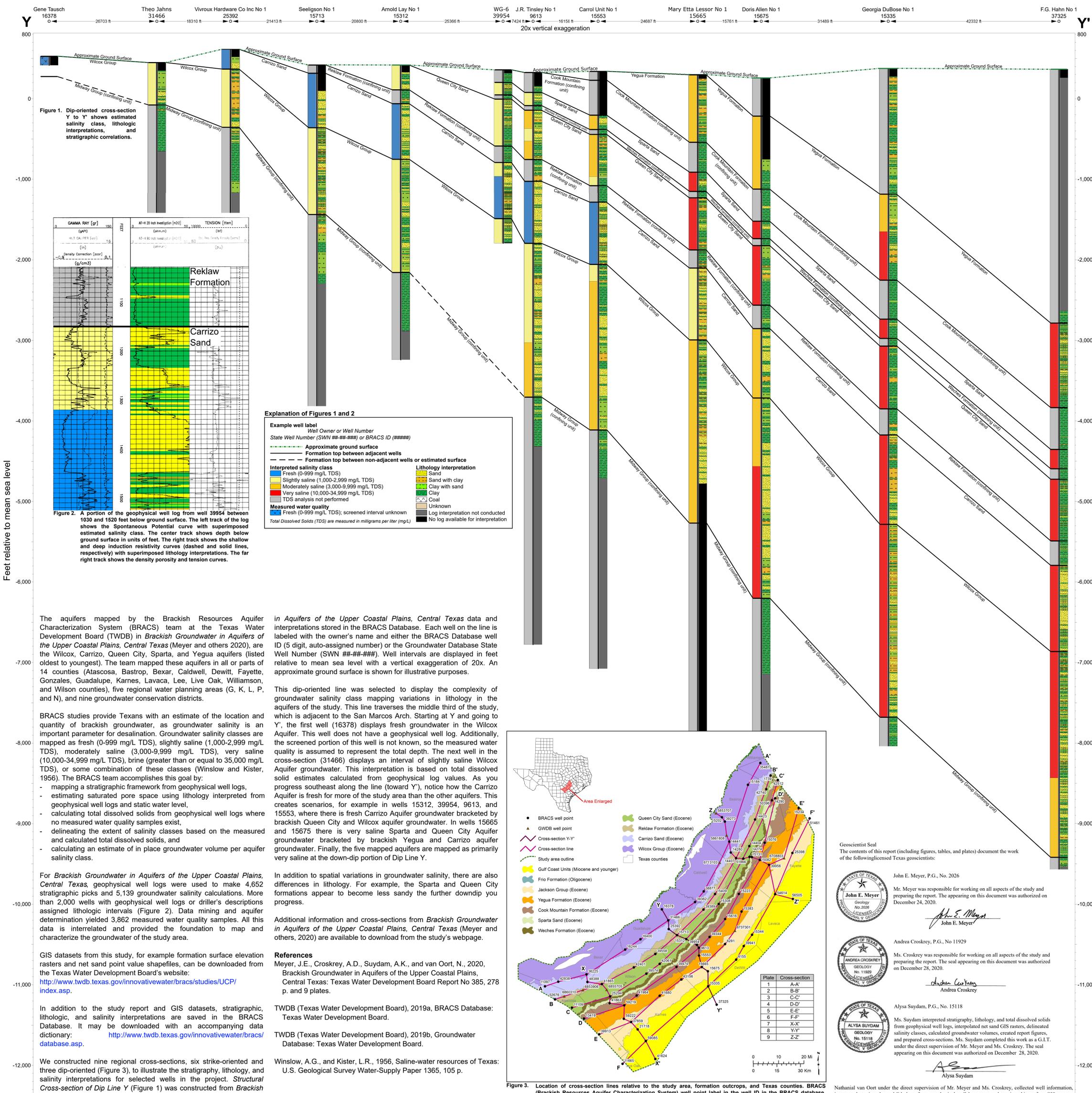


# Structural Cross-section of Dip Line Y

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



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 Y* (Figure 1) was constructed from *Brackish*

*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 line was selected to display the complexity of groundwater salinity class mapping variations in lithology in the aquifers of the study. This line traverses the middle third of the study, which is adjacent to the San Marcos Arch. Starting at Y and going to Y', the first well (16378) displays fresh groundwater in the Wilcox Aquifer. This well does not have a geophysical well log. Additionally, the screened portion of this well is not known, so the measured water quality is assumed to represent the total depth. The next well in the cross-section (31466) displays an interval of slightly saline Wilcox Aquifer groundwater. This interpretation is based on total dissolved solid estimates calculated from geophysical log values. As you progress southeast along the line (toward Y'), notice how the Carrizo Aquifer is fresh for more of the study area than the other aquifers. This creates scenarios, for example in wells 15312, 39954, 9613, and 15553, where there is fresh Carrizo Aquifer groundwater bracketed by brackish Queen City and Wilcox aquifer groundwater. In wells 15665 and 15675 there is very saline Sparta and Queen City Aquifer groundwater bracketed by brackish Yegua and Carrizo aquifer groundwater. Finally, the five mapped aquifers are mapped as primarily very saline at the down-dip portion of Dip Line Y.

In addition to spatial variations in groundwater salinity, there are also differences in lithology. For example, the Sparta and Queen City formations appear to become less sandy the further downdip you progress.

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., Croskrey, 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.

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  
 Mr. Meyer was responsible for working on all aspects of the study and preparing the report. The appearing on this document was authorized on December 24, 2020.

Andrea Croskrey, P.G., No. 11929  
 Ms. Croskrey 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. Croskrey. The seal appearing on this document was authorized on December 28, 2020.

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 in the well ID in the BRACS database. GWDB (Groundwater Database) well point label is the state well number in the GWDB Database.