

Aquifer Storage and Recovery: Its State in the State

CIGMAT – 2018 *23rd Annual Conference*

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Houston, Texas

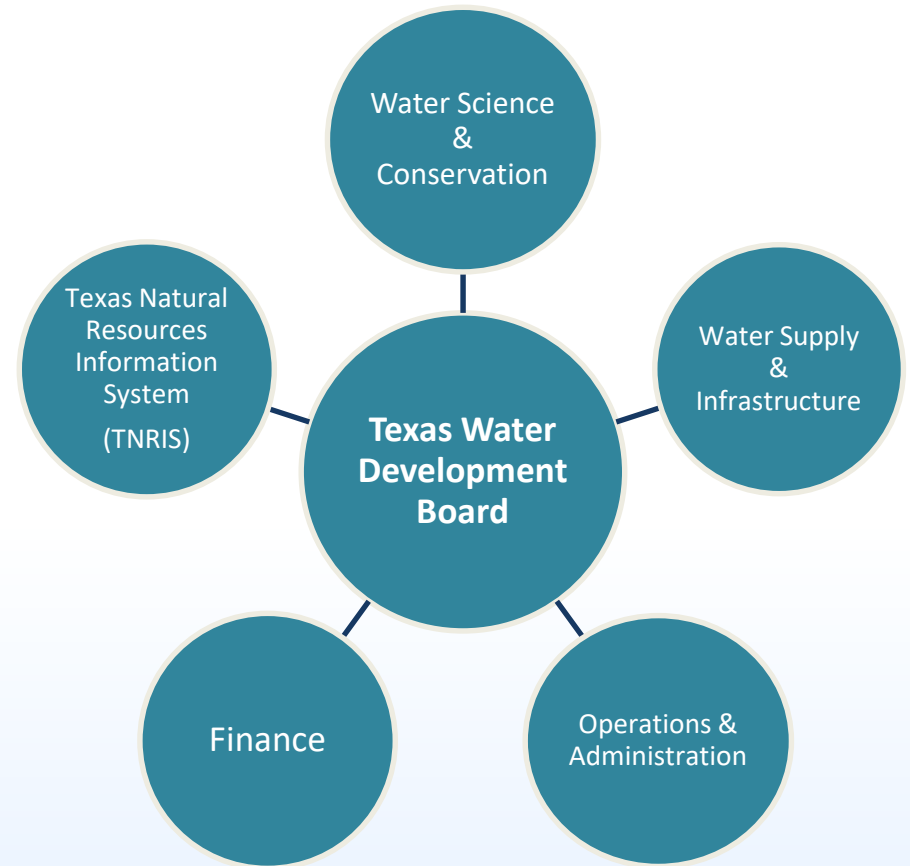
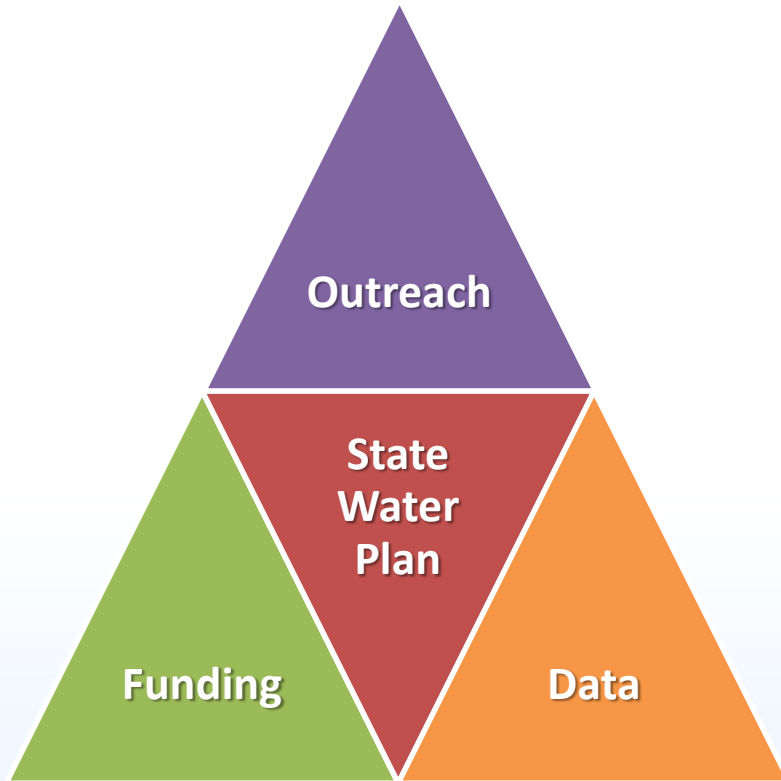
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*Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

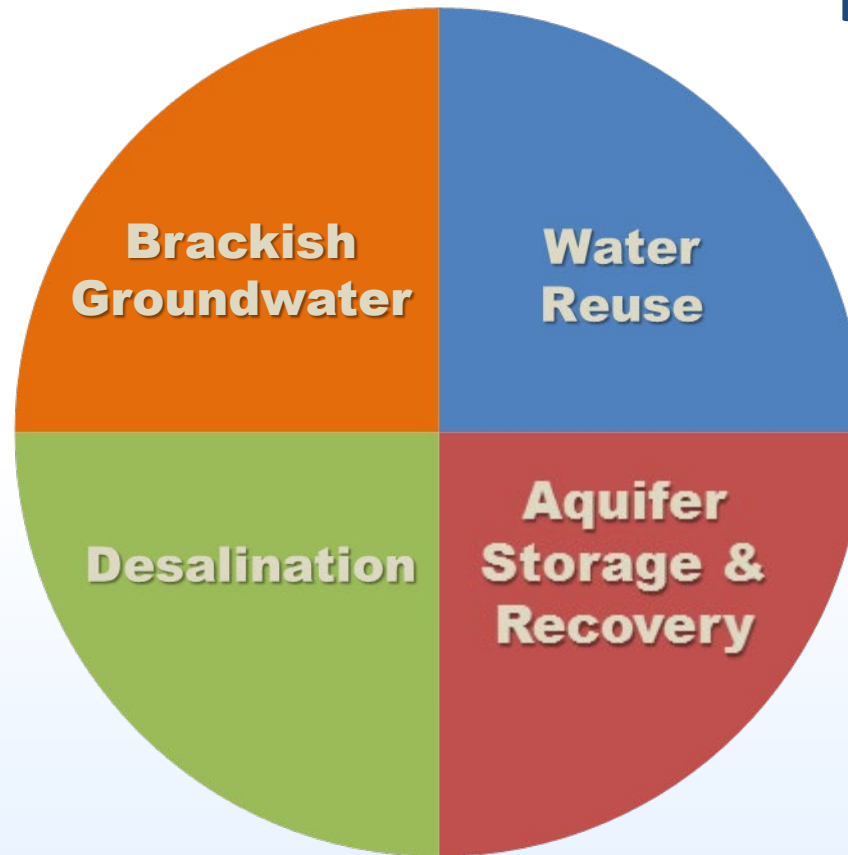
Who is the TWDB?



■ Agency Mission

- To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas

Innovative Water Technologies



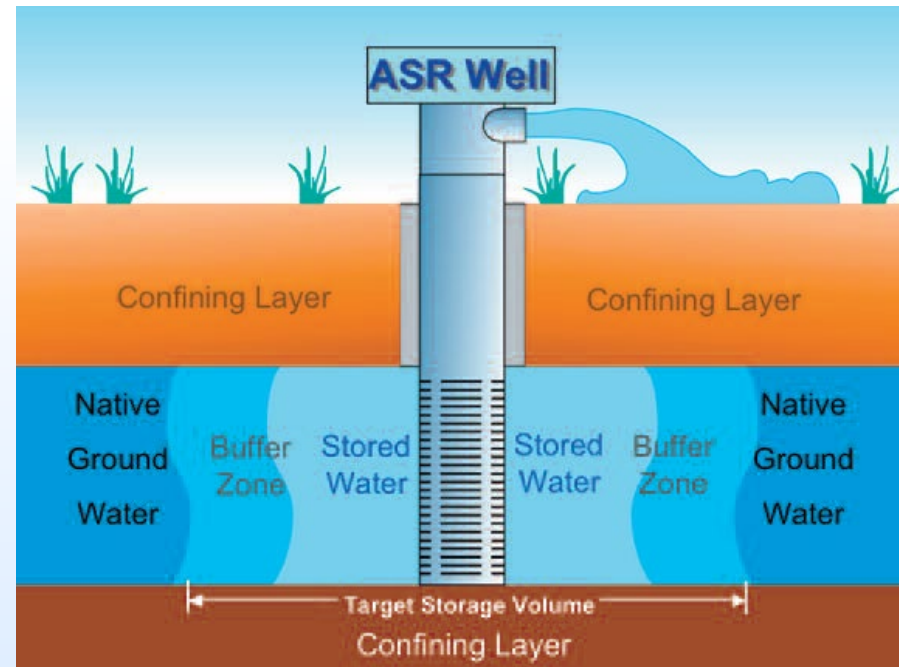
■ Department Mission

- To educate the water community on the use of nontraditional water supplies

What is ASR?

- Aquifer Storage and Recovery

- “...the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use...” (Texas Water Code Section 27.151(1))
- Storage of water in a suitable aquifer and recovery of that water during times of need for beneficial use
- Source water can be reclaimed, groundwater, or surface water; surface is most prevalent
- In Texas, we have El Paso (reclaimed), Kerrville (surface), San Antonio (groundwater)



Benefits

- Eliminates surface reservoir evaporative losses
 - 7.25 million acre-feet* lost to evaporation in average year
 - Compare to 33.8 million acre-feet of surface reservoir storage
 - Compare to 18.0 million acre-feet total state use in 2012
- Reduces surface inundation effects
 - Mid-size ASR of 30k acre-feet would require 2,500 acre surface reservoir
 - Texas average based on reservoirs less than 50,00 ac-feet capacity
- Maximize existing resources
 - Junior surface rights – Texas operates under prior appropriation
 - Maximize pipelines/water treatment/desalination plants
 - Run at average rather than peak in many cases
 - Defers costs of infrastructure expansion

* One acre-foot equals 325,851 gallons.

Rome Avenue ASR



Source: Google Earth 2015

- Located in Tampa, Florida
- Storage in the Lower Floridan Aquifer
- Eight wells, 10 million MGD* recovery

*MGD = million gallons per day

H2Oaks ASR



Source: The Edwards Aquifer Website 2015

- Southern Bexar County
- San Antonio purchased 3200 acres
- Leases land back to ranchers

Challenges

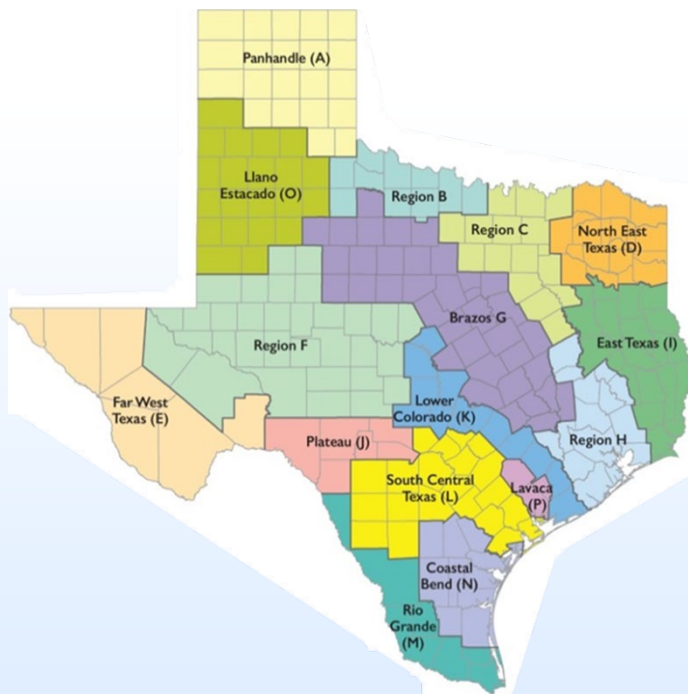
- Requires appropriate geology
- Pretreatment requirements
 - Injected water must not cause noncompliance with national primary drinking water standards
 - In practice, most injected water is treated to potable standards
- Hydraulic migration
 - Movement of stored water away from recovery well
 - Function of gradient, conductivity, and storage duration
 - Easier to manage with higher well counts
- Chemical interaction
 - Well plugging – swelling clays
 - Chemical mobilization – arsenic particularly
 - Development of disinfection by-products
 - Early-study formation geochemical testing highly recommended

Operating Facilities

- **El Paso Water Utilities**
 - Began operation in 1985 with ten injection wells
 - Highly treated reclaimed source water
 - Storage/transport in the Hueco Bolson Aquifer
- **City of Kerrville**
 - Operational in 1998 with two-well system; expansion planned to three
 - Guadalupe River source water
 - Storage in the Lower Trinity Aquifer
- **San Antonio Water system**
 - Second largest in the U.S.; over 150,000 acre-feet in storage
 - 29 well system; 60 MGD capacity
 - Edwards Aquifer source water
 - Storage in the Carrizo-Wilcox Aquifer

16 Regional Water Planning Areas

- Regional plans revised every five years
 - Forecasts in decadal increments over 50-year horizon
- Compiled by TWDB into the State Water Plan
 - 2017 plan published in 2016

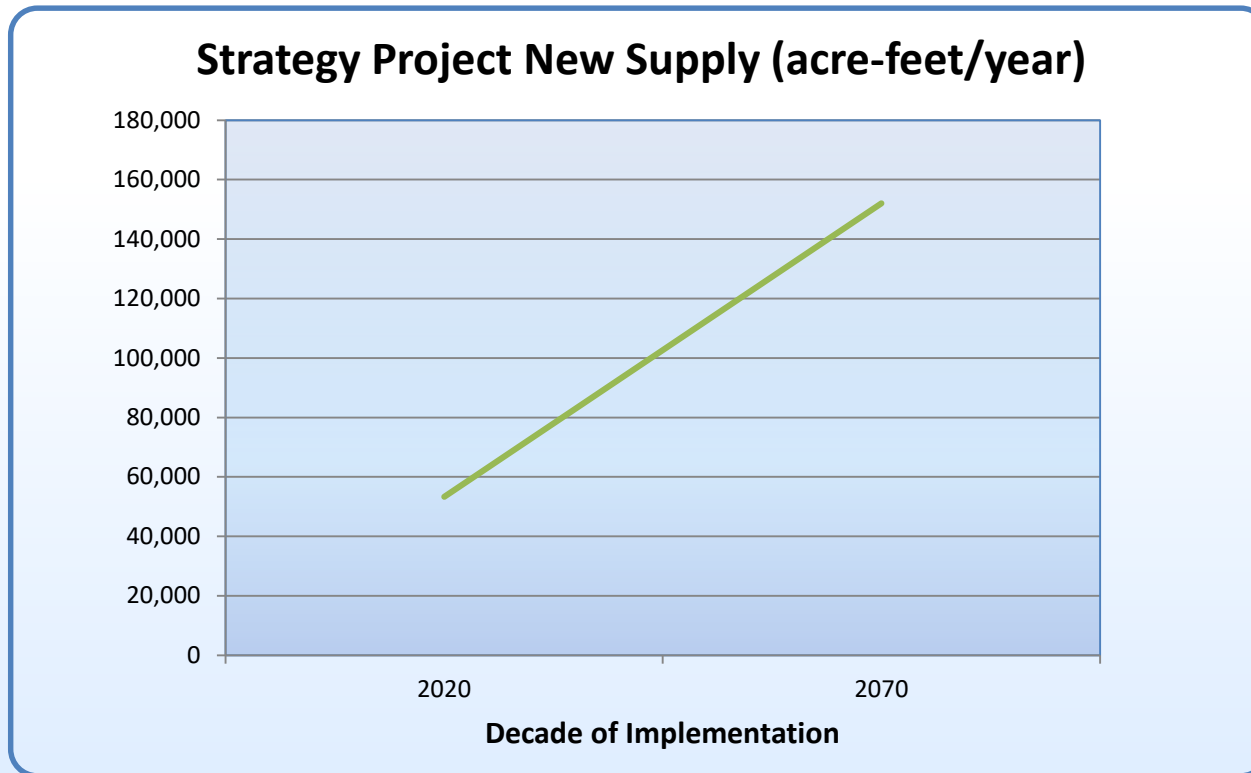


Statutory interests:

- Public
- Counties
- Municipalities
- Industries
- Agriculture
- Environment
- Small businesses
- Electric-generating utilities
- River authorities
- Water districts
- Water utilities
- Groundwater management areas (varies by region)

2017 State Water Plan

- Seven regions include ASR as a Recommended Water Management Strategy
 - 53,341 ac-ft decade 2020; 152,000 ac-ft decade 2070
 - Increase from 0.9% to 1.8% of total from 2012 to 2017 plan

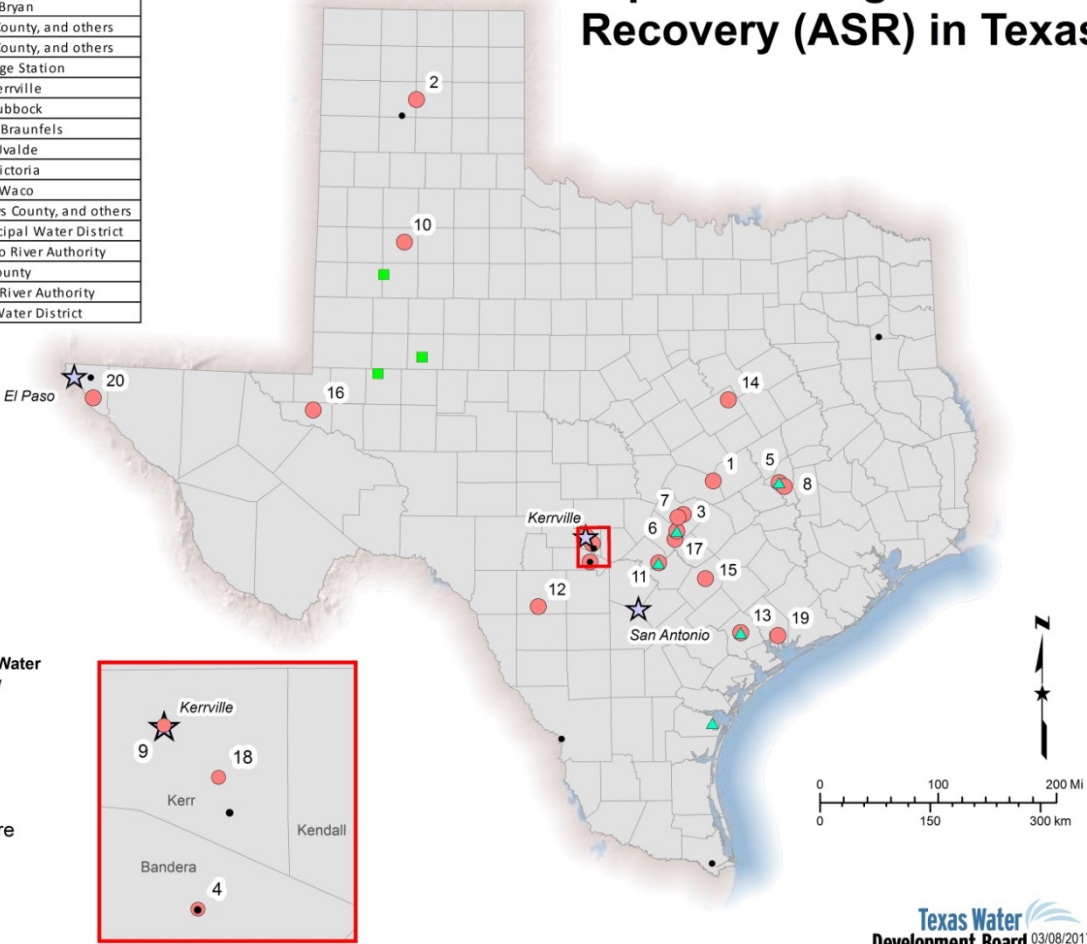


Aquifer Storage and Recovery (ASR) in Texas

ID	Project Sponsor
1	Brazos River Authority
2	Canadian River Municipal Authority
3	City of Austin
4	City of Bandera
5	City of Bryan
6	City of Buda, Hays County, and others
7	City of Buda, Hays County, and others
8	City of College Station
9	City of Kerrville
10	City of Lubbock
11	City of New Braunfels
12	City of Uvalde
13	City of Victoria
14	City of Waco
15	City of Wimberley, Hays County, and others
16	Colorado River Municipal Water District
17	Guadalupe-Blanco River Authority
18	Kerr County
19	Lavaca Navidad River Authority
20	Lower Valley Water District

- ★ Operating Facilities
- Decommissioned Operations
- Completed Studies
- ▲ Ongoing Studies
- 2017 Recommended Water Management Strategy Projects
- Texas Counties

Ongoing studies are those funded by TWDB. There are other efforts not funded by TWDB.



Texas Water Development Board 03/08/2017

- Listed projects support recommended water management strategies
- http://www.twdb.texas.gov/innovativewater/asr/img/ASR_phase_030817.pdf

Funding Background

- 84th Texas Legislature, House Bill 1, Rider 25
 - \$1,000,000 from General Revenue Fund
 - For innovative storage approaches, including but not exclusively, ASR
 - One-for-one matching grant funds
 - Competitive grant application process
 - Request for application notice – September 22, 2015
 - Application deadline – November 3, 2015
 - Grant approval – January 7, 2016

Application Summary

- Six applications received
 - Four ASR field studies
 - One ASR desktop/planning study
 - One enhanced recharge field study
- Three grants awarded
- Studies to be completed in 2019

Recipient	Funding		
	Total	Requested	Awarded
Edwards Aquifer Authority/New Braunfels Utilities	\$563,000	\$281,500	\$281,500
Victoria County Groundwater Conservation District	\$570,226	\$285,112	\$285,112
Corpus Christi Aquifer Storage and Recovery Conservation District	\$1,000,000	\$500,000	\$433,388

Texas Water **Development Board**

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