BRACKISH RESOURCES AQUIFER CHARACTERIZATION SYSTEM (BRACS) FOR TEXAS GROUNDWATER

Andrea Croskrey
2017 GSA South-Central Section Meeting
T6. “Karst: From Sinkholes to Springs and Everything in Between”
Monday March 13th
Omni Colonnade San Antonio, Grand Ballroom B
The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board’s statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.
Primary Responsibilities:

- State Water Plan
- Funding
- Water Resource Data
- Outreach

“To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas”
“Our mission is to educate the water community on the use of nontraditional water supplies.”
Brackish Resources Aquifer Characterization System (BRACS)

- TWDB program since 2009
- Mapping brackish aquifers
- Knowledge gap
- Legislation
Directed TWDB to:

• define brackish groundwater production zones
• estimate productivity over 30 & 50 year periods
• recommend groundwater monitoring
• four aquifers due December, 2016
• all aquifer studies due December, 2022
# Brackish Groundwater

Saltier than fresh water, less salty than seawater

<table>
<thead>
<tr>
<th>Groundwater Salinity Classification</th>
<th>Salinity Zone Code</th>
<th>Total Dissolved Solids Concentration (units: milligrams per liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>FR</td>
<td>0 to 1,000</td>
</tr>
<tr>
<td>Slightly Saline</td>
<td>SS</td>
<td>1,000 to 3,000</td>
</tr>
<tr>
<td>Moderately Saline</td>
<td>MS</td>
<td>3,000 to 10,000</td>
</tr>
<tr>
<td>Very Saline</td>
<td>VS</td>
<td>10,000 to 35,000</td>
</tr>
<tr>
<td>Brine</td>
<td>BR</td>
<td>Greater than 35,000</td>
</tr>
</tbody>
</table>

**Groundwater Salinity Classification**

*Source: modified from Winslow and Kister, 1956*
BRACS Program

Brackish Resources Aquifer Characterization System

Current studies and projects
- Bm. Blossom Aquifer (Contract No. 1600011951)
- Lp. Lipan Aquifer
- Nh. Nacatoch Aquifer (Contract No. 1600011952)
- Ty. Trinity Aquifer (Contract No. 1600011950)
- UCP. Upper Coastal Plain Aquifers

Completed studies and projects
- Be. Blaine Aquifer (Contract No. 1600011948)
- Cz. Carrizo-Wilcox Aquifer (Contract No. 1548301855)
- GC1. Gulf Coast Aquifer (Report 12-01)
- GC2. Gulf Coast Aquifer (Report 383)
- GC3. Gulf Coast Aquifer (Contract No. 1600011947)
- PV. Pecos Valley Aquifer (Report 382)
- QS. Queen City-Sparta Aquifer (Report 14-01)
- Rr. Rustler Aquifer (Contract No. 1600011949)

Proposed studies are conceptual and may or may not represent a precise location and extent or actual implementation.

This map was generated by the Texas Water Development Board using GIS (Geographical Information System) software. No claims are made to the accuracy or completeness of the information shown herein or to its suitability for a particular use. The scale and location of all mapped data are approximate.
General Methodology

Area (Extent) × Thickness (Net Sand) × Porosity (Specific Yield) = Volume (acre-feet)

Volume and Quality of Brackish Groundwater
## Log analysis: Stratigraphy and Lithology

BRACS Well ID 42889

<table>
<thead>
<tr>
<th>Formation</th>
<th>Lithology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaumont Fm</td>
<td>no data</td>
</tr>
<tr>
<td>Lissie Fm</td>
<td>clay</td>
</tr>
<tr>
<td></td>
<td>sand</td>
</tr>
<tr>
<td>Willis Fm</td>
<td>sand with clay</td>
</tr>
<tr>
<td></td>
<td>sand with clay</td>
</tr>
<tr>
<td>Upper Goliad Fm</td>
<td>sand with clay</td>
</tr>
<tr>
<td></td>
<td>sand with clay</td>
</tr>
<tr>
<td></td>
<td>clay with sand</td>
</tr>
<tr>
<td></td>
<td>sand with clay</td>
</tr>
<tr>
<td>Upper Goliad Fm</td>
<td>sand</td>
</tr>
<tr>
<td></td>
<td>sand with clay</td>
</tr>
</tbody>
</table>

Source: Lower Rio Grande Valley BRACS Study
Log analysis: Calculated TDS

BRACS Well ID 42889

Source: Lower Rio Grande Valley BRACS Study

At 160 ft = 15 ohm-meter

Rwa Minimum Method interpreted TDS = 2,500 mg/L

Water Well TDS concentration = 2,264 mg/L (well screen 170-349 ft)
BRACS Database: Primary Tables

- Microsoft Access Database
- Available on the TWDB web site (with data dictionary)
- Relational table design
- All wells are assigned a unique well id, linking records together

Key field links between tables:
- **Well_ID**
- **Well_ID, GL_Number**
- **Well_ID, GL_Number, DF**
- **Well_ID, GL_Number, Ro_TDS_Number**
GIS: Interpolate Points to make Rasters
The **Brackish Resources Aquifer Characterization System (BRACS) Database** was designed to store well and geology information in support of projects to characterize the brackish groundwater resources of Texas. The BRACS database is fully relational, with self-documenting object naming. The database design relies on extensive use of lookup tables. The BRACS database is a Microsoft Access 2007 format that has been compressed with the WinZip utility. This database will be updated periodically; the date of the last update is embedded in the filename.

This database was developed for use by TWDB staff in support of the BRACS program. The information changes on a daily basis and users should read the disclaimer below. If you have any questions, please contact John Meyer at 512-463-8010.

A data dictionary to accompany the BRACS Database is now available for download. The dictionary describes each primary table in the database and custom tables developed for a study.

Download Geophysical Well Logs!

1. Download logs on a per well basis using Water Data Interactive website
   https://www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer

2. Instructions for requesting a large volume of logs on a county basis
   http://www.twdb.texas.gov/innovativewater/bracs/WellLogs.asp
# Studies and Contracted Projects

## Completed Studies

http://www.twdb.texas.gov/innovativewater/bracs/studies.asp

![Completed Studies Table](image)

## Current and Completed Contracted Projects

http://www.twdb.texas.gov/innovativewater/bracs/projects.asp

<table>
<thead>
<tr>
<th>Date</th>
<th>Project</th>
<th>Report Number</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/2016</td>
<td>Identification of Potential Brackish Groundwater Production Areas - Rustler Aquifer</td>
<td>1600011949</td>
<td>INTERA, Inc.</td>
</tr>
</tbody>
</table>
We need your data!

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http://www.twdb.texas.gov/innovativewater/index.asp
Interactive 2017 Water Plan:
https://2017.texasstatewaterplan.org/statewide