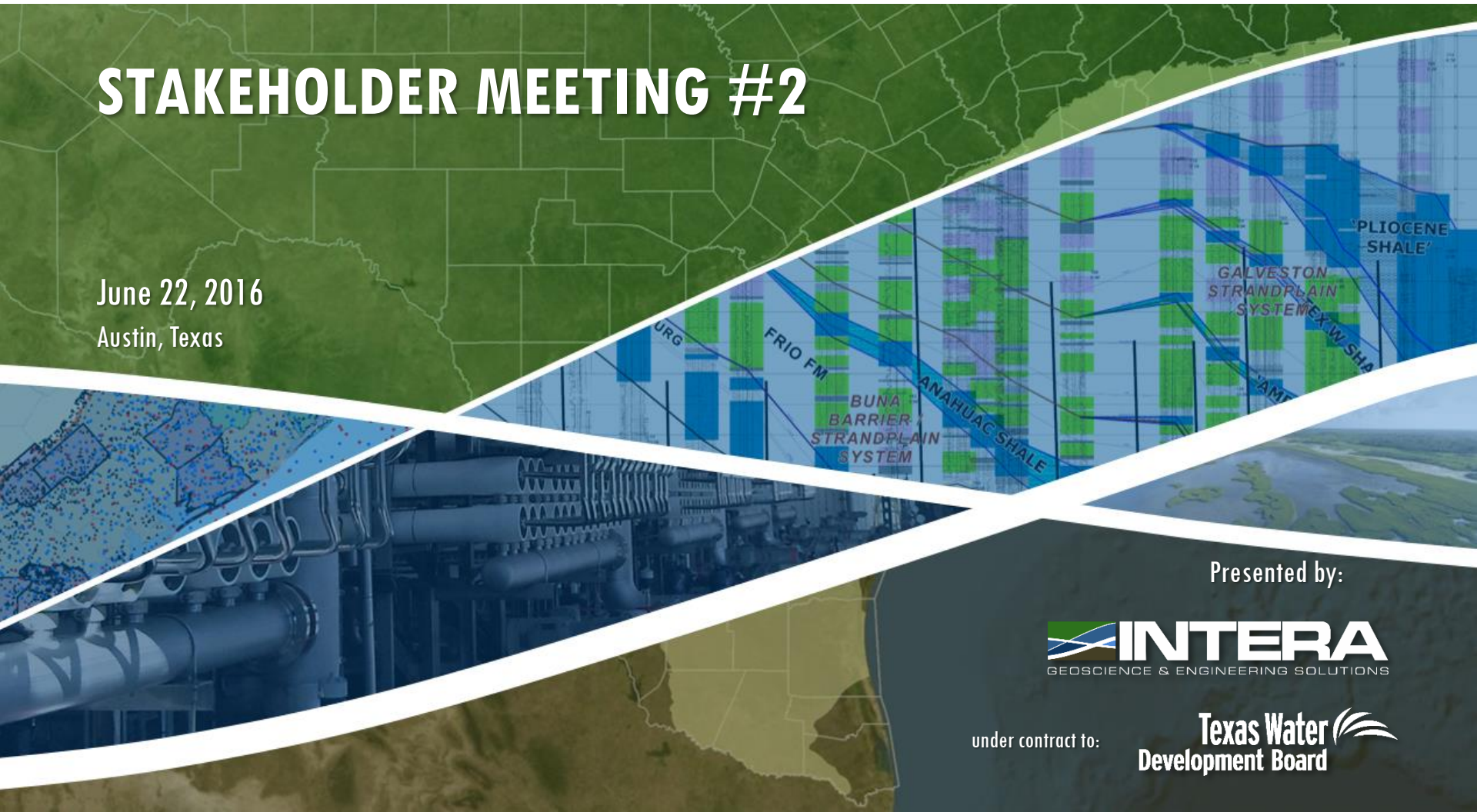
Study of Brackish Aquifers in Texas –

PROJECT NO. 1 - GULF COAST AQUIFER

STAKEHOLDER MEETING #2

June 22, 2016

Austin, Texas



Presented by:

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

under contract to: Texas Water Development Board

Outline

- Project Team
- House Bill 30 & Study Area
- Gulf Coast Geology
- Total Dissolved Solids (TDS)
- Distribution of TDS Concentration in Gulf Coast Aquifer System
- Methods for Estimating of TDS Concentration from Geophysical Logs
- Location of Water Wells and Injection or Disposal Wells
- Identification of Potential Production Areas
- Public Comment and Next Steps

Details

- Study of Brackish Aquifers in Texas- Project No. 1 Gulf Coast Aquifer
  - TWDB Contract # 1600011947
- Project Personnel
  - Steve Young (INTERA Incorporated)
    - project manager
    - hydrogeology and log interpretation for TDS
  - Thomas Ewing (independent consultant)
    - structure and stratigraphy – hydrogeological barriers
  - Amy Banerji & Scott Hamlin (Bureau of Economic Geology)
    - well log analysis – lithology and porosity
  - Deborah Piemont (INTERA)
    - well log analysis – lithology and porosity
  - Daniel Lupton, Neil Deeds (INTERA)
    - hydrogeology and log interpretation for TDS

House Bill 30 and Section 16.060

- Act relates to the development of seawater and brackish groundwater
- Section 16.060 of the Water Code (desalination studies and research)
  - (b) The board shall prepare a biennial progress report on the implementation of seawater or brackish groundwater desalination activities in the state…
    - (5) Identification and designation of local or regional brackish groundwater production zones…that can be used to reduce the use of fresh groundwater and that:
      - (A) are separated by hydrogeologic barriers sufficient to prevent significant impacts to water availability or water quality in any area of the same or other aquifers, subdivisions of aquifers, or geologic strata that have an average total dissolved solids level of 1,000 milligrams per liter or less at the time of designation of the zones; and…
      - (B) are not located in:
      - (ii)
        - (b) Harris-Galveston Subsidence District
        - (c) Fort Bend Subsidence District

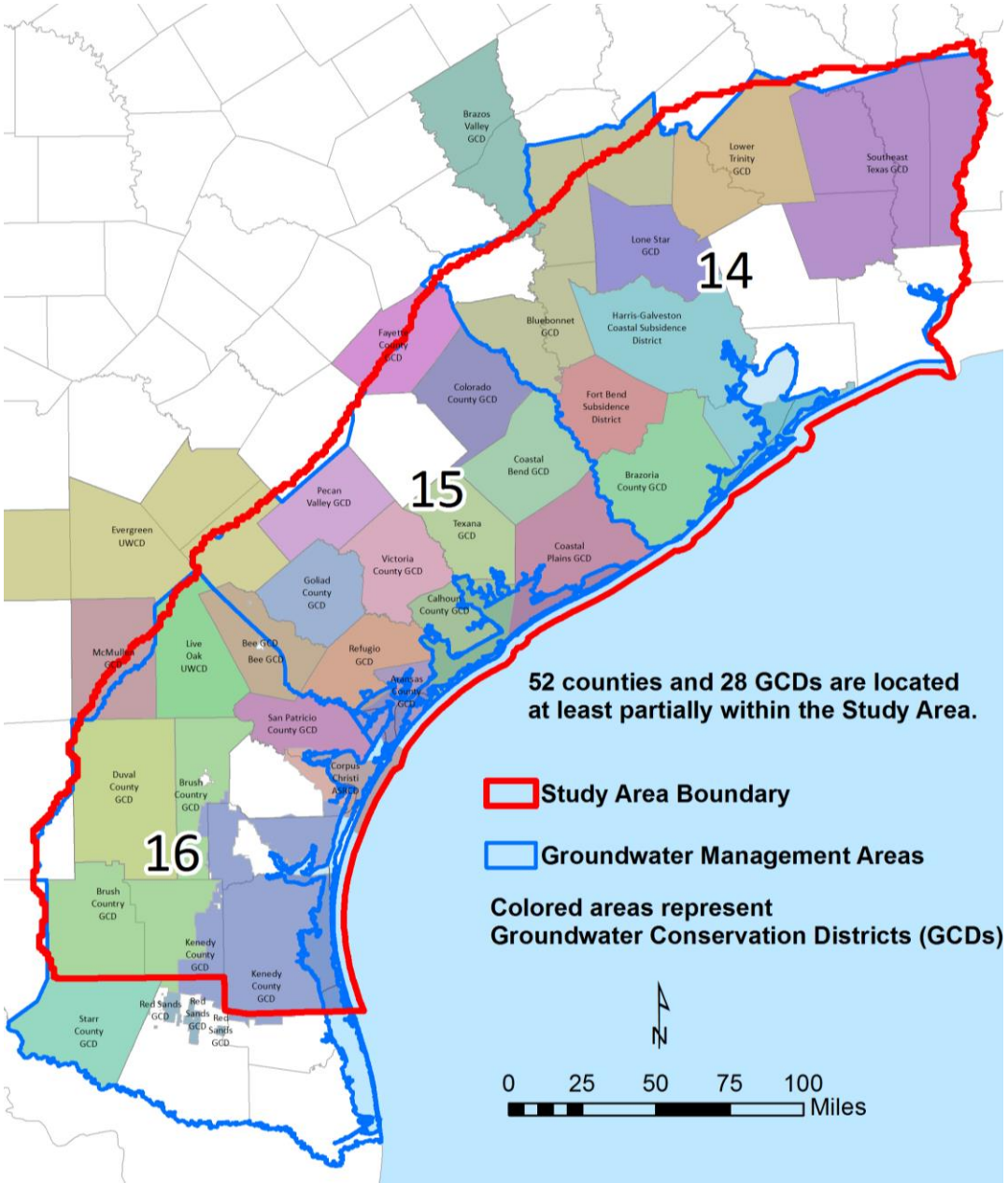
      (iii) An aquifer, subdivision of an aquifer, or geologic stratum that:

      (a) has an average TDS level of more than 1,000 mg/L;

      (b) is serving as a significant source of water supply for municipal, domestic, or agricultural purposes at the time of designation of the zones;

      (iv) An area of geologic stratum that is designated or used for wastewater injection through the use of injection wells or disposal wells permitted under Chapter 27

Study Area Location Map

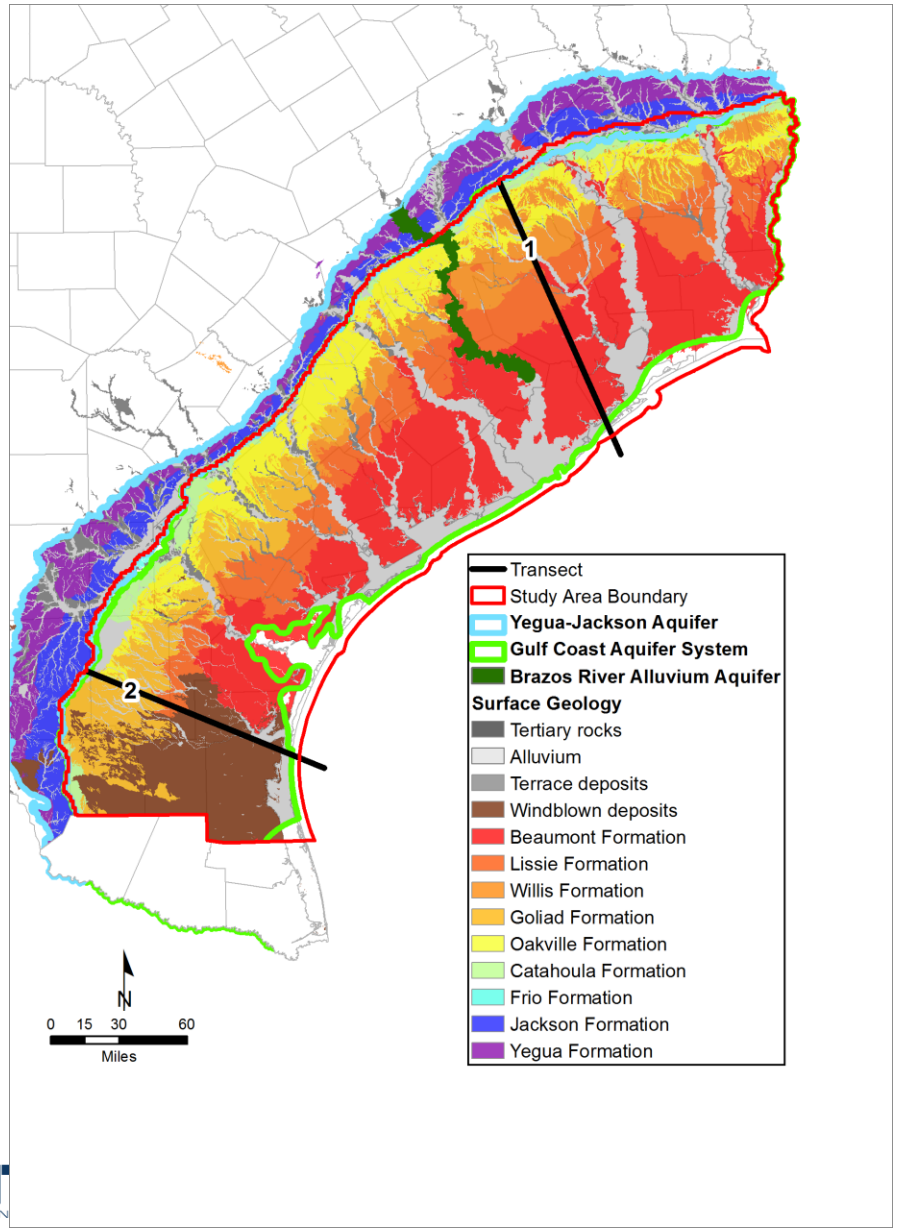


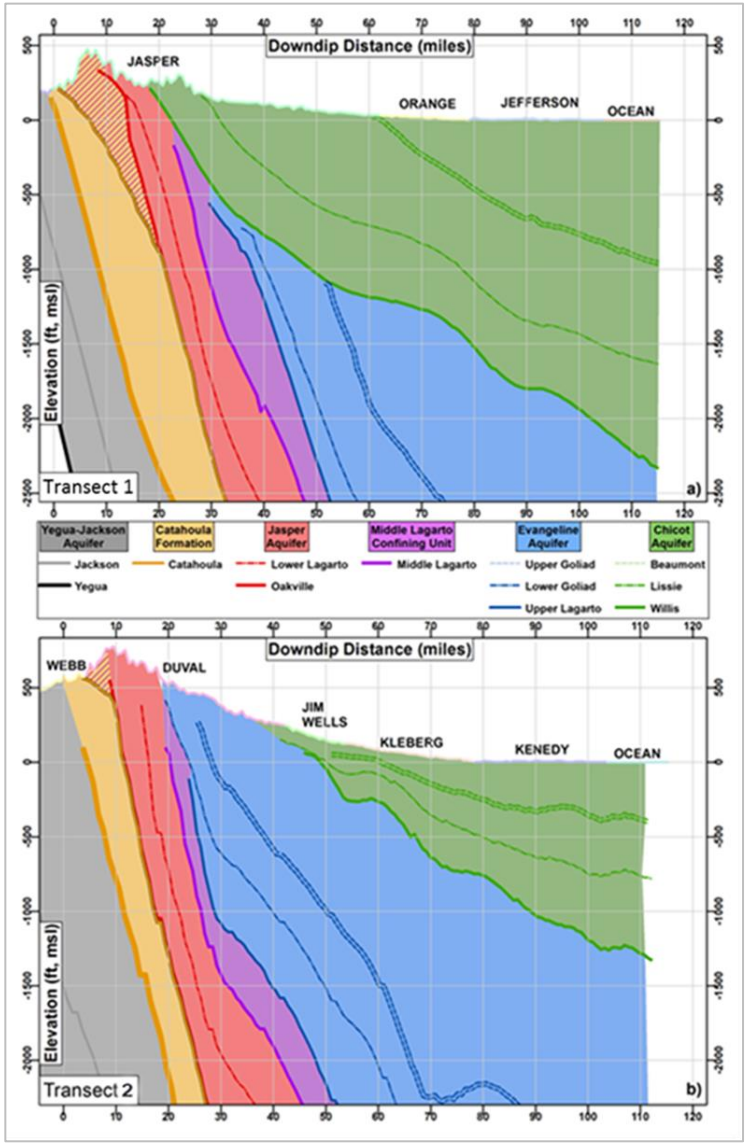
Site Geology

- Geology-Based TWDB Reports
  - Young, S.C., Kelley, V., Baker, E., Budge, T., Hamlin, S., Galloway, B., Kalboss, R., and Deeds, N., 2010, Hydrostratigraphy of the Gulf Coast Aquifer from the Brazos to the Rio Grande: Unnumbered Report, prepared by URS for the Texas Water Development Board.
  - Young, S.C., Ewing, T., Hamlin, S., Baker, E., and Lupton, D., 2012, Updating the Hydrogeological Framework for the Northern Portion of the Gulf Coast Aquifer: Unnumbered Report, prepared by INTERA for the Texas Water Development Board.

ERA	Epoch		Est. Age (M.Y)	Geologic Unit	Hydrogeologic Unit
Cenozoic	Pleistocene		0.7	Beaumont	CHICOT AQUIFER
			1.6	Lissie	
	Pliocene		3.8	Willis	
	Miocene	Late	11.2	Upper Goliad	EVANGELINE AQUIFER
			14.5	Lower Goliad	
		Middle	17.8	Upper Lagarto	
				Middle Lagarto	BURKEVILLE
		Early		Lower Lagarto	JASPER AQUIFER
			24.2	Oakville	
	Oligocene		32	Frio	CATAHOULA
			34	Vicksburg	

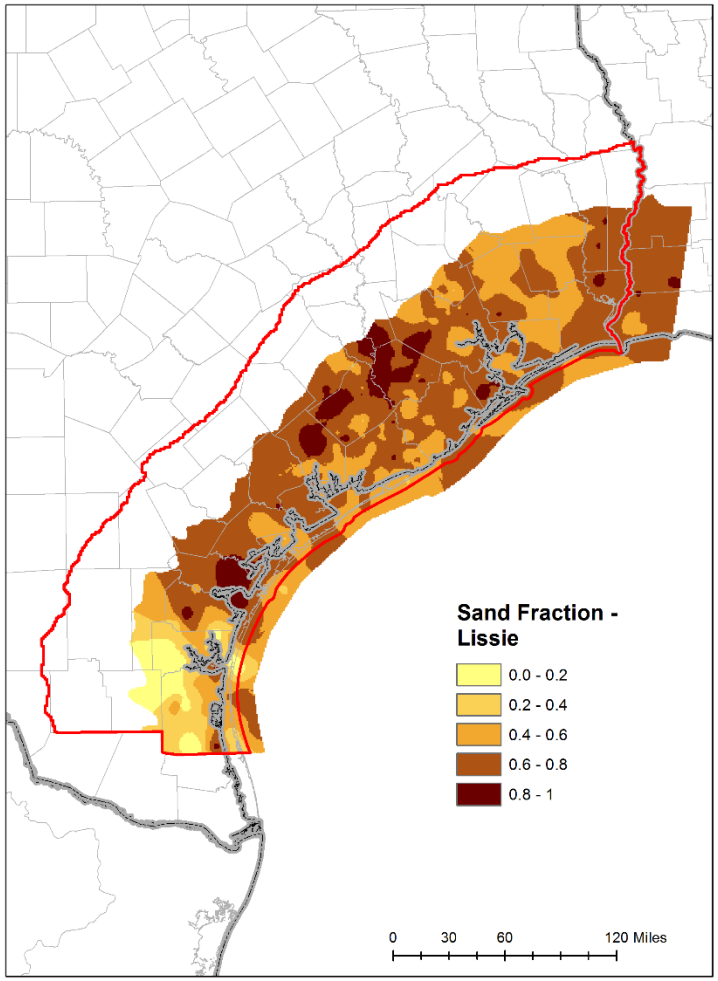
Site Geology (con't)



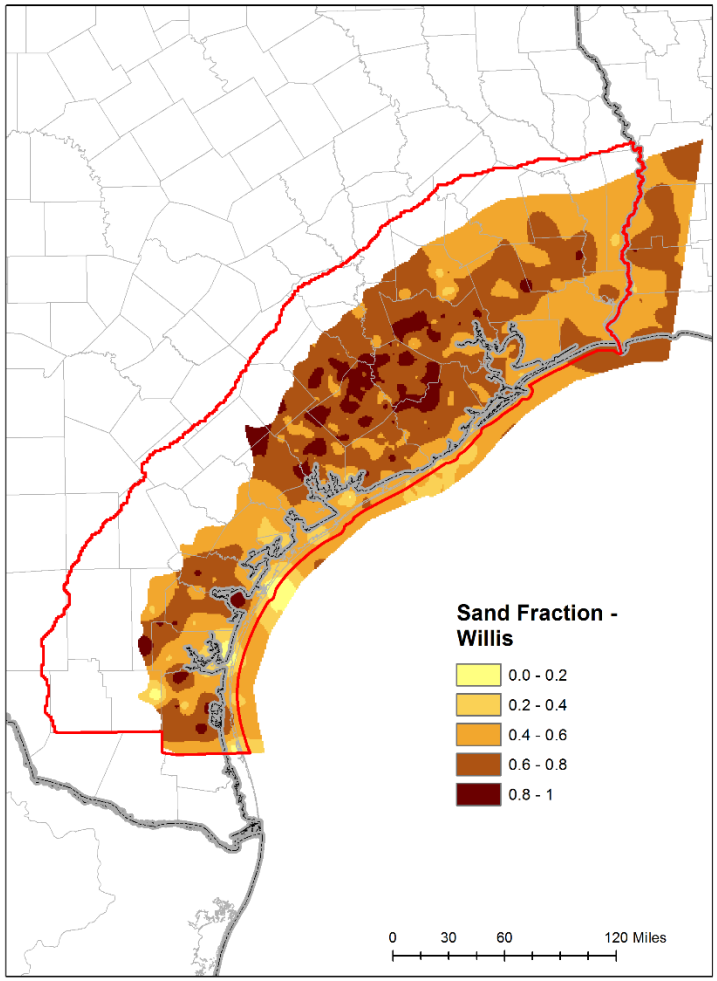


Site Geology - Chicot Aquifer Sand Percentages

Lissie



Willis



0.0 – 0.3 sand fraction is a potential hydraulic barrier if sufficiently thick

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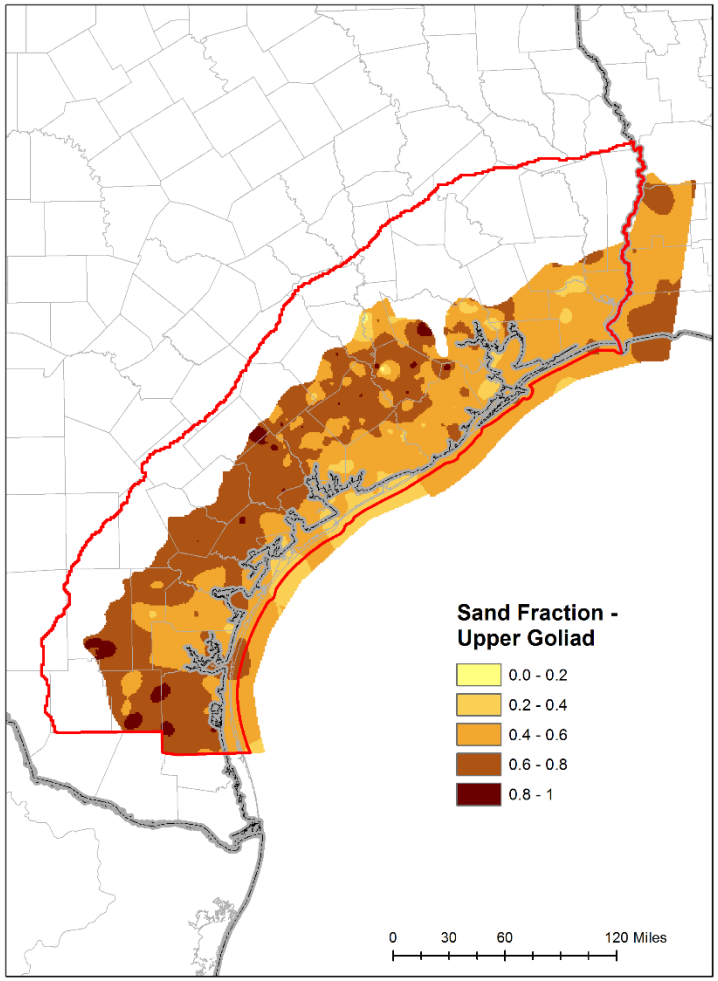
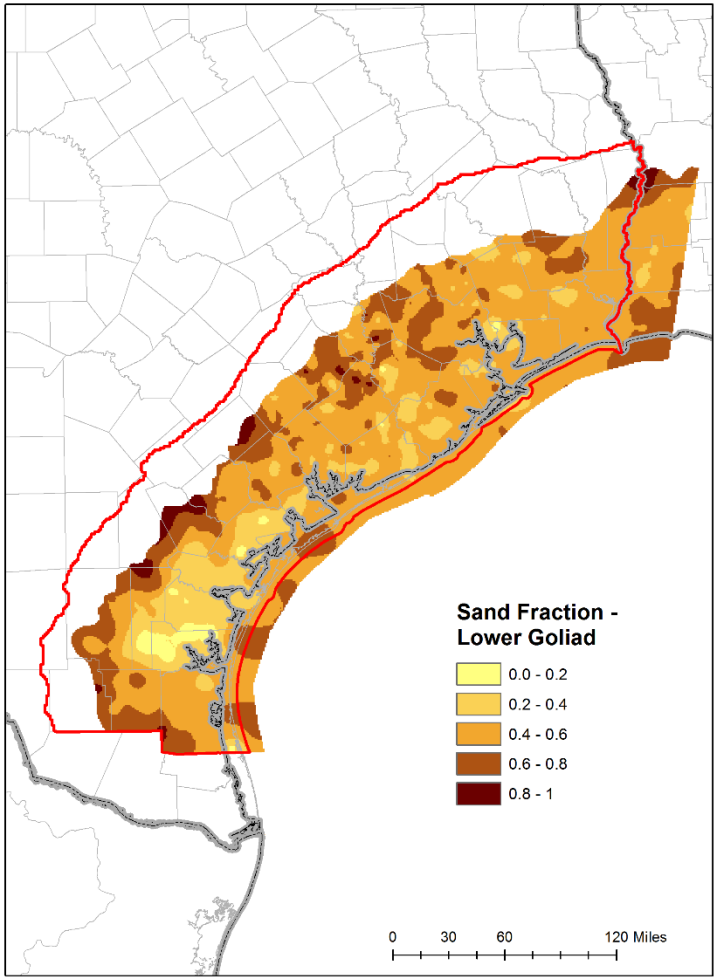
Site Geology - Evangeline Aquifer Sand Percentages

Upper Goliad



Lower Lagarto



0.0 – 0.3 sand fraction is a potential hydraulic barrier if sufficiently thick

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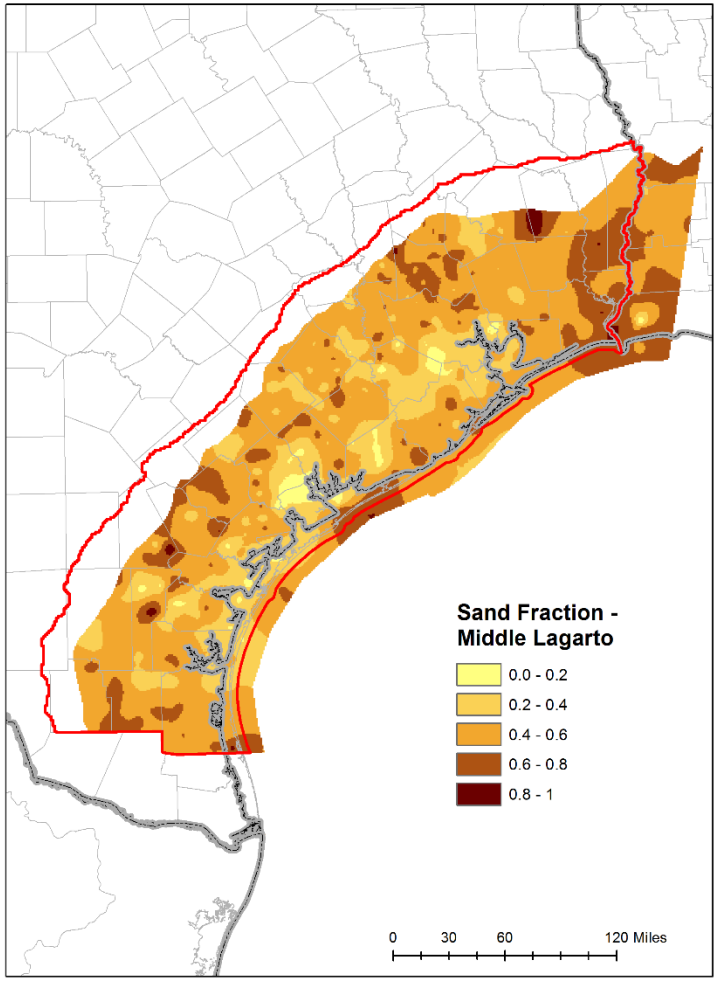
Site Geology - Middle Lagarto Layer Sand Percentages

Middle Lagarto



0.0 – 0.3 sand fraction is a potential hydraulic barrier if sufficiently thick

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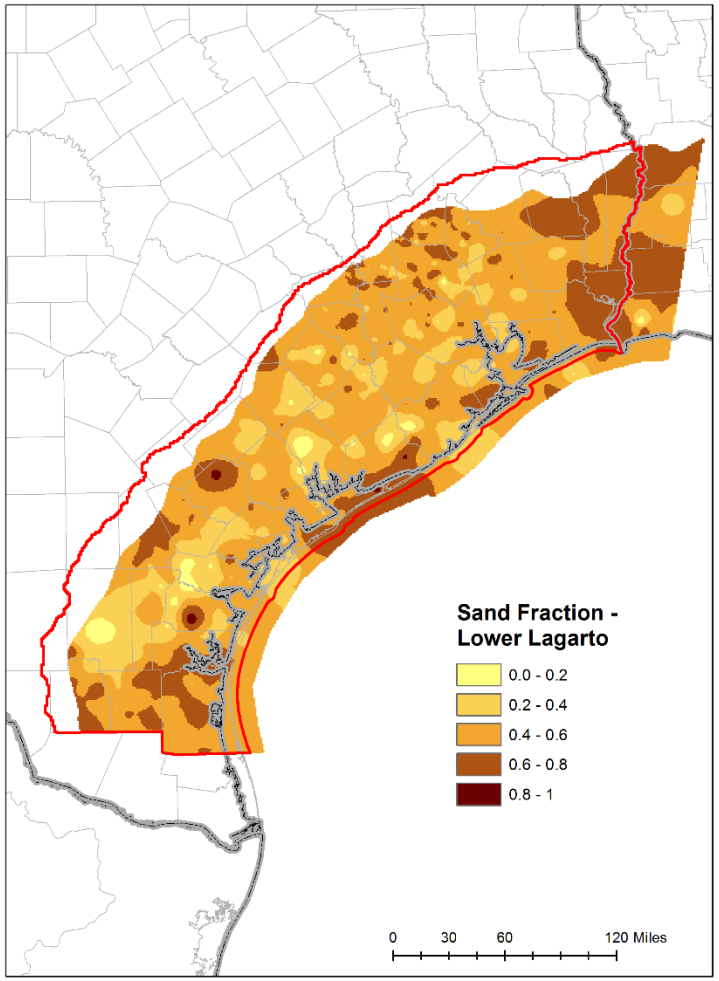
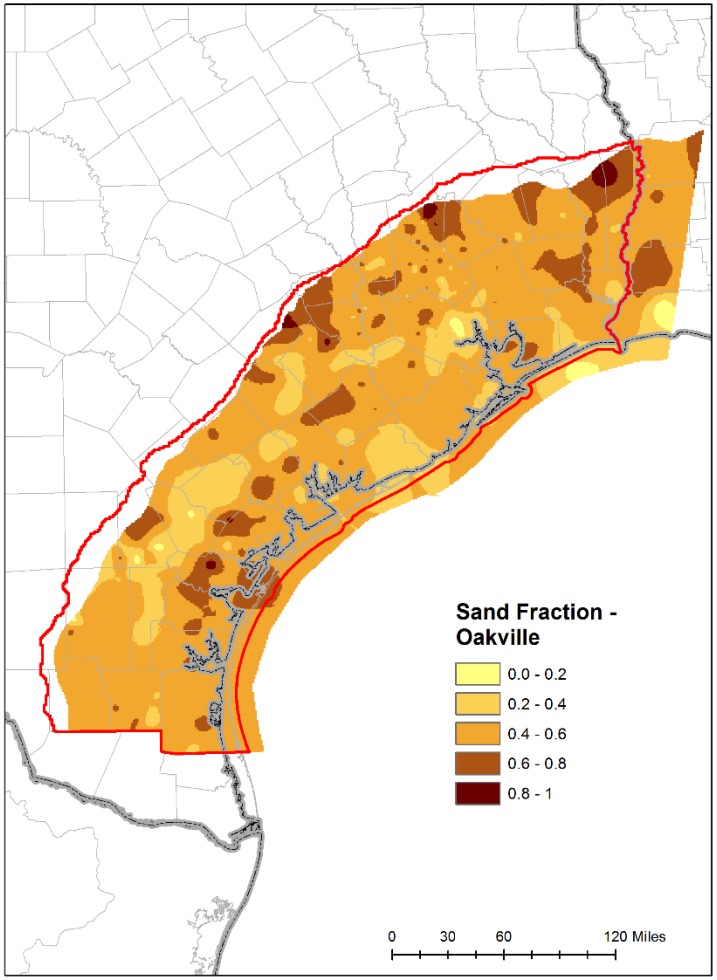
Site Geology - Jasper Aquifer

Upper Largato



Oakville



0.0 – 0.3 sand fraction is a potential hydraulic barrier if sufficiently thick

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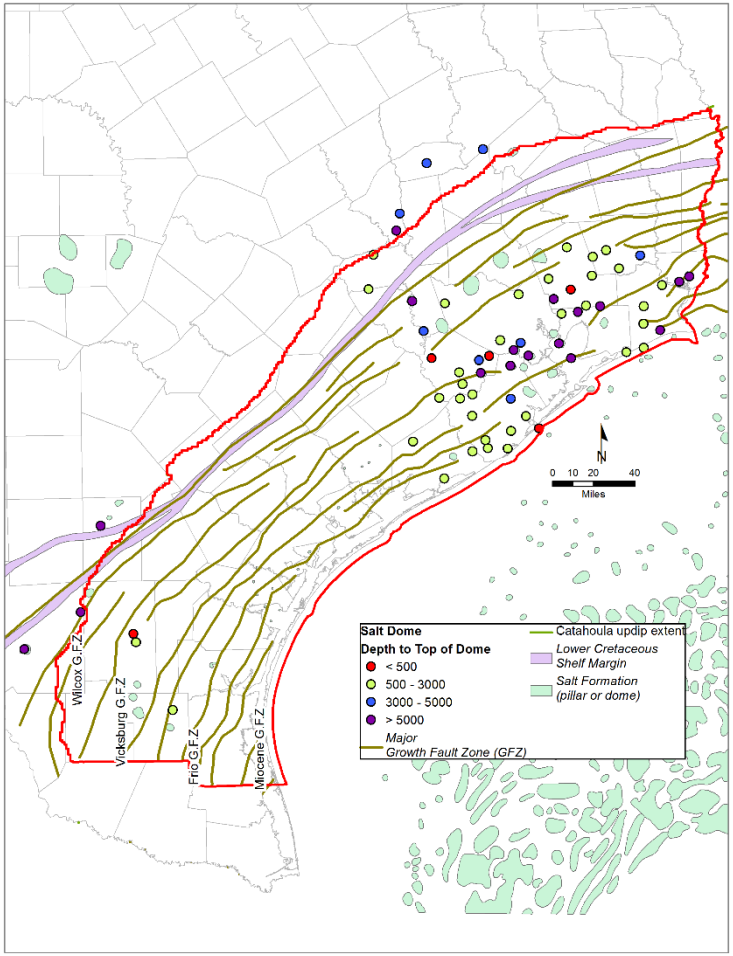
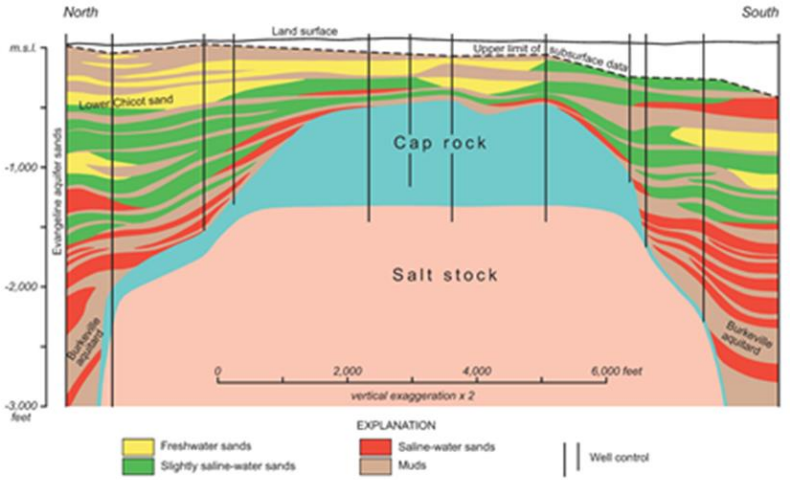
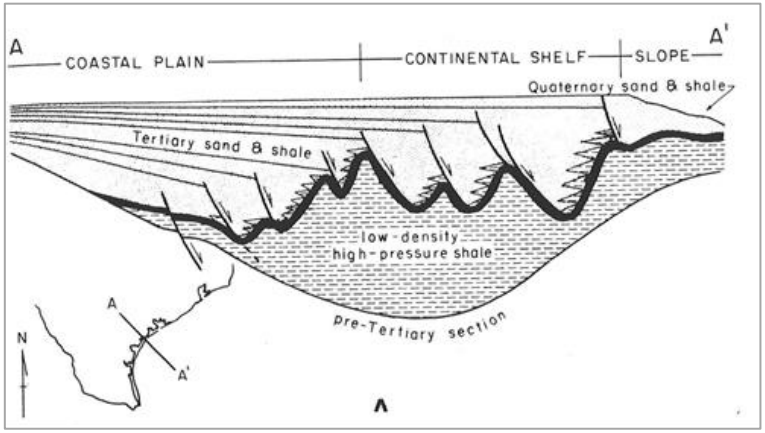
Site Geology



Salt Dome



Growth Fault



Growth faults are a potential hydraulic barrier if offset is large compared to sand thickness

Water Quality - Total Dissolved Solid Concentrations

Groundwater Salinity Classification	Total Dissolved Solids Concentration (units: milligrams per liter)	
Fresh	0 to 1,000	← EPA Secondary Drinking Water Limit (500 mg/l) ← TCEQ Secondary Drinking Water Limit (1,000mg/l)
Slightly Saline	1,000 to 3,000	
Moderately Saline	3,000 to 10,000	← Major/Minor (Texas) Mapped Limit (3,000 mg/l) In Gulf Coast, Texas Railroad Commission Defines Useable water at (3,000 mg/l) for Groundwater Protection
Very Saline	10,000 to 35,000	← EPA Underground Source of Drinking Water (USDW) is defined as having a less than 10,000 mg/L
Brine	Greater than 35,000	← Seawater

Brackish Water (1,000 mg/L to 10,000 mg/L)

Modified from Winslow and Kister, 1956

Definition of Total Dissolved Solid Concentrations

"**Dissolved Solids:** (sum of constituents) This is calculated based on the values, in mg/L, of the major anions and cations, silica, and 0.4917 of the bicarbonate. Nothing is added into the 'TDS' from the infrequent table. However, some high values that might be considered as contributing to the TDS, while not included in the TWDB's formula, are Fe, Br, B, Ba, and Zn. If a sample is missing one or more major anions or cations so that the analysis is unbalanced, a TDS determined by residue can be entered into the dissolved solids field. However, if all constituents are present, the TDS is calculated and replaces anything else in the field" (**TWDB, 2016**)

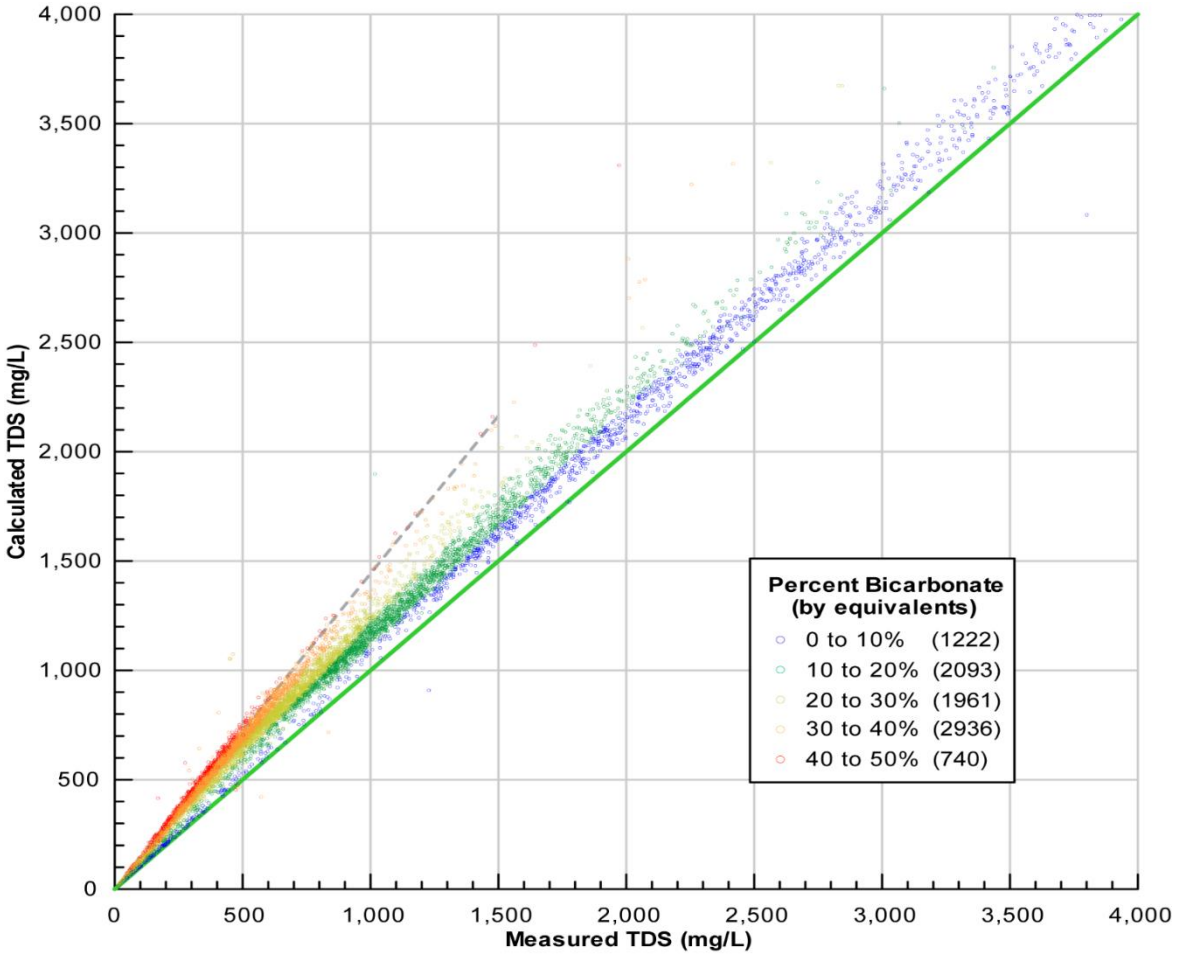
The United States Environmental Protection Agency (EPA) defines TDS as the total dissolved (filterable) solids present in a fluid as determined by use of the method specified in Title 40 of the Code of Federal Regulations (40 CFR) Part 136." The method specified in Title 40 of the Code of Federal Regulations (40 CFR) Part 136 subchapter D (Water Programs) and Part 136 (Guidelines Establishing Test Procedures for the Analysis of Pollutants) (**EPA, 2016**).

The **Government of Canada** defines TDS as "Total dissolved solids (TDS) comprise inorganic salts and small amounts of organic matter that are dissolved in water. The principal constituents are usually the cations calcium, magnesium, sodium and potassium and the anions carbonate, bicarbonate, chloride, sulphate and, particularly in groundwater, nitrate (from agricultural use)" (Government of Canada, 2016).

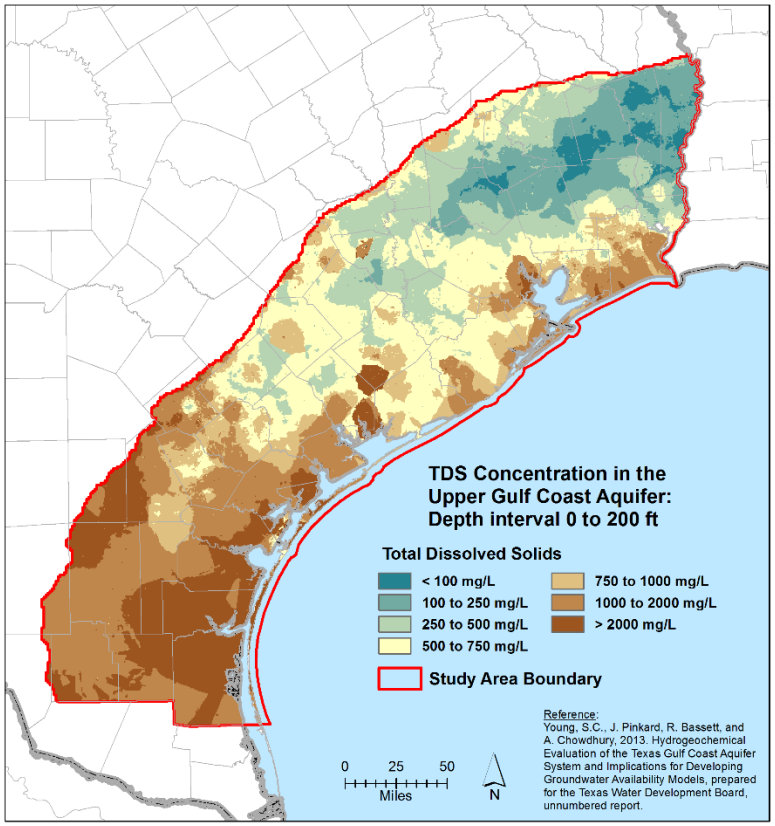
Measured (or Reported by TWDB) and Calculated TDS

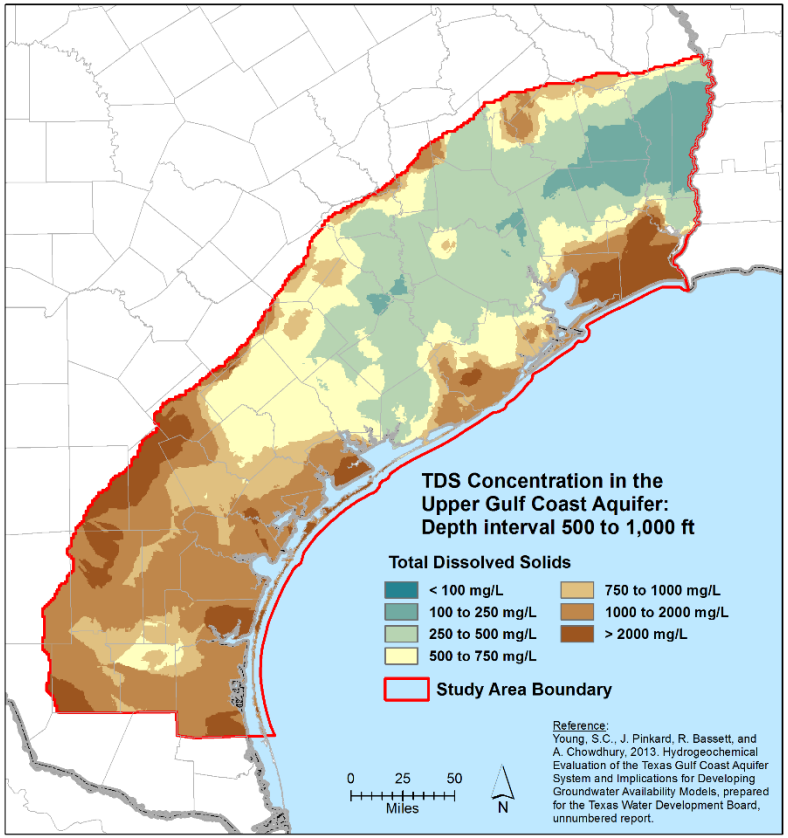
$TDS_{(calculated)}$ = total of ions + SiO_2 [Collier, 1993a]

$TDS_{(measured)}$ = total of ions – (0.508 * HCO_3^-) + SiO_2 [TWDB, 2016]



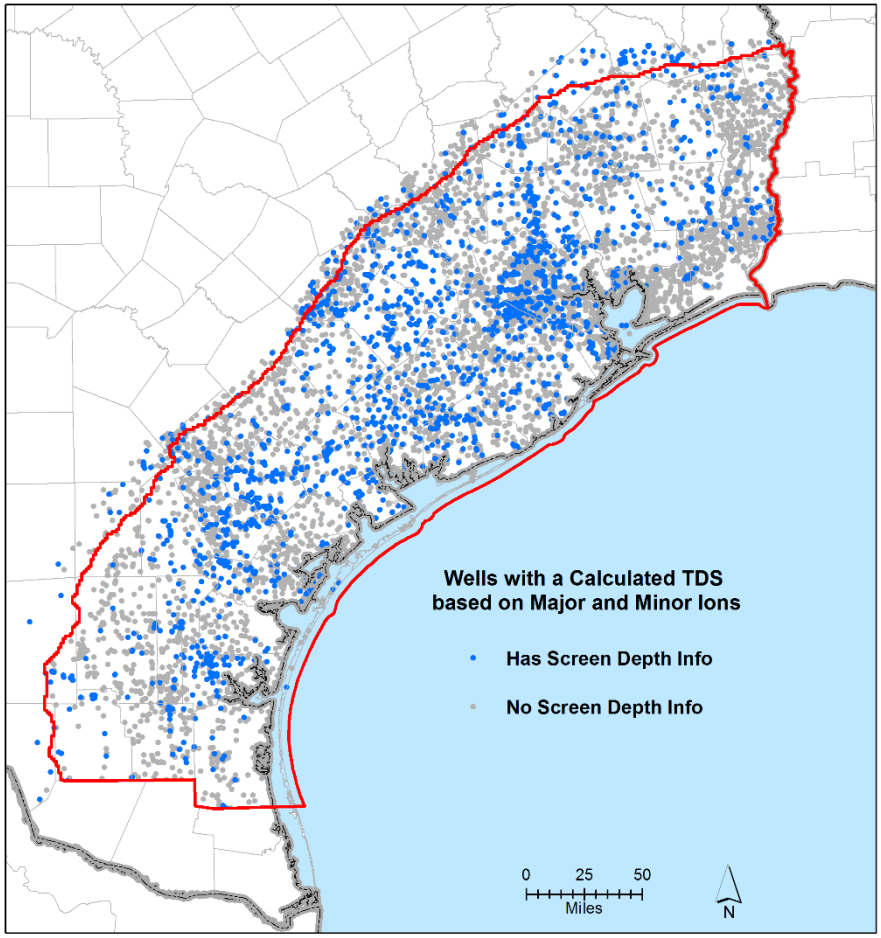
Site Hydrogeochemisty – $TDS_{(measured)}$ Concentration in Upper Gulf Coast Aquifer from the TWDB Groundwater Well Database

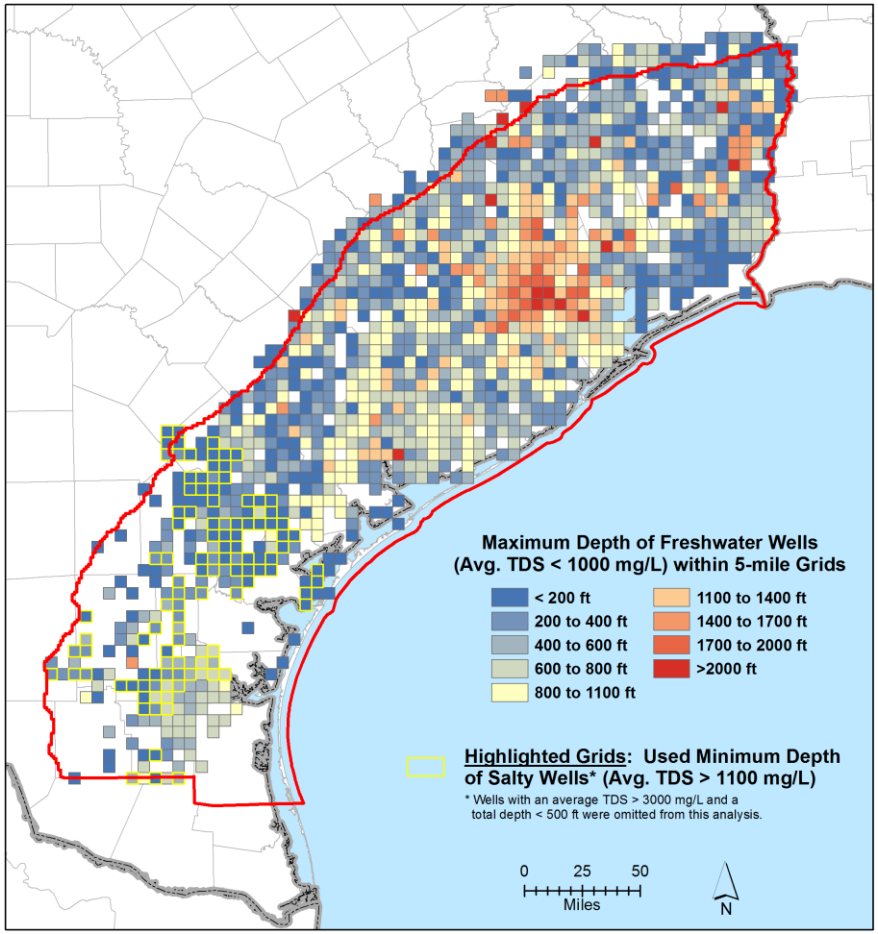




Young, S.C., Pinkard, J., Bassett, R., and Chowdhury, A. 2013. Hydrogeochemical Evaluation of the Texas Gulf Coast Aquifer System and Implications for Developing Groundwater Availability Models, prepared for the Texas Water Development Board, unnumbered report.

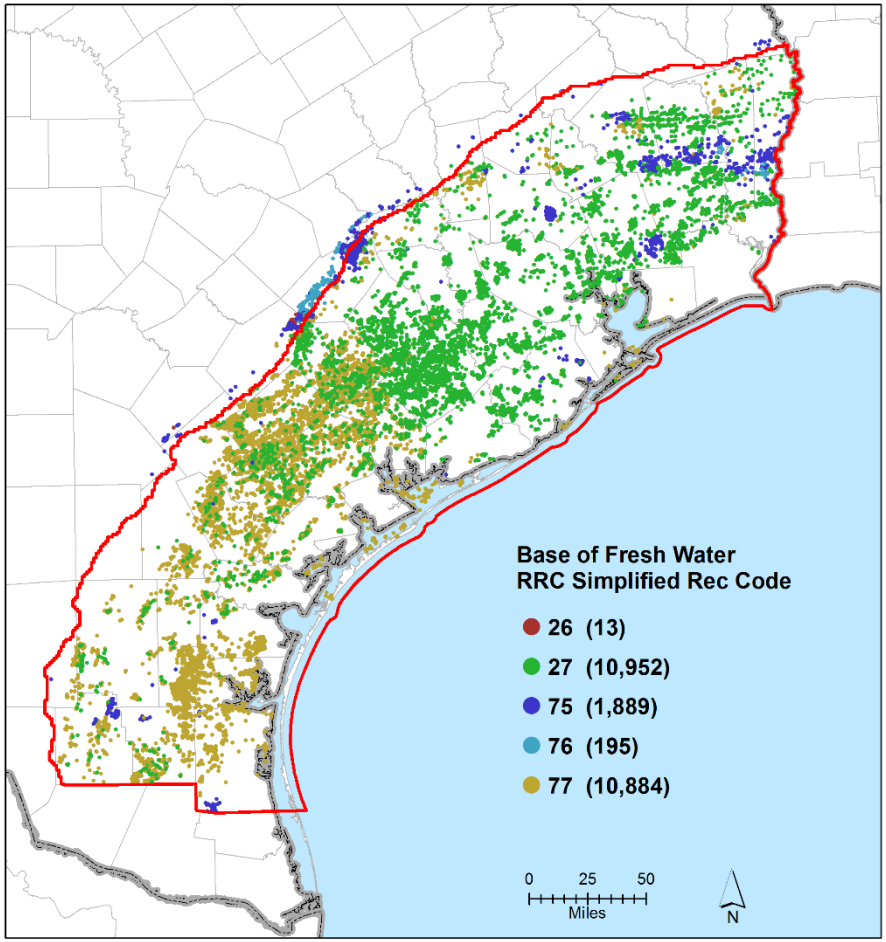
Estimated Base of Freshwater ($TDS_{measured}$ < 1000 mg/L) : ~ 9,000 Water Wells

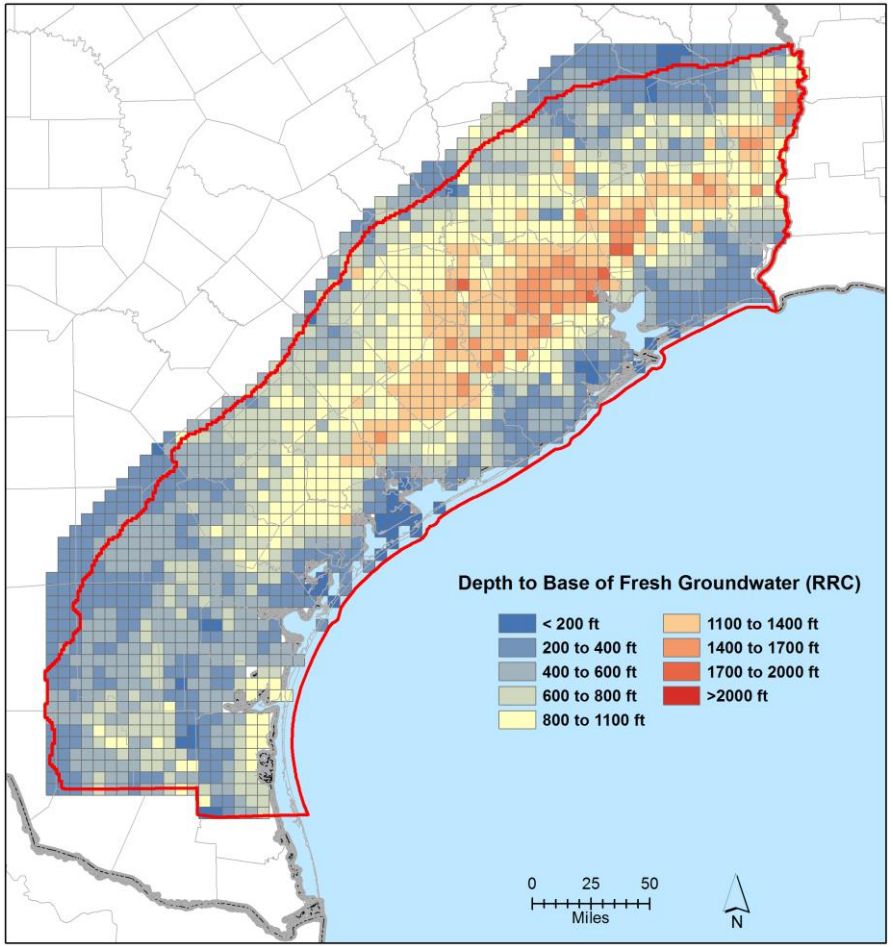




Geological stratum containing water with TDS less than 1,000 mg/l (freshwater) is excluded

Estimated Base of Freshwater (TDS < 1000 mg/L) : ~ 24,000 TRRC Codes

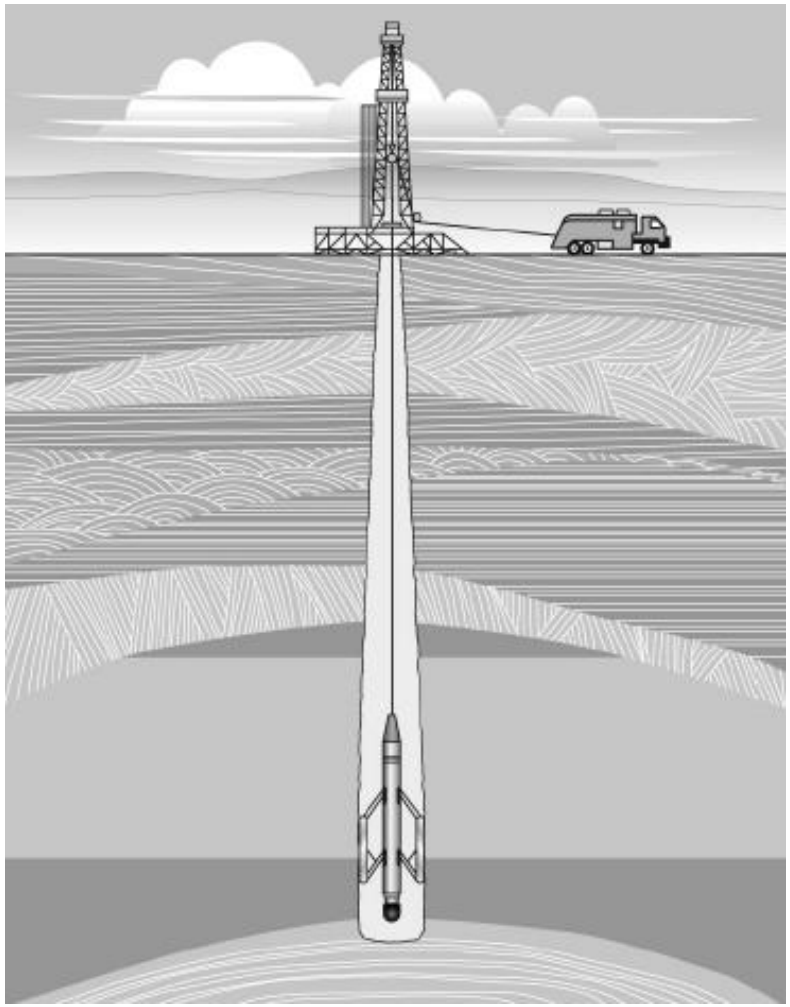




Geological stratum containing water with TDS less than 1,000 mg/l (freshwater) is excluded

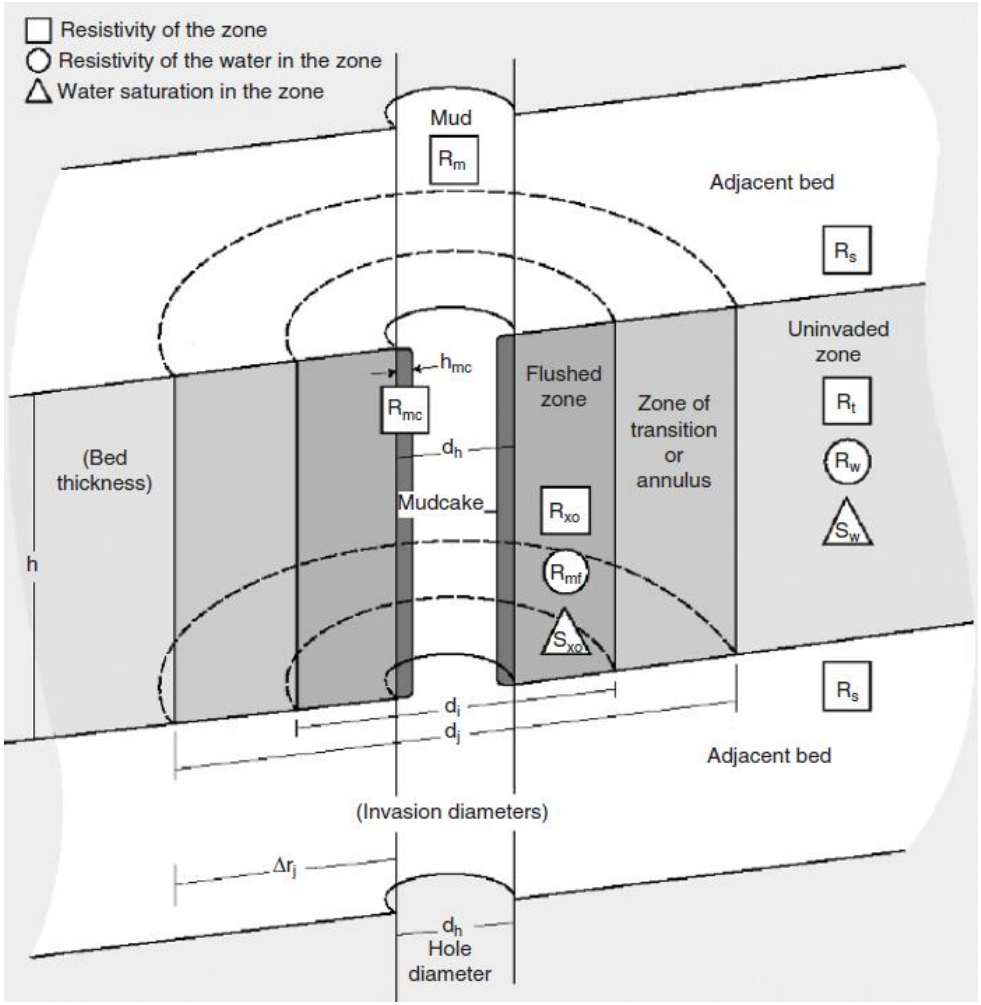
Calculation of Total Dissolved Solids from Logs

- What is a geophysical log?
  - A record of specific physical property measurements and variations by depth
  - A record of the rock material characteristics that were penetrated by the borehole
  - Most commonly used by scientists and engineers within the oil and gas and mining industries to characterize geologic formations



Calculation of Water Quality from Logs

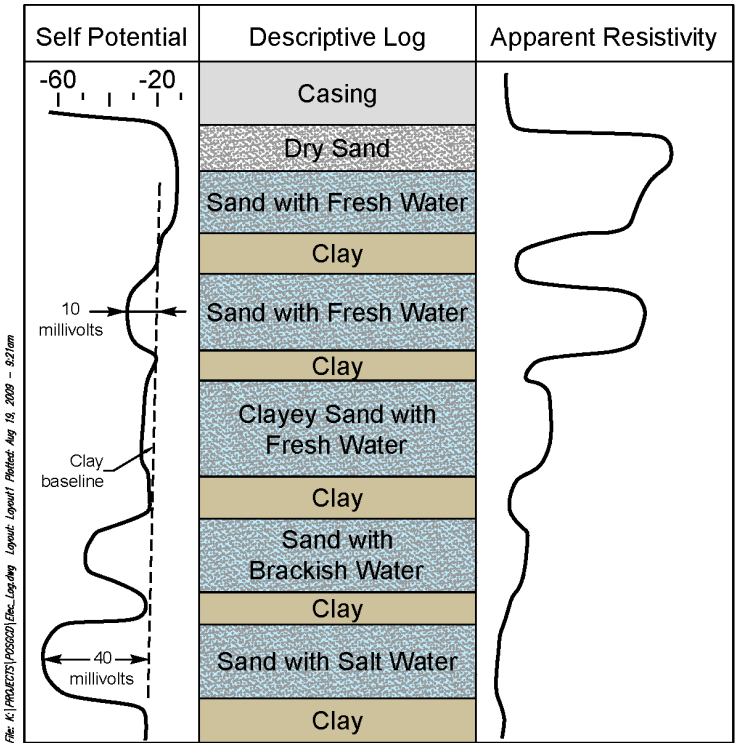
- Different resistivity tools have different depths of investigation



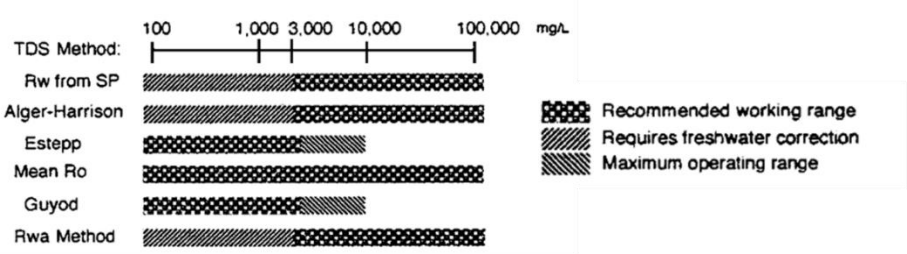
From Schlumberger, 2009

Calculation of Water Quality from Logs

Log response is a function of the geologic material and the groundwater



Estepp (1998, 2010) discusses six methods for estimating TDS from geological logs



TDS Method	SP	R_{mf}	R_{xo}	Rt	m	ϕ	est k
R_w from SP	♦	♦					
Alger-Harrison		♦	♦	♦			
Mean Ro				♦			
Estepp			♦	♦	♦		
Guyod				♦	♦	♦	♦
R_{wa}				♦	♦	♦	

(note that SP = spontaneous potential reading in millivolts, Rmf = resistivity of mud filtrate, Rxo = resistivity of flushed zone, Rt = true deep resistivity (ohms), m = cementation exponent, Φ = porosity, and est k = Guyod water chemistry factor).

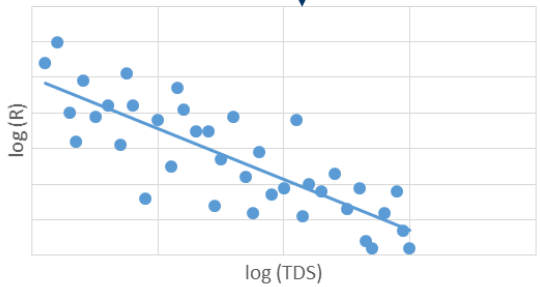
Approach for Developing Relationships For Estimating TDS from Geophysical Glos

TDS and measured screen intervals from water wells

Digitized and Raster Geophysical logs near water wells

From available "water wells-geophysical log" pairs filter by parameters in Box A

Create graph of R_o versus TDS and develop an equation for TDS = f(R_o)



Box A: Parameters

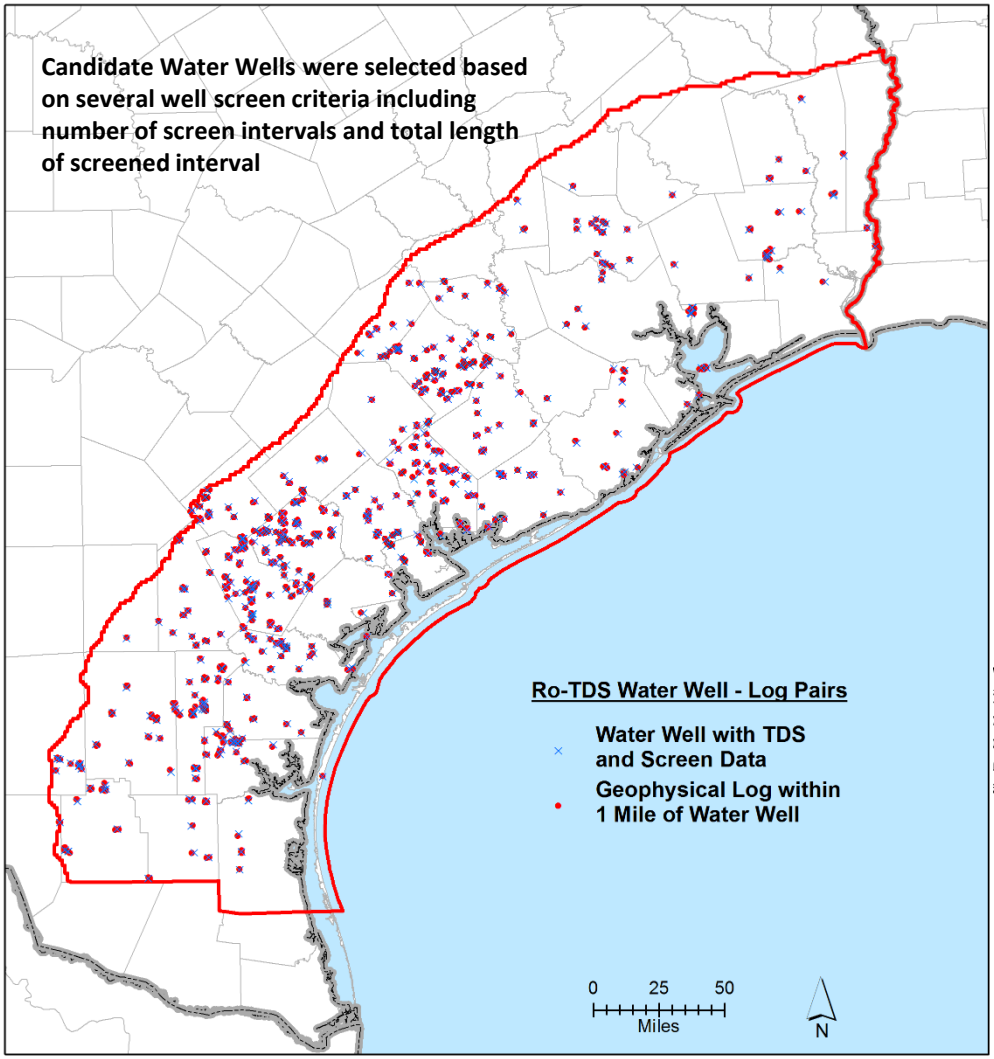
- Aquifer
- Formations
- Length of water well screens
- Depth of water well screens
- Horizontal distance between water well and location of geophysical log
- Region

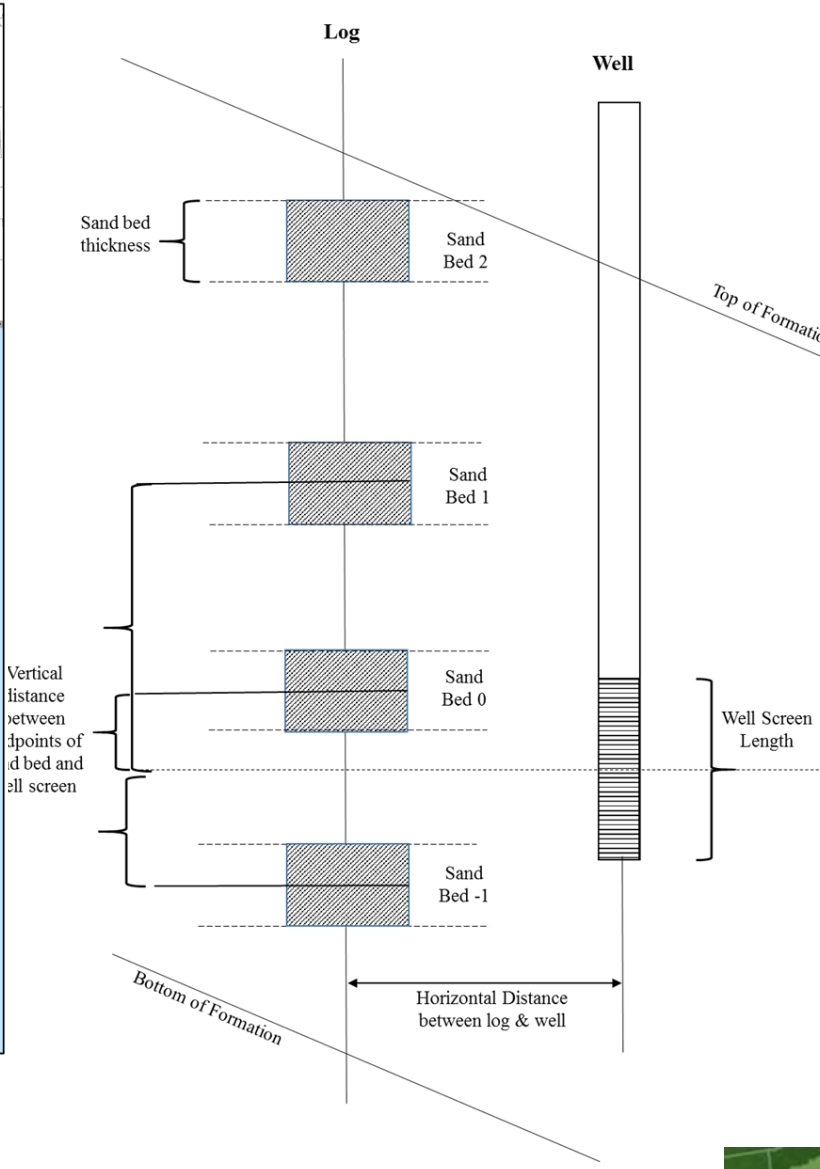
Check Results

Apply R_o cutoffs for TDS = 1,000 for the different "filtered" groups of data and check results against calculated base of 1,000 mg/L TDS from field data and Texas Railroad Commission base of fresh water. Evaluate confidence limit and determine if additional grouping is appropriate

Evaluate utility of Ro method for TDS values between than 3,000 mg/L and 10,000 mg/L. Develop Rwa method as an option for TDS value between 3,000 and 35,000. Where appropriate compare predictions of high TDS to measured values of high TDS concentrations.

Calculation of Water Quality from Logs –
Primary Data Set for Developing and Testing Technique



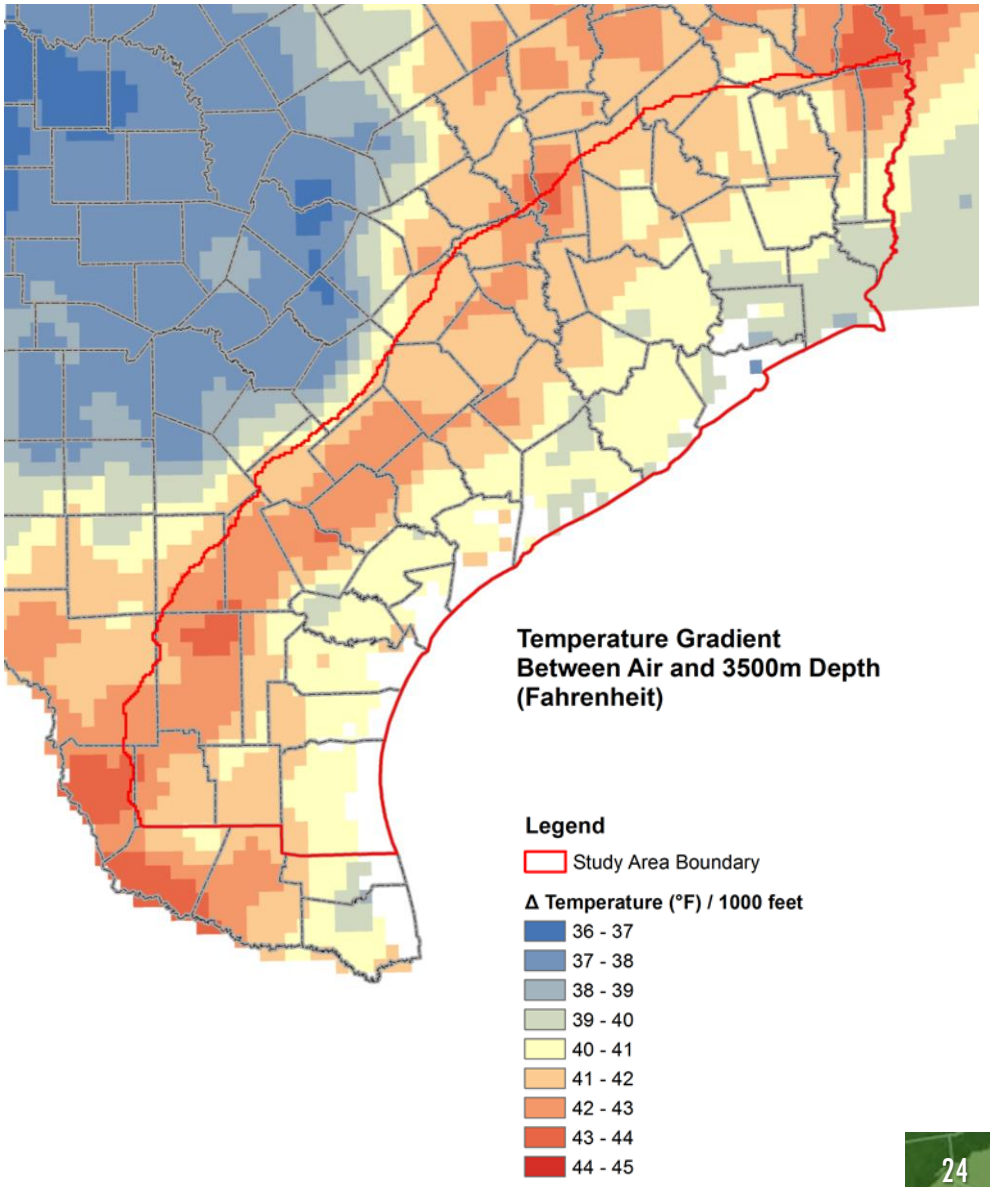


Resistivity of Sands are Temperature Corrected

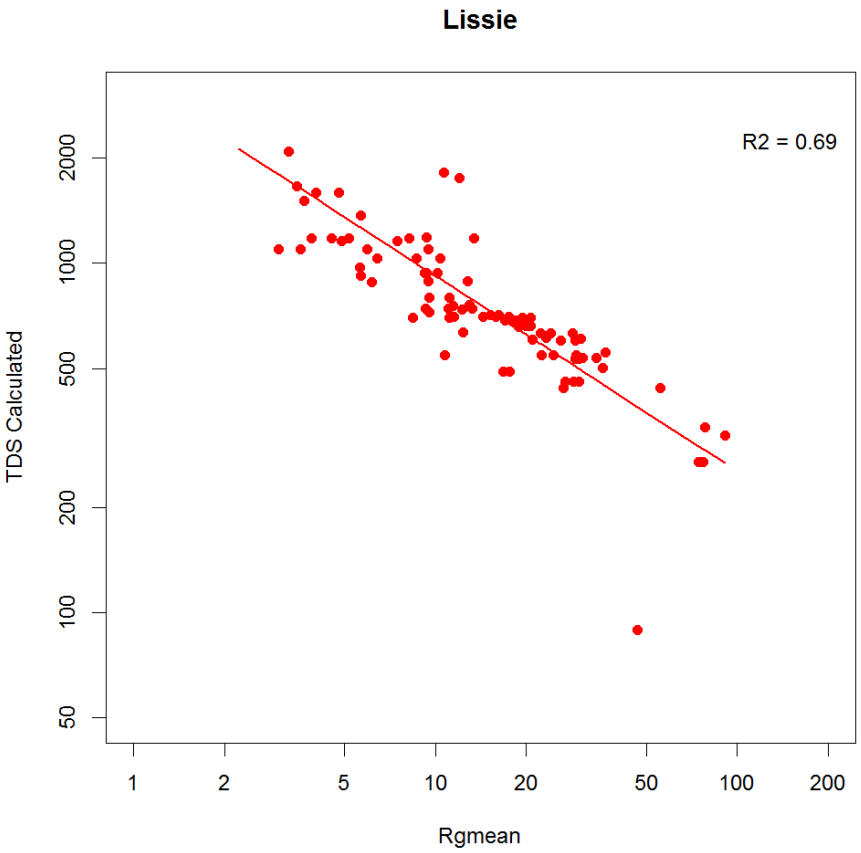
For Fahrenheit

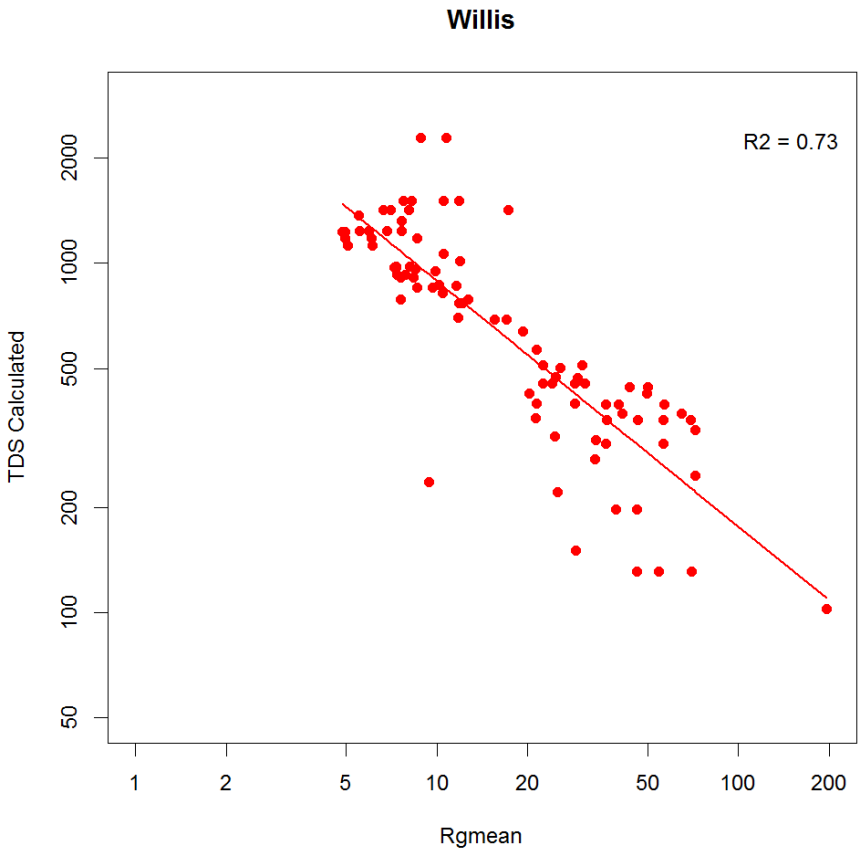
$$R_{W^2} = R_{W^1} \frac{(T_1 + 6.77)}{(T_2 + 6.77)}$$

Temperature (°F)	Resistivity (ohm-m)
77	10.0
157	5.1

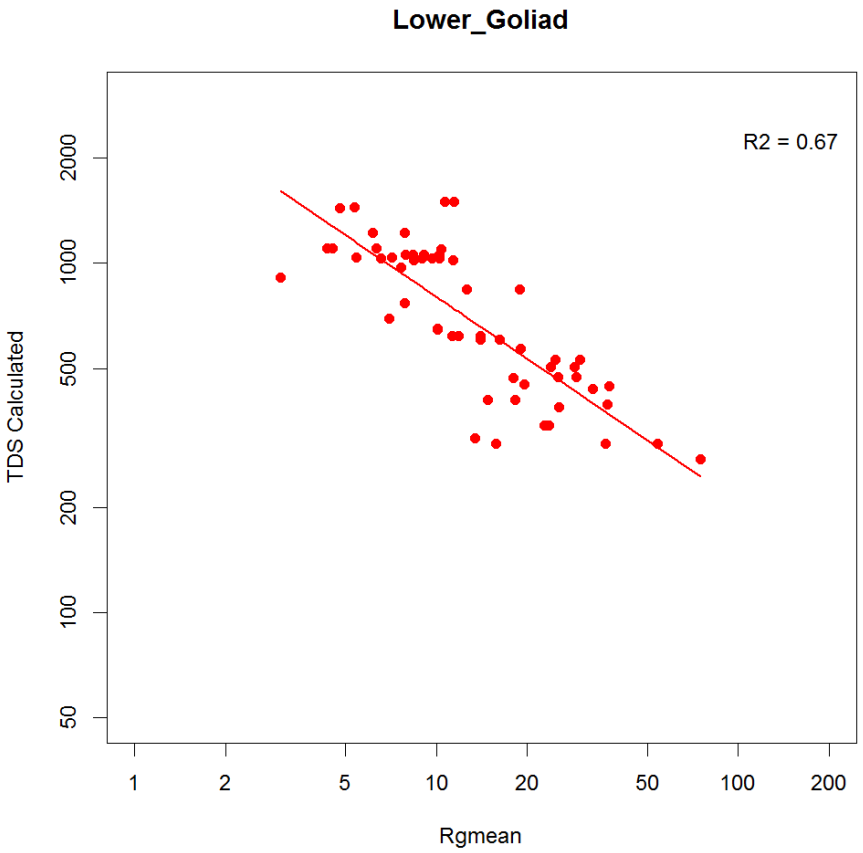


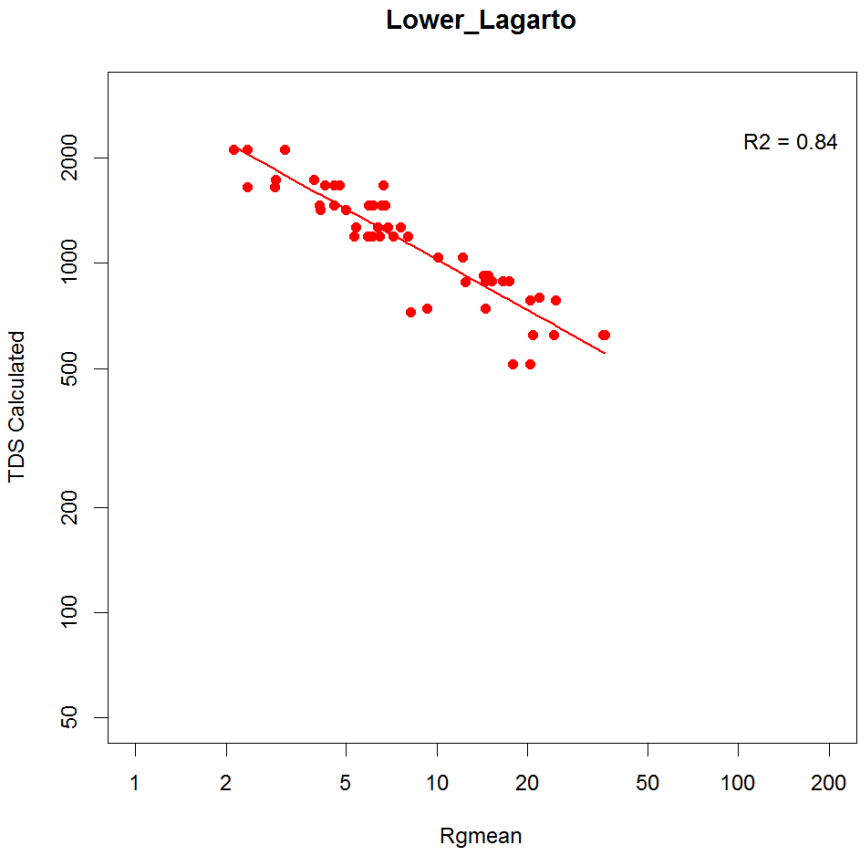
Ro-TDS Method is Based on Field Data





Ro-TDS Method is Based on Field Data





R_{wa} Method that is Based on Archie Equation

$$R_{we\,77°F} = \Phi^m \times R_{o\,77°F}$$

Where

$R_{we77°F}$ = resistivity of water equivalent (ohm-m)

Φ = porosity

m = the cementation exponent

$R_{o77°F}$ = the resistivity of a 100 percent water saturated formation (ohm-m)

F= formation factor = Φ^m

For NaCL solutions

$$C_{w77°F} = 10{,}000 / R_{we77°F}$$

$$TDS = ct * C_{w77°F}$$

Where:

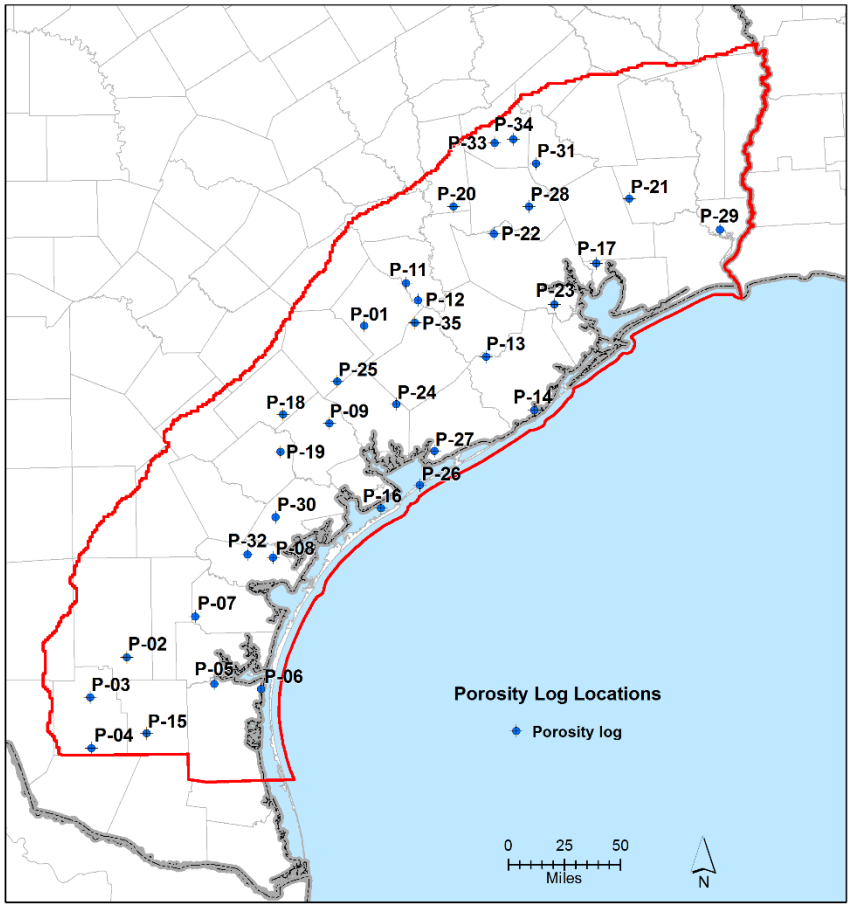
$C_{w77°F}$ = Specific Conductance (µmhos/cm at 25° C or 77° F)

$R_{w77°F}$ = water resistivity (Ohm-m at 25° C or 77° F)

Ct = 0.5 to 0.7 for NaCl solutions

TDS = Total Dissolved Solids (mg/L)

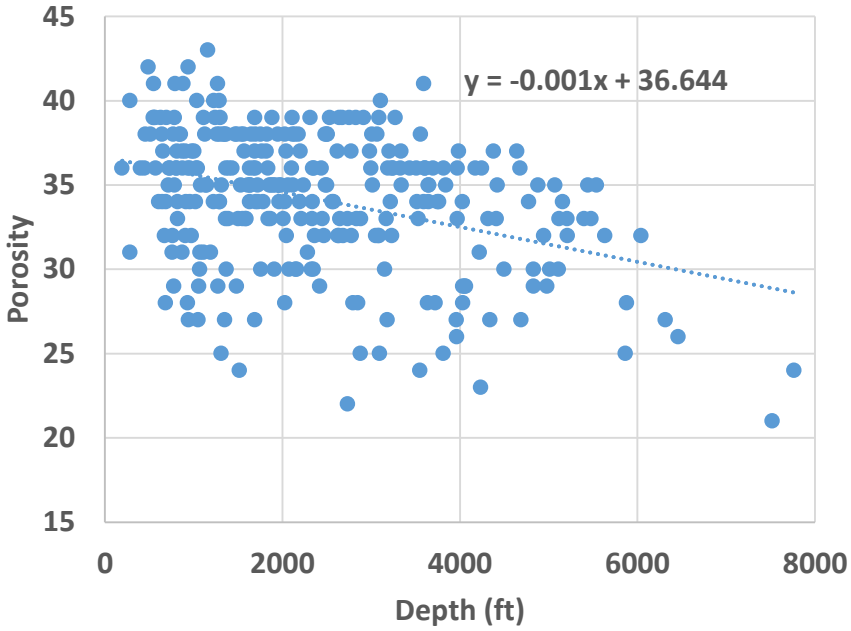
Site Geology - Porosity Measurements



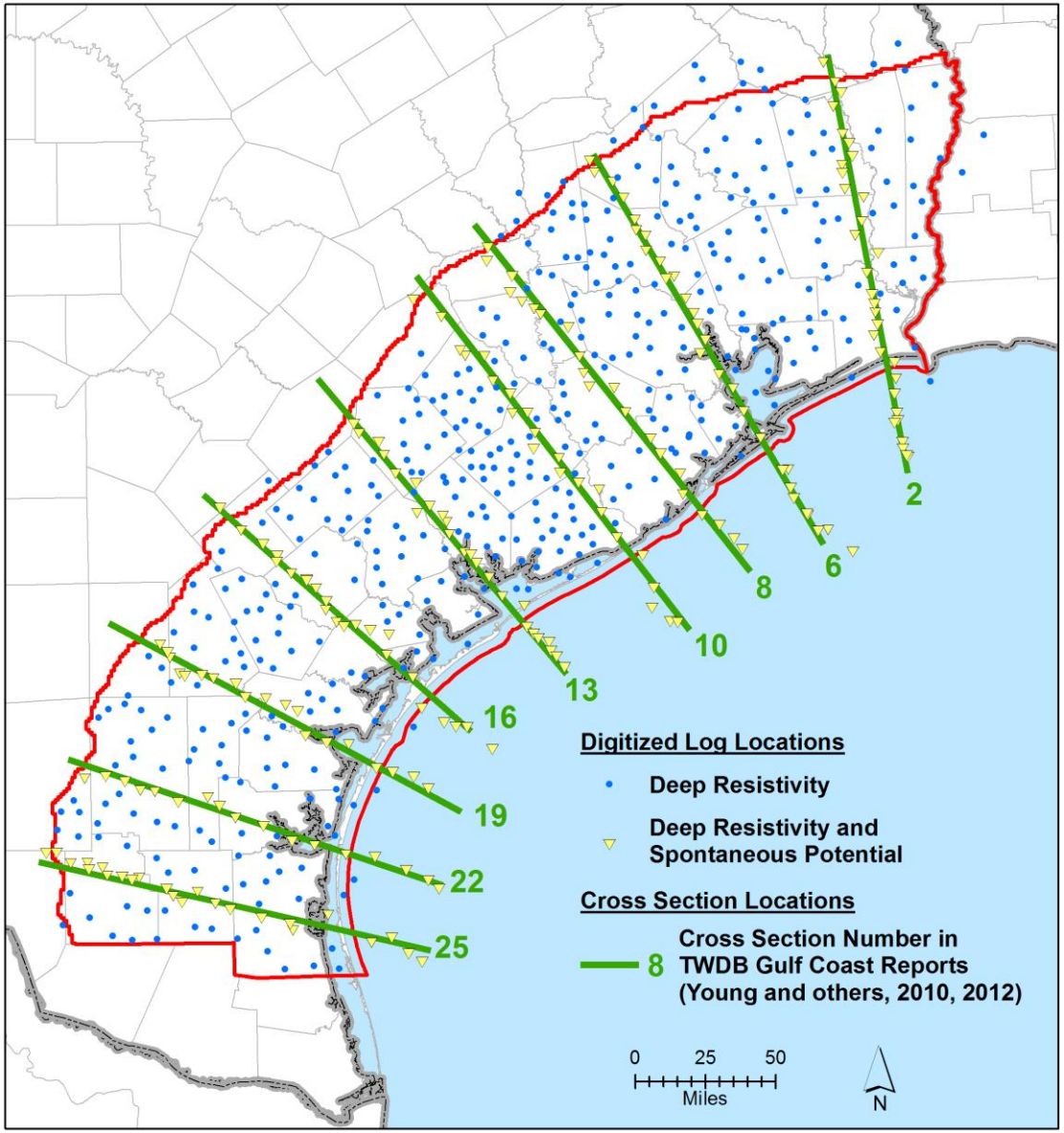
293 Measurements

35 locations

1% drop per 1000 feet



Network of Geophysical Logs Used to Characterize Stratigraphy, Lithology, and Water Quality of Texas Gulf Coast



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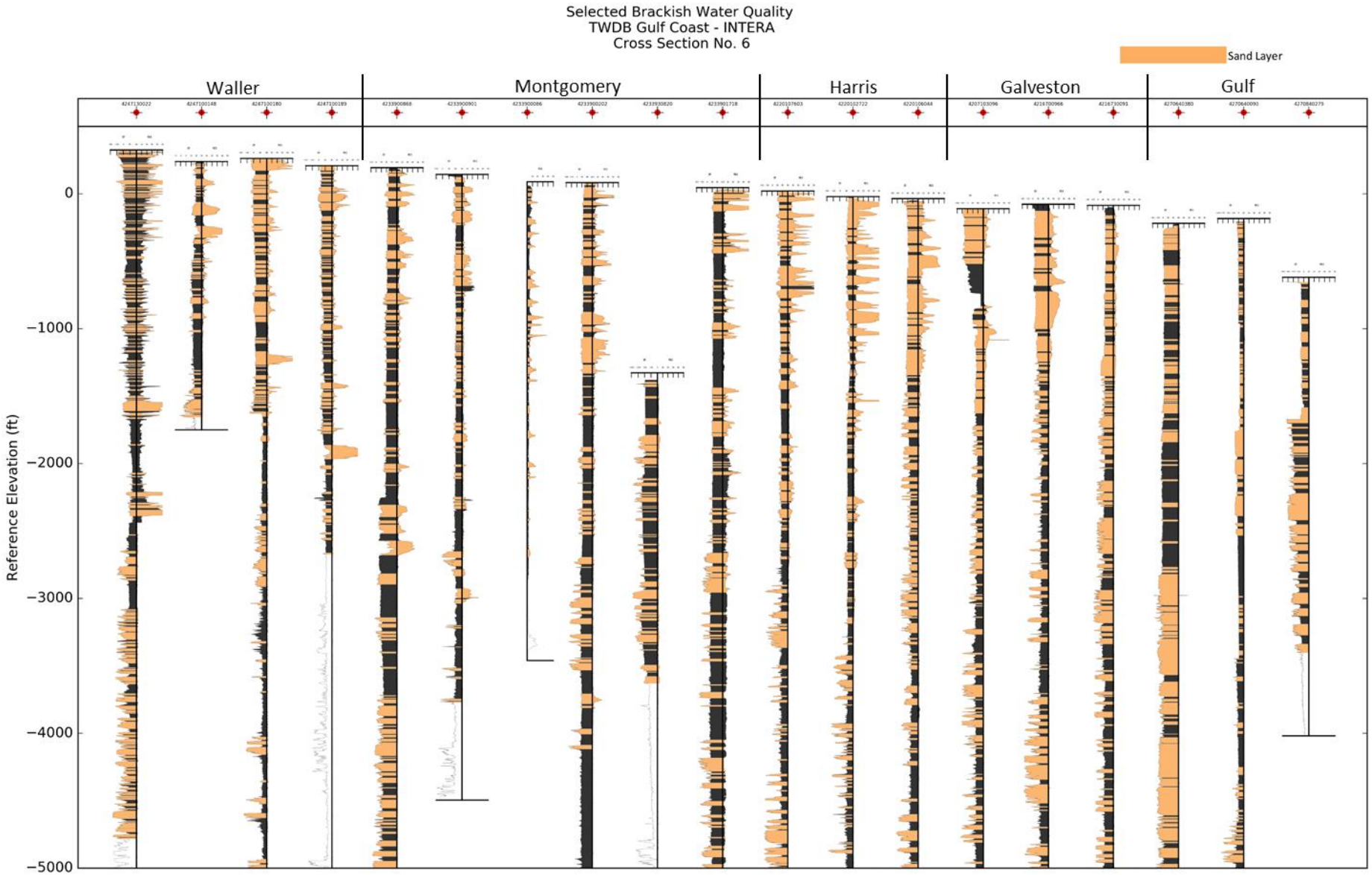
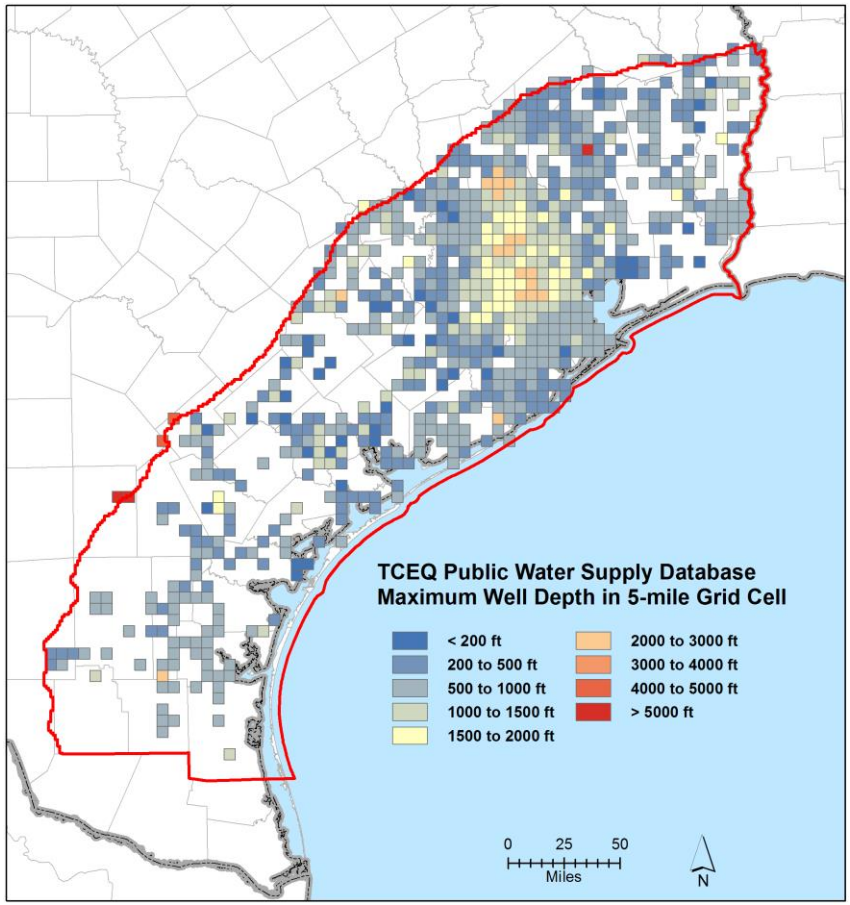
Example of Identification of Sand Beds on Geophysical Logs

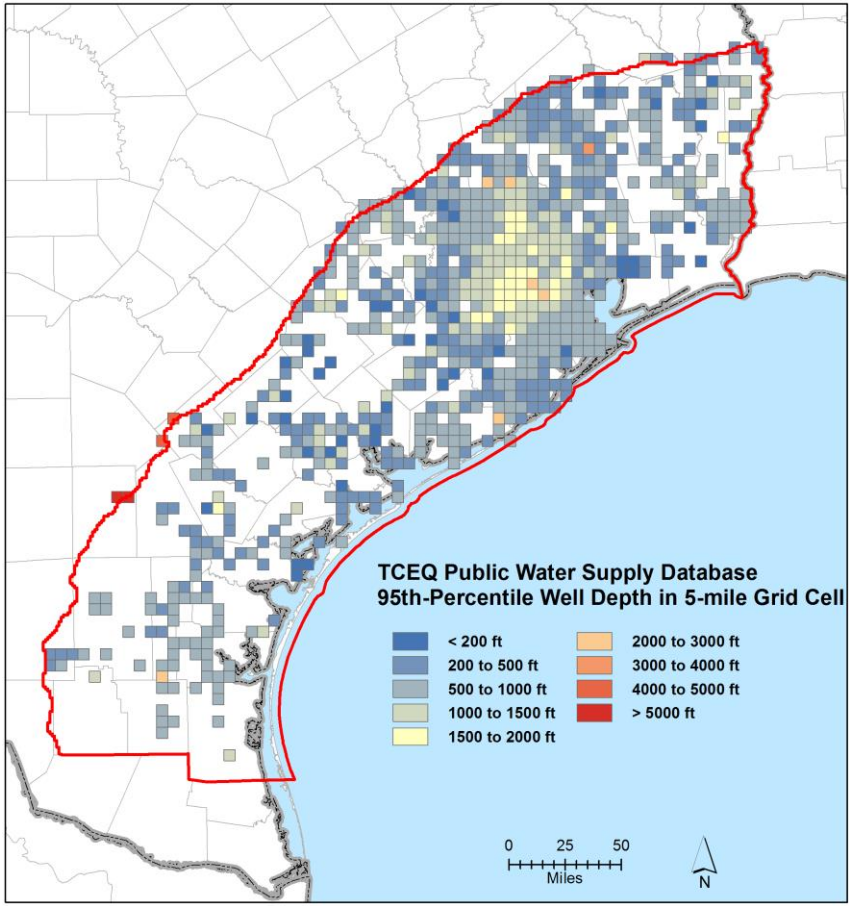


Muncipical Wells

Maximum Depth of A Municipal Well in a 25 square mile grid

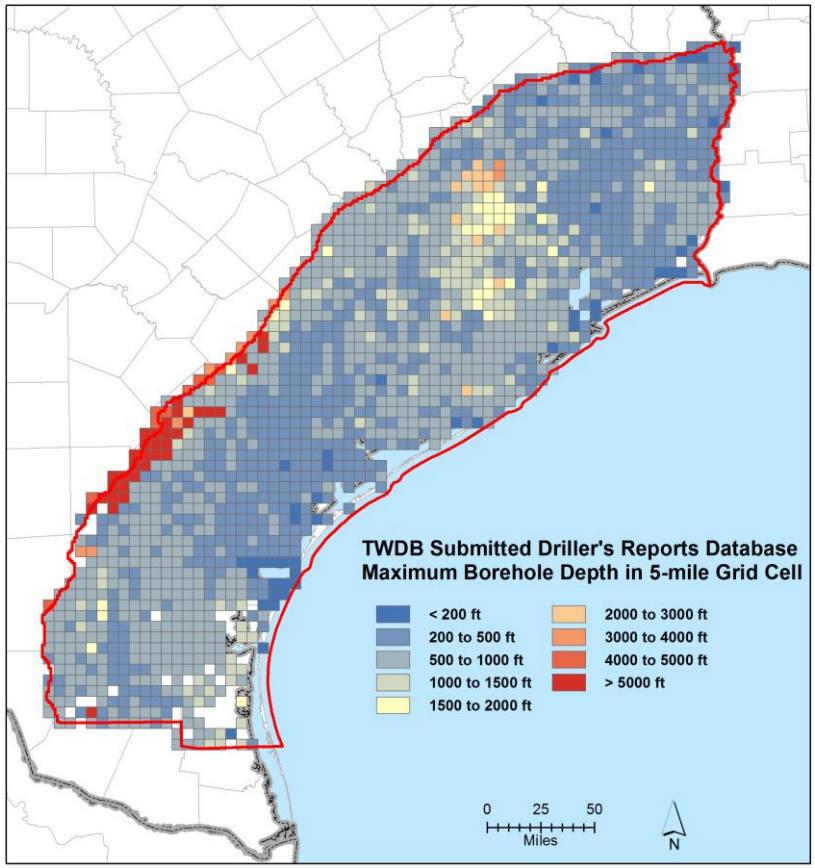


95% of Depth of Municipal Well in a 25 square mile grid

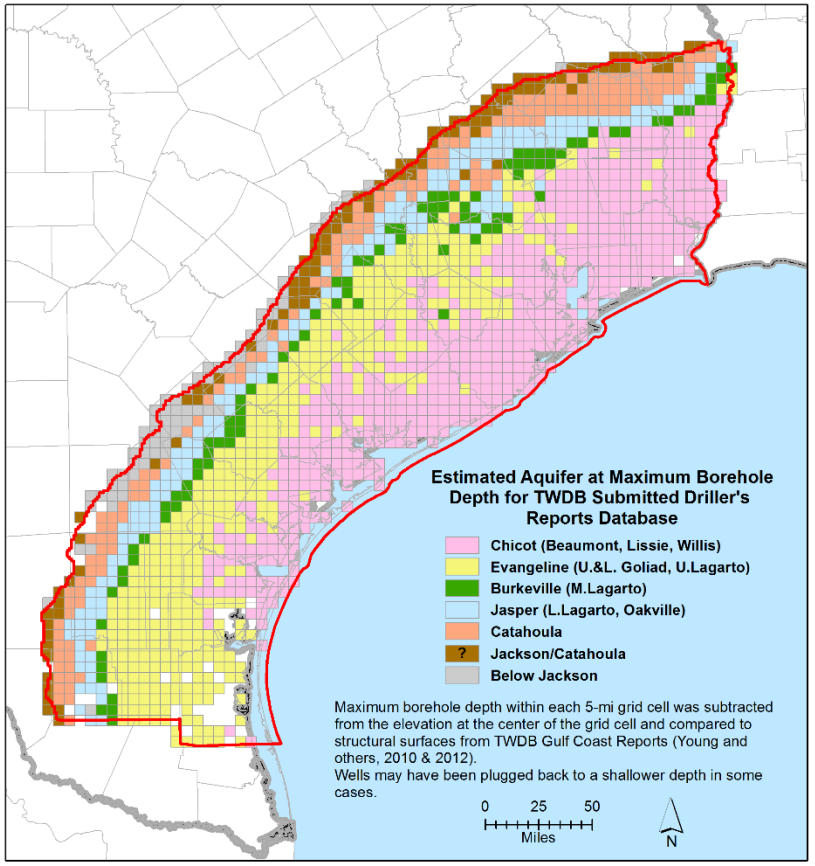


Submitted Drillers Reports

Maximum Depth of Wells from the Submitted Drillers Report in a 25 square mile grid

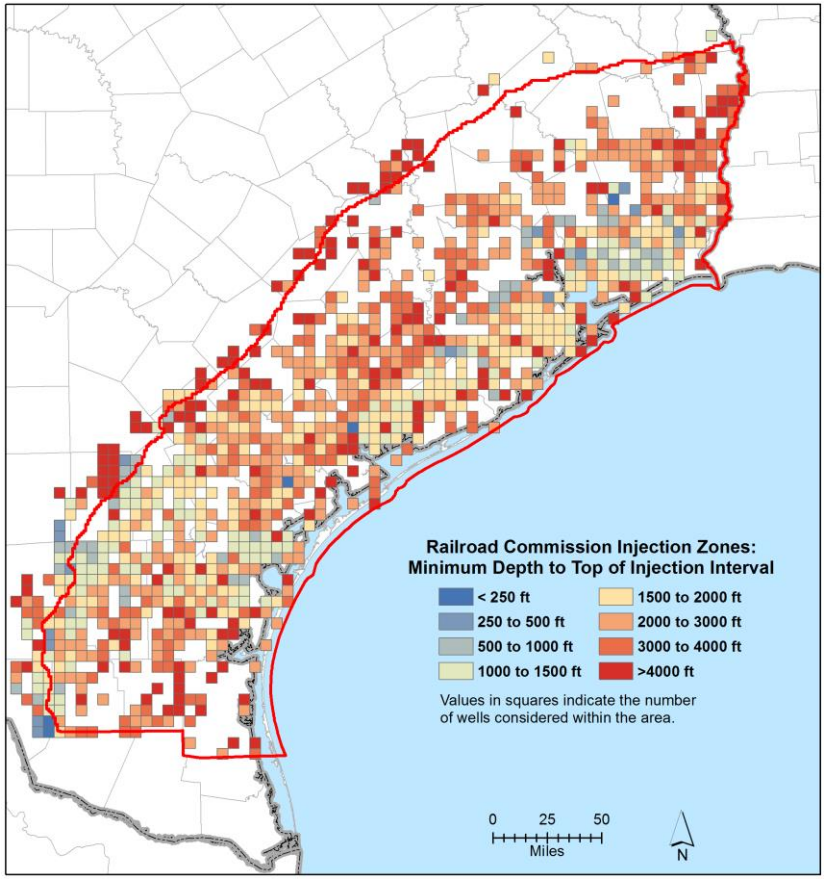


Geologic Stratum Associated with the Maximum Depth of Wells from the Submitted Drillers Report in a 25 square

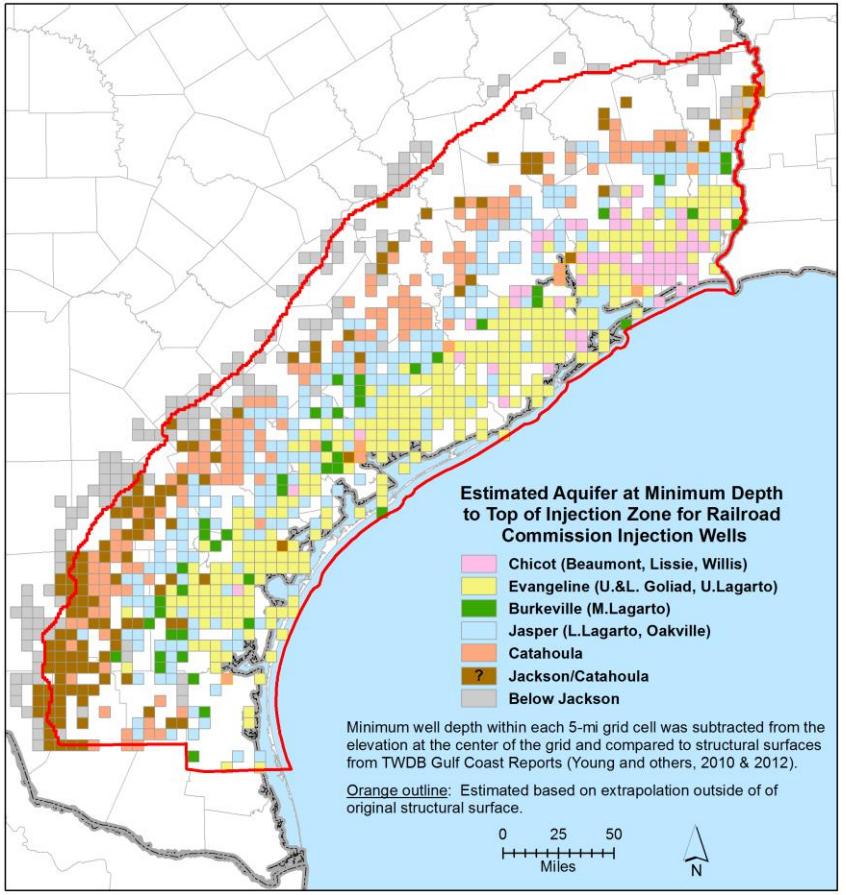


Disposal Wells Permitted Under Chapter 27

Shallowest Depth For Uppermost Permitted Zone



Geological Stratum Designated for Disposal



Exclusion includes an area of a geological stratum designated or used for wastewater injection under Chapter 27

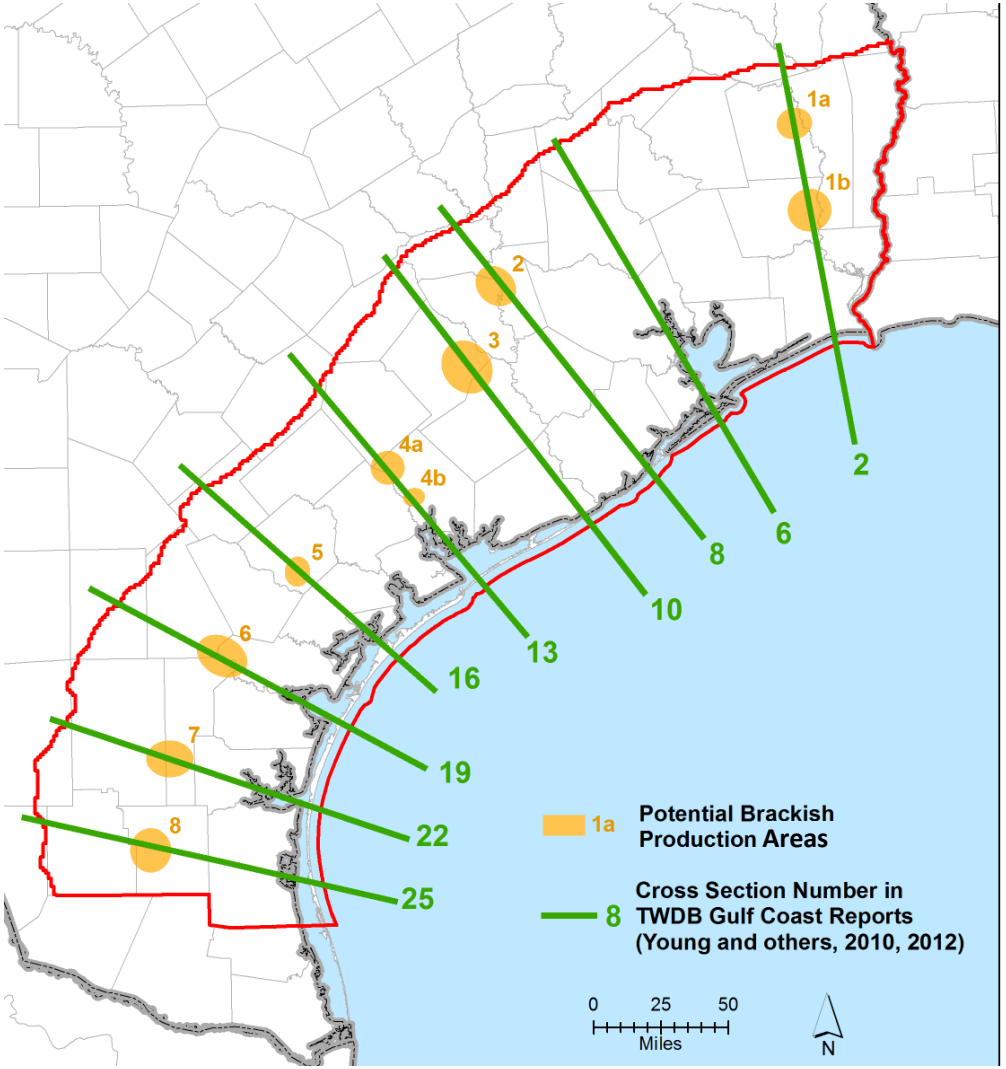
INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Criteria for Selecting Potential Production Areas

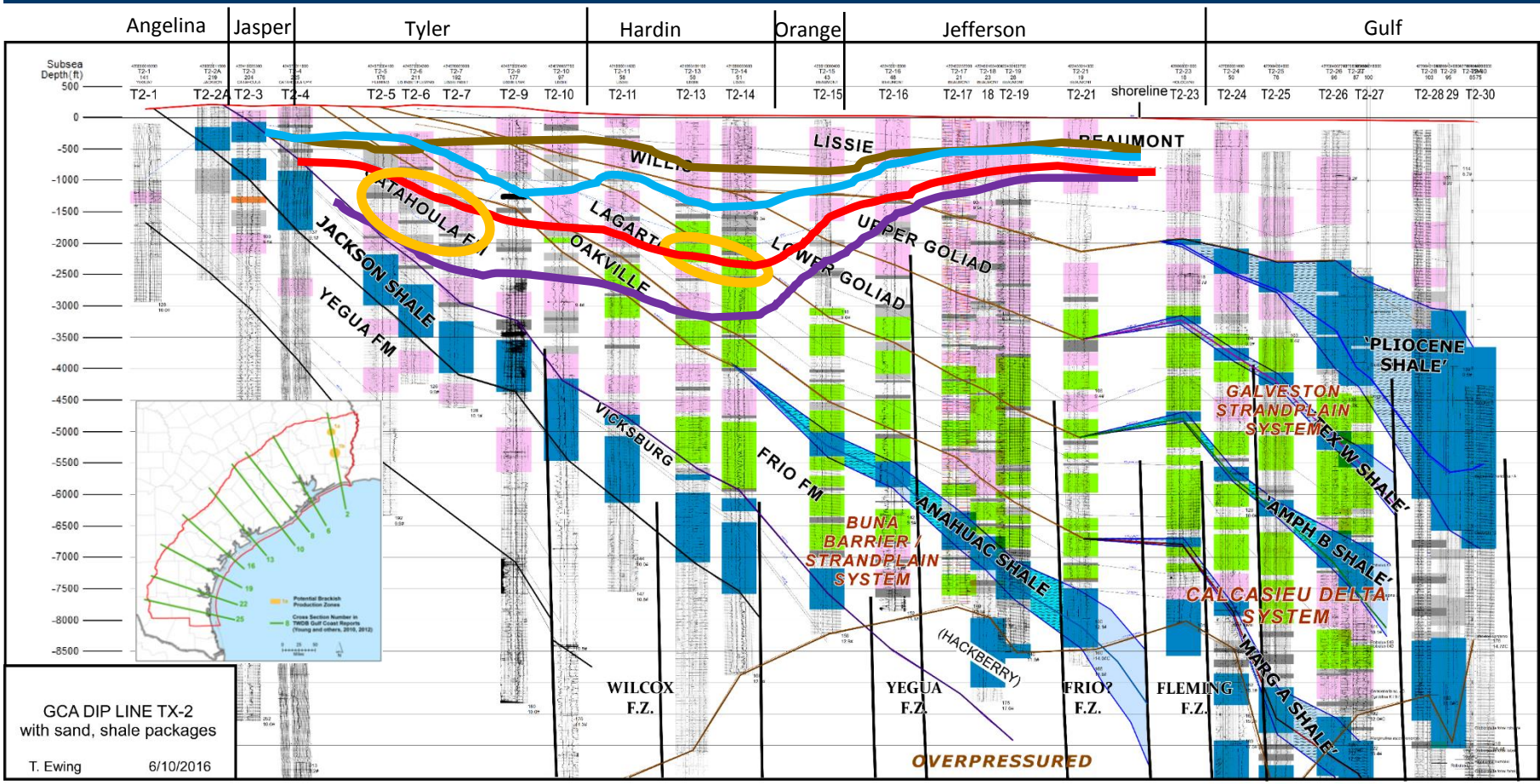
- Fresh Water (TDS < 1000 mg/L)
  - 400 feet below base of fresh water
  - hydrogeologic barrier consisting of at least 100 feet of clay rich (or very sand poor) deposits between top of PPA and base of fresh water
- Injection Wells or Disposal Wells
  - 500 feet above permitted zone for wells
  - Identification of a hydrogeological barrier consisting of at least 100 feet of clay rich (or very sand poor) deposits between base of PPA and top of permitted zone
- Existing water wells
  - Several hundred feet below existing water wells based on data from TCEQ public water wells and TWDB submitted driller reports

Potential Production Areas

PPA	Cross-Section	County	Elevation Range (ft, msl)	Formation	Estimated TDS (mg/L)
1a	2	Tyler	-700 to -1700	Catahoula	7,000 to 12,000
1b	2	Hardin	-1700 to -2200	Lower Goliad Lagarto	5,000 to 12,000
2	8	Austin Waller	-1500 to -2000	Oakville Catahoula	3,000 to 10,000
3	10	Colorado	-1300 to -1800	Oakville Catahoula	3,000 to 10,000
4a	13	Lavaca Victoria Jackson	-1500 to -2000	Lagarto Oakville	5,000 to 12,000
4b	13	Jackson	-1400 to -2000	Lower Goliad	4,000 to 12,000
5	16	Goliad	-1200 to -1500	Lagarto Oakville	4,000 to 10,000
6	19	Live Oak Jim Wells San Patricio	-1200 to -1600	Lagarto	5,000 to 10,000
7	22	Duval Jim Wells	-800 to -1500	Lagarto Oakville	5,000 to 12,000
8	25	Brooks	-1300 to -1800	Lagarto Oakville	5,000 to 12,000



Potential Production Areas #1a and #1b in Cross Section #2



Aggradational sandstones (shoreline)
Channel sandstone (over 50')
Sandstone packages (with sands >20')
Potential Production Area

Marine shales in wells
Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)
Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

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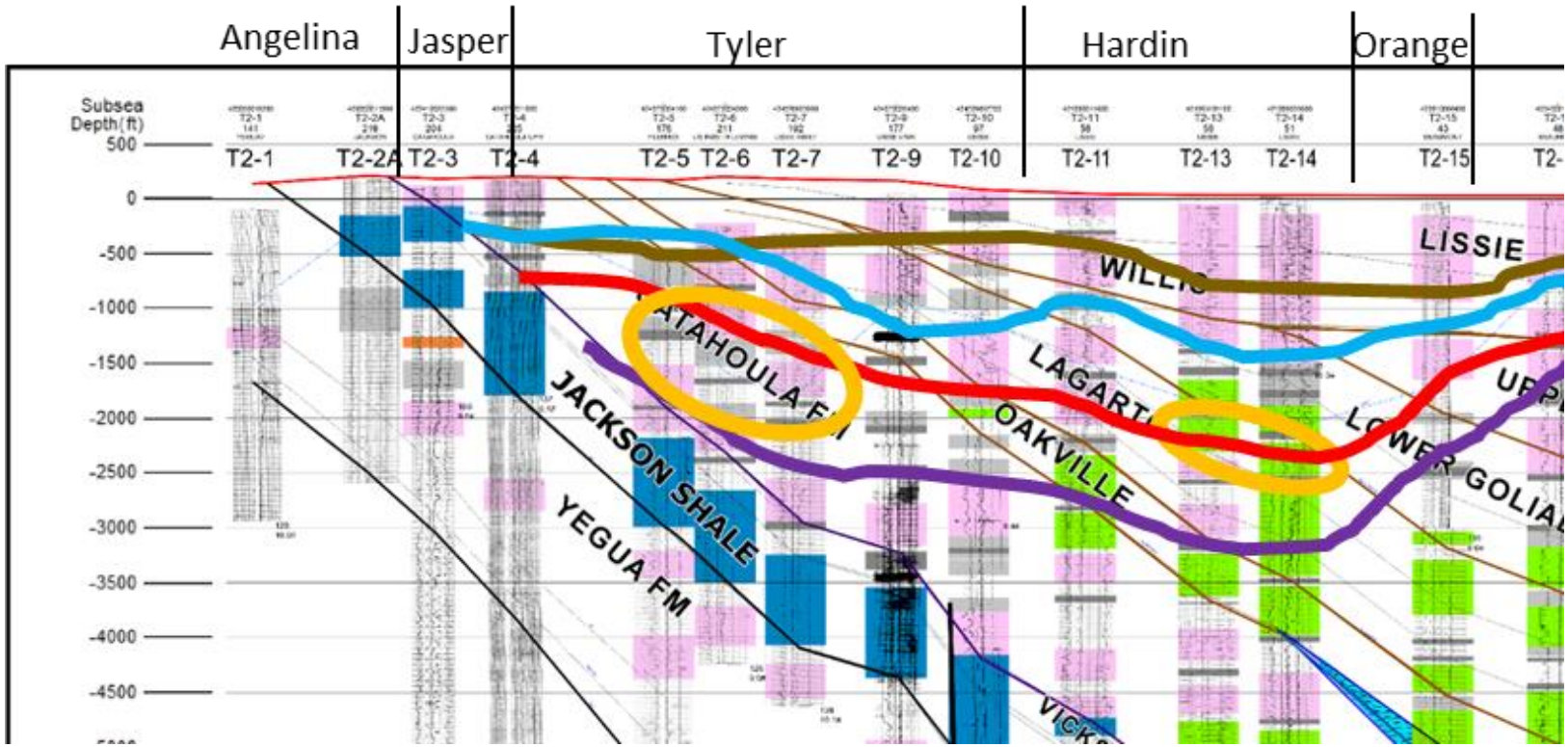
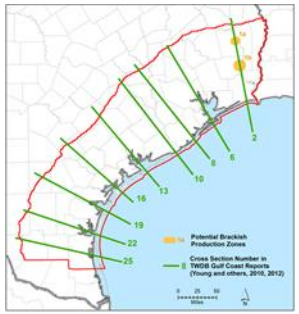
Potential Production Areas #1a and #1b in Cross Section #2





Maximum Depth Associated with Submitted Drillers Report

Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L

Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L

Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

Potential Production Area

INTERA
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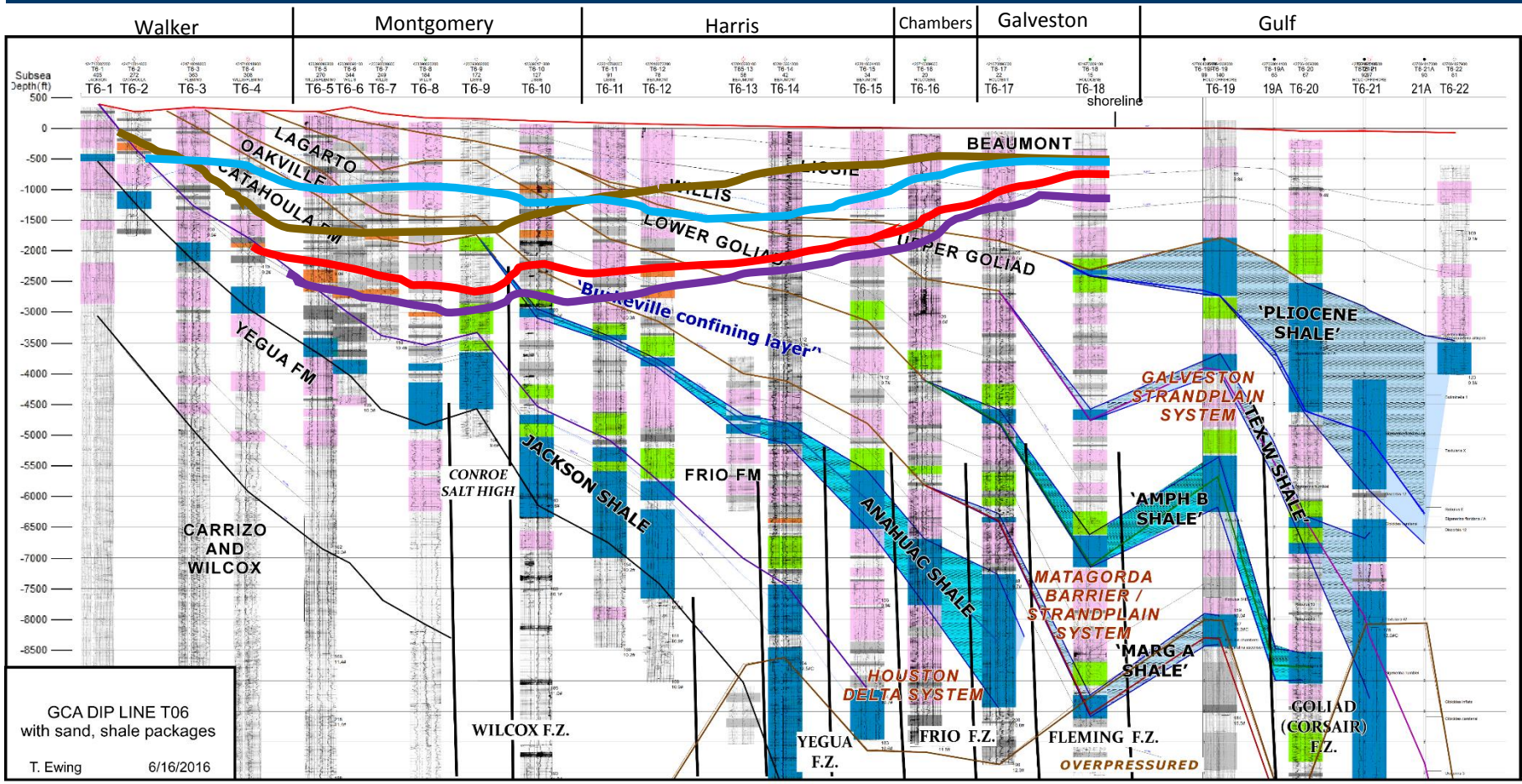
No Potential Production Areas in Cross Section #6



Aggradational sandstones (shoreline)
Channel sandstone (over 50')
Sandstone packages (with sands >20')

Marine shales in wells
Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)

Marine shale wedges

Potential Production Area

Maximum Depth Associated with Submitted Drillers Report
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA
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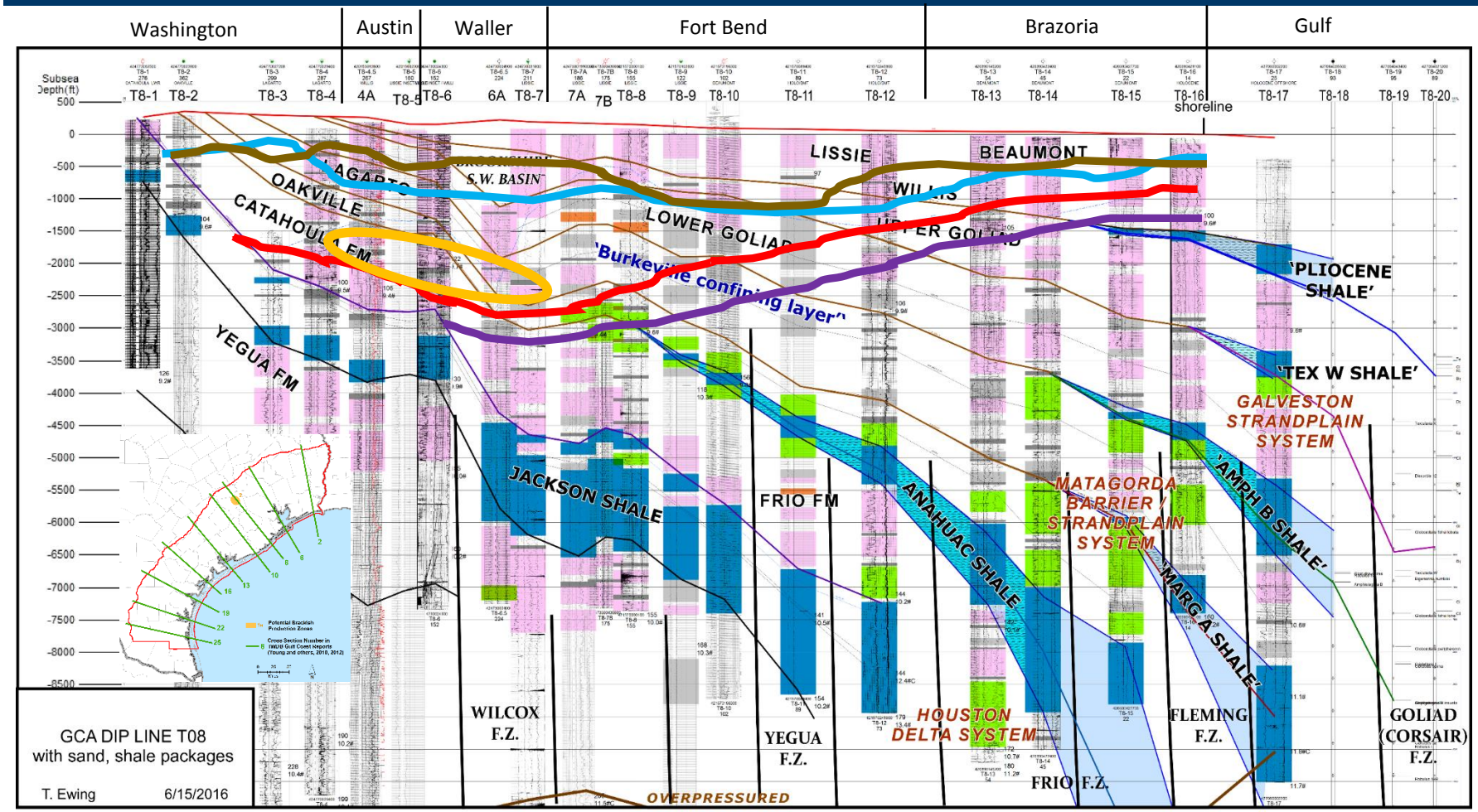
Potential Production Area #2 in Cross Section #8



Aggradational sandstones (shoreline)
Channel sandstone (over 50')
Sandstone packages (with sands >20')
Potential Production Area

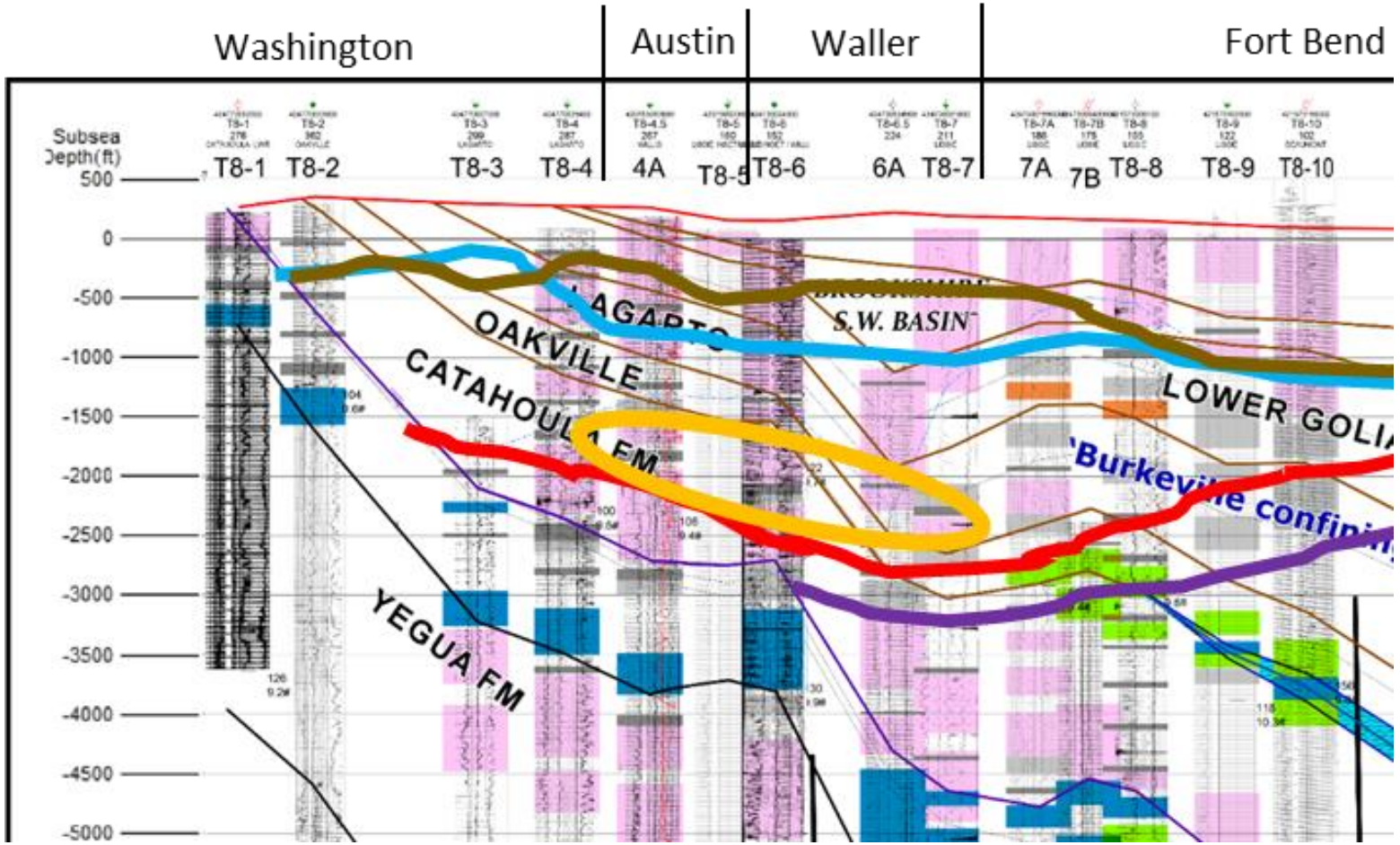
Marine shales in wells
Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)

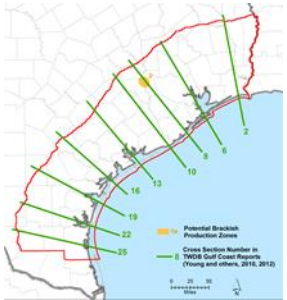
Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #2 in Cross Section #8





- Maximum Depth Associated with Submitted Drillers Report
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

INTERA
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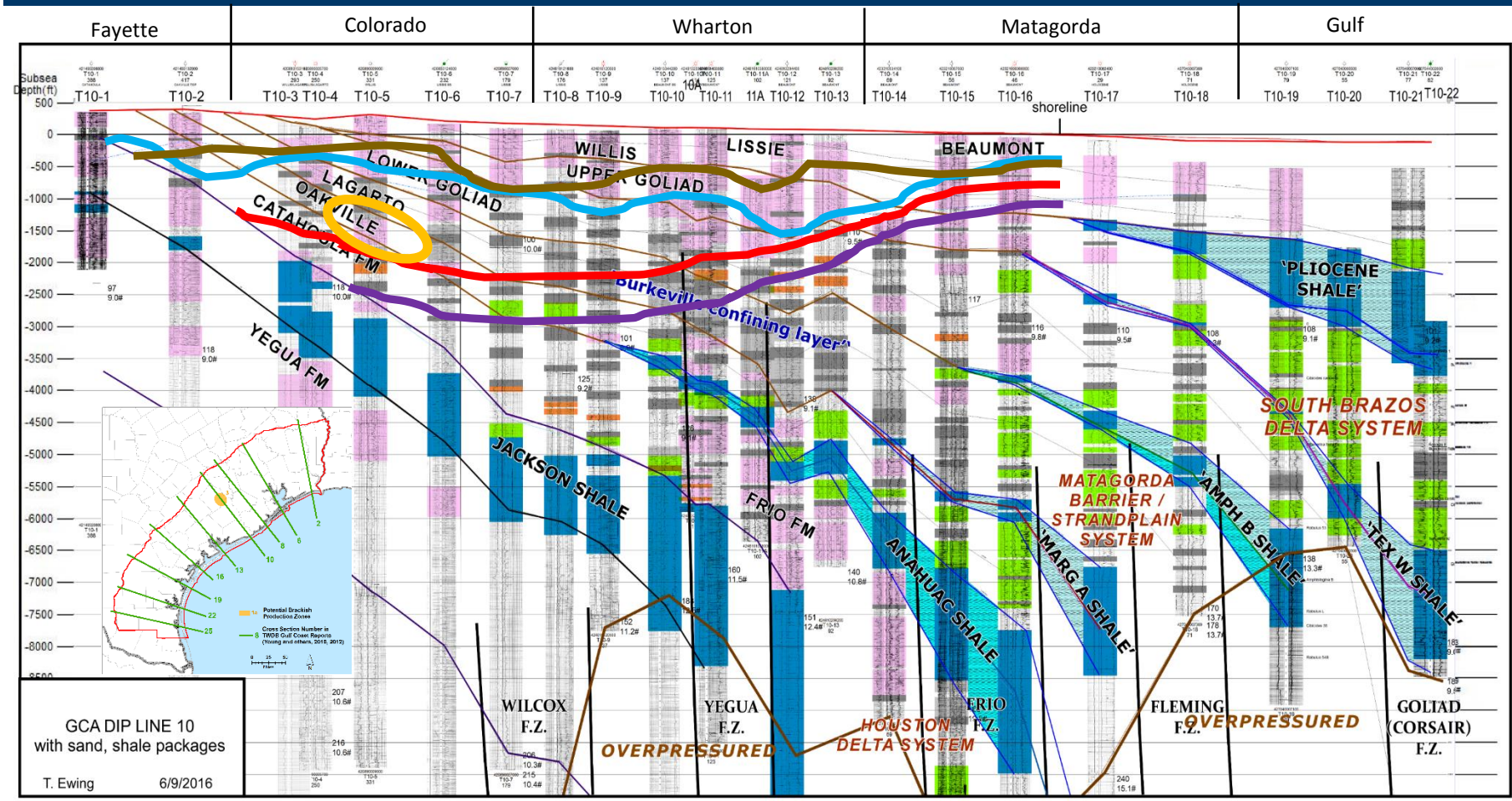
Potential Production Area #3 in Cross Section #10



Aggradational sandstones (shoreline)

Channel sandstone (over 50')

Sandstone packages (with sands >20')

Potential Production Area

Marine shales in wells

Mudstone layers (low-resistivity, purer)

Mudstone units (few or no sand bodies)

Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report

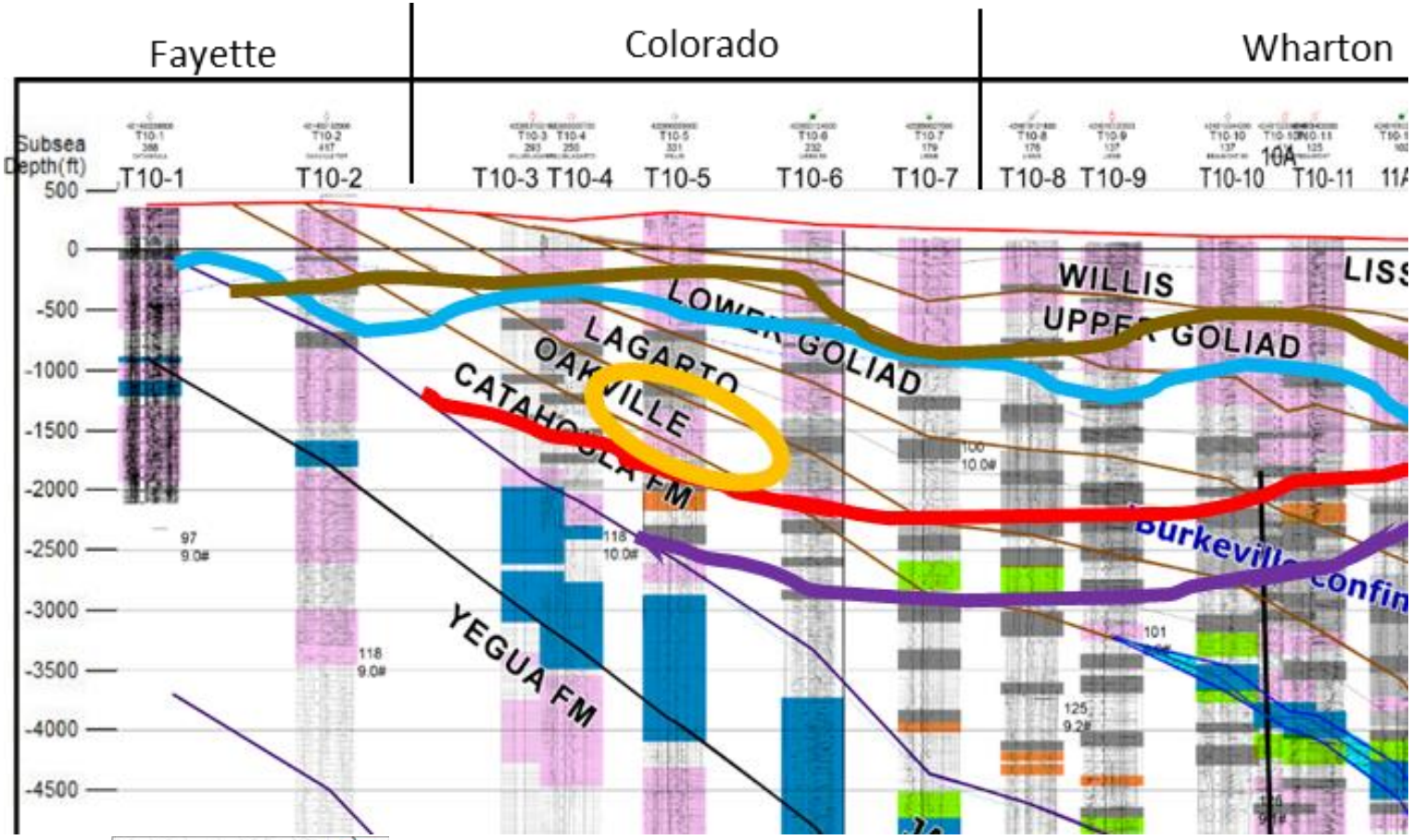
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L

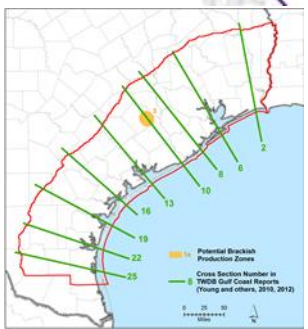
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L

Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #3 in Cross Section #10





- Maximum Depth Associated with Submitted Drillers Report
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

INTERA
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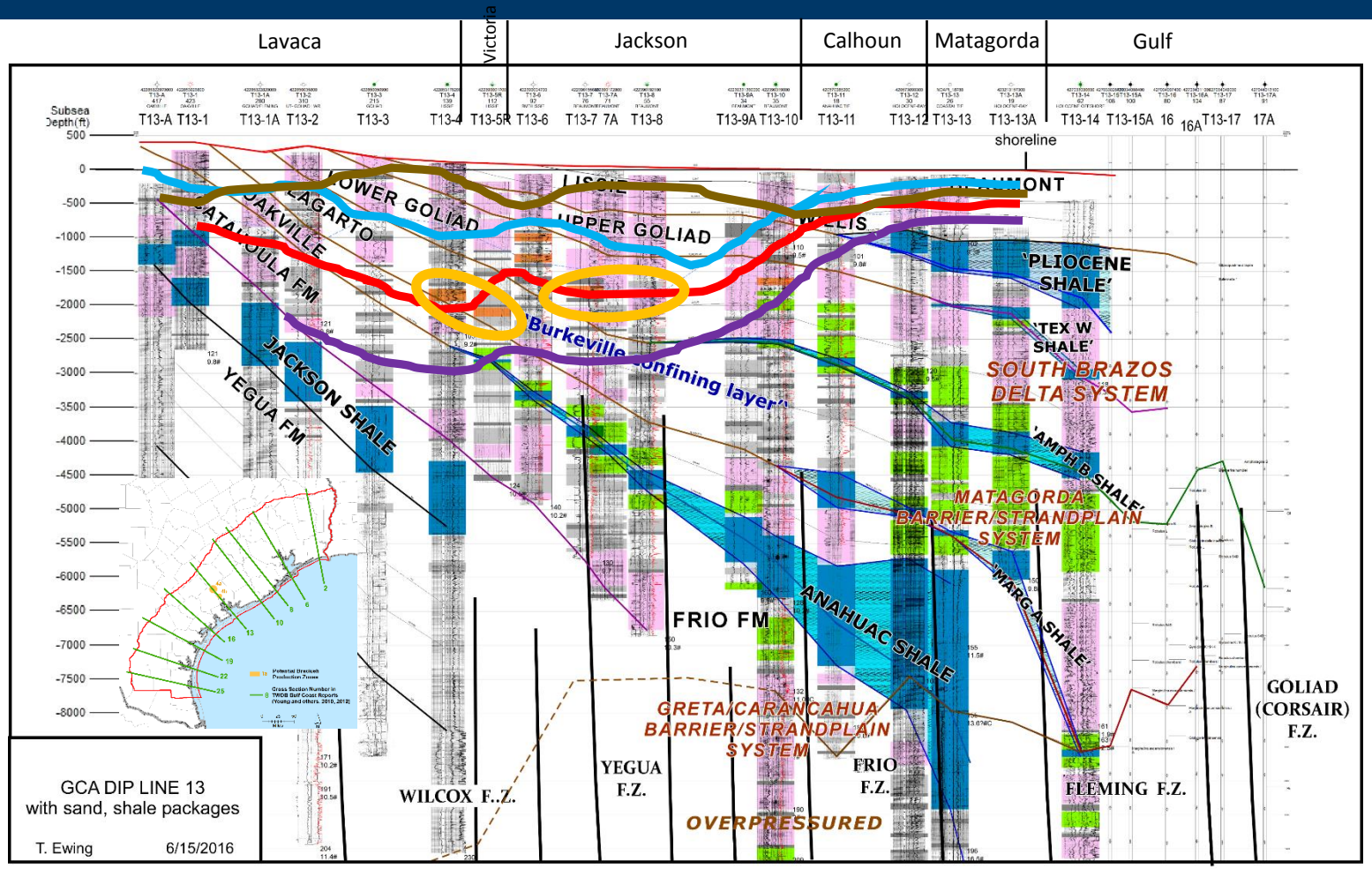
Potential Production Areas #4a and #4b in Cross Section #13



Aggradational sandstones (shoreline)
Channel sandstone (over 50')
Sandstone packages (with sands >20')
Potential Production Area

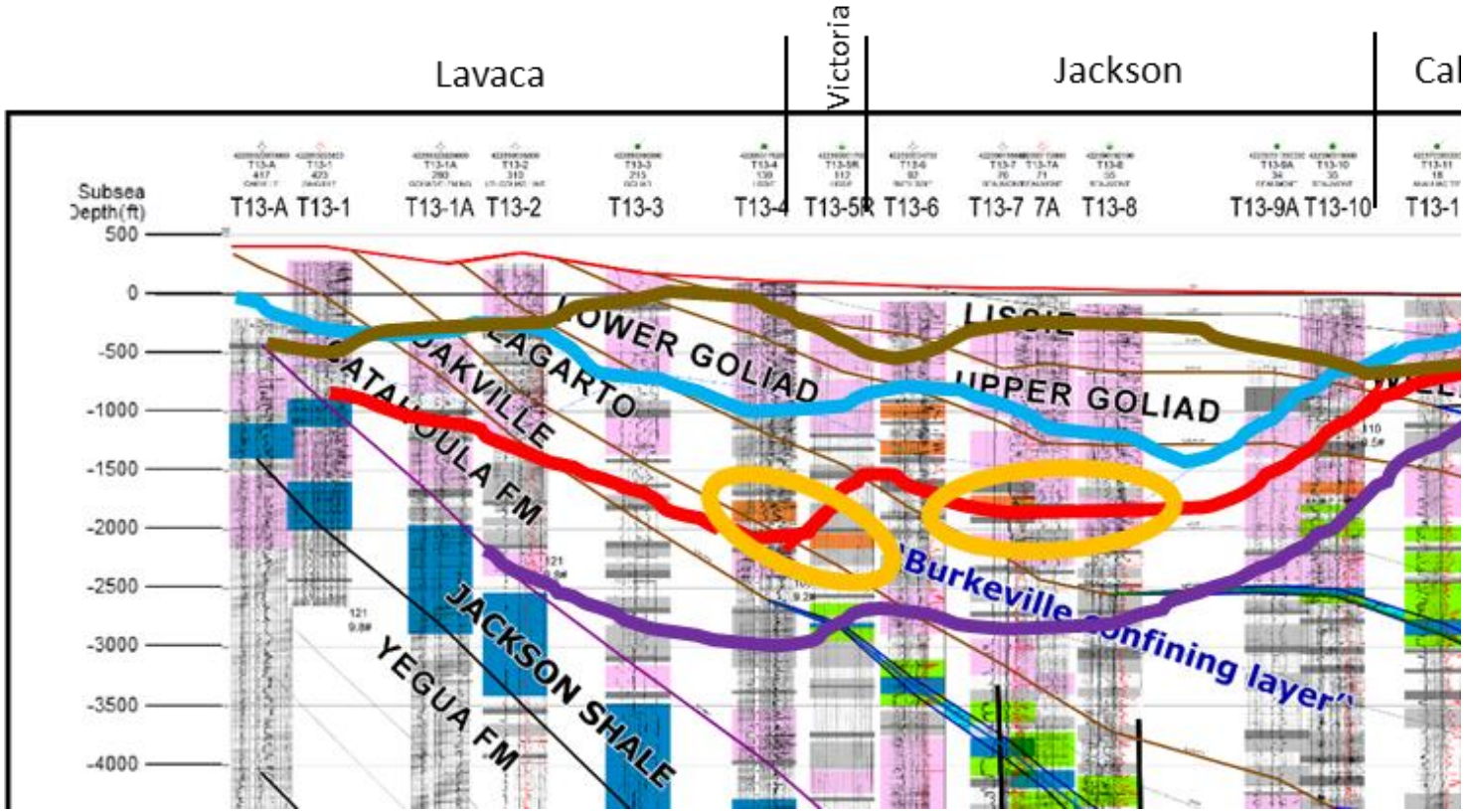
Marine shales in wells
Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)

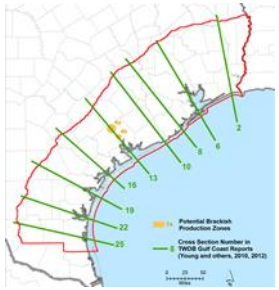
Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Areas #4a and #4b in Cross Section #13

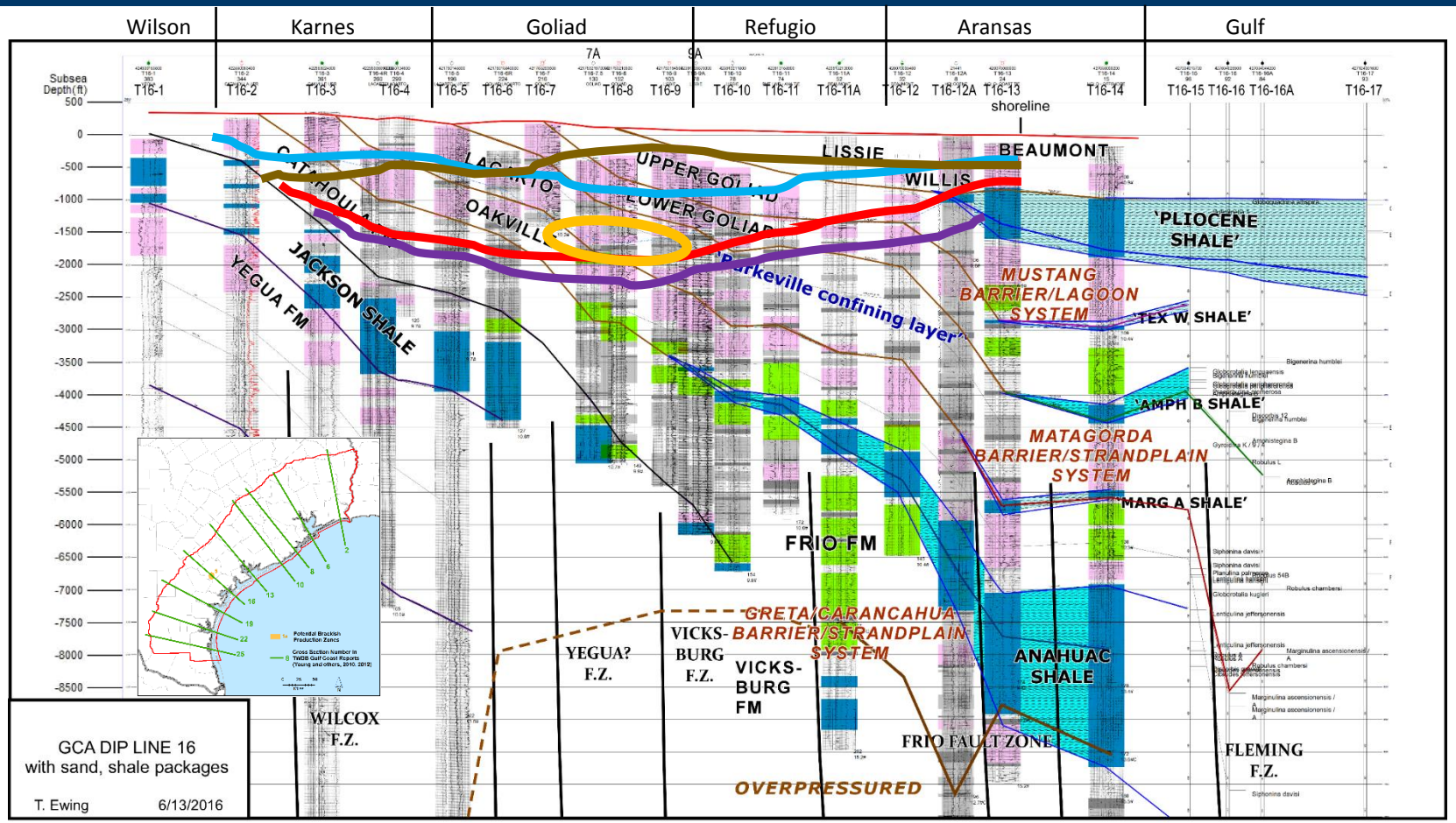




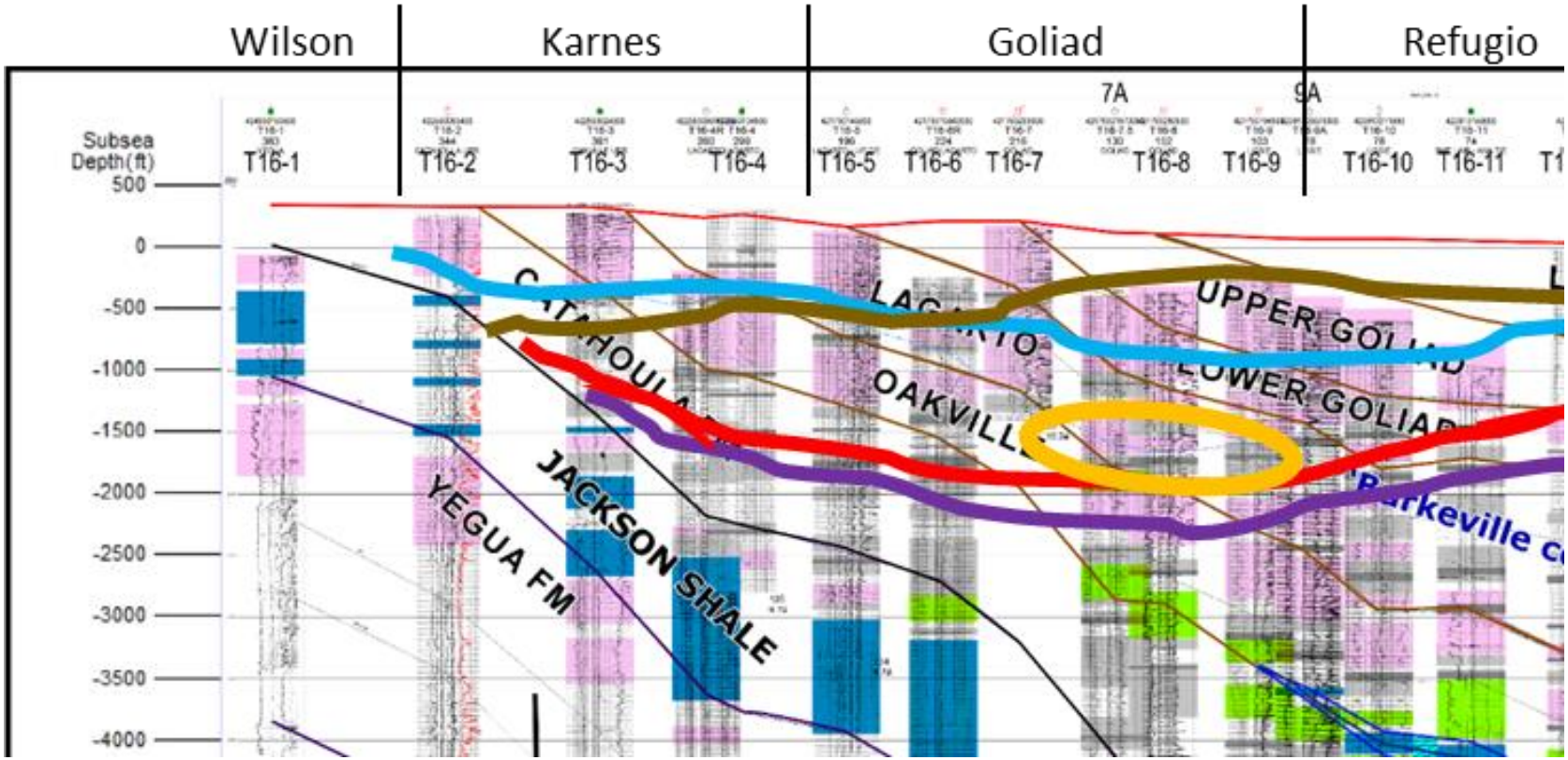
- Maximum Depth Associated with Submitted Drillers Report
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

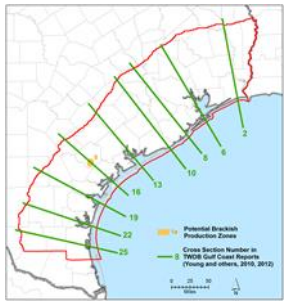
INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #5 in Cross Section #16



Potential Production Area #5 in Cross Section #16





- Maximum Depth Associated with Submitted Drillers Report
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

Potential Production Area

INTERA
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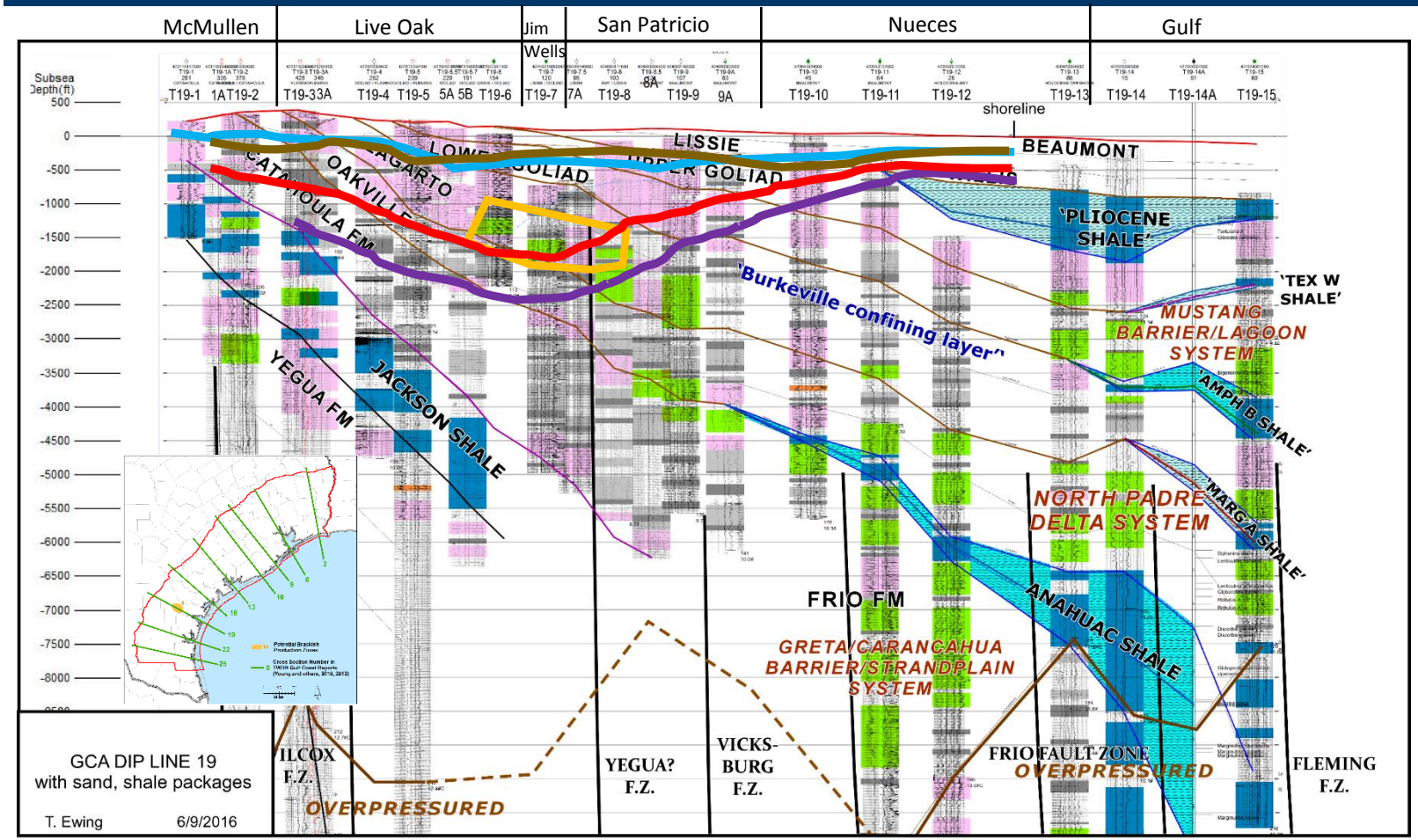
Potential Production Area #6 in Cross Section #19



Aggradational sandstones (shoreline)
Channel sandstone (over 50')
Sandstone packages (with sands >20')
Potential Production Area

Marine shales in wells
Mudstone layers (low-resistivity, purer)
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Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
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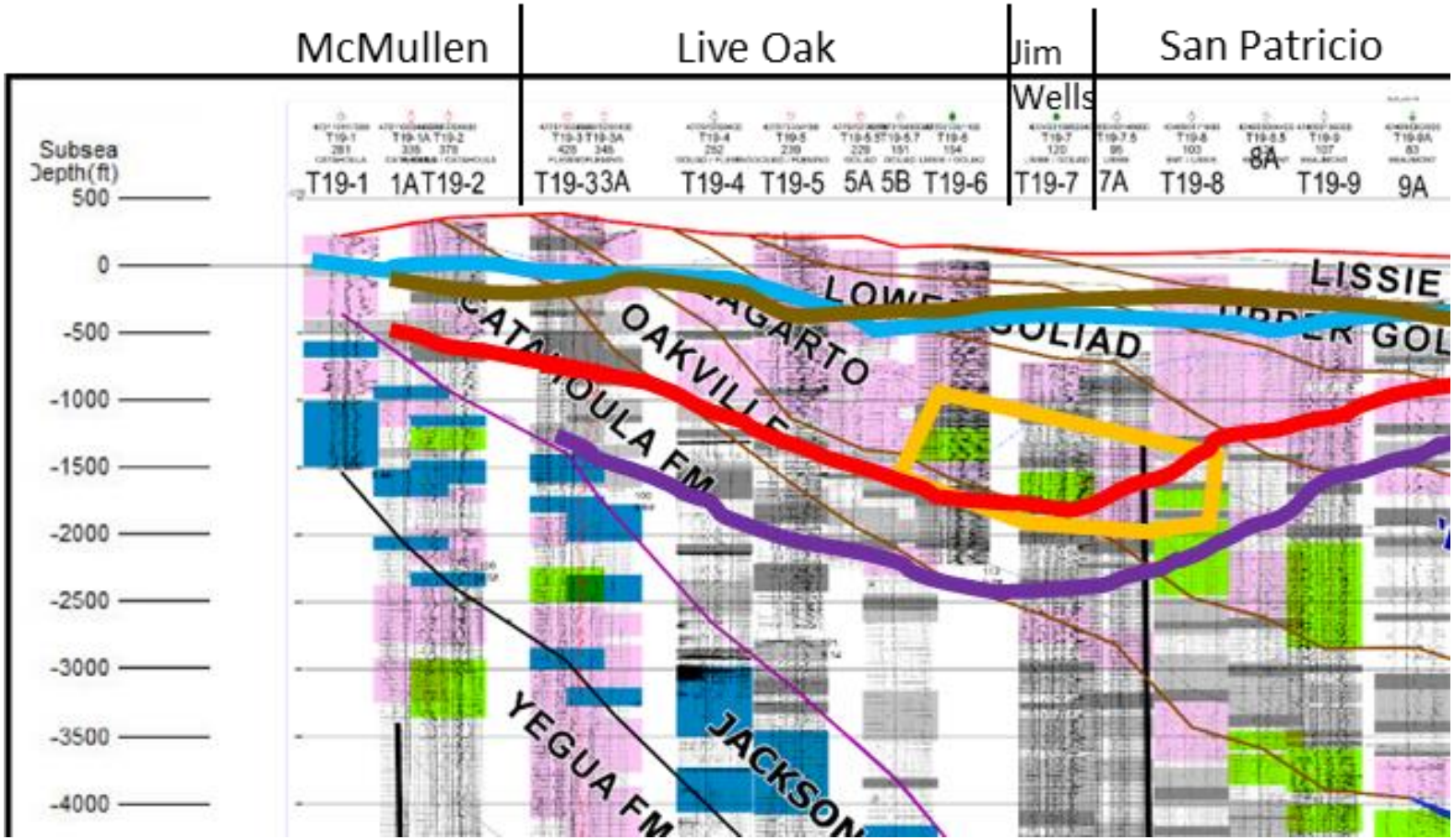
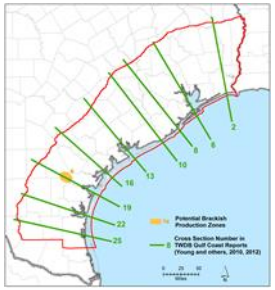
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #6 in Cross Section #19

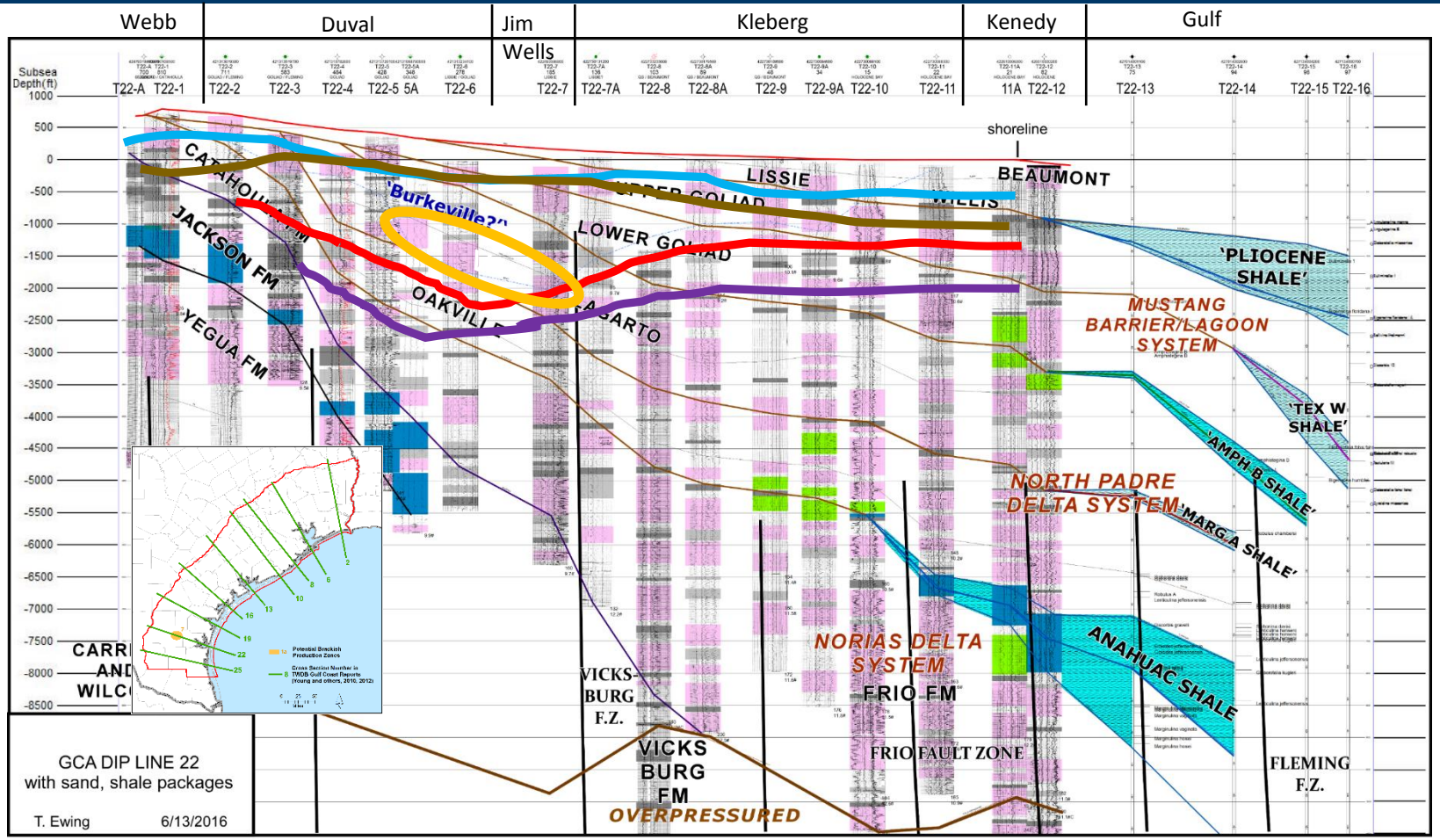




- Maximum Depth Associated with Submitted Drillers Report
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #7 in Cross Section #22



Aggradational sandstones (shoreline)
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Sandstone packages (with sands >20')
Potential Production Area

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Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)

Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
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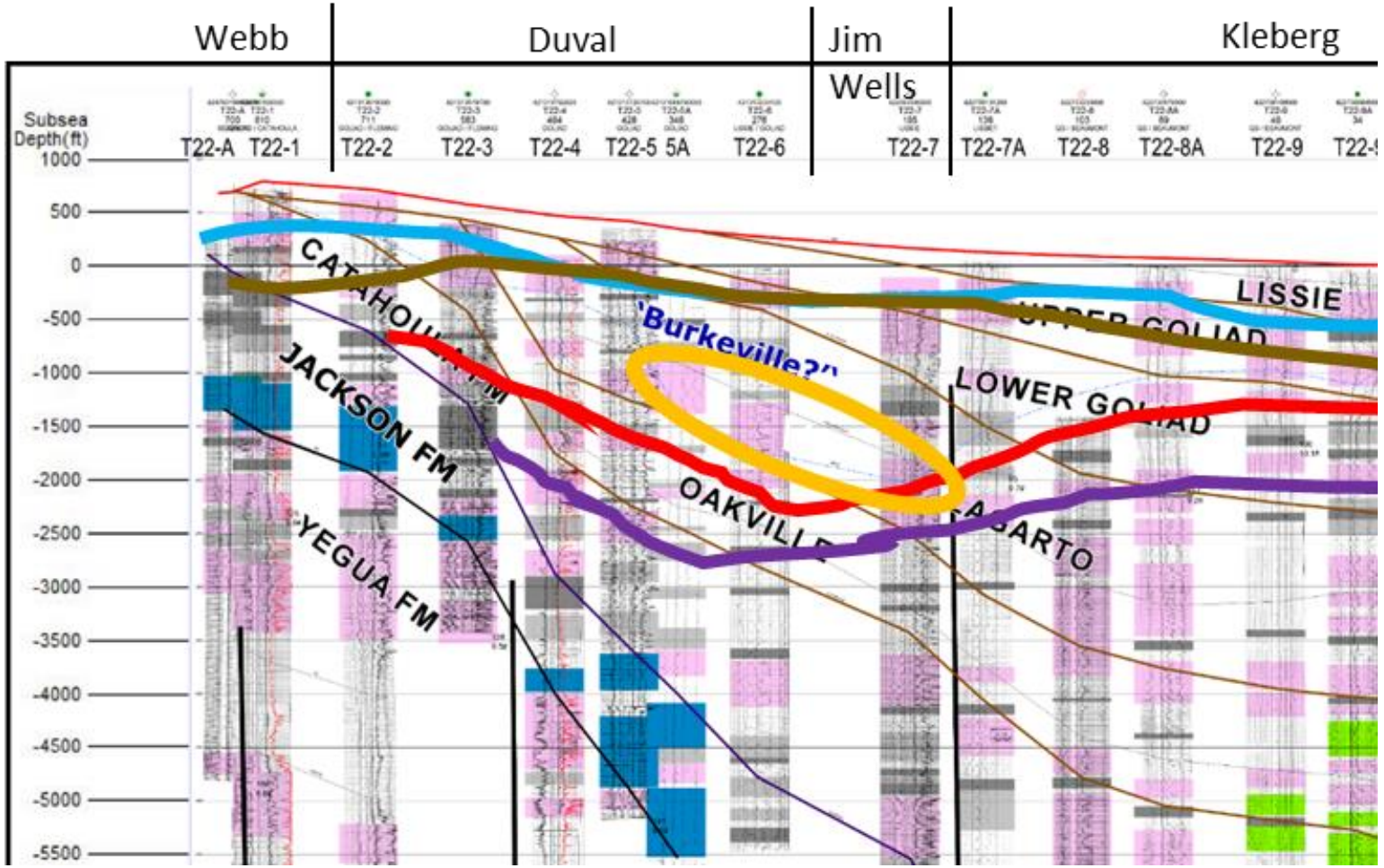
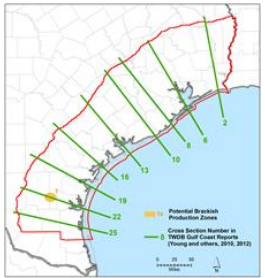
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #7 in Cross Section #22





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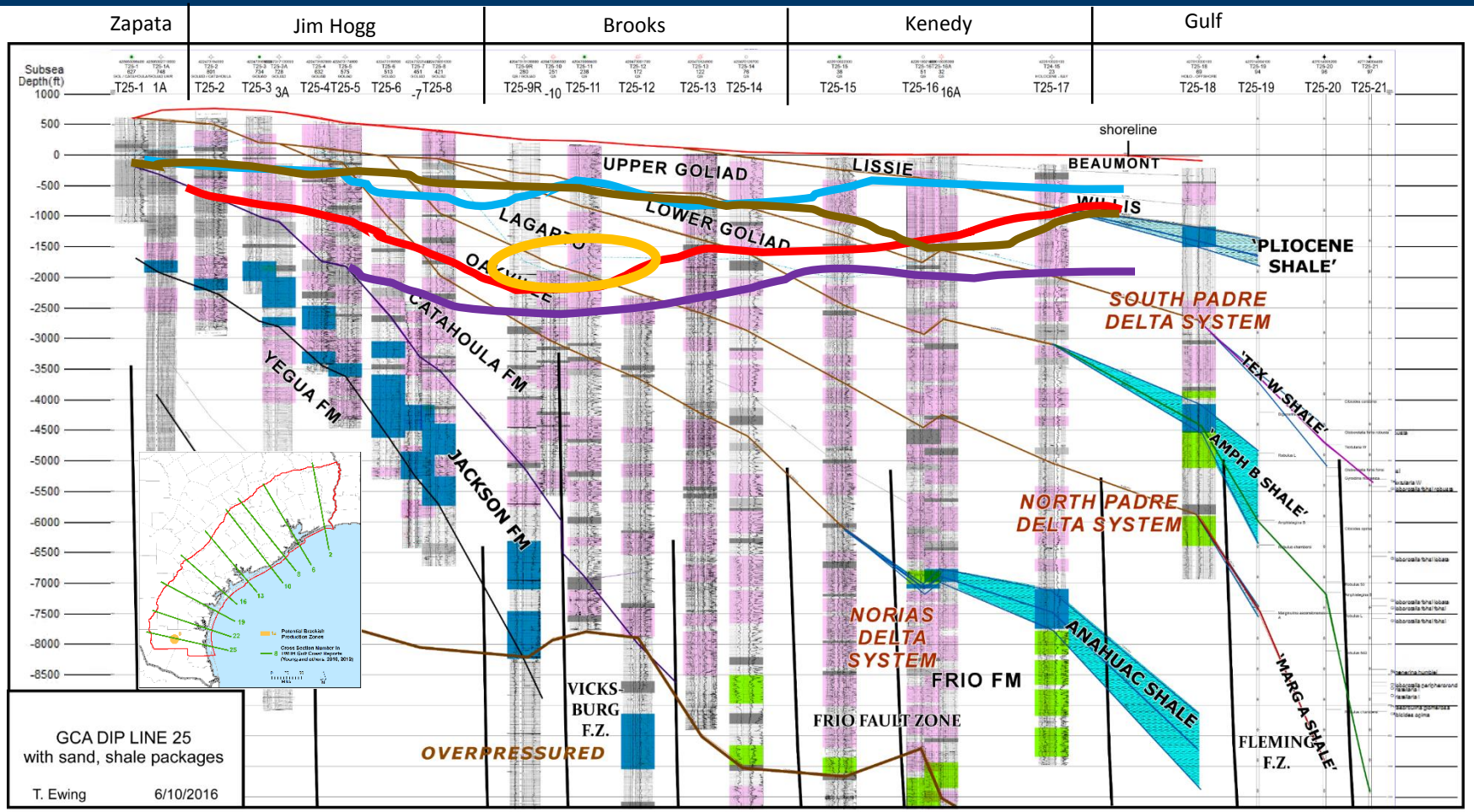
- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #8 in Cross Section #25



Aggradational sandstones (shoreline)
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Sandstone packages (with sands >20')
Potential Production Area

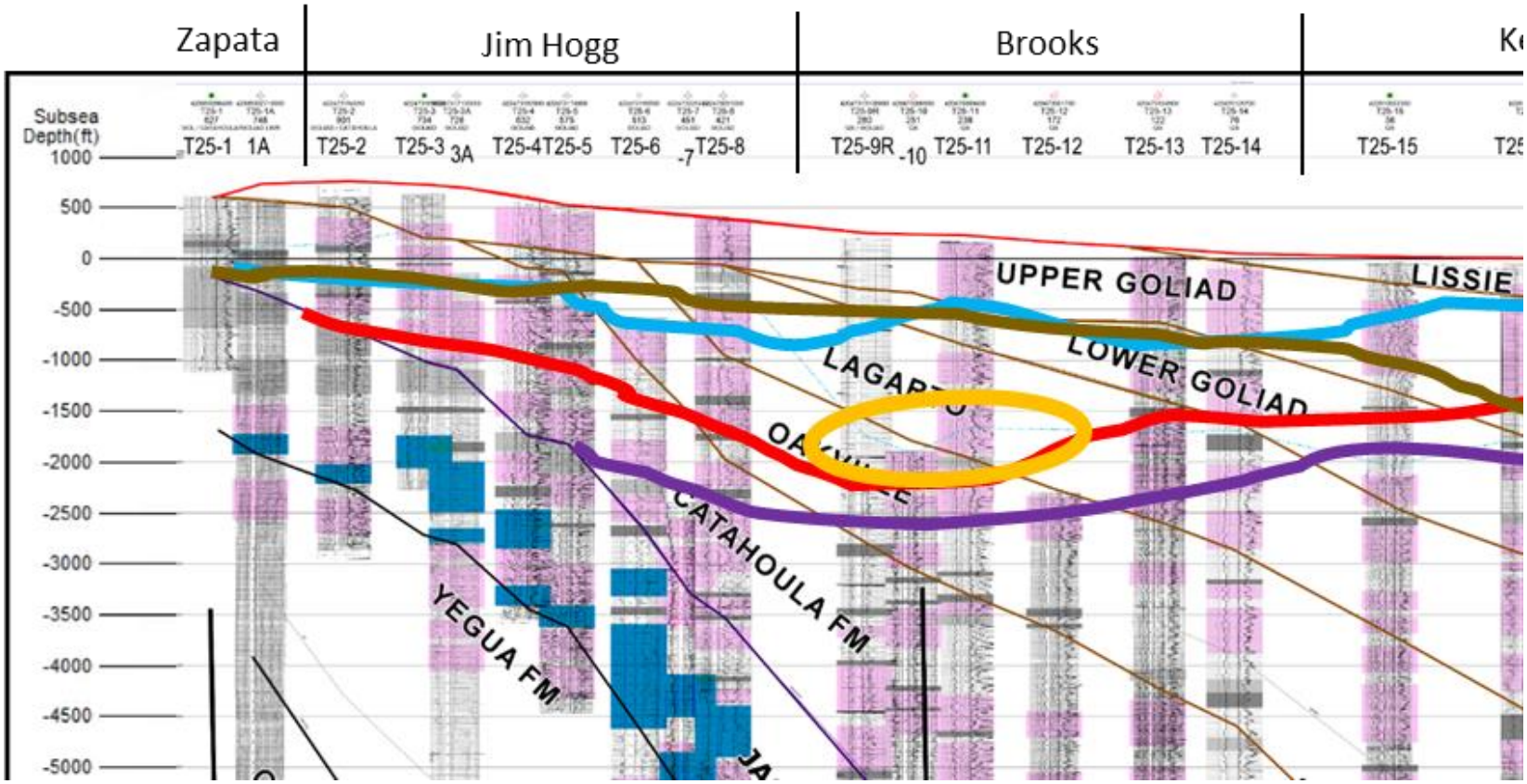
Marine shales in wells
Mudstone layers (low-resistivity, purer)
Mudstone units (few or no sand bodies)

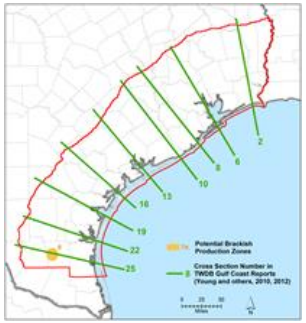
Marine shale wedges

Maximum Depth Associated with Submitted Drillers Report
Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

Potential Production Area #8 in Cross Section #25





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- Estimated Base of Groundwater with TDS Concentration of 1,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 10,000 mg/L
- Estimated Base of Groundwater with TDS Concentration of 35,000 mg/L
- Potential Production Area

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

List of Criteria for Exclusion from PPA

- Groundwater with TDS $\leq$1,000 mg/L is excluded
- Separated by hydrogeologic barriers sufficient to prevent significant impacts to water quality and availability of zones with a TDS at or less than 1,000 mg/L
- Are not located in an aquifer, subdivision of an aquifer, or geologic stratum that:
  - Has TDS >1,000 mg/L and is serving as a significant source of water supply for municipal, domestic, or agricultural purposes at time of designation
  - Is designated or used for wastewater injection through the use of injection wells or disposal wells permitted under Chapter 27
  - Harris Galveston or Fort Bend Subsidence District

Public Comments and Next Steps

The delineation of potential production areas presented today are draft and open to public comment:

- This presentation will be publicly available at the TWDB Gulf Coast Aquifer BRACS website
  - Stakeholders will receive an email when it is posted
  - Stakeholders should have their comments to the TWDB by August 1st
- The Final Report will be delivered to the TWDB by August 31st
  - Stakeholders will receive an email when the Final Report is posted to the website and will be encouraged to provide comments
- Brackish Groundwater Production Zones will be designated by the TWDB at a public board meeting in the fall
  - Stakeholders will receive an email with the meeting date, time, and location
- The biennial report to the Texas Legislature will be approved at a public board meeting in the fall
  - Stakeholders will receive an email with the meeting date, time, and location