

Brackish Groundwater Data Collection

Upper Coastal Plains: Sparta Aquifer, East Texas

February 8, 2021

GMA 11 meeting

Virtual

Presented by Sydney Weitkumat, PG

Brackish Resources Aquifer Characterization System (BRACS)

UCPE Team Members

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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.

Presentation Outline

Introduction to mapping brackish groundwater in the Upper Coastal Plain (East) Aquifers

- What is brackish groundwater?
- BRACS Study Process Overview
- Aquifer overview
- Data collected and data gaps
- Anticipated challenges
- Questions, comments, stakeholder input

Brackish Groundwater

BRACKISH

PWS >
 BUQ >
 USDW >

Groundwater Salinity Classification	Salinity Zone Code	Total Dissolved Solids (milligrams per liter)
Fresh	FR	0 to 1,000
Slightly Saline	SS	1,000 to 3,000
Moderately Saline	MS	3,000 to 10,000
Very Saline	VS	10,000 to 35,000
Brine	BR	Greater than 35,000

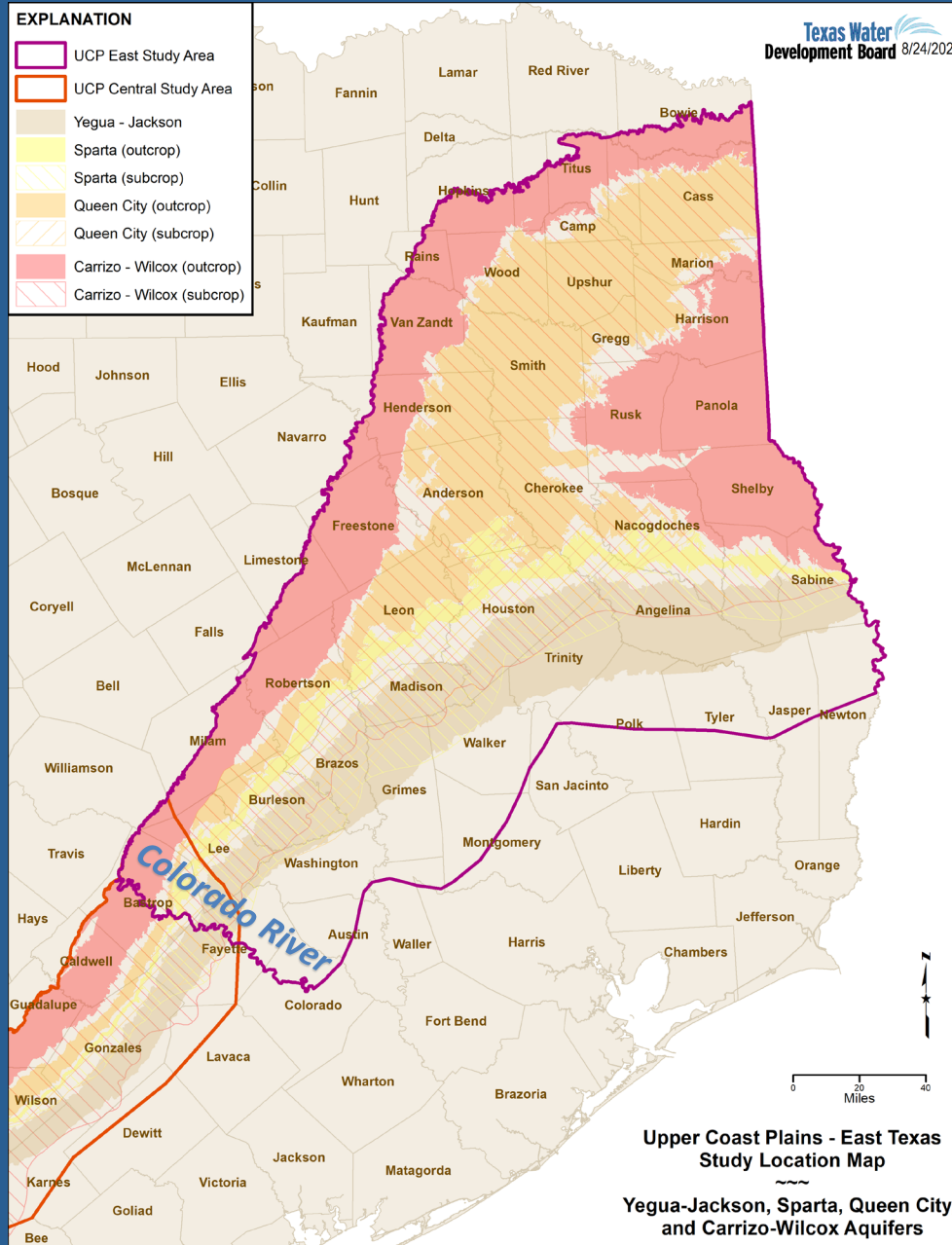
← Seawater

PWS: Public Water System threshold for fresh water, TX Commission on Environmental Quality
 BUQ: Base Useable Quality water, TX Railroad Commission
 USDW: Underground Source Drinking Water, US Environmental Protection Agency

Brackish Groundwater Production Zones (BGPZ) Process “Bird’s-Eye” Overview 84th Texas Legislature, 2015

- 1) Map & characterize the aquifer
- 2) Evaluate the aquifer for brackish groundwater production zones (BGPZs)
- 3) Recommend potential BGPZs to the EA & Board approves

Upper Coastal Plains East Study Extent

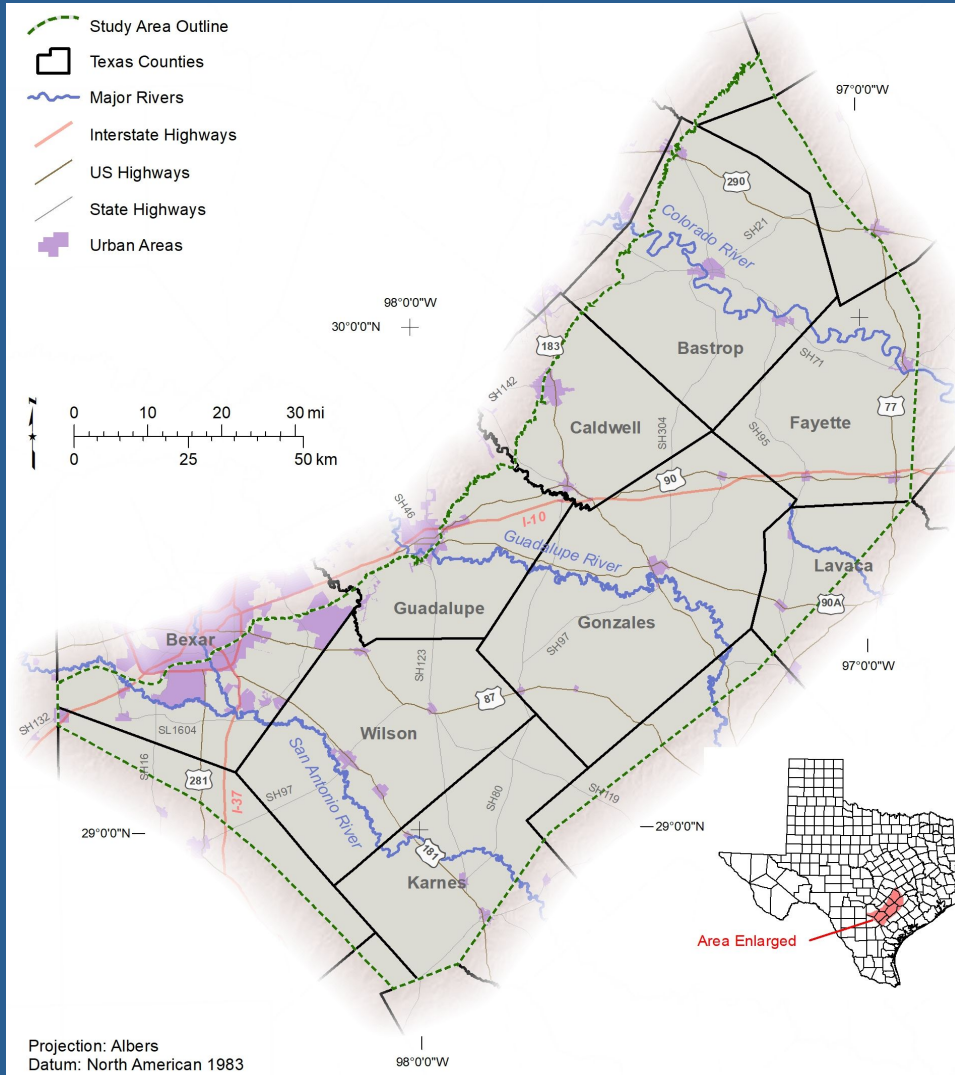


Regional Stratigraphic Nomenclature

PERIOD	EPOCH	HYDROSTRATIGRAPHIC UNITS
Quaternary	Post-Eocene	Quaternary Alluvium
		Younger Units
Tertiary	Eocene	Sparta Sand
		Weches Formation
		Queen City Sand
		Reklaw Formation
		Carrizo Sand
		Upper Wilcox
		Middle Wilcox
		Lower Wilcox
	Paleocene	Midway Group and Older Units
	Post-Paleocene	

Source: GAM Conceptual Model for Northern Portion of the Queen City, Sparta and Carrizo-Wilcox Aquifers (Schorr and others, 2020).

UCP Central BRACS Study: Lessons Learned



- 8 stratigraphic units mapped (Yegua, Cook Mountain, Sparta, Weches, Queen City, Reklaw, Carrizo, Wilcox)
- 4 aquifers (Yegua-Jackson, Sparta, Queen City, Carrizo-Wilcox)
- A BRACS study is not a GAM – vertical distribution of salinity is not a consistent gradient
- Less is more – split into smaller focused reports for clarity
 - Yegua - Jackson
 - Sparta (current)
 - Queen City
 - Carrizo-Wilcox

Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas

John E. Meyer, P.G., Andrea D. Croskrey, P.G., Alysa K. Suydam, P.G., and Nathaniel van Oort

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http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R385/report385.asp



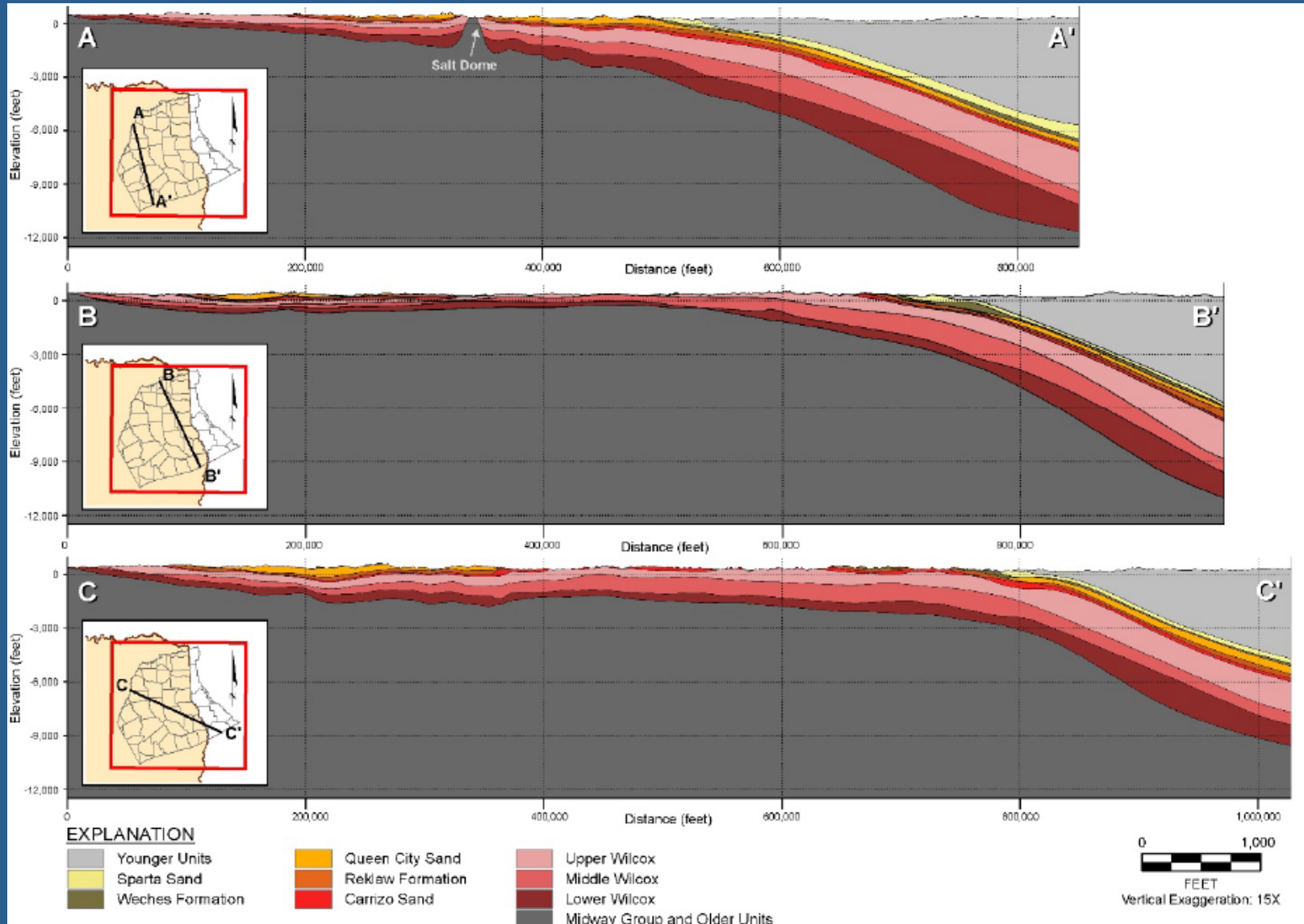
All BRACS data is managed in an MS Access Database available for download <https://www.twdb.texas.gov/innovativewater/bracs/database.asp>



Upper Coastal Plains (East) Aquifers

- 4 aquifers: Yegua-Jackson, Sparta, Queen City, Carrizo-Wilcox Aquifers
- General lithology: sands, silts, clays, with greensands and lignites
- Current aquifer extents map total dissolved solids (TDS) range up to 3,000 mg/L

Cross Sections



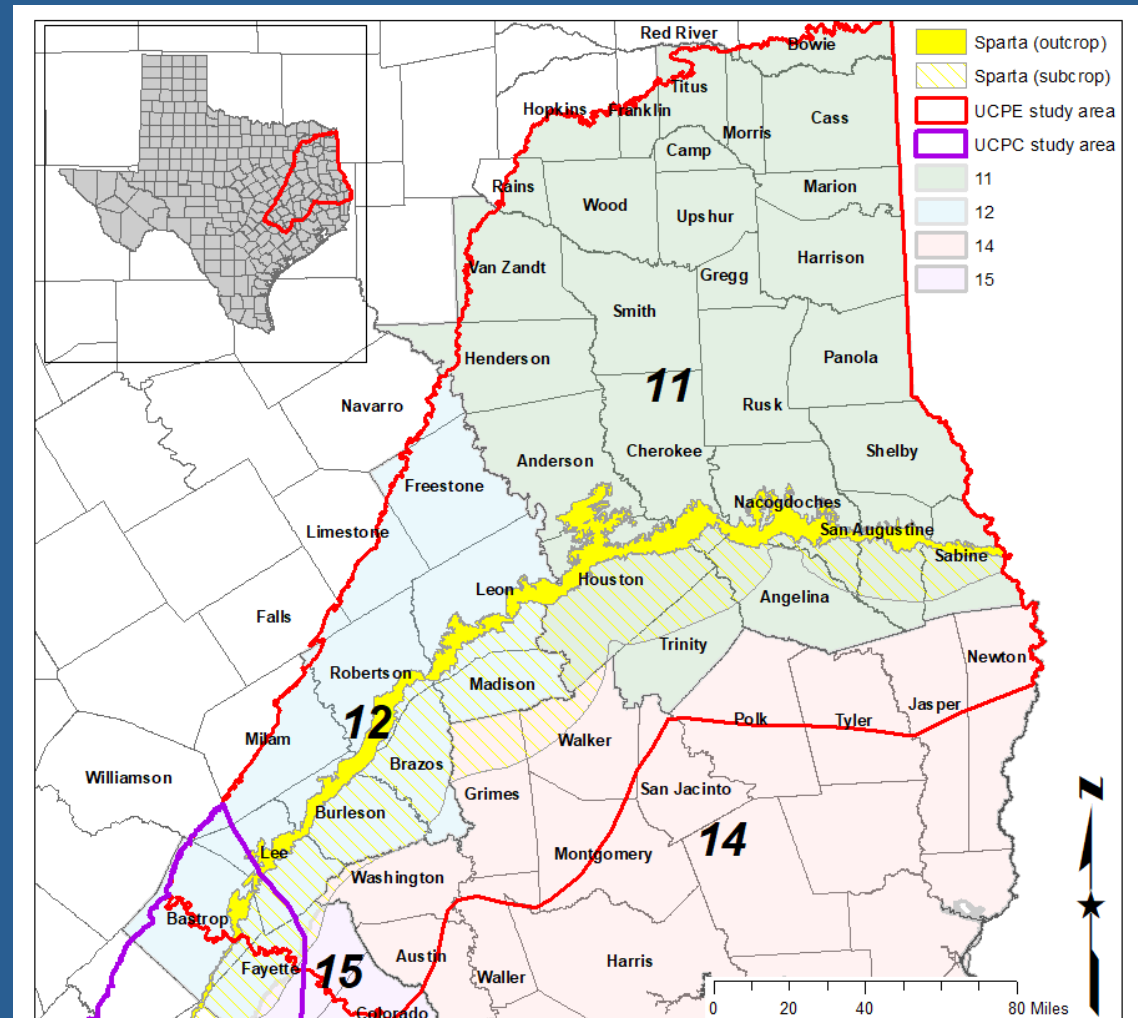
Source: GAM Conceptual Model for Northern Portion of the Queen City, Sparta and Carrizo-Wilcox Aquifers (Schorr and others, 2020).

Data Collected (so far) and Data Gaps

Upper Coastal Plains East Study Area

Groups within our study area include:

- GMA 11
- GMA 12
- GMA 14
- GMA 15

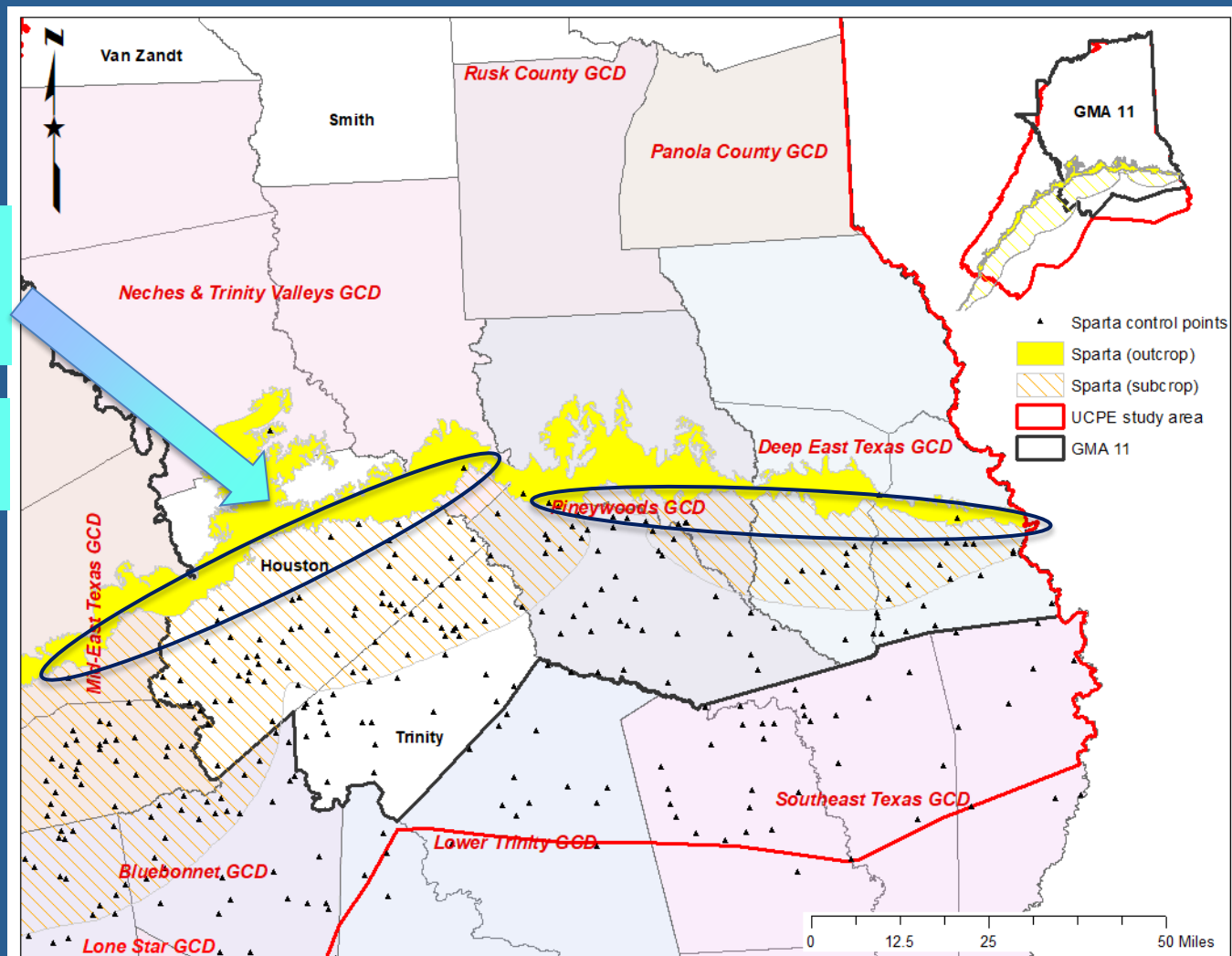


Sparta BRACS Stratigraphic Control Points and Data Gaps

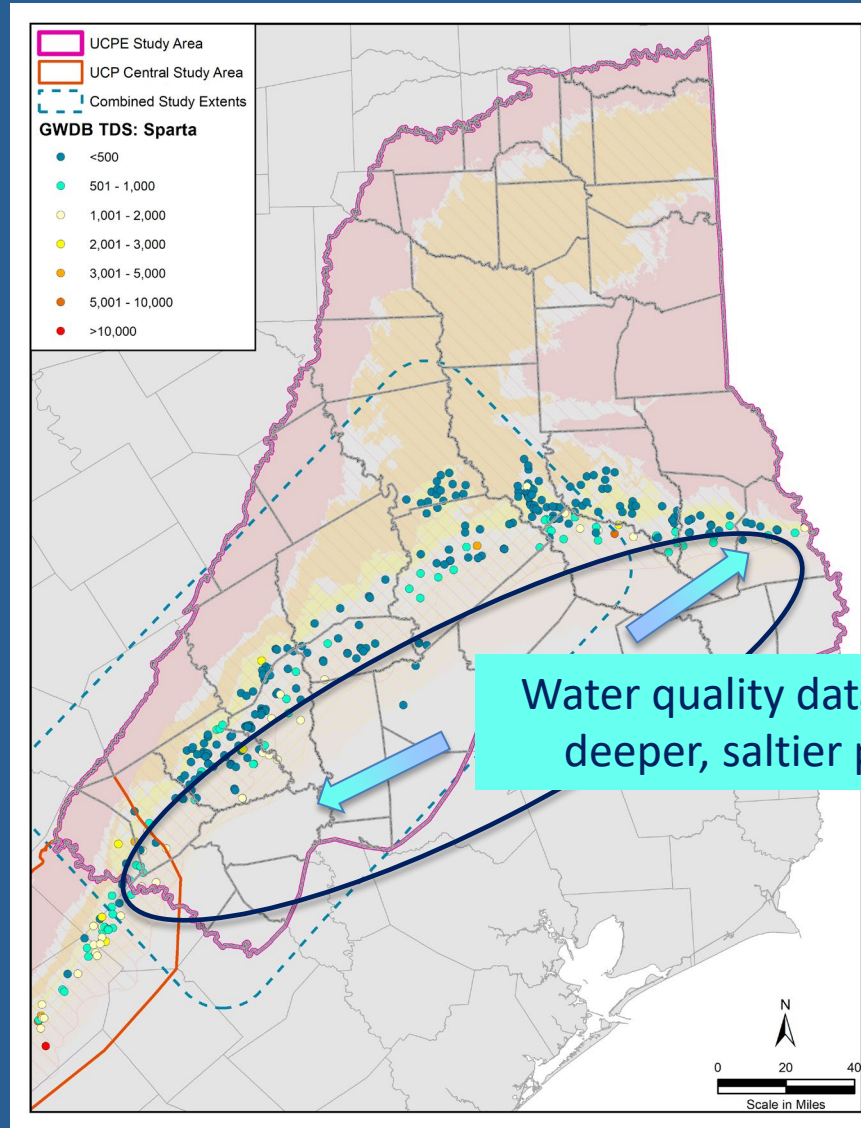
Data Gaps:

- Outcrop and shallow downdip geophysical logs
- Wells with porosity and gamma ray logs

We encourage GCDs and any other stakeholder to share non-proprietary geophysical log data and water quality data that is not in the TWDB GWDB for inclusion in future studies



TWDB Groundwater Database: Sparta TDS



Anticipated Challenges

- Structural anomalies
- Data gap near outcrop
- Few porosity logs
- Calculated TDS methodology

Next Steps: Sparta Aquifer, East Texas

- Map ~~stratigraphy~~, lithology, measured water quality, calculated water quality, and aquifer properties
- Calculate the volume of fresh, slightly saline, moderately saline, and very saline groundwater
- Host stakeholder meetings

Questions, Comments, and Input from Stakeholders

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aquifers of the upper coastal plains of texas



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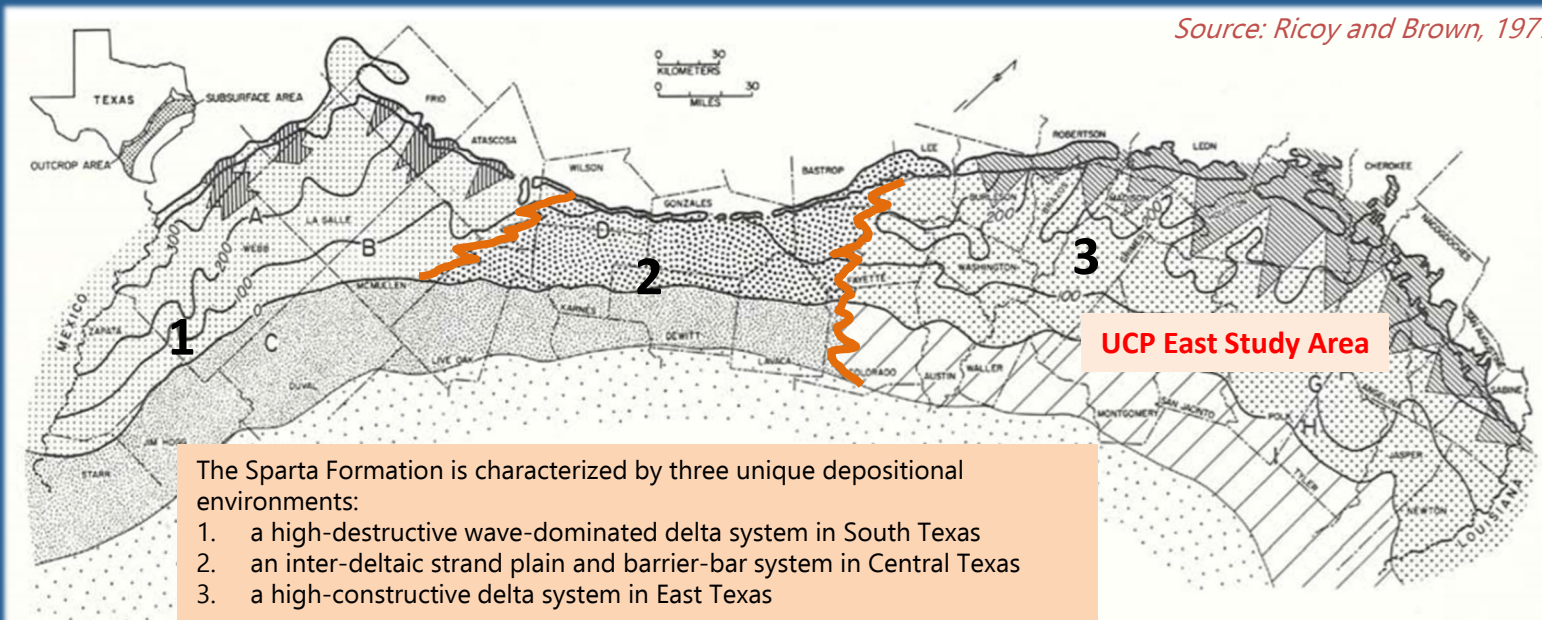
Texas Water Development Board

P.O. Box 13231, Capitol Station
Austin, Texas 78711-3231
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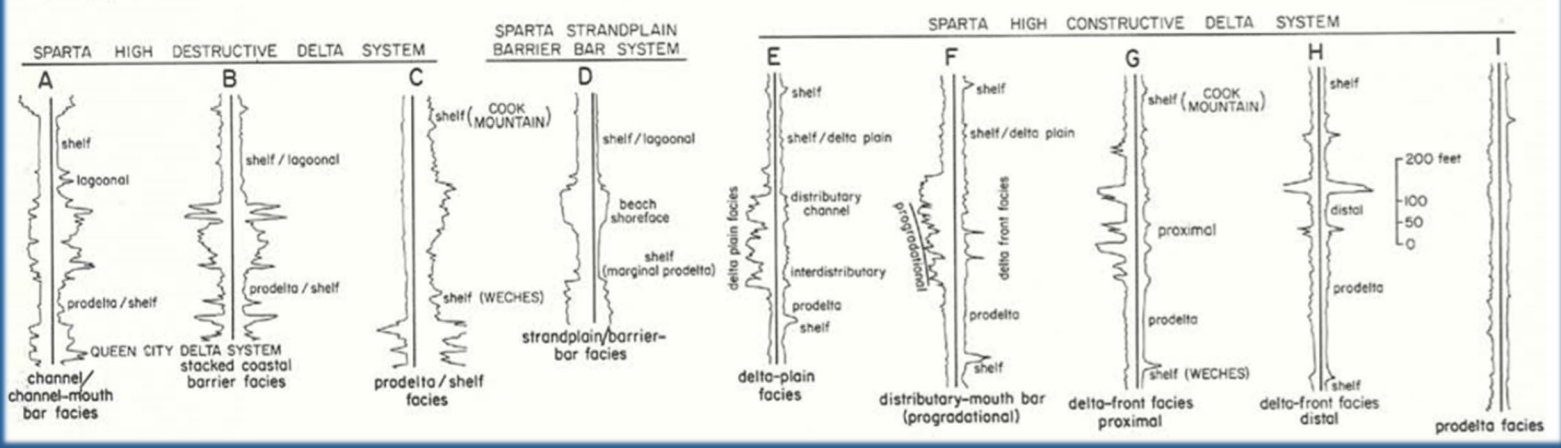
Sparta Depositional Zones – Maybe use a GAM version of the Ricoy sand map?

Source: Ricoy and Brown, 1977.



The Sparta Formation is characterized by three unique depositional environments:

1. a high-destructive wave-dominated delta system in South Texas
2. an inter-deltaic strand plain and barrier-bar system in Central Texas
3. a high-constructive delta system in East Texas



Brackish Groundwater Production Zones (BGPZ) 84th Texas Legislature, 2015

Directed TWDB to:

- ✓ Define brackish groundwater production zones
- ✓ Estimate productivity over 30- & 50-year periods
- ✓ Recommend groundwater monitoring
- ✓ Work with stakeholders and groundwater conservation districts
- ✓ Complete four aquifers December 2016
- ✓ Complete all aquifers December 2022

<http://www.twdb.texas.gov/innovativewater/bracs/HB30.asp>

Brackish Groundwater Production Zones (BGPZ) 86th Texas Legislature, 2019

- ✓ Appropriated \$2 million to the TWDB to support designation of brackish groundwater production zones in aquifers of the state, excluding the Dockum Aquifer
- ✓ Passed Senate Bill 1041 that extended the deadline to complete zone designations from December 1, 2022, to December 1, 2032
- ✓ Passed House Bill 722 that established a permitting framework for developing water supplies from TWDB-designated brackish groundwater productions zones

Brackish Groundwater Production Zones

Criteria designation:

Must have brackish water	In areas of the state with moderate to high availability and productivity
Must have hydrogeologic barriers	sufficient to prevent significant impacts to fresh water availability or quality
Cannot be within these boundaries	Edwards Aquifer within the Edwards Aquifer Authority, Barton Springs-Edwards Aquifer Conservation District, Harris-Galveston Subsidence District, or Fort Bend Subsidence District
Cannot be already in use	Brackish water already serving as a significant source of water supply for municipal, domestic, or agricultural
Cannot be used for wastewater injection	permitted under Title 2 of Texas Water Code, Chapter 27