

# Future of ASR in Texas: TWDB supporting studies

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Innovative Water Technologies  
Texas Water Development Board

*Texas Groundwater Conference  
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# Texas Water Development Board

## Offices

Water Science & Conservation

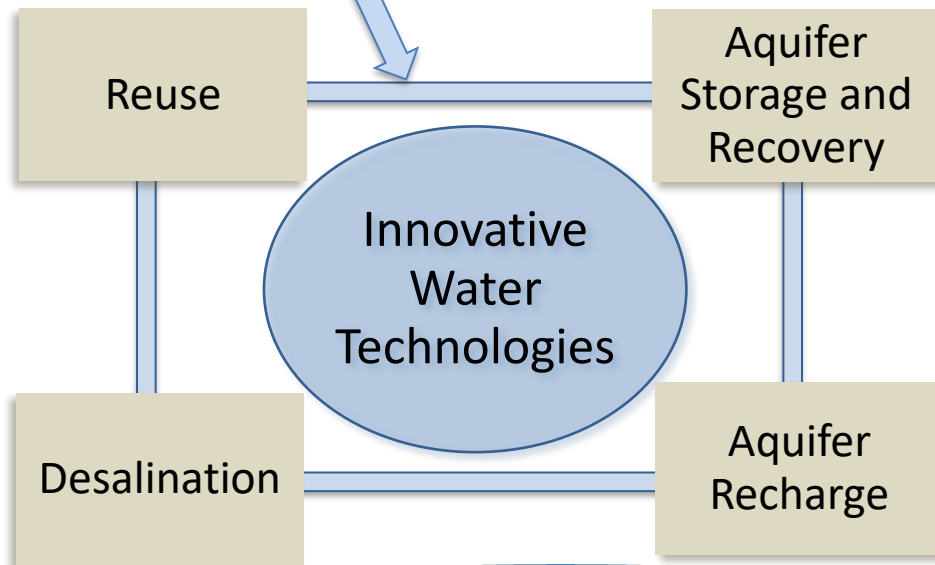
Water Supply & Infrastructure

Operations & Administration

Texas Natural Resources Information System

Planning

Finance



**IWT goal: advance and promote the development and use of alternative water supplies in Texas.**

# What is ASR?

- Using **the same well** for both **injection** and **recovery** of stored water

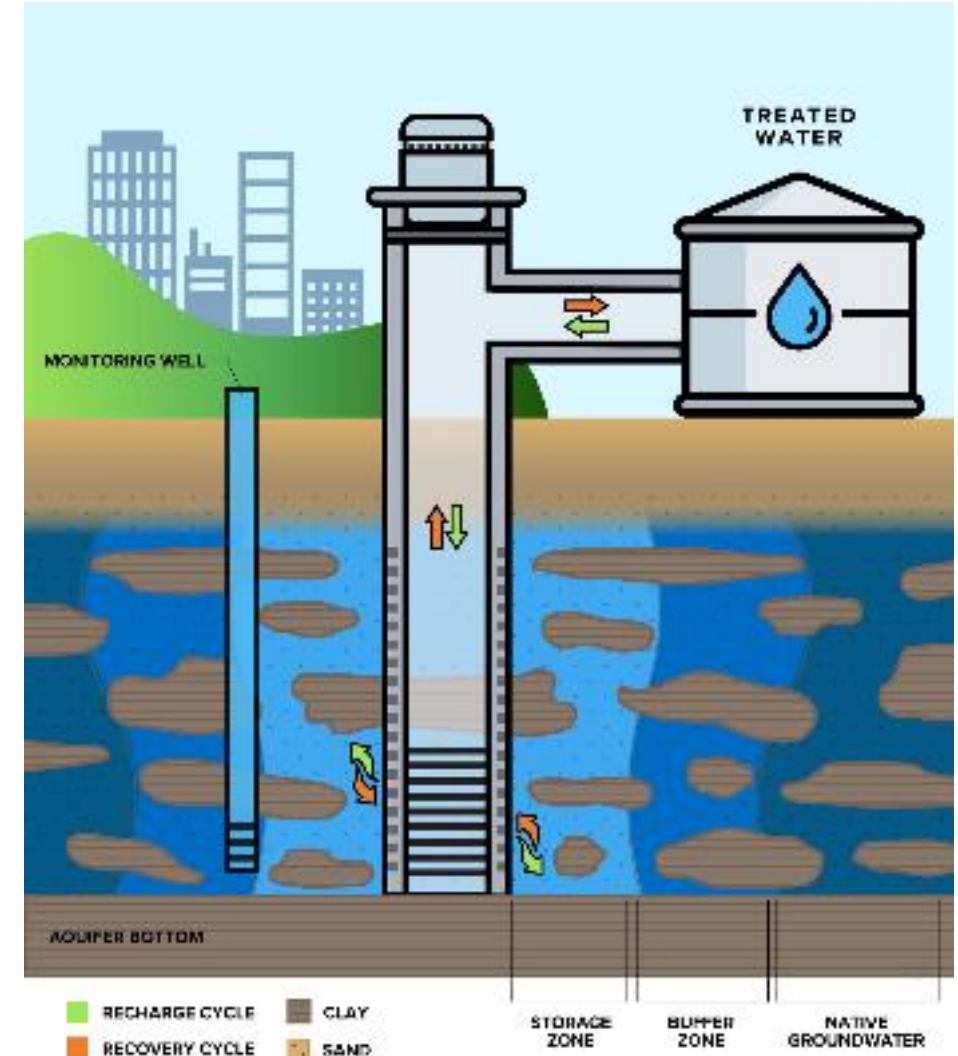
## Texas Water Code § 27.151

*“...a project involving the injection of water into a geologic formation for the purpose of subsequent recovery and beneficial use by the project operator.”*

## Why ASR?

- Drought and emergency supply
- Seasonal storage
- Benefits over surface reservoirs

## Water savings account



# What is AR?

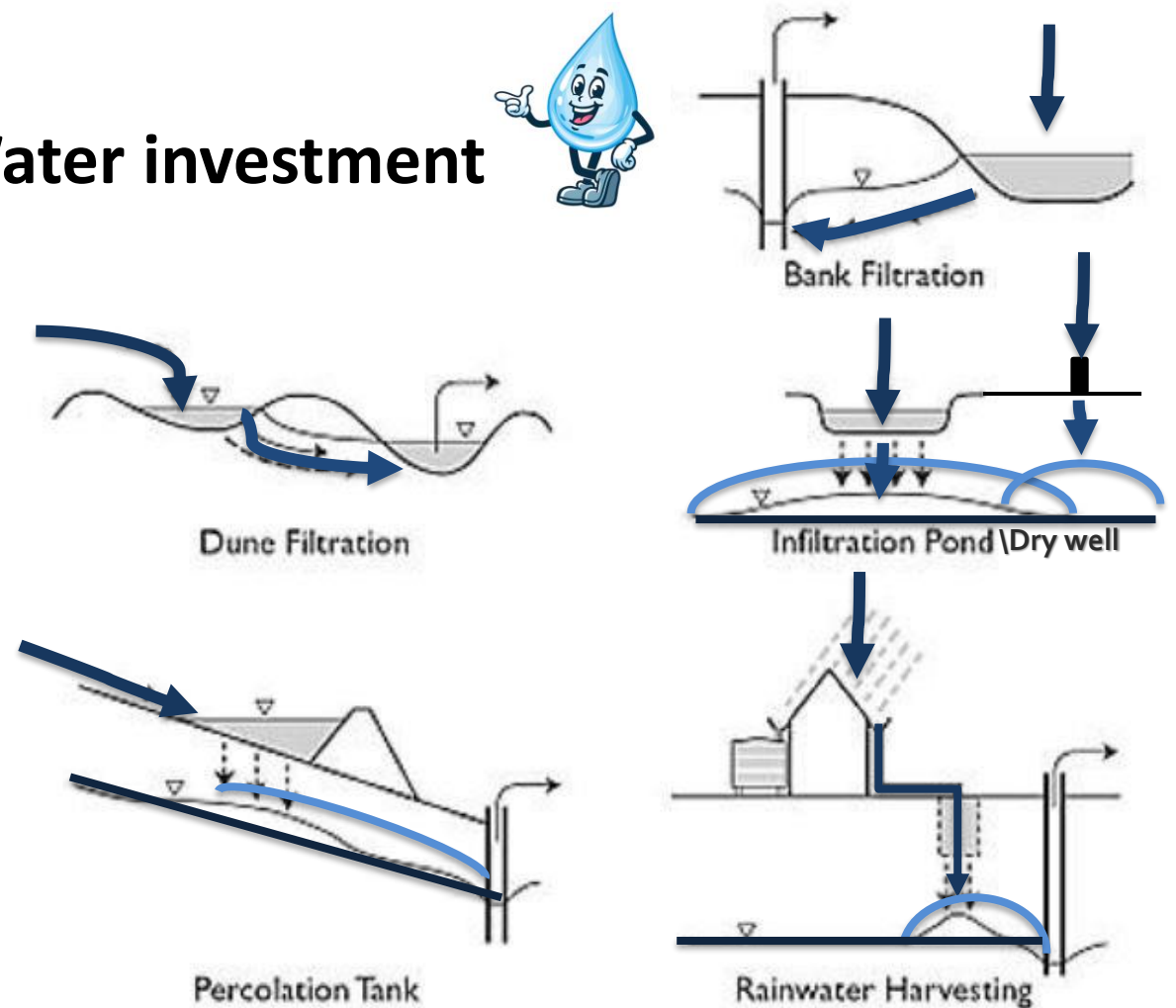
- Controlled recharge of an aquifer at the surface through various methods:

- Spreading methods
- Induced bank infiltration
- Channel modification or diversion
- Runoff harvesting
- Reclaimed water reuse

- **Texas Water Code § 27.201**

*“...a project involving the intentional recharge of an aquifer by means of an injection well,...,or other means of infiltration”*

## Water investment



Most common MAR techniques (Gale and Dillon 2005) ASR: Aquifer Storage and Recovery; ASTR: Aquifer Storage Transfer and Recovery

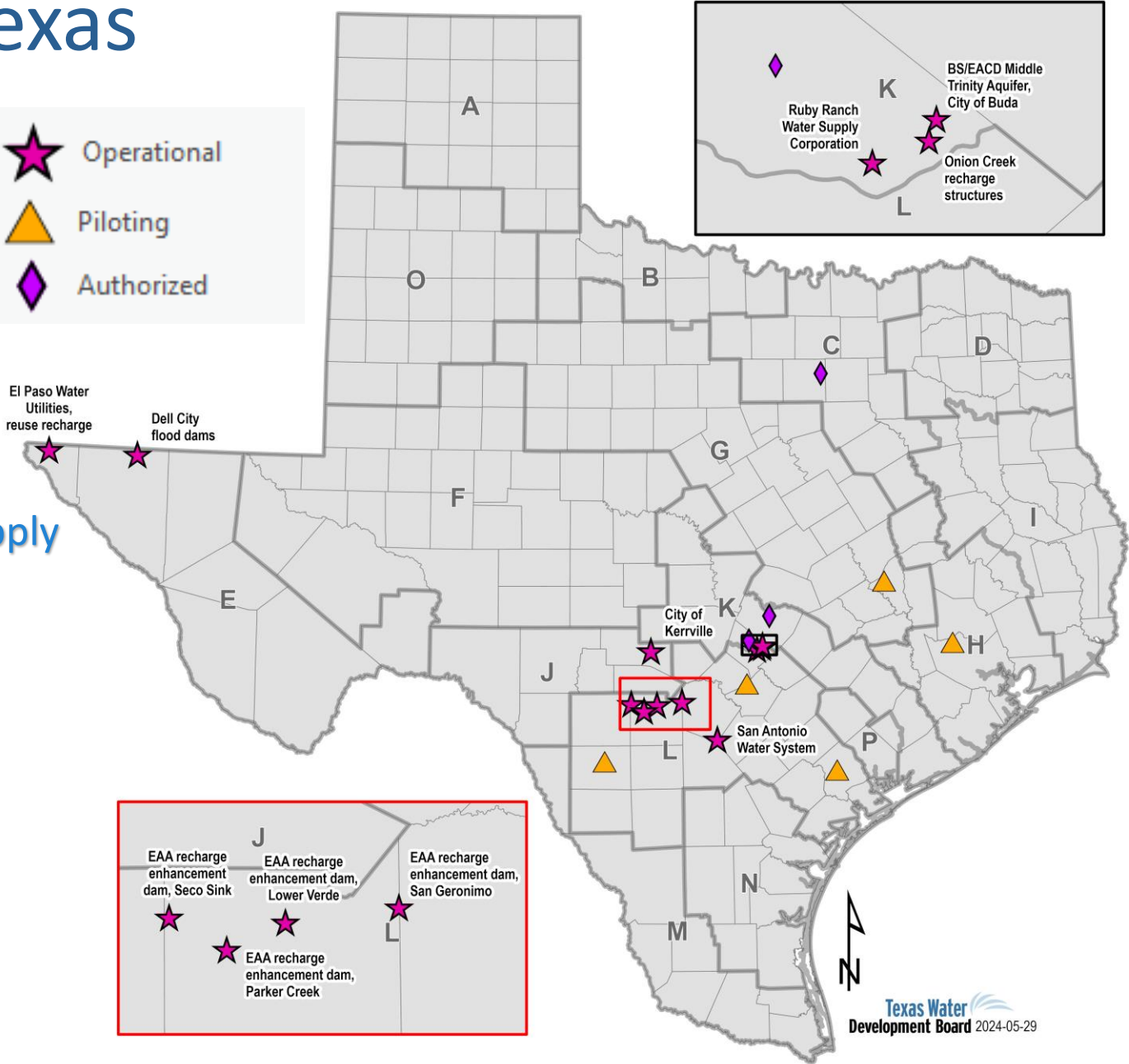
# Existing ASR and AR in Texas



- 8 operational
  - **ASR**
    - Kerrville
    - El Paso
    - San Antonio
    - Buda
    - Ruby Ranch
  - **AR**
    - Dell City
    - Onion Creek
    - EAA
- 5 testing
- 4 authorized

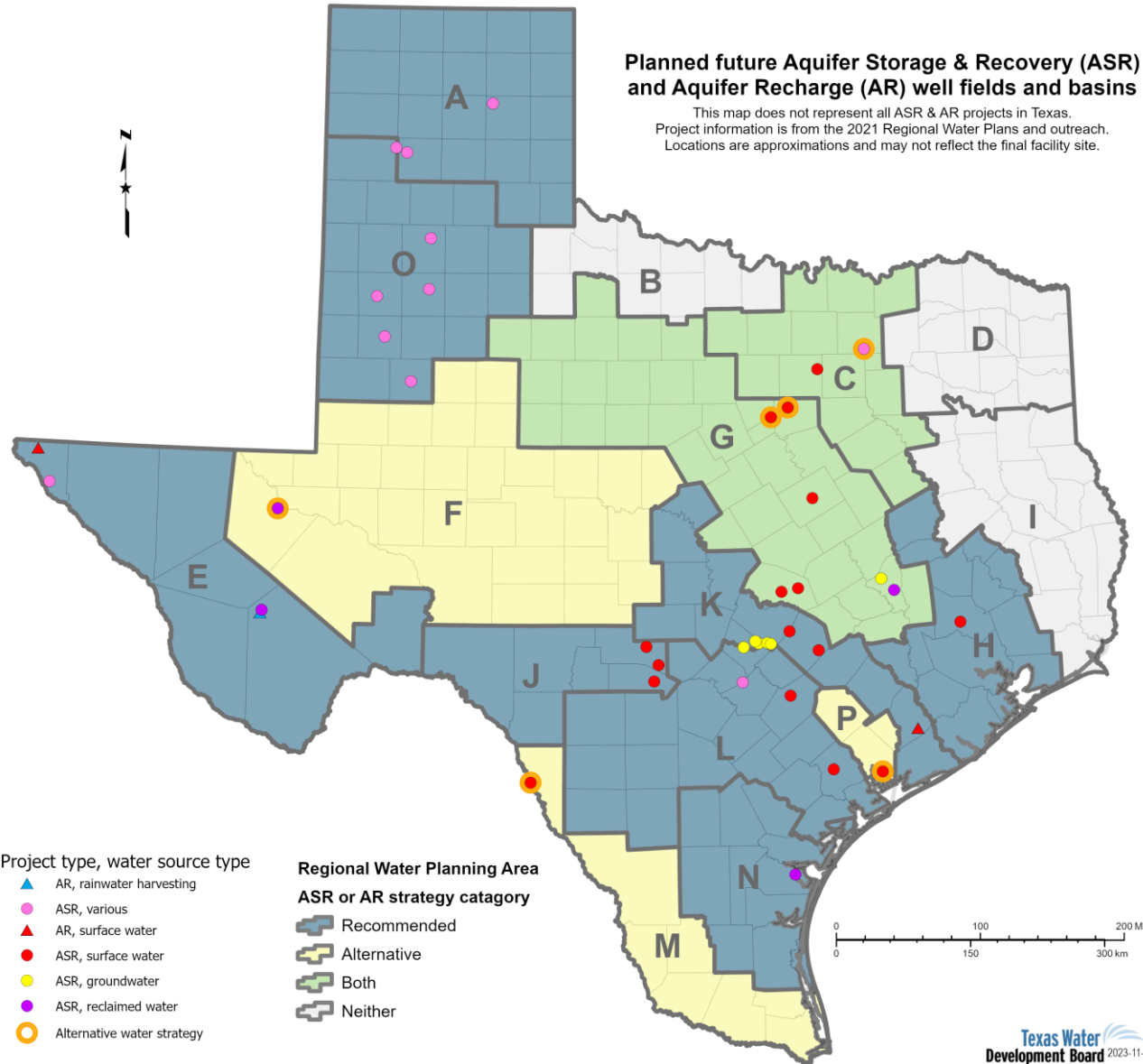
Common goals:  
 - Seasonal peak supply  
 - Drought supply

- ★ Operational
- ▲ Piloting
- ◆ Authorized





# Future ASR and AR in Texas



## 88<sup>th</sup> Texas Legislature (2023)

- SB 28 – water for Texas fund



## State Water Plan (2022)

- 13 of 16 regional water planning groups plan on ASR
- 37 ASR well fields, 4 AR surface infiltration facilities
- 193,000 acre-feet per year in 2070, 3% of the total new supply



## Challenges

- Available source water
- Suitable geology
- Economics
- Public perception and expectations



# IWT Mandates

- In 2019 Texas House Bill 721 (**Texas Water Code § 11.155**) tasked the TWDB:
  - Conduct Statewide survey of aquifer suitability for ASR and AR in Texas
  - Conduct ASR and AR studies identified in the State Water Plan or by interested persons
  - Report results of these studies

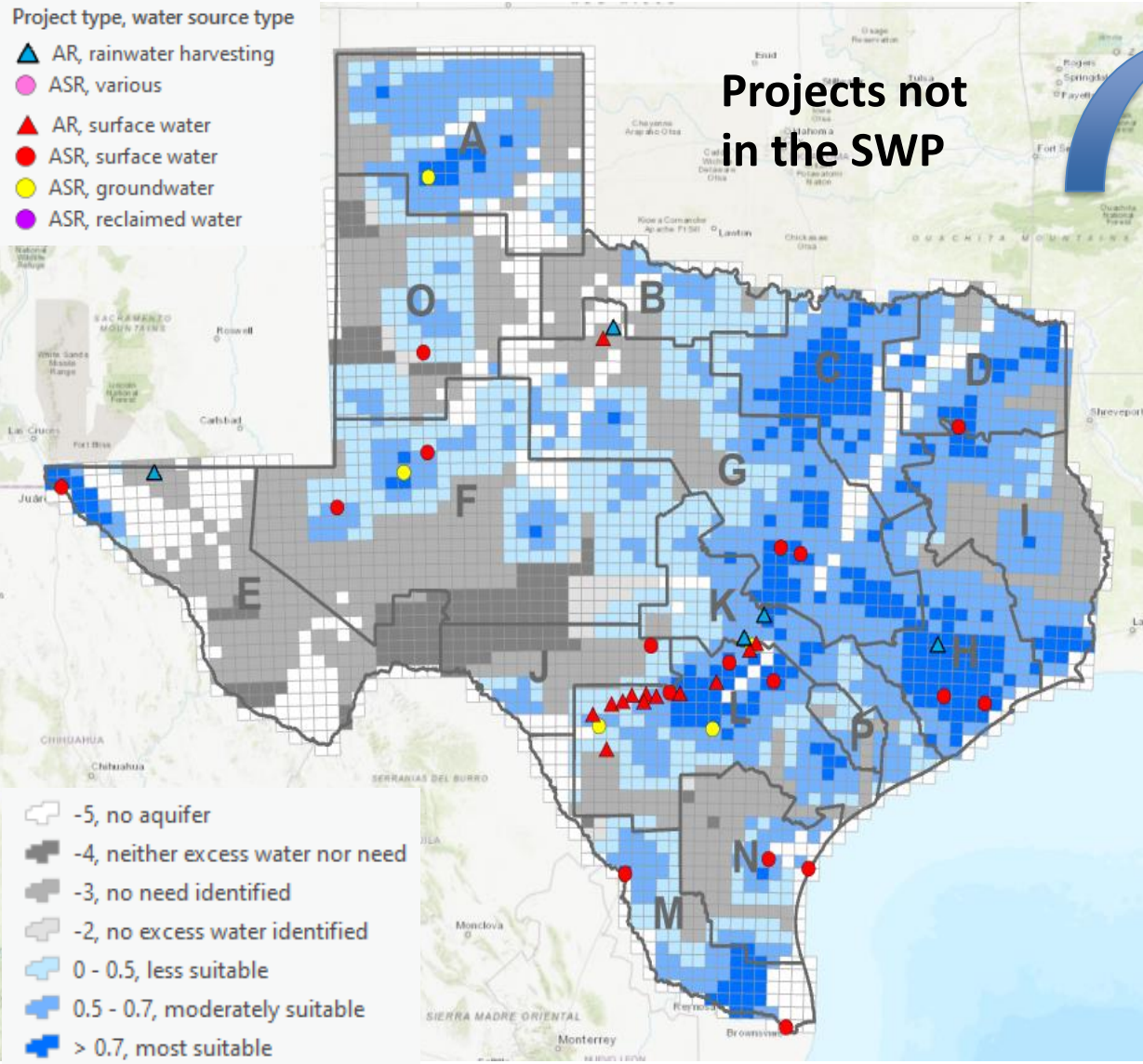
Project web page:



Story map:



# Statewide Suitability Survey Application

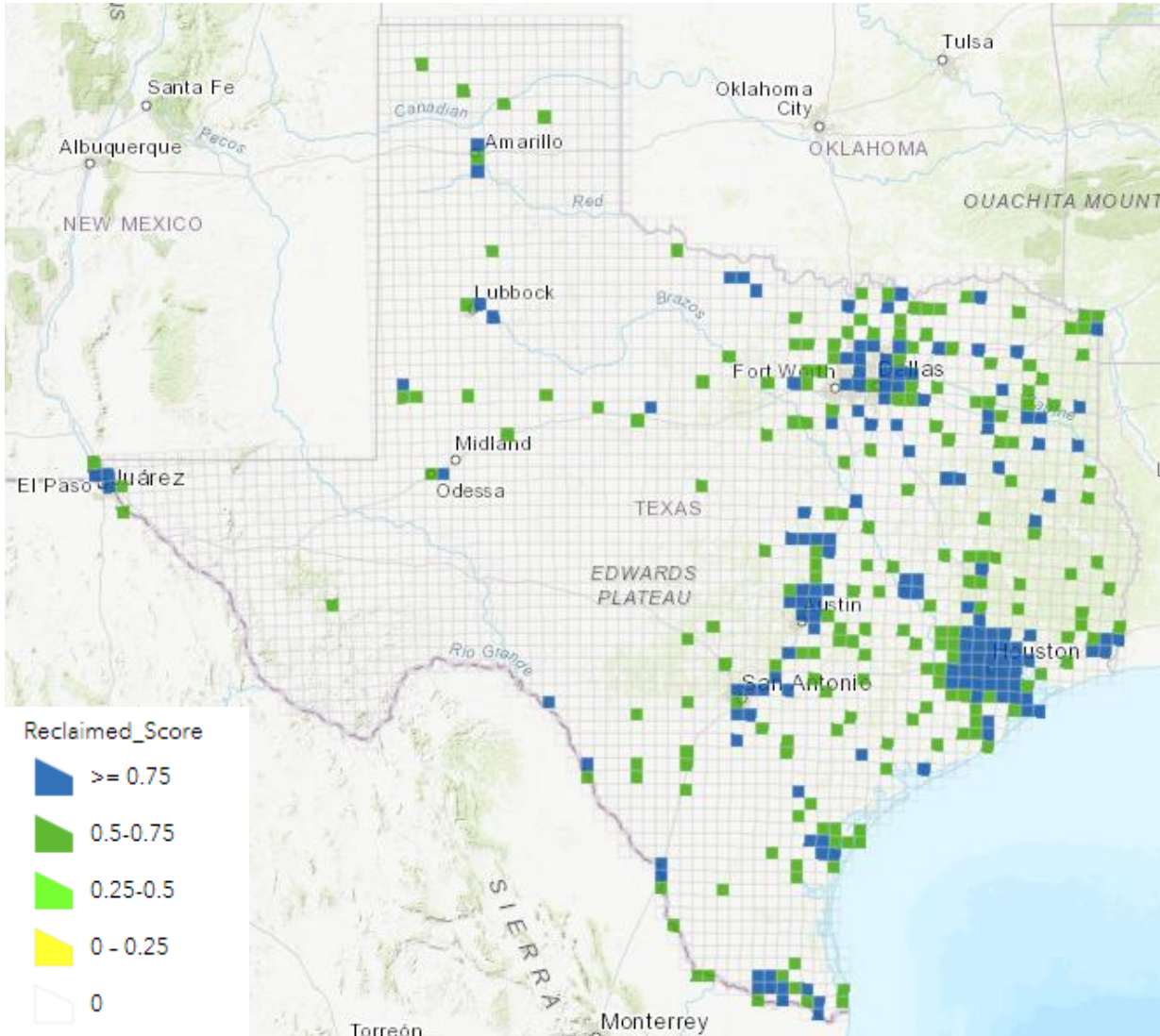


Informative: start conversations  
 Complementary: planning process





# Statewide Suitability Survey Application



Versatile: opportunities for **other** projects



# ASR Studies: Prioritization Criteria and Info

*(Based on most current available information)*

## Criteria

- 1) Sponsor interest and activity
- 2) Project planning status
- 3) Data availability and quality
- 4) Staff skillset
- 5) Online decade

## Supporting information

- Statewide Suitability Survey final rating for both ASR & AR
- Source water type
- Strategy goal
- Proposed study type

# IWT completed and current studies

## Texas Water Development Board ASR and AR Projects

ASR = aquifer storage and recovery  
AR = aquifer recharge  
See Texas Water Code § 11.155

Aquifer Storage and Recovery Report:  
Longevity Assessment for the  
City of Bandera Water Wells

Azzah AlKureli, Shirley C. Wade, Ph.D., P.G., James Golab, Ph.D., P.G., Andrea Croskrey, P.G.

Report 389  
February 2023

Texas Water Development Board  
www.twdb.texas.gov

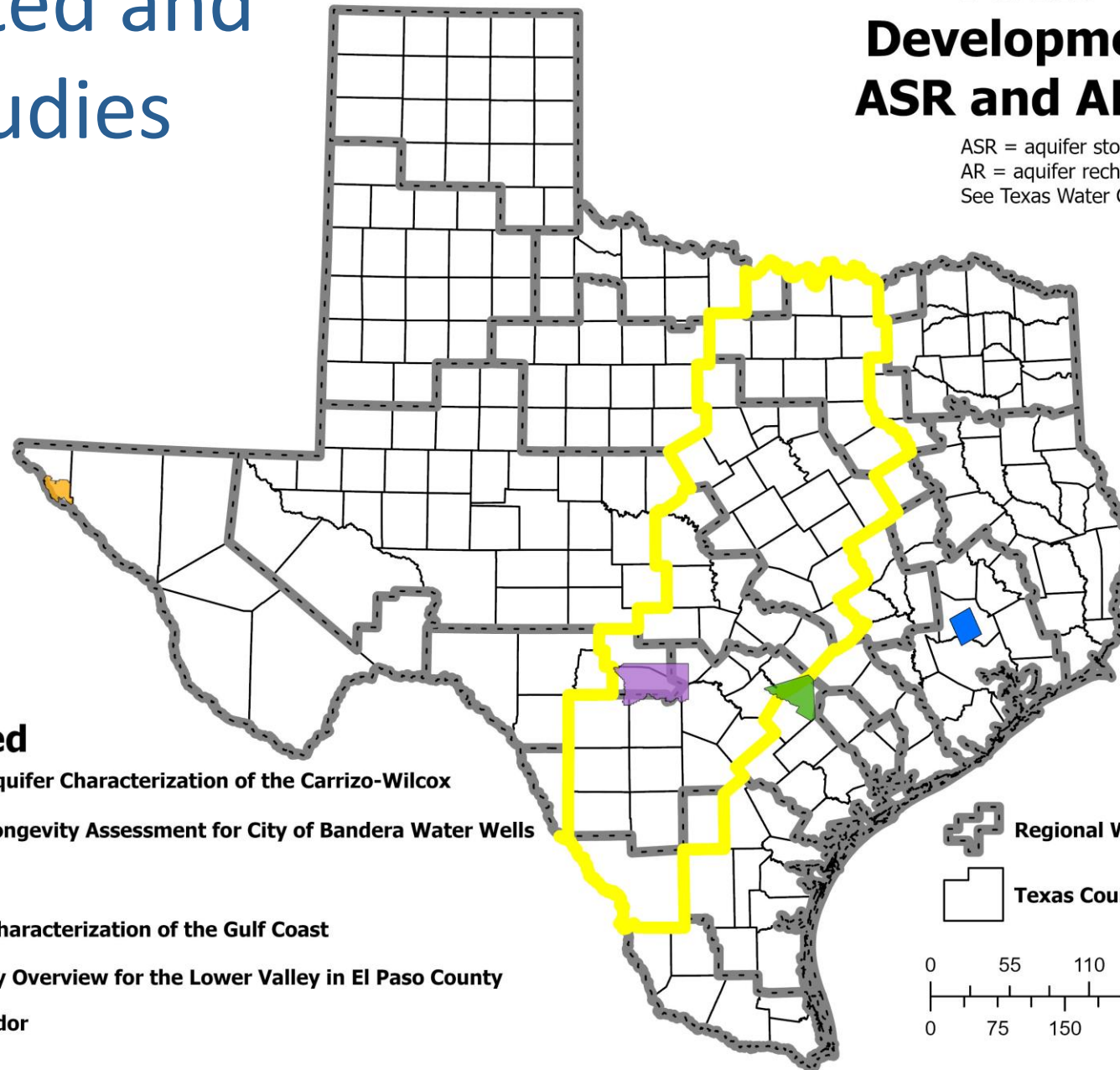


Aquifer Storage and Recovery Report:  
Carrizo-Wilcox Aquifer Characterization  
for Eastern Gonzales and Parts of  
Caldwell and Guadalupe Counties, Texas



Andrea Croskrey, P.G., James Golab, Ph.D., P.G., Daniel Collazo

Report 387  
March 2022




Texas Water Development Board  
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### Completed

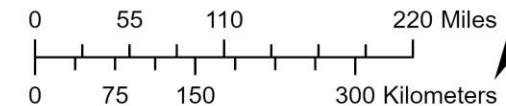
-  R387 - Aquifer Characterization of the Carrizo-Wilcox
-  R389 - Longevity Assessment for City of Bandera Water Wells

### Current

-  Aquifer Characterization of the Gulf Coast
-  Suitability Overview for the Lower Valley in El Paso County
-  I35 Corridor

 Regional Water Planning Areas

 Texas Counties



This map does not represent all ASR & AR studies in Texas.  
Project locations are approximations and may not reflect the final facility site.



# Guadalupe-Blanco River Authority ASR Study

**ASR project:** Mid-basin water supply (ASR component)

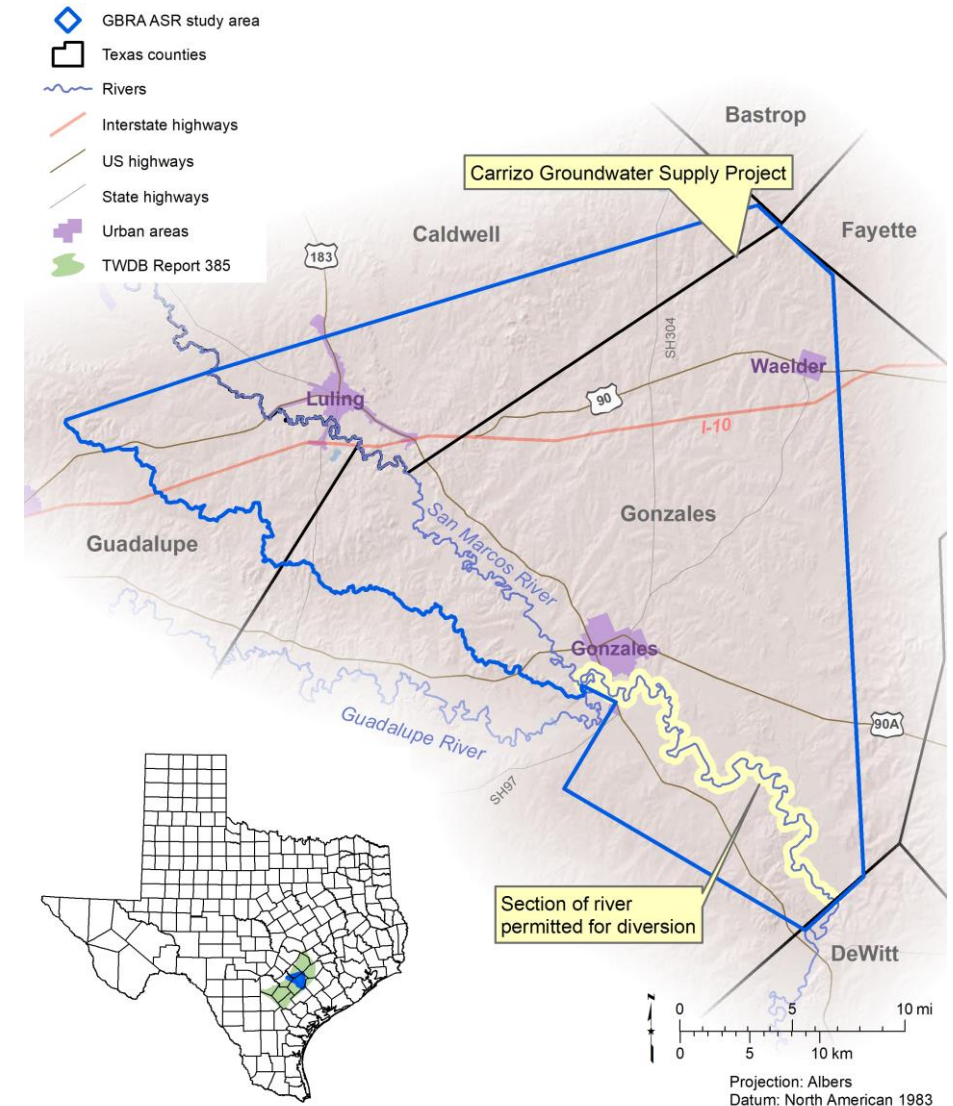
**Sponsor:** Guadalupe Blanco River Authority

**Source water:** Guadalupe River treated water

**Target aquifer:** Carrizo-Wilcox Aquifer

## Conditions:

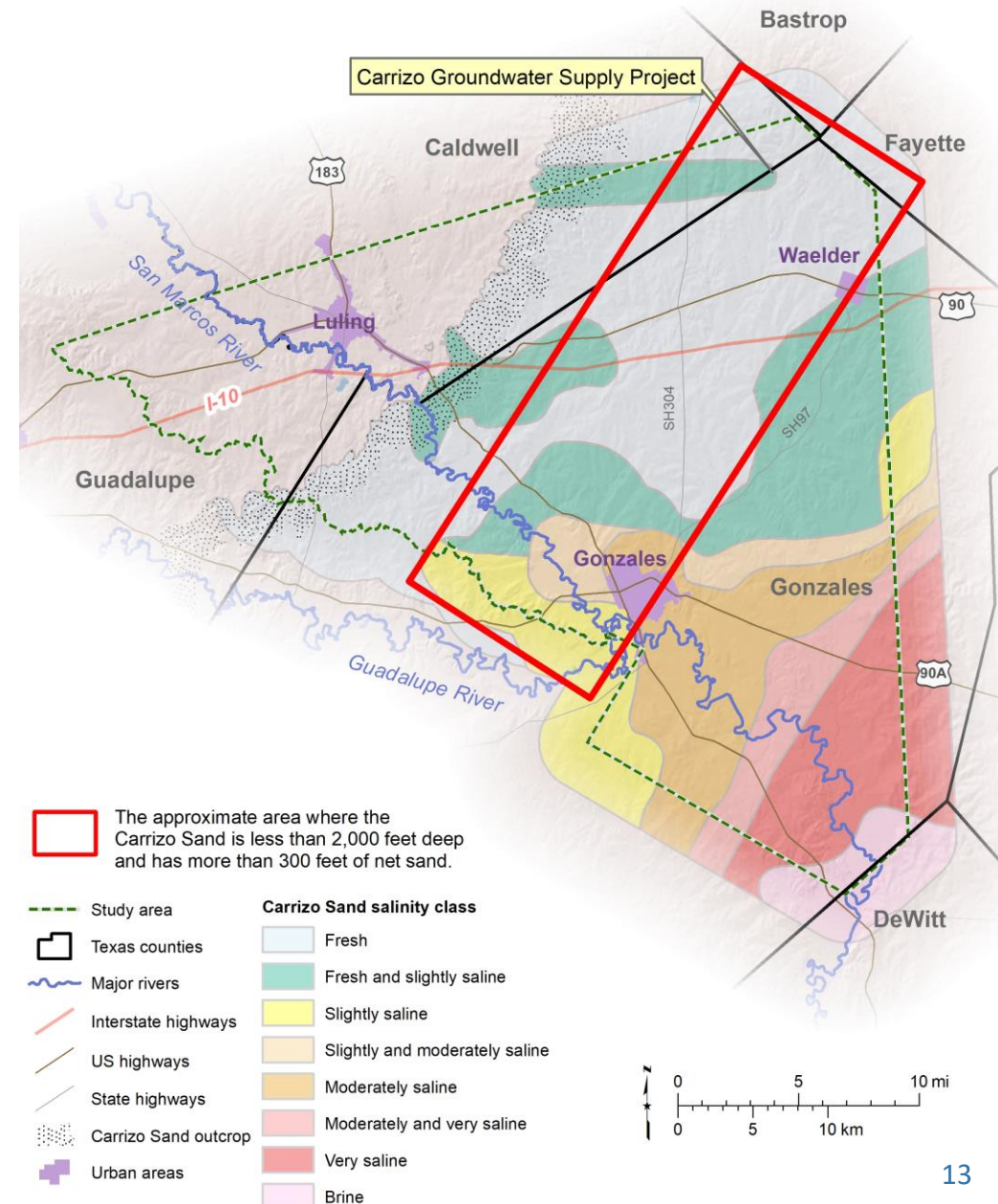
- when availability from the river exceeds customer demand, and
- there is available capacity at the new water treatment facility





# Guadalupe-Blanco River Authority ASR Study (R387)

- GBRA needed to better understand:
  - Storage parameters
  - Potential target aquifers in the vicinity of its Mid-Basin Water Supply Project
- IWT aquifer characterization study:
  - Stratigraphy
  - Lithology
  - Groundwater salinity
- The study identified:
  - **most suitable unit and zone** in the study area for an ASR project
  - potential **water quality implications** on well design
- The GBRA hired a contractor for final site selection, well construction, and design.



# Bandera Well Longevity Model

**ASR project:** Surface water acquisition, treatment, and ASR

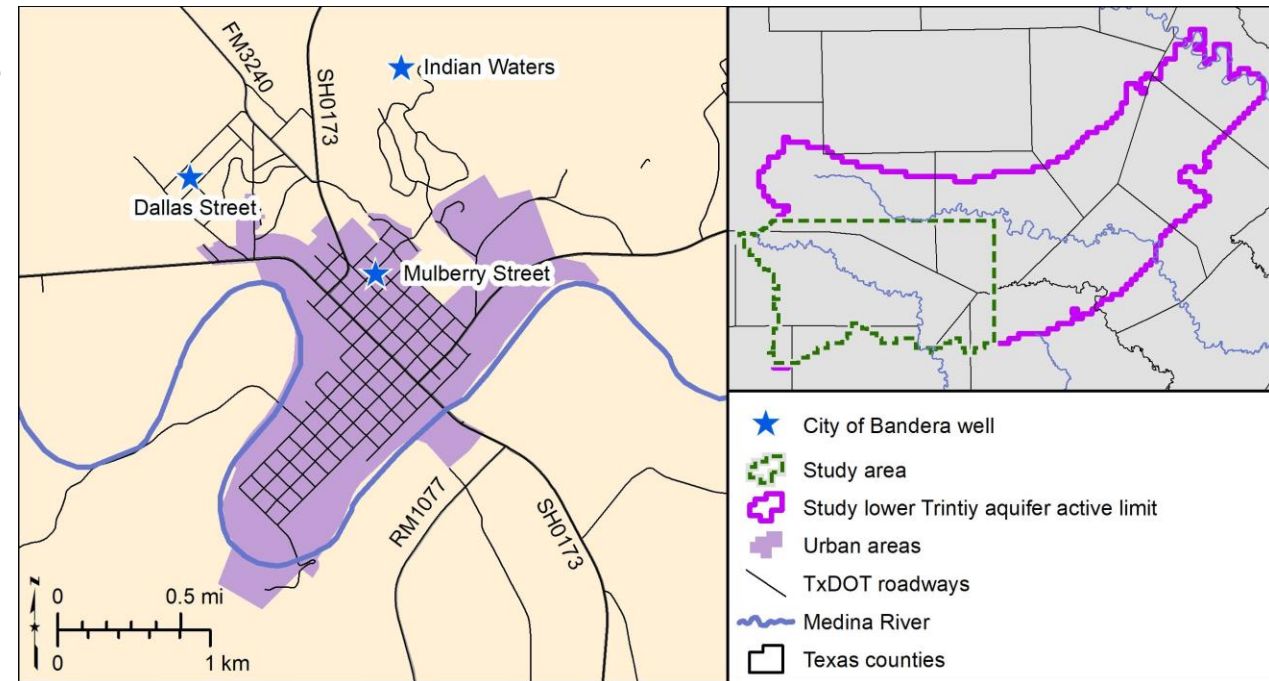
**Sponsor:** The City of Bandera

**Water source:** treated surface water from the Medina River

**Target aquifer:** lower Trinity aquifer

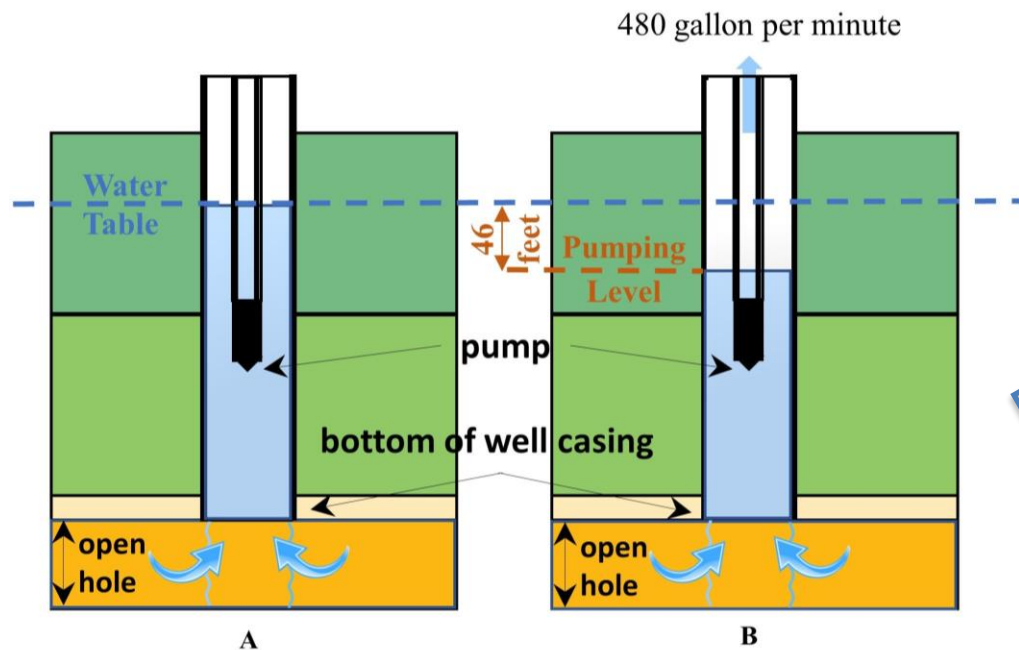
**plan:**

- Supply for high demands
- using existing water supply wells

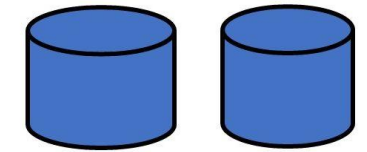


# Bandera Well Longevity Model (R389)

- The City of Bandera needed to understand the longevity of their existing wells:
  - Trinity Aquifer is the main supply source
  - Wells already reaching max drawdown
  - Little redundancy in case of failure



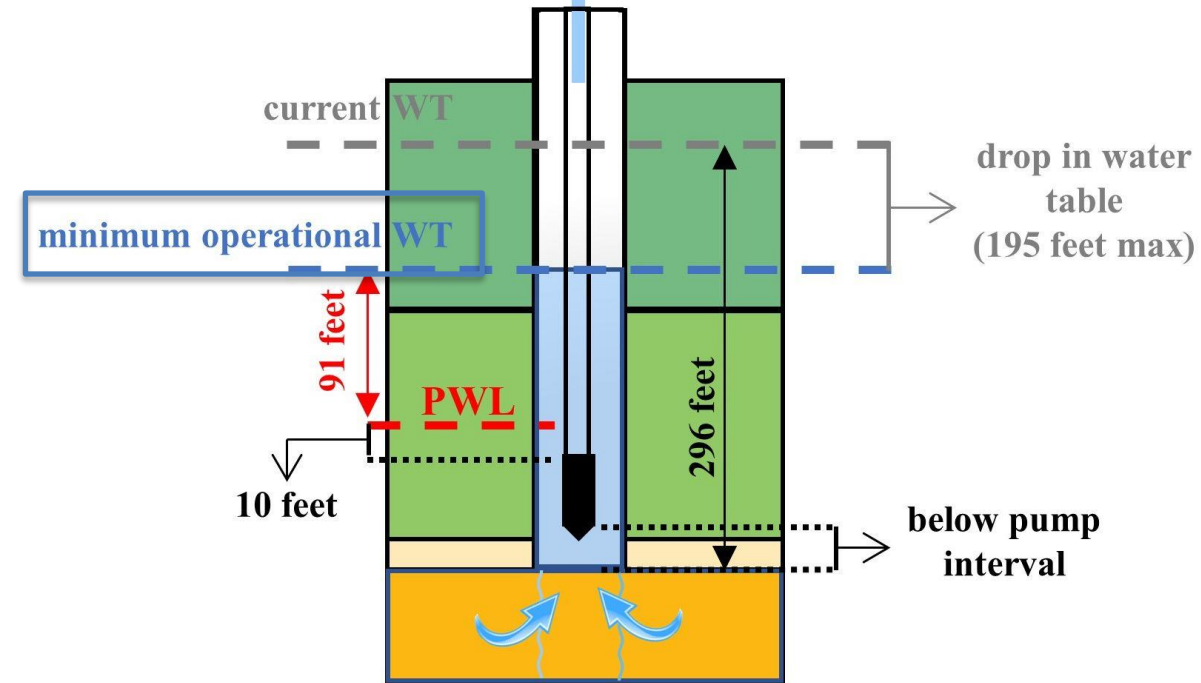
Upper Trinity Group  
 Middle Trinity Group  
 Hammett Shale  
 Lower Trinity Group



198,694 gallon per day

480 gallon per minute

6.9 hours

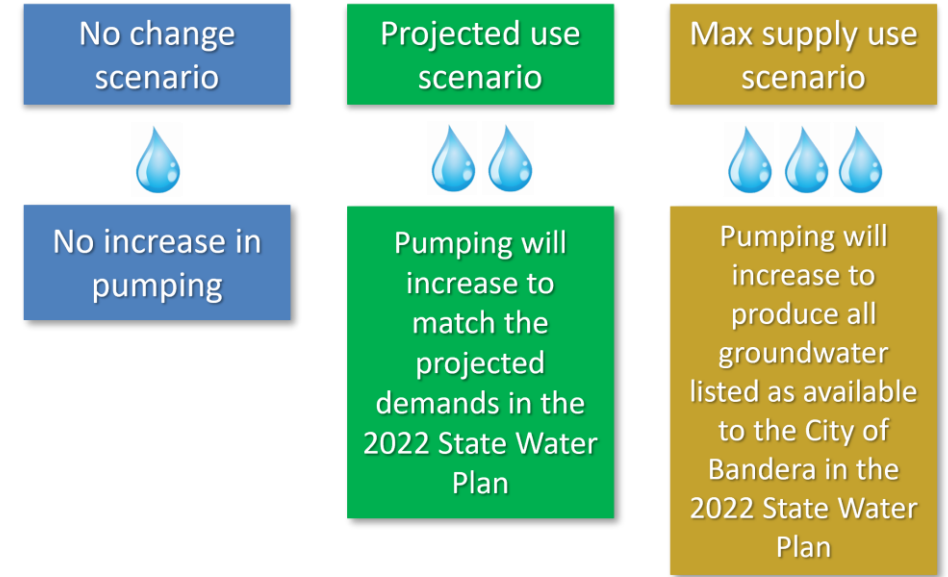
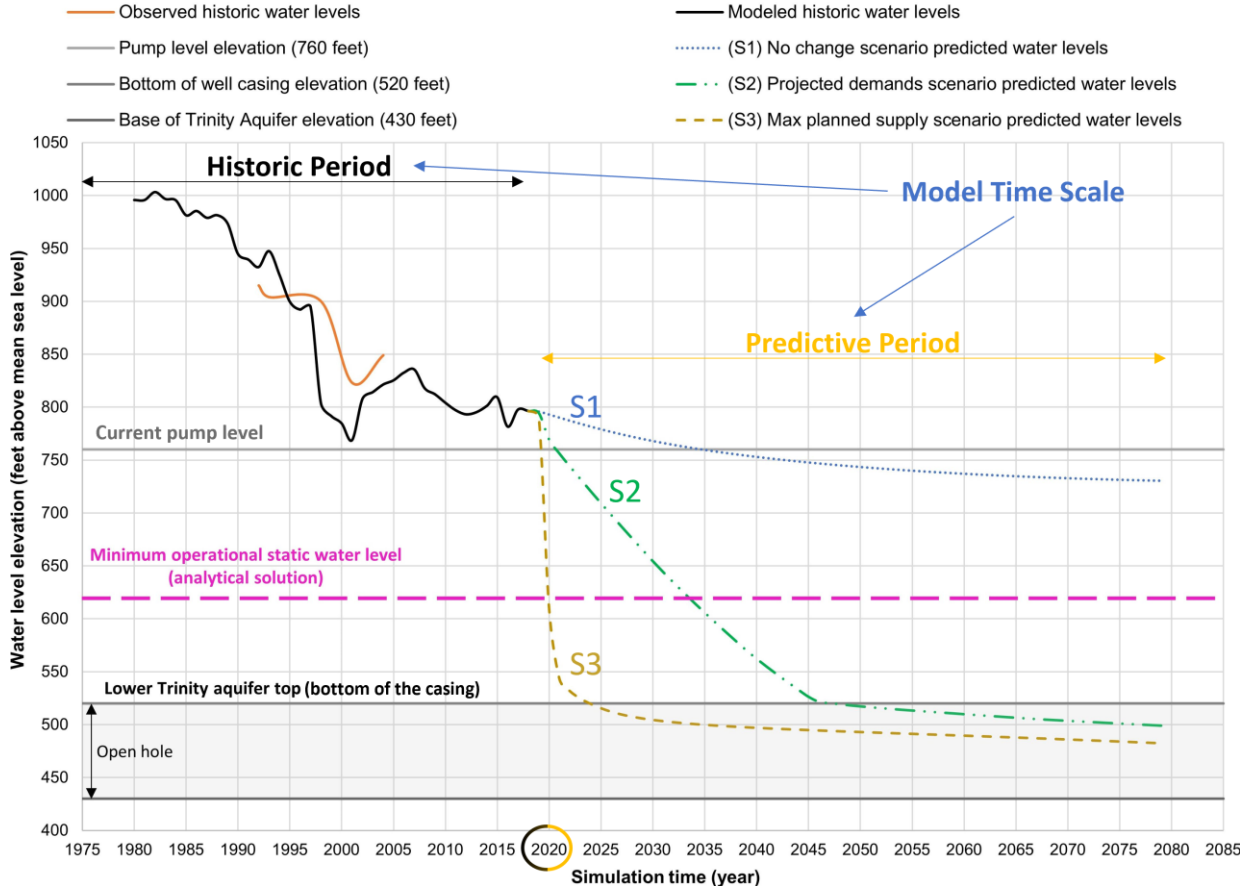


Upper Trinity Group  
 Middle Trinity Group  
 Hammett Shale  
 Lower Trinity Group

# Bandera Well Longevity Model *(R389)*

- IWT created a model to:
  - Assess the longevity of the city's lower Trinity aquifer wells
  - Forecast three potential scenarios

Mulberry Street Well Predictive Results



- Study identified:
  - The city's wells meet the city's needs but are reaching their pumping limits
  - The city likely has about 29 years to implement new management strategies (ASR)



# Lower Valley ASR Suitability Analysis

**ASR project:** Wastewater treatment and ASR

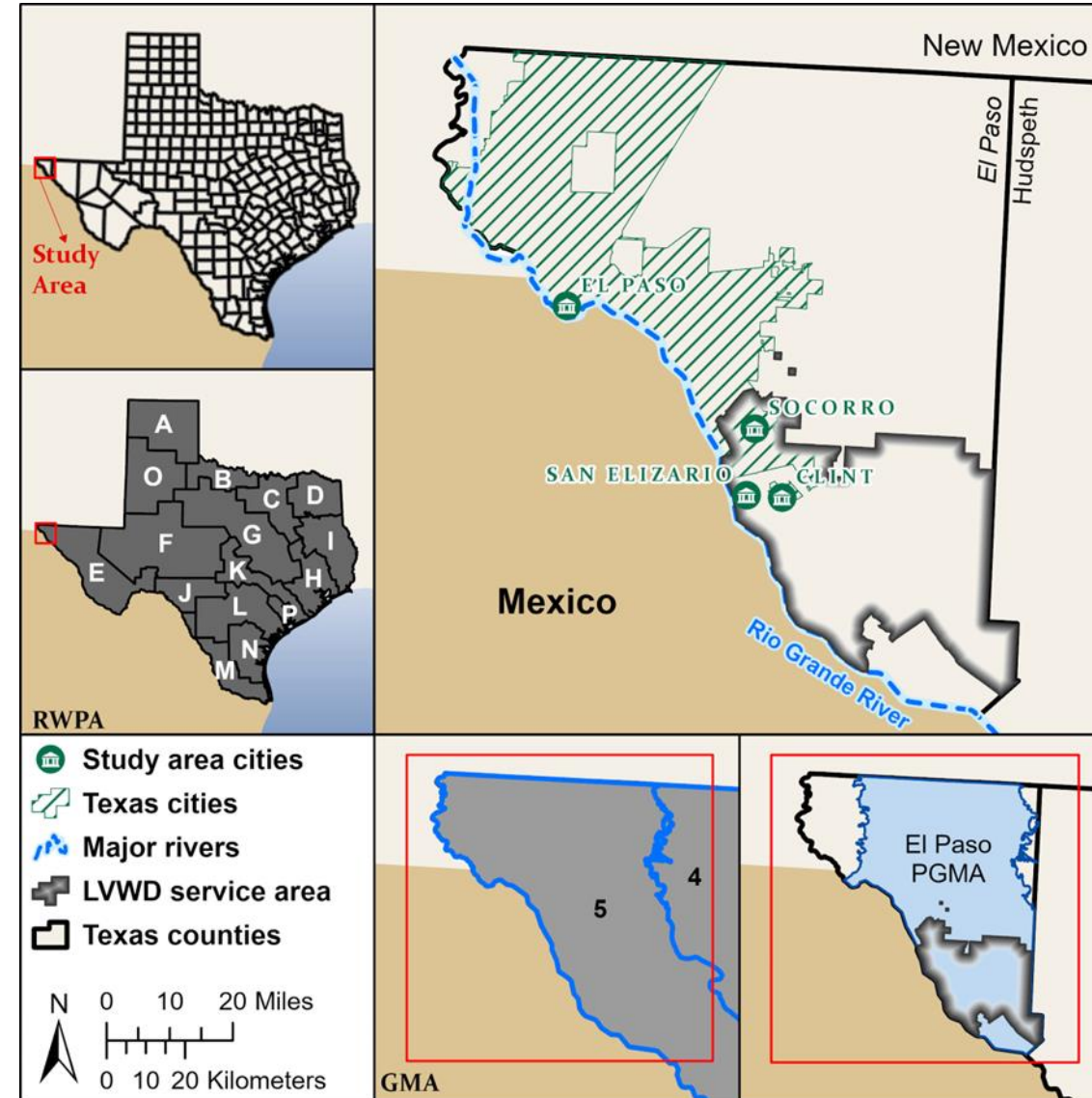
**Sponsor:** Lower Valley Water District

**Water source:** advanced treated reclaimed water

**Target aquifer:** the Hueco-Bolson aquifer

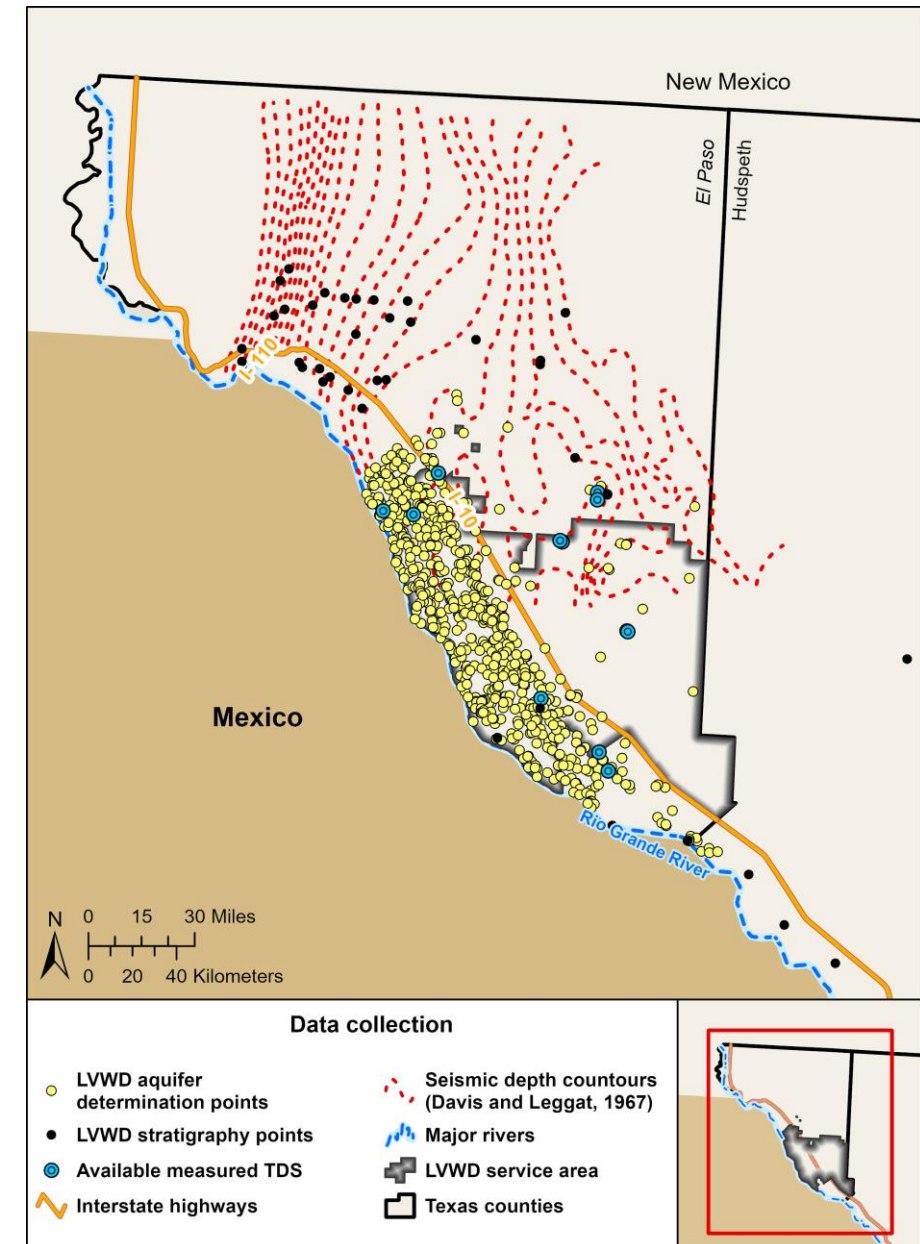
**Plan:**

- construction of a wastewater treatment facility
- use advanced treated wastewater to recharge the aquifer
- balance supplies during high demands



# Lower Valley ASR Suitability Analysis *(in review)*

- LVWD is interested in ASR or AR:
  - Arid region - scarcity of water resources is a concern
  - Project would benefit LVWD customers and agricultural users
- IWT performed a high-level suitability analysis due to limited available data
- Study identified
  - The **semi-confined sands** of the Hueco Basin present the best target for ASR or AR
  - **Infiltration basins** would be recommended based on the hydrogeology and permitting



# San Jacinto River Authority ASR study

**ASR project:** San Jacinto River Authority ASR

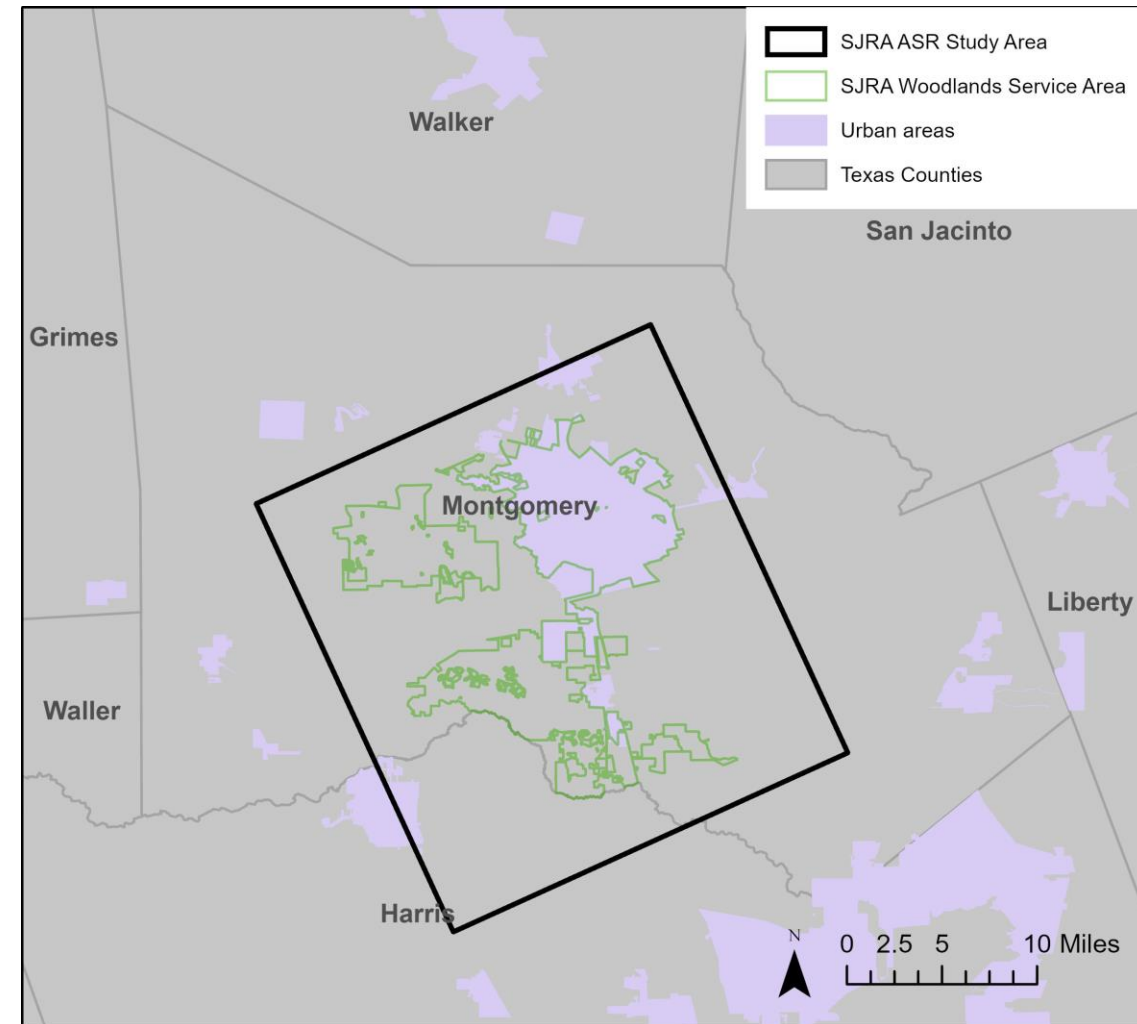
**Sponsor:** San Jacinto River Authority

**Water source:** Lake Conroe and Lake Creek

**Target aquifer:** Gulf Coast Aquifer

## Other information:

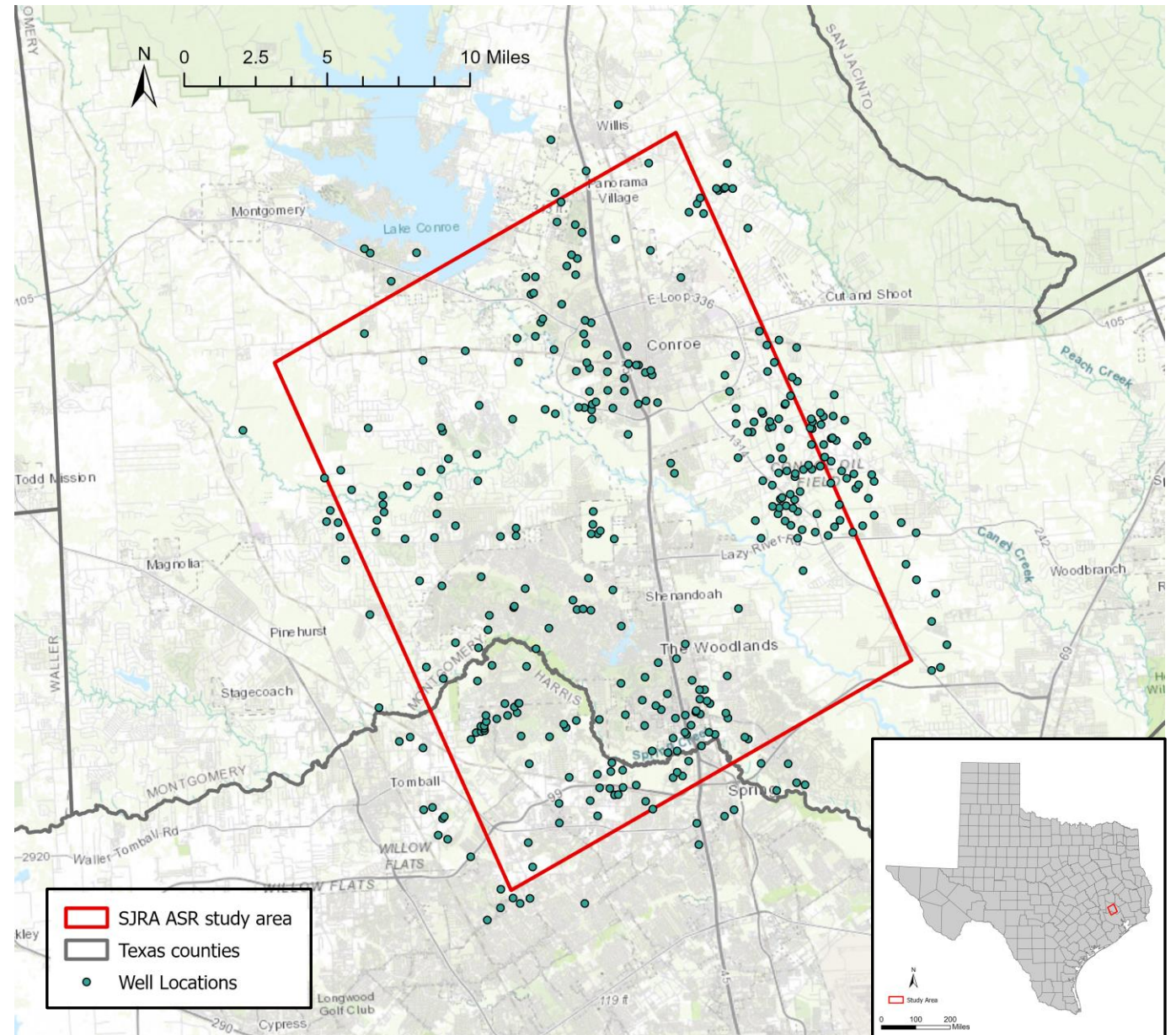
- High level suitability analysis conducted
- Available unappropriated interruptible surface water
- Opportunity to expand capacity of SJRA surface water treatment facility
- Data gaps in raw water plan





# San Jacinto River Authority ASR study *(in progress)*

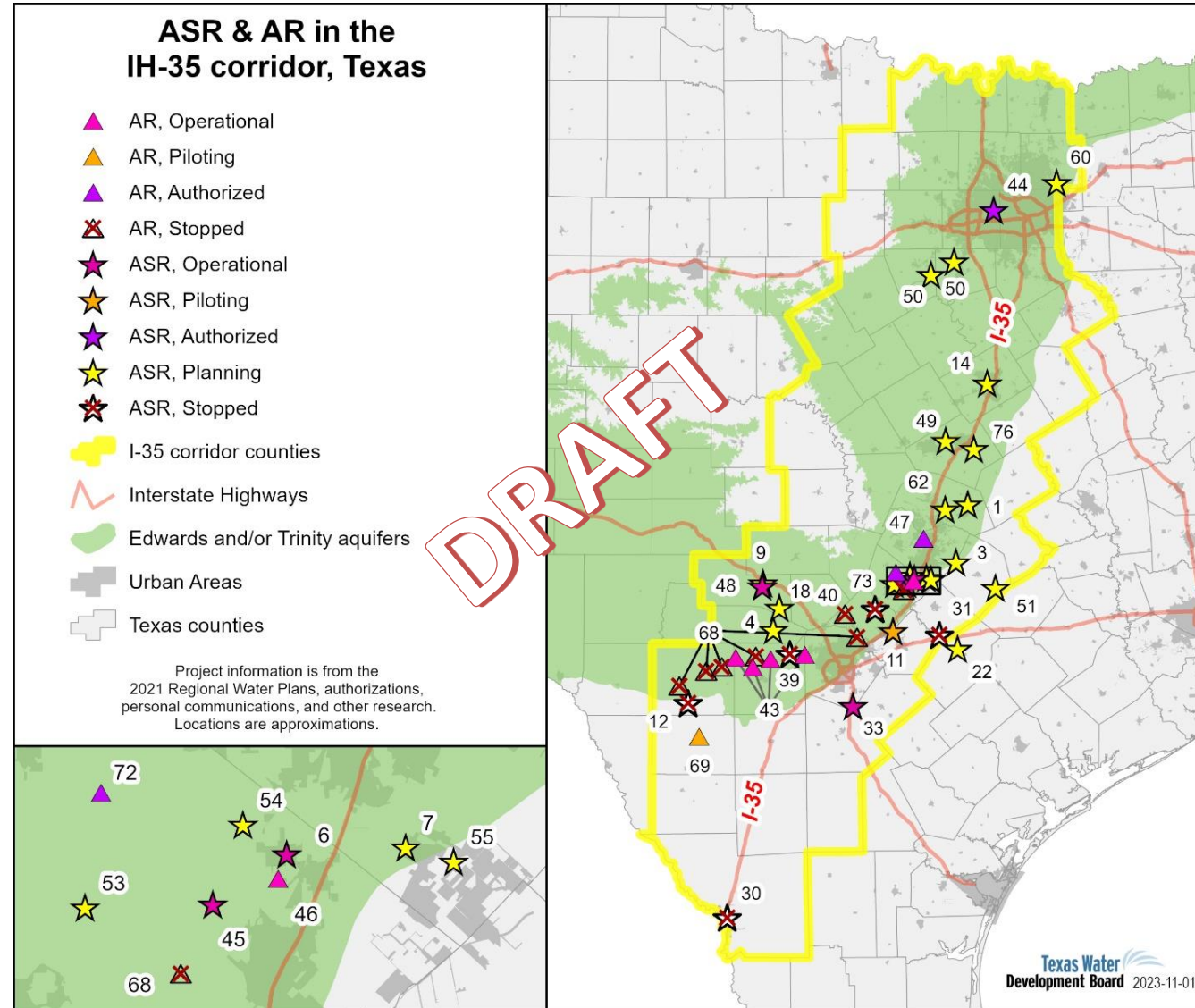
- SJRA is interested in identifying local aquifer characteristics and storage potential
- IWT aquifer characterization study:
  - Focus on the Evangeline and upper Jasper aquifers
  - Stratigraphy QA/QC phase

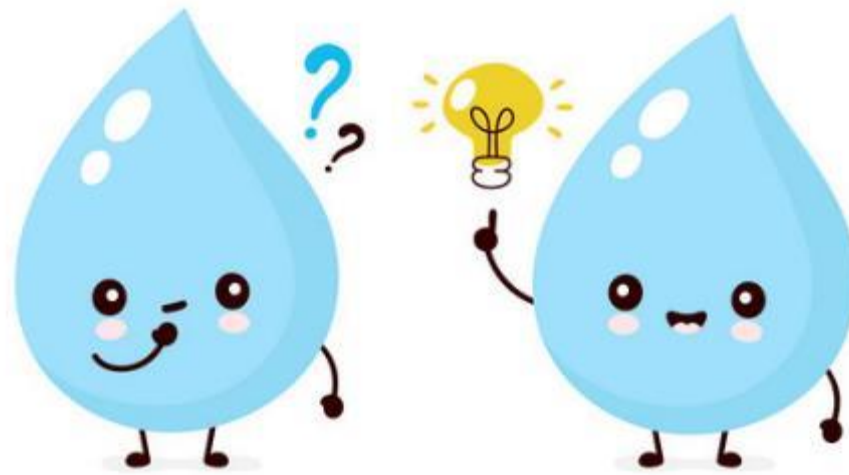




# Edwards and Trinity ASR and AR *(in review)*

- Highlights ASR and AR projects along the IH-35 corridor in Texas
- This area of the state is rapidly growing, and several entities are implementing ASR or AR projects
- Discusses the driving factors, challenges, and opportunities these projects face





Let us know if you would like to know more!



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