Structural Cross-section of Strike Line E

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, Bee, 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 value shapefiles, can be downloaded from the Texas Water Development Board’s website: http://www.tpwd.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.tpwd.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 E (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 (SHW #). Well intervals are displayed in feet relative to mean sea level with a vertical exaggeration of 8x. An approximate ground surface is shown for illustrative purposes.

This strike-oriented line was selected to highlight groundwater salinity class mapping in the Yegua Aquifer outcrop. Seven of eleven wells on Strike Line E display an interval of interpreted moderately saline Yegua Aquifer groundwater. However, all three measured water quality samples from the Yegua Aquifer are fresh groundwater samples. The aquifer underlying the Yegua is the Sparta Aquifer. The Sparta Aquifer is brackish or very saline on Strike Line E. Like the Sparta Aquifer, the underlying Queen City Aquifer is also brackish or very saline. Beneath the Queen City Aquifer is the Carrizo Aquifer. The Carrizo Aquifer is primarily saline on Strike Line E, whereas it was mostly fresh on strike lines B, C, and D. This leaves the Carrizo Aquifer bracketed by more saline waters above and below. Like the Sparta and Queen City aquifers above it, the Wilcox Aquifer on Strike Line E is brackish and very saline.

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


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

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