

Aquifer Storage and Recovery: Its State in the State

31st Annual SWQM Workshop

November 8, 2017

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Development Board

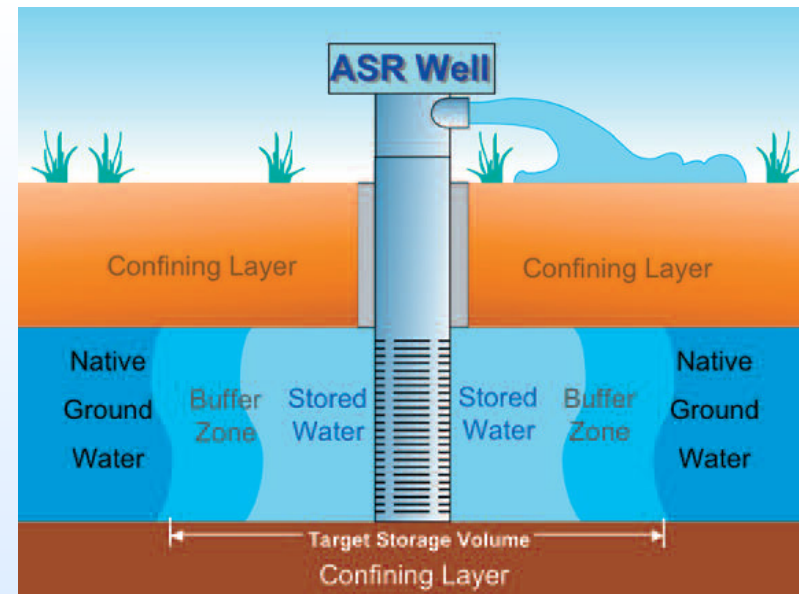
The logo for the Texas Water Development Board features the text "Texas Water" in a blue serif font and "Development Board" in a black sans-serif font. To the right of the text is a stylized graphic of three curved, overlapping lines representing water or waves.

Texas Water Development Board

The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.

What is ASR?

- Aquifer Storage and Recovery
 - “...the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use by the project operator.” (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)



Source: NGWA

Benefits (partial)

- Eliminates evaporative losses
 - 7.25M acre-feet lost in average year (20% of surface reservoir storage, 40% of demand)
- Mitigates surface inundation effects
 - Mid-size ASR of 30k acre-feet would require 2,500 acre surface reservoir
- San Antonio – Edwards Aquifer Authority
 - Component of the EA Habitat Conservation Plan
 - Maintain minimum flows at Comal and San Marcos springs
 - Protect endangered species
- Kerrville
 - Diversion from Guadalupe River constrained by TCEQ permit to maintain minimum river flow
 - ASR used to augment supply during low flow periods

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

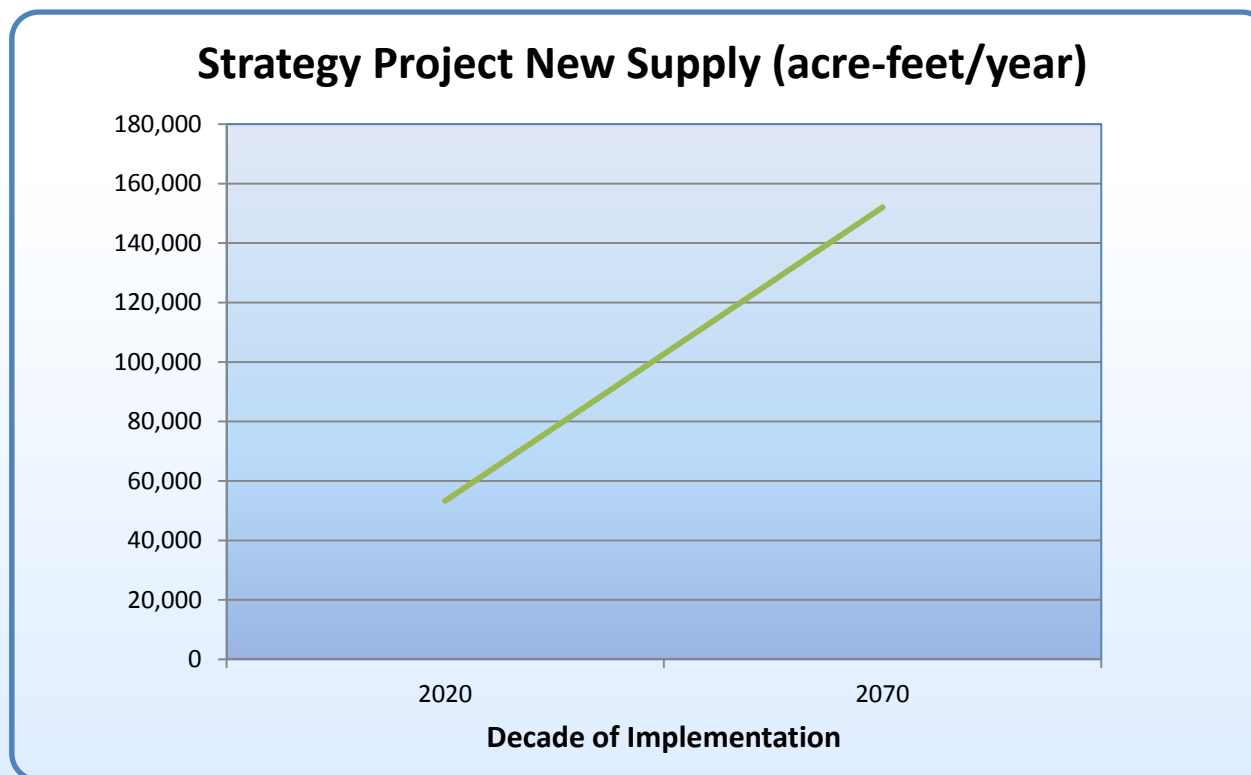
- Southern Bexar County
- San Antonio owns 3200 acres
- Leases land back to ranchers
- 29 ASR wells, 60 MGD capacity, 100k+ acre-feet in storage

Limits/Challenges (partial)

- Requires appropriate geology
- Offers no flood control
- 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 - THM's particularly
 - Early-study formation geochemical testing highly recommended

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



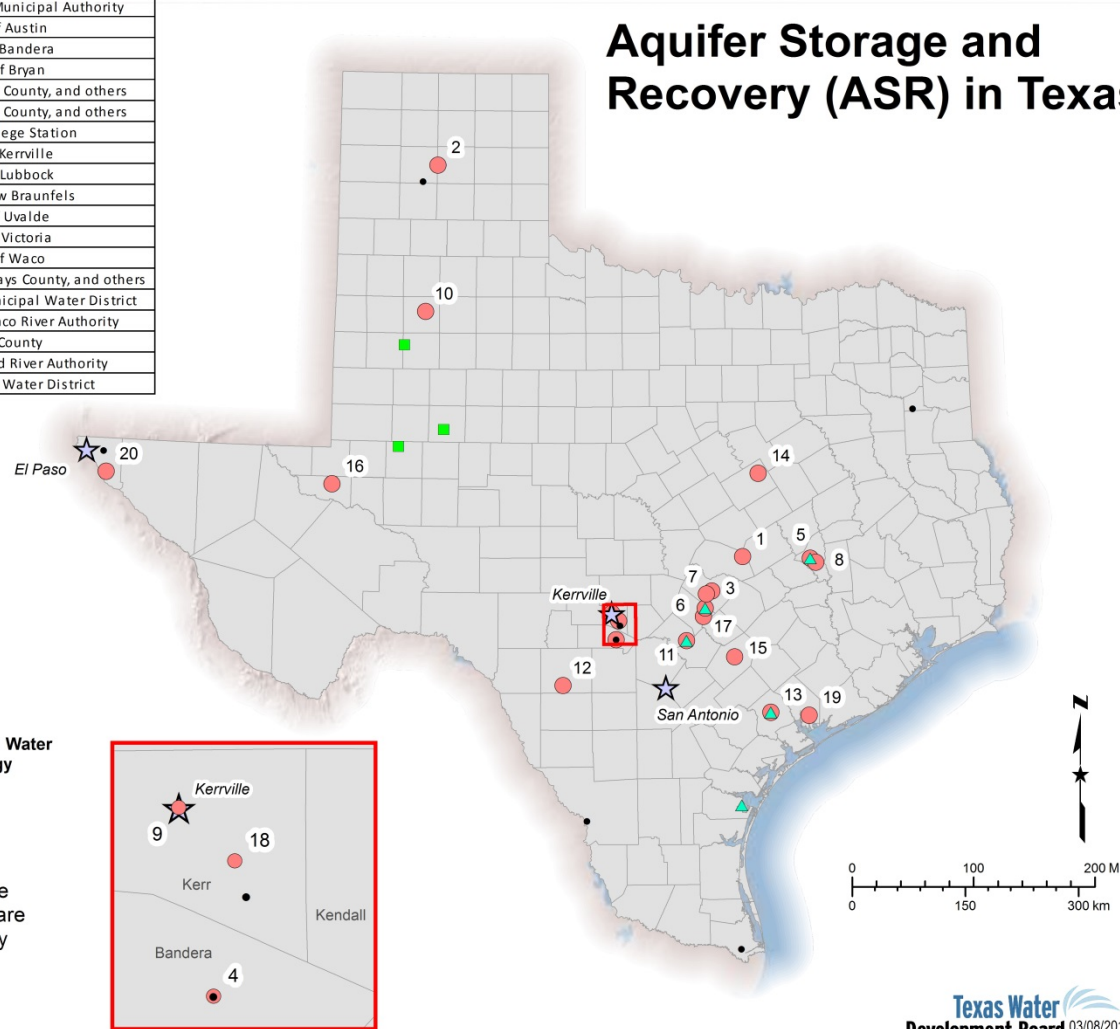
** Included only supply allocated to a water user group

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.



- 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	\$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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