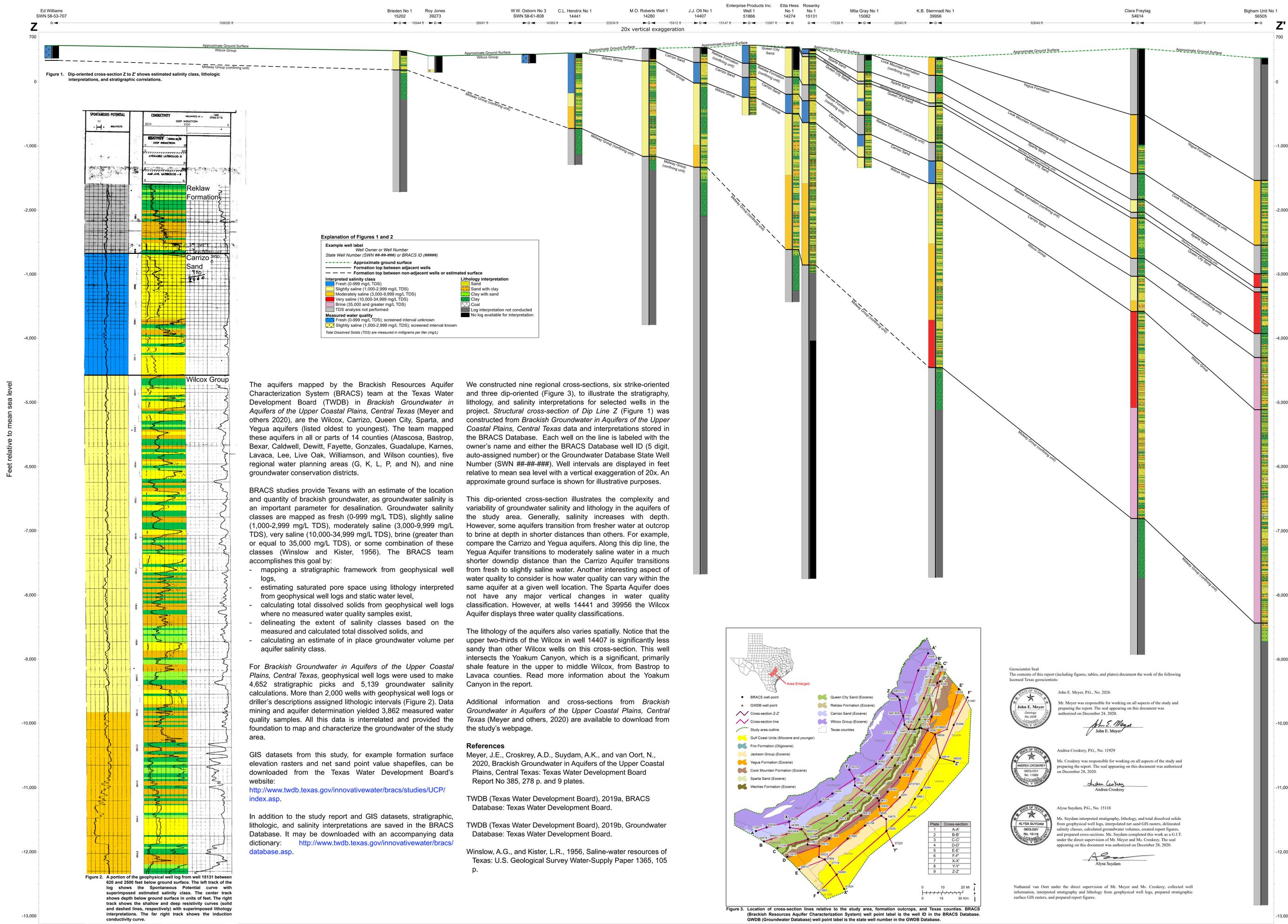


# Structural Cross-section of Dip Line Z

## Salinity class and lithology interpretations for the Yegua, Sparta, Queen City, Carrizo, and Wilcox aquifers, Central Texas



**Explanation of Figures 1 and 2**

**Example well label**  
 Well Owner or Well Number  
 State Well Number (SWN ##-##-###) or BRACS ID (#####)  
 --- Approximate ground surface  
 --- Formation top between adjacent wells  
 --- Formation top between non-adjacent wells or estimated surface

**Interpreted salinity class**  
 Fresh (0-999 mg/L TDS)  
 Slightly saline (1,000-2,999 mg/L TDS)  
 Moderately saline (3,000-9,999 mg/L TDS)  
 Very saline (10,000-34,999 mg/L TDS)  
 Brine (35,000 and greater mg/L TDS)  
 TDS analysis not performed  
 Measured water quality  
 Fresh (0-999 mg/L TDS); screened interval unknown  
 Slightly saline (1,000-2,999 mg/L TDS); screened interval known  
 Total Dissolved Solids (TDS) are measured in milligrams per liter (mg/L)

**Lithology interpretation**  
 Sand  
 Sand with clay  
 Clay with sand  
 Clay  
 Coal  
 Log interpretation not conducted  
 No log available for interpretation

The aquifers mapped by the Brackish Resources Aquifer Characterization System (BRACS) team at the Texas Water Development Board (TWDB) in *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas* (Meyer and others 2020), are the Wilcox, Carrizo, Queen City, Sparta, and Yegua aquifers (listed oldest to youngest). The team mapped these aquifers in all or parts of 14 counties (Atascosa, Bastrop, Bexar, Caldwell, Dewitt, Fayette, Gonzales, Guadalupe, Karnes, Lavaca, Lee, Live Oak, Williamson, and Wilson counties), five regional water planning areas (G, K, L, P, and N), and nine groundwater conservation districts.

BRACS studies provide Texans with an estimate of the location and quantity of brackish groundwater, as groundwater salinity is an important parameter for desalination. Groundwater salinity classes are mapped as fresh (0-999 mg/L TDS), slightly saline (1,000-2,999 mg/L TDS), moderately saline (3,000-9,999 mg/L TDS), very saline (10,000-34,999 mg/L TDS), brine (greater than or equal to 35,000 mg/L TDS), or some combination of these classes (Winslow and Kister, 1956). The BRACS team accomplishes this goal by:

- mapping a stratigraphic framework from geophysical well logs,
- estimating saturated pore space using lithology interpreted from geophysical well logs and static water level,
- calculating total dissolved solids from geophysical well logs where no measured water quality samples exist,
- delineating the extent of salinity classes based on the measured and calculated total dissolved solids, and
- calculating an estimate of in place groundwater volume per aquifer salinity class.

For *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas*, geophysical well logs were used to make 4,652 stratigraphic picks and 5,139 groundwater salinity calculations. More than 2,000 wells with geophysical well logs or driller's descriptions assigned lithologic intervals (Figure 2). Data mining and aquifer determination yielded 3,862 measured water quality samples. All this data is interrelated and provided the foundation to map and characterize the groundwater of the study area.

GIS datasets from this study, for example formation surface elevation rasters and net sand point value shapefiles, can be downloaded from the Texas Water Development Board's website: <http://www.twdb.texas.gov/innovativewater/bracs/studies/UCP/index.asp>.

In addition to the study report and GIS datasets, stratigraphic, lithologic, and salinity interpretations are saved in the BRACS Database. It may be downloaded with an accompanying data dictionary: <http://www.twdb.texas.gov/innovativewater/bracs/database.asp>.

We constructed nine regional cross-sections, six strike-oriented and three dip-oriented (Figure 3), to illustrate the stratigraphy, lithology, and salinity interpretations for selected wells in the project. *Structural cross-section of Dip Line Z* (Figure 1) was constructed from *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas* data and interpretations stored in the BRACS Database. Each well on the line is labeled with the owner's name and either the BRACS Database well ID (5 digit, auto-assigned number) or the Groundwater Database State Well Number (SWN ##-##-###). Well intervals are displayed in feet relative to mean sea level with a vertical exaggeration of 20x. An approximate ground surface is shown for illustrative purposes.

This dip-oriented cross-section illustrates the complexity and variability of groundwater salinity and lithology in the aquifers of the study area. Generally, salinity increases with depth. However, some aquifers transition from fresher water at outcrop to brine at depth in shorter distances than others. For example, compare the Carrizo and Yegua aquifers. Along this dip line, the Yegua Aquifer transitions to moderately saline water in a much shorter downdip distance than the Carrizo Aquifer transitions from fresh to slightly saline water. Another interesting aspect of water quality to consider is how water quality can vary within the same aquifer at a given well location. The Sparta Aquifer does not have any major vertical changes in water quality classification. However, at wells 14441 and 39956 the Wilcox Aquifer displays three water quality classifications.

The lithology of the aquifers also varies spatially. Notice that the upper two-thirds of the Wilcox in well 14407 is significantly less sandy than other Wilcox wells on this cross-section. This well intersects the Yoakum Canyon, which is a significant, primarily shale feature in the upper to middle Wilcox, from Bastrop to Lavaca counties. Read more information about the Yoakum Canyon in the report.

Additional information and cross-sections from *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas* (Meyer and others, 2020) are available to download from the study's webpage.

**References**  
 Meyer, J.E., Crockrey, A.D., Suydam, A.K., and van Oort, N., 2020, *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas*: Texas Water Development Board Report No 385, 278 p., and 9 plates.

TWDB (Texas Water Development Board), 2019a, BRACS Database: Texas Water Development Board.

TWDB (Texas Water Development Board), 2019b, Groundwater Database: Texas Water Development Board.

Winslow, A.G., and Kister, L.R., 1956, *Saline-water resources of Texas*: U.S. Geological Survey Water-Supply Paper 1365, 105 p.

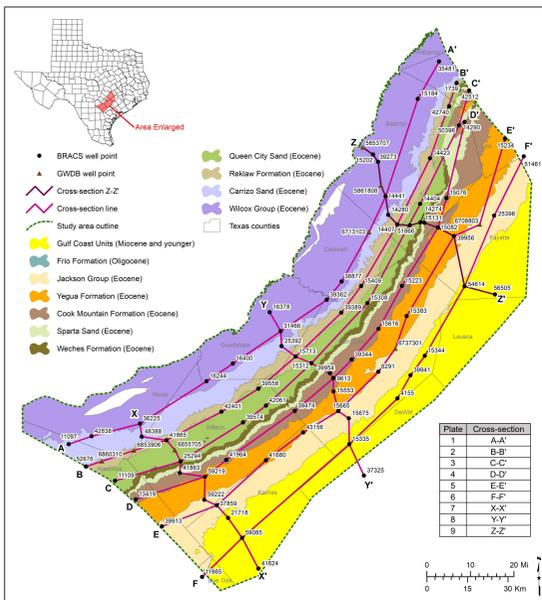


Figure 3. Location of cross-section lines relative to the study area, formation outcrops, and Texas counties. BRACS (Brackish Resources Aquifer Characterization System) well point label is the well ID in the BRACS Database. GWDB (Groundwater Database) well point label is the state well number in the GWDB Database.

Geoscientist Seal  
 The contents of this report (including figures, tables, and plates) document the work of the following licensed Texas geoscientists:

John E. Meyer, P.G., No. 2026  
 Ms. Meyer was responsible for working on all aspects of the study and preparing the report. The seal appearing on this document was authorized on December 24, 2020.

Andrea Crockrey, P.G., No. 11929  
 Ms. Crockrey was responsible for working on all aspects of the study and preparing the report. The seal appearing on this document was authorized on December 28, 2020.

Alysa Suydam, P.G., No. 15118  
 Ms. Suydam interpreted stratigraphy, lithology, and total dissolved solids from geophysical well logs, interpolated net sand GIS rasters, delineated salinity classes, calculated groundwater volumes, created report figures, and prepared cross-sections. Ms. Suydam completed this work as a G.I.T. under the direct supervision of Mr. Meyer and Ms. Crockrey. The seal appearing on this document was authorized on December 28, 2020.

Nathaniel van Oort under the direct supervision of Mr. Meyer and Ms. Crockrey, collected well information, interpreted stratigraphy and lithology from geophysical well logs, prepared stratigraphic surface GIS rasters, and prepared report figures.