2024

Acquisition Goals

Acquire land in strategic areas to develop new state parks and expand existing state parks that will have the most beneficial impact on the resources and people of Texas. Strategic areas are those areas where there is a measured "gap" or absence of state parkland or recreation opportunity.

Texas demographic data shows over 70% of Texans live within the triangle, while over 1.3 million Texans live in the Rio Grande Valley.

Targeted Regions:

- The Texas Triangle and the Rio Grande Valley
- State-Wide: Destination parks that protect a landscape and its features on a scale of state-wide significance.

Identifying Potential Acquisitions

Properties are nominated for consideration by TPWD staff in the field, Land Realtors, local governments or subdivisions, conservation and/or recreation partner organizations, land trusts, or by other stakeholders.

Nominate a property here: Centennial Parks Conservation Fund — Texas Parks & Wildlife Department

Evaluating & Scoring Potential Acquisitions

Phase 1 Review: A series of priority questions that indicate potential "Red Flags" at the start of a property review. Properties that are too small, not accessible by public road, have legal ownership constraints, or have an environmentally damaging land use history may be eliminated.

Phase 2 Review: The "Mission Critical Categories" outline ideal characteristics that potential new state parks should meet. Six group categories highlight the property's characteristics, including 1. Resource Value, 2. Strategic Location, 3. Recreation Opportunities, 4. Economic and Development Feasibility, 5. Legal Considerations, and 6. Stakeholder Support.

Centennial Park Characteristics

- Be scenic and represent iconic Texas landscapes and waters.
- Be large enough to provide great visitor experiences (usually >500 acres).
- Have natural, cultural and/or historic value.
- Be near populated areas or areas lacking state parks.
- Offer nature-based recreation.

***"Ideal"* Centennial Parks** would be similar to TPWD's current Tier III parks:

- Tier III state parks offer day use facilities, nature-based recreation opportunities and a variety of overnight camping options (camping, campsites, and lodging).

Acquisition & Construction Costs

Projected Costs for a New State Park	
Component	Total Cost
Land Acquisition	$25 - $50M
Park Planning	$1M - $2M
Advanced Planning and Design	$12 – $15M
Construction	$62 – $73M
Total	$100M – $140M

Acquisition, Design and Construction costs reflect stand-alone property (not adjacent to existing parks).

Centennial Park Operating Costs

- Annual operating budgets (less salaries) range from $94,000 to nearly $234,000, and annual revenues range from $165,000 to $775,000.
- The average staffing level of Tier III parks is 11.5 Full Time Equivalent (FTE) positions.

Examples of Tier III parks:

Park Name	Acres	FTE	FY23 Visitation	FY23 Revenue	FY24 Operating Budget	FY24 Operating & Salary
Lost Maples SNA	2,877	7.41	118,959	$630,645.22	$94,954.00	$418,899.00
Lake Whitney SP	775	9.81	113,347	$776,787.92	$149,262.00	$555,889.00
Martin Dies, Jr. SP	1,295	12.58	89,757	$679,517.94	$180,697.00	$713,626.00
Lake Somerville SP - Birch Creek	2,635	9.91	89,721	$532,458.45	$170,772.00	$642,246.00
Davis Mountains SP	2,684	10.75	89,640	$636,712.31	$133,976.00	$617,406.00
Cooper Lake SP - South Sulphur	2,960	14.88	85,659	$772,377.34	$233,735.00	$868,543.00
Caprock Canyons SP	15,027	10.00	73,628	$534,648.66	$127,869.00	$582,810.00
Hueco Tanks SP & SHS	860	11.75	33,159	$255,569.17	$111,408.00	$628,638.00
Bentsen-Rio Grande SP	766	16.25	28,976	$168,614.80	$152,776.00	$833,005.00

TPWD's Budgeting "Template" for Centennial Parks:

- Tier III designation based on predicted visitation, revenue, and operating budget
- 13 FTEs, plus $1 million one-time (start-up) cost, and $175,000 annual operating budget

Leveraging Opportunities

Properties nominated by cities, counties, or landowners who are completing research and coordinating pre-acquisition activities have a higher chance of selection because many of TPWD's due diligence actions are facilitated and require fewer resources. Reviewing and scoring property nominations from highly motivated sellers may also abbreviate the acquisition timeline.

FAQs – Centennial Parks Conservation Fund *(updated 8/19/2024)*

1) *What is the status of funds appropriated to the agency?*

- The Fund is held outside of the treasury and invested in the state treasury pool as permitted by statute. Interest began to accrue in January 2024.
- Balance includes $1 billion plus an additional $28.6 million in interest as of the end of July 2024.
- Approximately $4.1 million in interest is earned each month on existing balance.

Centennial Parks Conservation Fund Interest Accrual - Calendar Year 2024

Month	Interest Accrued	Starting Account Balance
January 2024	$ 3,758,722	$ 1,000,000,000
February 2024	$ 3,912,018	$ 1,003,758,722
March 2024	$ 4,145,031	$ 1,007,670,740
April 2024	$ 4,064,035	$ 1,011,815,771
May 2024	$ 4,213,819	$ 1,015,879,806
June 2024	$ 4,152,388	$ 1,020,093,625
July 2024	$ 4,304,299	$ 1,024,246,013
August 2024*	$ 4,199,469	$ 1,028,550,312
September 2024*	$ 4,044,510	$ 1,032,749,781
October 2024*	$ 3,520,634	$ 1,036,794,291
November 2024*	$ 3,534,424	$ 1,040,314,925
December 2024*	$ 3,548,267	$ 1,043,849,349
January 2025*	-	$ 1,047,397,616

- Amounts denoted in Interest Accrued in August through December 2024 reflect estimates provided to Texas Parks and Wildlife Department by the Texas Treasury Safekeeping Trust Company. Actuals may differ.
- Amounts denoted in Starting Account Balance for September 2024 through January 2025 are determined based upon estimated interest accrued. Actuals may differ.

2) *What is TPWD's **current timeline** for acquisitions?*

- 2024: Evaluate 40+ Properties with the goal of acquiring at least one property by February 2025.
- 2025: 2 properties purchased by end of 2025.

3) *How is TPWD assessing properties to develop a shortlist of candidates?*

- TPWD has developed a **Scoring Criteria** to ensure proper due diligence has been performed on each property and to assist in developing acquisition priorities.
- This information was developed from The Texas Administrative Code (TAC), the Land and Water Resources Conservation and Recreation Plan (Land and Water Plan) and the Texas Outdoor Recreation Plan (TORP) which provide general criteria for land acquisitions and other guiding principles.

Scoring Criteria Summary:

- Phase 1 Review: A series of priority questions that indicate potential "Red Flags" at the start of a property review. Properties that are too small in acreage, not accessible by public road, have legal ownership constraints, or have an environmentally damaging land use history may be eliminated.

- Phase 2 Review: The "Mission Critical Categories" outline ideal characteristics that potential new state parks should meet. Six group categories highlight the property's characteristics, including 1. Resource Value, 2. Strategic Location, 3. Recreation Opportunities, 4. Economic and Development Feasibility, 5. Legal Considerations, and 6. Stakeholder Support.
- Additional site investigations and aspects associated with Real Estate negotiations may influence how a site is assessed and prioritized.

4) *What is the process for Centennial property acquisitions?*

Summary of Project Review Milestones in Land Acquisition:

1. Submission of Property for Review – Input into Land Acquisition Tracking System.
2. Evaluation – Perform Site Reviews (Selection Criteria) and Site Visits.
3. Recommendation for Acquisition and Continued Land Negotiations.
4. Commission Awareness – Notify of intent to initiate formal review and approval processes.
5. Legislative Budget Board (LBB) Review and Approval – LBB approval required for Centennial Fund disbursements. Requests considered approved on the 30th day after the date of submission unless approved or disapproved before that date.
6. Commission Approval – Required for TPWD Executive Director to receive authority to pursue closing on land acquisitions. Includes a public hearing component.
7. Texas Treasury Safekeeping Trust Company Trust Funds Transfer – Funds are transferred from the Texas Treasury Safekeeping Trust Company to TPWD to complete acquisition.

4) *How many properties are on TPWD's list for consideration and how many are considered "top candidates"?*

Current List as of August 2024

- 40 properties for high level review
- 10 properties are TOP CANDIDATES

6) *What could be the timeline for the development of new Centennial properties? Why do timelines for development of Centennial properties versus non-Centennial properties differ?*

- Historically, the timeline for developing new state parks has been unpredictable due to funding constraints. The process often spanned from 8 to more than 15 years to acquire and open a park.

- To expedite the process, TPWD has created a team dedicated to new state park development, including Park Planners and Resource Specialists that will work concurrently with the acquisition team. TPWD has also established several planning blanket contracts to streamline the transition from planning to design.

- With the implementation of the Centennial Fund, TPWD will be able to complete the new state park delivery process with two funding requests from the Legislative Budget Board—one for acquisition of land and one for development.

- TPWD will heavily rely on Construction Manager at Risk (CMR) and Design Build (DB) procurements as these project delivery methods would expedite the typical construction process used (through Invitation for Bids (IFB), Competitive Sealed Proposals (CSP).

- Construction timelines for new park facilities and utilities will vary according to the components of the project (12-36 months).

- Once land is acquired, TPWD will immediately initiate Advance Planning and Public Use Planning, permitting processes and environmental reviews (cultural and natural resources), and preliminary design. (18-24 months)

- Upon completion of planning and permitting/environmental reviews, project will be designed (20-30% Design Documents for DB or CMR, 100% Construction Documents for IFB/CSP/JOC). (6-12 months)

- Construction of park facilities will include, at a minimum: Roads, utilities, restrooms, headquarters, maintenance building or facility, camping facilities, and trails. (12-36 months)

- TPWD will consider phased openings of locations if the land and the construction scheduled permit them to occur.

7) What is needed moving forward to support the successful expansion of the state parks system?

- Advanced Planning: Public Use Plan Development, including public and stakeholder meetings.
- Design and Construction Services: Capital project to build out Park Development
- Operation Funding: Before park opens, TPWD will need to steward the landscape and any buildings or other property associated with acquisition.
- Increased funding for qualified staff across TPWD to support state park system growth.

Scoring Criteria for New State Park Land Acquisition

	TPWD ONLY *v2024_02_26*
Property Name and Owner	Date of Review
County and Priority:	Site Visit
	TBD
Acres (Approximate)	Property Map
Property Highlights	GIS Boundary
.	
.	Property Score
.	**0**
.	

Phase 1 Review: *Priority Questions to Highlight Significant Barriers to State Park Operation*

NOTE: A "No" response indicates a potentially significant barrier to the operation of the property as a State Park.	Yes/No or TBD
1. Size: Is the property more than 500 Acres? (Yes/no) *If "No," does the property provide access to water recreation or access to a significant trailway system?*	
2. Context: Is the property protected from surrounding development that would prevent the ability to protect resources and public use? *If "No," please explain outside threats to property.*	
3. Access: Is property accessible through a road that can provide legal public access? *If "No," please explain how the public and TPWD could access the property.*	
4. Legal Ownership: Will TPWD retain complete ownership of property, including inholdings, leases and access easements? *If "No," describe any inholdings, leases, easements, mineral rights, or other legal restrictions associated with the property.*	
5. Authority: Does the seller have the full authority to enter into an agreement with TPWD? *If "No," please provide additional ownership information on the property.*	
6. Public Safety: Is the property free of any negative impacts from a past land use that would make unsafe for public use today? *If "No," please explain the land-use history that might make it unsafe for operation as a state park.*	
7. Existing Infrastructure: Is the property relatively free of buildings and/or utilities that are aging or fail to meet code? *If "No," please describe existing infrastructure conveyed with the property.*	
8. TPWD Mission: Is the owner committed to the types of outdoor recreation opportunities and facilities TPWD provides? *If "No," please describe any recreation limitations or facility development restrictions associated with the property.*	

Phase 2 Review: Mission Critical Categories

The total property score (0 to 10 points) is calculated by summarizing the individual scores for each mission critical category (6), which includes a checklist to assure proper due diligence is done for an initial desktop review. A checkmark indicates the presence of a positive characteristic and provides the rational for the acquisition of a property. The first three categories, Resource Value (3pts), Strategic Location (2pts) and Recreation Opportunity (2pts) carry a stronger weight, due to their relative importance in overall land acquisition strategy. A score of 6 pts or more indicates a property that meets the minimum threshold for acquisition and merits additional review.

Mission Critical Category	Category Pts
1. Resource Value: 0 - 3pts 0pt= Poor 1pt= Average 2pt= Good 3pt= Outstanding	**0**
	Checklist
1.1- Natural or Geological Feature of State-Wide Significance	
1.2- Significant Size (+/-5,000 acres) and ideal parcel form to protect from development or other outside influences that are harmful to natural resources	
1.3- Habitats for Rare, Endangered Species and/or Species of Greatest Conservation Need (SCGN)	
1.4- Ideal existing Habitat Condition and/or Viability of Potential Condition	
1.5- Identified as Priority Conservation Area in agency plan (LWRCP, TORP, Natural Agenda) or fills a measured gap in habitat conservation that is not common in the existing state parks system.	
1.6- Ideal acquisition for watershed, aquifer or wetland protection	
1.7- Parcel expands and protects an ongoing effort to acquire land for a new State Park or is part of a regional conservation strategy	
1.8- Cultural & Historic Resources of State-Wide or National Significance	
Additional Notes:	

2. Strategic Location: 0 - 2pts 0pt = Poor | 1pt = Low Priority Area | 2pt = High Priority Area	**0**
	Checklist
2.1- Within 30-minute drive of an Urban Center (Day Use Opportunities)	
2.2 Within 90-minute drive of an Urban Center (Overnight Use Opportunities)	
2.3- Located in an area where there is a measurable gap in state parks or state park acres per capita	
2.4- Property is Accessible from major state highways or county roads.	
2.5- Property is connected to another trail system (trailway), from proposed trailway, multi-use pathway or other trail system.	
2.6- Property is connected to a scenic river or significant waterbody that provides paddling opportunities.	
2.7- Adjacent to Existing Parks, Conservation Areas or other destinations that can support or enhance new state park development.	
Additional Notes:	
3. Recreation Opportunities: 0 - 2pts 0pt = Poor | 1pt = Average | 2pt= Exceptional	**0**
	Checklist
3.1- Provides opportunities for water recreation (Lake, River, Coast, Bay, Wetlands)	
3.2- Located in an area where there is a measured gap in visitor experiences or recreation opportunities.	
3.3- Feasible to construct the typical buildings, roads, parking and recreational facilities (multi-use trail system,) for SP/SNA operation?	
3.4- Property includes existing recreation facilities, buildings and/or utility systems of high quality that can support public use as a park.	
3.5- A recreation experience that is optimal to highlight habitat diversity of Texas land and water resources (Birding Center, Sea Center, Nature Center)	
3.6- Ideal location to expand public hunting or fishing opportunities.	
Additional Notes:	
4. Economic & Development Feasibility: 0 - 1 pt 0pt = Not Feasible | 1pt = Feasible	**0**
	Checklist
4.1- Cost Per Acre is at or below market value	
4.2- Ideal Funding Strategy & Schedule for New Park Acquisition and Development	
4.3- Includes Acquisition, Development or Operations Support (Donation, Reduced Sale, Existing Park, Lease Concessionaire Opportunities)	
4.4- Development Feasibility: Access to public utility systems, roads, parking and buildings of high quality that can support new state development. Floodplain, soil and other terrain conditions that are ideal for construction and operation of a park. (ADA/TAS, TCEQ, TXDOT and other applicable codes)	
Additional Notes	
5. Legal Considerations: 0 - 1 pt 0pt = High Risk | 1pt = Low/No Risk	**0**
	Checklist
5.1- No Significant Inholdings are within Boundary	
5.2- Complete Ownership is Retained and/or Threat of Development is Low	
5.3- Adjacent land use will not preclude operation as a state park	
5.4- No significant risk for to public health or environment is known or associated with property or area	
Additional Notes:	
6. Stakeholder Support: 1pt 0pt = None | 1pt = Strong	**0**
	Checklist
6.1- Local Government Support	
6.2- Public Support: Part of Greater Initiative with NGO, Conservation Agency, or Land Trust	
Additional Notes	
TOTAL PROPERTY SCORE	**0**

TPWD REVIEWER:

Name & Position: **Complete**

Signature:

Date:

CENTENNIAL PARKS CONSERVATION FUND

Disbursement Request for Texas Safekeeping Trust

Property Details

Tract Name:

Location:

Acres:

Requested Acquisition Funding:

General Seller Information

Property Description

Anticipated Recreational Opportunities

Centennial Parks Conservation Fund Balance

Current Balance:

Estimated Balance after Acquisition:

Long-term Obligations

Purchase Plan

State Impact

* Subject to Government Code Section 552.105: (Information Related to Location or Price of Property) the real estate information contained herein is privileged and confidential*

Appendix C: Additional Materials

Exhibit C-1	Memorandum from Tex. Comm'n on Env't Quality to Tex. Sen. Charles Perry Re: Unappropriated & Permitted Water in Tex. River Basins
Exhibit C-2	JEREMY B. MAZUR, TEX. 2036, FOUNDATION FOR ECONOMIC GROWTH: ASSESSING TEXAS' WATER INFRASTRUCTURE NEEDS (2024)
Exhibit C-3	Chart of City of Corpus Christi, Tex., Inner Harbor Seawater Desalination Treatment Plant Projected Capital, Operations & Maintenance Costs
Exhibit C-4	Press Release, U.S. Nuclear Regul. Comm'n, NRC Issues Construction Permit for Abilene Christian University Research Reactor in Texas (Sept. 16, 2024)
Exhibit C-5	Letter from Michael S. Reagan, Adm'r, U.S. Env't Prot. Agency, & Jake Sullivan, Asst. to the President for Nat'l Sec. Affs. (Mar. 18, 2024)

SWARA Hearing Follow Up: Unappropriated and Permitted Water in Texas River Basins

Introduction - The Texas Commission on Environmental Quality (TCEQ) manages state surface water in Texas by permitting and enforcing water rights. If a water right holder wants to divert, use, or store state water or use the bed and banks of a watercourse to convey water, a state water right permit is required. The surface water rights program is regulated under the provisions of Chapters 11 and 18 of the Texas Water Code (TWC).

The 2022 State Water Plan projects that surface water resources, including new reservoir projects, will comprise 37% of the recommended water management strategy supplies by 2070. An additional 21% of supplies will come from reuse, aquifer storage and recovery, and seawater desalination.

The information below is a snapshot of the water rights permitting and availability landscape in Texas river basins across the state and shows the average annual volume of unappropriated water and the permitted diversions for each river basin. The volumes of both unappropriated water and permitted diversions will change as TCEQ continues to process water rights applications.

Unappropriated Water – Unappropriated water is the amount of water remaining after all existing water rights exercise their full permitted amount. The volumes in the table below represent the minimum and average annual volumes of unappropriated water in Texas' river basins at the basin outlet(s). A river basin can have more than one outlet and the volumes in the table are the sum of the volumes at all outlets. The annual volume in any given year can vary from zero during droughts to much higher volumes during very wet periods. This means that, in many basins, some type of storage would be needed for projects requiring a firm supply.

The volume of water available for new permits may be less than the values shown in the table because one of the following: less water may be available at upstream locations in a river basin, some basins are subject to Interstate Compact requirements, and some of the available water is needed for instream uses and freshwater inflows to bays and estuaries. Infrastructure may also limit the amount of water that could be used to support a new water right. Infrastructure needs and project feasibility are addressed through the state and regional water planning process.

The volumes in the table do not include water that could be permitted for desalination as the water availability models TCEQ uses for permitting are freshwater river system models. Saline water rights are not dependent upon the availability of freshwater streamflow since they are permitted based on water in coastal bays, estuaries, and the tidal portions of streams and rivers. The volume of saline water available for desalination or other uses is always greater than requested diversions because the available supply is constantly replenished.

The volumes in the table also do not include groundwater or surface-water-based return flows that could be permitted under a bed and banks authorization because return flows are interruptible water under TCEQ's rules. Return flows are not included in TCEQ's water rights permitting models to lessen uncertainty in permitting actions for new water rights by ensuring modeled stream flows do not include flows that could be removed from the stream at any time.

- **Minimum Annual Unappropriated Water** – The minimum annual volume of unappropriated water in the period of record. The minimum annual volume can occur in different years in different river basins.

- **Average Annual Unappropriated Water –** The average volume of unappropriated water for a river basin over all the years in the period of record.

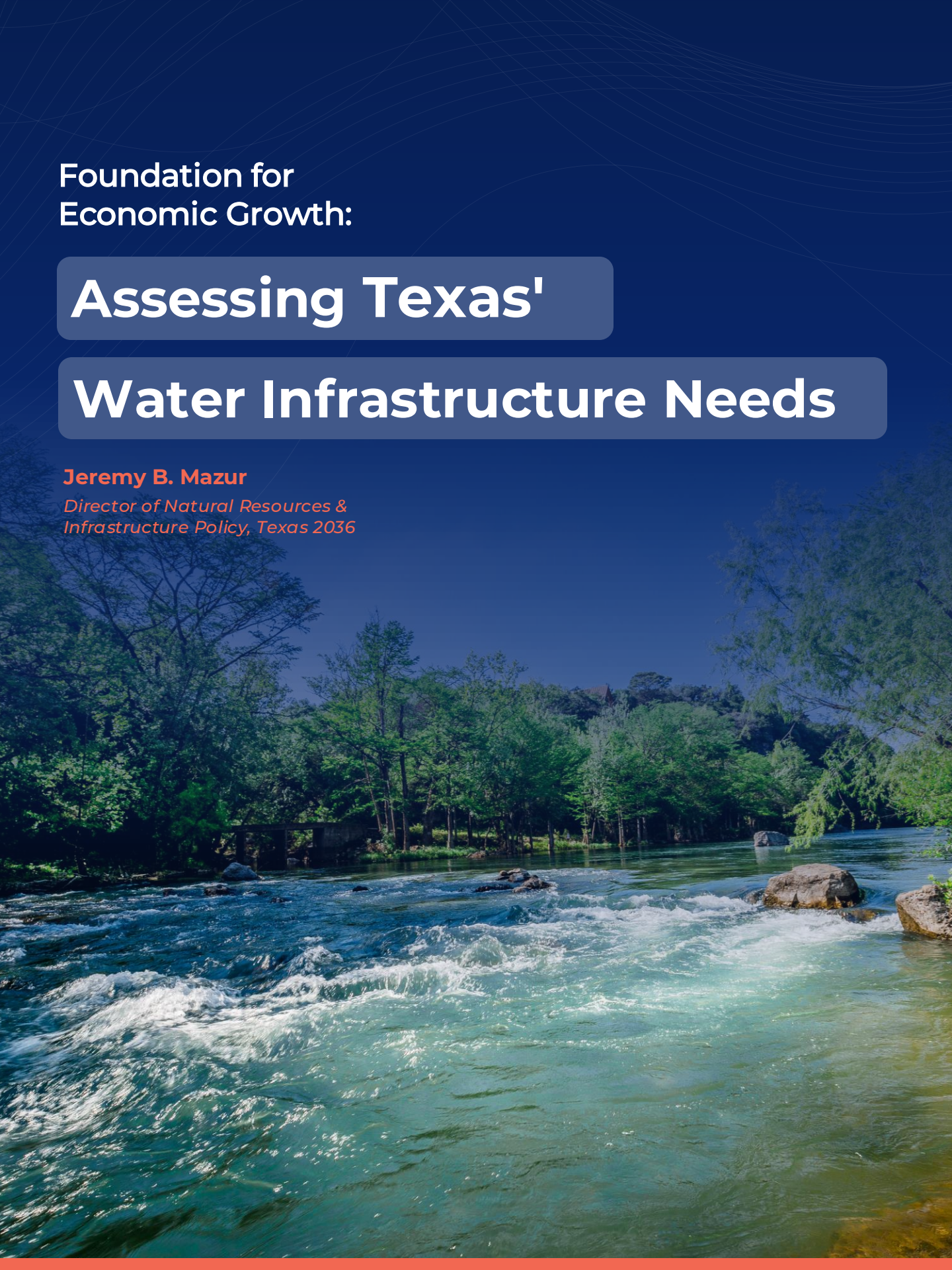
- **Authorized Diversions** – The total volume of permitted diversions in a river basin. These volumes include permitted hydropower uses as well as diversions of saline water for desalination or other uses and permitted diversions of groundwater or surface water-based return flows. The amounts actually diverted in any given year can be less if there are diversion limitations, such as instream requirements, in the water right. A water right is not a guarantee of available water, and less water may be available to permitted users during drought conditions.

Basin	**Period of Record**	**Minimum Annual Volume Unappropriated Water (AF)**	**Average Annual Volume Unappropriated Water (AF)**	**Authorized Diversions (AF)**
Canadian	1948 - 1998	22,074	120,952	165,328
Red	1948 - 2018	1,356,392	6,949,841	1,089,817
Sulphur	1940 - 2017	70,475	1,933,137	441,543
Cypress	1945 - 2020	72,326	1,409,624	443,755
Sabine	1940 - 1998	411,472	1,961,876	2,140,824
Neches	1940 - 2018	103,799	4,410,722	4,077,196
Neches-Trinity	1940 - 1996	271,834	971,359	410,850
Trinity	1940 - 1996	3,274	3,136,598	6,713,684
Trinity-San Jacinto	1940 - 1996	9,665	168,103	44,474
San Jacinto	1940 - 1996	100,659	1,754,400	1,497,090
San Jacinto-Brazos	1940 - 2018	106,404	1,195,854	4,483,341
Brazos	1940 - 2018	9,016	4,052,792	5,546,304
Brazos-Colorado	1940 - 1998	1,188	558,114	96,310
Colorado	1940 - 2016	0	383,826	5,759,268
Colorado-Lavaca	1940 - 1996	37,701	318,000	975,444
Lavaca	1940 - 1996	3,640	695,779	171,947
Lavaca-Guadalupe	1940 - 1996	6,528	355,267	4,600
Guadalupe	1934 - 1989	18,855	1,145,579	6,352,700
San Antonio	1934 - 1989	41,224	475,797	462,051
San Antonio-Nueces	1948 - 1998	7,815	564,110	359,698
Nueces	1934 - 1996	4,803	229,756	541,880
Nueces-Rio Grande	1948 - 1998	89,976	772,275	1,853,707
Rio Grande	1940 - 2018	0	37,832	6,914,933
Total			**33,601,593**	**50,546,742**

Foundation for
Economic Growth:

Assessing Texas' Water Infrastructure Needs

Jeremy B. Mazur
Director of Natural Resources & Infrastructure Policy, Texas 2036



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Executive Summary

In 2024, a Texas business ceased to exist because of a water shortage. Diminishing water supplies fueled by regional drought in the Rio Grande prompted the Santa Rosa sugar mill to close after 50 years of operation. The closure came at the cost of 500 jobs and hundreds of millions of dollars of economic activity.

The story of what happened in the Rio Grande serves as a cautionary tale about the state's relationship between water infrastructure and economic growth and development. In the same year that the Santa Rosa sugar mill closed forever, the cities of Conroe, Dripping Springs and Magnolia grappled with water infrastructure's controlling limits to continued growth.

Just as water can limit economic growth opportunities, it opens the door for them as well. In north Texas, the City of Sherman approved $500 million in infrastructure investments, including those for a wastewater facility, in order to support Texas Instruments' plans to build a $30 billion manufacturing plant.[1] In Central Texas, the City of Taylor, with an eye towards becoming a new regional tech hub, worked to secure reliable water supplies for Samsung's $17 billion semiconductor facility.[2] Meanwhile, the growth and expansion of other key industries, including downstream refining, data centers, and housing construction, to name a few, are supported by the reliability of water infrastructure.

Water infrastructure serves as one of the three core pillars of economic growth and development. The other pillars include reliable electricity service and a qualified workforce. Just as the continuation of the Texas economic miracle depends on electric reliability and workforce competency, it also relies on water infrastructure. Conversely, water infrastructure failure, like the loss of electric reliability or the absence of a competent workforce, threatens to topple any economic growth and development objective. State and local investments in water infrastructure are, by extension, economic development efforts.

Three Pillars Supporting Texas' Economic Growth & Development

[1] Erin Pellett, "The TI Effect: $500 million worth of projects in Sherman to prepare for manufacturing plant" KXII News, May 14, 2024.
[2] Tina Bellon, "How a little Texas town snagged a $17 bln Samsung chip plant deal" Reuters, November 21, 2021.

// EXECUTIVE SUMMARY

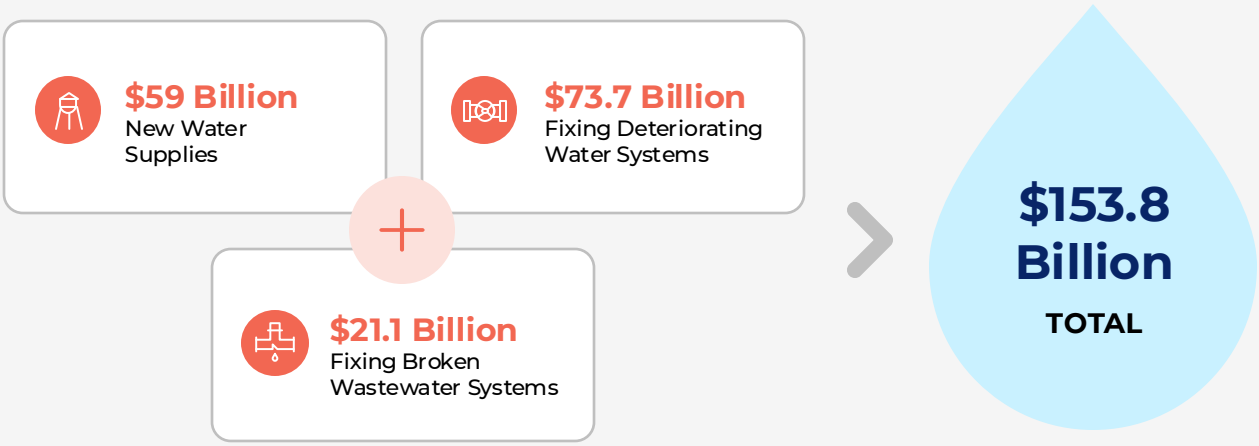
Despite water infrastructure's salience for economic growth and development, Texas faces two critical challenges. The first involves the need to expand its water supply portfolio for a drought-prone and growing state. Here, Texas faces a long-term water supply deficit of nearly 6.9 million acre-feet of water. If Texas fails to develop the broad, diversified water supply portfolio needed for the next prolonged, severe drought similar to that of the 1950s, then as soon as 2030 the state will endure $160 billion in annual GDP losses, nearly 800,000 jobs lost, and an exodus of families seeking refuge – and water – elsewhere. These consequences exceed – and by some metrics equal – those observed in Texas during the Great Recession of the late 2000s and the COVID-19 pandemic. This water supply deficit will also have a direct impact on the state's electricity generation capacity: low water supplies due to droughts could impede dispatchable generation from natural gas, nuclear and coal-fired plants, costing hundreds of millions, and possibly billions, of dollars in economic damages per day.

Texas' second water infrastructure challenge involves addressing the problems attributable to aging, deteriorating water and wastewater infrastructure. Recent headlines about boil water notices, broken water pipes and failing systems are indicative of water systems that are both deteriorating and operating past their useful life. The daily inconveniences and sometimes life-altering effects of water system failures – including families scrounging for bottled water, schools closing due to a boil water notice, and even business closures – represent thousands of small economic cuts that translate into a meaningful wound to Texas' economic well-being. Barring a significant intervention through new investment, over the next 15 years aging, deteriorating water and wastewater systems will contribute to nearly $320 billion in GDP losses for Texas – an amount equal to the size of the state's current two-year budget.

State and federal policymakers have made attempts to address these water infrastructure challenges. In 2013 and, more recently, in 2023, both the Texas Legislature and state voters approved the creation of new funds aimed towards developing water supplies and addressing infrastructure needs. Congress, for its part, approved the US Infrastructure Investment and Jobs Act (IIJA) in 2021, which temporarily course-corrected decades of declining federal spending on state and local water infrastructure. Unfortunately, Texas' share of IIJA gains have since been eroded through the use of Congressional earmarks for other water projects. Since 2022, this practice has resulted in a net loss of $105 million in federal funding for Texas' water infrastructure needs.[3]

Despite these funding efforts, a substantial funding gap exists between Texas' long-term water infrastructure funding needs and the projected state and federal funding effort. Based on inflation-adjusted cost estimates within the 2022 State Water Plan and the Environmental Protection Agency's community needs surveys for drinking and wastewater utilities, Texas will need to spend at least $154 billion over the next 50 years in order to sufficiently address its water supply and deteriorating infrastructure challenges. State and federal water funding programs, including the recently-created State Water Implementation Fund for Texas and the Texas Water Fund, are projected to provide approximately $40-45 billion in financial assistance in the coming decades. This leaves a long-term funding gap of over $110 billion for Texas' water infrastructure.

Texas' 50-Year Water Infrastructure Financial Assistance Needs

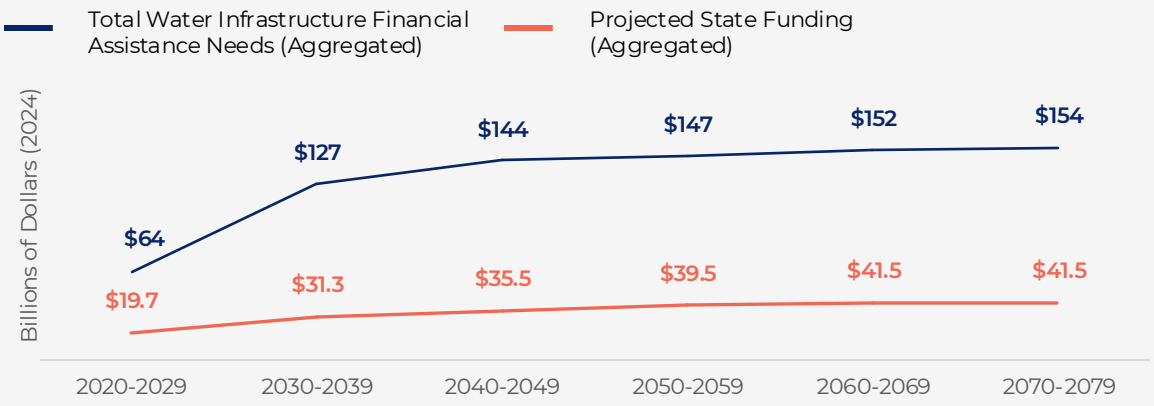


Sources: 2022 Texas State Water Plan, US EPA. Cost estimates reflect 2024 values.

[3] Council of Infrastructure Financing Authorities (CIFA), Impact of Congressional Earmarks on Annual Federal Funding for Water Infrastructure, 2024.

Texas' Water Infrastructure Funding Gap (2020-2079)

Based on Existing Inflation Adjusted Cost Estimates and Projected Funding Efforts



Failing to address this funding gap invites economic peril, endangering both the premise and promise of the Texas economic miracle.

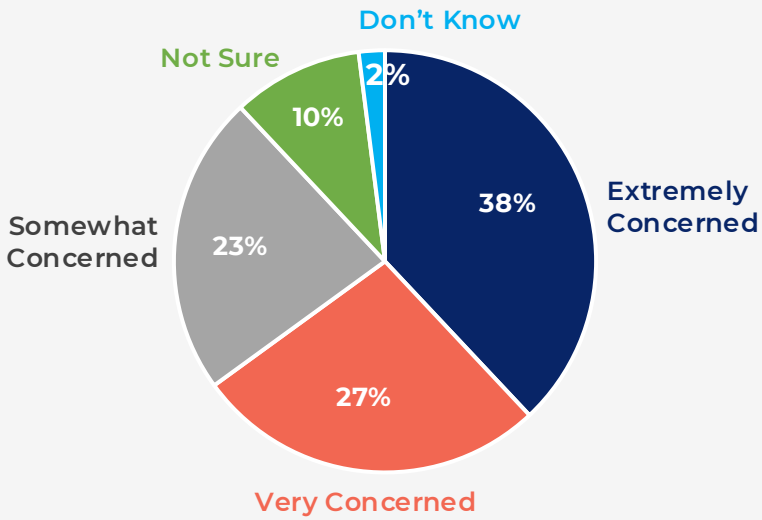
State policymakers have an opportunity to enact meaningful changes to the state's financial strategy for addressing Texas' long-term water infrastructure challenges. The basket of policy solutions available to state leaders includes increasing the endowment for the state's water funds and, more critically, establishing a revenue stream dedicated to those water infrastructure funds. Stable, reliable funding empowers long-term strategic planning and works towards addressing the state's escalating water infrastructure liabilities. Moreover, this financial strategy builds on the successful models that both the Texas Legislature and state voters have approved for funding state highways and parks.

A sustained financial strategy for water infrastructure development proves essential for two reasons. First, and as referenced above, water infrastructure investments will work to avoid severe economic consequences for Texas, including billions in GDP losses, hundreds of thousands of people losing the dignity of employment, and genuine hardships for Texas' families and businesses. Second, and perhaps strategically more important, reliable water infrastructure provides the essential foundation for continued economic growth and prosperity. As this report describes, water infrastructure investments could support billions of dollars in economic growth and development per year, and generate as many as 15 jobs for every million dollars invested. Moreover, the State of Texas has spent billions of dollars on transportation, parks, broadband, public education, health care and energy. The continued success of the state's investments in these areas depends on the reliability of water infrastructure.

Texas has the capacity and the capability to address its long-term water infrastructure challenges. The state's recent history of strategic infrastructure investments, forward-looking water planning processes and a robust water industry are indicative of strong, native assets that offer a firm foundation for long-term success. While this report includes detailed data on potential water shortages during drought, the conditions of aging and deteriorating water and wastewater systems, projected funding gaps and the economic consequences of not having sufficient infrastructure, Texas has the wherewithal to address these challenges. Indeed, the current Texas economic miracle serves as testament to the success of our water infrastructure to date. State investments in water infrastructure will help propel this miracle in the decades to come.

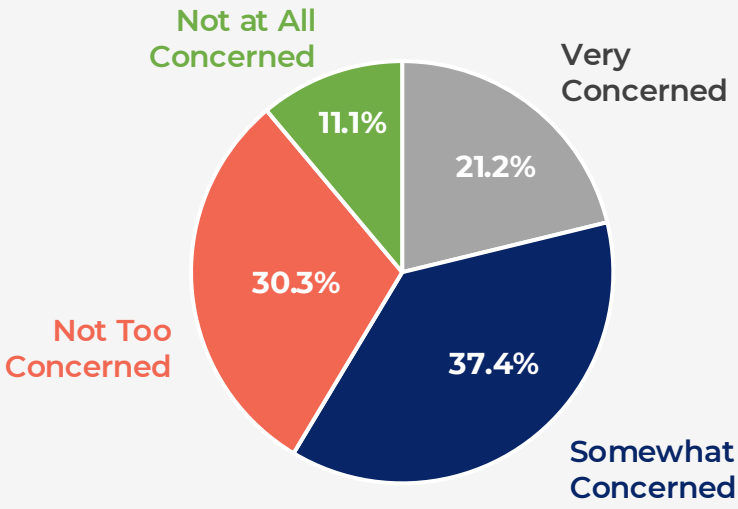
Texas Voters' Concerns About Water

? How concerned are you that if a severe drought occurs, then Texas will not be able to meet a significant amount of its water needs, meaning some communities may not have any access to water.



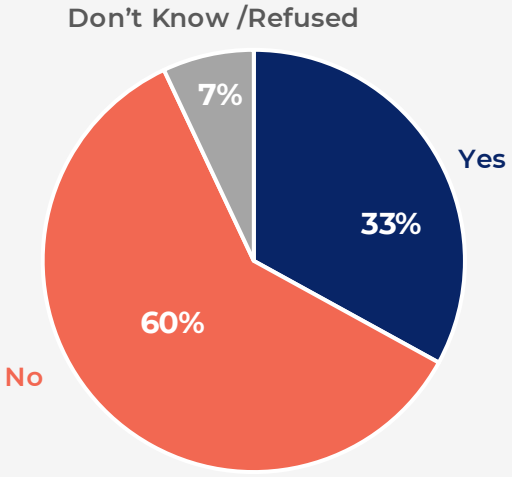
Source: Texas 2036 Voter Poll

? How concerned are you about the reliability of the water supply in your community?



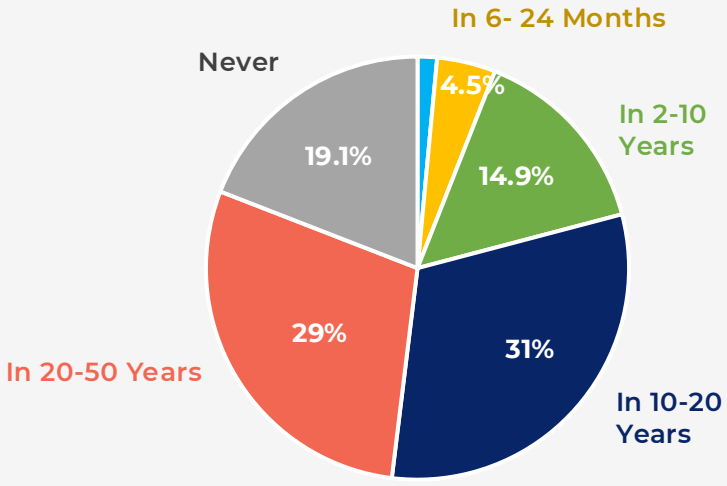
Source: Texas Lyceum Poll (2024)

Have you experienced a boil water notice or notification of unsafe tap water in the past year?



Source: Texas Lyceum Poll (2024)

To your best knowledge based on current and projected information, when will your (rural water) system run out of water?



Source: Texas Rural Water Association Survey (2024)

CHAPTER 1

Texas' Long-Term Water Infrastructure Challenges:

The Need for More Water Supplies and the Problem of Aging, Deteriorating Water and Wastewater Systems

The continuation of the Texas economic miracle hinges on the reliability of its water infrastructure. This includes water supplies and drinking water treatment and wastewater systems. Texas faces two critical challenges here. The first involves the need to expand the state's water supply portfolio given the threat of drought and the demands attributable to population and economic growth. The second challenge involves the significant and escalating problem associated with aging, deteriorating water and wastewater systems.

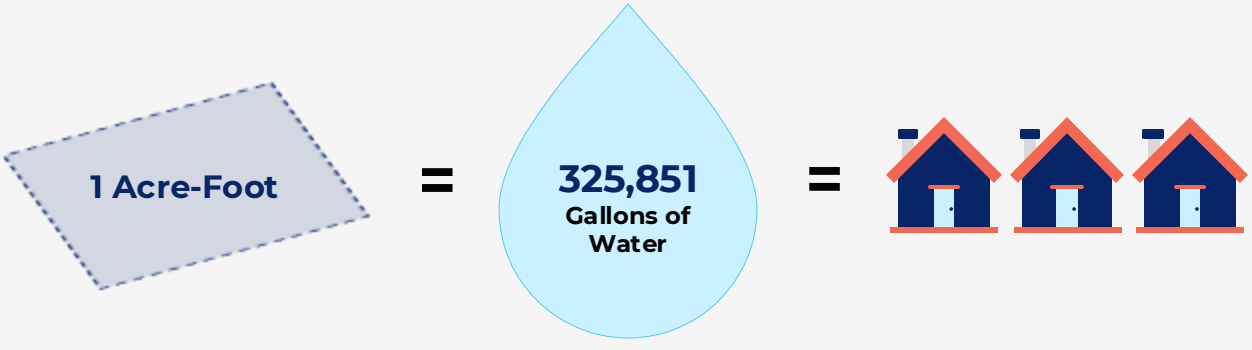
Texas faces a long-term water deficit

Texas' projected population and economic growth translate into increasing water demands. A growing population, due to in-state migration and growing families, will require more water. Between August 2014 and July 2024, a monthly average of 17,058 new private housing building permits were issued in Texas, totaling over 2 million permits during this time period according to data from the St. Louis Federal Reserve Bank.[4] These new subdivisions and housing units have all required water – both water supplies and infrastructure for delivery. As many water policymakers and practitioners have observed, "people are moving to Texas, but they're not bringing water with them."

Simply put, a growing state will demand more water. The 2022 State Water Plan prepared by the Texas Water Development Board (TWDB) forecasts that 51.5 million people will call Texas "home" by 2070. This represents a 73.4% increase from the 29.7 million people currently living in this state.[5]

Water demands will increase with this growing population. The 2022 State Water Plan forecasts that between 2020 and 2070, Texas' collective thirst will increase from 17.7 million acre-feet per year to 19.2 million acre-feet per year. This represents a 9% increase in water demands over the next half century.[6]

What is an acre-foot of water?



An acre-foot is the common metric used for water resource management

Enough to fill 1 acre of land (approximately the size of a football field with 1 foot of water)

1 acre-foot typically serves 2 to 3 Texas households per year

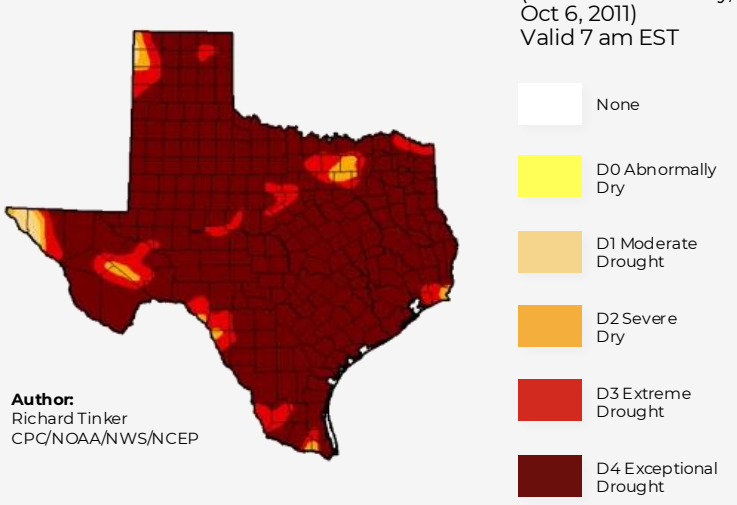
[4] U.S. Census Bureau, New Private Housing Units Authorized by Building Permits for Texas [TXBPPRIV], retrieved from FRED, Federal Reserve Bank of St. Louis, September 14, 2024.
[5] Texas Water Development Board, 2022 State Water Plan, page 48.
[6] Texas Water Development Board, 2022 State Water Plan, page 53.

Similarly, an economic expansion, attributable to the growth of in-state industries, industrial nearshoring and domestic relocation will increase – and in some cases, accelerate – water demands. Contemporary growth of certain water-intensive industries, particularly the semiconductor, data center, and refining industries, point to growing demands for water infrastructure. For example, recent announcements by Samsung and Texas Instruments for the expansion of semiconductor manufacturing activities in Texas coincided with public announcements regarding water supplies and infrastructure. In the meantime, the onset of data center development in Texas, which can consume hundreds of thousands – and sometimes millions – of gallons of water per day, will accelerate water demands.[7] Lastly, the growth in refining capacity, with six out of the seven newest refineries operating in the United States over the past decade located in Texas, equates with growing industrial demand for water.[8]

Texas' Droughts

The drought of record used for state water planning purposes occurred between 1950 and 1957. This prolonged drought had a severe impact on the state's agricultural economy, and prompted the beginning of state water planning and a subsequent boom in reservoir construction. The 1950s drought was not the worst Texas has endured, however. Paleoclimatic records indicate that Texas endured droughts that were longer, and more severe during the mid-19th, early 18th, and late 16th centuries. More recently, the worst one-year drought of record occurred in 2011. At its zenith in October 2011, 97% of the state was in the extreme drought category. Data from the Office of the State Climatologist at Texas A&M University suggests that future droughts may be more severe due to hotter temperatures and greater rainfall variability.

> **"Texas is the land perennial drought. broken by the occasional devastating flood.**
>
> - National Weather Service Meteorologist, 1927



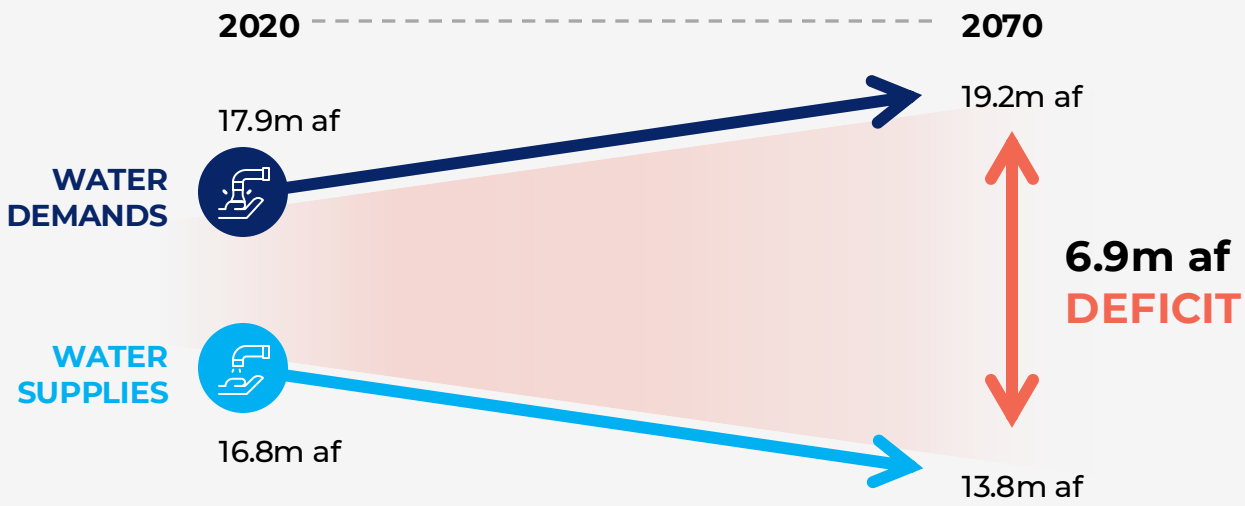
Sources: Cleveland. Votteler. et. al. "Extended Chronology of Drought in South Central, Southeastern, and West Texas." Texas Water Journal, Volume 2, No. 1, 2011. Office of the State Climatologist. Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036, 2024.

[7] Rasheed Ahmad, "Engineers often need a lot of water to keep data centers cool." Civil Engineering, March 4, 2024
[8] US Energy Information Administration, "When was the last refinery built in the United States?," updated June 18, 2024

While population and economic growth will contribute to increased water demands, existing water resources are expected to diminish during a repeat of the drought of record. The inset, *Texas' Droughts*, describes Texas' drought of record and history of drought. According to the 2022 State Water Plan, annual existing water supplies during a repeat of the drought of record will decline from 16.8 million acre-feet in 2020 to 13.8 million acre-feet in 2070.[9] These declines are attributable to the sedimentation of rivers, lakes, and reservoirs and the depletion of groundwater resources. Other drought-related factors that could accelerate declines in water availability, including diminished inflows into lakes or reservoirs, or higher rates of evaporation due to hotter temperatures, are not included in the State Water Plan's projections.

Increasing water demands coupled with decreasing available water supplies creates the potential for a long-term water supply deficit if Texas fails to develop needed water supplies before it is affected by a repeat of a drought of record. The State Water Plan projects that this water supply deficit could reach 4.7 million acre-feet by the 2030s, and nearly 6.9 million acre-feet by the 2070s.[10] Texas' cities will see the greatest increase in water needs (i.e. water supplies needed for a drought of record). Between 2020 and 2070, municipal water needs will increase from 215,000 acre-feet in 2020 to 3,144,000 acre-feet in 2070.[11] If additional municipal water supplies and management strategies are not implemented, then at least 13.3 million Texans will have less than half of the municipal water supplies that they require in 2070.[12] Other water users that will face substantial water needs by 2070 include agricultural irrigation (3,046,000 acre-feet), manufacturing (301,000 acre-feet) and steam-electric generation (203,000 acre-feet).

Texas' Water Supply Deficit



Source: 2022 Texas State Water Plan

[9] Texas Water Development Board, 2022 State Water Plan, page 77.
[10] Texas Water Development Board, 2022 State Water Plan, page 86.
[11] Texas Water Development Board, 2022 State Water Plan, page 85.
[12] Texas Water Development Board, 2022 State Water Plan, page 86.

Aging, deteriorating water and wastewater infrastructure threatens water reliability

Many of Texas' water and wastewater systems continue to operate past their designed life. Their antiquity, combined with deferred maintenance and exposure to extreme weather conditions, contributes to the ongoing deterioration of these water systems. Over the past few years, these problems caused prolonged boil water notices in Laredo, broken water mains in Odessa, and the complete failure of the City of Zavalla's water system just to name a few examples. In 2021, Winter Storm Uri forced the problems with aging, deteriorating water systems into stark relief. Widespread power outages prompted over 2,300 boil water notices across the state, affecting over half of the state's population.[13] Scholars believe this was the largest boil water notice event in American history.[14] Approximately 49% of Texans endured without running water for more than two days.[15] While the loss of power was oftentimes the leading cause of outages, aging, brittle systems often broke or burst under the freezing conditions, contributing to widespread failures.

Several data points underscore the magnitude of Texas' aging, deteriorating water and wastewater infrastructure problems. A recent report card issued by the American Society of Engineers (ASCE) rates Texas' drinking water infrastructure with a C-.[16] While ASCE rightfully credits TWDB's water planning and financing efforts for addressing drinking water supply needs, the report points to an increase in boil water advisories between 2008 and 2015 as a potential indicator of aging infrastructure. The report also notes that increasing rates of water loss, especially within small systems, are indicative of low operational maintenance. Further, state drinking water systems' susceptibility to extreme weather events, including droughts and hurricanes, remains an ongoing liability.

Texas' wastewater systems, which collect, treat, and discharge sewage, receive the near-failing grade of D.[17] ASCE's assessment here reflects the absence of resilience to extreme weather events and a decline in systems' condition due to their age. In addition, the documented increase in sanitary sewer overflows between 2016 and 2019, combined with an increased subscription for TWDB financial assistance, points to systems in poor condition.

Texas' Water Infrastructure Grades

C-	Water Infrastructure
D	Wastewater Infrastructure

Source: American Society of Civil Engineers

[13] Yael Glazer, et. al., "Winter Storm Uri: A Test of Texas' Water Infrastructure and Water Resource Resilience to Extreme Winter Weather Events," Journal of Extreme Events, Volume 08, Issue 04, December 2021, page 6.
[14] Glazer, page 6..
[15] Glazer, page 6.
[16] American Society of Civil Engineers (ASCE), 2021 Report Card for America's Infrastructure, Texas 2021 Report, 2021.
[17] American Society of Civil Engineers (ASCE), 2021 Report Card for America's Infrastructure, Texas 2021 Report, 2021.

Boil water notices and high rates of water loss are common symptoms attributable to deteriorating water systems. Between 2019 and 2023 an average of 2,883 boil water notices were issued each year according to Texas Commission of Environmental Quality data. The majority of these boil water notices were due to low distribution pressure frequently attributable to line breaks or water outages. The increased frequency of these events affects a significant portion of Texans. According to a Texas Lyceum poll in 2024, one out of every three Texans indicated that they have received a boil water notice or notification of unsafe tap water over the past year.[18]

In the meantime, Texas' water systems lose substantial quantities of water. A study released by the Texas Living Waters Project and the National Wildlife Federation revealed that Texas water utilities leak at least 572,000 acre-feet – the equivalent of 186 billion gallons – of water per year.[19] The report observes that this volume of water equates with the combined one-year water needs for the cities of Austin, Fort Worth, El Paso, Laredo, and Lubbock. In fact, leaking pipes waste enough water each year to fill a major state reservoir.

Recent subscription rates for the clean and drinking water state revolving funds (SRFs) serve as another indicator of Texas' growing problem with aging, deteriorating water and wastewater infrastructure. Both funds are administered by TWDB, which prioritizes the allocation of each fund towards drinking and clean water projects that ensure compliance with the US Safe Drinking Water and US Clean Water Act. Many entities apply for financial assistance from the state revolving funds in order to replace aging, deteriorating systems. For example, 94 out of the 192 project applications received for the SFY 2025 Clean Water State Revolving Fund Intended Use Plan cited a need for replacing "old", "aging", "failing", "deteriorating", "dilapidated", or "leaking" systems or those near the "end of their useful life."[20] Similarly, 75 out of the 298 applications for the SFY 2025 Drinking Water State Revolving Fund included similar concerns.[21]

The subscription rates for both state SRFs are determined by comparing the total dollar amount of all applications received with the amount of funding for each fiscal year. For both the Clean and Drinking Water SRFs, the total dollar amount of the applications received significantly exceeds the amount of funding available. As indicated within ASCE's report card, this metric points to the magnitude of aging and deteriorating water and wastewater systems in Texas.

Boil Water Notices in Texas

2,883
Average

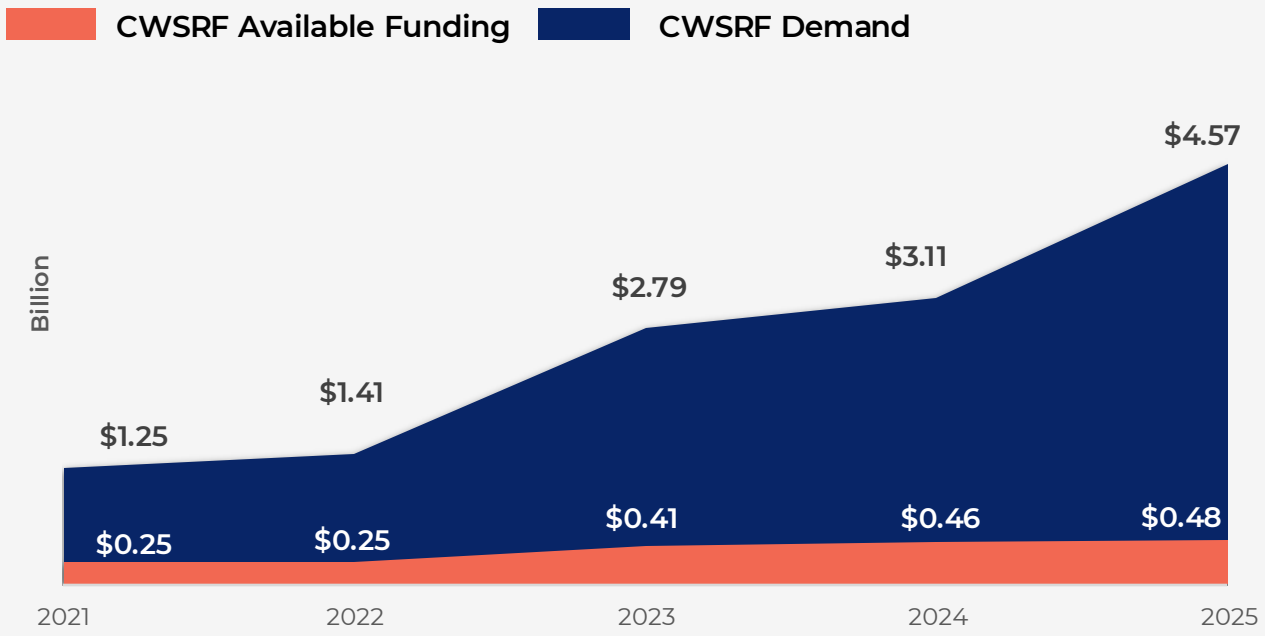
Boil water notices per year since 2019

Source: Texas Commission on Environmental Quality

[18] Texas Lyceum, 2024 Texas Lyceum Poll, 2024, page 16.
[19] Jennifer Walker, Alan Wyatt, Jonathan Seefeldt, Danielle Goshen, Meghan Bock, Ian Johnston, Maya Black, "Hidden Reservoirs: Addressing Water Loss in Texas" 2022, page 5.
[20] Texas Water Development Board, Clean Water State Revolving Fund Draft SFY 2025 Intended Use Plan, 2024.
[21] Texas Water Development Board, Drinking State Revolving Fund Draft SFY 2025 Intended Use Plan, 2024

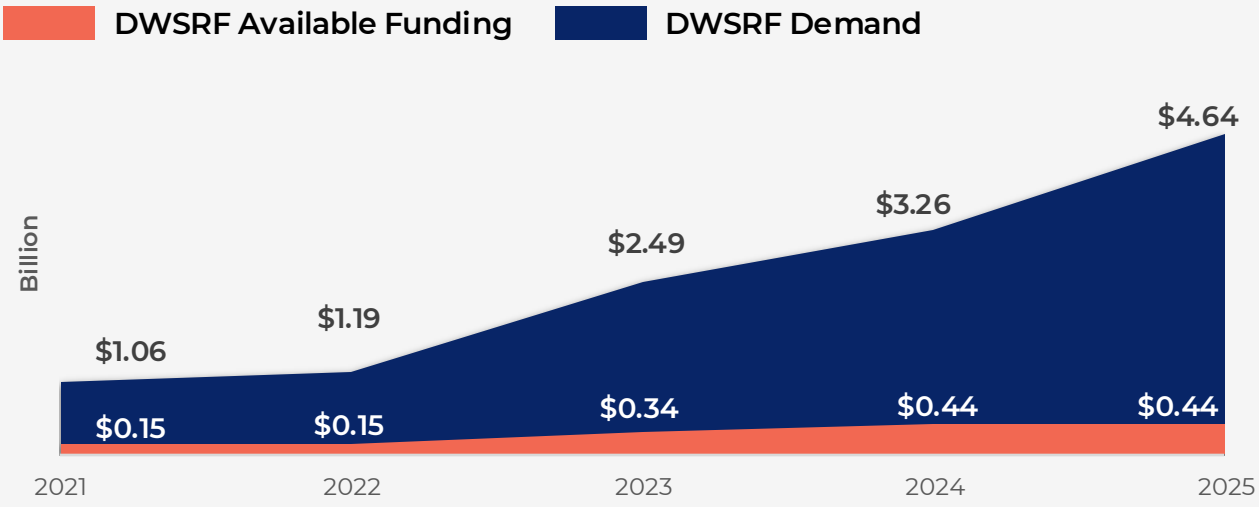
The Clean Water State Revolving Fund (CWSRF) provides financial assistance to assist wastewater operators in complying with the requirements of the US Clean Water Act. Over the past five years, Texas' CWSRF has received an average of $6.74 in applications for every available dollar. In the most recent funding cycle for state fiscal year (SFY) 2025, TWDB received CWSRF applications totaling nearly $4.6 billion for only $481.8 million in available funding. This amounts to a record-setting subscription rate of $9.48 for every available dollar. The chart, *CWSRF Demand vs. Available Funding (SFY 2021-2025)*, illustrates the widening gulf between Texas' wastewater utilities' demand for financial assistance and the funding amounts available for each fiscal year.

CWSRF Demand vs. Available Funding (SFY 2021-2025)



Texas' Drinking Water State Revolving Fund (DWSRF) assists utilities in achieving compliance with the requirements of the US Drinking Water Act. The DWSRF subscription rate is much higher than that for the CWSRF. For the past five years, TWDB received an average of $8.05 in application requests for every dollar available through the DWSRF. As indicated in the chart, *DWSRF Demand vs. Available Funding (SFY 2021-2025),* below, the annual demand for DWSRF funds significantly exceeds program capacity. In state fiscal year 2025, TWBD received over $4.6 billion in DWSRF applications for only $444.4 million in available funding, a record-setting subscription rate of $10.45 for every available dollar.

DWSRF Demand vs. Available Funding (SFY 2021-2040)



While the DWSRF and CWSRF subscription rates are indicative of a growing need to replace aging, deteriorating water and wastewater systems, they also highlight the substantial funding gap that exists between the state's financial assistance capacity and the needs of local utilities. The extent of this funding gap will be discussed in more detail in Chapter 3.

The final data point highlighting the magnitude of Texas' aging infrastructure problem is that many utilities are acutely aware of this problem. According to a 2024 survey of 245 water utilities released by the Texas Water Infrastructure Network and Collaborative Water Resources LLC, at least 55% cited aging infrastructure as a primary investment driver.[22] Nearly 50% of utilities indicated that at least 25% or more of their water mains were in need of replacement or repair.

Texas' long-term water infrastructure liability

Combined, Texas' long-term water infrastructure challenges will threaten future economic growth and development. The water supply deficit projected in the 2022 State Water Plan portends significant economic consequences in the absence of water needed by homes, businesses, and industry. Similarly, failing water and wastewater systems will continue to exact a toll on economic development and community vitality. This toll will become more severe as more systems continue to operate past their useful life. The next chapter explores the potential economic cost to Texas should the state fail to address these long-term water infrastructure challenges.

[22] Texas Water Infrastructure Network & Collaborative Water Resources LLC, Texas Water Capital Needs Survey (2024), page 9.

CHAPTER 2

Inadequate Water Infrastructure Threatens Economic Growth

Insufficient and unreliable water infrastructure invites the consequences of lost jobs, diminished income, and shrinking economic activity. This century alone includes several instructive examples of the economic harms attributable to the lack of reliable infrastructure. Between 1996 and 2012 Australia endured an extended drought known as the "Big Dry."[23] This prolonged drought shrank Australia's GDP (which is smaller than Texas') by 1.6%, incurred $15.7 billion ($10.7 billion US) in state and federal disaster assistance and resilience spending, and spurred billions in state spending on water supply projects including seawater desalination plants.[24] In 2018 the city of Cape Town, South Africa came perilously close to "Day Zero" – when it would run out of water – at a cost of 3.4% of the region's GDP.[25] Closer to Texas, in 2022, economic activity in Monterrey, Mexico, ground to a halt as the city ran out of water.[26]

The economic consequences of inadequate water infrastructure are also felt in the United States. Arizona limited new development around the City of Phoenix due to water availability limitations. In Texas, the cities of Conroe, Magnolia and Dripping Springs have also approved growth moratoriums owing to water supply and infrastructure concerns. In 2022, a failing water system in Jackson, Mississippi garnered national headlines as local businesses and residents struggled to find safe drinking water.[27] And in early 2024, a major employer in Texas' Rio Grande Valley, the Santa Rosa sugar mill, shuttered because of the lack of water in the Rio Grande. This closure was estimated to cost the local economy $100 million.[28] Later that year, South Texas citrus growers announced that diminishing water supplies were endangering both current production and the future viability of existing orchards.[29]

Left unaddressed, Texas' water infrastructure challenges will generate significant headwinds to the state's economy and growth prospects. As happened in Australia and Cape Town, a long, severe drought will inflict billions in economic losses if the state does not expand its water supply portfolio. At the same time, aging, deteriorating water and wastewater systems present growing liabilities to economic growth and activity that, if left unchecked, will bleed economic activity.

[23] Australian Institute for Disaster Resilience, "Environment - The Big Dry," (accessed Thursday, August 28, 2024.)
[24] David Fleming-Munoz, Stuart Whitten, Graham Bonnett, "The economics of drought: A review of impacts and costs," The Australian Journal of Agricultural and Resource Economics, June 28, 2023.
[25] Fleming-Munoz et. al., "The economics of drought: A review of impacts and costs," The Australian Journal of Agricultural and Resource Economics, June 28, 2023.
[26] Associated Press, "Deepening drought in Mexico's north a threat to jobs, tourism," NBC News, July 18, 2022.
[27] Ali Dinaldson, "Jackson, Mississippi's Water Crisis Is Pushing Local Businesses to the Brink," Inc., September 2, 2022.
[28] Fernando Del Valle, "Sugar mill closing amid water crisis; $100 million impact expected," MyRGV.com, February 22, 2024.
[29] Texas Citrus Mutual, "Texas Citrus Mutual Addresses Critical Water Issues in South Texas and Mexico's Water Debt," August 20, 2024.

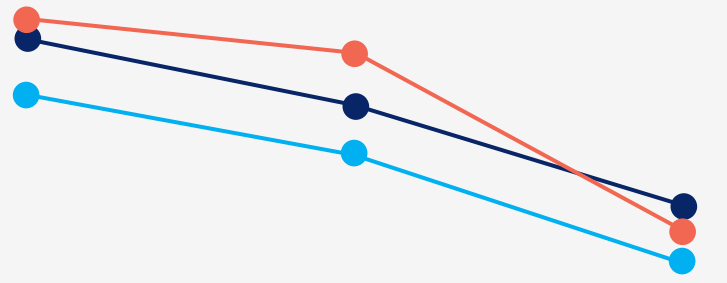
Failing to develop water supplies jeopardizes Texas' economy during drought

Texas' economy has suffered from the wrath of drought. The 1950s drought, also known as the Drought of Record, inflicted substantive damage on the state's agricultural sector, precipitating a migration from rural areas towards Texas' cities. In 2011, Texas endured its worst one-year drought of record, causing between $12 and $17 billion in damages to the state's agricultural sector.[30]

The 2022 State Water Plan provides insightful data on the economic consequences for Texas if the state fails to expand its water supply portfolio and is afflicted by another long, severe drought like that of the 1950s. The projected GDP loss values in the 2022 State Water Plan are in 2018 dollars. This analysis adjusts those values to 2024 dollars. Accordingly, by the 2030s, Texas could endure the loss of 785,000 jobs and $160 billion in GDP in one year from not having enough water for a prolonged drought period.[31] Towards the end of the State Water Plan's horizon, in the 2070s at least 1.4 million jobs could be lost along with $192 billion in GDP during a one year repeat of the drought of record. These economic consequences will precipitate migration out of Texas on the order of 144,000 leaving the state in the 2030s and nearly a quarter of a million by the 2070s.

2022 State Water Plan Economic Impact Data

(Inflation adjusted)



	2030	2050	2070
LEAVING TEXAS	144,000	187,000	252,000
JOBS LOST	785,000	1 Million	1.4 Million
GDP LOSS	$160 Billion	$165 Billion	$192 Billion

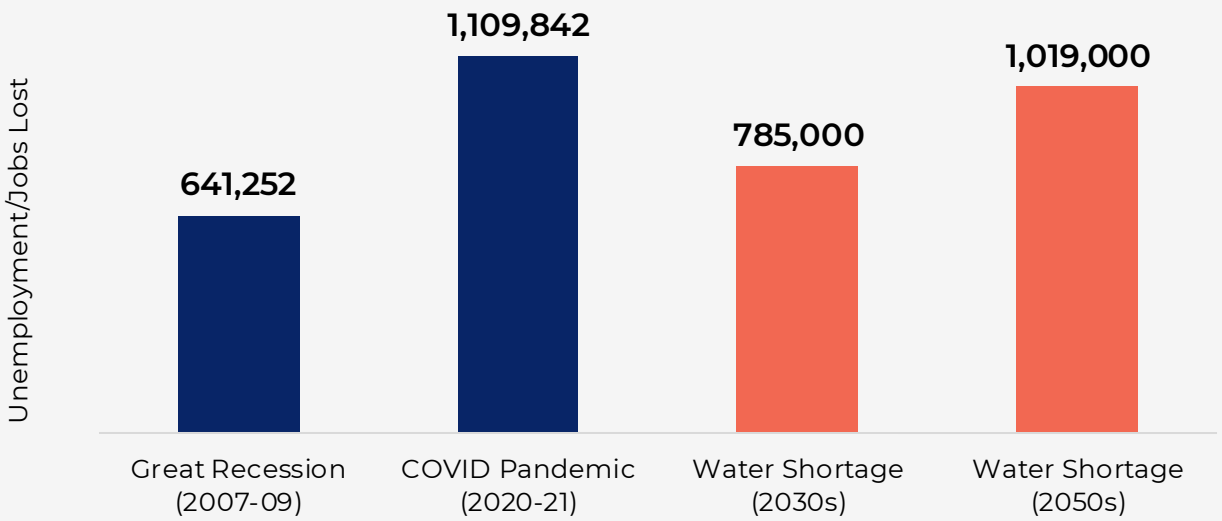
Source: 2022 Texas State Water Plan

[30] Gabriel Collins, Prospective Costs and Consequences of Insufficient Water Infrastructure Investment in Texas, 2024, [manuscript submitted for publication].
[31] Texas Water Development Board, 2022 State Water Plan, page 90.

For comparison, these economic shocks described in the State Water Plan exceed, and by some metrics equal, the magnitude of those endured in Texas during the Great Recession and the COVID-19 pandemic. During the Great Recession of the late 2000s, Texas' monthly unemployment averaged near 650,000 between December 2007 and June 2009 according to US Bureau of Labor Statistics data.[32] Texas' GDP declined by nearly $74 billion (2024 dollars) between 2008 and 2009 before recovering to slightly above 2008 levels in 2010.[33] Throughout the COVID-19 pandemic between March 2020 and April 2021 average monthly unemployment in Texas totaled just over 1.1 million, reaching a record high of 1.7 million in April 2020.[34] Between the pre-pandemic year 2019 and 2020, state GDP declined by $62.7 billion (2024 dollars) before rebounding in 2021.[35]

The chart, *Great Recession, COVID Pandemic, and Future Water Shortage Unemployment,* below, compares the average monthly unemployment rates in Texas during the Great Recession and the COVID Pandemic with the projected job losses from not having enough water supplies during a repeat of a drought of record in the 2030s and 2050s. The job losses attributable to water shortages are those reported in the State Water Plan. Although Texas' economy and labor force will likely be larger in the 2030s and 2050s relative to the Great Recession and Pandemic eras, the number of job losses due to water shortages are comparable to those observed during those times.

Great Recession, COVID Pandemic, & Future Water Shortage Unemployment



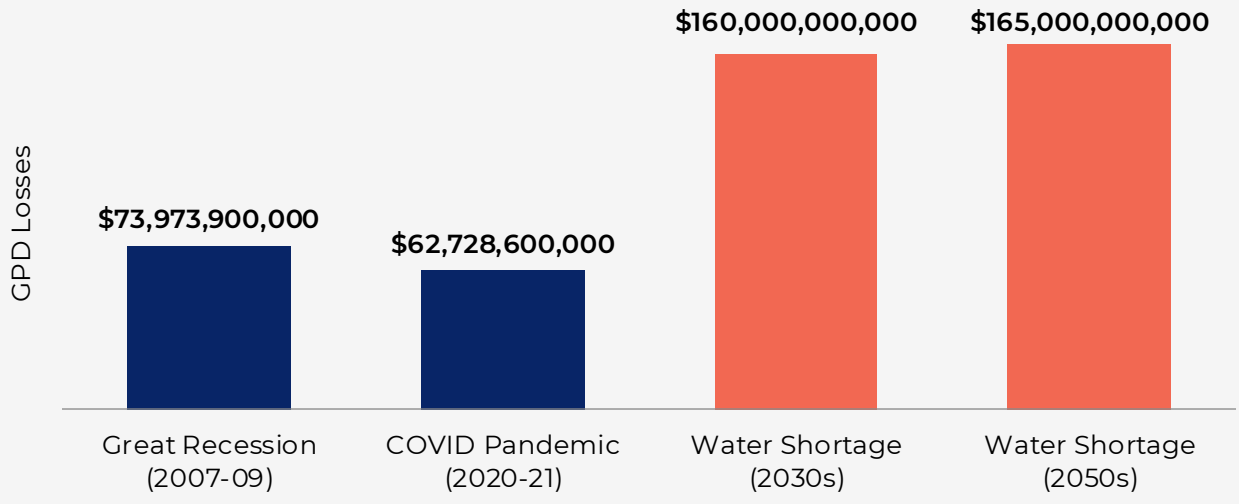
Sources: US Bureau of Labor Statistics, 2022 State Water Plan

[32]U.S. Bureau of Labor Statistics, "Texas Labor Force Data, Employment," (accessed Wednesday, October 9, 2024).
[33]U.S. Bureau of Economic Analysis, "SAGDP1 State annual gross domestic product (GDP) summary" (accessed Wednesday, October 9, 2024).
[34]U.S. Bureau of Labor Statistics, "Texas Labor Force Data, Employment," (accessed Wednesday, October 9, 2024).
[35]U.S. Bureau of Economic Analysis, "SASUMMARY State annual summary statistics: personal income, GDP, consumer spending, price indexes, and employment" (accessed Wednesday, October 9, 2024).

More alarmingly, the aggregate state GDP losses from not having enough water supplies to meet demands during future drought will exceed those endured during the Great Recession and COVID Pandemic. This comparison is depicted within the chart, *Great Recession, COVID Pandemic, & Water Shortage GDP Losses,* below. According to the State Water Plan's data, adjusted for inflation, water shortages during a repeat of a drought of record would inflict over $150 billion in GDP losses in the 2030s and 2050s. This exceeds the GDP declines observed in Texas during the Great Recession and COVID Pandemic.

The 2022 State Water Plan notes that these cost estimates are "snapshots of a one-year repeat of the drought of record" however.[36] This means that a prolonged, multi-year drought event, like that of the 1950s, would inflict greater economic damages in aggregate if Texas does not develop needed water supply projects. These GDP losses over the course of a multi-year drought – like that of the 1950s – would be substantially higher than those observed during the Great Recession and COVID Pandemic.

Great Recession, COVID Pandemic, & Water Shortage GDP Loss



Sources: US Bureau of Economic Analysis, 2022 State Water Plan

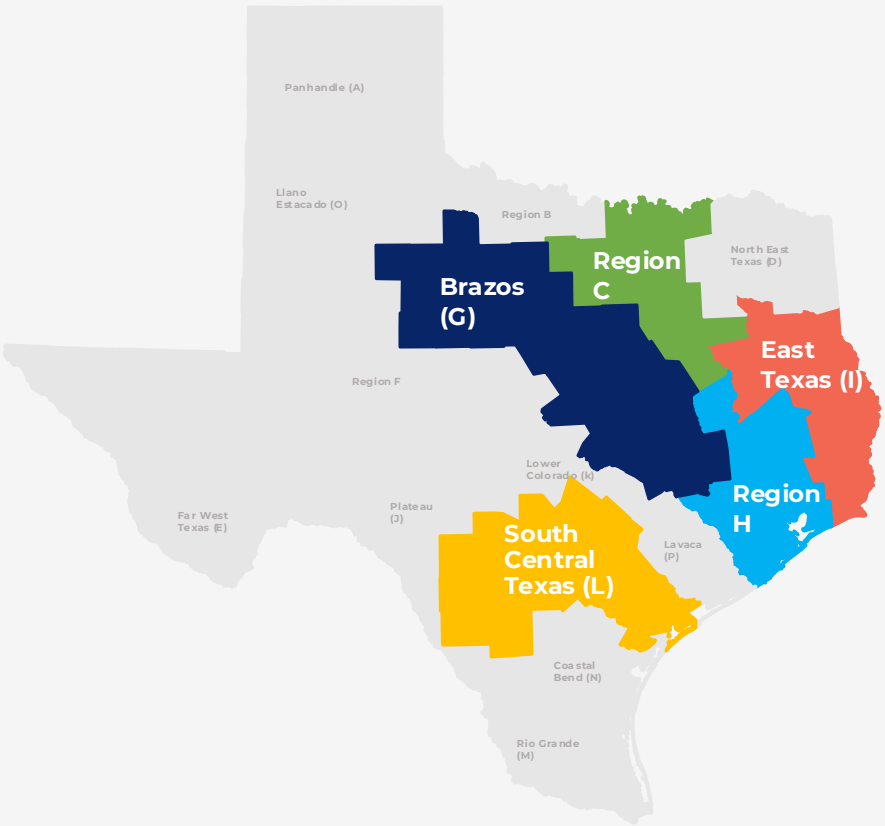
Regional Industry Economic Impacts

Different industries within various planning regions of the state will be affected by the lack of water supplies during a long, severe drought. This analysis shows how key industries across different regions of the state would be affected under these circumstances. While some of these economic sector impacts will be felt within the Texas Triangle between DFW, Houston, and Austin-San Antonio, key industries in regions outside of this area will also be affected.

[36] Texas Water Development Board, 2022 State Water Plan, page 90.

The top five regions for manufacturing in Texas include the Dallas-Fort Worth Metroplex, greater Houston area, East Texas (including Beaumont, Tyler, and Lufkin), Central Texas (including College Station, Temple, and Waco), and South Central Texas (including San Antonio and Victoria). These regions account for 82% of state manufacturing GDP and 77% of manufacturing jobs. According to an analysis by the Baker Institute for Public Policy at Rice University, within 20 years these five regions will endure nearly $20.8 billion in manufacturing GDP and more than 116,000 jobs lost due to water shortages during a repeat of a drought of record.[37]

Top 5 Manufacturing Regions Affected by Potential Water Shortage During a Drought of Record

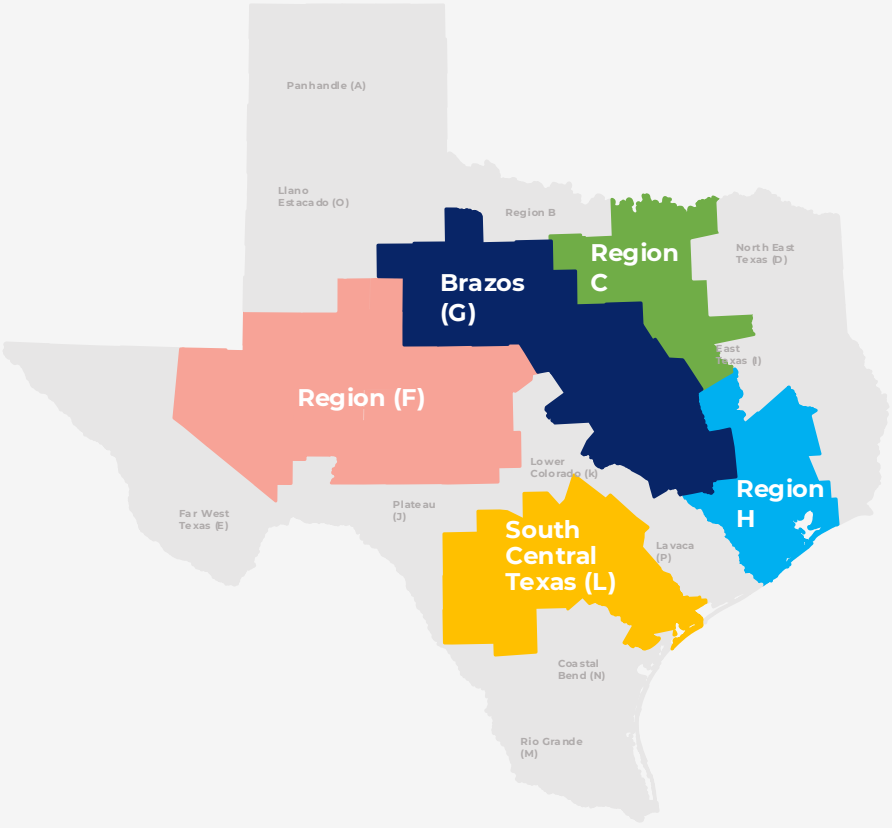


Sources: 2022 State Water Plan, Economic Impact of Severe Draught by Dr. Joyce Beebe(2022)

[37] Dr. Joyce Beebe, "Economic Impact of Severe Drought," 2022, pages 16-17. (This report cited $16.6 billion in manufacturing sector GDP losses by 2040 in 2018 dollar values. This analysis updates that GDP estimate to account for recent inflation.)

Texas' energy sector, which includes oil and natural gas extraction and electricity generation (steam-electric power), serves as a cornerstone to the state's economy. As illustrated by the map, Top 5 Energy Regions Affected by Water Shortage, Texas' leading energy-related regions include DFW, Houston, Central Texas, South Central Texas, and the Permian Basin (including Midland and Odessa). Combined, these five regions contribute over 80% of Texas' energy-related GDP, and account for 75% of energy-related jobs. By 2040, these five regions could lose $52.9 billion in energy sector GDP and nearly 200,000 jobs during a severe drought event.[38]

Top 5 Energy Regions Affected by Potential Water Shortage During a Drought of Record



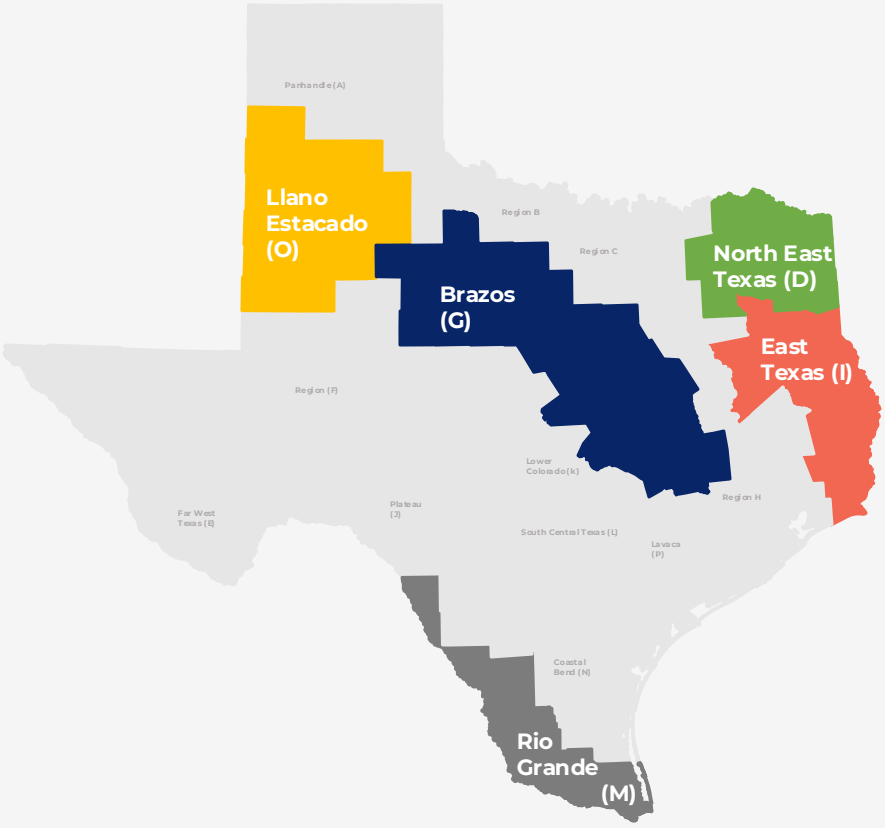
Sources: 2022 State Water Plan, Economic Impact of Severe Draught by Dr. Joyce Beebe(2022)

[38] Beebe, "Economic Impact of Severe Drought," 2022, page 19. (This report cited $42.2 billion in energy sector GDP losses by 2040 in 2018 dollar values. This analysis updates that GDP estimate to account for recent inflation.)

Although not as capital intensive as the manufacturing and energy sectors, Texas' agricultural sector will be profoundly affected by water shortages due to drought. This sector is also likely the first to endure economic losses from the onset of severe, prolonged drought conditions.

Moreover, and unlike the manufacturing and energy sectors, agricultural activity is more widely distributed across the state. Texas' top five agricultural regions, as measured by agricultural GDP and related jobs, include Northeast and East Texas, Central Texas, the Rio Grande Valley, and the Llano Estacado in West Texas. Combined, these regions account for 54% of state agricultural GDP and 45% of jobs. According to an analysis by the Baker Institute at Rice University, by 2040 a severe drought would cost these five regions over $4.5 billion in agricultural GDP and 63,000 jobs.[39]

Top 5 Agricultural Regions Affected by Potential Water Shortage During a Drought of Record



Sources: 2022 State Water Plan, Economic Impact of Severe Draught by Dr. Joyce Beebe(2022)

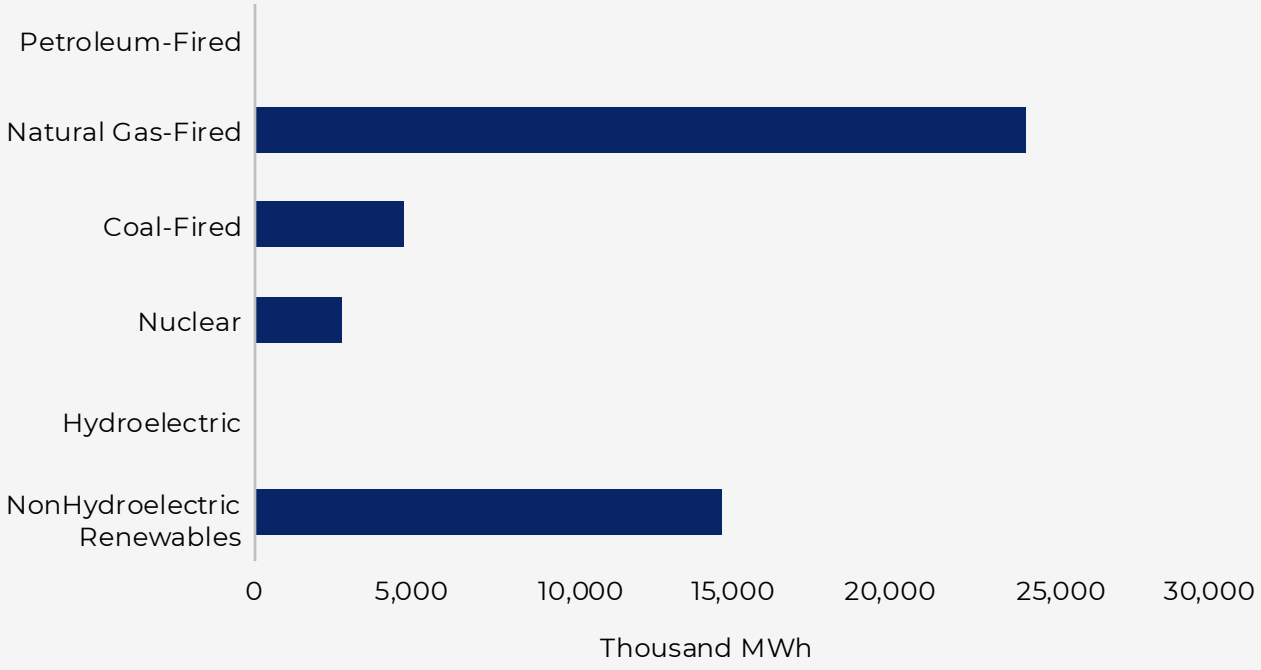
[39] Beebe, "Economic Impact of Severe Drought," 2022, page 21. (This report cited $3.6 billion in agricultural sector GDP losses by 2040 in 2018 dollar values. This analysis updates that GDP estimate to account for recent inflation.)

Impact on the Texas Electric Grid

Different industries within various planning regions of the state will be affected by the lack of water supplies during a long, severe drought. This analysis shows how key industries across different regions of the state would be affected under these circumstances. While some of these economic sector impacts will be felt within the Texas Triangle between DFW, Houston, and Austin-San Antonio, key industries in regions outside of this area will also be affected.

In 2023, Texas' utility-scale electricity generation accounted for 12.9% of all US generation.[40] According to the US Energy Information Administration's analysis, Texas generated more electricity than any other state, and nearly twice the amount of its second-place competitor, Florida.[41] As depicted within the chart, *Texas Net Electricity Generation by Source*, a substantial portion of Texas' electric generation comes from dispatchable sources, including natural gas, nuclear, and coal-fired plants. These generation sources, which are capable of operating regardless of weather conditions (provided that they are weatherized), are essential to the continued reliability of the state's electric grid. Moreover, and as demonstrated within Texas 2036's Future of Texas Energy scenario models, even as renewable generation capacity increases within Texas, these dispatchable forms of electricity generation will be essential for the seamless provision of electric service.[42]

Texas Net Electricity Generation by Source, May. 2024

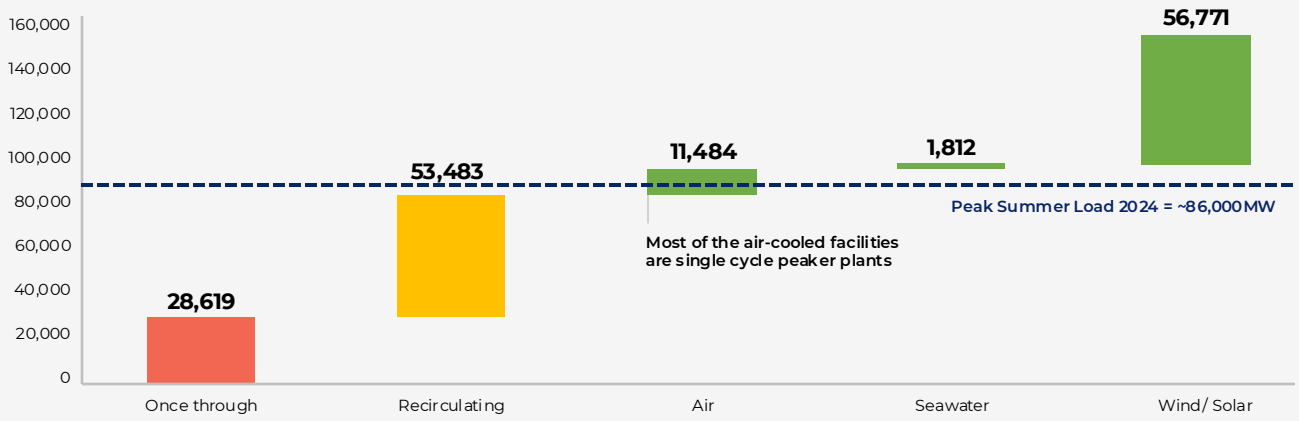


Source: Energy Information Administration, Electric Power Monthly

[40] US Energy Information Administration (USEIA), Electricity Data Browser.
[41] USEIA, Rankings: Total Net Electricity Generation, May 2024 (thousand MWh).
[42] Texas 2036, The Future of Texas Energy, Texas Energy and Economic Scenario Planner, 2024.

Dispatchable generation requires substantial water supplies and resources to operate. As depicted in the chart, *Texas Electricity Generation by Cooling Type*, over 80,000 MW of generation uses "once-through" or recirculating water for cooling and generation purposes. These "once-through" facilities collect surface water from rivers, lakes, or reservoirs for generation purposes and then discharge that water after it runs through their systems. Recirculating facilities collect water for continuous use within their generating systems that include heat exchangers and cooling towers. A substantial portion of the state's electric generation capacity relies on state water resources. More critically, this generation is essential for meeting peak summertime loads.

Texas Electricity Generation by Cooling Type



Source: Gabe Collins, Prospective Costs & Consequences of Insufficient Water Infrastructure Investment in Texas, 2024

Insufficient water infrastructure, specifically water supplies, will threaten the reliability of the state's electrical grid during prolonged drought conditions. In 2023 Texas witnessed one of its hottest summers on record, precipitating record-breaking electricity demands as homes and businesses increased air conditioning use. In the meantime, severe drought conditions spread throughout the state, including central and eastern portions of Texas.[43] That August, the Electric Reliability Council of Texas (ERCOT) reported more than 25% of the grid's dispatchable electricity generation was at risk of having insufficient water supplies over the subsequent 18 months to sustain operations.[44] Had these severe drought conditions persisted into 2024 as had happened during previous multi-year droughts, then a substantial portion of Texas' dispatchable generating capacity needed for reliable electricity service would have been at risk of interruption.

The interruption of dispatchable electricity generation due to the scarcity of reliable water supplies would inflict substantial damages on Texas' economy. A recent study that quantified the value of lost electricity load to medium and large commercial customers within the ERCOT region suggests that the cost of each unserved megawatt hour of electricity is approximately $35,000 for a one-hour outage, trailing down to $13,500 per megawatt-hour for a 16-hour outage.[45] At $13,500 per MWh, each 1,000 MW of generation capacity shortfall could trigger daily economic losses of more than $320 million. If recent history serves as an instructive guide, the electricity interruptions during Winter Storm Uri in February 2021, contributed to over $100 billion in losses for Texas.[46]

[43] U.S. Drought Monitor, Texas Drought Map, August 15, 2023.
[44] Electric Reliability Council of Texas (ERCOT), ERCOT Drought Risk Analysis: 2023, page 1. Gabriel Collins, Prospective Costs & Consequences of Insufficient Water Infrastructure Investments in Texas, 2024, [manuscript submitted for publication].
[45] Charles Gibbons, Sanem Sergici, "Value of Lost Load Study for the ERCOT Region," The Brattle Group, August 19, 2024, page 3.
[46] Garrett Golding, Anil Kumar and Karel Mertens, "Cost of Texas' 2021 deep freeze justifies weatherization" Federal Reserve Bank of Dallas, April 15, 2021.

Aging, deteriorating water and wastewater systems will inflict economic damages

Aging, deteriorating water and wastewater systems present distinct obstacles to economic growth and financial stability. Unreliable water service, whether caused by a broken water main or a failing pump, interrupts everyday civic and business activity. Restaurants and hotels close, manufacturers stop operations, and families search for bottled or hauled water to meet their needs. Over the past few years water system failures within several Texas cities, including Zavalla,[47] Odessa,[48] and Toyah,[49] to name a few, adversely affected communities' quality of life. Even boil water notices, which are sometimes symptomatic of failing systems, can inflict upheaval within an affected area. In November 2022, Houston issued a city-wide boil water notice, prompting area schools to close for several days and families to scramble for child-care options.[50] Lastly, improperly treated drinking water and wastewater present a threat to human health and safety. Contaminated drinking water can sicken entire communities, as happened in Milwaukee, Wisconsin when cryptosporidium contaminated the city's water system in 1993. Similarly, failing wastewater systems increase exposure to harmful parasites, viruses and bacteria.

Failing water systems will exact their economic toll over time. These costs come in the form of foreclosed or diminished business activity across multiple economic sectors, health care expenses and families' efforts and expenses towards obtaining safe water. While there is no Texas-specific study of the economic impacts attributable to aging, deteriorating water and wastewater systems, the Value of Water Campaign has released a series of reports in partnership with the American Society of Civil Engineers describing these costs at the national level. These reports found that failing water systems, left unaddressed, could contribute to a cumulative national GDP loss of $3.6 trillion dollars by year 2039.[51] This decline would precipitate the nationwide loss of 636,000 jobs per year. In addition to these macroeconomic impacts, American households will spend upwards of $5.3 billion annually by 2029, and over $17 billion per year in 2039, towards finding alternative water supplies and cleaning up after sewer overflows.[52] The Value of Water Campaign also estimates that between 2019 and 2039 US households will spend nearly $9.5 billion in cumulative health-care costs attributable to failing water and wastewater systems.[53]

US Economic Costs Attributable to Failing Water & Wastewater Systems

Cumulative GDP Loss (2019-2039)	**$3.6 Trillion**
Daily GDP Loss	**$30 Billion**
Annual Total Household Impact (2039)	**$17 Billion**
Cumulative Health Care Costs (2019-2039)	**$9.5 Trillion**

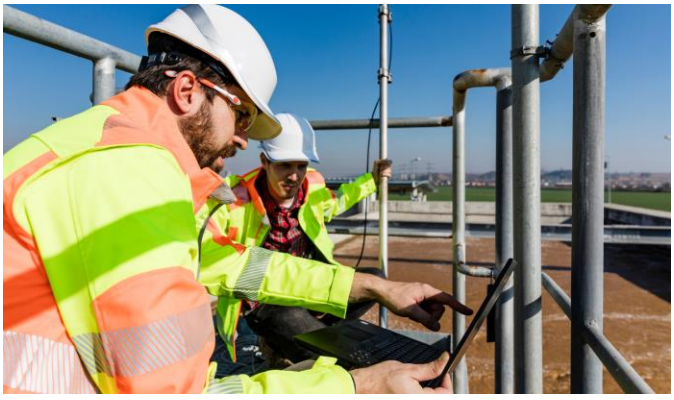
[47] Pooja Salhotra, "An East Texas town must boil its water on Thanksgiving as officials seek a solution to aging infrastructure," Texas Tribune, November 23, 2022.
[48] Carlos Nogueras Ramos, "After three citywide water outages, Odessa will invest $25 million to fix infrastructure," Texas Tribune, July 17, 2024.
[49] Mitch Borden, "Toyah residents struggle to access clean water as boil water notice stretches on for years," Marfa Public Radio, April 14, 2023.
[50] Hannah Dellinger, John Wayne Ferguson, "HISD cancels class again Tuesday due to boil water notice," Houston Chronicle, November 28, 2022.
[51] Value of Water Campaign, The Economic Benefits of Investing in Water Infrastructure: How Failure to Act Would Affect the US Economic Recovery, 2020, page 22. The original report, published in 2020, observed a GDP loss of $2.9 trillion in 2019 dollars. This analysis updates that estimate to account for recent inflation.
[52] Value of Water Campaign, 2022, page 24. Cost estimates updated to 2024 values.
[53] Value of Water Campaign, 2022, page 25. Cost estimates updated to 2024 values.

Analysis of the Value of Water Campaign's data reveals that Texas could endure substantial economic impacts attributable to aging, deteriorating drinking water and wastewater systems. Using the statistical basis that Texas accounted for an average of 8.83% of US GDP and 8.11% of US households over that past decade provides more granular insights into how much failing water infrastructure will cost Texas' economy and families.[54] Applying Texas' share of US GDP to the Value of Water Campaign's data suggests that between 2020 and 2039, water service interruptions due to decaying infrastructure could contribute to a cumulative state GDP loss of $317.9 billion.[55] Unreliable water and wastewater infrastructure will cost Texas households and families $430 million by 2029, and nearly $1.4 billion in 2039.[56] Lastly, water contamination attributable to failing drinking water and wastewater systems will cost Texas families, and also state and local governments, a total of at least $770 million by 2039.

The costs attributable to failing water and wastewater systems will escalate over time. Just as unreliable water infrastructure will trigger immediate problems for Texas' businesses and families as they cope with boil water notices or scrounge for bottled water, the persistence of these problems will accrue economic damages over the next 20 years that nearly equal the size of the current two-year state budget. These economic costs and impacts will escalate as Texas' water and wastewater systems continue their march towards – and in some cases past – the end of their useful life.

Texas' Economic Costs Attributable to Failing Water & Wastewater Systems

Cumulative GDP Loss (2019-2039)	**$317.9 Billion**
Annual Total Household Impact (2039)	**$1.4 Billion**
Cumulative Health Care Costs (2019-2039)	**$770 Million**



[54] These percentages were determined by analyzing US and Texas household and GDP data available through the U.S. Census Bureau and the U.S. Bureau of Economic Analysis.
[55] This value was determined by multiplying 8.83% (Texas' average share of US GDP between 2014 and 2023) by $3.6 trillion (the inflation-adjusted cumulative US GDP losses by 2039 reported by the Value of Water Campaign).
[56] These values were determined by multiplying 8.11% (Texas' average share of US households between 2013 and 2022) by $5.3 billion and $17 billion (the inflation-adjusted US household impacts for 2029 and 2039 reported by the Value of Water Campaign).

CHAPTER 3

Texas Underfunds Water Infrastructure Needs

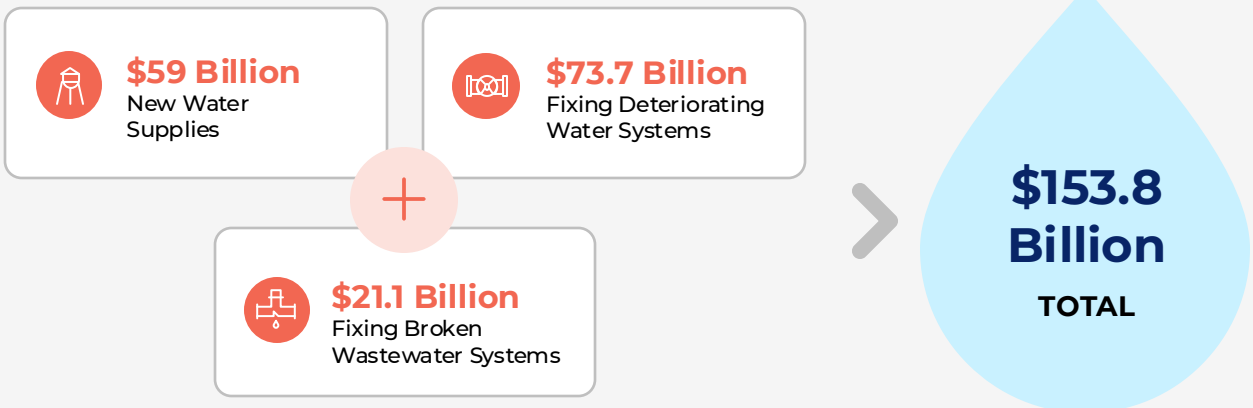
Texas will need to invest at least nearly $154 billion over the next 50 years in order to address its water infrastructure challenges. This figure reflects the inflation-adjusted cost estimates included in the 2022 State Water Plan and the US Environmental Protection Agency's (EPA) recent community needs assessments for drinking and wastewater infrastructure. Unfortunately, despite recent state and federal funding initiatives, the State of Texas remains behind the curve for keeping pace with needed water infrastructure investments. Texas 2036 estimates a long-term water infrastructure funding gap of at least $112 billion.

Texas' 50-year price tag for reliable water infrastructure: $153.8 billion

The 2022 State Water Plan recommends over 2,400 water supply projects needed to deliver reliable water supplies in the event of a repeat of the drought of record. These projects include new reservoirs, desalination plants, aquifer storage and recovery facilities, water reuse, conservation programs, and new groundwater wells, to name a few. The inflation-adjusted 50-year price tag for these projects equals $100 billion.[57] Part of this $100 billion will be paid by local water users through rates or fees. The remaining $59 billion in water supply project costs will require state financial assistance, however. These cost estimates are only for developing the new water supplies needed to answer Texas' anticipated water supply deficit during a drought of record. They do not include the cost attributable to the replacement of existing water and wastewater systems.

Data from the US EPA identifies the costs associated with addressing aging, deteriorating water and wastewater systems over the next 20 years. In 2023, the EPA released its 7th Drinking Water Infrastructure Survey and Needs Assessment.[58] This survey gauges the price tag for Drinking Water State Revolving Fund (DWSRF)-eligible projects, including the installation of new drinking water plants and the replacement or rehabilitation of existing systems. According to the 2023 assessment, and adjusting for inflation, Texas will have $73.7 billion in drinking water infrastructure needs between 2021 and 2040.[59]

Texas' 50-Year Water Infrastructure Financial Assistance Needs



Sources: 2022 Texas State Water Plan, US EPA. Cost estimates reflect 2024 values.

[57] The total capital costs for projects recommended in the 2022 State Water Plan equals $80 billion in 2018 dollars. (TWDB, 2022State Water Plan, page 133) Using an online inflation calculator, this $80 billion price tag equals $100 billion in 2024 dollars.

[58] US Environmental Protection Agency (USEPA), Drinking Water Infrastructure Needs Survey and Assessment, 7th Report to Congress, September 2023.

[59] EPA's original cost estimate for Texas equaled $61.3 billion in January 2021 dollars. The revised $73.7 billion estimate was calculated by using the US Bureau of Labor Statistics' Consumer Price Index Inflation Calculator to determine July 2024 values.

The EPA released a similar assessment for wastewater infrastructure in 2024.[60] This assessment identifies the capital investments needed for compliance with the US Clean Water Act between 2022 and 2041. Relevant projects include wastewater treatment plants, sewer systems, stormwater facilities, and nonpoint source controls. The EPA estimated that Texas's wastewater utilities will have $18.9 billion in wastewater infrastructure needs between 2022 and 2041. Adjusted for inflation, this figure equals $21.1 billion in 2024 dollars.[61]

The $153.8 billion cost estimate for Texas' long-term water infrastructure needs does not account for other factors that could make these costs higher over time. For example, the cost estimates in the State Water Plan do not account for future inflation. This means that the $100 billion in water supply projects costs and the $59 billion in state financial assistance needs could be higher if the United States endures inflationary periods similar to (or worse than) that between 2022 and 2024.

Further, the EPA's drinking water and wastewater community needs surveys are for project needs between now and 2040 and 2041. It is reasonable to assume that, as drinking water and wastewater systems continue to age and deteriorate, and are challenged to meet the requirements of the US Safe and Clean Water acts, that these costs will continue to escalate by 2070. For example, based on the observation that the EPA's cost estimates for the Drinking Water Community Needs assessments have increased by an average of 35.4% since the first assessment was released in 1997, the projected costs for a survey released in 2043 for project needs between 2041 and 2060 could equal $279.1 billion. [62] It should also be noted that the EPA's estimates are for compliance with existing federal water regulations. They do not account for aging, deteriorating utilities that are compliant with federal regulations but also lack the financial capacity to rehabilitate their systems.

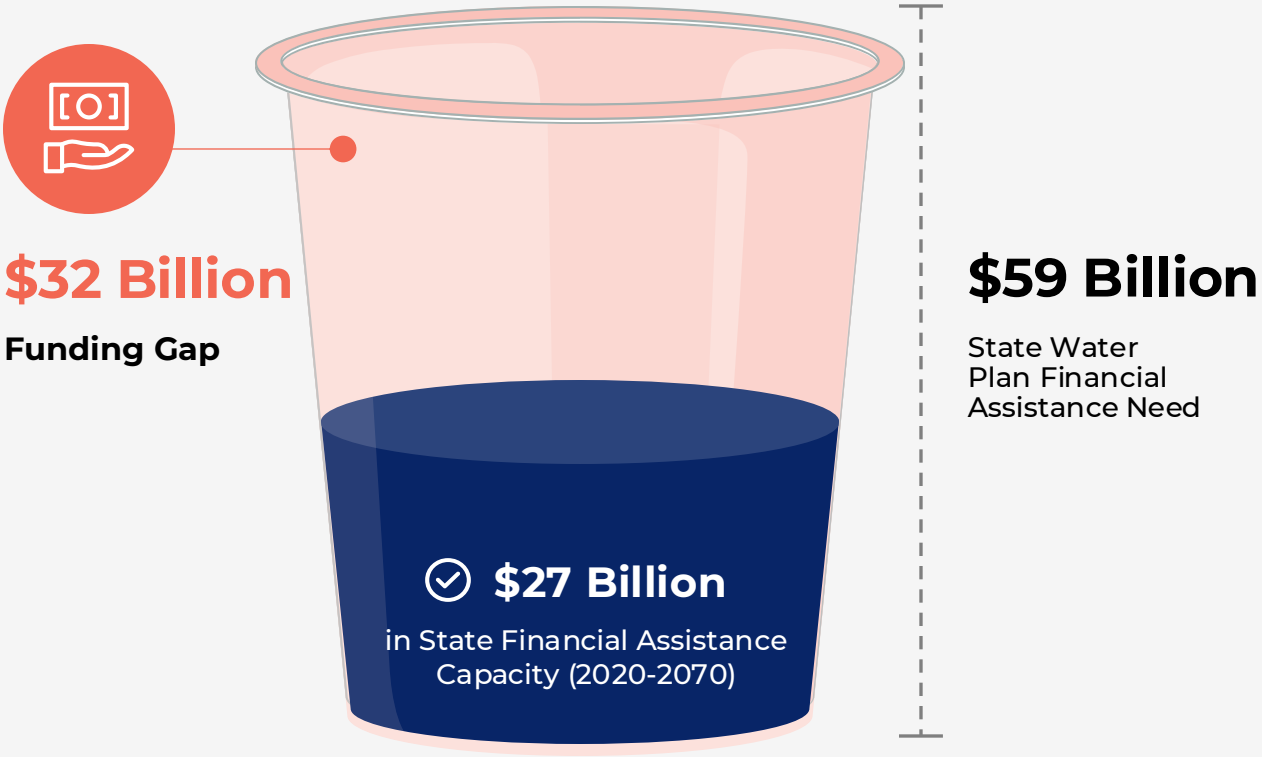
Lastly, the $153.8 billion cost estimate applies to only water infrastructure, including water supplies, and drinking and wastewater systems. This figure does not include the capital expenditures needed for flood control and mitigation projects. The 2024 State Flood Plan released by the Texas Water Development Board in August 2024 includes 4,609 flood risk reduction solutions with an estimated total implementation cost of more than $54.5 billion.[63]

[60] USEPA, 2022 Clean Watersheds Needs Survey, Report to Congress, April 2024.
[61] EPA's original cost estimate for Texas equaled $18.9 billion in January 2022 dollars. The updated, inflation-adjusted figure was calculated by using the US Bureau of Labor Statistics' CPI Inflation Calculator to determine July 2024 values.
[62] EPA's drinking water needs assessments have increased an average of 35.4% since they were first published in 1997. The non-inflation adjusted cost estimates for Texas' drinking water infrastructure needs within EPA's seven community needs assessments were $12.4 billion (1997 assessment), $13.1 billion (2001 assessment), $28.2 billion (2005 assessment), $26.1 billion (2009 assessment), $33.9 billion (2013 assessment), $45.2 billion (2018 assessment), and $61.3 billion (2023 assessment). The average rate of increase between these assessments equals 35.4%.
[63] Texas Water Development Board, 2024 State Flood Plan, 2024, page 2.

Texas' water infrastructure funding gap: $112 billion

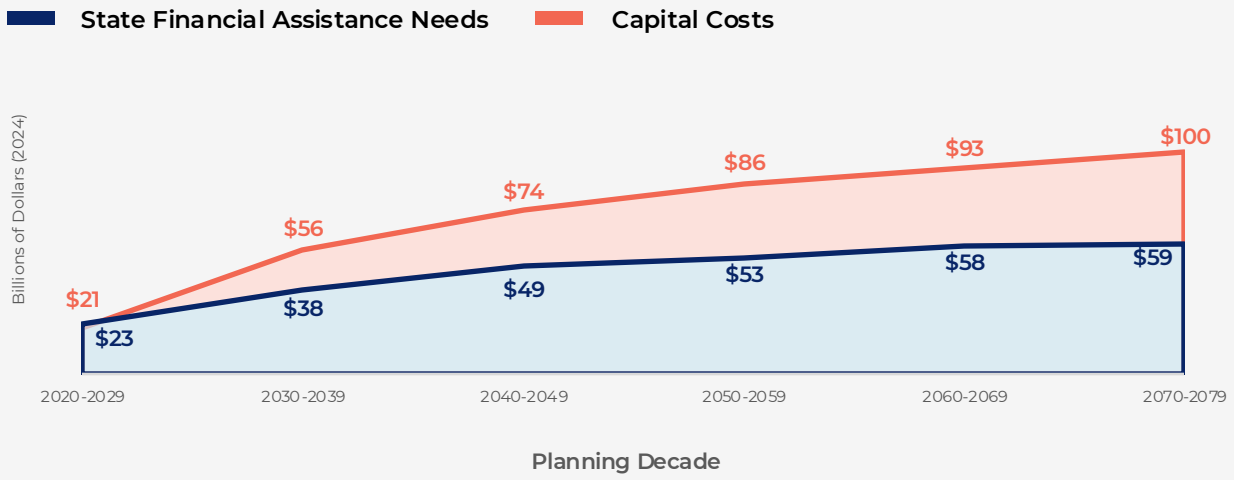
Despite the significant and escalating costs associated with Texas' water infrastructure needs, the state's financial assistance effort lags behind the estimated needs. Consequently, substantial funding gaps exist between the amount of financial assistance needed for water supply and drinking and wastewater projects and the amount of financial assistance that has been and is projected to be provided over the next decades.

State Water Plan Funding Gap: $32 Billion by 2079



The capital costs of recommended water supply projects and management strategies in the 2022 State Water Plan needed to prepare Texas for the next long, severe drought equals $80 billion. Of this $80 billion, $47 billion will require state financial assistance – in the form of state-originated low-interest loans or grants – over the next 50 years. The remaining $33 billion would be paid by local ratepayers. These figures were based on 2018 dollar values, however. A revised cost estimate that accounts for inflation since 2018 reveals that the State Water Plan's project costs are 25% higher than the figures provided in the original report. These updated cost estimates are depicted within the chart, *Inflation Adjusted 2022 State Water Plan Capital Costs & Financial Assistance Needs (2020-2079)*, below.

Inflation Adjusted 2022 State Water Plan Capital Costs & Financial Assistance Needs (2020-2079)



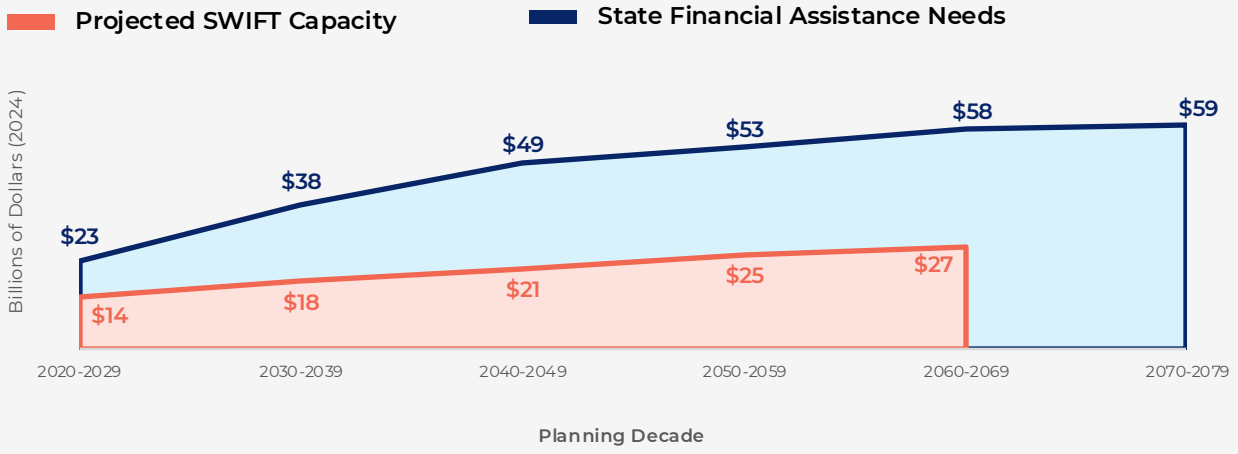
As depicted in the chart, the aggregate capital cost for water supply projects in the 2022 State Water Plan will total $100 billion by the 2070s. Over one half of these costs will require state financial assistance in the form of either below market interest rate loans or grants. By the 2030s at least $38 billion in state financial assistance will be required. The amount of state financial assistance effort required for recommended State Water Plan projects grows to $59 billion by the 2070s.

Despite TWDB's progress towards funding State Water Plan projects through the State Water Implementation Fund for Texas (SWIFT) and other agency programs, the State of Texas lags in the financial effort needed to fund the water supply projects needed over the next 50 years. The SWIFT was created in 2013 for the purpose of providing low-interest loans for water infrastructure projects in the State Water Plan. At the time of its creation, the SWIFT was designed and capitalized to finance $27 billion in State Water Plan projects over 50 years.[64] As of August 2024, the SWIFT has made nearly $14.5 billion in financial commitments, of which at least $13.7 billion reflects state financial assistance needs in the current State Water Plan.

[64] Texas Water Development Board, "State Water Implementation Fund for Texas (SWIFT)," accessed on August 20, 2024.

The SWIFT lacks the capacity to provide the $59 billion in state financial assistance needed over the next 50 years for State Water Plan projects. Given the SWIFT's historic funding commitments, the program's decade-old legislative directive to finance $27 billion in water projects over 50 years, and accelerating demands for state financial assistance for water supply projects, Texas faces a long-term funding gap of $32 billion for needed water supply projects. The chart, *State Financial Assistance Needs vs. Projected SWIFT Capacity (2020-2079)*, illustrates the magnitude of this funding gap. Between this decade and that of 2060, the last decade of the SWIFT's anticipated life cycle, state financial assistance needs are projected to increase at a rate of more than double the SWIFT's capacity. Further, given the SWIFT's 50-year operational horizon, it's hard to determine if the program will be capable of providing financial assistance after the 2060 decade.

State Financial Assistance Needs vs. Projected SWIFT Capacity (2020-2079)



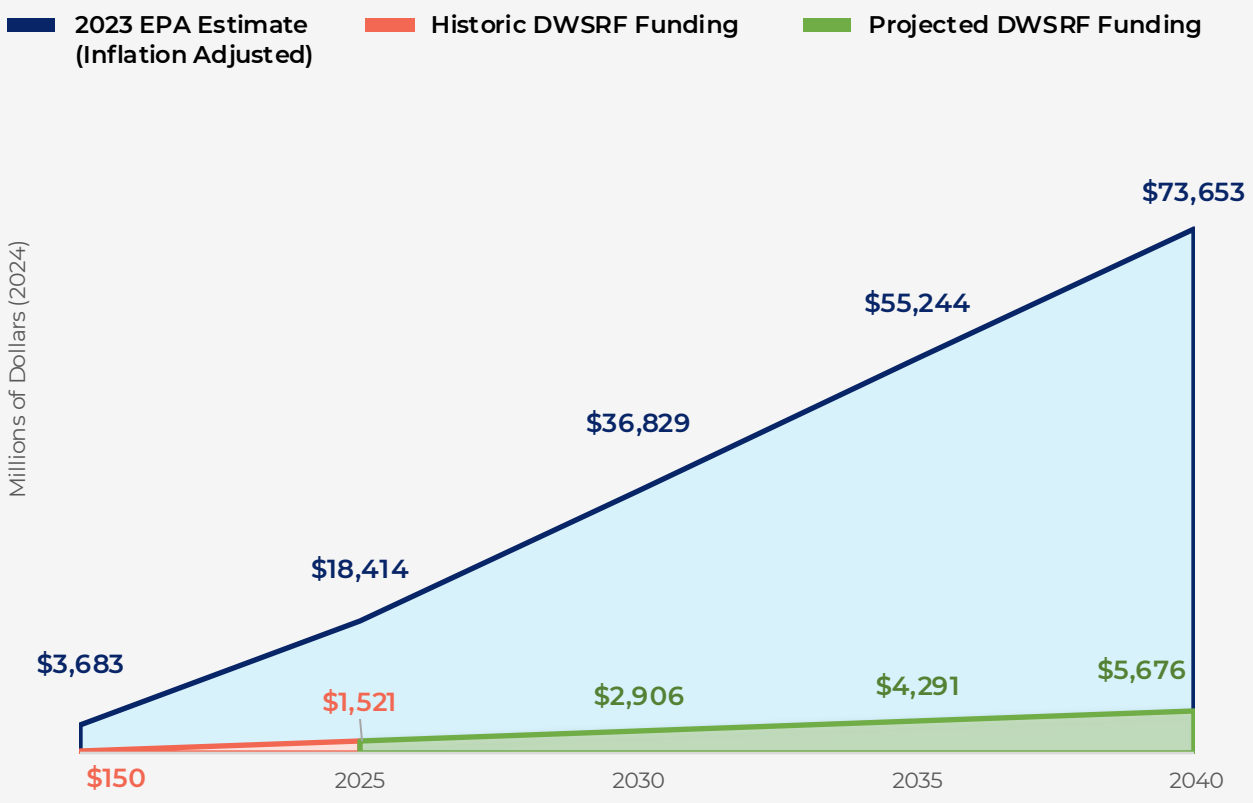
Other state financial assistance programs administered by TWDB have also funded projects listed in the State Water Plan. Since 2014, the state's revolving funds, Water Development Fund, and Economically Distressed Areas Program (EDAP), have provided over $1.4 billion in financial assistance for projects that are listed – entirely or in part – in the current or previous State Water Plans. While the efforts of these programs are significant, their funding variability combined with greater state reliance on the SWIFT, makes it difficult to determine how much funding they may contribute in future decades.

Texas' long-term funding gap for State Water Plan projects likely exceeds $32 billion. While the revised state financial assistance needs estimates account for the recent inflationary environment, they do not account for continued inflationary pressures or the rising costs attributable to public works projects.

Drinking Water Infrastructure Funding Gap: $68 Billion by 2040.

The EPA's 2023 7th Drinking Water Infrastructure Survey and Needs Assessment projects that Texas' drinking water utilities will require $61.3 billion in financial assistance over the next 20 years based on January 2021 dollars.[65] After adjusting for inflation, this cost estimate increases to nearly $73.7 billion. The chart, *Drinking Water Infrastructure Financial Assistance Needs vs. State Historic and Projected Funding (2021-2040),* depicts the level of state and federal funding effort required to achieve this level of financial assistance over the next 20 years. Between 2021 and 2025, TWDB has made a total of $1.5 billion available through the Drinking Water State Revolving Fund (DWSRF), well below the projected funding effort required. Using the assumption that future state and federal funding efforts for the DWSRF will match the annual average over the past decade ($277 million per year), Texas is on-track to provide a mere $5.7 billion in financial assistance through the DWSRF. This falls nearly $68 billion below the inflation-adjusted EPA estimate for required funding by 2040.

Drinking Water Infrastructure Financial Assistance Needs vs. State Historic & Projected Funding (2021-2040)

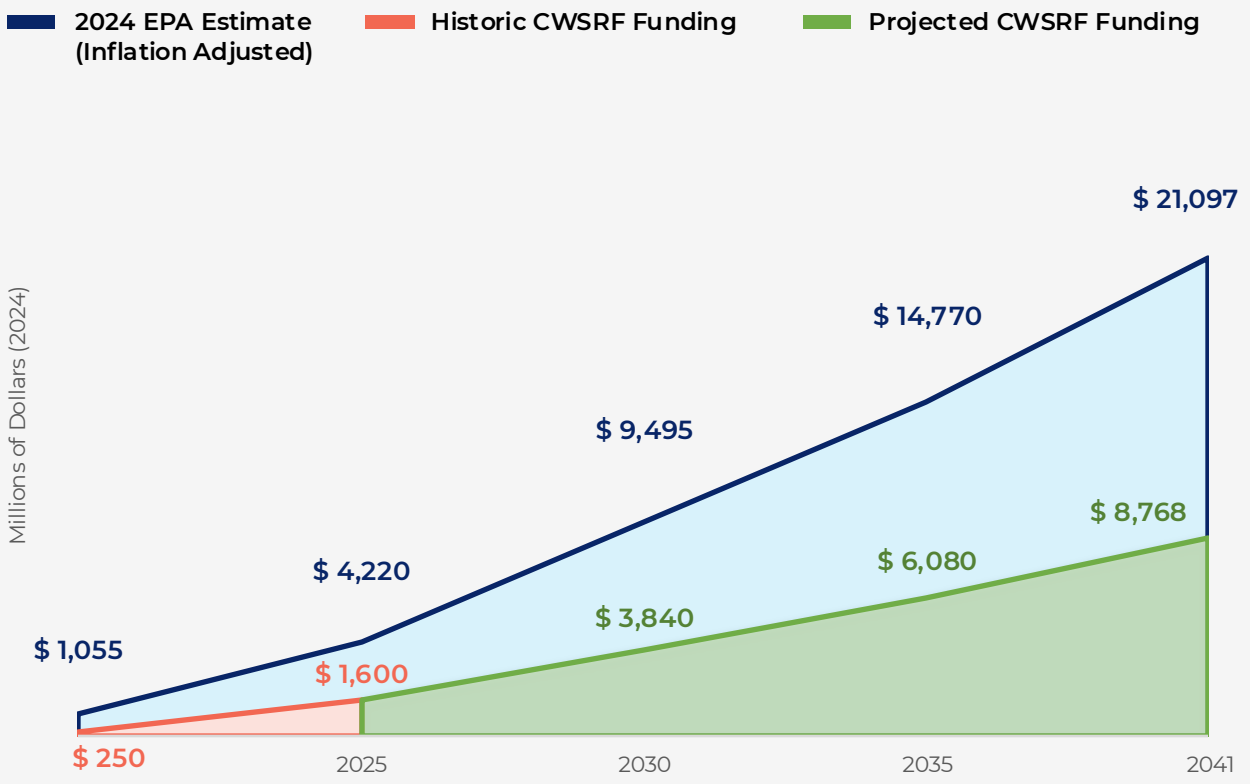


[65] USEPA, Drinking Water Infrastructure Needs Survey and Assessment, 7th Report to Congress, September 2023, page 14.

Wastewater Infrastructure Funding Gap: $12.3 Billion by 2041.

In April 2024 the EPA released its 2022 Clean Watershed Needs Survey assessing the financial assistance needs for state wastewater infrastructure. EPA's assessment, based on January 2022 dollars, estimated that Texas' wastewater operators would need $18.9 billion between 2022 and 2041.[66] Adjusted for inflation, that figure equals $21.1 billion in July 2024 dollars. The chart, *Wastewater Infrastructure Funding Needs vs. Historic and Projected Funding (2022-2041)*, includes these inflation-adjusted projections. Between state fiscal years 2021 and 2025, TWDB has allocated $1.6 billion through the Clean Water State Revolving Fund (CWSRF) towards eligible wastewater and stormwater projects. Assuming that the state and federal CWSRF funding effort between now and 2042 may equal the average annual funding effort from the past decade ($448 million per year), then the state will be able to provide $8.8 billion in financial assistance for wastewater improvement projects. This analysis indicates a long-term funding gap of $12.3 billion for Texas' wastewater infrastructure financial assistance needs.

Wastewater Infrastructure Funding Needs vs. Historic and Projected Funding (2022 – 2041)



[66] USEPA, 2022 Clean Watersheds Needs Survey, Report to Congress, April 2024, page 13.

Texas' Total Water Infrastructure Funding Gap: At Least $112 Billion.

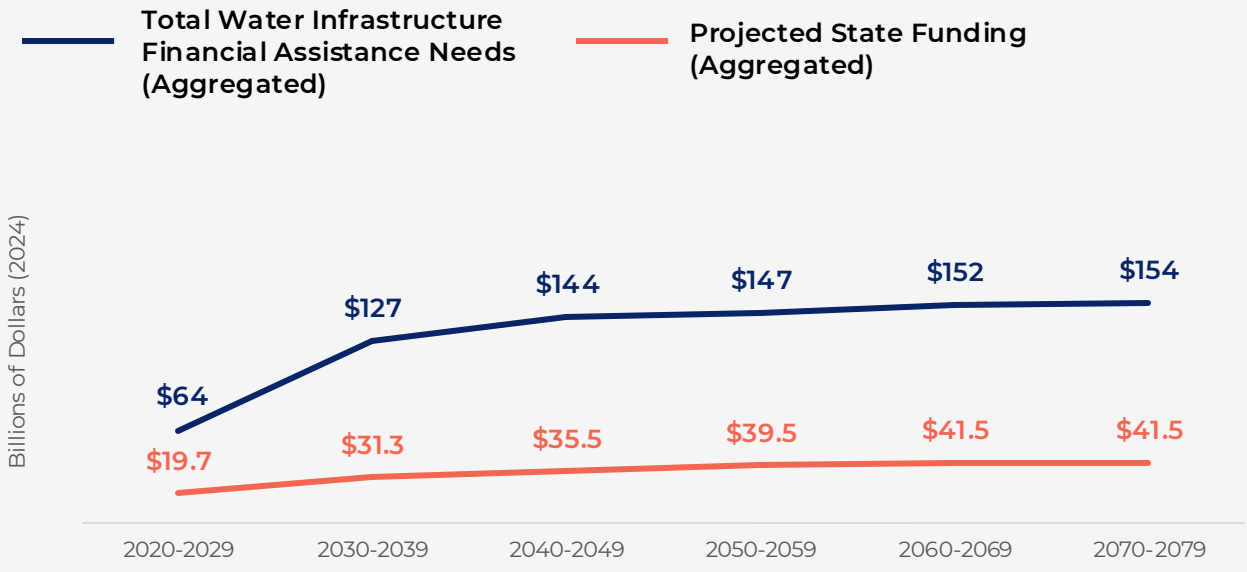
Based on existing financial needs assessments adjusted for inflation, and the historic and projected state and federal water infrastructure funding efforts, Texas faces a long-term water

infrastructure funding gap of at least $112 billion over the next 50 years. While the chart, *Texas' Water Infrastructure Funding Gap (2020-2079)*, provides a snapshot of this funding gap based on the analyzed data, several variables will affect the future estimates. Those variables that could affect the long-term financial assistance needs estimates include:

- Future State Water Plans may include different (higher or lower) state financial assistance needs estimates for water supply projects than the values reported in the 2022 plan.
- The financial assistance needs for aging, deteriorating drinking and wastewater infrastructure are based on EPA estimates through years 2040 and 2041. Future EPA estimates extending past these years may be higher than the values used for this assessment. (A review of all seven of EPA's drinking water community needs surveys since 1997 found that the financial assistance needs estimates for Texas increased an average of 35% every four years.)

Texas' Water Infrastructure Funding Gap (2020-2079)

Based on Existing Inflation Adjusted Cost Estimates and Projected Funding Efforts



This funding gap analysis also includes the following assumptions about the state's funding efforts for water infrastructure:

- The SWIFT will provide at least $27 billion in financial assistance through the 2060s. This analysis does not include the assumption that the SWIFT's capacity will expand or extend beyond the 2060s.

- State Clean and Drinking Water revolving fund funding efforts are projected through 2040 and 2041. This funding gap analysis does not project future state or federal SRF funding efforts past these years. The continuation of water infrastructure funding through these programs past 2040 and 2041 will increase the amount of projected state and federal funding. This increase would likely be offset by the rising costs attributable to the continued aging and deterioration of drinking water and wastewater systems.

Lastly, this funding gap analysis does not include the impact of the recently-created Texas Water Fund. While the one-time $1 billion appropriation to the Fund by the 88th Legislature will work to close this funding gap, and may be leveraged with existing bond programs to close it slightly further, it's too early to gauge the success of this effort.

A separate hypothetical analysis developed by Texas 2036 based on the assumption that the costs attributable to aging and deteriorating drinking water systems continue to escalate according to current projections, while state and federal revolving fund efforts continue into the 2070s based on the previous decade's funding effort, reveals a substantial widening of the anticipated funding gap. In this hypothetical example, the funding gap grew from nearly $44 billion in the current decade, to over $260 billion by 2079.

Despite recent state water infrastructure funding initiatives, including the creation of the SWIFT in 2013 and the Texas Water Fund in 2023, Texas has not applied the funding effort needed to address anticipated long-term funding gaps. Further, it is hard to predict whether future federal funding efforts will work to ameliorate this water infrastructure funding gap. Although the US Infrastructure Investment and Jobs Act of 2021 represented a slight course-correction in decades of declining federal spending on state and local water infrastructure, recent congressional earmarks have detracted from this effort. Given the projected magnitude of these funding gaps – for both needed water supply projects for drought times and fixing aging, deteriorating water and wastewater systems – Texas needs its own consistent and sustained funding effort.

CHAPTER 4

Reliable Water Infrastructure Funding Supports Economic Growth and Development

Texas' policy makers have a proven track record for adopting financial strategies aimed towards addressing long-term infrastructure needs. In 2014 and 2015, the state dedicated portions of sales and severance tax collections towards the state highway fund for the purposes of funding needed transportation projects for a growing state. In 2019, both the Legislature and state voters approved the dedication of sporting goods-related sales tax collections for the development of state parks and historic sites. More recently, and in response to the growing need for reliable, dispatchable electricity generation, the Legislature appropriated $5 billion to the Texas Energy Fund.

Texas' long-term success with regard to addressing its water infrastructure needs, and closing the anticipated funding gaps, hinges on the magnitude and duration of future funding commitments. While the $1 billion appropriated to the newly-created Texas Water Fund will certainly help advance the development of needed water supply and infrastructure rehabilitation projects, this one-time effort falls short of the $112 billion in projected unmet financial assistance needs the coming decades.

Fortunately, the Texas Water Code includes the legal authorization for several water infrastructure funds that work to address water infrastructure needs. The SWIFT, created in 2013, provides low-interest loans for water supply projects identified in the State Water Plan. Monies within the newly-created Texas Water Fund may be transferred to other TWDB-administered funds, including the SWIFT, Rural Water Assistance Fund, Water Assistance Fund, and the Texas Water Development Fund, to underwrite water supply and drinking and wastewater infrastructure projects. The 88th Legislature smartly designed the new fund to work in concert with other existing water program funds. This structure provides TWDB with the flexibility needed to allocate monies from the Texas Water Fund to other program funds tailored for certain water infrastructure project types and entities. Legally – and on paper – the State of Texas has the financial framework needed to support continued water infrastructure investments. The creation of new, additional water funds within the Texas Water Code is not needed at this time.

The success of the funds authorized within the Texas Water Code towards meeting their designed purposes depends on the extent of their capitalization, however. This section includes a series of recommendations aimed towards establishing a dedicated revenue stream for Texas' water funds that will enable those programs established by statute to work towards addressing the state's long-term water infrastructure challenges.

Recommended two-step financial strategy for the 89th legislature: dedicated funding and an additional appropriation

Step 1: Establish a dedicated revenue stream for the Texas Water Fund.

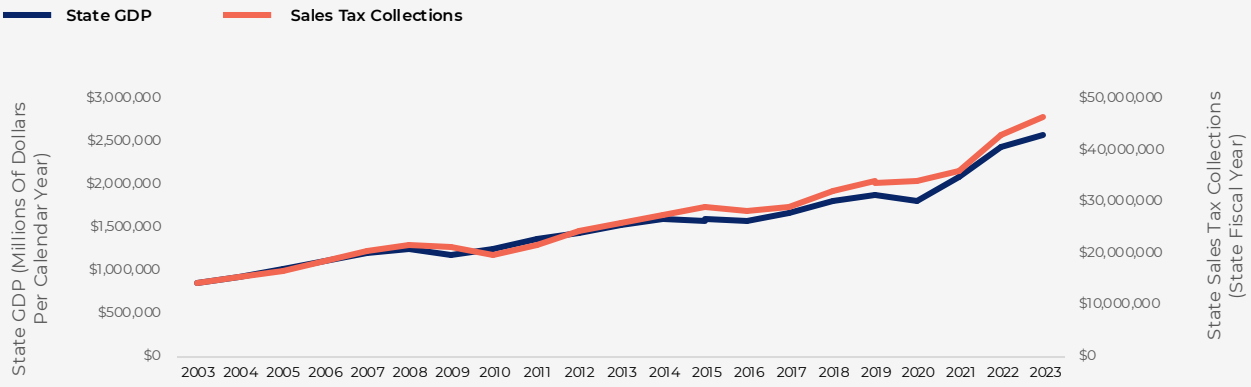
State policy makers have a basket of options available for dedicating funding for water infrastructure needs. One option would be to dedicate a set portion of sales tax collections to the Texas Water Fund. This follows the model for state highway funding approved by the Legislature and voters in 2015, where $2.5 billion of sales tax collections after the first $28 billion in collections are directed to the State Highway Fund. Another option could be to dedicate a portion of the collection of sales taxes attributable to the sale of goods and services associated with the use of state water resources (i.e. a "state water good sales tax dedication") to the Texas Water Fund. This model approximates the state sporting goods sales tax dedication approved by the Legislature and voters in 2019.

Other funding options include dedicating a portions of severance tax revenues, as currently done for state highway funding, or reallocating funds that would go towards the state's Economic Stabilization Fund (aka the "Rainy Day Fund") once ESF deposits have reached their constitutionally-authorized limit. These funding methods are volatile, however, and may not yield the consistent revenues needed for addressing the state's water infrastructure funding gap.

Given the volatility attributable to other funding streams, the dedication of sales tax revenues would provide more reliable funding for water infrastructure needs. This is because state sales tax collections grow in concert with greater state economic activity. The chart, *Texas GDP and Sales Tax Collections (2003-2023)*, illustrates this relationship. Between 2003 and 2023, state sales tax collections increased by 226%, while state GDP grew by 207%.[67] As will be discussed in this chapter, Texas' sales tax collection growth has provided reliable funding for transportation infrastructure. As the state's economy continues to grow and expand, the continued increase in sales tax revenues offer the reliable funding stream needed to underwrite Texas' long-term water infrastructure needs.

[67] State GDP data obtained from U.S. Bureau of Economic Analysis, "SAGDP1 State annual gross domestic product (GDP) summary" (accessed Tuesday, October 8, 2024). State sales tax data obtained from Office of the Texas Comptroller, "Historical All Funds Revenues Data FY 2003-2024."

Texas GDP and Sales Tax Collections (2003-2023)



As part of this recommendation, the amount of sales tax revenues dedicated to the Texas Water Fund should be at least $1 billion per state fiscal year. The dedication may begin in state fiscal year 2027 (September 2026-August 2027), and expire in FY 2053 with the option for a legislative renewal.

A $1 billion per year dedicated revenue stream would direct $25 billion to the Texas Water Fund over 25 years. If these funds are leveraged with TWDB's existing bonding authority – including its constitutionally-authorized evergreen general obligation bonding authority and revenue bonding authority under the State Water Implementation Revenue Fund for Texas (SWIRFT) – they could be used to underwrite a substantially larger portion of the state's financial assistance needs depending on the type of financial assistance provided. For comparative reference, the SWIFT, which was capitalized with $2 billion in 2013, is directed to provide at least $27 billion in financial assistance when leveraged with general obligation and revenue bond programs

Step 2: Recapitalize Texas Water Fund with an interim endowment

The Texas Water Development Board has swiftly, and prudently worked to allocate the initial $1 billion in funding for the Texas Water Fund. Should state leaders face another budget surplus during the 89th Regular Session, the Texas Water Fund should receive an additional endowment using available surplus funds. Towards that end, it is recommended that at least $5 billion be allocated towards the Texas Water Fund. Should the Legislature and Texas voters approve a dedicated revenue stream for the Fund, and the dedication takes effect in FY 2027, this additional one-time deposit would serve as needed "bridge" financing in the interim.

Dedicated funding for water infrastructure requires enhanced legislative oversight and transparency

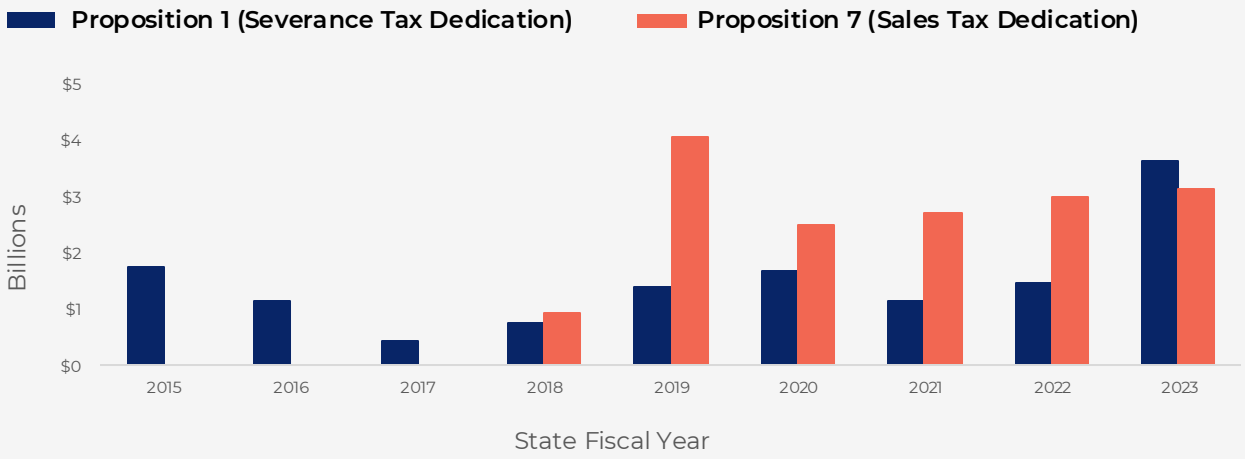
A dedicated revenue stream offers consistent, reliable funding for long-term water infrastructure needs. This funding mechanism redirects the use of funds that would have been subject to legislative oversight through the appropriations process, however. While the Legislature would retain a level of oversight over the Texas Water Development Board through the appropriations and Sunset review processes, the following recommendations aim to enhance the transparency of TWDB's use of dedicated revenues

- Expand the jurisdiction of the State Water Implementation Fund for Texas Advisory Committee to include oversight of the Texas Water Fund.
- Require that TWDB provide an annual report to the Legislature on Texas Water Fund activities, including water supply and infrastructure projects receiving financial assistance from the Fund.
- Require that TWDB develop a publicly-facing project tracker that quantifies progress made towards addressing the state's water supply deficit and aging, deteriorating water systems.

Dedicated water infrastructure funding builds on existing state policies for infrastructure needs

A dedicated revenue stream for water infrastructure replicates the successful funding model already used for state transportation projects. In 2014, state voters approved Proposition 1 authorizing the dedication of a portion of oil and natural gas severance tax collections to the State Highway Fund.[68] Despite the variability in severance tax collections attributable to volatility within the oil and natural gas markets, this dedication has yielded an average of $1.6 billion per year for the Fund since its authorization. One year later, in 2015, voters approved Proposition 7 dedicating a portion of sales tax collections to the State Highway Fund.[69] Since FY 2018 this sales tax dedication has delivered an average of $2.7 billion per year for Texas' roads and highways. The chart, *Annual Transportation Funding from Propositions 1 & 7 (2015-2024)*, below, depicts the annual sales and severance tax collections distributed to the State Highway Fund each fiscal year since 2015.

Annual Transportation Funding From Propositions 1 & 7 (2015 – 2024)

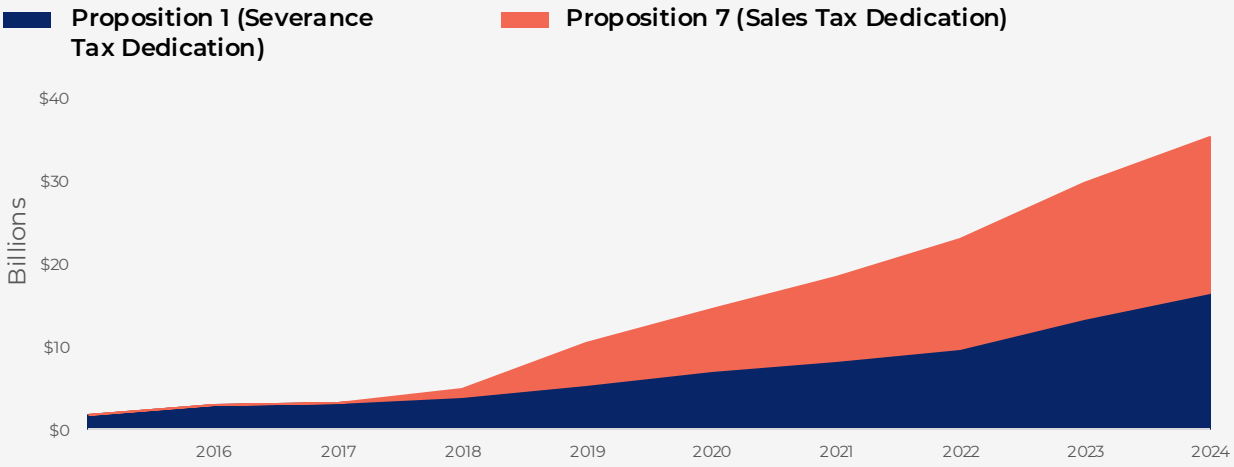


Source: Texas Department of Transportation.

Both the severance and sales tax dedications work to provide reliable, stable funding to the State Highway Fund. Between FY 2015 and 2024, a total of $16.4 billion in severance tax collections have been deposited into the fund. Proposition 7's sales tax dedication has delivered $18.8 billion for state highway projects since FY 2018. These aggregate dedications from sales and severance tax collections are depicted within the chart, *Total Transportation Funding from Propositions 1 & 7 (2015-2024),* below. This method of finance has yielded over $35 billion for the State Highway Fund over the past decade, demonstrating a proof of concept on how a dedicated revenue stream provides stable funding for needed infrastructure.

[68] Tex. S.J. Res. 1, 83d Leg., 3rd Called Session (2013).
[69] Tex. S.J. Res. 5, 84th Leg., Regular Session (2015).

Total Transportation Funding From Propositions 1 & 7 (2015 – 2024)



Source: Texas Department of Transportation.

Given the magnitude of Texas' $112 billion plus water infrastructure funding gap, and the anticipated escalation of water infrastructure funding needs, the state needs to adopt a similar method of finance for water infrastructure. This policy builds on an existing framework – already approved by the Texas Legislature and state voters – for financing needed highway projects for a growing state. A dedicated funding strategy works to finance and facilitate the expansion of roads and highways for a growing population. This same financial strategy offers reliable funding for water infrastructure and provides a firm foundation for continued economic growth.

Water infrastructure investment supports continued economic growth and job creation

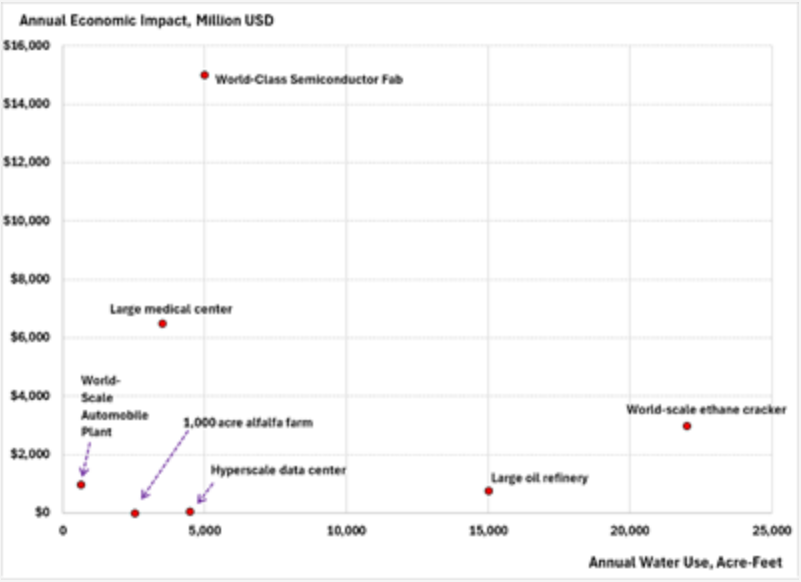
Water infrastructure investment supports continued GDP growth

Texas' economy has grown by 62% over the past decade. In 2023, the state's GDP totaled $2.583 Trillion, representing 9.3% of all US GDP.[70] This growth trajectory reflects several phenomena, including greater oil and gas production, increasing energy exports to domestic and international markets, manufacturing growth, housing expansion, industrial nearshoring, and, among others, corporate relocations to Texas. The continuation of this growth trajectory depends on three critical elements, including electric reliability, qualified workforce availability, and water infrastructure reliability.

[70] U.S. Bureau of Economic Analysis, "Table 1.1.5. Gross Domestic Product" (accessed Wednesday, October 9, 2024).

Expanding Texas' water supply portfolio accomplishes two key economic objectives. First, this effort makes Texas more resilient to future severe droughts. Second, water supplies work to support increased economic activity. According to one study, each 100,000 acre-foot increment of water supply could potentially support $30 billion in economic activity.[71] This economic potential depends on the intrinsic and generative value of the industries using the supplied water. This relationship is illustrated in the graphic, *Annual Economic Impact vs. Annual Water Use for Selected Industries*, below.

Annual Economic Impact vs. Annual Water Use for Selected Industries



Source: Gabe Collins, Prospective Costs & Consequences of Insufficient Water Infrastructure Investments in Texas, 2024, [manuscript submitted for publication].

The expansion of new industries in Texas will come with additional water demands. New petrochemical facilities, such as oil refineries and ethane plants, will require between 15,000 to 23,000 acre-feet of water per year while yielding between $750 million and $3 billion in economic impact. A similar correlation could be seen with the expansion of the hydrogen industry in Texas. New semiconductor plants will require at least 5,000 acre-feet of water per year in order to yield nearly $15 billion in annual economic value. Expansion of other industries, including automotive and aerospace manufacturing, residential construction, pharmaceutical development, and data centers, to name a few, will require reliable water infrastructure in order to yield meaningful economic returns.

The decisions to build new plants and facilities are market driven. To be sure, Texas' tax, regulatory and economic environment supports these business decisions. The availability of reliable water infrastructure, however, works as the necessary condition to guarantee their fruition

[71] Gabe Collins, Prospective Costs & Consequences of Insufficient Water Infrastructure Investments in Texas, 2024, [manuscript submitted for publication].

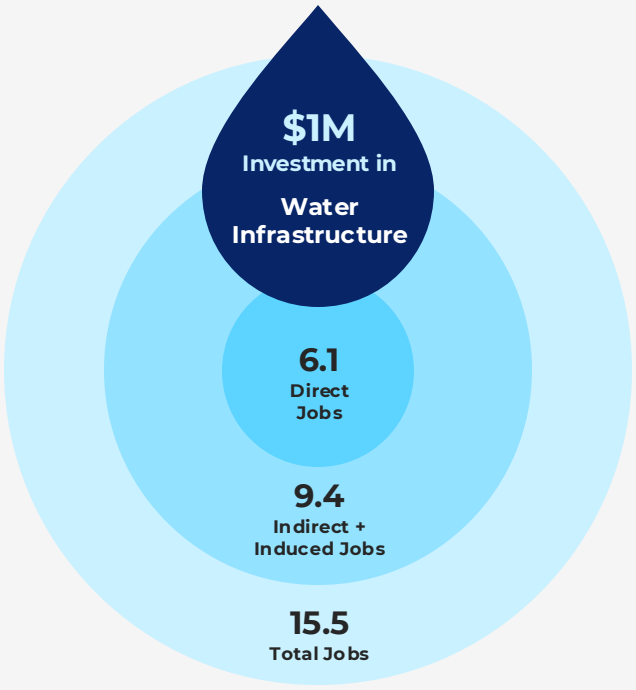
Just as reliable water supplies will support continued economic growth, addressing the problems attributable to aging, deteriorating water and wastewater systems offers to do the same. Unreliable aging, deteriorating drinking water and wastewater systems present an economic drag. Conversely, improved reliability and water quality offer enhanced productivity and efficiency in other sectors, contributing to greater investment according to the Value of Water Campaign's analysis.[72] On the national level, water infrastructure upgrade investments are projected to yield over $5.5 trillion in GDP over the next 20 years. In Texas, the economic returns to fixing aging, deteriorating water systems could equal $489 billion in GDP gains over the same time period. This growth benefit comes in addition to that from mitigating the economic consequences attributable to unreliable water systems.

Water infrastructure investment supports job creation

According to the Value of Water Campaign, each $1 million of investment in water infrastructure generates over 15 jobs.[73] Of those 15, at least six jobs created are directly attributable to the infrastructure investment. These include the design, engineering, and construction of the needed infrastructure. Another nine jobs are created through indirect and induced impacts. These include jobs supported through the purchase of goods (e.g. pipes, computers, and heavy machinery) and services (e.g. retail and medical) attributable to infrastructure development. The Value of Water campaign's analysis concludes that this aggregate employment impact is comparable to similar public investments in energy, health care and transportation.

Beyond the jobs directly attributable to water infrastructure development, these investments support economic expansion that, in turn, generates greater jobs.

Jobs Supported Per $1 Million Investment in Water Infrastructure



Source: Value of Water Campaign, The Economic Benefits if Investing in Water Infrastructure. 2017

[72] Value of Water Campaign, The Economic Benefits of Investing in Water Infrastructure, How a Failure to Act Would Affect the US Economic Recovery, 2020, page 28.
[73] Value of Water Campaign, The Economic Benefits of Investing in Water Infrastructure, 2017, page 9.

CHAPTER 5

Policy Background

Since the Drought of Record of the 1950s, the Texas Legislature has created several funds, and voters have approved multiple bond authorizations, for providing financial assistance for water infrastructure projects. Between 1957 and 2024, the Texas Water Development Board (TWDB), committed a total of nearly $36 billion towards water infrastructure projects.[74] The majority of this financial assistance, just over $20 billion, has been committed by TWDB since 2010.

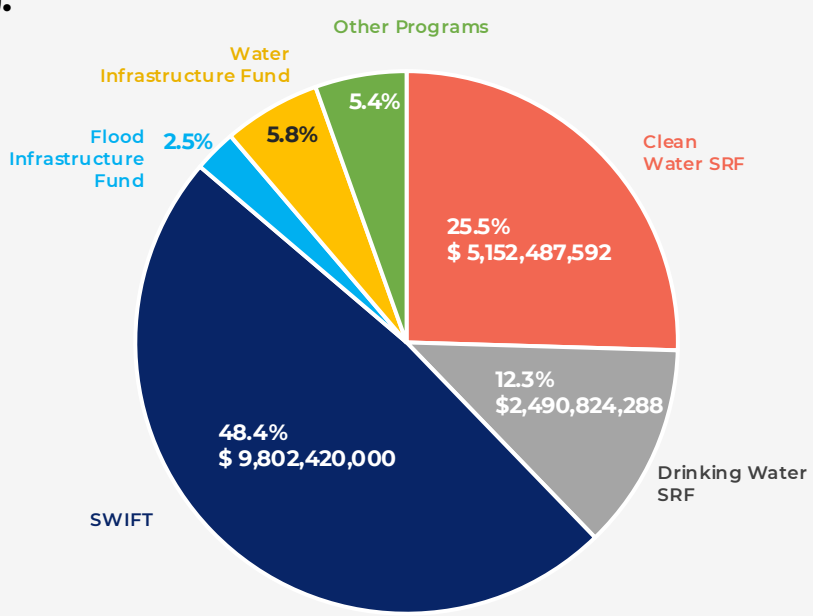
The majority of financial assistance provided by TWDB for local and regional water infrastructure projects has been delivered through three key water funds. These include the State Water Implementation Fund for Texas (SWIFT), the Clean Water State Revolving Fund (CWSRF), and the Drinking Water State Revolving Fund (DWSRF). Two other key funds include the Flood Infrastructure Fund (FIF), established in 2019, to finance flood control and mitigation projects, and the Water Development Fund.

In 2023, the Texas Legislature and state voters approved the creation of a new water infrastructure fund, the Texas Water Fund. The 88th Legislature authorized a one-time appropriation of $1 billion to the Texas Water Fund effective on January 1, 2024. While the chart, *TWDB Financial Assistance Commitments (2010-2024)*, does not yet include Texas Water Fund commitments, this new fund will make in-roads towards financing water infrastructure projects once TWDB makes specific project funding commitments.

This chapter provides a brief description of the state's primary water infrastructure funds, including when they were created, what types of projects they support, and how much financial assistance has been provided by each since 2010.

TWDB Financial Assistance (2010-2024): $20.2 Billion

Commitments Between January 1, 2010 to June 30, 2024



[74] Texas Water Development Board, "Funding Commitments Since Inception: 1957 - February 2024," accessed on September 12, 2024.

The State Water Implementation Fund for Texas (SWIFT)

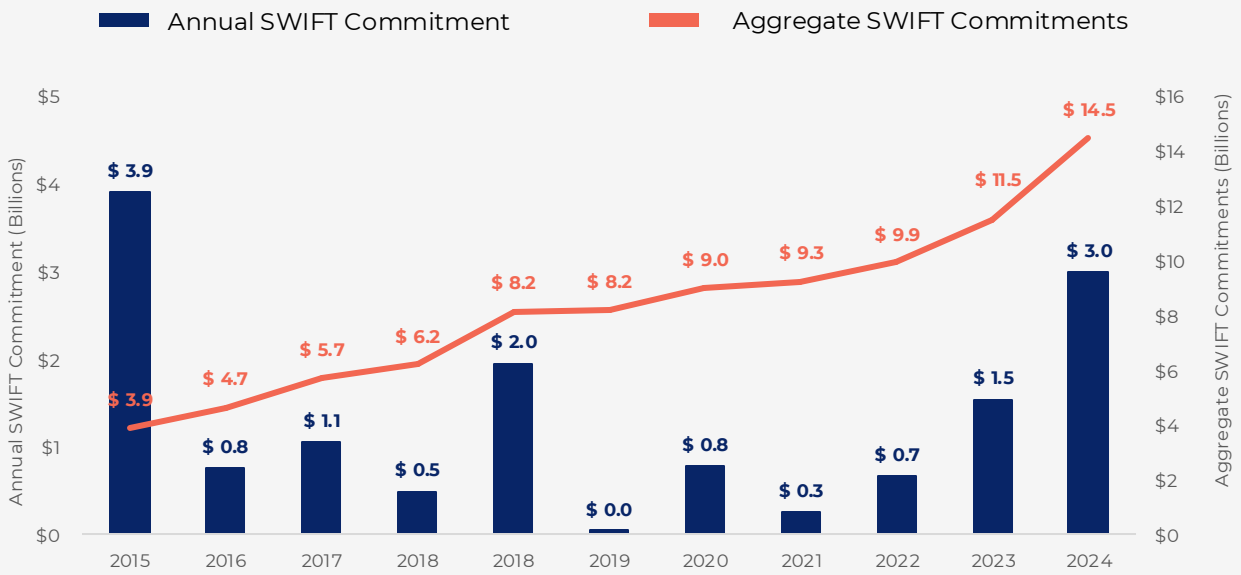
The SWIFT, and its associated revenue bond program, the State Water Infrastructure Revenue Fund for Texas (SWIRFT), was approved by an amendment to the Texas Constitution in 2013. The Legislature capitalized the SWIFT with $2 billion and authorized TWDB, in partnership with the Texas Treasury Safekeeping Trust Company, to invest the initial endowment.

The SWIFT may only be used to provide financial assistance for water supply projects listed in the State Water Plan. The program provides below market interest rate loans for the development of water supply projects. Grants from the SWIFT are prohibited by law.

The SWIFT essentially works as a subsidized debt program. First, TWBD issues a bond, which could be a general obligation, taxable, or revenue bond through the SWIFT. TWDB then uses those bond proceeds to provide low interest loans for state water projects developed by local or regional governments. Proceeds from the SWIFT are used to subsidize the interest owed on the issued bond. This allows TWDB to provide low-interest loans for water projects that are below market rates. In addition to debt subsidization, the SWIFT may be used as a credit enhancement towards guaranteeing the bonds issued. This works to secure competitive market rates for bonds.

Since its inception, the SWIFT has provided nearly $14.5 billion in commitments for State Water Plan projects. The chart, SWIFT Funding Commitments (2015-2024), illustrates the total amount of commitments made per year since 2015 and the aggregate commitment amount over time. The debt subsidization offered through the SWIFT has provided over $1.3 billion in savings since 2015.

SWIFT Funding Commitments (2015-2024)



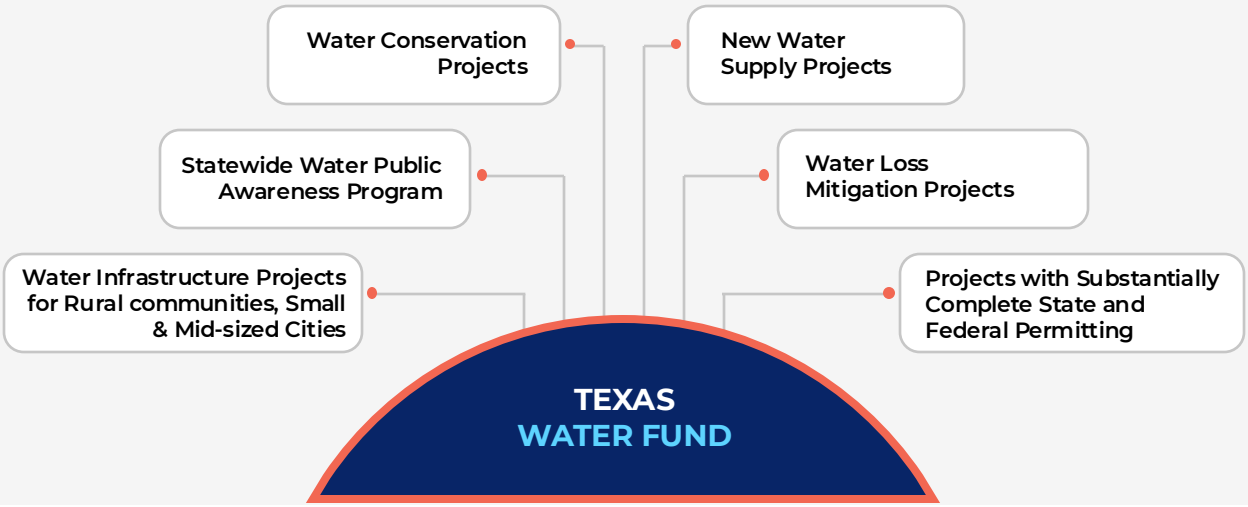
Source: Texas Water Development Board.

Texas Water Fund

During the regular legislative session in 2023, the Legislature approved a legislative package aimed at both delivering new water supplies and fixing aging, deteriorating water systems. The legislation that makes up this package, Senate Joint Resolution 75, Senate Bill 28, and Senate Bill 30, work in concert to create a new fund, the Texas Water Fund, and capitalize that fund with a $1 billion down payment.

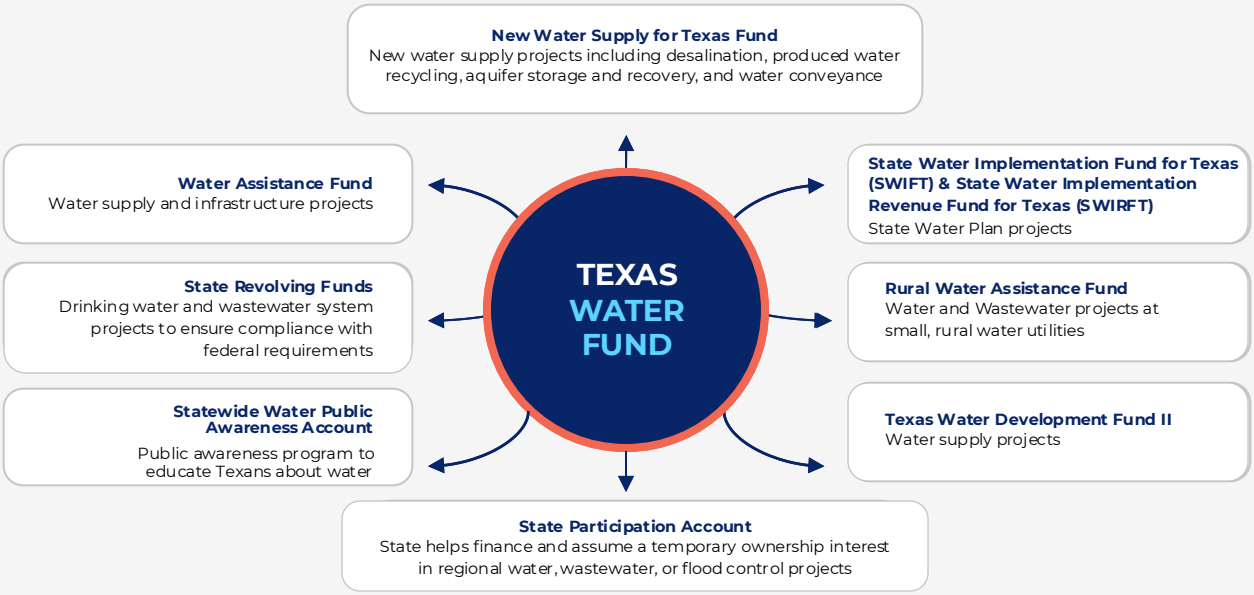
Senate Bill 28 (88R) instructs which types of water infrastructure projects are eligible to receive financial assistance through the Texas Water Fund. These include new water supply projects, such as desalination and aquifer storage and recovery, water conservation and loss mitigation, as well as water infrastructure projects for small, rural, and mid-sized communities.

Types of Projects Eligible for Texas Water Fund Financing



The Legislature designed the Texas Water Fund to work in concert with other existing water funds. As illustrated in the graphic, *Water Funds Eligible to Receive Texas Water Fund Financing*, monies in the Texas Water Fund can be transferred to other TWDB-administered water funds, including the SWIFT, to provide financial assistance for water infrastructure projects. This design enables TWDB to better leverage TWF funds and tailor financial assistance through different funding programs that work for specific project types and political subdivisions.

Water Funds Eligible to Receive Texas Water Fund Financing



In the short period of time since the Texas Water Fund's creation, TWDB has proposed allocating the $1 billion within the Fund to other eligible water infrastructure funds. This includes the allocation of $195 million to the Rural Water Assistance Fund, $300 million towards the SWIFT and $250 million to the New Water Supply for Texas Fund.[75]

Clean and Drinking Water State Revolving Funds (CWSRF & DWSRF)

The other major funds used by TWDB for providing financial assistance for water and wastewater infrastructure projects include the Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF). The CWSRF is used for projects that ensure compliance with the pollution control requirements of the US Clean Water Act. The DWSRF is used for assisting utilities with compliance with the drinking water standards prescribed within the US Drinking Water Act. Between 2010 and 2024, CWSRF has committed $5.2 billion in financial assistance towards eligible projects. DWSRF has committed $2.5 billion during the same period.

Both state revolving funds use a mixture of state and federal dollars. The Environmental Protection Agency receives congressional appropriations for the revolving funds that the EPA, in turn, makes available to the states. In order to receive these federal SRF dollars, states need to provide matching funds of their own. The SRFs are then used to provide low-interest loans or grants to eligible entities.

[75] Texas Water Development Board, "Texas Water Fund Implementation Plan," Agenda Item Memo, July 23, 2024.

In 2021 Congress passed the US Infrastructure Investment and Jobs Act authorizing additional allotments to state SRFs. While seen as a course-correction to decades of declining federal spending on state and local water infrastructure, IIJA required that substantial portions of state SRF dollars be allocated towards specific purposes, including lead service line replacement and emerging contaminant remediation. Shortly after its passage, IIJA was projected to provide nearly $2.5 billion towards Texas' SRFs over the course of five years. Since 2022, however, congressional earmarks have been deducted from the amounts that would have gone towards state SRF programs. As a result of this practice, Texas' SRF programs have lost over $100 million in potential funding towards earmark programs for other states.[76]

Other Key Water Funds

While the Texas Water Fund, the SWIFT, and the SRFs serve as Texas' key water infrastructure funds, there are several others that are used by TWDB for specific purposes. These other funds include the following

- **New Water Supply for Texas Fund**
  Created by Senate Bill 28 in 2023, this fund may be used for developing water projects that deliver new sources of water. Eligible projects include brackish groundwater desalination, seawater desalination, aquifer storage and recovery, and water imported from elsewhere.

- **Texas Water Development Fund**
  This fund may be used for the planning, design, and construction of water supply, wastewater and flood control projects. The Texas Water Development Fund, also referred to as "Dfund", has provided over $1.1 billion in financial assistance since 2010.

- **Flood Infrastructure Fund (FIF)**
  Created in 2019, the Flood Infrastructure Fund provides financial assistance for drainage, flood control and flood mitigation projects. The FIF has provided just over $500 million for flood projects since its inception.

- **Rural Water Assistance Fund (RWAF)**
  This is a state-funded program for water and wastewater projects for small and rural communities.

- **Economically Distressed Areas Program (EDAP)**
  Facilitates implementation of water supply and wastewater projects in economically distressed areas. Between 2010 and 2014, EDAP has provided $318 million in financial assistance.

[76]Council of Infrastructure Financing Authorities, "Impact of Congressional Earmarks on Annual Federal Funding for Water Infrastructure," accessed on September 13, 2024.


TX
2036

Inner Harbor Seawater Desalination Treatment Plant
2024 Opinion of Probable Cost (OPC) Summary

	Dollar Amount	Percent Allocation
Total Project Capital Cost	**$757,585,000**	**100%**
Construction	$654,700,000	86%
Non-construction (Permitting, Legal, Desing)	$102,885,000	14%
Annual Operations and Maintenance	**$44,050,000**	**100%**
Chemical	$13,020,000	30%
Power	$7,860,000	18%
Personnel, Plant Operations, and Preventative Maintenance	$23,170,000	52%

NRC NEWS
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No: 24-071 September 16, 2024

CONTACT: Scott Burnell, 301-415-8200

NRC Issues Construction Permit for Abilene Christian University Research Reactor in Texas

The Nuclear Regulatory Commission has issued a Construction Permit to Abilene Christian University to build its Molten Salt Research Reactor facility on the university's campus in Abilene, Texas.

"This is the first research reactor project we've approved for construction in decades, and the staff successfully worked with ACU to resolve several technical issues with this novel design," said Andrea Veil, Director of the NRC's Office of Nuclear Reactor Regulation. "Going forward, we'll have inspectors on the ACU campus when construction gets started."

The MSRR, which will not generate electricity, will use molten salt coolant with fuel dissolved in the salt. The facility will provide a platform to research molten-salt technology, as well as educational opportunities in nuclear science and engineering. The permit only authorizes construction; ACU will have to submit a separate application for an operating license in the future.

The NRC accepted ACU's application to build the reactor and began the regulatory review in November 2022. ACU submitted updates in November 2023 and July 2024. The NRC issued its final environmental assessment for the site on March 7, and the final safety evaluation for the permit on September 16.

THE WHITE HOUSE

WASHINGTON

March 18, 2024

Dear Governor:

Disabling cyberattacks are striking water and wastewater systems throughout the United States. These attacks have the potential to disrupt the critical lifeline of clean and safe drinking water, as well as impose significant costs on affected communities. We are writing to describe the nature of these threats and request your partnership on important actions to secure water systems against the increasing risks from and consequences of these attacks.

Two recent and ongoing threats illustrate the risk that cyberattacks pose to the nation's water systems:

- Threat actors affiliated with the Iranian Government Islamic Revolutionary Guard Corps (IRGC) have carried out malicious cyberattacks against United States critical infrastructure entities, including drinking water systems. In these attacks, IRGC-affiliated cyber actors targeted and disabled a common type of operational technology used at water facilities where the facility had neglected to change a default manufacturer password. See Exploitation of Unitronics PLCs used in Water and Wastewater Systems | CISA for further information on these attacks.

- The People's Republic of China (PRC) state-sponsored cyber group known as Volt Typhoon has compromised information technology of multiple critical infrastructure systems, including drinking water, in the United States and its territories. Volt Typhoon's choice of targets and pattern of behavior are not consistent with traditional cyber espionage. Federal departments and agencies assess with high confidence that Volt Typhoon actors are pre-positioning themselves to disrupt critical infrastructure operations in the event of geopolitical tensions and/or military conflicts. See PRC State-Sponsored Actors Compromise and Maintain Persistent Access to U.S. Critical Infrastructure for further information.

Drinking water and wastewater systems are an attractive target for cyberattacks because they are a lifeline critical infrastructure sector but often lack the resources and technical capacity to adopt rigorous cybersecurity practices. As the Sector Risk Management Agency identified in Presidential Policy Directive 21 for water and wastewater systems, the U.S. Environmental Protection Agency (EPA) is the lead Federal agency for ensuring the nation's water sector is resilient to all threats and hazards. Partnerships with State, local, tribal, and territorial governments are critical for EPA to fulfill this mission. In that spirit of partnership, we ask for your assistance in addressing the pervasive and challenging risk of cyberattacks on drinking water systems.

We need your support to ensure that all water systems in your state comprehensively assess their current cybersecurity practices to identify any significant vulnerabilities, deploy practices and controls to reduce cybersecurity risks where needed, and exercise plans to prepare for, respond to, and recover from a cyber incident. In many cases, even basic cybersecurity precautions – such as resetting default passwords or updating software to address known vulnerabilities – are not in place and can mean the difference between business as usual and a disruptive cyberattack. The Department of Homeland Security's Cybersecurity and Infrastructure Security Agency's (CISA) website has a list of actions water and wastewater systems can take to reduce risk and improve protections against malicious cyber activity.

Additionally, both EPA and CISA offer guidance, tools, training, resources, and technical assistance to help water systems to execute these essential tasks. Further, cybersecurity support and technical assistance are available from private sector associations like the American Water Works Association, the National Rural Water Association, and the Water Information Sharing and Analysis Center. State leadership and messaging to connect water systems with these tools and resources is essential to ensure that utility leaders assess and mitigate critical cyber risks. Your state Homeland security advisors are a resource, as they have links into Federal cybersecurity efforts and access to relevant information about these threats.

We will invite your Environmental, Health and Homeland Security Secretaries to participate with us in a convening to discuss the improvements needed to safeguard water sector critical infrastructure against cyber threats. This meeting will highlight current Federal and state efforts to promote cybersecurity practices in the water sector, discuss priority gaps in these efforts, and emphasize the need to take immediate action. We will provide details about this convening to your teams shortly.

Additionally, EPA will engage the Water Sector and Water Government Coordinating Councils to form a Water Sector Cybersecurity Task Force, which will build on recommendations from your Environmental, Health and Homeland Security Secretaries. The Task Force will identify the most significant vulnerabilities of water systems to cyberattacks, the challenges that water systems face in adopting cybersecurity best practices, and near-term actions and long-term strategies to reduce the risk of water systems nationwide to cyberattacks.

The White House and EPA are hopeful that the efforts outlined in this letter, and others we may undertake together, will protect the water systems from cyberattacks and prevent the need to use other Federal authorities.

In recognition of the significant risk that cyberattacks pose for mission critical water utility operations, we appreciate your attention to this important issue and thank you for your partnership. If you or your staff would like to engage with the EPA or the National Security Council staff on any aspect of this request, please contact Deputy Director of the EPA Janet McCabe and Deputy National Security Advisor for Cyber and Emerging Technologies Anne Neuberger at the National Security Council at mccabe.janet@epa.gov and anne.neuberger@nsc.eop.gov.

Sincerely,

Michael S. Regan
Administrator
Environmental Protection Agency

Jake Sullivan
Assistant to the President for
National Security Affairs