Interim Report

to the 87th Texas Legislature

House Committee on Natural Resources

December 2020

HOUSE COMMITTEE ON NATURAL RESOURCES
TEXAS HOUSE OF REPRESENTATIVES
INTERIM REPORT 2020

A REPORT TO THE
HOUSE OF REPRESENTATIVES
87TH TEXAS LEGISLATURE

LYLE LARSON
CHAIRMAN

COMMITTEE CLERK
SHANNON HOUSTON

Committee On
Natural Resources

December 31, 2020

Lyle Larson
Chairman

P.O. Box 2910
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The Honorable Dennis Bonnen
Speaker, Texas House of Representatives
Members of the Texas House of Representatives
Texas State Capitol, Rm. 2W.13
Austin, Texas 78701

Dear Mr. Speaker and Fellow Members:

The Committee on Natural Resources of the Eighty-sixth Legislature hereby submits its interim report including recommendations and drafted legislation for consideration by the Eighty-seventh Legislature.

Respectfully submitted,

Lyle Larson

Will Metcalf, Vice Chairman

Alex Dominguez

Anna Eastman

Cody Harris

Tracy O. King

Mike Lang

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Tom Oliverson

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Members: Alex Dominguez, Anna Eastman, Cody Harris, Tracy O. King, Mike Lang, Poncho Nevárez, Tom Oliverson, Four Price, Ana-Maria Ramos

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INTRODUCTION

At the beginning of the 86th Legislative Session, the Honorable Dennis Bonnen, Speaker of the Texas House of Representatives appointed eleven members to the House Committee on Natural Resources (the Committee). The Committee's membership consisted of the following eleven members: Chairman Lyle Larson, Vice-Chairman Will Metcalf, Jessica Farrar, Tracy O. King, Four Price, Poncho Nevarez, Tom Oliverson, Mike Lang, Cody Harris, Alex Dominguez, and Ana-Maria Ramos.

The Rules of the Texas House grant the Committee jurisdiction over the following matters:

1) the conservation of the natural resources of Texas;

(2) the control and development of land and water and land and water resources, including the taking, storing, control, and use of all water in the state, and its appropriation and allocation;

(3) irrigation, irrigation companies, and irrigation districts, and their incorporation, management, and powers;

(4) the creation, modification, and regulation of groundwater conservation districts, water supply districts, water control and improvement districts, conservation and reclamation districts, and all similar organs of local government dealing with water and water supply not otherwise assigned by these rules to another standing committee;

(5) oversight of the Texas Commission on Environmental Quality as it relates to the regulation of water resources; and

(6) the following state agencies: the Office of Canadian River Compact Commissioner for Texas, the Office of Pecos River Compact Commissioner for Texas, the Office of Red River Compact Commissioner for Texas, the Office of Rio Grande Compact Commissioner for Texas, the Office of Sabine River Compact Commissioners for Texas, the Southwestern States Water Commission, and the Texas Water Development Board.

INTERIM STUDY CHARGES

During the 86th Interim, Speaker Bonnen assigned the Committee the following four interim charges:

1. Monitor the agencies and programs under the Committee's jurisdiction and oversee the implementation of relevant legislation passed by the 86th Legislature. Conduct active oversight of all associated rulemaking and other governmental actions taken to ensure intended legislative outcome of all legislation, including the following:

- HJR 4, SB 7, and SB 8, which relate to statewide and regional flood planning and mitigation. Monitor the progress of the Texas Water Development Board (TWDB) and other entities to provide for the planning, development, and financing of drainage, flood mitigation, and flood control projects statewide to strengthen the state's infrastructure and resiliency to future floods.

- HB 720, which relates to appropriations of water for recharge of aquifers and use in aquifer storage and recovery projects. Monitor the rulemaking process for the permitting of unappropriated flows for aquifer storage and recovery projects by the Texas Commission on Environmental Quality (TCEQ).

- HB 721, which relates to reports on aquifer storage and recovery and aquifer recharge projects. Monitor the implementation by the TWDB of legislation to encourage the development of aquifer storage and recovery and aquifer recharge projects, including the completion of a statewide study of the state's aquifers' suitability for aquifer storage and recovery and aquifer recharge projects.

- HB 722, which relates to the development of brackish groundwater. Monitor the designation of Brackish Groundwater Production Zones by the TWDB and the adoption of rules by groundwater conservation districts for the production of brackish groundwater from those Zones.

- HB 807, which relates to the state and regional water planning process. Monitor the appointment of the Interregional Planning Council by the TWDB and the Council's progress toward increasing coordination among Regional Water Planning Groups.

2. Study the efforts of the TCEQ, the TWDB, and the Public Utility Commission of Texas to incentivize, promote, and preserve regional projects to meet water supply needs and encourage public and private investment in water infrastructure. Identify impediments or threats to regionalization with special emphasis on: prioritization in planning and implementing the State Water Plan, Regional Water Plan, and other recommended water supply projects; barriers to private investment and the development of public-private partnerships to implement needed water supply projects, including the retail water and wastewater industry, to address the state's growth challenges; public water and wastewater systems that are unable to meet federal and state standards due to inadequate operational capacity and factors that prevent such systems from

being integrated into larger systems and processes that more easily facilitate the sale, transfer, or merger of systems; and state agency authority to regulate regional water supply pricing.

3. Monitor the joint planning process for groundwater and the achievement of the desired conditions for aquifers by groundwater conservation districts.

4. Monitor the State Auditor's review of agencies and programs under the Committee's jurisdiction. The Chair shall seek input and periodic briefings on completed audits for the 2019 and 2020 fiscal years and bring forth pertinent issues for full committee consideration.

In addition, Chairman Lyle Larson initiated studies on the following two topics:

- Emerging issues in groundwater and surface water interaction, in particular in areas of increasing competition for scarce resources.
- The status of water markets in Texas and the potential benefits of and challenges to expanded markets for water.

ANALYSIS

The ongoing COVID-19 pandemic presented challenges in scheduling public hearings on the Speaker-assigned interim charges. On advice from the House Parliamentarians, the House Committee on Natural Resources posted a Formal Request for Information to solicit written submissions from interested parties and the public in lieu of holding public hearings to complete its interim studies. All responses to the Formal Request for Information can be viewed on the webpage for the Natural Resources Committee on the Texas House of Representatives website. This report includes a background on, discussion of, and recommendations for each charge based on the Committee's proceedings.

INTERIM CHARGE 1: MONITORING AND OVERSIGHT OF THE IMPLEMENTATION OF KEY LEGISLATION

The 86th Texas Legislature signaled a continued, serious commitment to responding to Texas' flooding challenges with the creation of the Flood Infrastructure Fund, the Texas Infrastructure Resiliency Fund, and the Regional and State Flood Planning process which will culminate in the Texas' first ever State Flood Plan. The loss of life and property endured through the course of numerous devastating floods, including Hurricane Harvey, underscored the need for these historic investments. As noted in one national publication evaluating flood risk, "Texas outranks all other states in deaths, injuries and property loss resulting from flood events… the crude death rate in Texas by cataclysmic storms and floods is more than double the national rate" (Zahran et al., 2008).[1]

In addition, the 86th Texas Legislature took bold and proactive steps to facilitating innovative water supply strategies. In addition to monitoring the implementation of seminal flood legislation, the Committee was tasked with monitoring the implementation of legislation aimed at addressing water rights permitting for aquifer storage and recovery projects (HB 720), statewide assessment of feasibility for aquifer storage and recovery projects (HB 721), brackish groundwater studies and permitting (HB 722), and the creation of the Interregional Planning Council (HB 817). This chapter is broken out into six sections.

The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

1. **Flood Programs (HJR 4, SB 7, SB 8):**

    - El Paso County
    - Greater Houston Partnership
    - Texas Floodplain Management Association
    - Texas General Land Office
    - Texas Land Trust Council
    - Texas Living Waters Project
    - Texas State Soil and Water Conservation Board
    - Texas Water Development Board
    - Texas Water Foundation

2. **Modifications to Water Rights Permitting & Underground Injection Control (UIC) for Aquifer Storage and Recovery and Aquifer Recharge Projects (HB 720):**

    - Texas Commission on Environmental Quality

3. **Aquifer Storage and Recovery and Aquifer Recharge Project Statewide Feasibility Assessment (HB 721):**

    - Texas Water Development Board

4. Brackish Groundwater Studies & Permitting (HB 722):

- Kenedy County Groundwater Conservation District
- Lone Star Groundwater Conservation District
- Schertz Seguin Local Government Corporation
- Texas Alliance of Groundwater Districts
- Texas Water Development Board

5. Interregional Planning Council (HB 817):

- Texas Water Development Board
- Texas Water Supply Partners

6. **Other**:

- Rubinstein, Carlos
- San Antonio River Authority
- Texas Alliance of Groundwater Districts
- Texas Commission on Environmental Quality
- Texas Water Trade

1A. Flood Programs (HJR 4, SB 7, SB 8)

Senate Bill 7 and House Joint Resolution 4 (SB 7 and HJR 4)

SB 7 established the Flood Infrastructure Fund (FIF) and the Texas Infrastructure Resiliency Fund (TIRF), which each perform unique functions.

Flood Infrastructure Fund

The FIF is a new program administered by the Texas Water Development Board to provide financial assistance in the form of grants and low interest loans to any community in the state for flood mitigation. Specifically, financial assistance can be committed for the following purposes: drainage, flood mitigation, or flood control projects, including: planning and design activities; work to obtain regulatory approval to provide nonstructural and structural flood mitigation and drainage; and construction of structural flood mitigation and drainage infrastructure.[2]

The Legislature made a one-time appropriation of $793 million from the Economic Stabilization Fund for this purpose. The Legislature also passed a constitutional amendment, HJR 4, to establish the Flood Infrastructure Fund in the state treasury outside the general revenue fund; Proposition 8 was approved by voters on November 5, 2019.[3]

Since being signed into law and approved by voters, TWDB adopted rules to administer the FIF, which resulted in the Board's adoption of the Flood Intended Use Plan (IUP).
The Flood IUP, includes categories of projects, the standards for loan and grant eligibility associated with each category of eligible activities, along with the prioritization criteria that will be used to rank proposed projects:

- Category 1: Flood Protections Planning for Watersheds
- Category 2: Planning, Acquisition, Design, Construction and/or Rehabilitation (Structural and nonstructural, including nature-based solutions)
- Category 3: Federal Award Matching Grants
- Category 4: Measures immediately effective in protecting life and property (Warning systems, public education and outreach, reverse 911 systems, crossing barriers and dam emergency action plans)[4]

After opening up the newly established program for applications, TWDB received 286 abridged applications for a total of $2.39 billion in requested funds from all regions of the state; these applications included about $89 million in requests for category 1 projects; about $2.2 billion for category 2 projects; about $153 million for category 3 projects; and about $4.4 million for category 4 projects.[5]

The Board approved $770,000,000 of available funds for FIF projects, of which $231,000,000 (30 percent) is allocated to grants and $539,000,000 (70 percent) is allocated for loans; no project will receive more than $23,100,000 in grant funding (10 percent of total grant allocation).

The interest rate on all loans will be zero percent.[6]

The response to the FIF was overwhelming and received interest from all corners of the state. Even as many entities were working to address local challenges driven by the pandemic, the FIF received $2.39 billion worth of requests for which there was $770,000 million available.

Here is a snapshot of how the FIF funding has been allocated:[7]

Category of Expenditure	Flood Infrastructure Fund
SB500 Appropriated Amount	$793,000,000
Expended:	
FY20 Staff and Operations	$924,981
Obligated:	
FY21 Staff and Operations	$2,451,340
Local Match for Flood Mitigation Assistance	$7,013,767
Authorized [1]:	
Maximum Allocation for Grants [2]	$231,000,000
Allocation for Loans [2]	$539,000,000
Requested:	
FY22-23 Legislative Appropriations Request for FIF	$5,052,680
Total Expended, Obligated, or Requested	$785,442,768
FIF Resources Available for Future Fiscal Years	$7,557,232
Percent of FIF Appropriation Obligated:	99.05%

Below is a list of projects that were awarded financial assistance as of December 2020:[8]

- $1,365,368 in grant funding for federal grant award matching funds projects for Llano County and the City of Harlingen
- $3,002,708 in financial assistance (consisting of $1,051,000 in financing and $1,951,708 in grant) for a federal grant award matching funds project for City of Weslaco
- $895,208 in financial assistance (consisting of $233,000 in financing and $662,208 in grant) for a federal grant award matching funds project for City of Marble Falls
- $1,185,079 in grants for flood early warning system related projects

Bee County, DeWitt County Drainage District No. 1, Uvalde County, and Nueces County Drainage and Conservation District No. 2 received funds for flood early warning system projects. Llano County and the cities of Weslaco, Marble Falls, and Harlingen received assistance for local projects receiving federal grant award matching funds. Importantly, these matching funds will be paired with federal funding programs to bring an additional $5.2 million to Texas. The TWDB will execute financial assistance for numerous additional projects in the coming months.[9]

Texas Infrastructure Resiliency Fund (TIRF)

The TIRF houses four subaccounts: the Floodplain Management Account, the Hurricane Harvey Account, the Federal Match Account, and the Flood Plan Implementation Account. Two of these accounts received appropriations, the Floodplain Management Account ($47 million) and the Hurricane Harvey Account ($638 million). The other two accounts serve as placeholders for potential appropriations by future Legislatures. Any funding remaining in the TIRF after 2031 is required to be transferred to the State Flood Plan Implementation Account in order to implement projects once the first State Flood Plan is developed in 2023 pursuant to SB 8.[10]

The Floodplain Management Account was appropriated $47 million for the following purposes:[11]

- Support the development of regional and state flood plans pursuant to SB 8, including base level engineering studies to support their development
- Support Texas Water Development Board's (TWDB) flood science efforts, including updating flood risk maps; collection of more flood-related data; advancement of river and coastal modeling capabilities; and distribution of critical flood information through an online dashboard

The Hurricane Harvey Account was appropriated $638 million for the following purposes:[12]

- Provide nonfederal matching funds to enable local governments to participate in federal programs administered by the Texas Division of Emergency Management (TDEM), namely the FEMA Hazard Mitigation program and the FEMA Public Assistance program.
- The account received $273 million in appropriations for eligible hazard mitigation measures that reduce future disaster losses and $365 million in appropriations for public assistance for disaster recovery
- Provide a $30 million grant to Harris County for the removal of accumulated siltation and sediment deposits at the confluence of the San Jacinto River and Lake Houston.

Projects funded by the Hurricane Harvey Account are eligible to be disbursed for projects statewide, however priority is given to areas that received a Presidential major disaster declaration.[13]

Here is a snapshot of how the TIRF funding has been allocated:[14]

Category of Expenditure	Hurricane Harvey Account	Floodplain Management Account [1]			Total
		Planning Activities	Mapping Activities	Indirect Administration	
SB500 Appropriated Amounts	$638,000,000	$20,837,809	$14,356,974	$11,805,217	$685,000,000
Expended and Obligated Amounts					
Harris County	$30,000,000				$30,000,000
TDEM - Hazard Mitigation	$273,000,000				$273,000,000
TDEM - Public Assistance	$335,000,000				$335,000,000
Staff and Operations		$1,163,004	$4,082,215	$1,518,327	$6,763,546
Contracted Services		$359,849	$3,427,727		$3,787,576
Planning Grants [2]		$19,300,000			$19,300,000
Base Level Engineering [3]			$7,436,835		$7,436,835
Employee Benefits				$267,264	$267,264
Salary Savings				$801,698	$801,698
Total Expended or Obligated	$638,000,000	$20,822,853	$14,946,777	$2,587,289	$676,356,919
TIRF Resources Available for Future FYs	$0	$14,956	-$589,803	$9,217,928	$8,643,081
% of TIRF Obligated	100.00%	99.93%	104.11%	21.92%	98.74%
FY22-23 Legislative Appropriations Request for TIRF		$40,800,000	$36,400,000	$22,212,000	$99,412,000

[1] Planning, Mapping, and Indirect Administration are all paid from a single account, the Floodplain Management Account.
[2] The TWDB Board authorized the execution of Flood Planning Grants on November 19, 2020.
[3] The RFQ for Base Level Engineering Services is currently being evaluated by the Comptroller's Statewide Procurement Division.

As of August 18, 2020, the TWDB has delivered $27 million in funds to TDEM, including $3.5 million for hazard mitigation grants and $23.5 million for public assistance grants. The TWDB closed on the $30 million grant to Harris County on March 12, 2020, and the project is currently in progress.[15]

Key points reported by TDEM on the disbursement of funds from the Hurricane Harvey Account:

- TDEM is currently working on 336 projects. Of those, 87 are represented by county government, 184 are represented by city government, and 65 by special purpose districts.
- 123 are drainage projects, and 2 are watershed or drainage studies
- 92 of the projects have more than one funding source, 3 of the projects have 4 or more fund sources, and on 107 of these projects, local partners adding funding sources of their own.
- TDEM has noticed some delay in reporting from local partners due to government shutdown, but expect projects to stay on time and for full allotment to be spent.
- According to Chief Nim Kidd, this process has enabled them to better coordinate with TWDB and GLO, learn more about their functions and programs, and better layer and sequence funding.[16]

Flood Funding Information Clearinghouse[17]

To implement this provision of SB 7, the TWDB has worked in close cooperation with the Texas General Land Office (GLO), TDEM, and other state agencies to create the Texas Flood Information Clearinghouse website as the first "one-stop-shop" for information on flood

mitigation funding opportunities for Texas' communities. Launched in early 2020, the site includes an online "Request for Information" form that entities can submit to get feedback on what state and federal financial assistance programs could be the best fit for their flood mitigation needs. It also includes information on current funding opportunities, general project and entity eligibility by program, upcoming events related to flood mitigation financial assistance, and other resources.

The corresponding interagency Flood Information Clearinghouse Committee, or "FLICC," regularly meets to review funding inquiries submitted to the Information Clearinghouse website and to coordinate the use of state and federal funding for flood mitigation projects. The FLICC has been meeting regularly each month since May 2020, with regular participation from the GLO, TDEM, the Texas State Soil and Water Conservation Board, and the Texas Department of Agriculture.

Legislative Advisory Committee

SB 7 created a legislative advisory committee charged with reviewing the overall operation, function, and structure of the TIRF at least semiannually. The committee may provide comments and recommendations on any matter related to the fund. The advisory committee was appointed by the Speaker and Lt. Governor and held public hearings on December 10, 2019 and December 15, 2020.

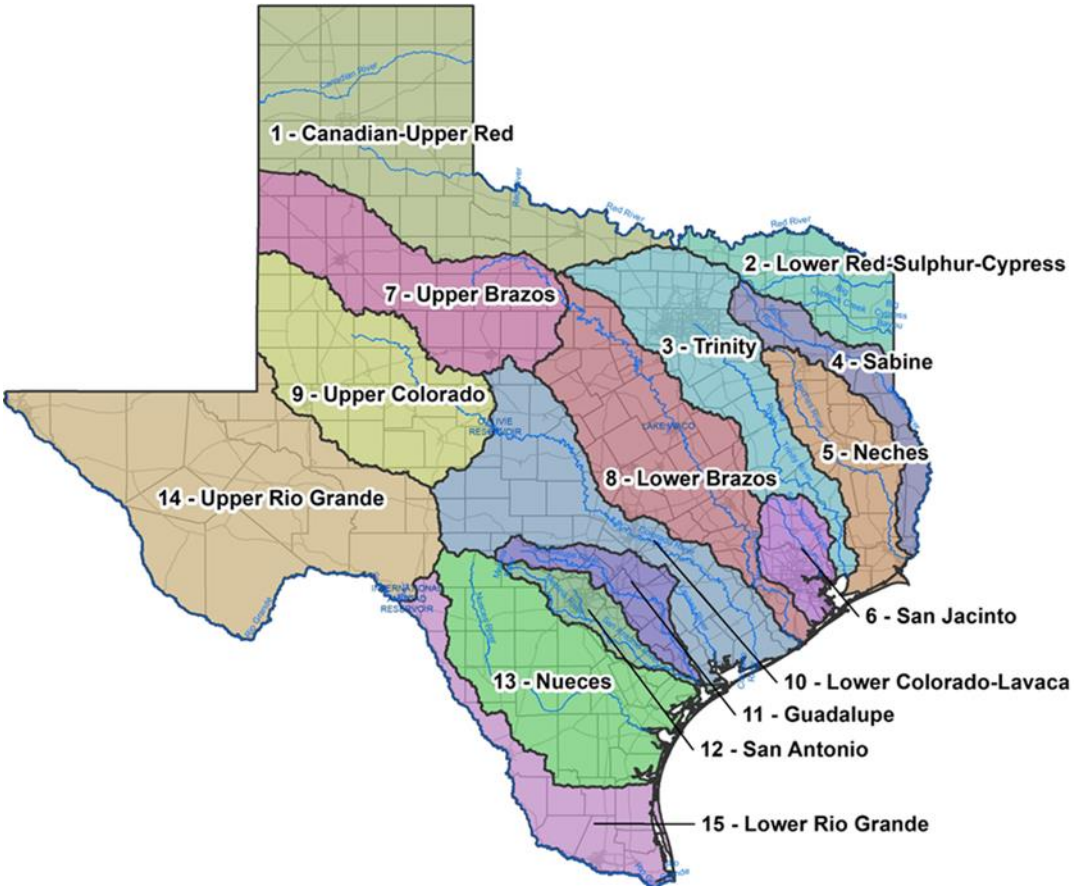
Senate Bill 8 (SB 8)[18]

Whereas the FIF and the TIRF were intended to distribute funds to communities immediately to assist with disaster recovery and flood mitigation efforts, SB 8 creates a long-term mechanism for creating regional and statewide flood strategies. SB 8 establishes the State and Regional Flood Planning process at the Texas Water Development Board, modeled after the state's regional process for water supply planning.

SB 8 requires the first regional flood plans to be delivered to the Board by January 10, 2023, and the TWDB to prepare and adopt a comprehensive state flood plan not later than September 1, 2024, and every five years after. Further, the bill requires the Board to:

- designate flood planning regions,
- designate representatives from each flood planning region to serve as the initial regional flood planning group,
- provide technical and financial support for the RFPGs, and
- adopt guidance principles for regional and state flood planning.

To implement SB 8, TWDB designated the final 15 flood planning region boundaries (Figure 2).
Figure 2. Flood planning region boundaries



In developing the flood planning regions, coastal basins were combined with adjacent major river basins based on the potential to be influenced by interbasin flooding, ongoing coastal management efforts, and the stream contribution to bays. Smaller river basins were combined with larger basins based on similar types of flooding, relatively small populations, and practical administrative constraints limiting the number of regions that can be adequately supported.

In designating flood planning regions, Texas Water Code § 16.062(b) allows the TWDB to divide river basins to avoid having an impracticably large area for efficient planning. In considering public comments received on the previously proposed boundaries, the EA determined that the benefits of splitting some larger river basins into two flood planning regions would outweigh the risks of the potential for conflicts between upstream and downstream regions.

The divisions of larger river basins as shown in Figure 2 were located based on the diverse conditions across their large area including geography, rainfall, topography, and land use patterns and to address some of the logistical and membership concerns that have been expressed by stakeholders.

These boundaries together with the Board-adopted final regional flood planning administrative rules that included membership interest requirements, were the basis for initiating the flood

planning group member solicitation process.

The TWDB designated 180 initial members to serve in each of the 12 interest positions on each of the 15 planning groups. The initial members of each group will then convene for their first public meetings at which the initial planning group will be expected to consider:

- nominating and selecting a chair and vice-chair;
- adoption of group bylaws;
- what additional representative categories, as either voting or non-voting members, might be needed to ensure adequate representation from interests in the flood planning region;
- selecting a political subdivision sponsor to act on behalf of the group including to solicit grant funds from the TWDB and to procure a technical consultant to support the group;
- initiating a request by the political subdivision sponsor to apply for grant funds from the TWDB and initiate a procurement process for a technical consultant; and
- set its next meeting date.

General Land Office Flood Funds[19]

The GLO is not directly responsible for aspects outlined in Senate Bill 7 nor Senate Bill 8. However, the GLO implements programs and projects similar to the activities outlined in both TIRF and FIF, such as funding flood projects and conducting flood planning studies.

Since 2011, the GLO has administered CDBG-DR funding in the form of allocations or grant competitions to fund flood and drainage improvement projects and other disaster-impacted infrastructure projects. GLO flood project and drainage improvement activities differentiate from TWDB activities due to the origin of the funds, rules associated with the funds for grant timeline execution, and eligibility criteria. The GLO and TWDB report that they are working together to minimize duplication of effort by actively assisting local governments in their determinations to pursue either CDBG-DR or CDBG-MIT funding from the GLO, TIRF or FIF funding from TWDB, Hazard Mitigation Grant Program (HMGP) funding from TDEM, and other potential grant opportunities from any of the three agencies. As previously mentioned, the interagency coordination was formalized with the formation of the Flood Information Clearinghouse Committee.

The Texas General Land Office (GLO) is responsible for administering federal Community Development Block Grant Disaster Recovery (CDBG-DR) and Mitigation (CDBG-MIT) funds that are appropriated by Congress to the US Department of Housing and Urban Development (HUD) for federally declared disasters. As the federal agency partner, HUD administers the appropriated funding to the State of Texas and the GLO administers programs and projects throughout eligible disaster areas to help Texans recover from disasters.

Since 2011, the GLO has administrated CDBG-DR funding for federally declared disasters dating back to Hurricane Rita in 2005, Hurricanes Ike and Dolly in 2008, the 2011 Bastrop Wildfires, the 2015 Floods, the 2016 Floods, and Hurricane Harvey in 2017. Soon, the GLO will also administer CDBG-DR funding appropriated for the South Texas Floods in 2018 and Tropical Storm Imelda and Lower Rio Grande Valley Floods in 2019. In addition to CDBG-DR

programs and projects, the GLO is also responsible for administering a unique appropriation of mitigation funds known as CDBG-Mitigation.

The GLO reports that it is actively administering the following CDBG-DR grants:

Texas General Land Office CDBG-DR and CDBG-MIT Grant Programs

Disaster Event	Appropriation	Grant Expiration
2008 Hurricanes Ike/Dolly	$3,114,645,446	N/A
2011 Bastrop Wildfires	$31,319,686	N/A
2015 Floods	$74,568,000	April 5, 2023
2016 Floods	$238,895,000	July 15, 2023
2017 Hurricane Harvey (initial)	$57,800,000	June 23, 2024
2017 Hurricane Harvey CDBG-Mitigation	$5,676,390,000 $4,297,189,000	August 17, 2024 2032

The GLO reports that it is actively administering the following CDBG-MIT grant programs:

Program	Allocation
2015 Floods State Mitigation Competition	$46,096,950
2016 Floods State Mitigation Competition	$147,680,760
Hurricane Harvey State Mitigation Competition	$2,144,776,720
Regional Mitigation Program (COG MODs)	$500,000,000
HMGP: Supplemental	$170,000,000
Coastal Resilience Program	$100,000,000
Housing Oversubscription Supplemental	$400,000,000
Resilient Home Program	$100,000,000
Hazard Mitigation Plans	$30,000,000
Resilient Communities Program	$100,000,000
Regional and State Planning	$214,859,450

Discussion

SB 7 authorized the use of the FIF for both structural and nonstructural projects, however less than 10% of the FIF project applications received prioritization points for nonstructural projects under the FIUP for SFY 2020. Nonstructural, including nature-based projects, are cost effective tools to reduce flooding, which also provide multiple benefits for communities year-round, such as improved air and water quality.[20] Both traditional engineered structures and nonstructural projects, such as the acquisition of floodplain land for use as public open space to slow down the velocity and volume of flood waters, should always be on the table.

Determining the metrics for how funds should be allocated is a challenge. Some stakeholders, including the Texas Water Foundation, noted that the impacts of flood, including risk of death, disproportionally affects socially vulnerable communities and inflict unequal harm by minority and income status.[21]

While the interagency coordination occurring between TWDB, TDEM, and the GLO through the FLICC is encouraging, the Legislature must closely monitor the expenditure of state and federal funds to ensure timely coordination and maximize value for communities depending on these resources. For example, while the State appropriated funding for the newly imagined Regional and State Flood Planning process, GLO also reports allocating significant funds for regional and state flood planning from the federal funds it's received. Where appropriate, efforts should be combined to maximize value.

Recommendations

Work with the TWDB and nonprofit groups such as land trusts to promote the use of nonstructural projects through the Food Infrastructure Fund and State and Regional Flood Planning Process.

Work with the TWDB, TDEM and the GLO to increase inclusivity practices for socially vulnerable communities in the planning process and disbursement of funds.

Explore opportunities to consolidate GLO's flood planning and flood project financing activities into TWDB and TDEM existing programs.

1B. Modifications to Water Rights Permitting & Underground Injection Control (UIC) for Aquifer Storage and Recovery and Aquifer Recharge Projects (HB 720)

House Bill 720 incentivizes water users to capture unappropriated flows for recharge into an aquifer underlying this state as part of an aquifer (AR) recharge project or storage and subsequent use as part of an aquifer storage and recovery (ASR) project by providing an expedited permit process that gives TCEQ 180 days to review permit applications. ASR is a water supply strategy that enables water users to store water under the ground in an aquifer of the state to be recovered in the future and put towards a beneficial use. Similar to ASR, AR includes taking water that meets certain water quality standards and injecting that water under the grounder into an aquifer of the state. However, unlike ASR, in an AR project the water is not later recovered. Thus, to enable to utilization of state water for AR projects, HB 720 amended Chapter 11 of the Texas Water Code to authorize the appropriation of state water for the purpose of aquifer recharge.

The legislation maintains current protections in law for all environmental flows for streams, rivers, bays, and estuaries, and ensures the amounts needed for these important purposes are protected from being captured. It also preserves the notice and hearing requirements applicable to permitting the diversion of surface water for storage in a reservoir.

The legislation changed requirements related to aquifer storage and recovery projects and aquifer recharge projects for both the Texas Commission on Environmental Quality's (TCEQ) underground injection control (UIC) and water rights programs.

Water Rights[22]

HB 720 removed permitting barriers for surface water right applications for new appropriations of water and amendments to existing water rights to facilitate ASR and AR. The TCEQ adopted rules that clarify the application and review process and should result in shorter processing times for these types of applications. Specific changes to water rights rules to implement HB 720 include:

- The timeframe for completing technical review of a water right application for a new appropriation for ASR or AR is 180-days.

- The adopted rules add specific water availability criteria for new appropriations of water for ASR and AR projects. Under the adopted rules, the full volume of water would only need to be found available in one year in the period of record of TCEQ's water availability models, provided the project was viable for its intended purpose such as municipal supply. If the full volume is available in at least one year, additional amounts less than the full volume will be available in other years, providing an opportunity to take

advantage of higher flows during wetter years, store the diverted water in an ASR, and enhance water supply for Texas' growing populations.

- For amendments to water rights, the adopted rules establish technical criteria and specific procedures for notice to address reservoirs that have not been constructed or to authorize replacement of storage lost to sedimentation with storage in an ASR. For example, an application to amend a water right to remove a storage authorization can now be processed without notice and technical review if the diverted water will be stored in an ASR and there is no increase in the amount of the diversion authorization or the diversion rate.
    - A water right holder can also amend a water right to remove a storage reservoir that has not been constructed and increase the diversion amount based on a credit for evaporation that would no longer occur if the water will be stored in an ASR.
    - TCEQ's adopted rules also include specific methods to determine the amount of the evaporation credit and to calculate the volume of water available for converting storage capacity lost to sedimentation to an ASR project.

Underground Injection Control[23]

Implementation of HB 720 also included developing new rules in the TCEQ's Underground Injection Control (UIC) portion of the Texas Administrative Code. These rules provide requirements and standards for aquifer recharge projects that use injection wells:

- identification and evaluation of artificial penetrations, springs, quarries, and other bodies of water and features that connect to the injection zone within at least ½ mile of each aquifer recharge well;
- aquifer recharge well proposed design, construction, operation, and closure plans;
- Operational water quality standards, to ensure injection will not endanger drinking water sources;
- injection well mechanical integrity and injection pressure requirements;
- metering of aquifer recharge injection wells to measure the volume of water injected and annual reporting to the TCEQ of the injected water volumes;
- water quality testing of the injected water at least annually and written reporting to TCEQ of the water quality testing; and
- information and considerations the TCEQ executive director must consider before issuing an authorization for an aquifer recharge injection well including site specific aquifer recharge well fluid analysis, hydrogeologic testing and hydrogeologic modeling to evaluate the interaction of injection fluids with the receiving formation and native groundwater and prediction of injection fluid movement.

Additional information[24]

It is also worth noting that TCEQ has completed development of an analytical tool to evaluate the recovery of water stored in ASR projects, with the aid of professionals at the University of Texas at Austin. This tool, known as the ASR Recoverability Applet, is currently available for use, and TCEQ is in the final stages of posting the ASR Recoverability Applet on its public UIC

webpages. Water providers and others who are considering storage of available water in an ASR may use this tool to gain a basic understanding of the capability of specific underground formations contemplated by the operator to store and transmit water in an ASR.

TCEQ also reported that it has conducted outreach at the national level through the Ground Water Protection Council (GWPC) to educate prospective AR and ASR project operators about the new rules and discuss potential ASR and AR projects. TCEQ participates as a co-chair of the GWPC's ASR-MAR Workgroup, conducting educational workshops and coordination among state and federal UIC Program Directors. TCEQ is also participating as a regulatory resource in local ASR and AR planning efforts, such as the Bell Co./Clearwater Underground Water Conservation ASR Coalition workshops.

Discussion

According to TCEQ, the agency has not yet received any applications for an expedited permit for a water right to divert and store surface water in an ASR or AR project.[25] The Legislature will be in a better position to evaluate whether changes are warranted to this program as this newly-created tool is utilized.

1C. Aquifer Storage and Recovery and Aquifer Recharge Project Statewide Feasibility Assessment (HB 721)

House Bill (HB) 721 directs the Texas Water Development Board (TWDB) to 1) conduct a statewide survey of Texas' major and minor aquifers to determine their relative suitability for use in aquifer storage and recovery (ASR) projects or aquifer recharge projects (AR) and 2) study specific ASR and AR projects in the State Water Plan or recommended by interested parties on an ongoing basis.

Aquifer storage and recovery is defined by Section 27.151 of the Texas Water Code as "the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use by the project operator." Aquifer recharge, as defined by HB 721 and amended Section 11.155 of the Texas Water Code, "involves the intentional recharge of an aquifer by means of an injection well authorized under Chapter 27 of the Texas Water Code or other means of infiltration, including actions designed to (a) reduce declines in the water level of the aquifer; (b) supplement the quantity of groundwater available; (c) improve water quality in an aquifer; (d) improve spring flows and other interactions between groundwater and surface water; and (e) mitigate subsidence."

Statewide Survey of Aquifer Suitability for ASR and AR projects[26]

The legislation requires that the relative suitability consider hydrogeological characteristics, the availability of excess water for potential storage, and the current and future water supply needs as documented in the state water plan. To accomplish this, three stand-alone screenings were developed:

- Hydrogeological parameters: The first screening focused on hydrogeological characteristics, such as storage potential, transmissivity, infiltration characteristics, storativity, recoverability, and water quality.
- Excess water: The second screening focused on excess water that could be available for storage and recharge from surface, reclaimed water, or groundwater sources based on frequency, volume, and other factors affecting reliability.
- Water supply needs: The third screening focused on identifying current and future water supply needs. To use the most current information available, the water supply needs were based on the draft State Water Planning Database (draft DB22) (submitted March 2020).

Together these three screenings are combined into a Final Suitability Rating to help identify areas where suitable hydrogeology, excess water, and water needs exist for further consideration for ASR or AR project potential.

Key takeaways from the survey:

- Nearly all of the major aquifers have some portions that may be highly suitable for an ASR facility.
- Four of the nine major aquifers have a median score that is in the "high" category (>0.7) for hydrogeological characteristics. These aquifers are the Carrizo-Wilcox, Edwards (Balcones Fault Zone), Gulf Coast, and Hueco-Mesilla Bolsons.
- The Trinity Aquifer narrowly missed the median "high" category score cutoff with a median score of 0.69. These aquifers all have either operating ASR wells or pilot studies in San Antonio, New Braunfels (saline portion of the Edwards (Balcones Fault Zone) Aquifer), Victoria, El Paso, and Kerrville, respectively.
- The highest ASR Final Suitability Ratings (>0.85) were found in the Carrizo-Wilcox, Trinity, Gulf Coast, Sparta, and Edwards (Balcones Fault Zone) aquifers.
- Seven of the 22 minor aquifers have at least some grid cells that are rated "high" in terms of hydrogeological suitability for ASR. One of the 22 minor aquifers has a median hydrogeological suitability score that is rated in the "high" category, the Sparta Aquifer.
- When excess groundwater supplies from major and minor aquifers are combined to identify opportunities in areas with coinciding aquifers, the greatest opportunities for excess groundwater occurs in the Panhandle, West Texas, and the East Texas area north of Houston.
- Final AR suitability scores were assigned to all 9 major aquifers and 15 of the minor aquifers. The four aquifers with the most widespread coverage included the Gulf Coast, Ogallala, Cross Timbers and Carrizo-Wilcox aquifers, which accounted for 57 percent of the scored cells. The highest AR Final Suitability Ratings (>0.85) were found in the Brazos Valley Alluvium, Gulf Coast, Carrizo-Wilcox, and Hueco-Mesilla Bolsons Aquifer outcrops.
- In general, results of the evaluation indicate excess surface water is the most widely available source for potential use in ASR and AR projects. However, if excess reclaimed water and groundwater sources are available, they generally receive a higher score compared to the excess surface water sources.

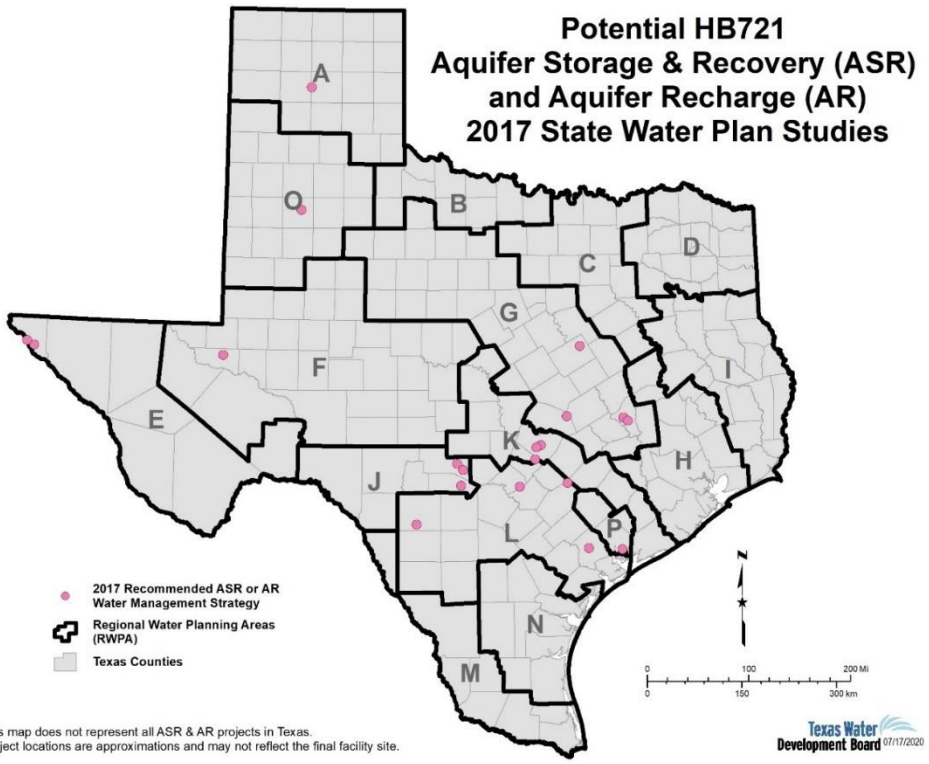
A large amount of data was gathered during this process and has been integrated into a public page on the Texas Water Development Board website where users can get detailed information on the data informing the survey's assessment of the viability of ASR and AR projects in any part of the state.

Studies of ASR and AR projects in the State Water Plan[27]

There are 19 ASR and 1 AR water management strategy projects recommended in the 2017 State Water Plan (Figure 1). HB 721 directs the TWDB to conduct individual studies of these projects and to share the study results with the regional water planning groups and interested persons. TWDB staff have preliminarily ordered state water plan projects for study based on the following criteria:

- Decade in which the project is scheduled to be completed (2020 through 2040)
- Project status (no studies, desktop study, exploratory well(s), pilot system testing, or facility built)
- Data availability (overlap with a completed, ongoing, or planned brackish groundwater study)
- Source water type (groundwater, surface water, reclaimed water, or mixed)
- Staff experience and skillsets
- Project sponsor interest
-

Figure 1. Recommended ASR and AR projects in the 2017 State Water Plan



Of the 20 recommended projects in the 2017 State Water Plan, initial research and communications indicate that:

- 9 projects have sponsors that are interested in studies,
- 3 projects are on hold by the sponsor due to the economics of the project,
- 2 projects are not included in the draft 2021 regional water plans,
- 4 projects already have exploratory or pilot wells drilled, and
- 2 projects are expansions of existing facilities.

The newly formed team for the ASR program at the TWDB has evaluated all 20 ASR and one AR recommended water management strategy projects in the 2017 State Water Plan. The evaluation of each project included gathering information from regional water plans, calling project sponsors to obtain status of project and interest, and classifying different components of projects. All the information was used to develop a project study schedule and begin the evaluation of the initiate two projects.[28]

For the first project, the ASR team started an aquifer characterization study for the ASR component of the Guadalupe-Blanco River Authority's Mid-Basin project. The proposed project includes storing treated surface water into the Carrizo-Wilcox Aquifer. The ASR team has coordinated with the Authority to develop the study area and objectives. For the second project, the ASR team has started an evaluation of a 2009 model of the proposed ASR project for the Bandera County River Authority and Groundwater District. The proposed project plans on treating surface water from the Medina River or stormwater to store in the Lower Trinity Aquifer. The ASR team plans to meet with the District to share findings and coordinate next steps.[29]

Following the approval of the 2022 State Water Plan, ASR team plans to update the list of recommended and alternative water management strategy projects to review for study.[30]

1D. Brackish Groundwater Studies & Permitting (HB 722):

Brackish groundwater has been identified as an innovative and cost-effective source of water that could be developed to reduce pressure on fresh groundwater resources. In recent years, the Texas Legislature has demonstrated a commitment to funding the science necessarily to facilitate the responsible development of this important resource as well as establish a permitting framework for producing brackish groundwater for long-term water supplies.

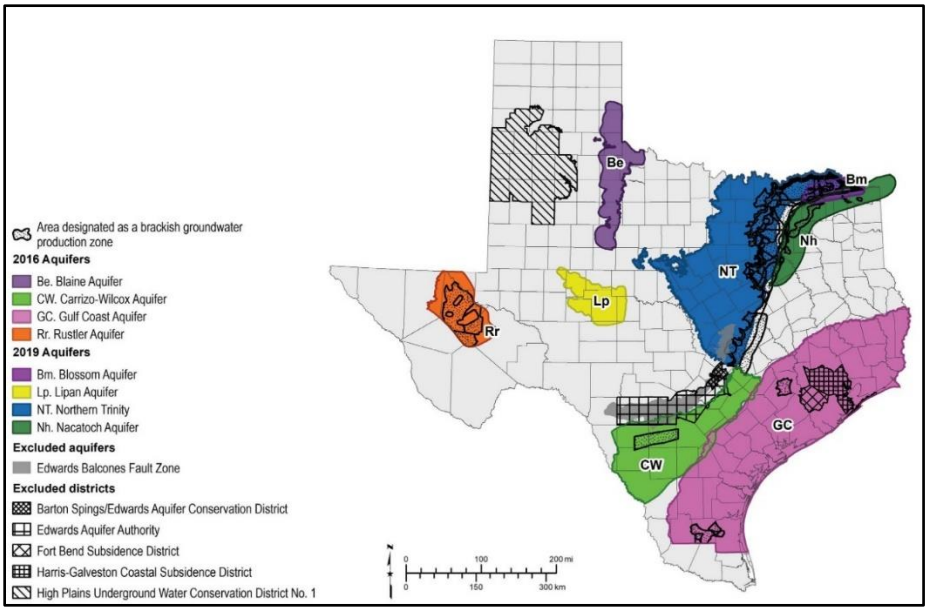
In 2015, the 84th Texas Legislature passed HB 30, directing the Texas Water Development Board (TWDB) to identify and designate brackish groundwater production zones in areas of the state with moderate to high availability and productivity of brackish groundwater that can be used for sources of long-term (30-50 year) water supply.

In 2019, the 86th Texas Legislature also passed HB 722 and created a framework for groundwater conservation districts (GCDs) to establish a permitting framework for developing water supplies from TWDB-designated brackish groundwater productions zones.

Designation of Brackish Groundwater Production Zones (84R HB 30)

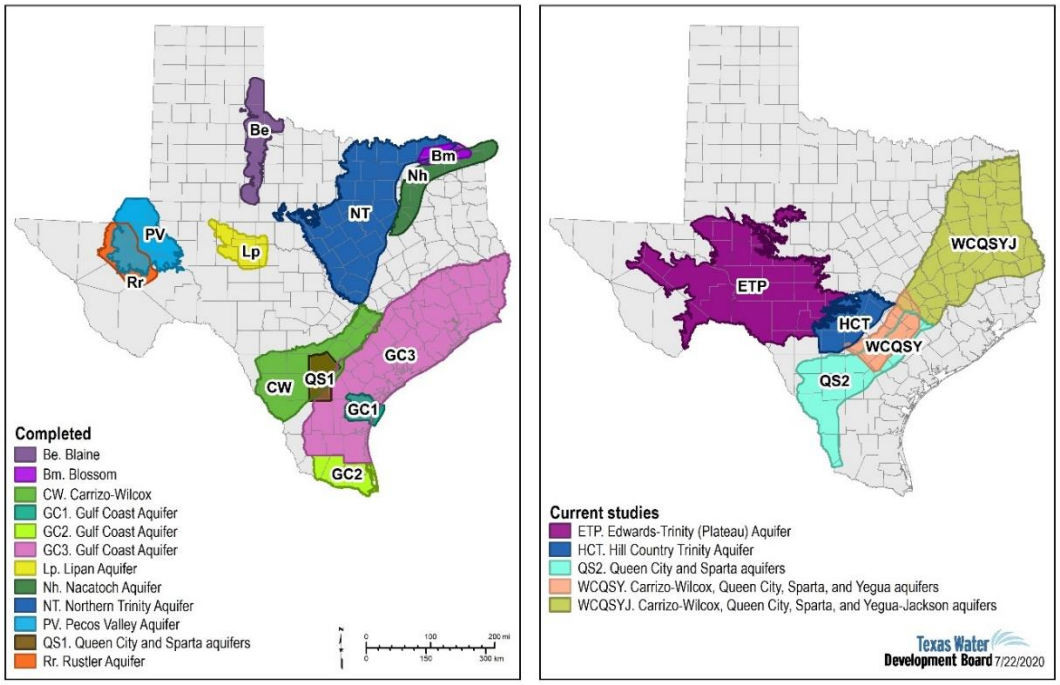
To date, the TWDB has designated a total of 31 brackish groundwater production zones (BGPZ) with moderate to high availability and productivity of brackish groundwater that meet these criteria in six aquifers: the Carrizo-Wilcox Aquifer south of the Colorado River (1), Gulf Coast Aquifer and bordering sediments (4), the Rustler Aquifer (3), the Blossom Aquifer (3), the Nacatoch Aquifer (5), and the Northern Trinity Aquifer (15).[31]

Areas designated as brackish groundwater production zones and legislatively excluded aquifers and districts:



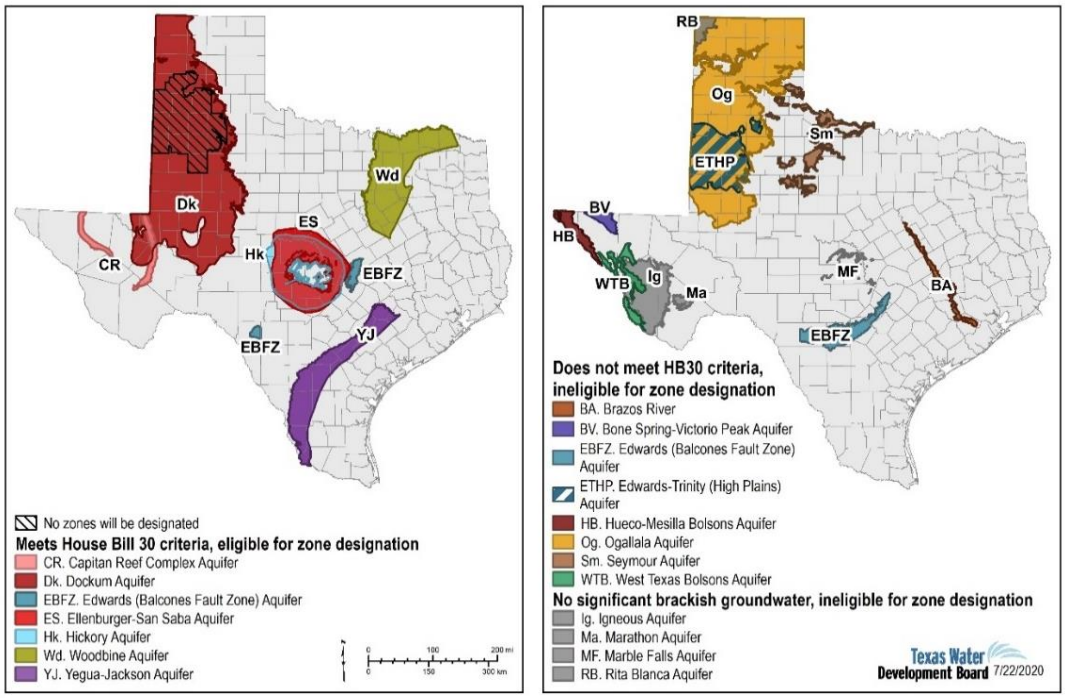
The TWDB is currently working on five regional brackish aquifer studies (right-side map).

Brackish groundwater aquifer studies completed and currently in process:



In addition, the TWDB has identified seven aquifers that meet HB 30 criteria and are eligible for zone designation, noting that the Dockum Aquifer within the area of the High Plains Underground Water Conservation District No. 1 is not eligible (left-side map).

Future brackish groundwater studies:



Buffer Zone Study

TWDB is contracting a study that will serve as an important update since TWDB first undertook the task of designating BGPZ's, and may affect past and future zone designations.

One HB 30 criterion is that brackish groundwater production zones cannot be designated "…in an area of a geologic stratum that is designated or used for wastewater injection through the use of injection wells or disposal wells permitted under Chapter 27…." This requirement is to ensure a zone isn't designated near deep wells used to dispose of ag waste and oil and gas waste.[32]

Given the uncertainty in readily available public data and methodologies, to date the TWDB has applied a conservative estimate of 15 miles to buffer all Class II injection wells within geologic stratum shared with mapped brackish groundwater to address this criterion. This precluded some areas from being designated or resulted in the designation of a zone that was smaller in area that it otherwise would have been.[33]

The study will develop technically defensible mapping procedures and tools to improve and refine the existing default 15-mile buffer distance. The TWDB will form an advisory workgroup consisting of federal and state agencies and stakeholders that will be engaged throughout the study to build scientific consensus on appropriate buffers. The contract study will extend through the remainder of the current biennium with deliverables expected by August 2021.[34]

Issuing Permits in BGPZs (HB 722)

Currently, there are 20 GCDs that have one or more BGPZ designated within the boundaries of their district. With respect to the jurisdiction and management of groundwater of those BGPZs:

- 14 GCDs currently have 1 zone in their boundaries.
- 4 GCDs current have 2 zones in their boundaries.
- 2 GCDs have 3 zones in their boundaries.
- 9 or more BGPZs appear to cover both areas with GCDs and areas where there is no GCD.
- 10 or more BGPZs appear be wholly located in areas where there is no GCD.
- 9 GCDs have previously-adopted Desired Future Conditions (DFCs) covering a subsequently-designated BGPZ.[35]

Section 36.1015 of the Texas Water Code, as enacted by HB 722, provides that a GCD *may* elect to adopt rules to govern the production of groundwater from a BGPZ and *shall* adopt such rules if a petition is received. TAGD survey results indicate the following:

- Zero GCDs have received a petition to adopt HB 722 Rules.
- 2 GCDs are in the process of adopting HB 722 Rules.

- 1 GCD has prepared HB 722 Rules, but does not anticipate adopting the rules unless/until a petition is received.[36]

With respect to the timeframe for adopting HB 722 Rules, GCDs articulated the following considerations:

- A desire to hear from project proponents/potential permittees within a BGPZ on the costs and benefits of permitting and production under the GCD's existing rules vs. the special provisions of HB 722 Rules.
- Awaiting completion of the TWDB rulemaking and any other guidance to implement HB 722.
- Existing permitting and production from within the BGPZ already occurring under the existing GCDs rules (4 GCDs were aware of existing groundwater production from their BGPZs).
- The small area and/or likely low productivity of that portion of the BGPZ within the GCD.
- The potential for future BGPZs to be identified within the GCD and a desire to consider rules for all BGPZs simultaneously.[37]

TWDB Rulemaking[38]

HB 722 directed the TWDB to conduct technical reviews of operating permit applications submitted to GCDs and, when requested by a GCD, investigate the impacts of brackish groundwater production as described in the annual reports of the permitted production. HB 722 does not apply to a district that: (1) overlies the Dockum Aquifer and (2) includes wholly or partly 10 or more counties, which is the High Plains Underground Water Conservation District No. 1.

For a technical review of a brackish groundwater production zone operating permit application, the TWDB will submit a report to the GCD that includes (1) findings regarding the compatibility of the proposed well field design with the designated brackish groundwater production zone, and (2) recommendations for a monitoring system. The TWDB does not have a required timeline to conduct the technical review and prepare a report for the GCD. To date, no such permit applications have been submitted to the TWDB for technical review.

In response to a GCD request for an investigation into permitted brackish groundwater production in the designated production zones, the TWDB will submit a report to the GCD that addresses whether the production from the permitted project is projected to cause (1) significant, unanticipated aquifer level declines, or (2) negative effects on water quality in the same or an adjacent aquifer, subdivision of an aquifer, or geologic stratum. The report will also include analysis of subsidence projected to be caused by brackish groundwater production during the permit term, if the brackish groundwater production zone is in the Gulf Coast Aquifer. The TWDB has 120 days to conduct the technical investigations and return the report to the GCD after receiving a request.

To clarify the process for technical reviews of operating permit applications and associated

annual production reports as required by HB 722, the Board approved the publication of proposed amendments to 31 Texas Administrative Code (TAC), Chapter 356, at the August 5, 2020 Board meeting. The proposed rulemaking will define two new terms that will be used in a new subchapter: 'brackish groundwater production zone operating permit' and 'designated brackish groundwater production zone.

In addition, the new Subchapter G would include three sections:

- Section 356.70 will clarify how the agency identifies and designates local or regional brackish groundwater production zones in areas of the state that meet specific criteria and the information required to be provided for each zone.
- Section 356.71 will outline how the agency will conduct assessments and technical reviews of brackish groundwater production zone operating permit applications.
- Section 356.72 will outline how the agency will investigate and conduct technical reviews of annual reports, upon request by GCDs.

The TWDB is on the process of reviewing comments and will request that the Board approve the adoption of the rules with any recommended revisions in a future Board meeting.

Discussion

Zone designations are made by the Texas Water Development Board after conducting aquifer characterization of the whole or portion of the aquifer, applying HB 30 criteria (namely that production from a zone cannot affect existing freshwater resources or already be in use for some other purpose), and then finally approved by the Board after receiving staff recommendations and public comment.

Some stakeholders have expressed dissatisfaction that there is not a process to petition TWDB to amend a zone once it's been designated. Comments to this affect were received from groundwater conservation districts who want to remove or limit the size of a zone that was designated in the boundaries of the district.[39] Some noted that zones have been designated in areas where public water supply wells exist, causing complications for overlaying the special permitting process provided for zones under HB 722.[40]

Due to the potential for changing conditions in an area where a zone was designated and to address concerns from stakeholders, the TWDB will likely need to create a process by which an affected party can petition to change the boundaries of a zone.

The Lone Star GCD also raised concerns about the authority to collect fees on the production of brackish groundwater in a zone, establishing a timeframe for the TWDB to conduct a technical review of a permit, potential delays in the permitting process due to HB 722's requirement that the district work jointly with TWDB, greater direction on how to monitor specific impacts from production, the cost of monitoring equipment, and that the TWDB's determination of groundwater availability acts as a cap.[41]

Recommendation

Work with TWDB to develop a process by which affected parties can petition the agency to amend the boundaries of a Brackish Groundwater Production Zone.

1E. Interregional Planning Council (HB 817):

HB 807 directed the TWDB to appoint an Interregional Planning Council made up of one regional water planning group member from each planning group. The Council is charged by statute to:

> (1) improve coordination among the regional water planning groups, and between each regional water planning group and the board, in meeting the goals of the state water planning process and the water needs of the state as a whole;
> (2) facilitate dialogue regarding water management strategies that could affect multiple regional water planning areas; and
> (3) share best practices regarding operation of the regional water planning process.[42]

The Council is required to: "(1) hold at least one public meeting; and (2) prepare a report to the Board on the Council's work."[43]

TWDB designated the membership of the Council from each of 16 regional water planning groups:[44]

Region	**Member**
A	Steve Walthour (Chair, Best Management Practices Committee)
B	Russell Schreiber
C	Kevin Ward
D	Jim Thompson
E	Scott Reinert
F	Allison Strube
G	Gail Peek (Chair, Enhancing Interregional Coordination Committee)
H	Mark Evans (Chair, Planning Water Resources Committee)
I	Kelley Holcomb (Vice-Chair, Interregional Planning Council)
J	Ray Buck
K	David Wheelock
L	Suzanne Scott (Chair, Interregional Planning Council)
M	Tomas Rodriguez
N	Carl Crull

O	Melanie Barnes
P	Patrick Brzozowski

Ahead of the Council's initial meetings, Chairman Lyle Larson sent letters to each of the Council members that included six specific objectives within the bounds of the statute for the Council to consider, as follows:

1. *review and make recommendations regarding any identified interregional conflicts;*
2. *review the viability and justification of projects included in the State Water Plan;*
3. *make recommendations on how to encourage the inclusion of alternative projects, including innovative strategies such as aquifer storage and recovery and desalination;*
4. *provide an outline of a plan to facilitate better interregional coordination in the future;*
5. *identify potential new multi-regional projects for consideration that serve the state as a whole; and*
6. *identify additional ways that the TWDB might assist in interregional coordination and planning at the statewide level.* [45]

The Council held 10 public meetings to discuss the workings of the Council, deliberate the aforementioned topics, and to discuss its final report.

The Council established three Committees to further conduct its work. In addition to many planning and preparation meetings with staff and the chairs, these Committees themselves have held more than 13 public meetings thus far to address their specific Council-adopted problem statements which include:

1. Enhancing Interregional Coordination - *In creating regional water plans that comprise the state water plan, the expectations for the scale at which planning groups coordinate is not clear, throughout the state. Although there have been few interregional conflicts, Regions may not be coordinating effectively on issues related to shared water resources and the development of multi-regional projects. Coordination requirements are not fully formalized in statute or rule, coordination roles of consultants and liaisons are not fully specified, and regions are not always coordinating early enough in the process.*
2. Planning Water Resources for the State as a Whole - *Planning Water Resources for Texas as a whole is hindered by the varied and unique characteristics of different regions of the state, land use patterns and trends, the costs of such planning, the protective nature of regions and states over their natural resources, the ownership of water supplies and the impacts of water development, constraints of existing laws and rules, and the many competing needs for the water.*

3. General Best Practices for Future Planning - *Formal requirements may stymie the use of best practices. Formalized sharing of information between planning groups is not always facilitated timely in the planning cycle by TWDB, including group processing of Chapter 8 recommendations. Funding may be inadequate to devote time and effort for reviewing best practices.*[46]

Additionally, a work group made up of two Council members that have been directly involved in past identified interregional conflicts, was established to discuss issues related to interregional conflict in support of the facilitator's development of future agendas for the Council's discussion of the topic.[47]

Prior to the meeting of this interregional conflict work group, the Council-adopted the following problem statement for interregional conflicts:

> *The current roles (planning group, TWDB, Legislature, others), responsibilities, and timelines for identifying interregional conflicts, and the rules for addressing them, may not be appropriate. Clear criteria are needed to define what may constitute an interregional conflict, what is the planning group's role in defining and resolving conflict, and when should these actions occur in the planning process.*[48]

The IPC produced a detailed report chronicling its discussions as well as recommendations to improve the regional water planning process which can be found on the TWDB webpage for the Interregional Planning Council. The Council made recommendations to TWDB, the Legislature, to the regional water planning groups themselves, and to future Interregional Planning Councils.[49]

Discussion

Texas' bottom-up regional water planning process has served to improve the state's method for planning for future water supplies beyond what existed prior to its inception in 1997. It provides a framework for bringing together stakeholders in each geographic region of the state to plan how it will meet its water supply needs for the next 50 years. However, it has also become clear that the regional water planning process does not facilitate the development of visionary projects that would serve the state as a whole, has led to heated battles between regions, and in some instances can represent a wish list of projects with no plan for implementation.

Undoubtedly, an incredible amount of effort goes into the development of the regional water plans to the credit of many dedicated professionals and volunteers from across the water spectrum as well as the staff at the TWDB who support the regional water planning process. Some of the limitations of the State Water Plan are due to the dynamics inherent in having a regional water planning process. Even so, HB 807 was a necessary step towards evaluating how the process can be improved and what changes are warranted to ensure that the resources and energy spent on water planning produces the results that will serve not only the regions, but the entire state's interests.

As noted by the Texas Water Supply Partners, a coalition consisting primarily of regional water supply entities, the IPC Draft Report notes that "state water planning prior to S.B. 1, attempted to address state water resources…" and that "multi-regional and large-scale projects are not a focus within the existing regional water planning process." Further, the Draft Report recommends that the TWDB amend their rules to authorize the regional water planning groups to identify long-range, visionary projects that extend beyond the 50-year planning horizon and benefit multiple regions. The IPC's commitment to planning beyond the current planning cycle and considerations of ways to advance visionary projects that benefit multiple regions or the state as a whole is commendable.[50]

Prior to the initiation of regional water planning with the passage of S.B. 1, the TWDB produced many studies that included large-scale, visionary projects serving vast geographic areas of the state. The regional water planning process has proved extremely effective at meeting the water needs of the individual planning regions, but has lost some of the statewide perspective that the planning experts at the TWDB provided. The best approach for encouraging the identification and development of interregional or statewide projects is through a separate planning process or "module" that supplements the current regional planning process. This new statewide planning module would not in any way replace or interfere with the current regional planning process or impact the current strategies in the plan, but it would instead supplement the current process and allow the planning experts at the TWDB to look beyond the regional process to consider larger-scale projects and potentially longer planning horizons.[51]

In addition, it was also noted that the members of the IPC and the TWDB invested an extraordinary amount of time and resources in the process and identified a number of areas where additional funding would enhance the work of the IPC and the state water planning process, as a whole. Finally, if the IPC is to continue to function in a manner consistent with the inaugural IPC, the state should consider providing for one full-time employee to the TWDB to facilitate these efforts.[52]

Recommendations

Develop a module at the TWDB that works in parallel to the Regional Water Planning Process to identify and foster the development of multi-regional, visionary projects.

Provide the TWDB with one full-time employee to facilitate the work of the Interregional Planning Council.

INTERIM CHARGE 2: PROMOTING THE DEVELOPMENT OF FUTURE WATER SUPPLIES

As Texas continues to grow, and as the water supply and demand gap widens in this and subsequent decades, actions that hinder investment in cost effective predictable water supply development are counter to regionalization and timely development of needed water supplies. These negative impacts can easily extend to private capital investment in our needed water strategies.[53]

The Committee was tasked with studying the efforts of the state agencies primarily involved in water supply issues, the Texas Commission on Environmental Quality (TCEQ), the Texas Water Development Board (TWDB), and the Public Utility Commission of Texas (PUC), to incentivize, promote, and preserve regional water projects to meet the water supply needs of the state and encourage public and private investment in water infrastructure.

The interim charge tasks the Committee with identifying impediments or threats to regionalization with special emphasis on (1) Prioritization in planning and implementing the State Water Plan, Regional Water Plan, and other recommended water supply projects; (2) Barriers to private investment and the development of public-private partnerships to implement needed water supply projects, including the retail water and wastewater industry, to address the state's growth challenges; (3) Public water and wastewater systems that are unable to meet federal and state standards due to inadequate operational capacity and factors that prevent such systems from being integrated into larger systems and processes that more easily facilitate the sale, transfer, or merger of systems; and (4) State agency authority to regulate regional water supply pricing.

The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

City of Austin
Environment Texas
Gulf Coast Authority
Lone Star Chapter of the Sierra Club
North Texas Municipal Water District
Poseidon Water
Public Utility Commission of Texas
Rubinstein, Carlos
Texas Attorney General's Office
Texas Association of Groundwater Owners and Producers
Texas Commission on Environmental Quality
Texas Rural Water Association
Texas Water Conservation Association
Texas Water Development Board

Regionalization is a clear directive and preference of the Legislature and is referenced in various sections of the Texas Water Code with multiple cross agency responsibility between TWDB, TCEQ, and PUC.

Texas Water Code (TWC), Section 15.001(13) defines regionalization as the development of a water supply or wastewater collection and treatment system that incorporates multiple service areas into an areawide service facility or any such system that serves an area that includes more than a single county, city, special district, or other political subdivision of the state. A regionalization partnership can be as simple and informal as two or more water systems agreeing to share equipment or buy treatment chemicals together to achieve savings from bulk purchases.[54]

A more formal partnership could include contractual assistance or establishing a joint organization to share operators, building an emergency interconnection, or engaging in regional water planning with nearby water systems. Complex partnerships include ownership transfer, where two or more systems combine to form one system, or where the ownership of a system is transferred to another entity, also called full consolidation. Current public/private partnerships include large investor-owned utilities acquiring public water systems and having “regional” management, combining public and private sources for project funding and public entities contracting with private management companies for day-to-day operations.[55]

This section of the report will focus on recent cases that may pose threats to regionalization.

The Role of the Regulation of Wholesale Water rates in Promoting and Preserving Regional Water Supplies

In 2016, four of the thirteen member cities of the North Texas Municipal Water District (NTMWD or District) challenged the wholesale water rates charged by the NTMWD to its member and customer cities.[56] These wholesale water rates provide the basis for funding the District's water infrastructure system, including the under-construction $1.6 billion Bois d'Arc reservoir, the first major water supply reservoir to be built in Texas in 30 years.[57]

The petitioning cities argued that the cost allocation amongst the cities who pay for water from the District was unfair. In February 2020, PUC made the finding that the protested rates were “adverse to the public interest,” the legal standard for the agency to review and potentially change the rates at the agency. This was the first finding of this sort in over twenty-five years. In October 2020, the parties signed a settlement agreement, which provides for an updated wholesale rate structure.[58] While ultimately the case at the PUC was dismissed before the case went to a "cost of service" hearing, the lingering precedent that was set by this case has caused instability in the wholesale water market and warrants review by the Legislature.

Jurisdiction Over Wholesale Rate Appeals

In 2013, the Public Utility Commission of Texas (PUC) Sunset bill House Bill (HB) 1600 transferred the economic regulation of retail public water and sewer utilities from the Texas Commission on Environmental Quality (TCEQ) to the PUC. The PUCT has original jurisdiction

over the rates of investor-owned retail water and sewer utilities (IOUs), and appellate jurisdiction over the rates of districts, water supply corporations (WSCs), and the customers outside the city limits of city-owned utilities. The PUC also grants certificates of convenience and necessity (CCNs) that allow water and sewer retail public utilities to serve in an area and obligates them to provide continuous and adequate service.[59]

Wholesale rates charged for raw or treated surface water, groundwater, and wastewater treatment services are regulated by PUC, pursuant to the three key statutory provisions depicted below. PUC's authority with respect to wholesale rates is constrained by the statutory provisions depicted below. PUC's authority with respect to wholesale rates is constrained by the "public interest test" adopted in Texas Water Comm'n v. City of Fort Worth. In short, PUC cannot set aside a rate charged pursuant to a contract unless that rate "adversely affects the public interest." The public interest may be violated when a rate impairs a purchaser's or seller's ability to provide service, or when a rate is excessively burdensome or unduly discriminatory.[60]

Summary of Key Wholesale Rate Review Statutory Provisions		
Water Code Provision	**Scope of Review**	**Key Differences (Underlined)**
TWC 11.036	Price and terms of the contract shall be "just and reasonable and without discrimination."	Authorizes those with control of state water to enter into water supply contracts, subject to rate review.
TWC 12.013	Fix reasonable rates for the furnishing of raw or treated water, and "may use any reasonable basis for fixing rates as may be determined…to be appropriate under the circumstances."	Creates mutuality of remedies for state water: buyers and sellers may appeal.
TWC 13.043(f)	Authorizes appeals by retail public utilities to PUC of "a decision of the provider of water or sewer service affecting the amount paid for service."	Narrow application to rate appeals by retail public utilities that received water or sewer service from another retail public utility or political subdivision.

Public Interest Rule

The TCEQ and its predecessor agencies enacted rules in 1994 (Public Interest Rule) which were and remain consistent with the Texas Water Commission v. City of Fort Worth court case decision. These rules set up a bifurcated process that requires that the Commission must first find that wholesale water rates set pursuant to a contract are adverse to the public interest before the TCEQ could take jurisdiction, set the rates aside, and set the matter for a second phase in which cost of service is reviewed. The rule established a consistent and narrow set of criteria for making a determination relative to the public interest.[61]

Courts have held that a state agency may only change the terms of a contract if the contract

violates the public interest. The rule adopted by the TCEQ sets an appropriate high hurdle as it relates to proving that wholesale rates set pursuant to a contract are adverse to the public interest and should be set aside. This is an intentional and inherent deference to private contracts.[62]

The rule also sets a clear and unequivocable prohibition that states that the public interest determination shall not be based on an analysis of the seller's cost of service. As stated in the Public Interest Rule Preamble, there is no legal requirement that regional water and wastewater contract rates must be based on the seller's cost of service. Further, the Preamble states that parties should not be allowed to urge violation of criteria other than that set in rule.[63]

Discussion

Some of the findings regarding the public interest, if taken out of context, could set a precedent that impacts the ability of wholesale water suppliers to continue to provide affordable wholesale water and wastewater services to support the state's existing population and economy. Together with other recent PUC decisions, this case may also impair the development of critical new sources of water required to meet projected population growth.[64]

Wholesale water rate contracts are agreements negotiated by and entered into by sophisticated parties. On one hand they provide water supply certainty to the purchaser of water without the burden or risk of developing individual and alternate sources of water; while transferring the risk of developing the source supplies, constructing treatment works, and assured reliance to the seller.[65]

The entity responsible for the development, conveyance and treatment of existing and future water supplies is also responsible for building in the necessary capacity to meet future demands for water. Such development and water supply implementation projects often require debt issuance, either by the seller of water directly to the market, or via the TWDB. In the latter case, the public entity and developer and seller of water becomes an underlying credit of the TWDB.[66]

Specific concerns include:

Potential Litigation Impacts on Wholesale Contracts. PUC's decisions create uncertainty regarding the validity of existing contracts, opening the door for parties to potentially abrogate a contract and "re-trade the parties' deal."[67]

Impacts to Water Supply Planning and Development. Increased litigation and unforeseen changes to contract provisions could create a disincentive to the development of long-term, regional, and nonconventional water projects. Stability is important for both buyers and sellers, as new water supplies can take decades to develop.[68]

Higher Water Costs. Potentially changing the rules of the game regarding cost recovery could increase borrowing costs and increase wholesale and retail rates.[69]

Cost-of-Service Ratemaking Could Undervalue Water. Limiting rates to the cost of providing service could undervalue water and discourage conservation.[70]

Deter Private Capital Investment in Texas. Without the contract deference that regional water suppliers have historically relied on, private investors may not prudently provide capital for new water supply projects in Texas.[71]

Undermines Viability of the SWIFT Fund. Changes or uncertainty in the underlying rates threatens the ability for entities to repay its creditor, whether public or private. The State is the creditor for many water projects through the SWIFT fund, a revolving fund whose goal of facilitating the development of $27 billion worth of water projects.

Many of these concerns have been emphasized by large wholesale water suppliers in Texas.

On the other hand, some purchasers of wholesale water such as municipal utility districts and members of the Texas Rural Water Association, have argued that the North Texas case does not demonstrate a need for changes to the appeals process, and if anything, the historical lack of findings that wholesale rates are adverse to the public interest shows that the process is unfairly weighted towards wholesalers already. They argue that the adherence to basic tenets of ratemaking does not threaten a utility's bondholders, undervalue its water, contradict the goals of conservation, or endanger system capacity reservations. They noted that current law provides strong deference to contract language that has been nearly absolute for several decades. But such deference should not always occur when contracts have become reasonable over time, which is why the current appeals process must remain.[72]

Troubled Water Systems

Around 60% of Texas public water systems serve populations of 500 or less. While TCEQ reports that 96% of public water systems are on compliance with health and safety standards, it remains an issue that some systems, generally smaller and less sophisticated systems, are able to achieve compliance but have chronic boil water notices, insufficient water pressure, and other issues.[73]

Troubled utilities are generally characterized by inconsistent service, poor water quality and sewer management, and ineffective operational and financial management. TCEQ regulates the health and safety aspects of water and sewer systems; however, a utility must be managerially and financially healthy to deliver safe water and sewer service.[74]

Since assuming ratemaking responsibilities, the PUC reports that it has dedicated a significant amount of time and effort to water and sewer retail public utilities that cannot or do not serve their customers adequately. Customers of these troubled utilities typically suffer from poor quality water, sewer discharge issues, frequent outages, and bad customer service. These troubled utilities are a small part of the overall industry, but they require significant agency resources to rehabilitate. Most are small utilities with fewer than 500 connections.[75]

While health and safety symptoms of a troubled utility tend to fall within TCEQ’s purview, the

PUC oversees ratemaking and has a major role in ensure systems have the capabilities and resources to correct these problems and avoid them in the future.[76]

Specific challenges to troubled systems include:

- **Increasing technical expertise required to run a public water system.** As water quality technologies and drinking water program requirements change and become more complex, the degree of technical expertise and skills necessary to understand and manage these issues also increases. Proposed revisions to the federal Lead and Copper Rule are expected to significantly increase complexity and implementation requirements in the upcoming year.[77]
- **Financial constraint relative to small customer base.** Researcher have estimated that infrastructure needs per residential customer connection that has less than 100 customers is around $19,734— compared with $2,503 for systems that have more than 10,000 connections.[78]

- **Expense associated with seeking rate increase.** Many small water and sewer utilities, particularly those with fewer than 500 connections, have limited financial, managerial and technical capabilities that hinder their ability to keep appropriate financial records and to successfully navigate the rate filing process.[79]

- **Raising rates unpopular with customers.** PUC staff have anecdotal reports of small utility owners reluctant to raise rates on friends and neighbors, even when it is in the long-term interest of the community.[80]

- **Access to capital.** These utilities are too small to issue bonds, and even private local banks can be unwilling to lend them money. Investor-owned utilities cannot access funds from the State Water Implementation Fund of Texas (SWIFT) or public financing programs. Without the ability to borrow, these utilities must rely on bills paid by their customers to finance their businesses.[81]

Recent efforts to assist trouble water systems include:

- **Helping utilities avoid trouble.** In September 2019, the PUC created the Department of Utility Outreach to support smaller water and sewer utilities. The department assists retail public utilities with training on utility management, bookkeeping basics, records management, rate studies, utility ratemaking concepts, regulatory compliance, and required PUC filings. The department aids troubled and non-functioning utilities to transform into viable retail public utilities.[82]

- **Identifying troubled systems before it's too late.** An amendment last session by Representative Springer to HB 3542 seeks to identify utilities before they become troubled. Within three years of violating a TCEQ order, the utility must file a report with the PUC related to the utility's financial, managerial, and technical capability to provide continuous and adequate service.[83]

- **Streamlined ratemaking.** SB 700 from last session created a Class D for utilities with less than 500 connections and affords them a streamlined ratemaking process. This method tailors the level of regulation to fit different sizes of utilities and reduces rate case expenses for smaller utilities.

Classification	Number of Taps or Active Connections	Number of Utilities
Class A	10,000 or more	5
Class B	2,300 to 9,999	14
Class C	500 to 2,299	41
Class D	fewer than 500	405[84]

The PUC has adopted simplified rate filing package forms for Class D utilities to ease the administrative burden of applying for a rate change while still providing enough information for PUC staff to review the rate request. Class D utilities can also apply to receive an annual rate increase of 5% on the base rate and gallonage charge without a hearing. A Class D utility can use this option no more than once per year and up to four times before filing a regular rate application. Since September of 2019, the PUC has received 24 applications for 5% annual rate adjustments.[85]

Recent efforts to encourage the sale, transfer, or mergers of troubled systems:

- **Allow temporary rates to continue to fund needed investment.** Often the best and quickest outcomes for customers of a troubled utility is for the owner to sell the utility to an entity that can invest in the utility and provide better service. SB 700 added Texas Water Code 13.046(d) that allows the PUC to keep in place temporary rates for a specified period of time when a non-functioning system is purchased. PUC-approved temporary rates are used by temporary managers and receivers to maintain and operate the utility. Before this amendment took effect, a temporary rate would immediately cease upon purchase of the utility, returning the rates to the level that led to the under-investment in the utility. This greatly hindered the rehabilitation of troubled utilities. SB 700 removes disincentives for buyers to purchase a troubled utility and raises confidence that revenues will be available to make repairs to the utility without immediately going through the time and expense of a rate case. Anecdotally, PUC staff has heard from companies that this provision has been successful in making it more attractive to serve as a temporary manager or receiver and to ultimately purchase a troubled utility.[86]

- **Assessing public water systems based on their fair market value**. HB 3542 by Representative Phelan created an alternate method for determining the appropriate value of a retail public utility at the time of an acquisition. The "fair market value" method uses appraisals from utility valuation experts as the basis for determining the sales price for a retail public utility. This facilitates the sale of retail public utilities for which it might otherwise be difficult to determine an appropriate value, such as the sale of a Class C or D utility whose previous owners did not maintain adequate financial records documenting the cost of capital investments. The fair market value method is voluntary and is available to larger Class A and Class B utilities seeking to acquire other retail

public utilities. The PUC adopted rules to implement this provision of HB 3542 in July 2020.[87]

Temporary Management, Supervision, and Receivership[88]

In addition to the methods outlined above, investor-owned utilities can be placed into temporary management, supervision, or receivership as tools in statute to force troubled utilities into compliance.

Both the PUC and TCEQ have the authority to appoint a temporary manager to a utility; however, only the PUC can approve a temporary rate. A temporary manager has the power and duty to ensure continued operation of the utility and the provision of continuous and adequate water or sewer service to customers. Once appointed by the PUC or TCEQ, the temporary manager can begin charging a temporary rate to recover the utility's cost of providing service plus allow reasonable compensation to the temporary manager for their service, upon notice to its customers. The PUC must approve or adjust the temporary rates within 90 days of implementation by the manager. Temporary rates may continue in effect after a non-functioning utility is acquired by another utility for a period determined by the PUC.

The PUC may place a utility under supervision when the utility has exhibited gross or continued mismanagement, gross or continued noncompliance with Chapter 13 of the Water Code, or exhibited noncompliance with PUC orders. When a utility is placed into supervision, the PUC may require the utility to abide by conditions and requirements such as placing restrictions on hiring, salary or benefit increases, capital investments, borrowing money or issuing stock, or use of funds.

Finally, the PUC has the authority to refer a water or sewer utility to the Office of the Attorney General to seek a court-ordered appointment of a receiver to manage and operate a non-functioning water or sewer utility. A receiver has more power over a utility than a temporary manager, including the ability to seek court approval to sell the utility. A receiver is also authorized to charge temporary rates.

Working with a utility that is in temporary management or receivership requires significant agency resources. The PUC staff spends a considerable amount of time coaching temporary managers through the process of applying for a temporary rate and obtaining or amending a CCN, if needed. The PUC staff often holds customer meetings and contacts neighboring utilities and other entities to facilitate acquisition of the non-functioning utility.

The PUC staff also helps the temporary manager or receiver with coordination between local, state, and federal agencies and helps them understand overlapping and different reporting requirements. Customers of non-functioning utilities are often confused with the status and role of a temporary manager or receiver and have many questions which need to be thoughtfully addressed. The PUC staff spends a large amount of time answering questions for these customers. The average time a non-functioning utility remains in temporary management, supervision, or receivership is between two to four years. In some cases, the period of temporary management must be extended or a new temporary manager must be found because the existing

temporary manager has lost interest in continuing or are no longer interested in buying the troubled utility.

Discussion

Last session, the Legislative Budget Board provided a series of recommendations to correct issues with public water systems:

1) provide TCEQ and PUC with additional cost-recovery mechanisms to recover costs of sampling for non-compliant systems;
2) require TCEQ to send automated system notifications for non- compliant systems;
3) require TCEQ to notify the Department of State Health Services and Health and Human Services Commission when health based violations are identified;
4) require state agencies to consider applying for financial assistance to address deficiencies;
5) require TCEQ and PUC to periodically review and adjust financial accountability requirements for new and at-risk systems;
6) authorize TCEQ and PUC, or the administrator of the existing system under receivership to apply for financial assistance on behalf of the system owner;
7) permit TCEQ and PUC to adopt new thresholds that would initiate the required regionalization, consolidation, or closure of systems that incur significant health-based violations during a period and initiate a public petition process to start this review; and
8) create drinking water supply assistance grant program at TCEQ to help fund noncompliant, struggling systems.

According to the Office of the Attorney General, one effective mechanism to stop these problems from occurring would be an up-front bond/financial assurance requirements for all public water systems that would cover the cost to repair or replace systems going forward. Also, rate mechanisms could be used to send a small portion of rates into a water improvement fund for the state (similar to the former system benefit fund for electric utilities).

Recommendations

Provide for an appellate process to challenge a determination of a violation of the public interest by the PUC.

Interested stakeholders should work with the PUC on their proposed undertaking to review and update portions of the Texas Water Code in regards to the wholesale ratemaking appellate process.

Permit TCEQ and PUC to adopt new thresholds that would initiate the required regionalization, consolidation, or closure of systems that incur significant health-based violations during a period and initiate a public petition process to start this review.

INTERIM CHARGE 3: MONITOR THE JOINT PLANNING PROCESS AND ACHIEVEMENT OF DESIRED FUTURE CONDITIONS FOR AQUIFERS

Groundwater has become the most common source of water in Texas, providing 54% of the water for the state. Due to the heavy reliance on groundwater, management goals for aquifers known as "desired future conditions (DFCs)," which are adopted by groundwater conservation districts(GCDs) within a groundwater management area (GMA) and utilized to determine how much water is available for production versus conservation, have come into greater focus and become the source of heated debate. In essence, a DFC for an aquifer is a management goal, and the GCD overlying the aquifer must manage and regulate the production of groundwater from the aquifer in a manner that achieves the DFC. As groundwater management areas are currently nearing the end of the third five-year cycle for joint planning, the Committee was tasked with monitoring the process for joint planning and setting DFCs.

The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

Bandera County River Authority & Groundwater District et al.
Chubb, Dr. Curtis
Environmental Stewardship
Groundwater Management Area 7
Groundwater Management Area 12
Kenedy County Groundwater Conservation District
Schertz Seguin Local Government Corporation
Texas Alliance of Groundwater Districts
Texas Association of Groundwater Owners and Producers
Texas Water Development Board
West Texas Regional Groundwater Alliance

Overview of Joint Planning & Key Terms

In 2005, the Legislature passed HB 1763, which required joint planning among GCDs within GMAs. One of the key requirements established by HB 1763 is that GCDs shall establish DFCs for all relevant aquifers in the GMA by no later than September 1, 2010, and every five years thereafter. After the first cycle of joint planning, the process was expanded and modified by the Legislature in 2011. The second five-year cycle of joint planning was completed in May 1, 2016. The GMAs are currently nearing the end of the third five-year cycle for joint planning. GMAs must propose DFCs by May 1, 2021, and finally adopt DFCs by January 5, 2022.[89]

Joint planning requires district representatives to meet at least annually to do three things:

1) review management plans,
2) review accomplishments of the management area, and
3) consider proposals to adopt new or amend existing long-term management goals knows as "desired future conditions."[90]

Groundwater Management Area (GMA): The Texas Water Development Board (TWDB) has designated groundwater management areas covering all major and minor aquifers in the state. These GMAs are designated with the objective of providing the most suitable area for the management of the groundwater resources. To the extent feasible, GMAs shall coincide with the boundaries of a groundwater reservoir or a subdivision of a groundwater reservoir. All GCDs are within one or more GMA.[91]

Desired Future Conditions (DFCs): Defined in TAC §356.10 (7) as "the desired, quantified condition of groundwater resources (such as water levels, spring flows, or volumes) within a management area at one or more specified future times as defined by participating groundwater conservation districts within a groundwater management area as part of the joint planning process." DFCs must be physically possible, individually and collectively, if different DFCs are stated for different geographic areas overlying an aquifer or subdivision of an aquifer. The TWDB uses the DFCs established by GMAs to determine a modeled available groundwater (MAG) value for an aquifer or portion of an aquifer.[92]

In essence, a desired future condition is a management goal that captures the philosophy and policies addressing how an aquifer will be managed. What do you want your aquifer to look like in the future? Some examples of desired future conditions include, but are not limited to: (1) water levels do not decline more than 100 feet in 50 years, (2) water quality is not degraded below 1,000 milligrams per liter of total dissolved solids for 50 years, (3) spring flow is not allowed to fall below 10 cubic feet per second in times during the drought of record for perpetuity, and (4) 50 percent of the water in storage will be available in 100 years.[93]

Desired future conditions may be expressed in different ways, such as changes in groundwater levels (the most common desired future conditions in the Texas), springflows (Central Texas), storage volumes (High Plains), and subsidence (northern Gulf Coast).[94]

Districts are required to consider several scientific and policy factors when proposing desired

future conditions. These factors include:

- aquifer uses or conditions;
- water supply needs and water management strategies included in the state water plan;
- hydrological conditions (including the total estimated recoverable storage provided by the TWDB Executive Administrator);
- other environmental impacts, including springflow and groundwater-surface water interaction;
- subsidence;
- socioeconomic impacts;
- impacts on interests and rights in private property;
- feasibility of achieving the desired future condition; and
- other information.[95]

Current and Anticipated DFCs

As mentioned, DFCs can be expressed in a number of ways, as outlined in TAC 356.10(7). In selecting a metric for expressing a DFC, various considerations are taken into account including such things as aquifer conditions, local uses and priorities, and ability to measure the DFC. DFC expressions as a percentage of total DFCs are as follows:

- Drawdown - 84%
- Water level decline - 6%
- Percent of saturated thickness - 4%
- Volume in Storage - 3%
- Spring flow – 2%
- Subsidence – 1%[96]

As these numbers demonstrate, the vast majority of GCDs have adopted DFCs that are expressed in terms of drawdown. When asked the reasons for using this expression, GCDs responded that measuring drawdown/water level decline is the most readily available, robust, easiest to collect and monitor, and has been historically important to address local aquifer concerns.[97]

These water level measurements are also used to estimate aquifer storage volume and saturated thickness. Some GCDs that measure water well production have elected to express DFCs as a volume remaining in storage as a direct comparison to the MAG, while continuing to monitor water level and drawdown. Maintaining saturated thickness is particularly important in outcrop areas and thus sometimes used to express DFCs. In some areas, maintaining spring flow or reducing subsidence is the highest socio-economic and/or environmental concern, and GCDs in those areas may elect to adopt a DFC to monitor the aquifer conditions related to those concerns.[98]

According to the Texas Alliance of Groundwater Districts, there is a large degree of consistency in the metrics used to express DFCs across the GMAs. All responding GCDs report that the metric used for DFCs is either the same or generally the same - with limited exceptions -

throughout their GMA.[99]

TAGD further reports that the nine factors that GMAs must consider embody some of the reasons why there may be multiple DFCs within a GMA. Just like aquifer conditions vary within the same formation (i.e., outcrop vs. downdip, geologic faults, transmissivity and permeability, etc.), so do the forecasted water use, water supply needs, and socioeconomic considerations. In order to allow for DFCs to reflect these localized considerations while also looking at the aquifer formation as a whole, over half of the GMAs have established "umbrella" DFCs that apply to aquifer formations throughout the extent of the GMA. These are in addition to DFCs for the same formation that may be adopted at a district or county level.[100]

Modifications to DFCs[101]

As a part of the current round of joint planning, GMAs are evaluating potential DFCs pursuant to the nine factors through an open process with public input. Responding GCDs indicate the following:

- 25% indicate they anticipate one or more new or modified DFC for the GMA.
- 22% are still investigating whether there may be one or more new or modified DFC for the GMA.
    - Only 2 GMAs have received an outside request to reconsider one or more DFC.
- Nearly all current DFCs have a base or historic year between 2000-2012.
    - The majority of GCDs plan to maintain the same "base" year in this round of planning. One reason identified for this is to maintain consistency in monitoring DFCs.
- Most DFCs currently extend to 2070.
    - Over 50% plan to extend DFCs to 2080 in the current planning cycle. If a GMA does not, then TWDB will extend the DFCs out to 2080 in order provide numbers for the state and regional water planning process.

For those GCDs that do anticipate new or possible modifications to one or more DFC, articulated reasons include:

- new or updated GAMs since the last round of planning,
- incorporation of new groundwater production data,
- improve the ability to monitor DFC,
- considering new approach for DFCs,
- newly-designated aquifer with no existing DFC,
- previously non-relevant aquifer now relevant, and/or
- new areas added to a district, which do not have an existing DFC.

Achievement of Desired Future Conditions[102]

DFCs reflect a planning goal for the GCD. Once the DFCs have been adopted, a GCD's management plan must include goals and performance standards for addressing the DFCs (among other things) and should include a methodology by with the GCD will track its progress

in achieving its management goals. On this topic, responding GCDs indicate the following:

- 98% report that their management plan sets out program to monitor DFC achievement.
- 100% use monitoring well measurements to track DFC achievement.
    - This reflects nearly 5,400 monitoring wells used to track achievement of DFCs.
    - Monitoring networks by GCDs vary in size between 6-1,400 monitoring wells.
    - Water level monitoring from individual wells range from real-time readings with automated equipment (every 15 minutes to once a day) to monthly, quarterly, or annual manual measurements. The measurement frequency and observation well number is largely dependent on:
        - the maturity of the observation well network;
        - the data amount a GCD believes necessary to characterize aquifer conditions; and/or
        - the costs associated with investing in observation well acquisition and maintenance.
- Some GCDs also utilize groundwater production reporting and TWDB data in their efforts to monitor DFC achievement.
- When asked what may improve the monitoring of DFCs, GCDs identified expanded monitoring well networks and availability of recharge data.
- Many GCDs identified the GMA as a beneficial forum where GCDs can establish protocols for monitoring of DFCs.
- Only one GCD reported a brief period during which a DFC was exceeded as a result of declining aquifer levels during a period of drought.
- 40% report having rules currently in place to address how pumping may be limited or curtailed in the event a DFC is not being achieved. Curtailment approaches include across-the board reduction in pumping, targeted reductions on specific zones/areas, and use of conditional permits.

Discussion

DFC Appeals Process

During the 2015 Legislative Session, the process to appeal the adoption of a desired future condition was changed from an administrative appeal to the Texas Water Development Board to a judicial appeal before the local district court. Within 120 days after the final adoption of the DFC, an affected person may file a petition with the GCD appealing the reasonableness of the desired future condition. Texas Water Code § 36.1083(b).[103]

Some GCDs argue that due to the time it takes for a successful DFC appeal to wind its way fully through the process, coupled with the fact that the GCDs in a GMA must adopt desired future conditions every five years, the timing makes the appeal process irrelevant.[104]

The only appeal filed under the new process (City of Conroe et al vs. Lone Star GCD) settled the day the hearing was scheduled to begin. The Lone Star GCD adopted the DFCs on August 9, 2016, and the petitions were filed on December 2nd and 6th, 2016. Even on an accelerated

schedule, the GMA 14 representatives have been told that process will take 18-19 months. By that time in the 5-year cycle the GMA is already embarking on the next round of DFCs.[105]

After the Lone Star Groundwater Conservation District settled the dispute and agreed the 2016 DFC was "no longer reasonable," the GMA 14 representatives were asked to adopt a new DFCs for Montgomery County. Because the GMA had already started the 2021 planning process they decided to combine the request with the current planning process. When the Lone Star Groundwater Conservation District adopted a new management plan it stated it did not have a DFCs. The Texas Water Development Board rejected that management plan as administratively complete and commented that the district must use the DFC approved in 2010, the last acceptable DFC on record for the district. That dispute was settled through the mediation process, but there is still an issue of what DFC applies to a district following a successful appeal.

Role of the MAG in Permitting Decisions

Amendments to Sec. 36.1132, Water Code, adopted in 2011 significantly changed the importance of the Modeled Available Groundwater. First, the name was changed from "Managed Available Groundwater" to "Modeled Available Groundwater." But the more significant change was the repeal of the provisions that establish the MAG as a permit limit and replaced that with provisions utilizing the MAG as a consideration. The original provision stated "A district, to the extent possible, shall issue permits up to the point that the total volume of groundwater permitted equals the managed available groundwater . . . ." Texas Water Code § 36.1132 (repealed)(emphasis added).[106] The new version is a follows:

Sec. 36.1132. PERMITS BASED ON MODELED AVAILABLE GROUNDWATER. (a) A district, to the extent possible, shall issue permits up to the point that the total volume of exempt and permitted groundwater production will achieve an applicable desired future condition under Section 36.108.

> (b) In issuing permits, the district shall manage total groundwater production on a long-term basis to achieve an applicable desired future condition and consider:
>
> (1) the modeled available groundwater determined by the executive administrator;
>
> (2) the executive administrator's estimate of the current and projected amount of groundwater produced under exemptions granted by district rules and Section 36.117;
>
> (3) the amount of groundwater authorized under permits previously issued by the district;
>
> (4) a reasonable estimate of the amount of groundwater that is actually produced under permits issued by the district; and
>
> (5) yearly precipitation and production patterns.

Texas Water Code § 36.1132 (emphasis added).

The perspective of some districts is that removing the MAG as a permit limit significantly reduces its significance in the permit process. Instead, the MAG is one of several considerations in issuing a permit, and the District's goal is not to limit permits to the MAG, but limit production enough to ensure achieving the DFC.[107]

Recommendations

Continue to monitor and assess the impacts of the DFCs that are submitted to the TWDB through May of 2021.

Work with TWDB to rectify instances in which a groundwater conservation district submits a management plan to the agency that contains a DFC that was deemed "no longer reasonable" or “unreasonable.”

INTERIM CHARGE 4: REVIEW OF STATE AUDITOR'S OFFICE REPORTS IN THE COMMITTEE'S JURISDICTION

The Speaker tasked each committee with monitoring and reviewing the State Auditor's Office review of agencies and programs in its jurisdiction, and to bring forth any pertinent information. Chairman Lyle Larson identified the following two State Auditor's Office reports as meriting review by the Committee: (1) "An Audit Report on Selected Groundwater Conservation Districts" and (2) "A Summary Report on Senate Bill 1289 Provisions Related to the Water Development Board's Financial Assistance of Construction Projects".
The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

State Auditor's Office
Texas Alliance of Groundwater Districts

An Audit Report on Selected Groundwater Conservation Districts

Texas Water Code, Section 36.061, states that the State Auditor may audit the records of any district for which the State Auditor determines an audit is necessary. Texas Water Code, Section 36.302, states that the State Auditor's Office may audit a district's activities under the direction of the Legislative Audit Committee. The State Auditor makes a determination about whether a district is actively engaged in achieving the objectives in its groundwater management plan based on an analysis of the district's activities.[108]

This audit was completed between February 2019 and May 2019.[109] Past Audit Reports on Selected Groundwater Conservation Districts were published in October 2013, October 2014, and May 2018. Recent reports have included confirming compliance with the following requirements:

- Obtaining an annual audit of the financial condition of the district
- Obtaining bonds for district officers, employees, or consultants who are responsible for handling district funds
- Obtaining bonds for district board members
- Holding regular board meetings in accordance with statute
- Adopting written policies
- Adopting written district rules
- Participating in joint planning meetings with other groundwater conservation districts within the same Groundwater Management Area
- Preparing and obtaining board approval on an annual budget that includes a complete financial statement
- Maintaining at least one bank as the official depository for district funds, obtaining dual signatures on fund disbursements in the prior fiscal year, and ensuring that payments made to board members are supported by a verified statement.[110]

Texas Water Code, Section 36.303, specifies that if a district fails to comply with the provisions of Texas Water Code, Chapter 36, the Texas Commission on Environmental Quality must implement an enforcement action. The Texas Commission on Environmental Quality has several enforcement action options established under the Texas Water Code. Those options include:

- Requiring a district to take or refrain from certain actions.
- Dissolving a district's board and calling for the election of a new board.
- Requesting that the Office of the Attorney General bring suit for the appointment of a receiver to collect the assets and carry on the district's business.
- Dissolving the district.[111]

Auditors selected the seven districts below and audited their (1) achievement of selected groundwater management plan goals and (2) compliance with selected statutory requirements for each district's fiscal year 2018. Below is a summary of the results:[112]

Achievement of Selected Management Plan Goals			
Fully Achieved All	Fully or Partially Achieved All	Fully or Partially Achieved Majority	Partially Achieved or Did Not Achieve Majority
▪ Calhoun County Groundwater Conservation District ▪ Headwaters Groundwater Conservation District ▪ Live Oak Underground Water Conservation District	▪ Barton Springs/Edwards Aquifer Conservation District ▪ Gonzales County Underground Water Conservation District	▪ Mesa Underground Water Conservation District	▪ Evergreen Underground Water Conservation District

Compliance with Selected Statutory Requirements			
Fully Complied with All	Fully Complied with Majority	Fully or Partially Complied with Majority	Partially Complied or Did Not Comply with Majority
▪ Gonzales County Underground Water Conservation District ▪ Headwaters Groundwater Conservation District	▪ Barton Springs/Edwards Aquifer Conservation District ▪ Calhoun County Groundwater Conservation District ▪ Mesa Underground Water Conservation District	▪ Evergreen Underground Water Conservation District	▪ Live Oak Underground Water Conservation District

In each instance of noncompliance, a response from district management is included in the audit report documenting specific steps taken to remedy the failure to comply with the statute or management plan.[113]

According to the Texas Alliance of Groundwater Conservation Districts, overall, GCDs expressed satisfaction with the process used by the State Auditor. As a general matter, State Auditor findings assisted the GCDs in evaluating whether their management plan objectives were best designed to measure achievement of their management goals. It was suggested that the State Auditor more closely involve other agencies (TWDB and TCEQ) when assessing risk levels on any deficiencies identified in the report.[114]

It was suggested that the State Auditor ensure that report findings are consistent with statutory requirements to trigger TCEQ oversight authority. In Report 18-030, for example, the State Auditor determined that one district was not achieving management plan goals or complying with statutory requirements. However, the Report did not include a specific finding that the district was "not operational" under 36.302(f). A specific finding that the district was "not operational" may have been warranted in this case. If this language is used by the State Auditor in the future, when appropriate, it may avoid uncertainty about whether TCEQ is required to take enforcement action against a GCD that is not meeting management plan goals or complying with statutory requirements. Specifically, in the case of the GCD at issue in Report 18-030, a "Not

operational" finding may have avoided the need for a group of GCDs to file a petition for review under Section 36.3011 with TCEQ in order for TCEQ to appoint a review panel and take action to address that GCD's performance.[115]

The work of the State Auditor's Office is commended for helping to achieve the critical importance of transparency and accountability as groundwater conservation districts carry out their duty to conserve, protect, and manage groundwater.

A Summary Report on Senate Bill 1289 Provisions Related to the Texas Water Development Board's Financial Assistance of Construction Projects

Senate Bill 1289 passed by the 85th Legislature required the Water Development Board to submit a report electronically to the State Auditor's Office no later than December 1, 2018, on all contracts for construction of a project that received financial assistance during fiscal year 2017 under Texas Water Code, Chapters 15, 16, or 17. The State Auditor's Office prepared a summary of the report published by the Board in accordance with Texas Government Code, Section 2252.2025.[116]

The report is intended to provide the Legislature with a summary of the impacts of Senate Bill 1289 on projects financed by the Board under the Texas Water Code. The Board must also report on (1) the country of origin of the iron and steel products used in a project and (2) the cost and quantity of all iron and steel products received from each country of origin of the project. In addition, Senate Bill 1289 requires the Board to report any related bond information, including the credit rating of general obligation bonds or revenue bonds issued to finance or refinance projects included in the state water plan.[117]

Key findings:[118]

- The Board asserted in their December 1, 2018, report to the State Auditor's Office that enactment of Senate Bill 1289, relating to the purchase of iron and steel products made in the United States, resulted in immediate changes to five of the Board's state financial assistance programs. The Board updated bid document requirements, removed the manufactured goods and electrical components applicability, and created a new exemption and waiver process.
- The Board reported no impact related to Senate Bill 1289 based on 20 responses to a survey sent to 70 political subdivisions who received funding for 83 projects from the Board during fiscal year 2017. The Board asserted that although no impacts were reported, the potential impacts on future projects cannot be extrapolated from these results.
- The Board relied on survey responses from seven entities representing eight projects to determine which entities with construction projects purchased iron and steel products during fiscal year 2017. Seven of those projects received funding from sources that were not affected by Senate Bill 1289. The remaining project was not anticipated to be affected by Senate Bill 1289 until May 2019.
- The Board obtained a rating and report from the credit rating agencies on outstanding bonds issued by the Board to finance or refinance projects in the state water plan as of

August 31, 2018. The Board reported the highest possible ratings.

Discussion

It has been speculated that the reason for the lack of impact on surveyed projects is due to unfavorable tariffs on foreign iron and steel that were implemented after the passage of SB 1289.

ADDITIONAL TOPIC: GROUNDWATER-SURFACE WATER INTERACTION

The State of Texas continues to be challenged with how to deal with the interaction between surface water and groundwater. According to the Texas Water Development Board's *2016 Texas Aquifers Study*, about 30 percent of surface-water flow in Texas is attributable to groundwater discharge from the major and minor aquifers. According to the TWDB, "eighteen major and minor aquifers contribute between 20 and 50 percent of the flow to streams flowing over their outcrop zones," and "groundwater contributions to surface water are greatest in East Texas and around major springs in the Hill Country and west Texas."

Prior to the 86th Legislative Session, the Committee visited the San Saba River region and received testimony on the adverse affect on the flow of the river when groundwater pumping from shallow wells for irrigation season starts for pecan trees and hay that's grown in the area. The Committee has also held hearings in Del Rio to discuss the challenges associated with the affect of groundwater production on San Felipe Springs and the flow of the Devil's River. The hydrogeology, regulatory dynamics, types of use, and other circumstances in each region affected by this dynamic differs slightly, lending to the challenge with developing statewide solutions. This issue will continue to be a challenge to the state as more compression on groundwater resources occurs.

Given the hydrological connection between groundwater and surface water, and the ongoing challenges associated with the bifurcated regulatory regimes for each of these water sources, Chairman Lyle Larson tasked the committee to again study emerging issues related to this topic. The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

Bersch, Martha Tobin
Brazos Valley Groundwater Conservation District
Crook, Elizabeth
Danysh, Kathleen and Richard
Davee, Robert A.
Devils River Conservancy
Environmental Defense Fund
Environmental Stewardship
Flato, Ted
Friends of San Saba
Granstaff, Charles A.
Greenwood, M. Harris
Hays Trinity Groundwater Conservation District
Headwaters Groundwater Conservation District
Howard, Ryland
Langford, David K.

Lower Colorado River Authority
Oates, Michael and Barbara
Rubinstein, Carlos
Schertz Seguin Local Government Corporation
Texas Water Foundation
Texas Water Trade
Wallace, Roger and Mary
Yelderman Jr, Dr. Joe C. (Baylor University)

Developments in Groundwater-Surface Water Interaction

Jacob's Well Groundwater Management Zone

Jacob's Well is a karst spring originating from the Lower Cretaceous, Middle Trinity Aquifer and is located in the Cypress Creek watershed near Wimberley, Texas. The Middle Trinity Aquifer is the primary groundwater resource for water supply in the region. Jacob's Well flow responds to climatic variations of both short- and long-term cycles. Groundwater pumping from the Middle Trinity Aquifer also directly influences flow at Jacob's Well. The combination of periodic drought cycles and increased groundwater pumping has significantly diminished springflow in recent years.[119] Jacob's Well is estimated to provide 20% of baseflow to the Blanco River.[120]

In 2000, Jacob's Well flow stopped flowing for the first time in recorded history. After a second 167-day flow interruption in 2008-2009 and another stop in 2011, residents of the Wimberley Valley coalesced to advocate for solutions that would keep waters flowing from Jacob's Well through Cypress Creek and into the Blanco River, citing its importance as a community asset, the local economy, and to property values.**[121]**

As a result, in March 2020, the Hays Trinity Groundwater Conservation District adopted the Jacob's Well Groundwater Management Zone. Within the 39 square mile Jacobs's Well Groundwater Management Zone, the District designates cutback triggers based on Jacob's Well spring flow. When flows from Jacob's Well averages six cfs or less during any 10-day period, The District Board declares appropriate drought stage.**[122]**

Comanche Springs[123]

Comanche Springs was once one of the largest springs in Texas, flowing at 30 million gallons a day. It ceased its flow in the early 1960s when groundwater development in its zone of influence exceeded recharge. Over the last decade, its wintertime flow has returned when irrigation is suspended in the course of routine crop management. Groundwater modeling indicates that the spring could be restored to perennial flow with a realistic reduction in groundwater pumping.

At Comanche Springs, the non-profit Texas Water Trade has begun a pilot market program to demonstrate the responsiveness of the Edwards-Trinity Aquifer to voluntary groundwater pumping reductions. With roughly $1.4 million in federal funding and another $300,000 from oil and gas partners, Texas Water Trade will be incentivizing irrigators to undertake voluntary conservation measures to test spring response. In coordination with the City of Fort Stockton and local stakeholders, we will simultaneously be evaluating the potential for conjunctive water management projects to meet the changing needs of municipal and farming users in this region while enabling Comanche Springs to be restored to perennial flow. Based upon actual spending by visitors to Balmorhea, restoring the springs would bring $4 million in non-local spending to Fort Stockton and create 72 permanent jobs, making the spring's restoration an important economic development opportunity.

Bastrop County[124]

Scientific studies. To help address the recognized gaps in groundwater-surface water science, the Lower Colorado River Authority is working with the Texas Water Development Board (TWDB) and several partners to implement additional research as a follow up to the TWDB study, "Field Studies and Updates to the Central Carrizo-Wilcox, Queen City, and Sparta GAM to Improve the Quantification of Surface Water-Groundwater Interaction in the Colorado River Basin" (Intera 2017).

Specifically, through a pilot study along the Colorado River in Bastrop County, the project hopes to develop methods for collecting and analyzing data related to the exchange of water between the river and the alluvium over a range of different hydrological conditions that can be applied to other test sites across the state. This study may also provide helpful information related to methods for more accurately estimating river gains and losses and understanding how pumping in the alluvium impacts river flows under varying hydrologic conditions.

Other factors also affect groundwater-surface water interactions, such as the location of springs and seeps, hydraulic properties of the alluvium, and physical characteristics of stream deposits. Very recently, LCRA has also engaged with the TWDB on a planned study of groundwater-surface water interactions on the Llano River, which represents a very different system from the lower Colorado River, with a shallow, unconfined, and more rapidly recharging aquifer. While these relatively modest studies may not shed light on all of the factors that affect groundwater-surface water interactions, they nevertheless reflect an important step in advancing the state's understanding of these complex issues.

Permitting challenges. In its recent hearing, opponents to LCRA's permits argued that a GCD should deny or severely limit private property rights to groundwater if there was any potential impact to the reliability of surface water that could impact TCEQ's decisions in water rights permitting decisions.

Taking this a step further in its recent hearing, the opponents asserted that LCRA's proposed permits to produce private groundwater (from a well field on thousands of acres nearly seven (7) miles away from the river) had the potential to impact the reliability of surface water rights and instream flows, thus affecting TCEQ's surface water permitting decisions. Therefore, they argued the GCD should deny or severely limit the proposed groundwater permits. This argument not only ignored the serious limitations in the scientific understanding and modeling capabilities discussed above but also ignored established caselaw that affords surface water users no such protection from groundwater pumping. *See* Pecos v. Water Control and Imp. Dist. No. 1 v. Williams, 271 S.W.2d 503, 506 (Tex.Civ.App. – El Paso, 1954, writ ref. n.r.e). While the administrative law judges (ALJs) did not adopt this standard, it remains pending before the Lost Pines Groundwater Conservation District Board as the outcome could have significant statewide implications.

Also under consideration by the Lost Pines Groundwater Conservation District Board is whether to require LCRA, as part of its permits, to be responsible for a monitoring program to inform the

District on the cumulative impacts of district-wide pumping on surface water resources. This action is being urged notwithstanding the fact that the ALJs found that LCRA's proposed pumping would not cause unreasonable impacts to surface water resources. LCRA believes groundwater conservation districts that wish to better understand the complexities of groundwater-surface interactions and the potential impacts of pumping from all of the groundwater users within its boundaries should use permitting fees collected from all users to develop and implement such a program, rather than implementing a program through ad hoc decisions that impose the burden on a small number of permittees (or, as in this case, the one permittee that also happens to manage surface water).

Existing Regulatory Authority

Under Section 36.113(d)(2) of the Texas Water Code, groundwater conservation districts (GCDs) are required to consider whether a proposed groundwater permit will cause an unreasonable effect on surface water resources. State law does not, however, provide any specific definitions or guidance on what constitutes an "unreasonable" impact nor does it provide any guideposts on the manner in which a district should respond if such impacts are identified. GCDs report that they are unable to fully consider or address impacts to surface water resources caused by groundwater pumping for two main reasons: a lack of site-specific field data and refined models and regulatory boundaries are not based on groundwater flow.

When the jurisdictional boundaries of GCDs and groundwater management areas are not based on the flow path of groundwater in a watershed, it is difficult for a GCD to fully consider how to address impacts to springflow in its district because the impacts may be a result of management decisions made by a neighboring GCD, or in some cases, unregulated pumping when no GCD exists.

Limitations of Current Models

It is widely held that the lack of modeling capability results in the inability to adequately inform decision makers charged with considering and preventing negative outcomes from groundwater and surface water interactions.

Groundwater conservation districts require more site-specific information about local groundwater-surface water interactions "to properly address questions of how much groundwater pumping is affecting surface-water availability, flow, and quality." Many GCDs the lack highly refined models and granular data needed to understand groundwater and surface water interactions in a specific river basin. Field data and refined models are crucial for GCDs to adopt sound policy and to make informed management decisions; yet there is no state funding for this type of science and no formal process to coordinate with TWDB. Efforts to collect field data and develop local models are initiated and funded by local stakeholders and GCDs.[125]

Although GCDs and the TWDB have developed and are updating groundwater availability models (GAMs) for aquifers across the state, these models do not accurately simulate surface water-groundwater interactions for three main reasons: (1) GAMs were developed to address water issues at relatively large spatial scales, whereas surface water-groundwater interactions

occur at a local scale; (2) GAMs use time periods of months to years, whereas accurate modeling of surface water-groundwater interaction requires time periods of hours to days; and (3) GAMs cannot simulate unsaturated flow — the water flowing through the land surface into an aquifer.[126]

Discussion

Almost all the groundwater conservation districts who have desired future conditions that maintain spring flow are managing groundwater to protect federally listed endangered or threatened species that reside in the springs. Some would argue that the Endangered Species Act should not be the hammer needed to protect springs in Texas – our state groundwater management framework should require it on its own, as protecting springs protects the well-being of all Texans.[127]

However, a management framework designed to protect spring flow will also result in more groundwater being conserved in place, as groundwater levels must be maintained to ensure the continued flow of springs, and less water available for production. As the State continues to grow, this would provide an even greater challenge in meeting the State's water supply needs.[128]

Regarding modeling needs, it was noted by the LCRA that some may suggest that we need to integrate the state's surface and groundwater models in a manner to provide a more holistic view of the hydrologic cycle. While a laudable goal, such an effort is premature given the recognized limitations of today's models. Moreover, it is questionable whether the two models can ever be appropriately linked. The lack of reliable data, as discussed above, is just one problem. Another is that the two different models are structured differently and produce model output that is simply not transferrable between the two. What may seem like simple differences between the models can exacerbate the potential for significant errors and oversimplified interpretations. For example, the models rely on different time steps (daily vs. annual) and make predictions over different time periods (historic vs future conditions). [129]

Further, certain versions of the state's surface water availability models employ extremely conservative assumptions only used by the Texas Commission on Environmental Quality (TCEQ) in very limited circumstances that would be inappropriate to use when trying to get a realistic understanding of groundwater-surface water interactions.[130]

Many stakeholders expressed support for additional funding to develop site-specific models that could better inform management decisions as well as an advisory committee to make recommendations on the how to best use limited resources.

Recommendations

Create a statewide advisory group to develop policy recommendations related to improving the understanding of and management of groundwater and surface interactions in Texas. The advisory group should consist of a diverse group of stakeholders and provide opportunity for public input.

ADDITIONAL TOPIC: WATER MARKETS

Water markets at their core, as with any market, are intended to help reduce the impacts of scarcity by facilitating the transfer of water to its highest-valued uses. Water scarcity is likely to increase significantly moving forward, primarily due to population growth and the added water demand associated with such growth. Improvements in water use efficiency, both in the agricultural and municipal sectors, have helped society respond to date (indeed, overall water use has decreased in the agricultural and municipal sectors). However, demand will harden, and thus such efficiency gains will be harder to come by, resulting in water demand rising with population growth. Scarcity will also heighten due to lower and/or more variable supplies coupled with increased regulation surrounding groundwater pumping and use. These conditions, increasing demand coupled with stagnating or declining and more variable supplies, suggest an increasingly important role for water markets in Texas, as in the western United States.[131]

Given the ongoing need to discuss the development of water markets, Chairman Lyle Larson tasked the committee to again study the role of water markets in Texas and report to the Legislature on developments in this space.

For an in-depth look at water markets in Texas, a review of that Committee's Interim Report to the 86th Legislature is recommended. This section of the report will focus on notable developments since the publishing of the Committee's previous report.

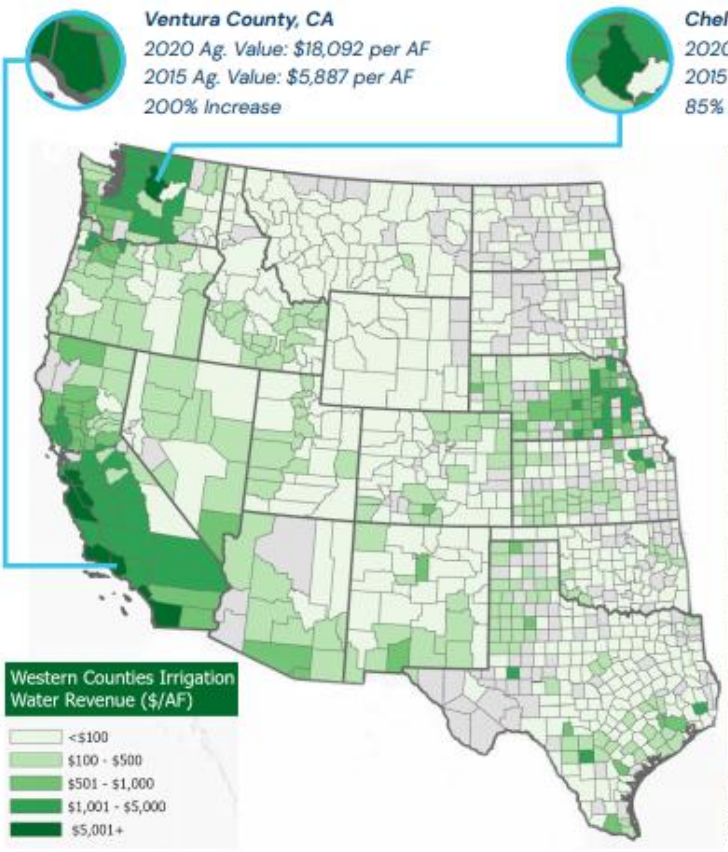
The Committee received written submissions in response to its Formal Request for Information from the following stakeholders:

Bandera County River Authority & Groundwater District et al.
Environmental Defense Fund
Lone Star Chapter of the Sierra Club
Rubinstein, Carlos
Texas Water Trade

Trends in the Western United States

Irrigated agriculture is an important component of the Western U.S. economy and are a major player in water markets. In total, the Western states annually see about $50 billion of agricultural sales related to irrigation. Recent trends in the Western U.S. toward high-value and capital-intensive crops that depend on irrigation are changing the importance and value of water in agriculture, and such changes have important implications for water trading and water market prices.

Parts of California and Washington continue to have highest values for water used in agricultural production. The increase in water value in these two states has largely tracked with an expansion in permanent and high value crops such as almonds, pistachios, and tree fruits. These states have also seen rises in water prices and an uptick in agricultural water purchases. The experience of these two states may have broader implications for water prices in other parts of the West as commodity prices rise with improved trade relations globally and as the impacts of COVID work through agricultural supply chains. A rise in agricultural water values will drive water market prices.



	Estimated Agricultural Water Use Value ($/AF)		Estimated Agricultural Production Value from Irrigation ($Million)		Estimated Annual Agricultural Water Use (Million AF)	
STATE	2020	2015	2020	2015	2020	2015
AZ	$330	$378	$1,019	$1,013	3.09	2.68
CA	$1,564	$1,188	$32,418	$28,596	20.73	24.07
CO	$86	$88	$879	$900	10.19	10.26
ID	$168	$176	$2,643	$2,717	15.77	15.43
KS	$204	$222	$500	$594	2.45	2.67
MT	$32	$34	$296	$263	9.12	7.65
NE	$769	$1,121	$4,753	$6,726	6.18	6.00
NV	$166	$206	$274	$328	2.36	1.59
NM	$218	$166	$537	$457	2.47	2.75
ND	$127	-	$13	$0	0.10	0.00
OK	$85	$151	$78	$60	0.91	0.40
OR	$242	$185	$1,305	$1,024	5.40	5.52
SD	$214	$74	$38	$18	0.18	0.24
TX	$261	$219	$1,287	$1,398	4.93	6.38
UT	$136	$136	$452	$484	3.33	3.56
WA	$1,578	$1,081	$4,125	$3,186	2.61	2.95
WY	$26	$63	$231	$310	8.81	4.96
TOTAL			$50,848	$48,073	98.84	97.11

Note: 2015 values based on 2010 USGS water use data and 2012 USDA Ag. Census; 2020 values based on 2015 USGS water use data and 2017 USDA Ag. Census. Agency reported data values were modified for consistency and specificity to irrigation water use.

California Futures Market Index

California has existing surface water and groundwater markets valued at $1.1 billion.[132] Statewide, almost 1.5 million acre-feet of water are traded annually—about 4% of all water used by cities and farms.[133] This year, water joined gold, oil, and other commodities traded on Wall Street with the launch of a water futures exchange.

Farmers, hedge funds and municipalities alike are now able to hedge against, or bet on, future water availability in California, home of the biggest U.S. agriculture market. Chicago-based CME Group Inc.'s January 2021 contract traded on November 30, 2020, at 496 index points, equal to $496 per acre-foot.

Futures markets allow commodities producers and consumers to engage in "hedging" in order to limit the risk of losing money as commodity prices change. For example, a Kansas wheat farmer who plants a crop runs the risk of losing money if the price of wheat falls before harvest and sale. The farmer can minimize this risk by selling wheat futures contracts, which guarantee that the farmer will receive a predetermined price.[134]

There is a key distinction between the more commonly known oil futures market and the recently imagined California water futures market. The value of oil in the futures market is based on physical delivery of West Texas Intermediate-type crude oil at a storage hub in Cushing Oklahoma. At futures expiration, the exchange matches the buyers and sellers who elect to make or take delivery of physical oil. The physical-delivery requirement of West Texas Intermediate futures is a direct link to the underlying physical market.

In the California market, there is no requirement for physical delivery of water to a central hub. Rather, a firm called the CME Group has developed a pricing index upon which to base the value of water.

According to the CME Group, the Nasdaq Veles California Water Index (ticker symbol: NQH2O) tracks the price of water rights leases and sales transactions across the five largest and most actively traded regions in California. Water entitlement transactions from the surface water market and four adjudicated groundwater basins –the Central Basin, the Chino Basin, the Main San Gabriel Basin, and the Mojave Basin Alto Subarea are included in the index. The value of the index reflects the volume-weighted average price of water, at the source, excluding conveyance costs and water losses in the underlying markets after adjusting for idiosyncratic pricing factors specific to each of the eligible markets and transaction types. NQH20 is valued in US dollars per acre foot (the volume of water required to cover one acre of land (43,560 square feet) to a depth of one foot, equivalent to 325,851 gallons).[135]

While there does not yet appear to be widespread trading of water futures, nor is it expected to dramatically alter the landscape of California water markets, it may provide a formal mechanism for assessing stakeholders' "best guess" as to the future value of water, and allow better management of risk associated with water scarcity.

Water Exports

While water transfers can lead to an overall increase in the net benefits water use from a social perspective, concerns of third-party effects and externalities on other users can create challenges and limit the full functioning of a water market. For instance, if water transferred out of a region results in impacts on local employment and income, such third-party effects can lead to transfers being politically unattractive (and lead to limits on transfers). Of course, if the transfers occur within a particular region, then such third-party effects will be minimal. In response to these third party effects, governments often respond by limiting out-of-region transfers via mandates or fees. Some groundwater districts have adopted rules to prevent or impose limits on the export of groundwater outside the boundaries of the district.[136]

Alternatively, if transfers incentivize greater groundwater pumping in agricultural-based communities, this may have impacts on the availability of municipal water for those communities dependent on groundwater for health and hygiene. Careful hydrological monitoring, or employment of a general water accounting framework, can help policy makers better understand the potential implications of transfers on groundwater levels and other users.[137]

The 86th Legislature passed HB 1066 which requires a groundwater conservation district to extend the permit term of an export permit to match the term of the operating permit to provide greater stability to developers of large-scale groundwater projects and prevent instances in which a user has a permit to produce water but not the authorization to transport to its end use. The 86th Legislature also considered legislation that would prevent groundwater conservation districts from requiring a transport permit in addition to the production or operating permit.

One recent groundwater conveyance project commenced this year, while another that has been under development several years, came online.

In May of 2020, the cities of Midland, Abilene, and San Angelo signed a contract to purchase the lionshare of permitted Edwards-Trinity Groundwater for $261 million, which will be transported from Fort Stockton. Fort Stockton Holdings owns the operating permit and associated transport permit for 28,400 acre-feet per year. The annual volume is being split in a manner that addresses each city's needs: Midland: 15,000 acre-feet per year, Abilene: 8,400 acre-feet per year, and San Angelo: 5,000 acre-feet per year. The contract will continue until Dec. 31, 2070. The cities will have the opportunity to extend the contract term until 2090, and then again until 2110.

In San Antonio, the Vista Ridge project is now being integrated into the San Antonio Water System's water supply system. The infrastructure to pump up to 50,000 acre-feet of groundwater per year from the Carrizo/Simsboro Aquifer in Burleson County and deliver it to San Antonio for 30 years is now installed.

In the realm of surface water, interbasin transfers of surface water have long been envisioned as a key water supply strategy, however, the Texas Water Code stipulates a cumbersome permitting process for an interbasin transfer such that they are a rare occurrence. The origin of this policy dates back to 1997, when the Legislature enacted restrictions due to concerns from some residents of the basin of origin that the interbasin transfer may deprive them of needed water and

economic opportunity in the future. Others in both basins worry about potential environmental impacts of the transfer regarding stream flows, water quality, and potential influx of non-native aquatic organisms.[138]

One interbasin transfer is contemplated in the Draft Regional Water Plans submitted to the TWDB this year: the Marvin Nichols Reservoir. The contemplated water supply project would be developed in the Sulphur River basin to serve the Dallas-Fort Worth region, and remains a hotly contested project for some residents of east Texas.

Environmental Outcomes

There is growing momentum to encourage the development of water markets to achieve environmental outcomes in Texas. As noted by Texas Water Trade, across the broader West, conservation buyers drive a substantial proportion of the total water market: as of 2018, about one-third of total water traded was for the benefit of environmental uses. Voluntary trading continues to be the Texas Legislature's preferred mechanism for reallocating scarce water resources. Yet in contrast to our neighboring western states, markets have played only a marginal role in meeting Texas' environmental water needs.[139]

In 2007, the 80th Texas Legislature enacted Senate Bill 3 which provided for the identification of flow regimes and water volumes necessary to support a sound environment. It required that the TCEQ balance recommendations received as part of that process with the needs of the public in establishing environmental water set asides for priority basins. Senate Bill 3 mandated that these set asides originate from unallocated water that may be identified by the TCEQ within a specific basin. Unfortunately, most all surface water in Texas had already been allocated by 2007 for other uses based on the prior appropriation system or first in time first in right.[140]

According to stakeholders, this leaves two options: identification of ways to make more unallocated water available within a basin, or incentivize and add value to market-based transactions from already allocated water for environmental flows.[141]

One recommendation from stakeholders to change this is to bolster the use of forbearance agreements.

At least one non-profit, Texas Water Trade, and its partners are building leasing and forbearance markets in basins across the state to tap into this latent opportunity to ensure environmental flows by incentivizing water rights holders to keep some proportion of their water right instream or in the aquifer. In many instances, a prerequisite to these arrangements is the administrative addition of in-stream flows as a beneficial use, which often can be done through a simple amendment process at the Texas Commission on Environmental Quality (TCEQ). However, in some instances—for example, when such a process cannot be undertaken in a timely manner—the conservation lessee may instead be satisfied with a contractual agreement from the water rights holder to forbear use of their full entitlement of water. This is known as a forbearance agreement.[142]

Unlike other western states—including New Mexico, Colorado, and Washington—Texas does not afford statutory protection from water right cancellation to forbearance agreements that provide water for environmental flows. Texas Water Code § 11.173(b), however, does protect from cancellation those water rights which are acquired to meet a recommended strategy under a regional water plan, or those unused due to conservation measures as per applicable conservation plans.[143]

Stakeholders argue that to be an effective tool for flexibly allocating water for environmental flows, water markets must not place water rights holders at risk of property right curtailment.

Specifically, the Committee received several recommendations to amending TWC § 11.173(b) to add a statutory exemption from cancellation of a water right to owners who have entered into forbearance agreements with entities that are focused on enhancing and protecting environmental flows on Texas watercourses, bays, and estuaries would enhance the ability of water rights holders to realize the value of their water rights and further bolster the opportunity for environmental flow needs to be met through voluntary, market-based agreements.[144]

Environmental advocates also recommend advancing the recognition of the value of groundwater in place, but note that this would require significant investment in modeling. According to the Environmental Defense Fund, the first step is understanding the local interactions between groundwater and surface water (discussed above) and then determining what volume of water can be sustainably pumped in the long term without adversely impacting surface water.[145]

ENDNOTES

[1] Written Submission from Sarah Rountree Schlessinger, Executive Director, Texas Water Foundation in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[2] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[3] *Id.*
[4] *Id.*
[5] *Id.*
[6] *Id.*
[7] Email from Bryan McMath, Governmental Relations Liaison, Texas Water Development Board, December 10, 2020.
[8] *Id.*
[9] *Id.*
[10] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[11] *Id.*
[12] *Id.*
[13] Phone call with Blair Walsh, Division Chief, Communications, Texas Department of Emergency Management, December 7, 2020.
[14] Email from Bryan McMath, Governmental Relations Liaison, Texas Water Development Board, December 10, 2020.
[15] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[16] Oral testimony from Chief Nim Kidd, Texas Division of Emergency Management, Public hearing of the Texas Infrastructure Resiliency Fund Advisory Committee on December 15, 2020.
[17] *Id.*
[18] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[19] Written Submission from the Texas General Land Office in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[20] Written Submission from Amanda Fuller, Director, National Wildlife Federation's Texas Coast and Water Program and Texas Living Waters Project in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[21] Written Submission from Sarah Rountree Schlessinger, Executive Director, Texas Water Foundation in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[22] Written Submission from the Texas Commission on Environmental Quality in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[23] *Id.*
[24] *Id.*
[25] Email from Ferrell Fields Damen, Director, Intergovernmental Relations, Texas Commission on Environmental Quality, November 17, 2020.
[26] Texas Water Development Board, *Statewide Survey of Aquifer Suitability for Aquifer Storage and Recovery Projects or Aquifer Recharge Projects [Abridged]* (2020)
[27] *Id.*
[28] Email from Bryan McMath, Governmental Relations Liaison, Texas Water Development Board, December 17, 2020.
[29] *Id.*
[30] *Id.*
[31] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[32] *Id.*

[33] *Id.*
[34] *Id.*
[35] Written Submission from Leah Martinsson, Executive Director, Texas Alliance of Groundwater Districts, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[36] *Id.*
[37] *Id.*
[38] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[39] Written Submission from Mary K. Sahs on behalf of Kenedy County Groundwater Conservation District in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[40] *Id.*
[41] Written Submission from Samantha Stried Reiter, General Manager, Lone Star Groundwater Conservation District, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[42] Written Submission from the Texas Water Development Board in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[43] *Id.*
[44] *Id.*
[45] *Id.*
[46] *Id.*
[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] Written Submission from Heather Harward, Texas Water Supply Partners, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[51] *Id.*
[52] *Id.*
[53] Written Submission from Carlos Rubinstein, Principal RSAH2O, LLC, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[54] Written Submission from the Texas Commission on Environmental Quality in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[55] *Id.*
[56] Written Submission from the North Texas Municipal Water District in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
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[58] Written Submission from the Texas Water Conservation Association in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[59] Written Submission from the Public Utility Commission of Texas in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[60] Written Submission from the Texas Water Conservation Association in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[61] Written Submission from Carlos Rubinstein, Principal RSAH2O, LLC, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[62] *Id.*
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[64] Written Submission from the Texas Water Conservation Association in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[65] Written Submission from Carlos Rubinstein, Principal RSAH2O, LLC, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[66] *Id.*
[67] Written Submission from the Texas Water Conservation Association in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[68] *Id.*

[69] *Id.*
[70] *Id.*
[71] Written Submission Carlos Riva, Chief Executive Officer, Poseidon Water, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[72] Letter to Chairman Lyle Larson from Travis County WCID No. 1, North Austin MUD No. 1, Northtown MUD, and Wells Branch MUD on November 3, 2020.
[73] Written Submission from the Office of the Texas Attorney General in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[74] Written Submission from the Public Utility Commission of Texas in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[75] *Id.*
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[102] *Id.*
[103] Written Submission from the Bandera County River Authority and Groundwater District, Blanco-Pedernales Groundwater Conservation District, Brazoria County Groundwater Conservation District, Calhoun County Groundwater Conservation District, Gonzales County Underground Water Conservation District, Jeff Davis County Underground Water Conservation District, Hays Trinity Groundwater Conservation District, Hemphill County Underground Water Conservation District, Lost Pines Groundwater Conservation District, Refugio Groundwater Conservation District, Texana Groundwater Conservation District, Trinity Glen Rose Groundwater Conservation District, Victoria County Groundwater Conservation District in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[104] *Id.*
[105] *Id.*

[106] *Id.*
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[108] Written Submission from the State Auditor's Office in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
[109] *Id.*
[110] Written Submission from Leah Martinsson, Executive Director, Texas Alliance of Groundwater Districts, in response to the Formal Request for Information posted by the House Natural Resources Committee on August 1, 2020.
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[113] *Id.*
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