Increasing Use of Aquifer Storage & Recovery (ASR) in Drought Prone States

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What is Aquifer Storage & Recovery (ASR)?

- "The practice of **storing** water in a suitable aquifer through a well or recharge facility when water is available and recovering the water from the same aquifer when it is needed"

- ASR is an established water management strategy that has been successfully implemented in around the world

Why ASR?

- Aquifer management and sustainability
- Take advantage of and store water during times of excess supply
- Replenish aquifers or prevent seawater intrusion
- Provide emergency supplies during droughts or water shortages
- No evaporative losses
- Cost effective solution compared to traditional construction

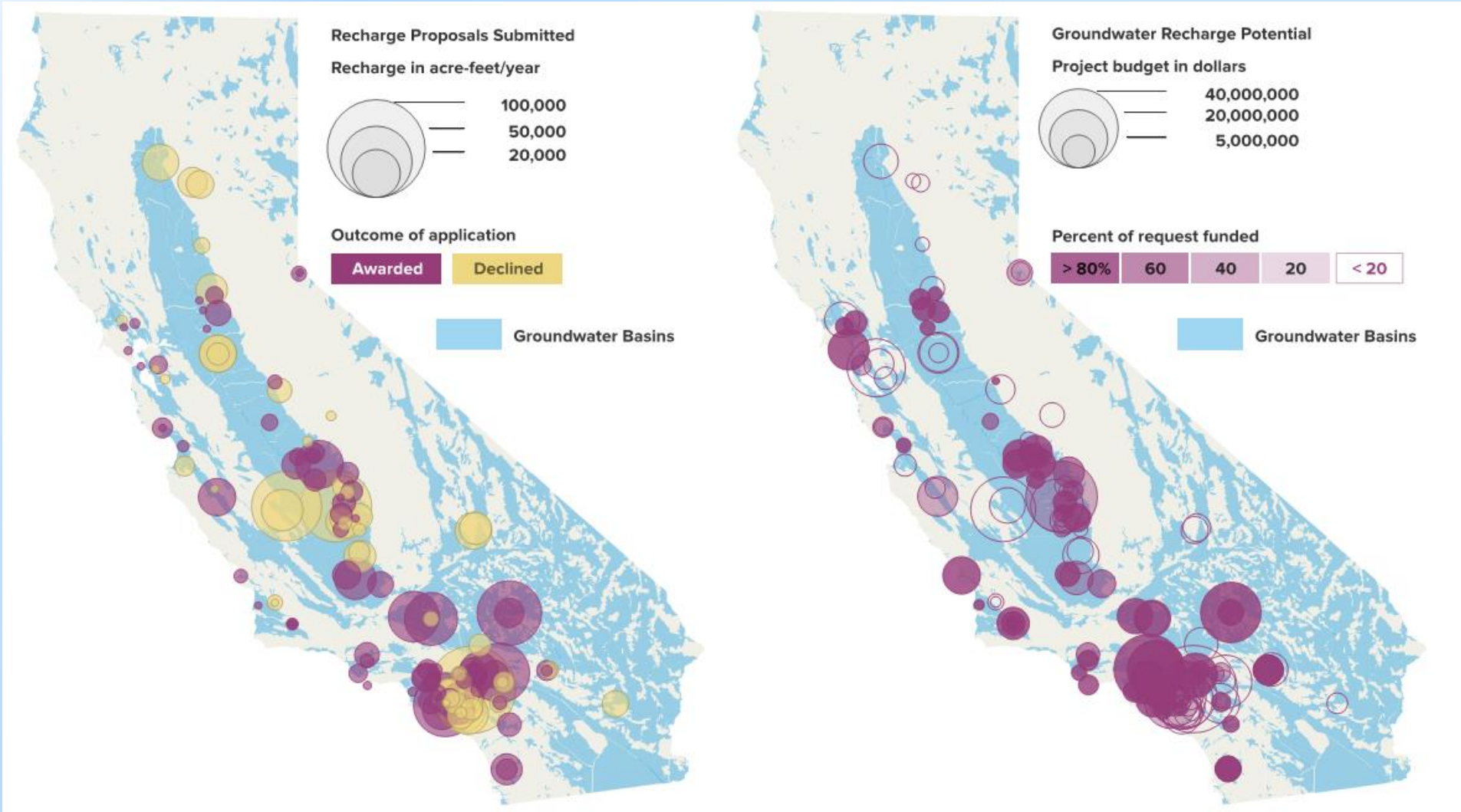
Why has ASR historically been challenging to implement

- Rules and regulations
- Source water availability and location
- Water quality concerns
- Aquifer parameters
- $$$$$
- Public understanding

ASR History in the United States

- ASR Facilities are found in 27 states
- The first "modern" ASR system in the United States was built in Wildwood, New Jersey in 1968
- Over 130 ASR systems with over 500 wells in the United States
  - Florida leads with 54 ASR systems
  - Las Vegas, NV has the largest recovery capacity of over 200 mgd and a stored capacity of over 350,000 acre-feet

California Proposals and Projects



ASR in Colorado

- The first ASR well was installed in Highlands Ranch, CO in 1992 for the Centennial Water and Sanitation District
- In 2003 statewide assessment of differing aquifers for artificial recharge was performed
- HB 17-1076 passed in 2017 allowing for artificial recharge of nontributary aquifers, outside of the Denver Basin (opening the ability of entities across the state to utilize ASR)

ASR in Arizona

- In 1986, the Arizona Legislature established the Underground Water Storage and Recovery Program to allow entities with surplus water supplies to store that water underground and recover it for later use
- Active management areas in Phoenix, Tuscon, Prescott, and Pinal County
- Several ASR projects (more to come)

ASR in New Mexico

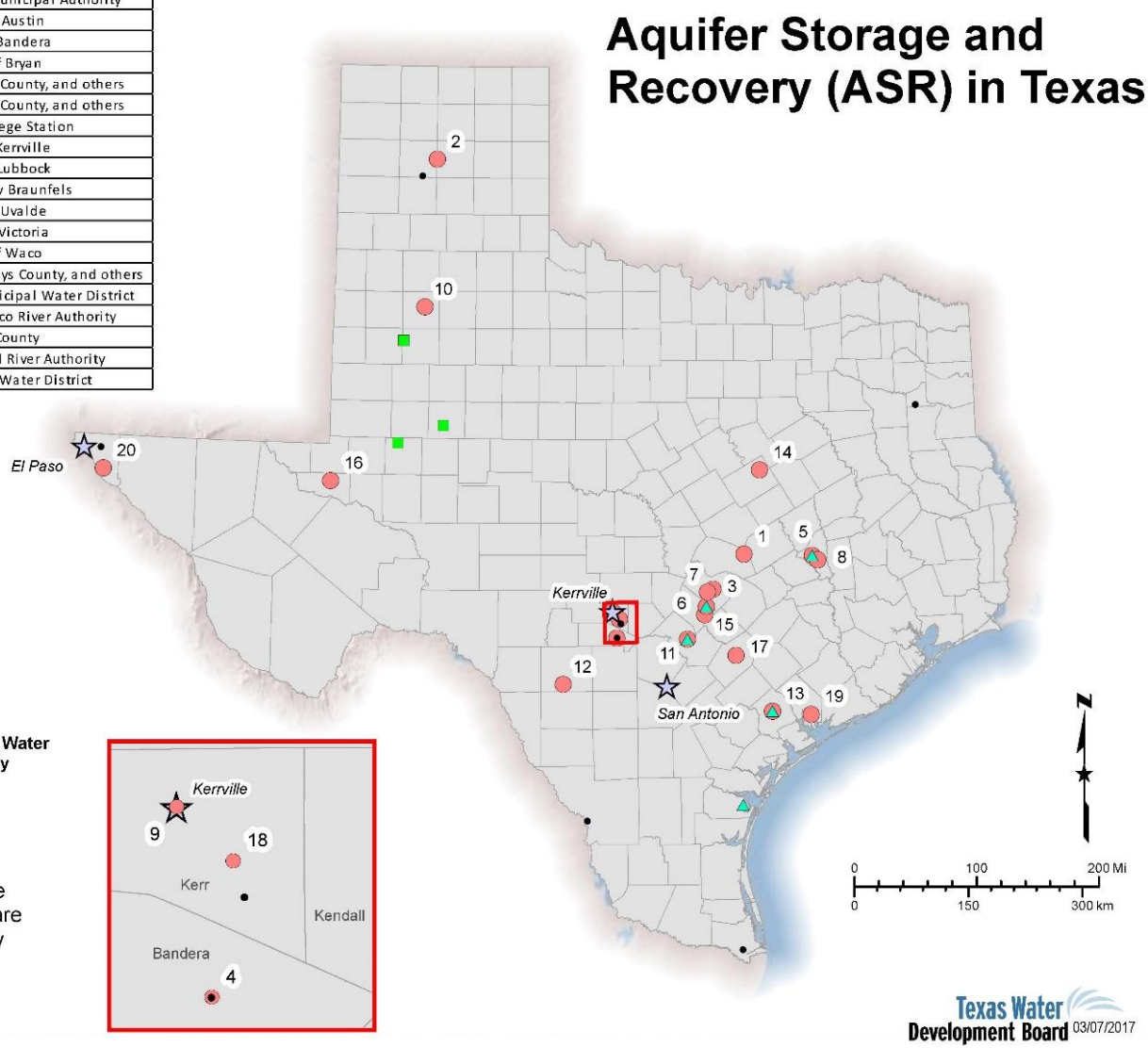
- ASR use in New Mexico has not been as significant as some other states
- Legislation was passed in 1999 that authorized artificial recharge and underground storage
- First project was conducted at the Bear Canyon Arroyo in Northeast Albuquerque in 2014
- First withdrawal of the stored water occurred in 2015
- Allows 3,000 acre-feet of recharge per year
- Rio Rancho

ASR in Texas

- ASR activities in Texas began in the Amarillo and El Paso (1950s)
- In 1995, House Bill 1989 provided the allocation of surface water for ASR
- House Bill 655 in 2015 amended the statute to make the permitting process more conducive to implementing ASR projects
- Only three (maybe four) active ASR projects

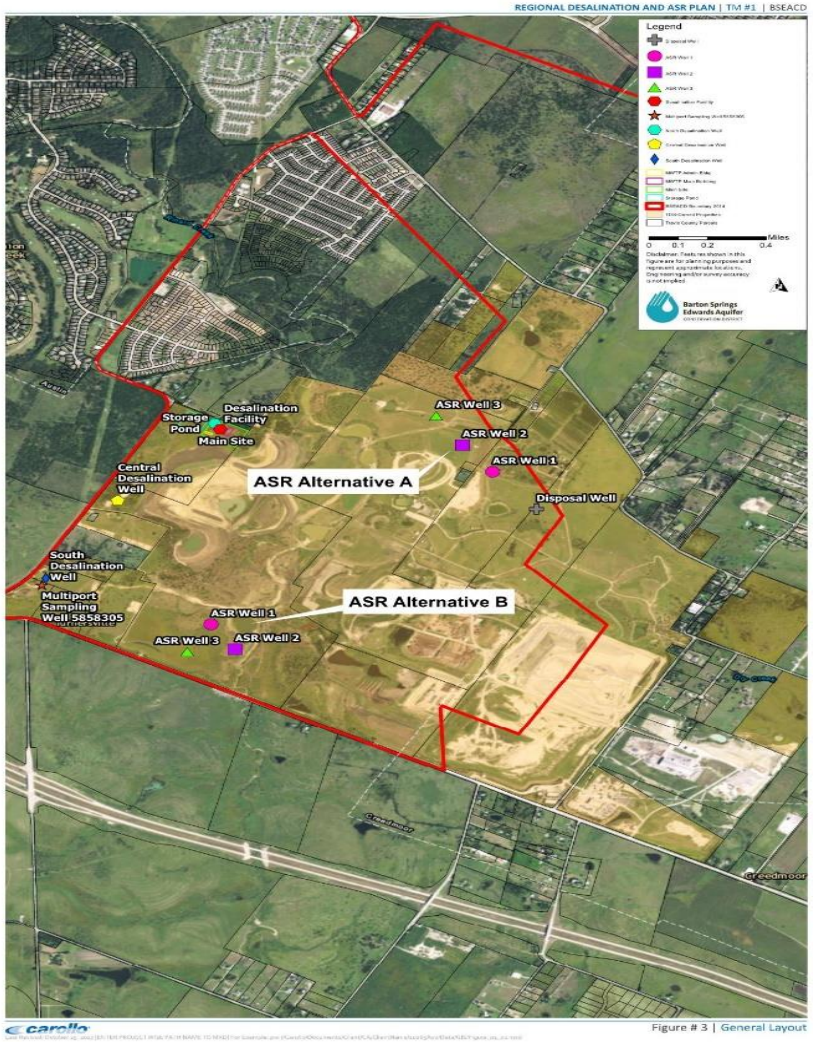
State Funded Studies in Texas

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



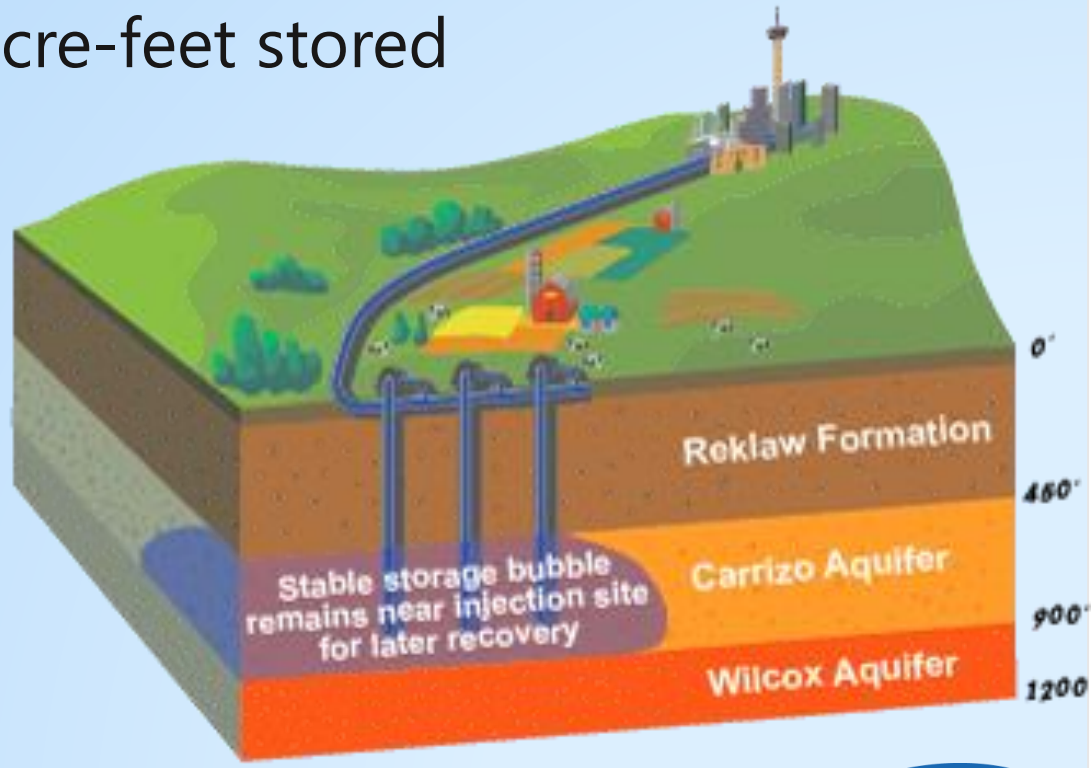
Barton Springs Edwards Conservation District

- Desalinization
- ASR
- Energy recovery



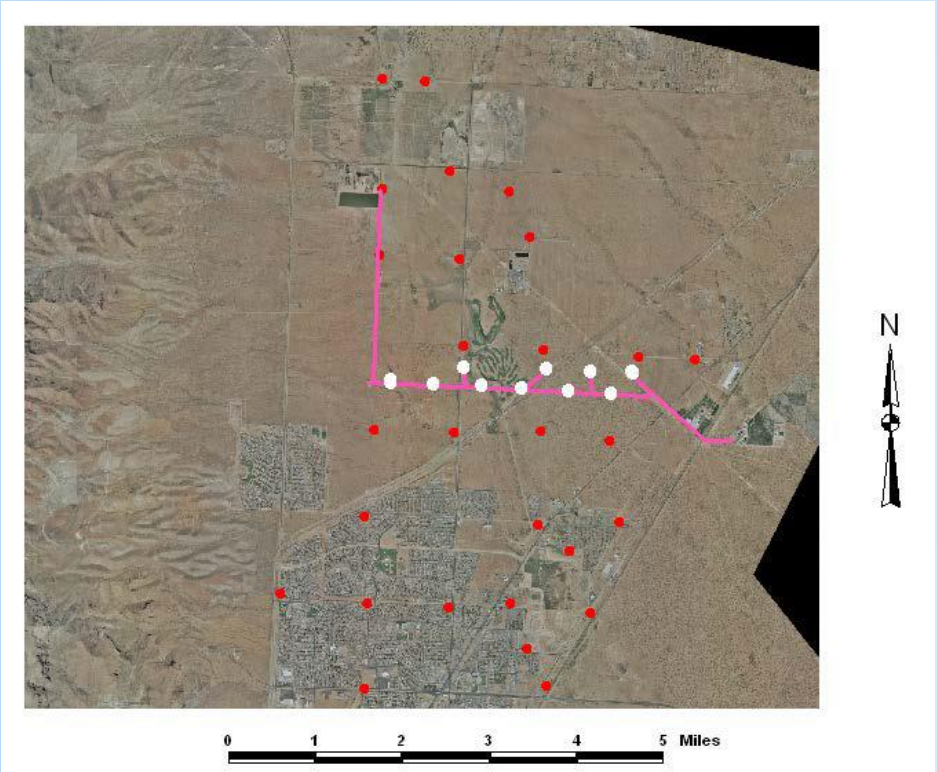
San Antonio Water System (Twin Oaks ASR)

- Edwards aquifer water (excess right)
- Injected into Carrizo
- As of 2018, 157,000 acre-feet stored
- 60 MGD capacity
- 29 wells



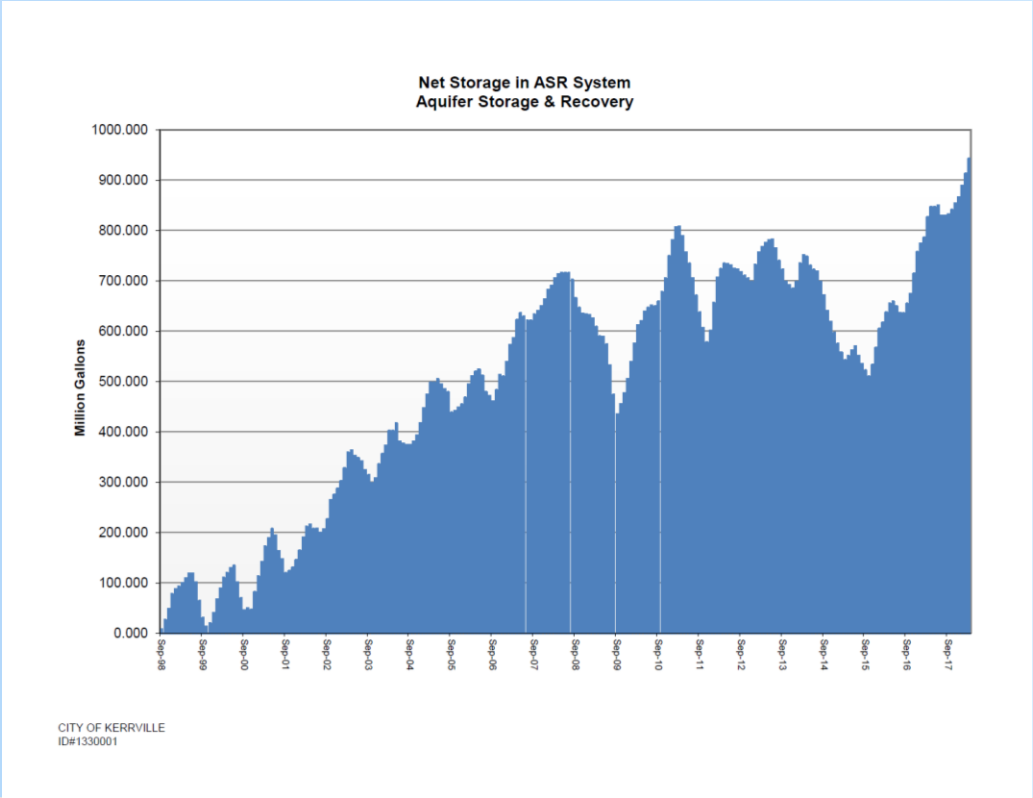
El Paso, Texas ASR Project

- Began operation in 1985
- Wastewater effluent source
- 10 injections wells and spreading basins



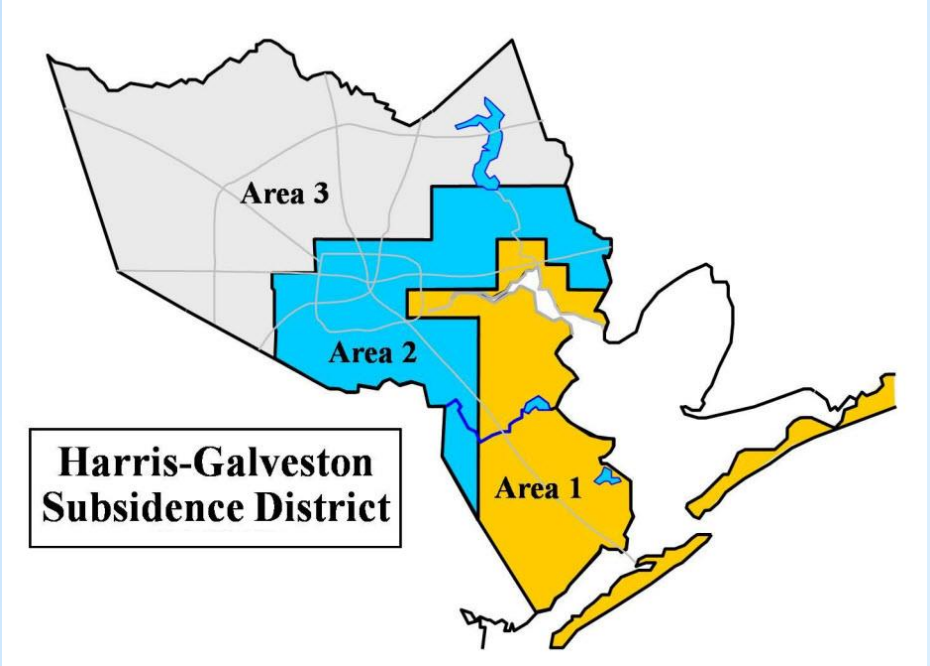
City of Kerrville, Texas

- Trinity aquifer
- Treated surface water
- Almost 1B gallons stored



Harris County Subsidence District

- Gulf Coast aquifer
- Over pumping since 1940s
- Subsidence
- Groundwater regulated
- Hurricane Harvey
- ASR candidate?



Future ASR Systems in Texas

- In the 2017 State Water Plan, 7 of the 16 regional water planning groups include ASR as water management strategies
- The state water plan recommends about 53,000 acre-feet per year in aquifer storage and recovery strategies in 2020, and 152,000 acre-feet per year in 2070
- Total capital cost of the recommended ASR projects is approximately $1.03 billion

ASR future trends

- Rules and regulations (most states are getting better)
- Source water availability and location (better planning/technology)
- Water quality concerns (technology)
- Aquifer parameters (more science)
- $$$$$ (more economical)
- Public understanding (perception is good)

Questions?

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