Future of ASR in Texas: TWDB ASR Supporting Studies

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Texas Water Development board

Texas Alliance of Groundwater Districts Summit

August 31, 2022 – San Antonio

Outline

- Introduction
- Texas Water Code § 11.155
  - 1st Mandate: Statewide Suitability Survey
  - 2nd Mandate: ASR studies
    - Study Selection
    - Completed Study
    - Current Studies

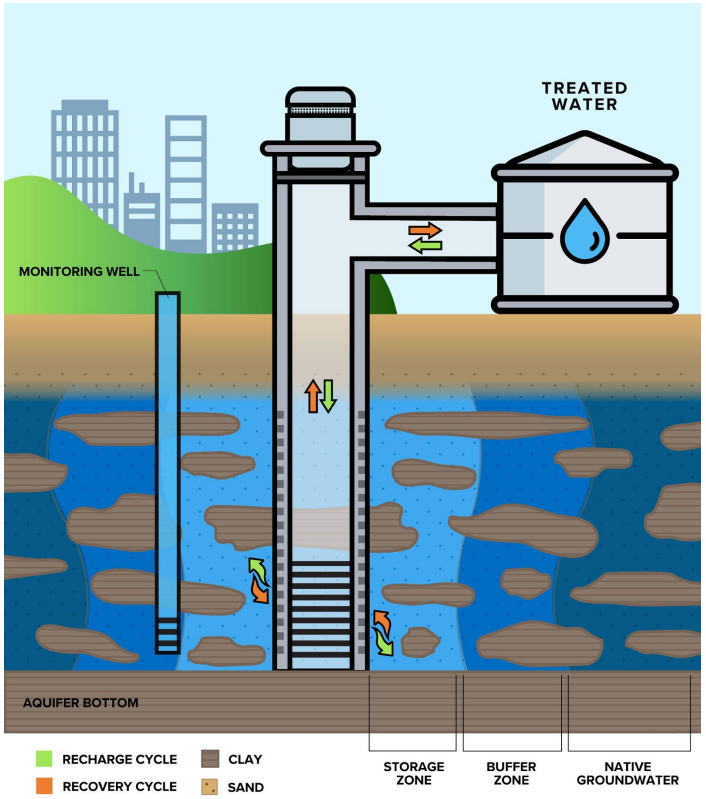
What is ASR?

Aquifer Storage and Recovery (ASR)

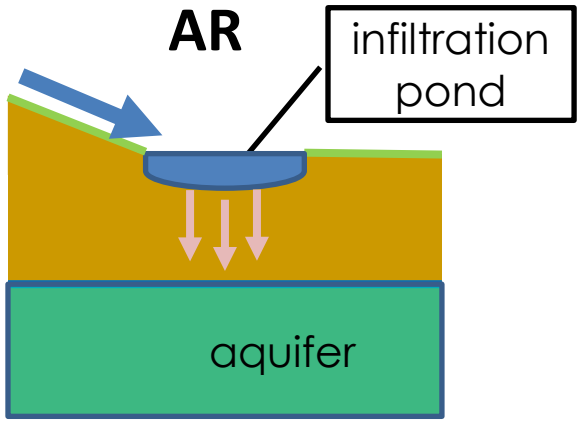
- Texas Water Code § 27.151

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

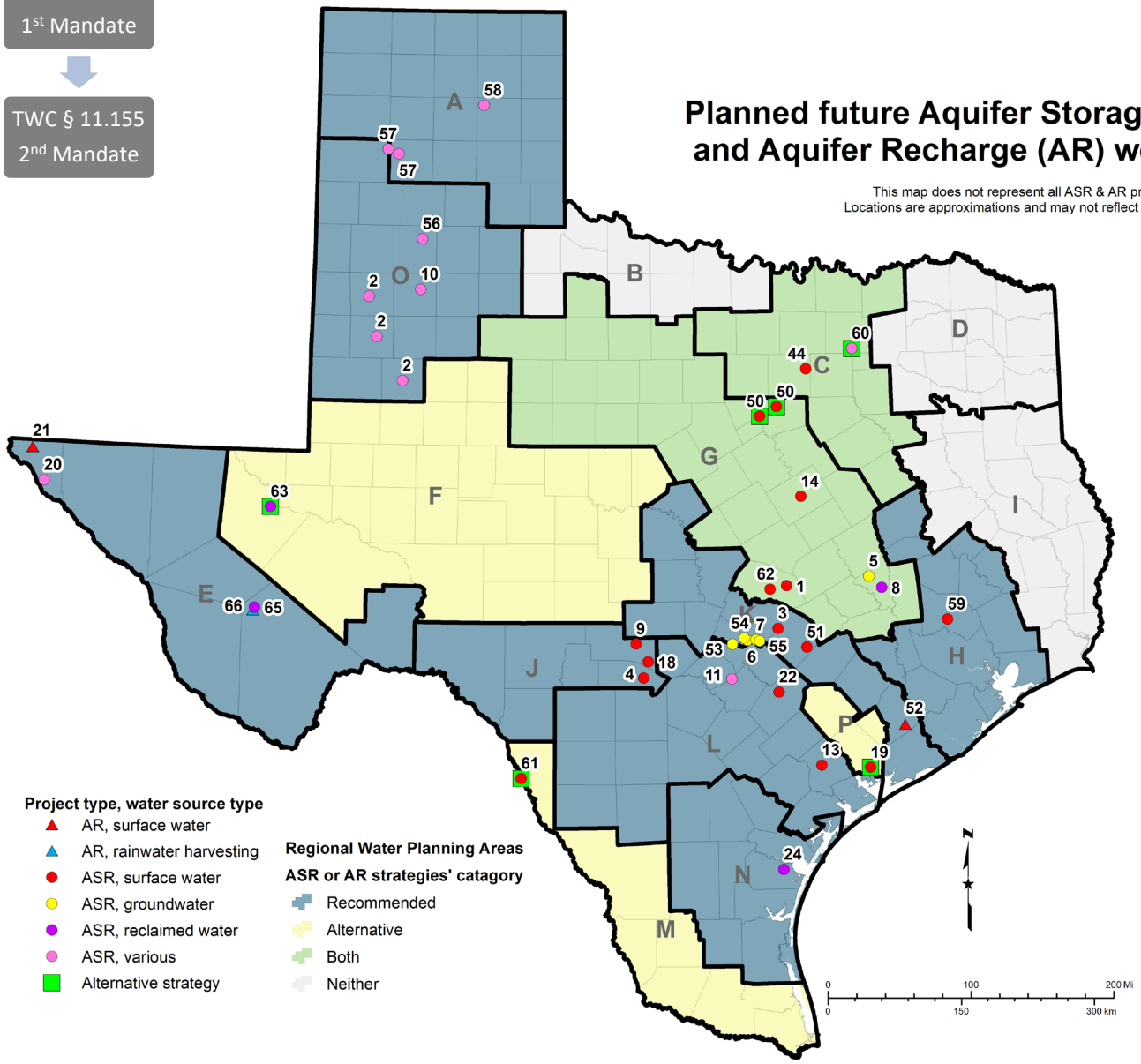
- ASR uses the same well to inject and retrieve



- Other forms of managed aquifer recharge (AR) might use infiltration basins



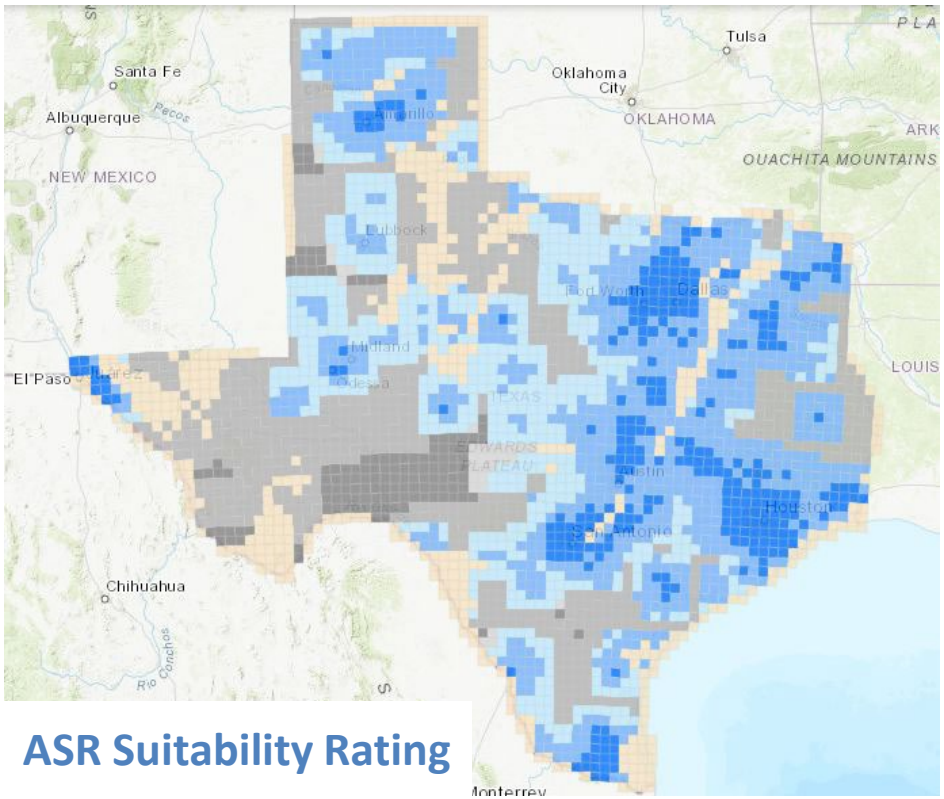
Potential Future ASR/AR Projects in Texas



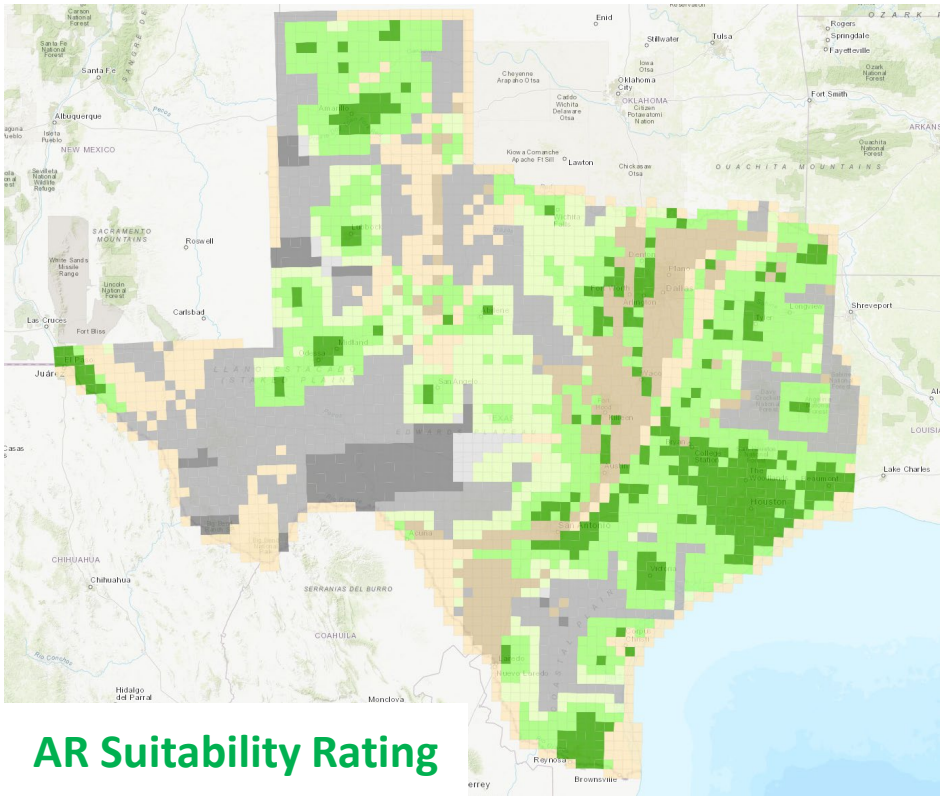
Map label	2022 SWP Project ID	Map name
1	1854	Brazos River Authority - Lake Granger
2	3906	Canadian River MWA
3	2135	City of Austin
4	2430	City of Bandera
5	1853	City of Bryan
6	2238	BS/EACD middle Trinity aquifer, City of Buda
7	2241	BS/EACD, saline Edwards aquifer
8	1847	City of College Station
9	2389	City of Kerrville, expansion
10	2165	City of Lubbock
11	2437	City of New Braunfels
13	2396	City of Victoria
14	1851	McLennan County (City of Waco)
18	4315	Eastern Kerr County Regional Water Supply Project
19	1667	Lavaca Navidad River Authority (alternative)
20	2140	Lower Valley Water District
21	2003	EPWU Hueco Bolson Artificial Recharge
22	2108	Guadalupe-Blanco River Authority (Mid-basin)
24	4251	Corpus Christi ASR
44	3841	Tarrant Regional Water District
50	1844	Johnson County SUD and Acton MUD (alternative)
51	2158	LCRA ASR Carrizo-Wilcox
52	2167	LCRA Enhanced Recharge
53	4269	BS/EACD middle Trinity aquifer, Hays County Other
54	4270	BS/EACD middle Trinity aquifer, Hays
55	4272	BS/EACD middle Trinity aquifer, Creedmoor-Maha WSC
56	4130	City of Plainview
57	3875	City of Amarillo
58	3905	City of Pampa
59	3679	San Jacinto River Authority
60	3844	North Texas MWD ASR (alternative)
61	4116	Eagle Pass (alternative)
62	4264	Brazos River Authority - Lake Georgetown
63	4352	City of Pecos (alternative)
65	4109	City of Alpine, wastewater treatment facility
66	4027	City of Alpine, rainwater harvesting

ASR legislative 1st mandate

- Texas Water Code § 11.155 ASR mandate:
  - Statewide survey of aquifer suitability for ASR or AR projects in Texas



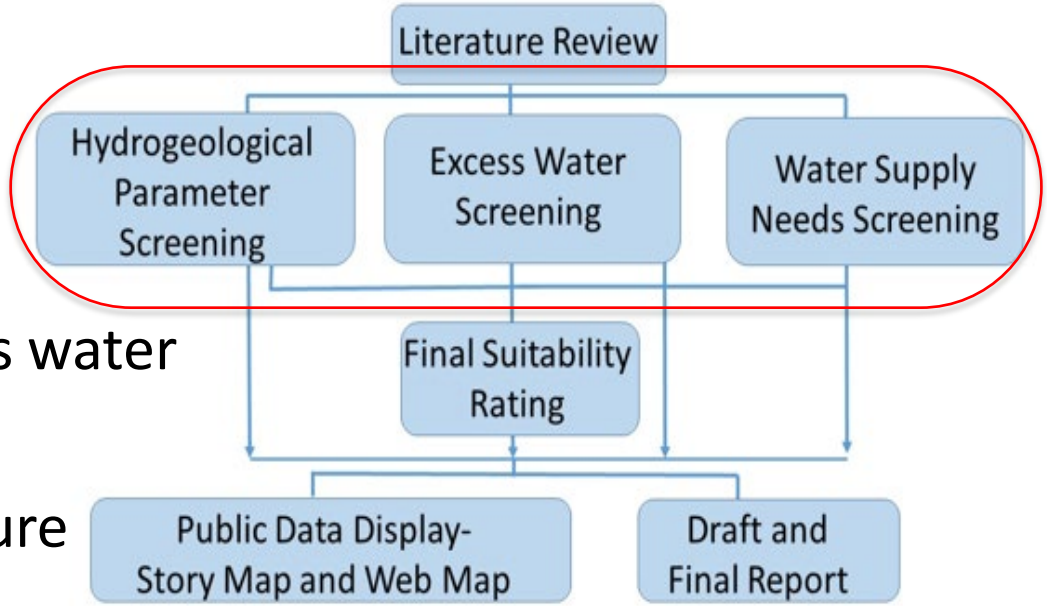
ASR Suitability Rating



AR Suitability Rating

Intro to the Survey

- TWDB contracted with HDR
- Must include:
  - hydrogeological characteristics,
  - availability of excess water sources, and
  - the current and future water supply needs



- Resulted in final suitability ratings
- Completed and published December 2020

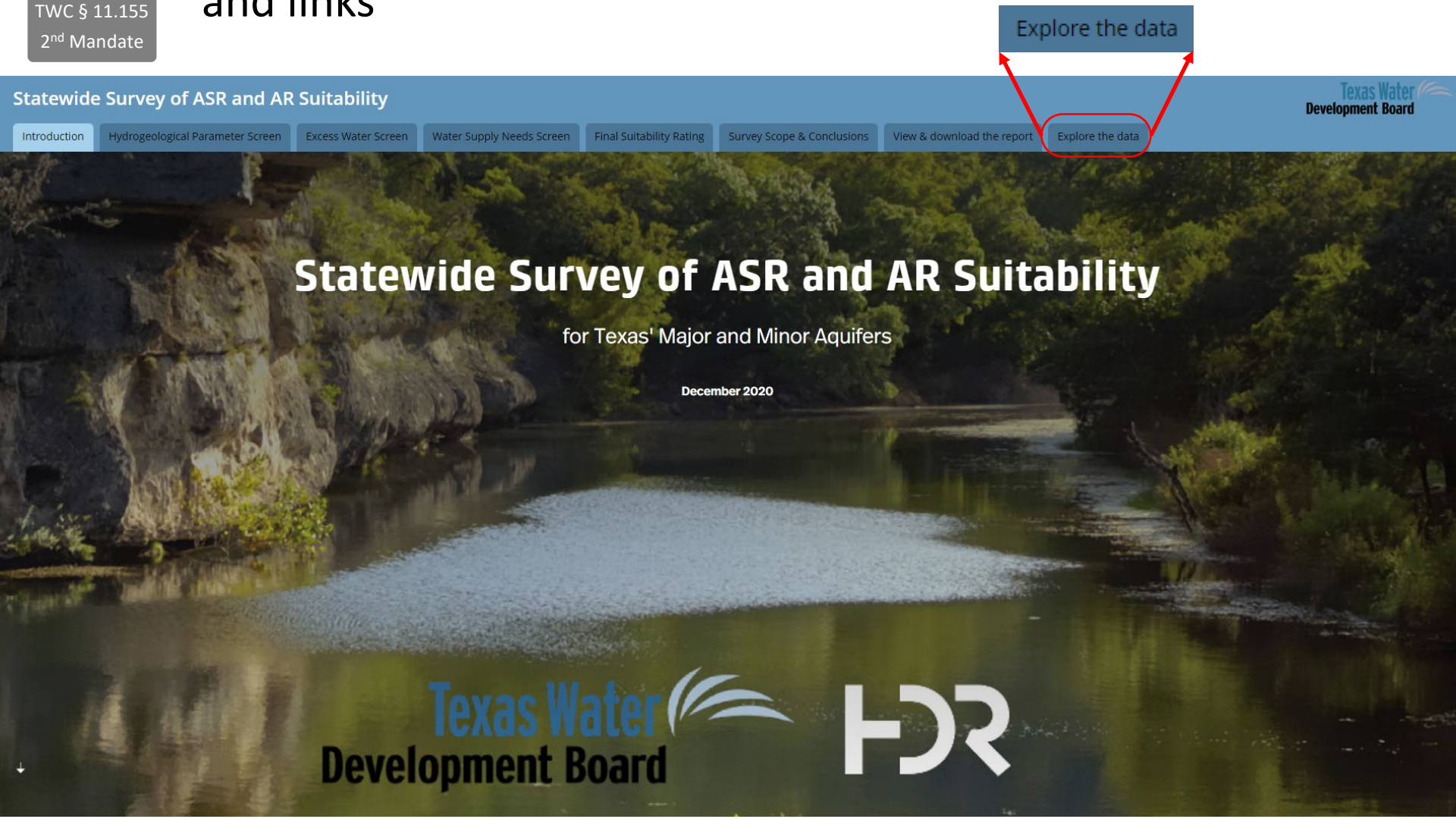
Introduction

TWC § 11.155 1st Mandate

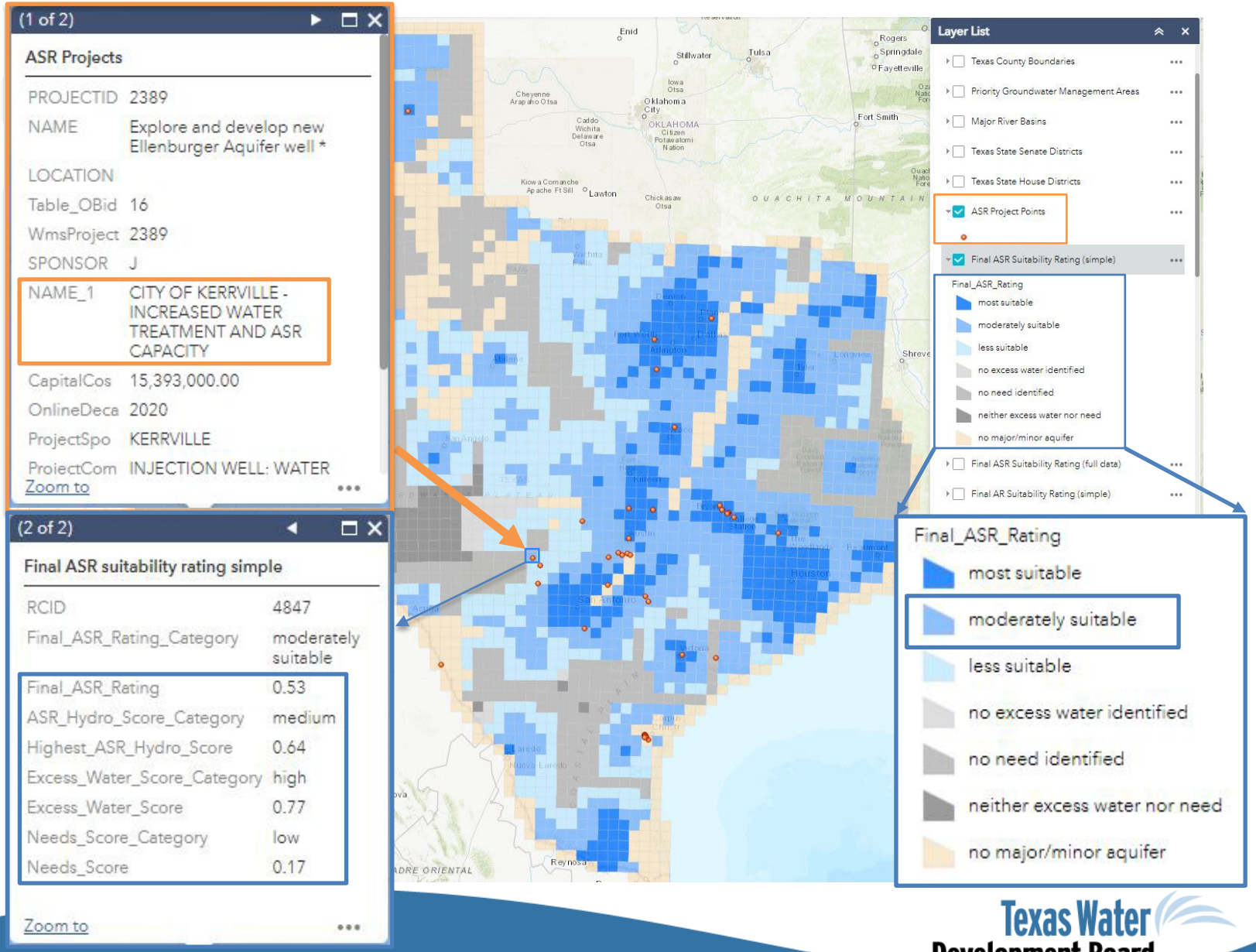
TWC § 11.155 2nd Mandate

Public Data Display

- Tabs with more information on each screening, conclusions, and links

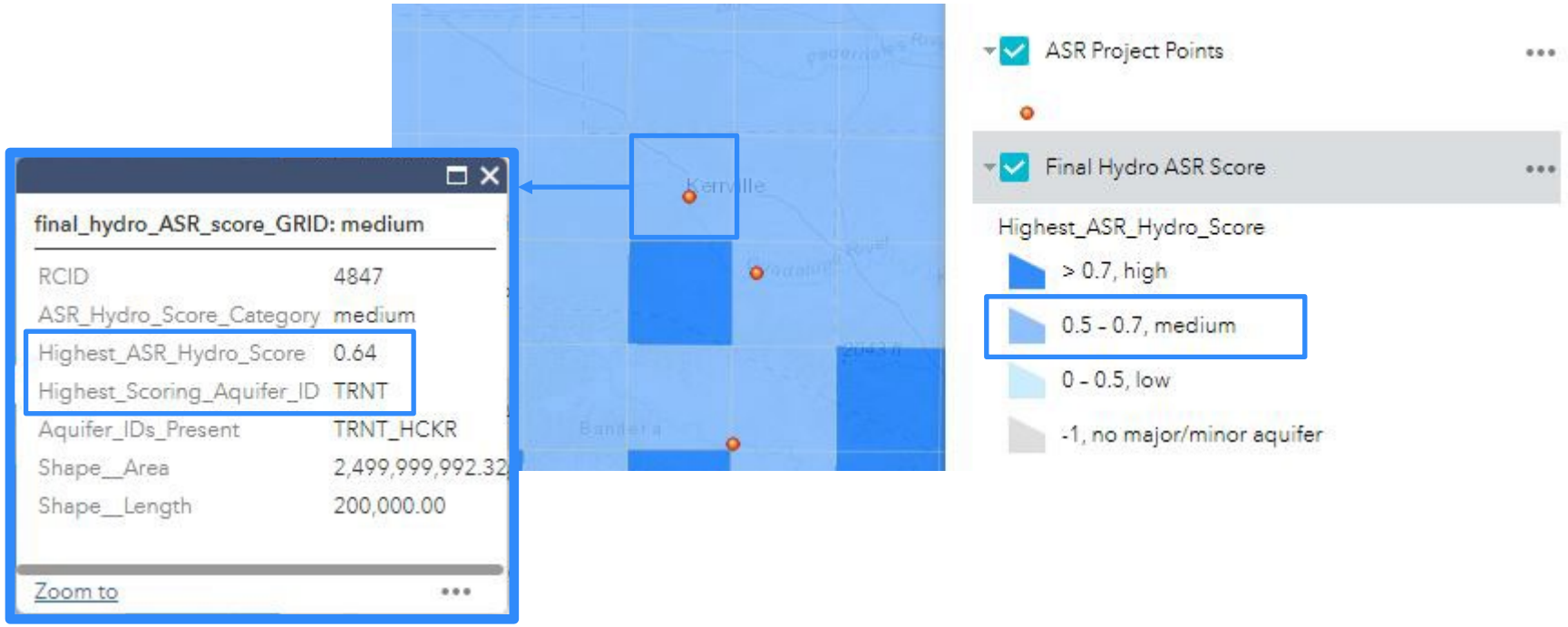


Survey Results



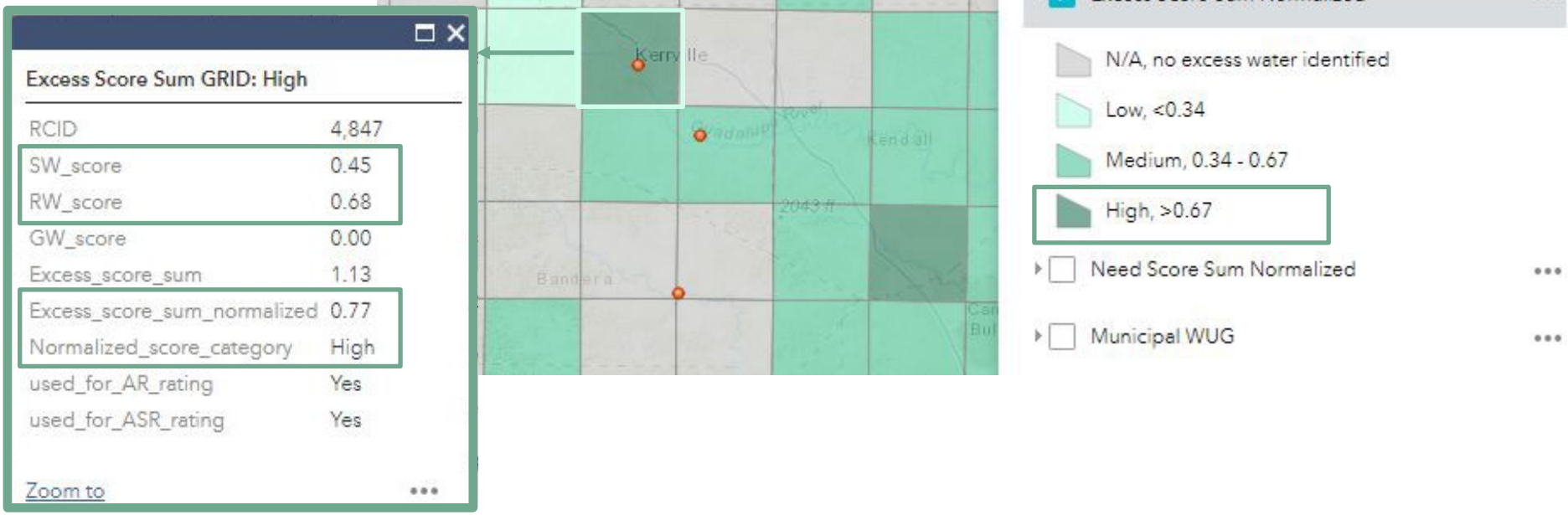
City of Kerrville Increased Water Treatment and ASR Capacity

Hydrogeological Score



City of Kerrville Increased Water Treatment and ASR Capacity

Excess Water Score



Introduction

TWC § 11.155 1st Mandate

TWC § 11.155 2nd Mandate

City of Kerrville Increased Water Treatment and ASR Capacity

Water Needs Score

Needs Grid - Normalized Needs Score Sum: No

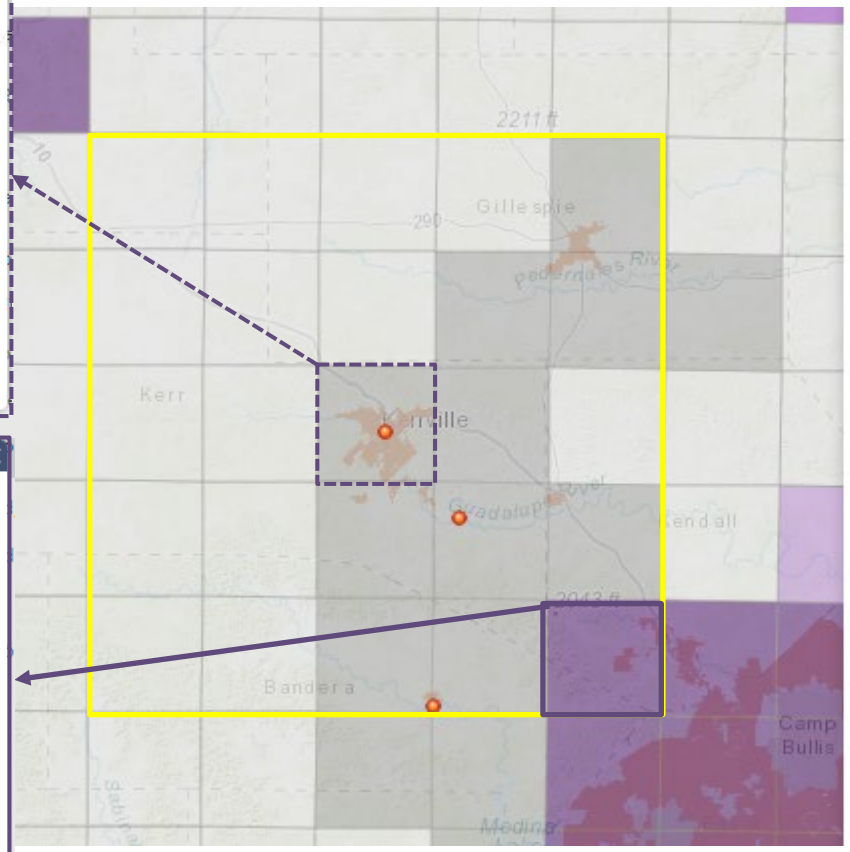
RCID	4,847
Manu_Score	
Max_Muni_Score	0.00
SE_score	
Need_sum	0.00
Need_Sum_Normalized	0.00
used_for_AR_rating	No
used_for_ASR_rating	No
Need_Score_Category	WUG, no need

Zoom to ...

Needs Grid - Normalized Needs Score Sum: Yes

RCID	5,049
Manu_Score	
Max_Muni_Score	0.75
SE_score	
Need_sum	0.75
Need_Sum_Normalized	0.68
used_for_AR_rating	Yes
used_for_ASR_rating	Yes
Need_Score_Category	High

Zoom to ...



- Need scores used for ASR final suitability rating
- Need scores used for AR final suitability rating
- ASR Project Points
- Need Score Sum Normalized
  - no WUG identified, -1
  - WUG, but no need identified, 0
  - Low, <0.34
  - Medium, 0.34 - 0.67
  - High, >0.67
- Municipal WUG

Survey Benefits and Uses

- Free and public
- Data accessibility
- Data versatility
- Dovetails with the water planning process
- Start conversations
- Explore the data
- Identify areas that could warrant a feasibility analysis
- Arrive at your own conclusions

Access data:

Project web page:

Story map:

ASR legislative 2nd mandate

- Texas Water Code § 11.155 ASR mandate:
  - Conduct studies - work with appropriate interested persons to conduct studies of ASR and AR projects and report the results to the regional water planning groups and interested persons

ASR Studies: Prioritization Criteria and Info

(Based on most current available information)

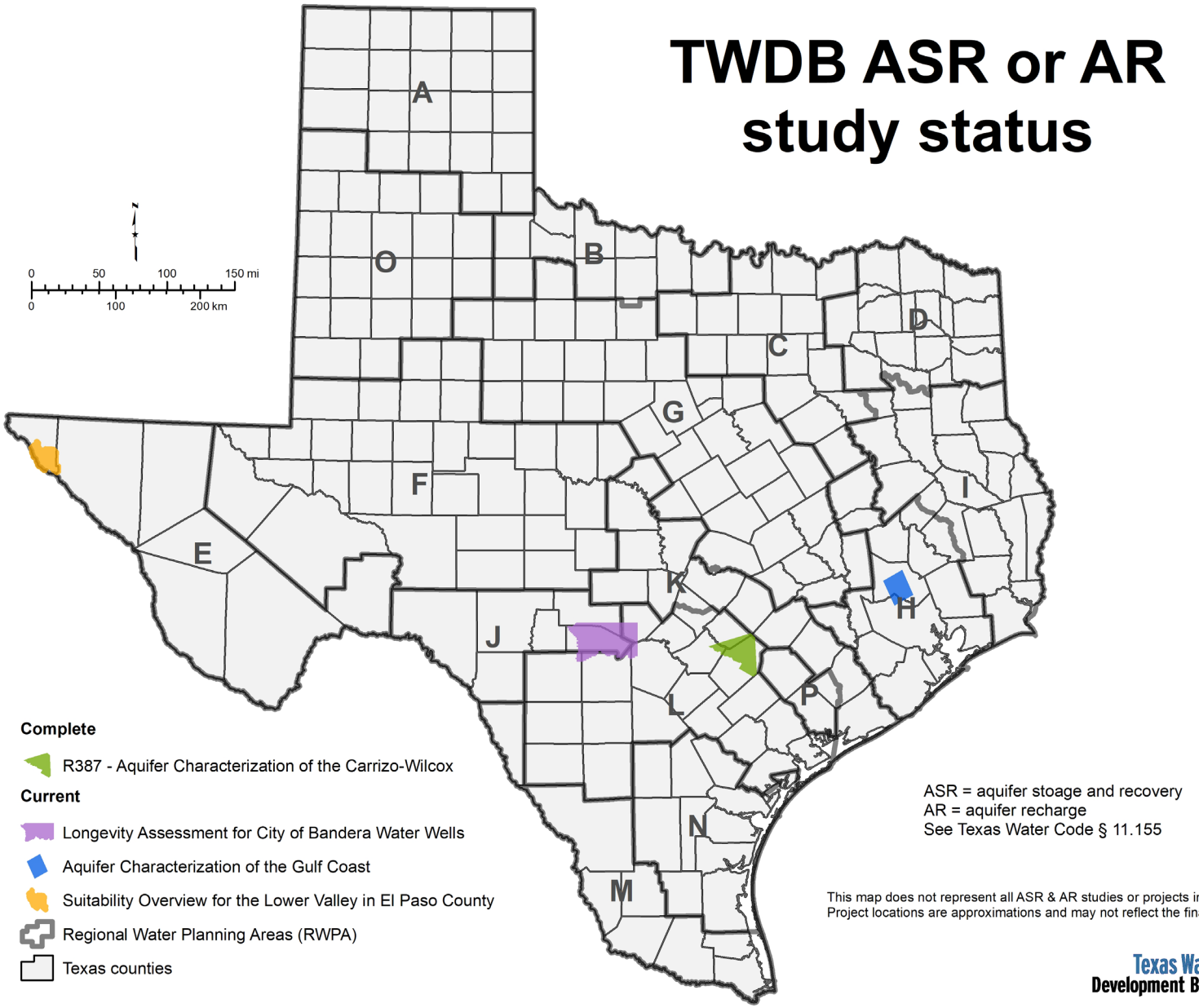
Criteria

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

Completed and current studies



Completed Study

Guadalupe-Blanco River Authority (GBRA) Mid-basin Water Supply Project

- Plans to inject treated surface water from the Guadalupe River into the Carrizo-Wilcox Aquifer when availability from the river exceeds customer demand and there is available capacity at the new water treatment facility.

Sponsor interested	Planning status	Data availability	Staff skillset	Online decade
Yes	Desktop Study	High	Match	2035

Introduction

TWC § 11.155 1st Mandate

TWC § 11.155 2nd Mandate

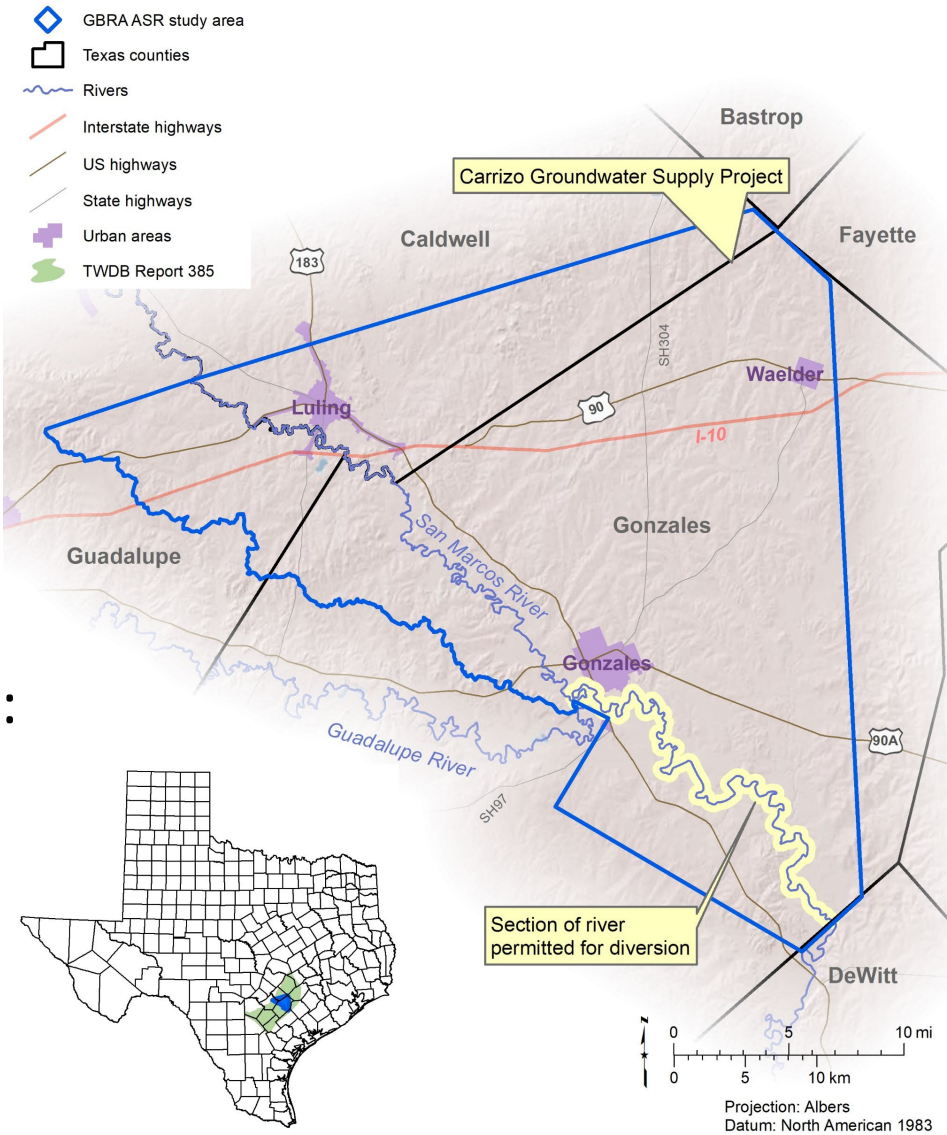
ASR study: aquifer characterization

Published

The GBRA needed to better understand the storage parameters and options of the aquifers in the vicinity of its Mid-Basin Water Supply Project

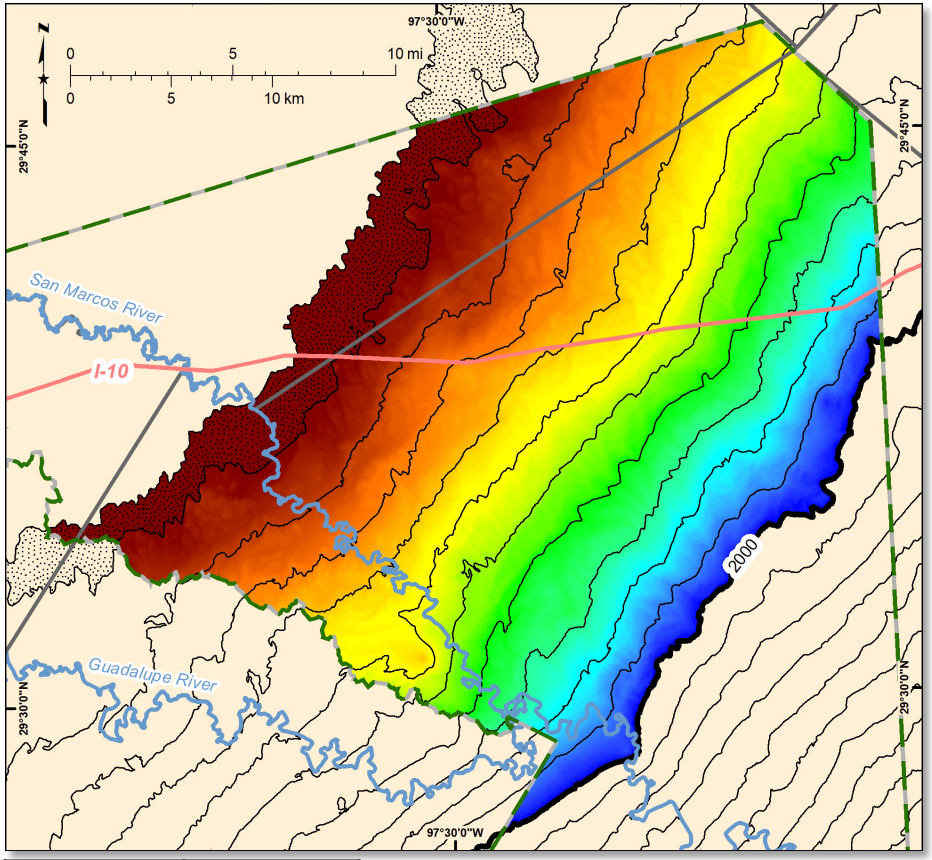
IWT studied the hydrogeological characteristics of the aquifer system:

- Stratigraphy
- Lithology
- Groundwater salinity

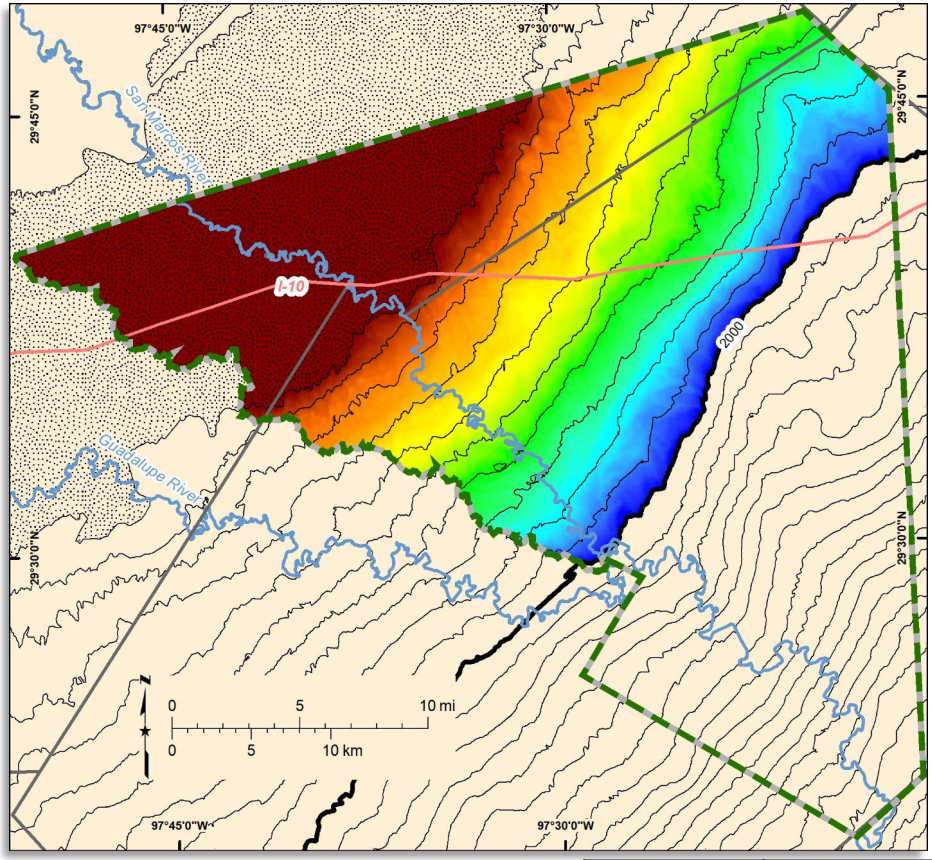


Results: stratigraphy

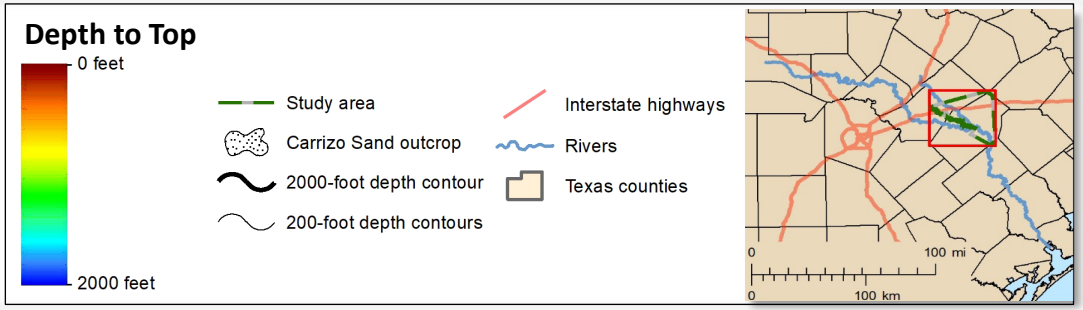
Carrizo Sand



Wilcox Group



Reklaw	Clay, youngest
Carrizo	Aquifer
Wilcox	Aquifer
Midway	Clay, oldest



Reklaw	Clay, youngest
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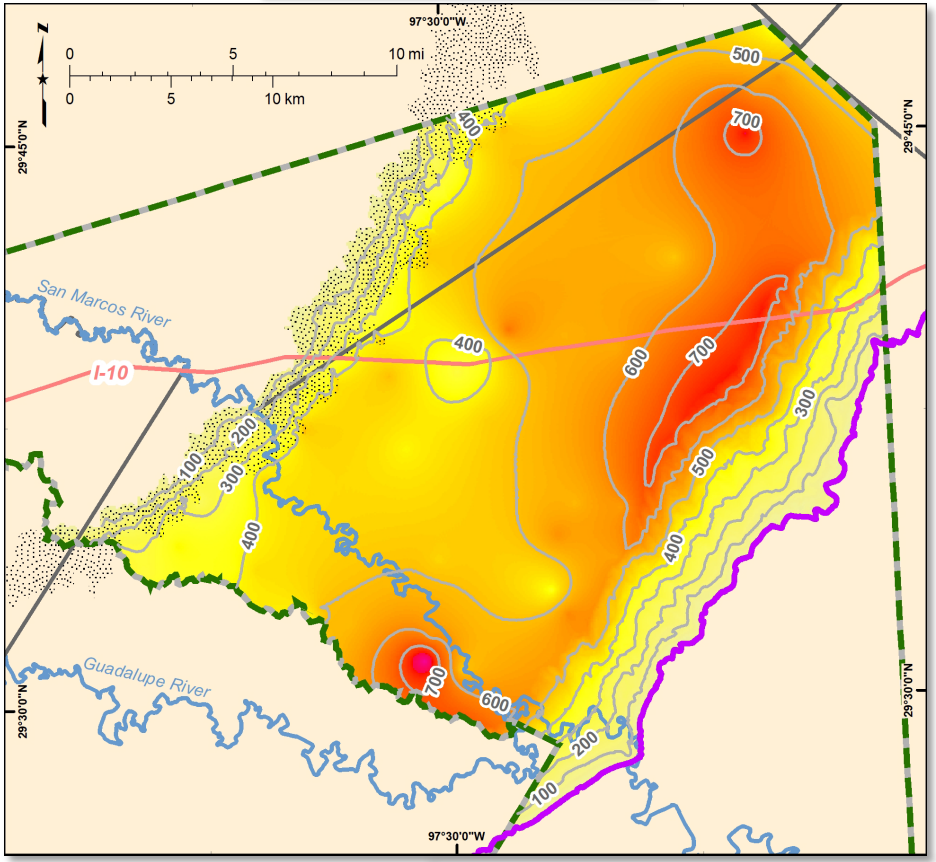
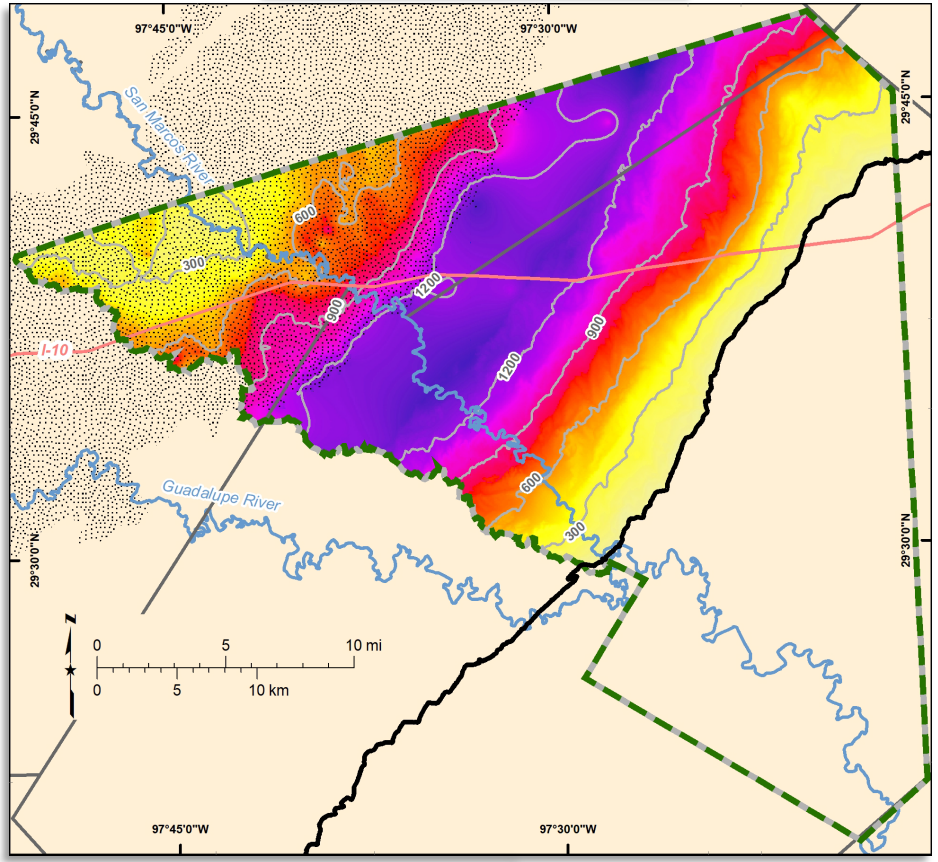
Results: thickness

Carrizo Sand



Wilcox Group



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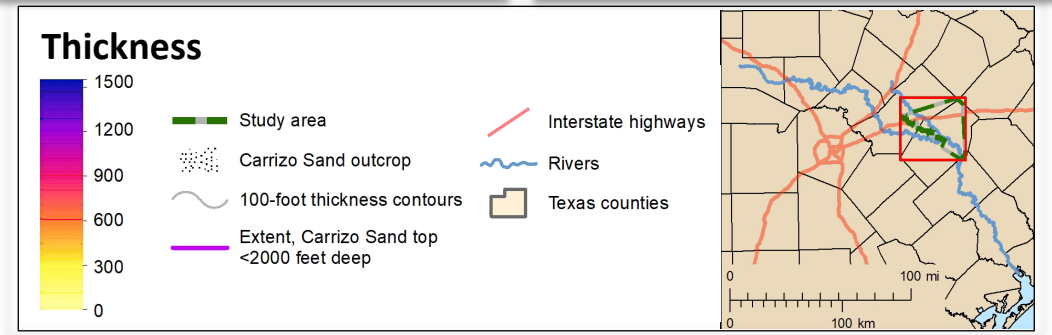

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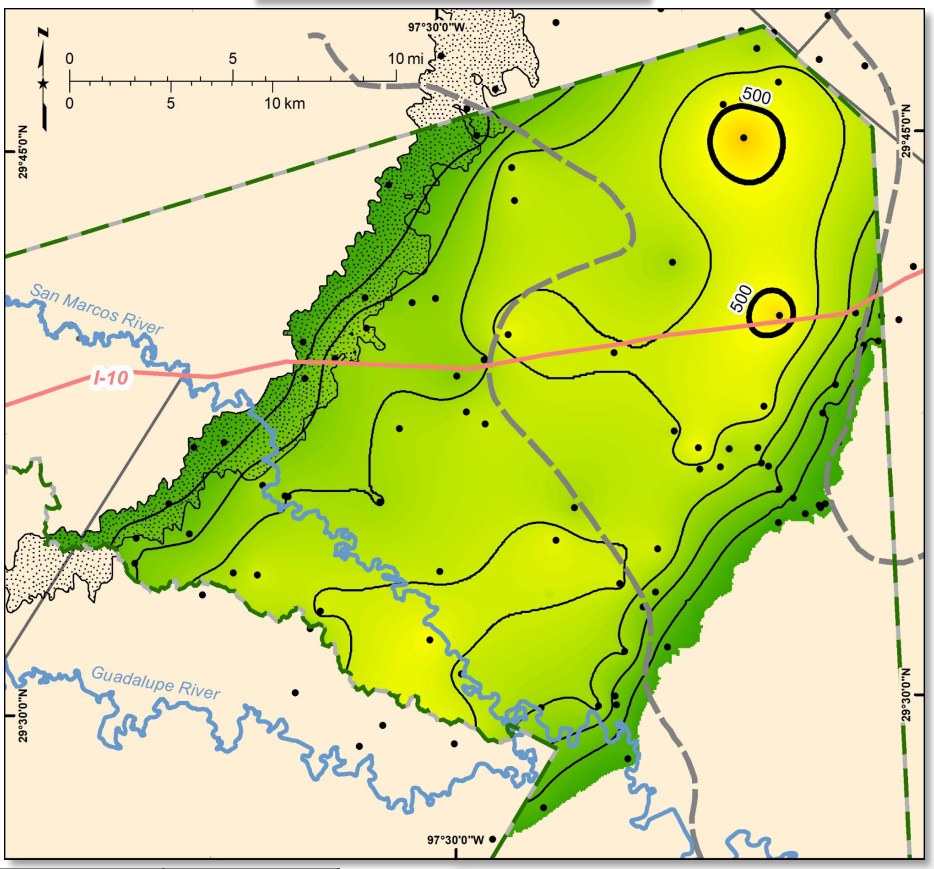
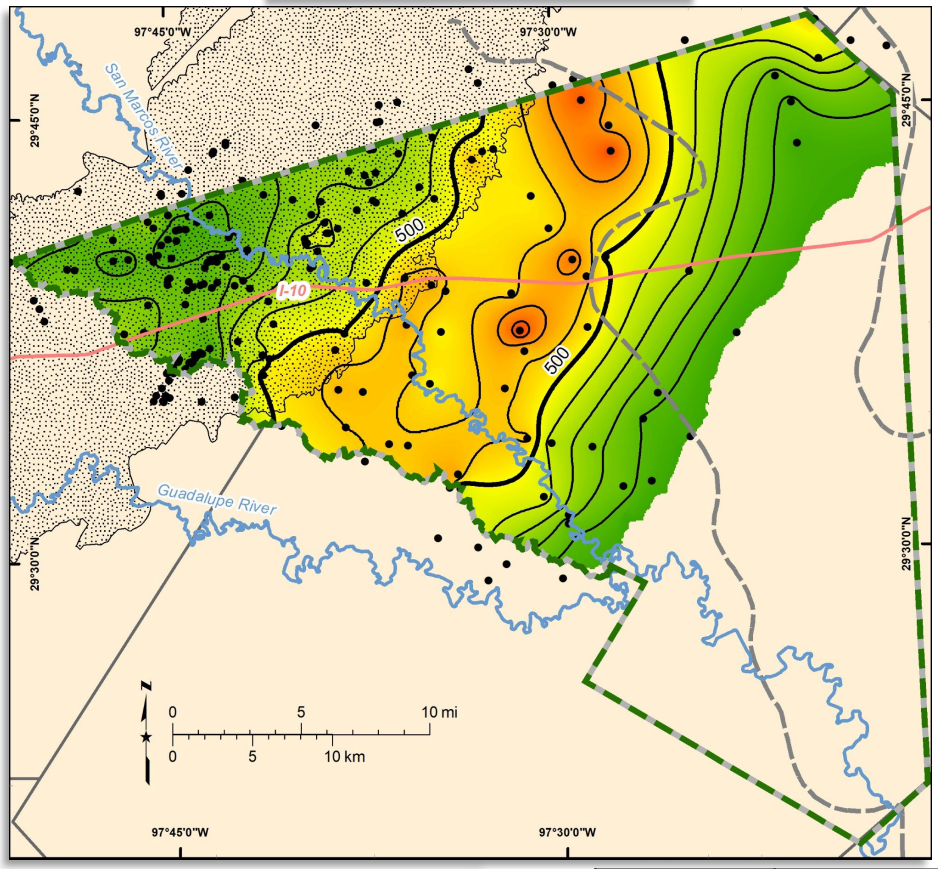
Midway	Clay, oldest

Results: lithology

Carrizo Sand



Wilcox Group



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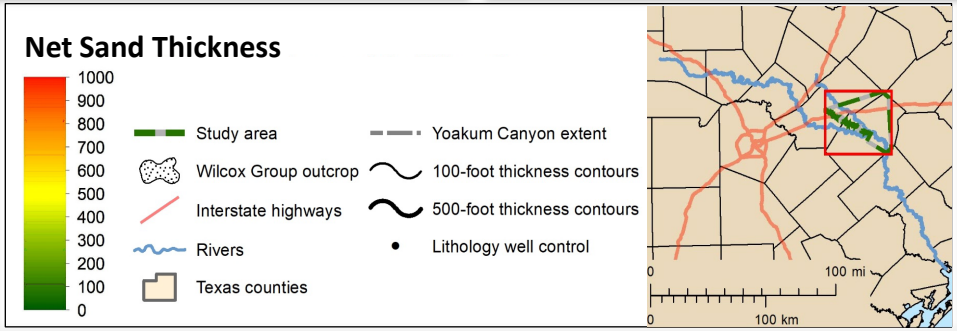
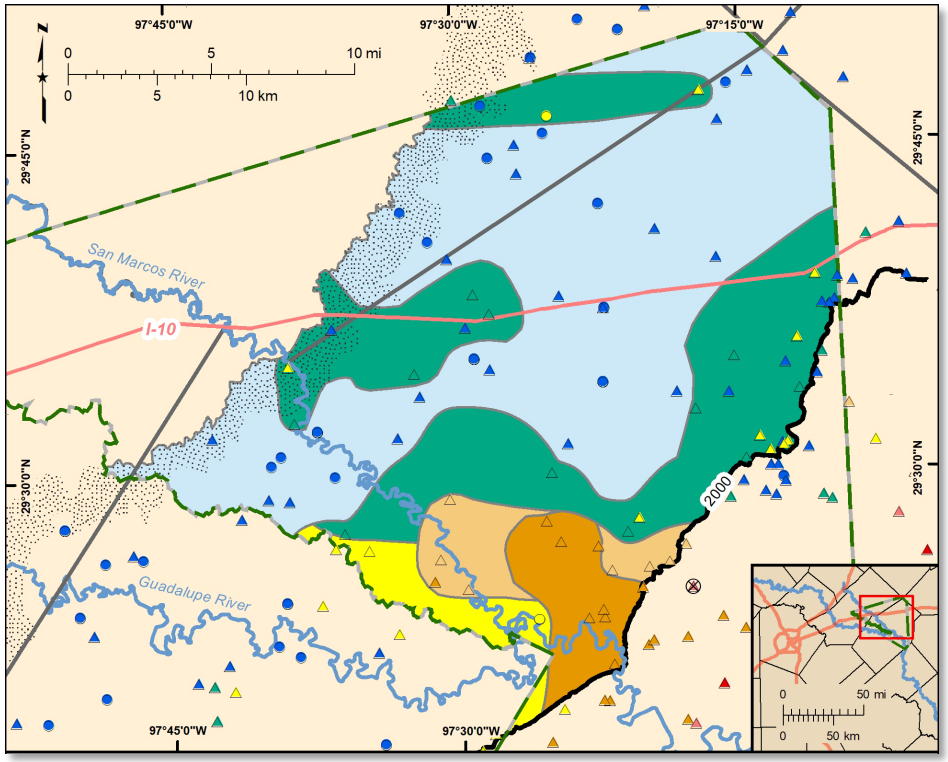


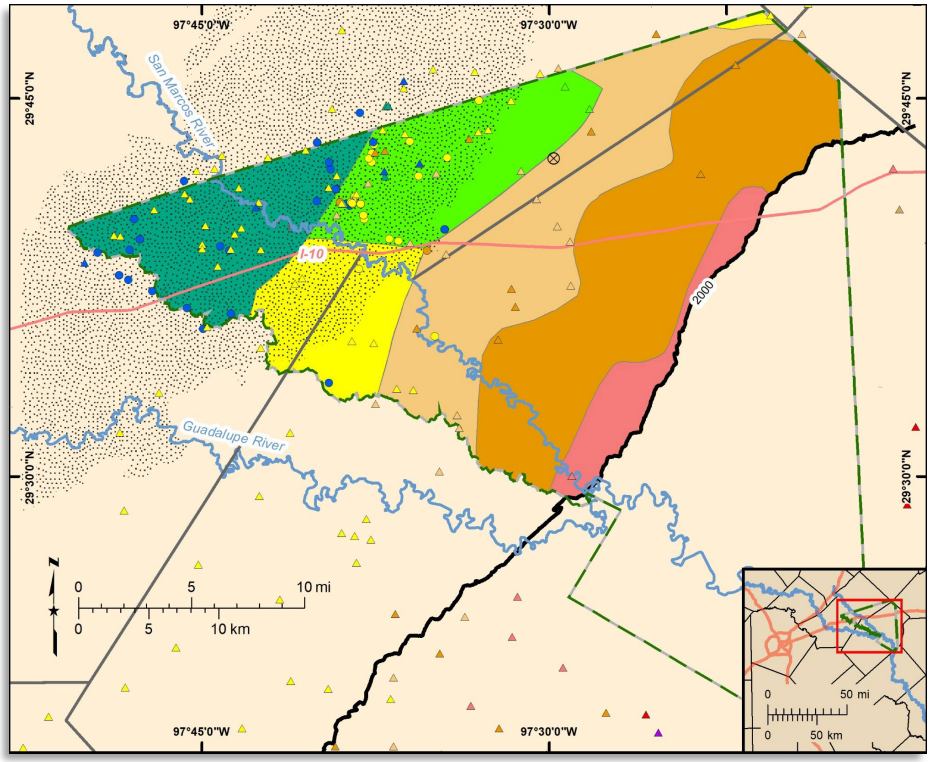
Reklaw	Clay, youngest
Carrizo	Aquifer
Wilcox	Aquifer
Midway	Clay, oldest

Results: groundwater salinity

Carrizo Sand



Wilcox Group



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Salinity class	Calculated TDS	Measured TDS
Fresh	Fresh	Fresh
Fresh and slightly saline	Fresh and slightly saline	Slightly saline
Slightly saline	Slightly saline	Moderately saline
Slightly and moderately saline	Slightly and moderately saline	Very saline
Moderately saline	Moderately saline	Brine
Moderately and very saline	Moderately and very saline	Study area
Rivers	Very saline	Wilcox Group outcrop
Interstate highways	Ignored	2000-ft depth contour
Texas counties		

Reklaw	Clay, youngest
Carrizo	Aquifer
Wilcox	Aquifer
Midway	Clay, oldest

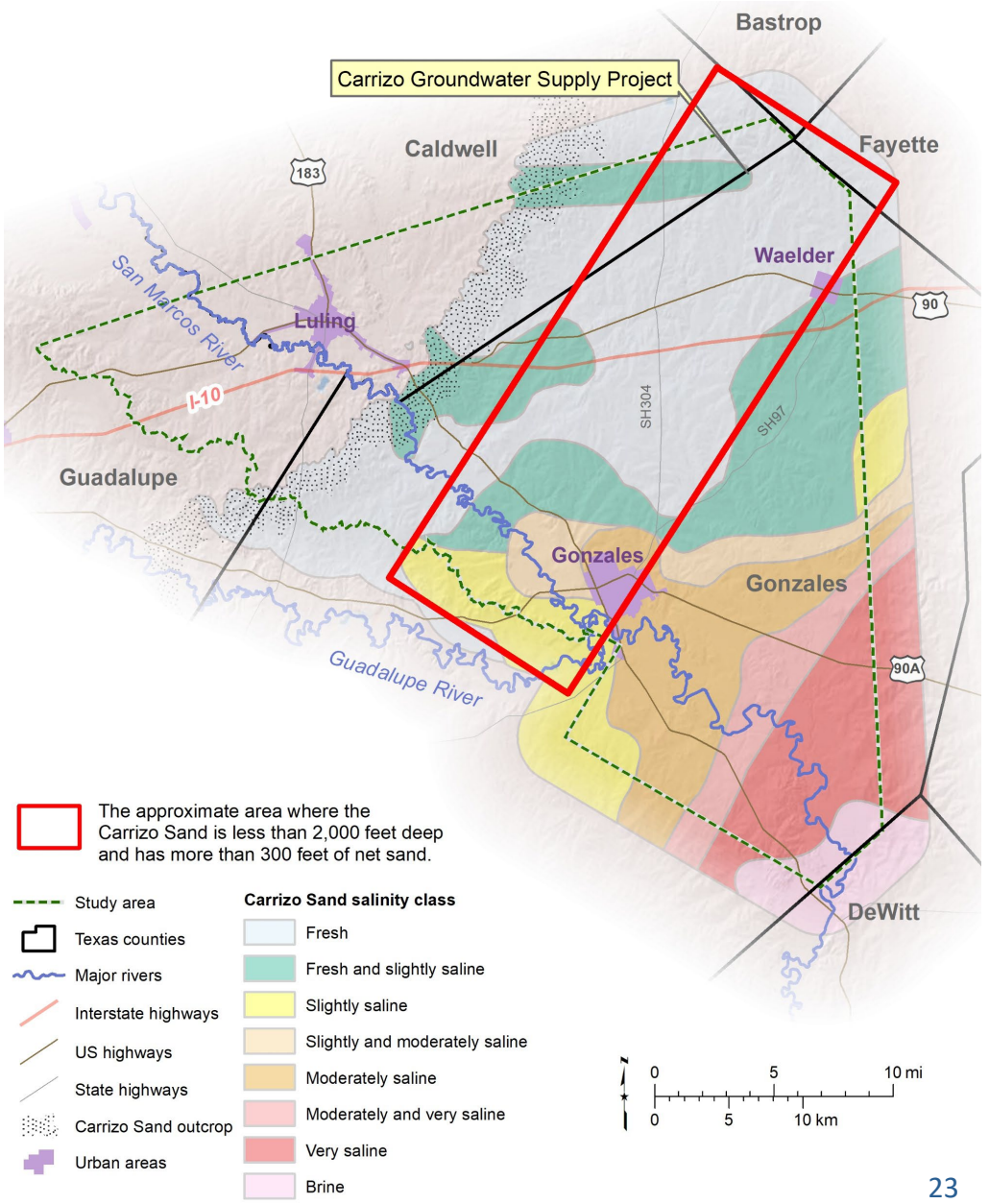
Introduction

TWC § 11.155 1st Mandate

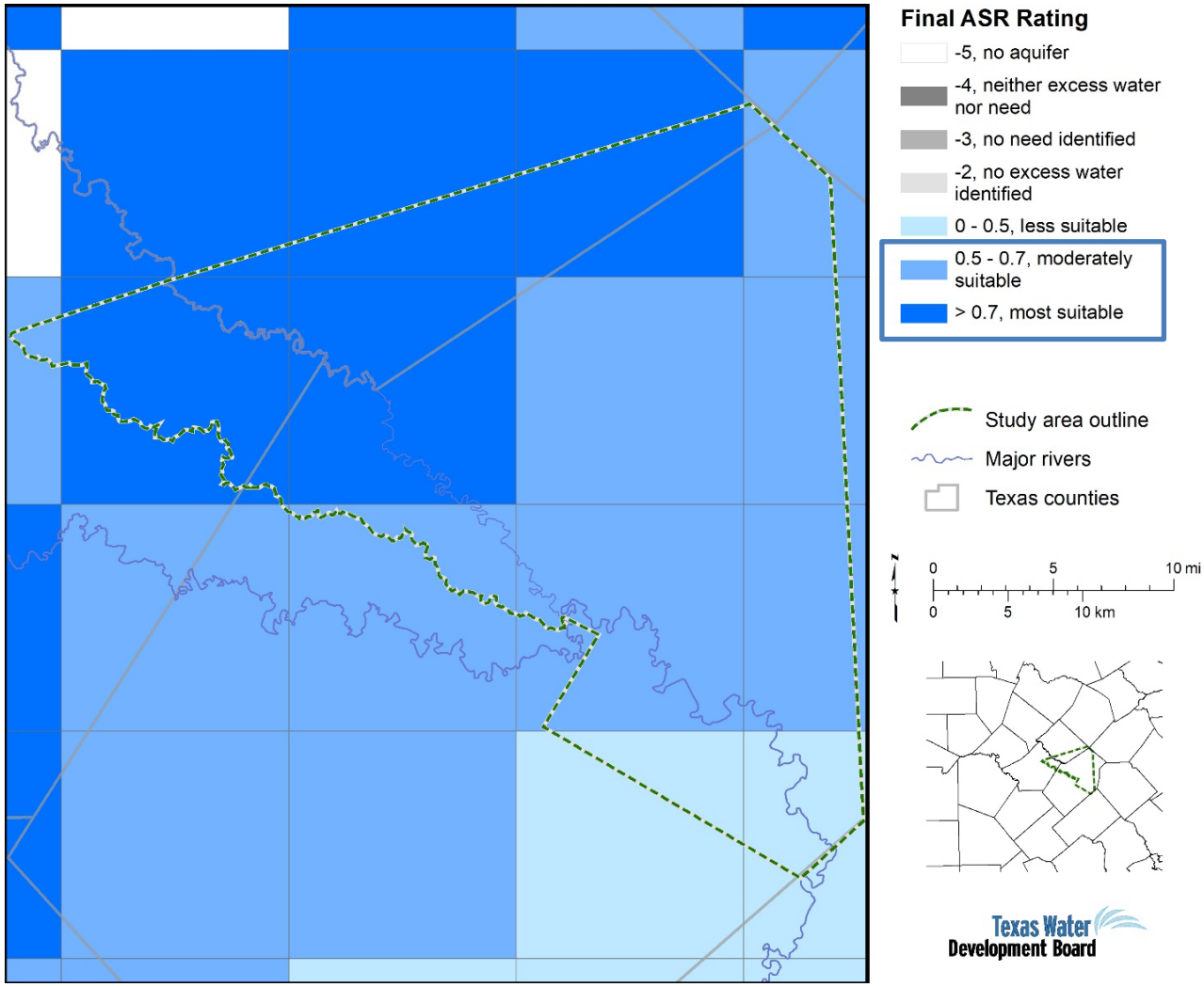
TWC § 11.155 2nd Mandate

Site selection and well construction

- The aquifer characterization 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 contactor for final site selection, well construction and design



Statewide Suitability Survey final rating for ASR



Introduction

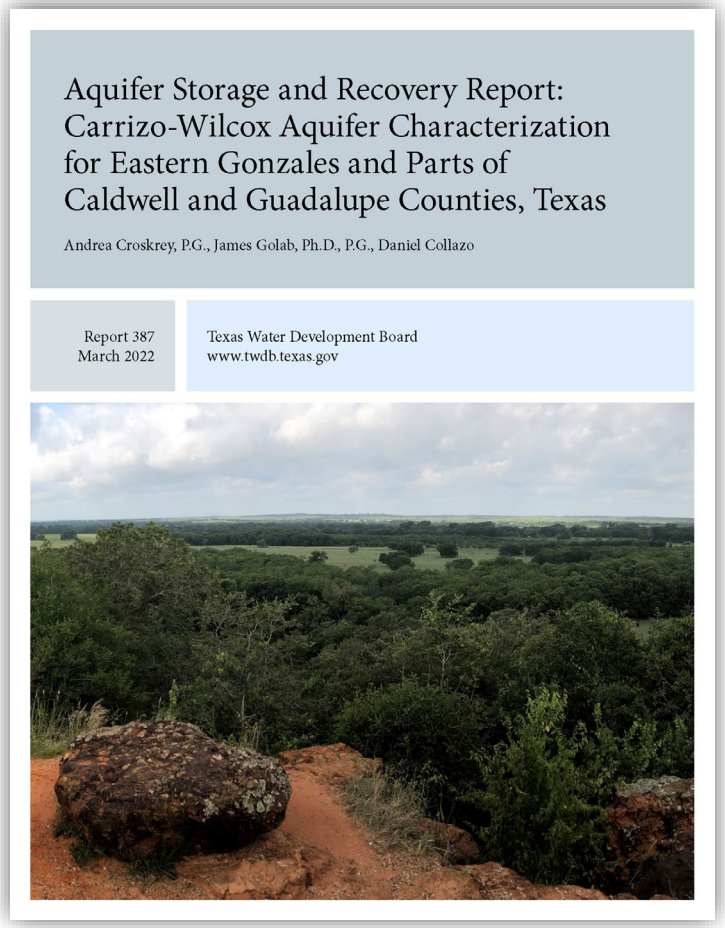
TWC § 11.155
1st Mandate

TWC § 11.155
2nd Mandate

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

Report 387

Published in March 2022



Current Studies

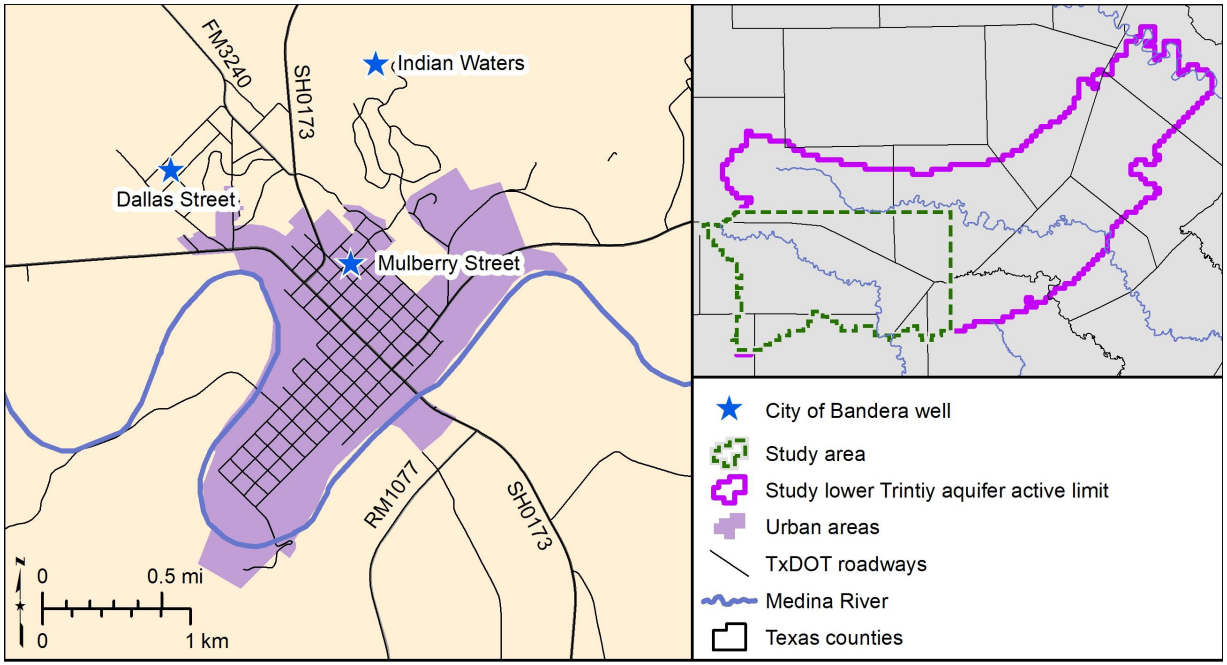
City of Bandera Surface Water Acquisition Treatment and ASR

- Plans to inject treated surface water from the Medina River into the lower Trinity aquifer to be recovered when water supply demand is high using existing water supply wells

Sponsor interested	Planning status	Data availability	Staff skillset	Online decade
Yes	Desktop Study	High	Match	2040

ASR Report: Longevity Assessment for the City of Bandera Water Wells *(in review)*

- The City of Bandera wanted 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

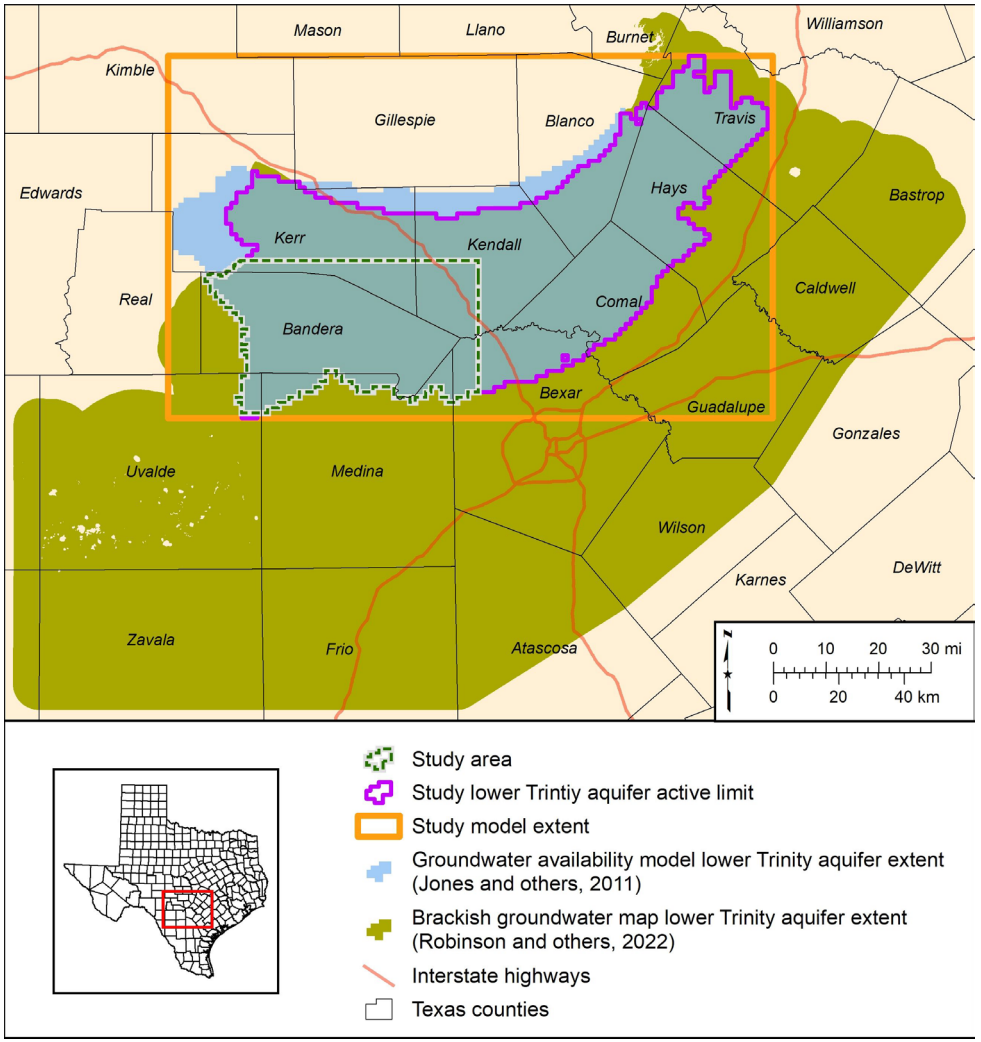


- IWT created a model to assess the longevity of the City of Bandera's lower Trinity aquifer wells.

Bandera Well Longevity Model

The model is based on:

- the Hill County Groundwater Availability Model (GAM), and
- the surfaces generated by the Hill Country Trinity Brackish Resources Aquifer Characterization System (BRACS) study



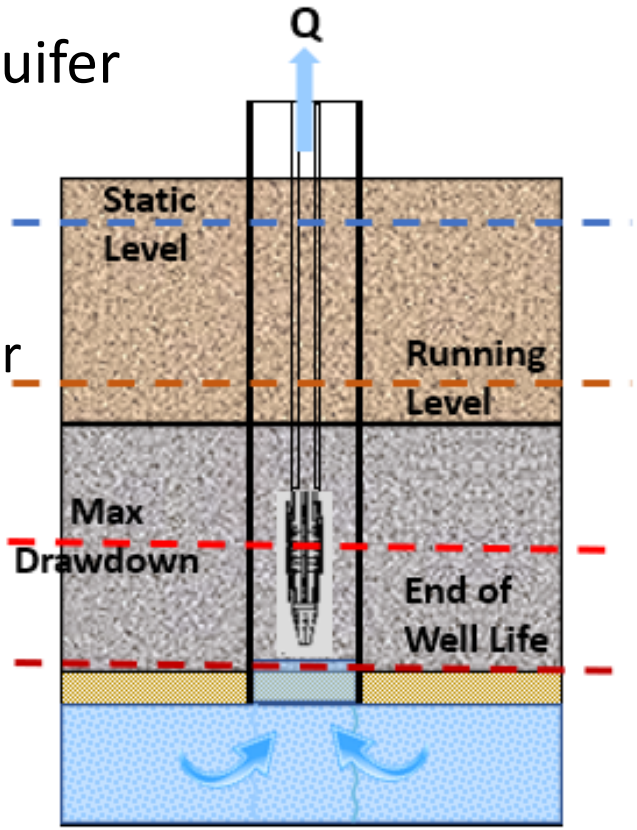
Bandera Well Longevity Model

The model was used to forecast future conditions based on three scenarios:

No Change Scenario	Projected Use Scenario	Max Supply Use Scenario
Pumping will remain static	Pumping will increase to match the projected demands in the 2022 State Water Plan	Pumping will increase to produce the all groundwater listed as available to the City of Bandera in the 2022 State Water Plan

Preliminary Results

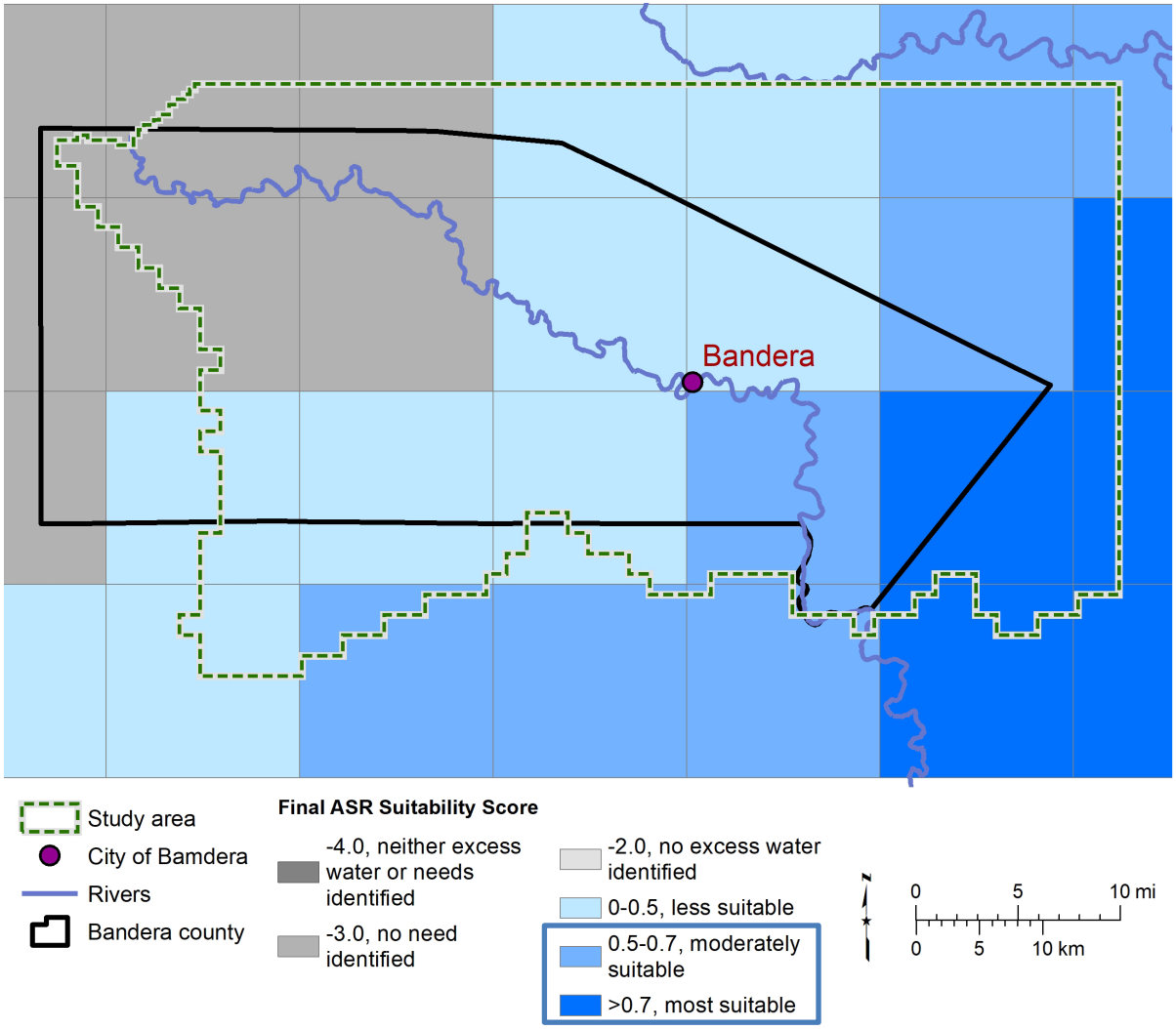
- The City of Bandera's lower Trinity aquifer wells:
  - are reaching max drawdown with the current well configuration
  - will be no longer usable once the water levels reach the bottom of the casing



- Worst case scenario for the City of Bandera (max supply use):
  - consume existing groundwater supply (SWP 2022)
  - drawdown would exceed current pump depth

- The City of Bandera should consider ASR as a possible mitigation option

Statewide Suitability Survey final rating for ASR



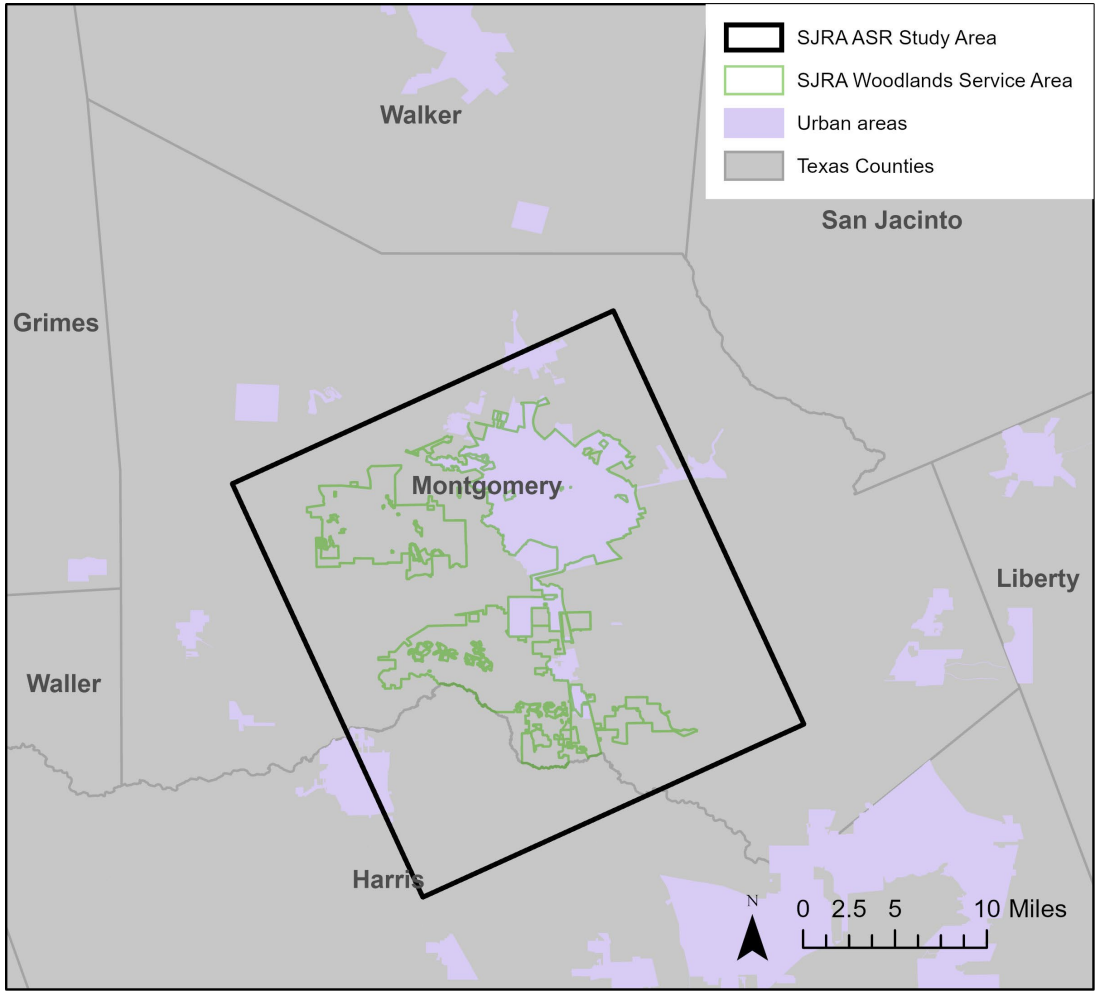
ASR study: aquifer characterization

Data collection and QA/QC

San Jacinto River Authority (SJRA) ASR project: Plans to inject surface water into the Gulf Coast aquifer

Goal: Fill some data gaps identified in SJRA's Raw Water Supply Master Plan including local aquifer characteristics and aquifer storage potential

Description: Aquifer characterization of the Gulf Coast Aquifer with a focus on the Evangeline and upper Jasper formations



Introduction

TWC § 11.155 1st Mandate

TWC § 11.155 2nd Mandate

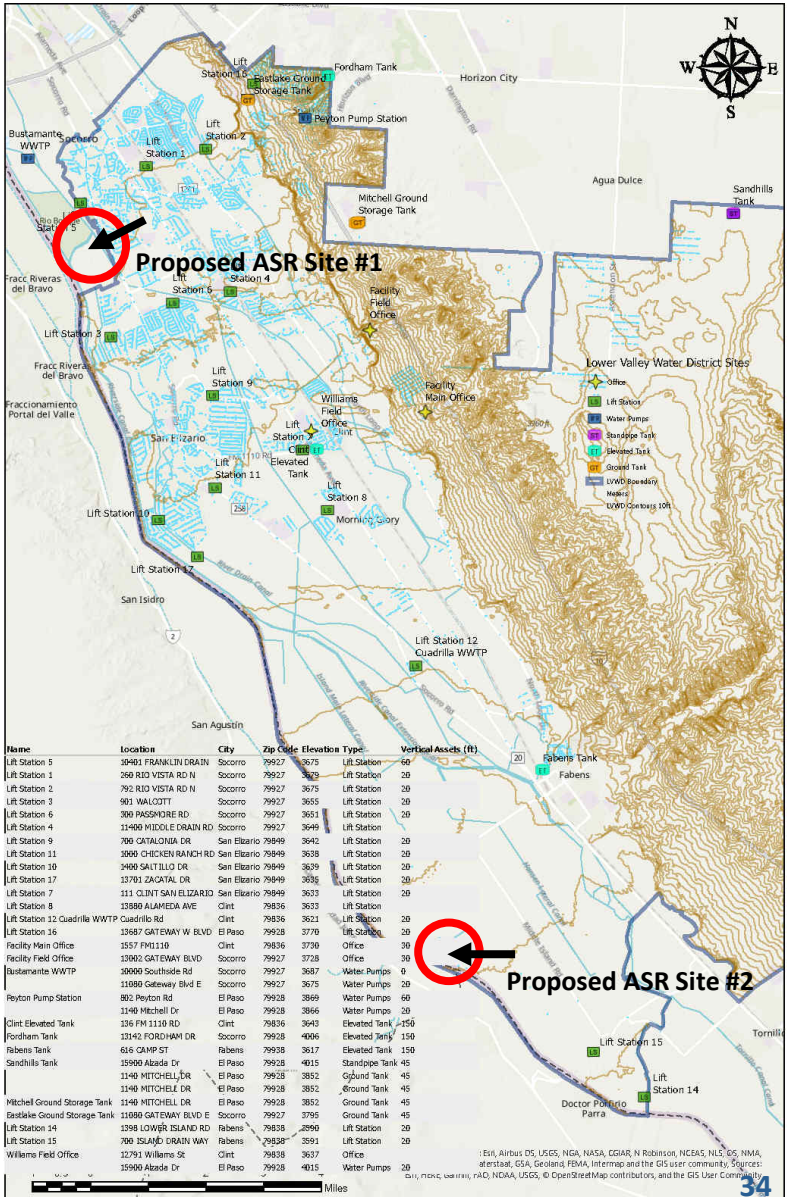
ASR study: high-level suitability analysis

Data collection and QA/QC

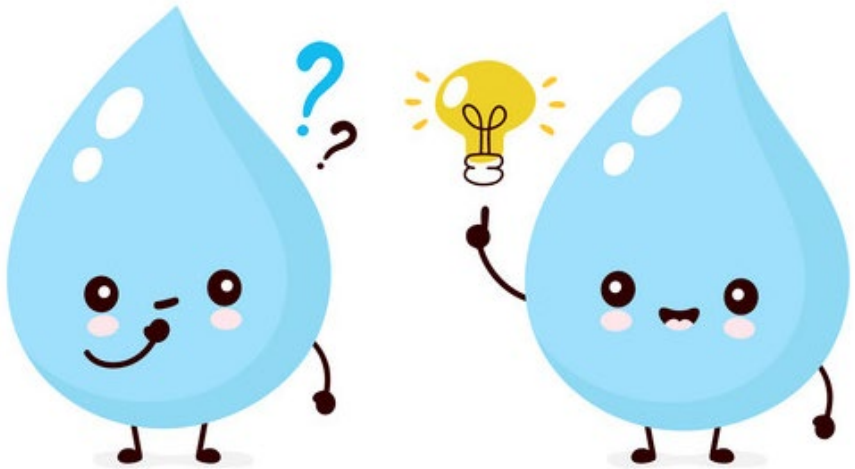
Lower Valley Water District ASR project:
Plans to inject surface water from the Rio Grande River and/or reclaimed water into the Hueco-Bolson aquifer.

Goal: Provide a refined suitability analysis for ASR and determine what additional data needs to be collected

Description: Report will include an analysis of the hydrogeological characteristics of the Hueco Formation and an excess water and needs analysis from the statewide survey and data from the LVWD.



Name	Location	City	Zip Code	Elevation	Type	Vertical Assets (ft)
Lift Station 5	10401 FRANKLIN DRAIN	Socorro	79927	3675	Lift Station	60
Lift Station 1	260 RIO VISTA RD N	Socorro	79927	3679	Lift Station	20
Lift Station 2	792 RIO VISTA RD N	Socorro	79927	3675	Lift Station	20
Lift Station 3	901 WALCOTT	Socorro	79927	3655	Lift Station	20
Lift Station 6	700 PASSMORE RD	Socorro	79927	3651	Lift Station	20
Lift Station 4	11400 MIDDLE DRAIN RD	Socorro	79927	3649	Lift Station	
Lift Station 9	700 CATALONIA DR	San Elizario	79849	3642	Lift Station	20
Lift Station 11	1000 CHICKEN RANCH RD	San Elizario	79849	3638	Lift Station	20
Lift Station 10	3400 SALTILLO DR	San Elizario	79849	3639	Lift Station	20
Lift Station 17	13701 ZACATAL DR	San Elizario	79849	3635	Lift Station	20
Lift Station 7	111 CLINT SAN ELIZARIO	San Elizario	79849	3633	Lift Station	20
Lift Station 8	13880 ALAMEDA AVE	Clint	79836	3633	Lift Station	
Lift Station 12 Quadrilla WWTP	Quadrilla Rd	Clint	79836	3621	Lift Station	20
Lift Station 16	13687 GATEWAY W BLVD	El Paso	79928	3770	Lift Station	20
Facility Main Office	1557 FM1110	Clint	79836	3730	Office	30
Facility Field Office	13002 GATEWAY BLVD	Socorro	79927	3728	Office	30
Bustamante WWTP	10000 Southside Rd	Socorro	79927	3687	Water Pumps	0
	11080 Gateway Blvd E	Socorro	79927	3675	Water Pumps	20
Peyton Pump Station	802 Peyton Rd	El Paso	79928	3869	Water Pumps	60
	1140 Mitchell Dr	El Paso	79928	3866	Water Pumps	20
Clint Elevated Tank	136 FM 1110 RD	Clint	79836	3643	Elevated Tank	150
Fordham Tank	13142 FORDHAM DR	Socorro	79928	4006	Elevated Tank	150
Fabens Tank	616 CAMP ST	Fabens	79938	3617	Elevated Tank	150
Sandhills Tank	15900 Alzada Dr	El Paso	79928	4015	Standpipe Tank	45
	1140 MITCHELL DR	El Paso	79928	3852	Ground Tank	45
	1140 MITCHELL DR	El Paso	79928	3852	Ground Tank	45
Mitchell Ground Storage Tank	1140 MITCHELL DR	El Paso	79928	3852	Ground Tank	45
Eastlake Ground Storage Tank	11080 GATEWAY BLVD E	Socorro	79927	3795	Ground Tank	45
Lift Station 14	1398 LOWER ISLAND RD	Fabens	79838	2990	Lift Station	20
Lift Station 15	700 ISLAND DRAIN WAY	Fabens	79838	3591	Lift Station	20
Williams Field Office	12791 Williams St	Clint	79838	3637	Office	
	15900 Alzada Dr	El Paso	79928	4015	Water Pumps	20



Let us know if you would like to know more!

Texas Water Development Board

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