

Structural Cross-section of Strike Line C

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

SPONTANEOUS POTENTIAL (mV)	DEPTH (ft)	RESISTIVITY (Ohm m/ft)	CONDUCTIVITY (mS/cm)
89.5	0	16" NORMAL	INDUCTION CONDUCTIVITY 40" SPACING
	0	20	1000
	200	2000	1000
	200	2000	1000

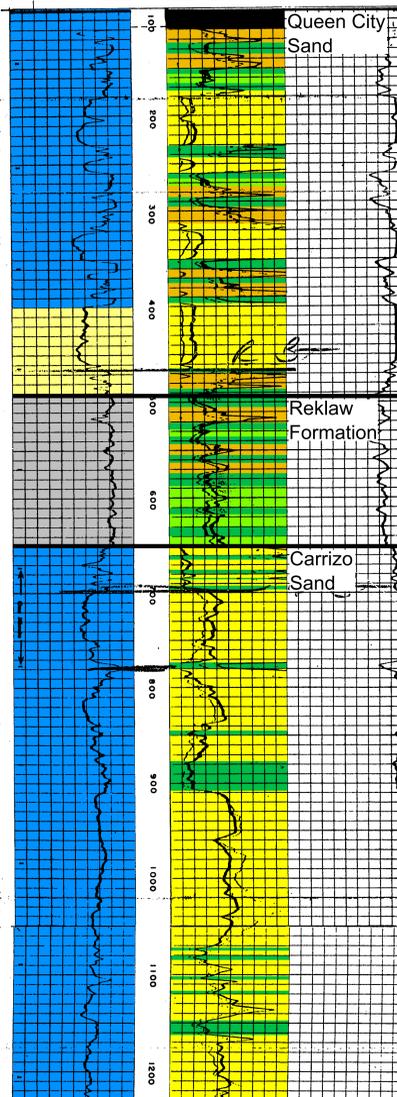


Figure 2. A portion of the geophysical well log from well 42061 between 100 and 1240 feet below ground surface. The left track of the log shows the Spontaneous Potential curve with superimposed estimated salinity class. The center track shows depth below ground surface in units of feet. The right track shows the shallow and deep induction resistivity curves (solid and dashed lines, respectively) with superimposed lithology interpretations. The far right track shows the induction conductivity curve.

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)
TDS analysis not performed

Measured water quality
Fresh (0-999 mg/L TDS); screened interval known
Log interpretation not conducted
Nolog available for interpretation

Lithology interpretation
Sand
Sand with clay
Clay with sand
Clay
Coal
Unknown
Log interpretation not conducted
Nolog 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.

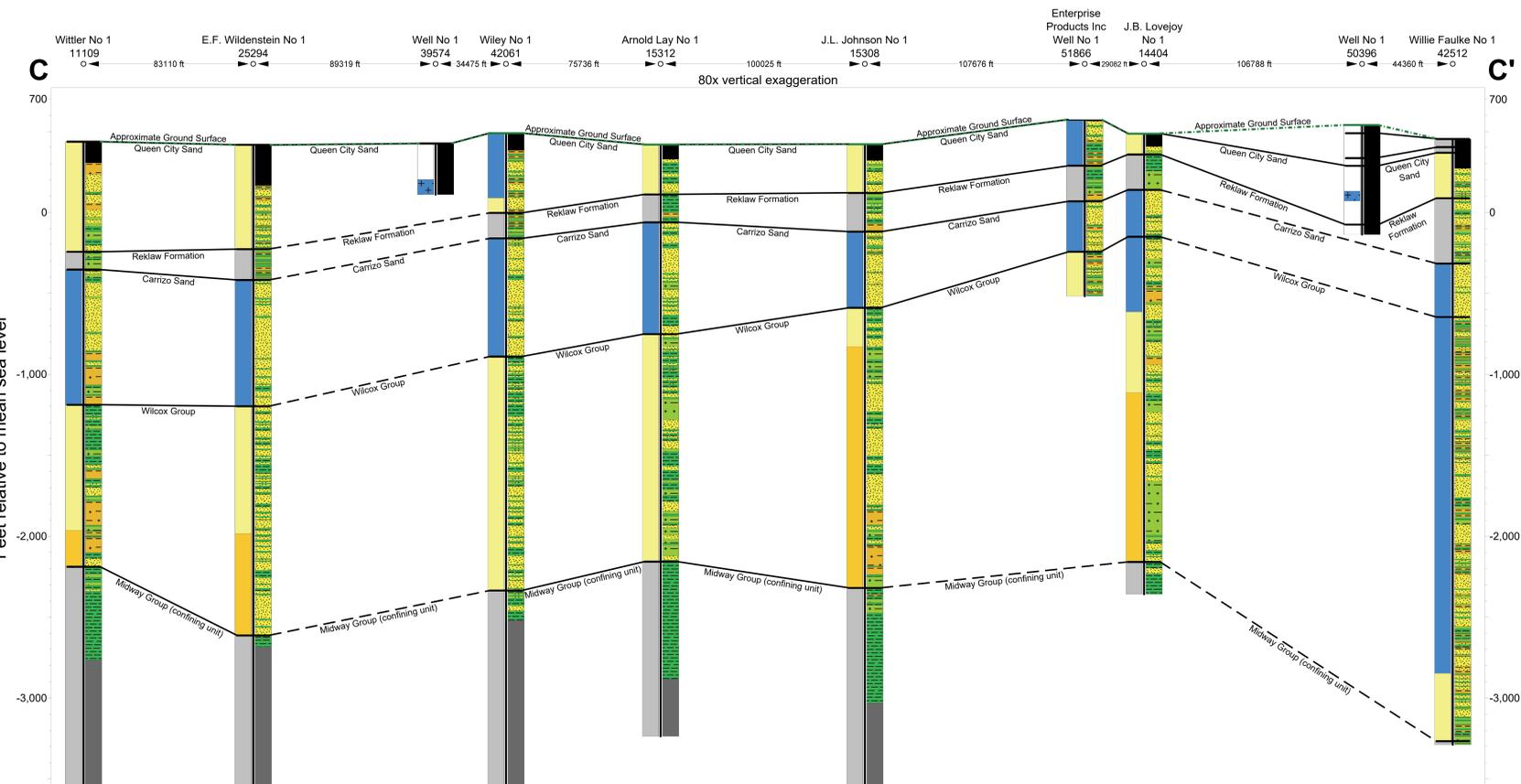
For *Brackish Groundwater in Aquifers of the Upper Coastal Plains, Central Texas*, geophysical well logs were used to make 4,652 stratigraphic picks and 5,139 groundwater salinity calculations. More than 2,000 wells with geophysical well logs or driller's descriptions assigned lithologic intervals (Figure 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 Strike Line C* (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 80x. An approximate ground surface is shown for illustrative purposes.

This strike-oriented line was selected to highlight groundwater salinity class and lithology mapping in the Queen City Aquifer. The Queen City Aquifer is interpreted to have a mix of fresh and slightly saline groundwater, even in outcrop. On Strike Line C, the underlying Carrizo Aquifer is interpreted to have fresh groundwater. Since the Carrizo Aquifer is fresher downip than underlying or overlying formations, this creates situations, for example in wells 11109, 25294, 15312, 15308, and 14404, where the Carrizo Aquifer is sandwiched by brackish groundwater. The oldest



formation mapped in this project is the Wilcox Group, which is interpreted to be largely brackish in Strike Line C. The Wilcox Group displays one to three vertical salinity classifications ranging from fresh to moderately saline on this strike line. Wilcox Aquifer groundwater appears to be mostly fresh in well 42512, and this may be due to the presence of the Simsboro Formation in this well.

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.

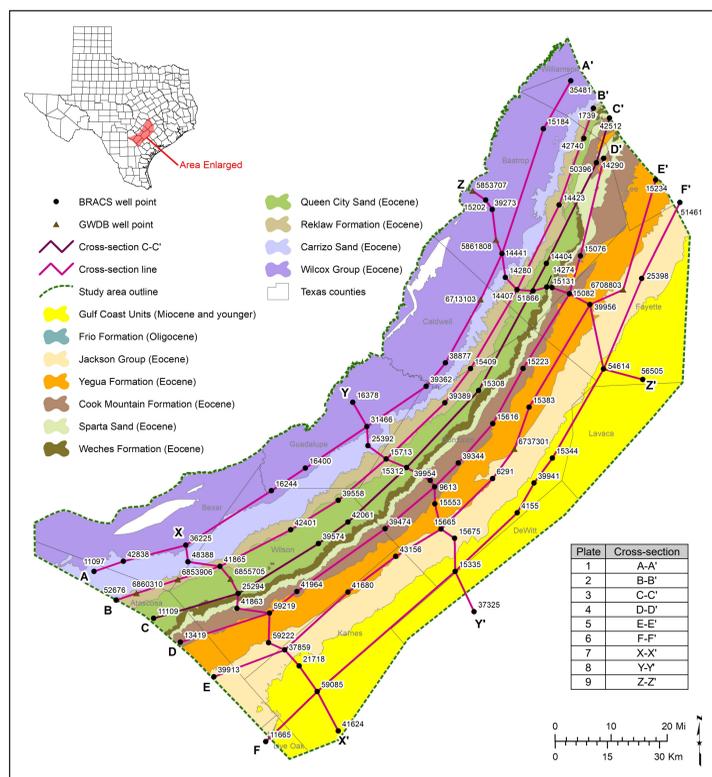


Figure 3. Location of cross-section lines relative to the study area, formation outcrops, and Texas counties. BRACS (Brackish Resources Aquifer Characterization System) well point label is the well ID in the BRACS Database. GWDB (Groundwater Database) well point label is the state well number in the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

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

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Mr. 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 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.

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