Brackish Groundwater Data Collection

Upper Coastal Plains: Sparta Aquifer, East Texas

February 12, 2021
GMA 12 meeting
Virtual
Presented by Sydney Weitkunat, PG
Brackish Resources Aquifer Characterization System (BRACS)

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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

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

BRACKISH

PWS >

BUQ >

USDW >

← 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

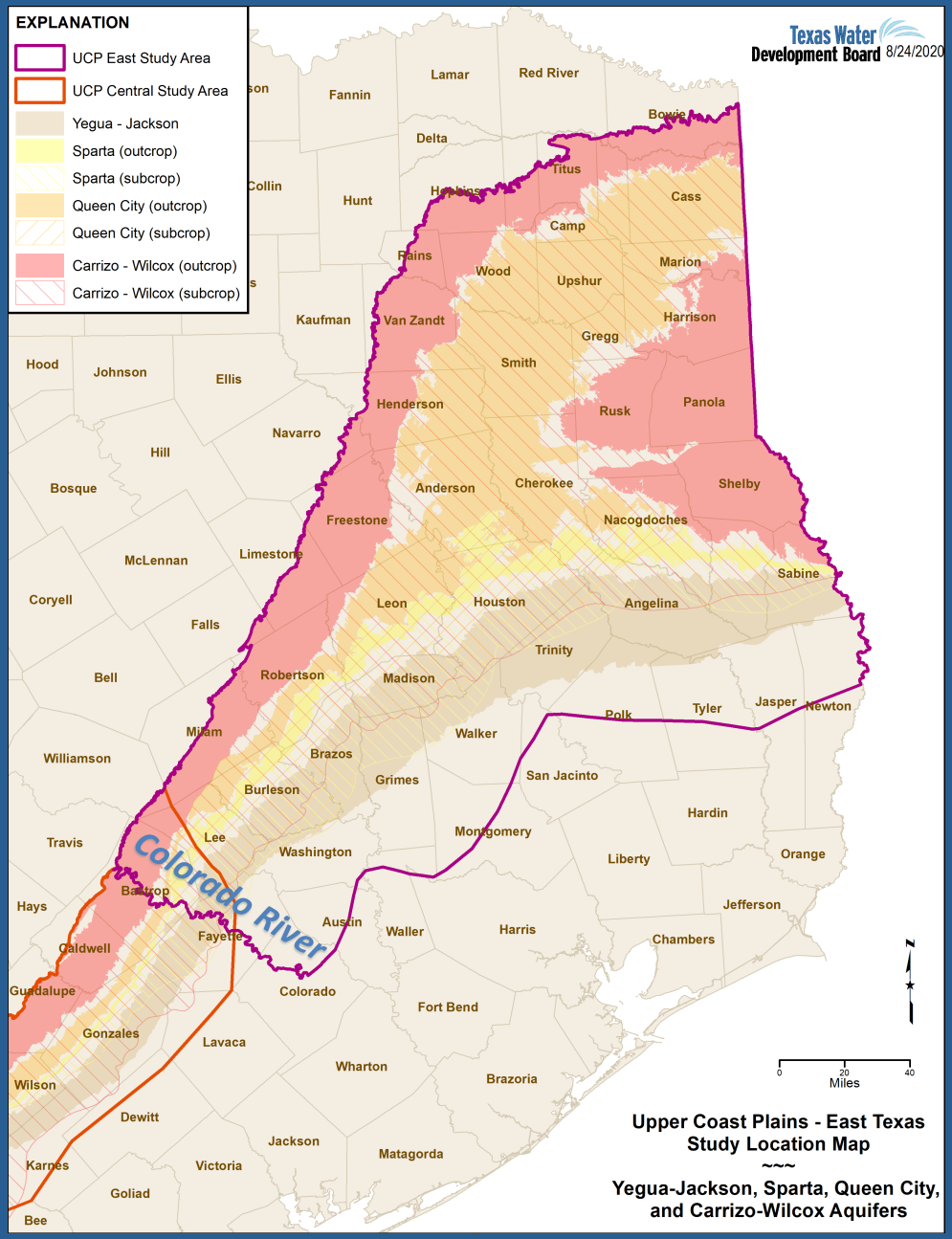
modified from Winslow and Kister (1956) USGS WSP 1365

Brackish Groundwater Production Zones (BGPZ) Process "Bird's-Eye" Overview

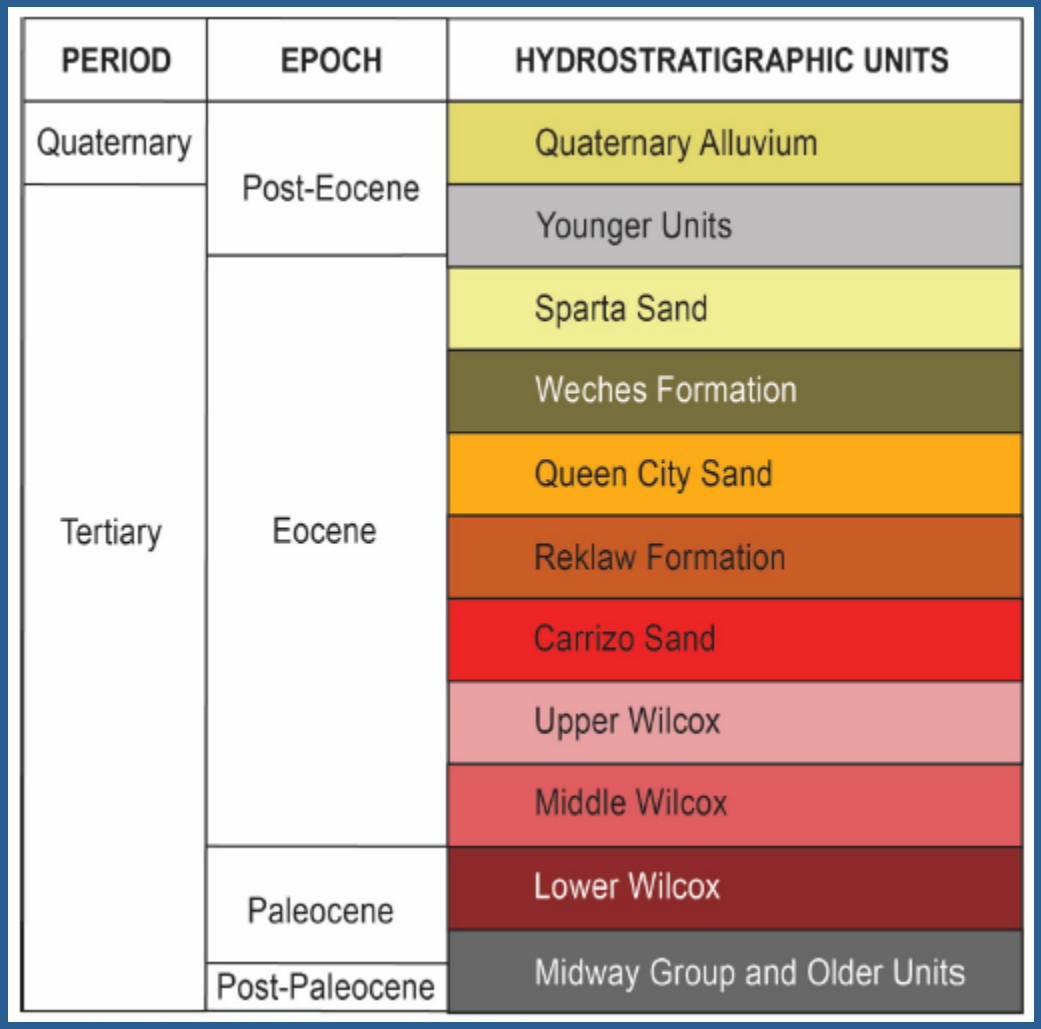
84th Texas Legislature, 2015

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



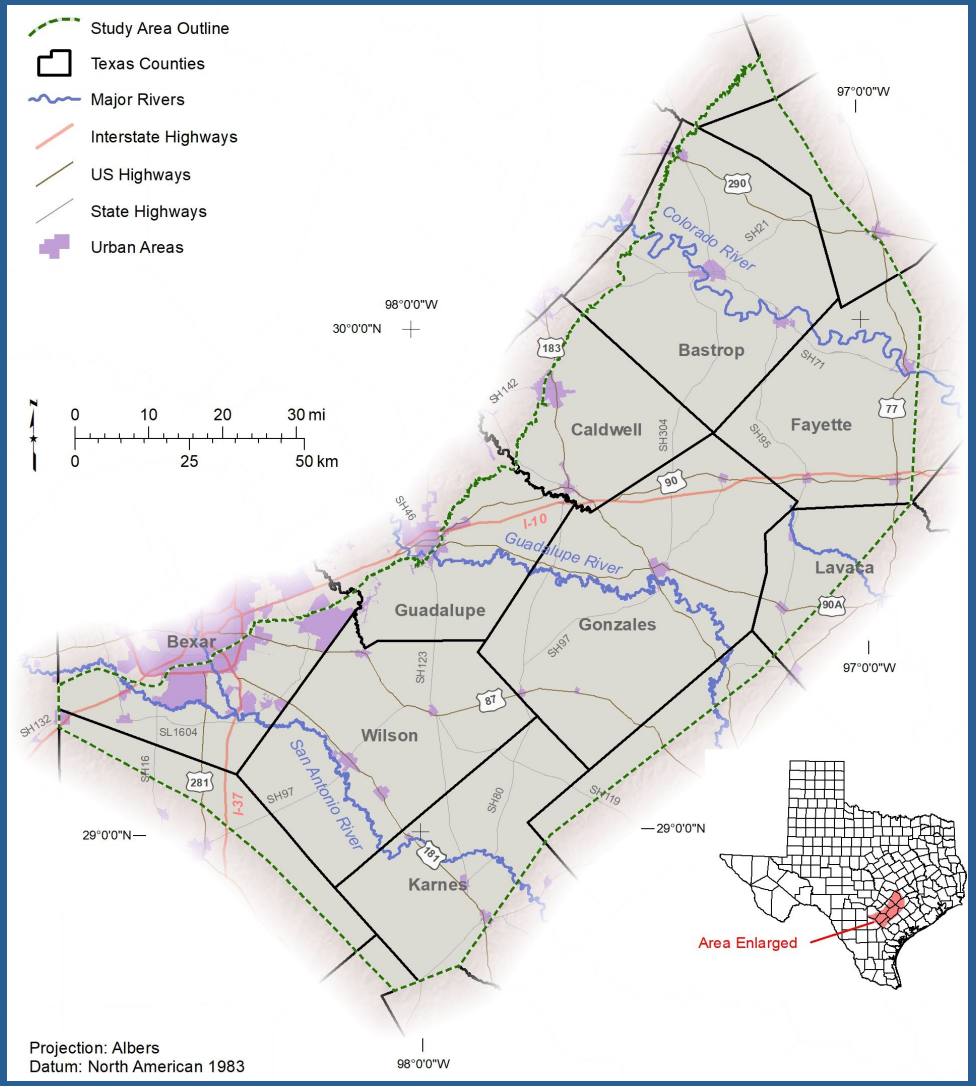
Regional Stratigraphic Nomenclature



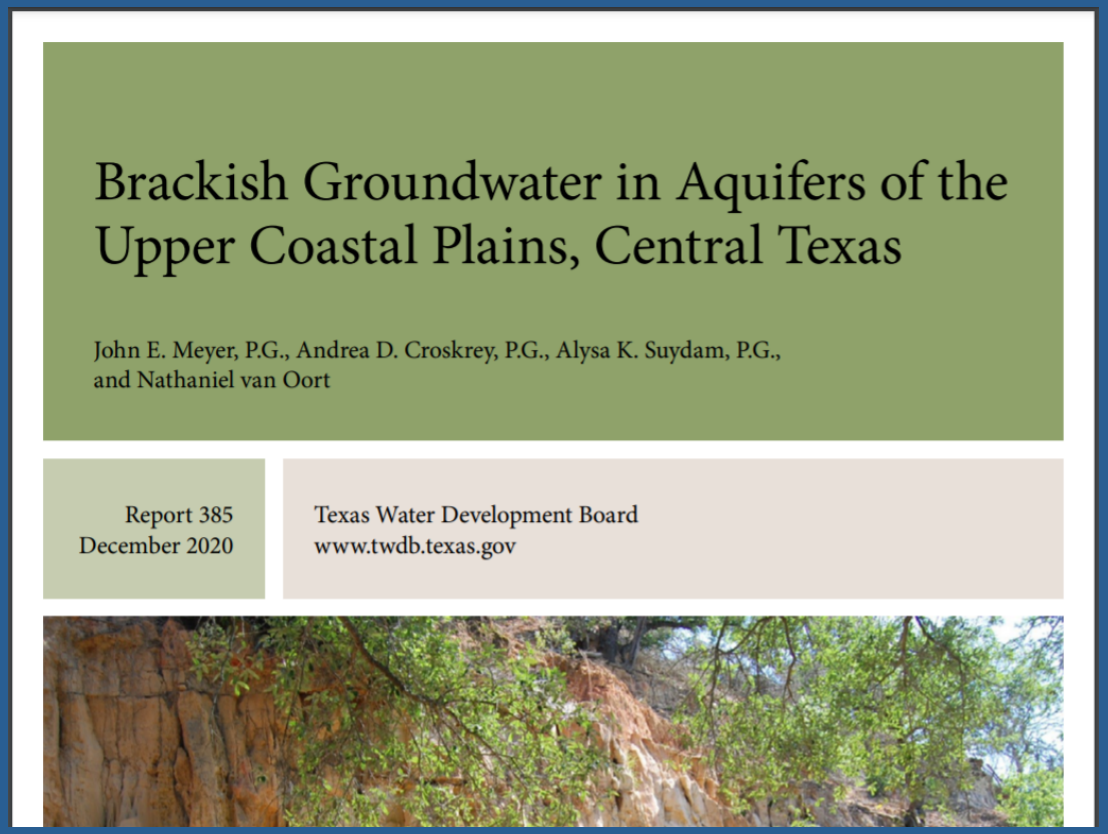
PERIOD	EPOCH	HYDROSTRATIGRAPHIC UNITS
Quaternary	Post-Eocene	Quaternary Alluvium
		Younger Units
Tertiary	Eocene	Sparta Sand
		Weches Formation
		Queen City Sand
		Reklaw Formation
		Carrizo Sand
		Upper Wilcox
		Middle Wilcox
	Paleocene	Lower Wilcox
	Post-Paleocene	Midway Group and Older Units

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**



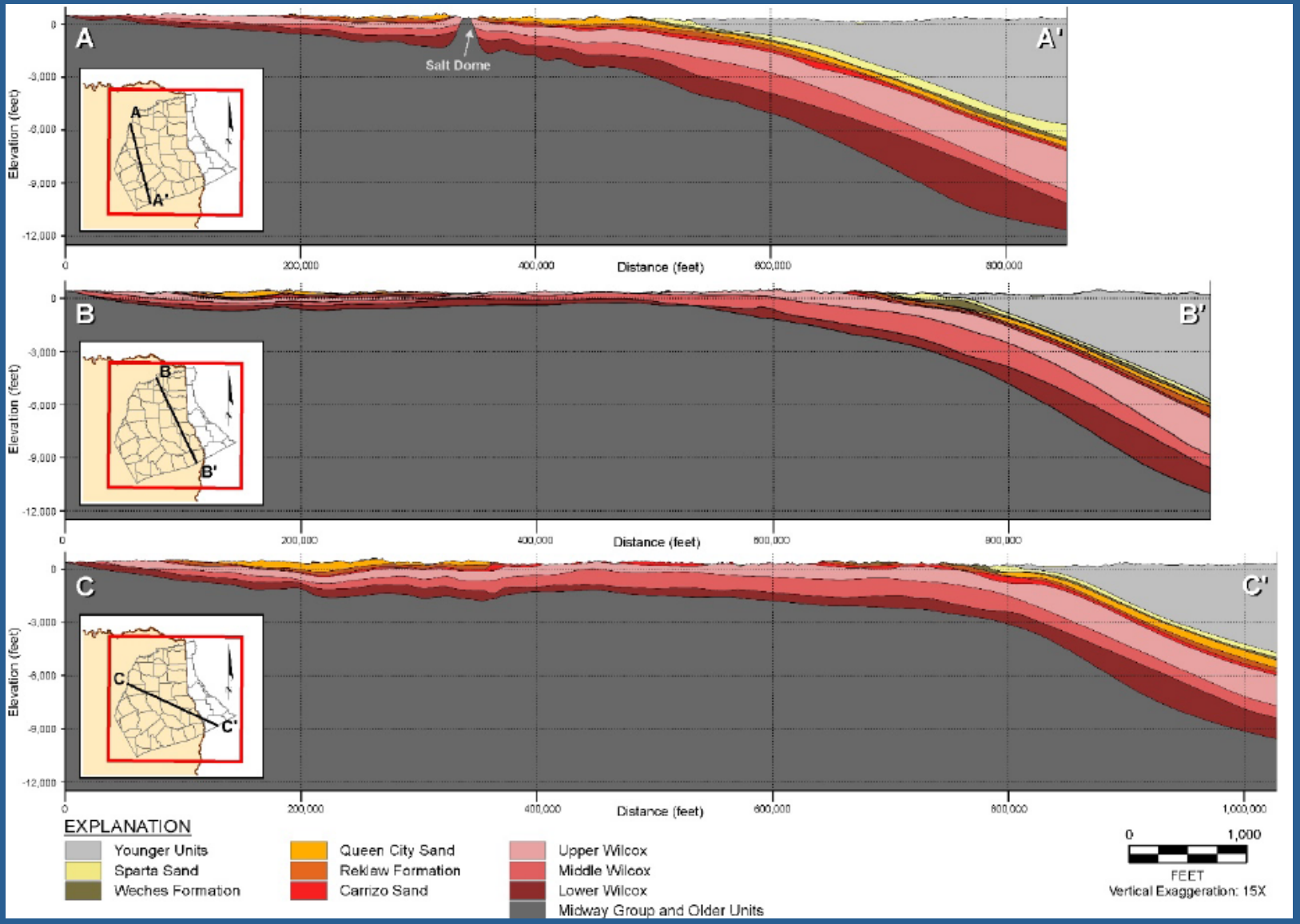
http://www.twdb.texas.gov/publications/reports/numbered_reports/doc/R385/report385.asp

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



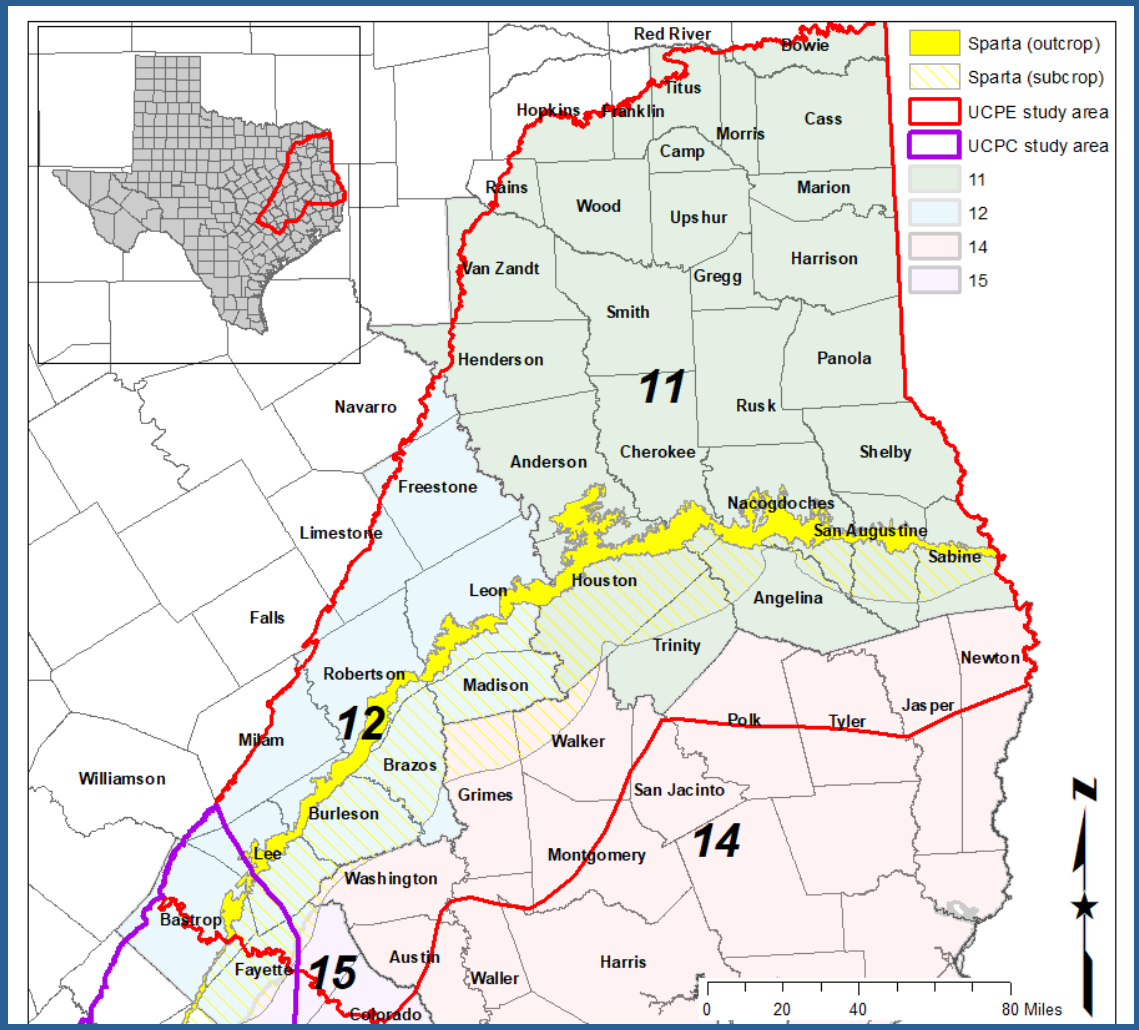
Source: GAM Conceptual Model for Northern Portion of the Queen City, Sparta and Carrizo-Wilcox Aquifers (Schorr and others, 2020).

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

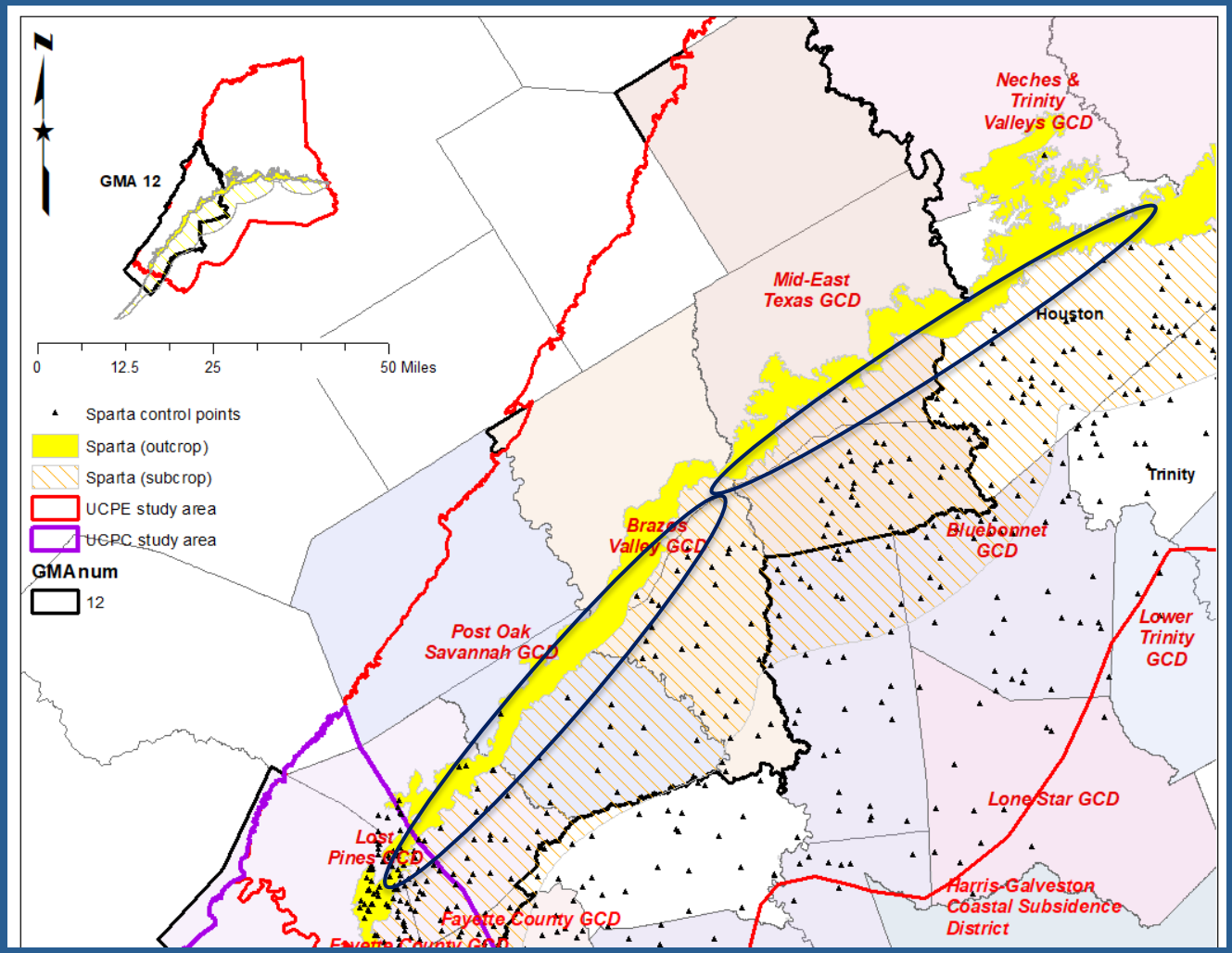


Sparta BRACS Stratigraphic Control Points and Data Gaps

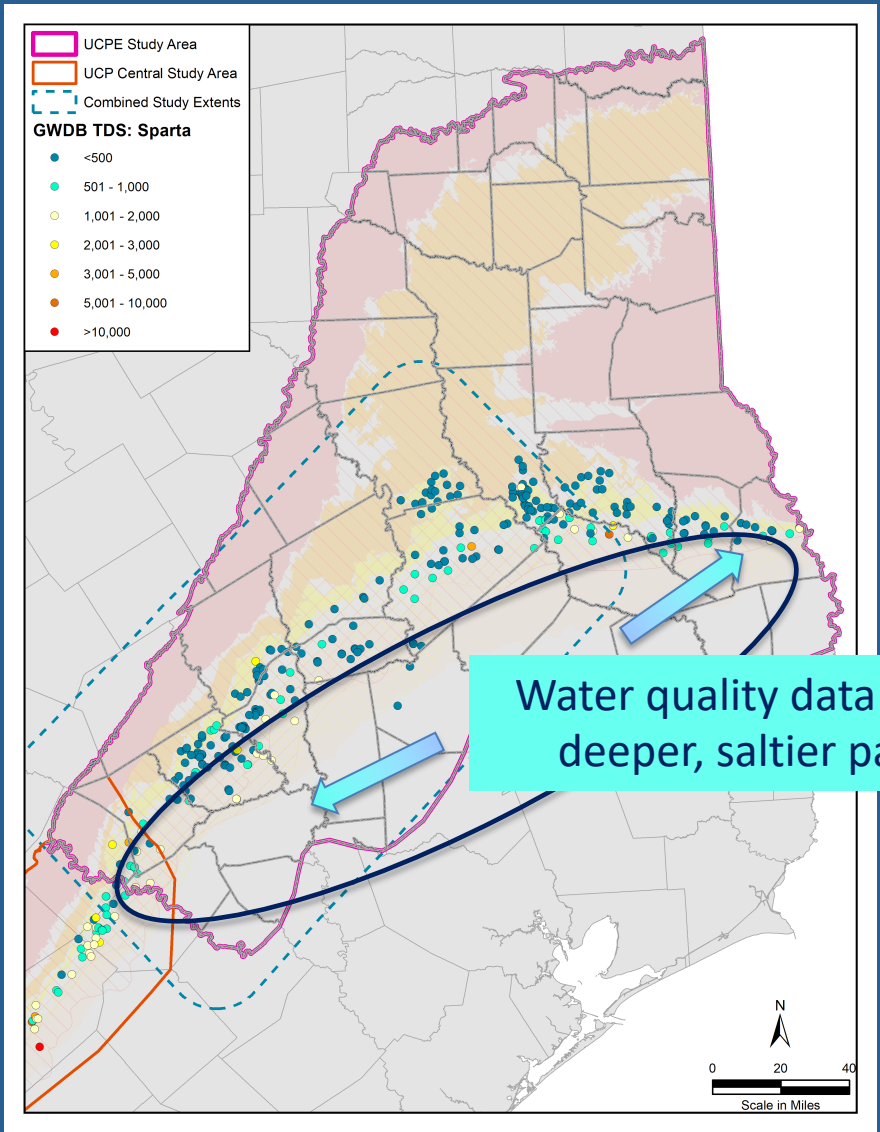
Data Gaps:

- 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



Water quality data gap = samples from deeper, saltier parts of the aquifer

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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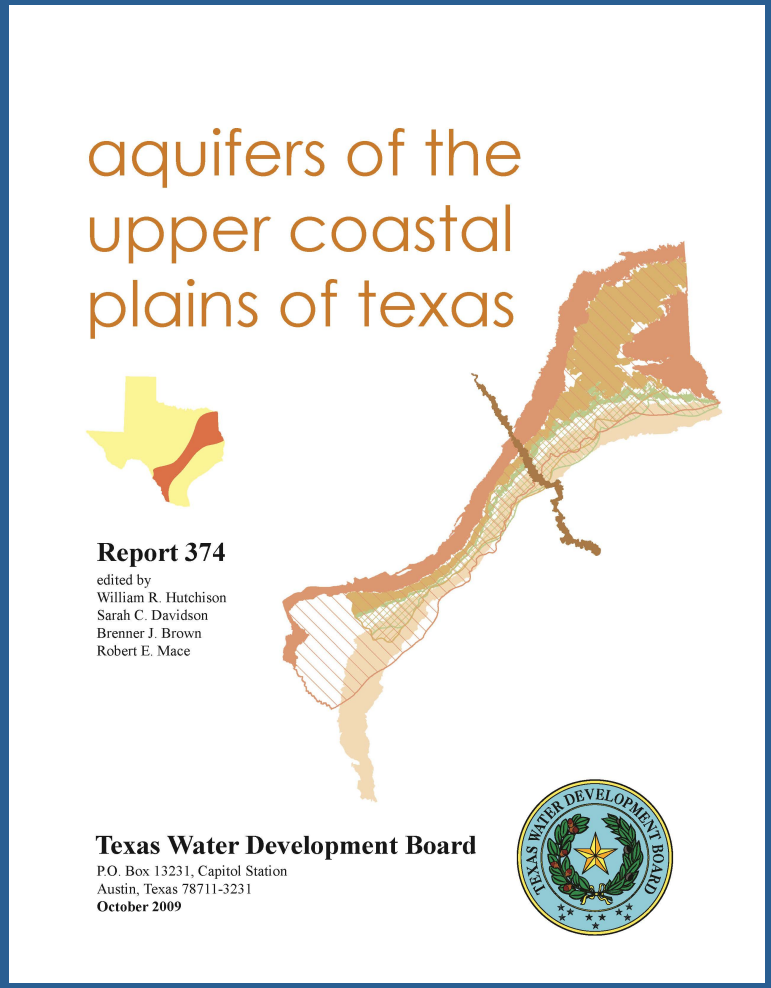
https://www.twdb.texas.gov/innovativewater/bracs/studies/UCPE/index.asp


aquifers of the upper coastal plains of texas
Report 374
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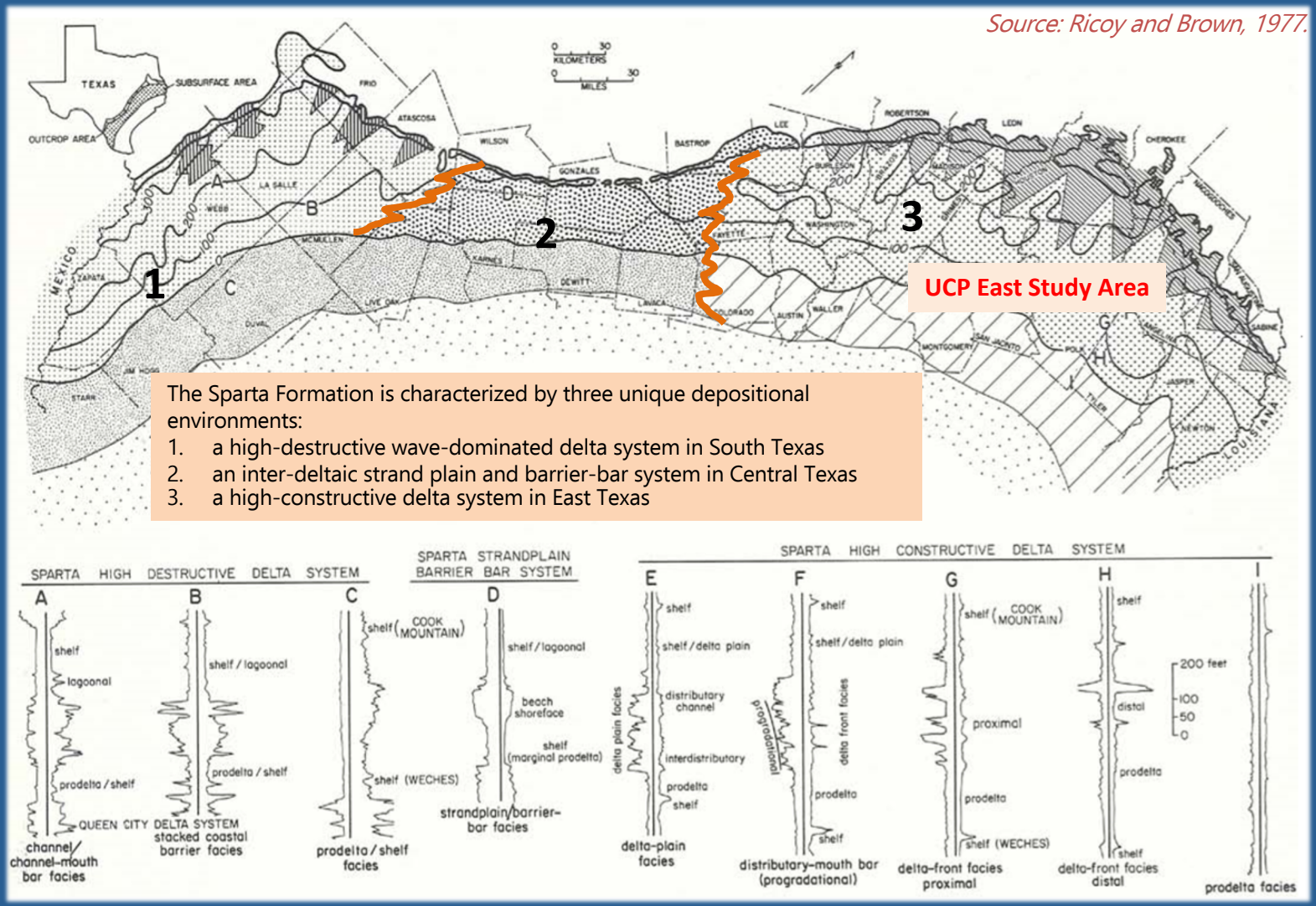
TEXAS WATER DEVELOPMENT BOARD

Sparta Depositional Zones – Maybe use a GAM version of the Ricoy sand map?

Source: Ricoy and Brown, 1977.



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