

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”

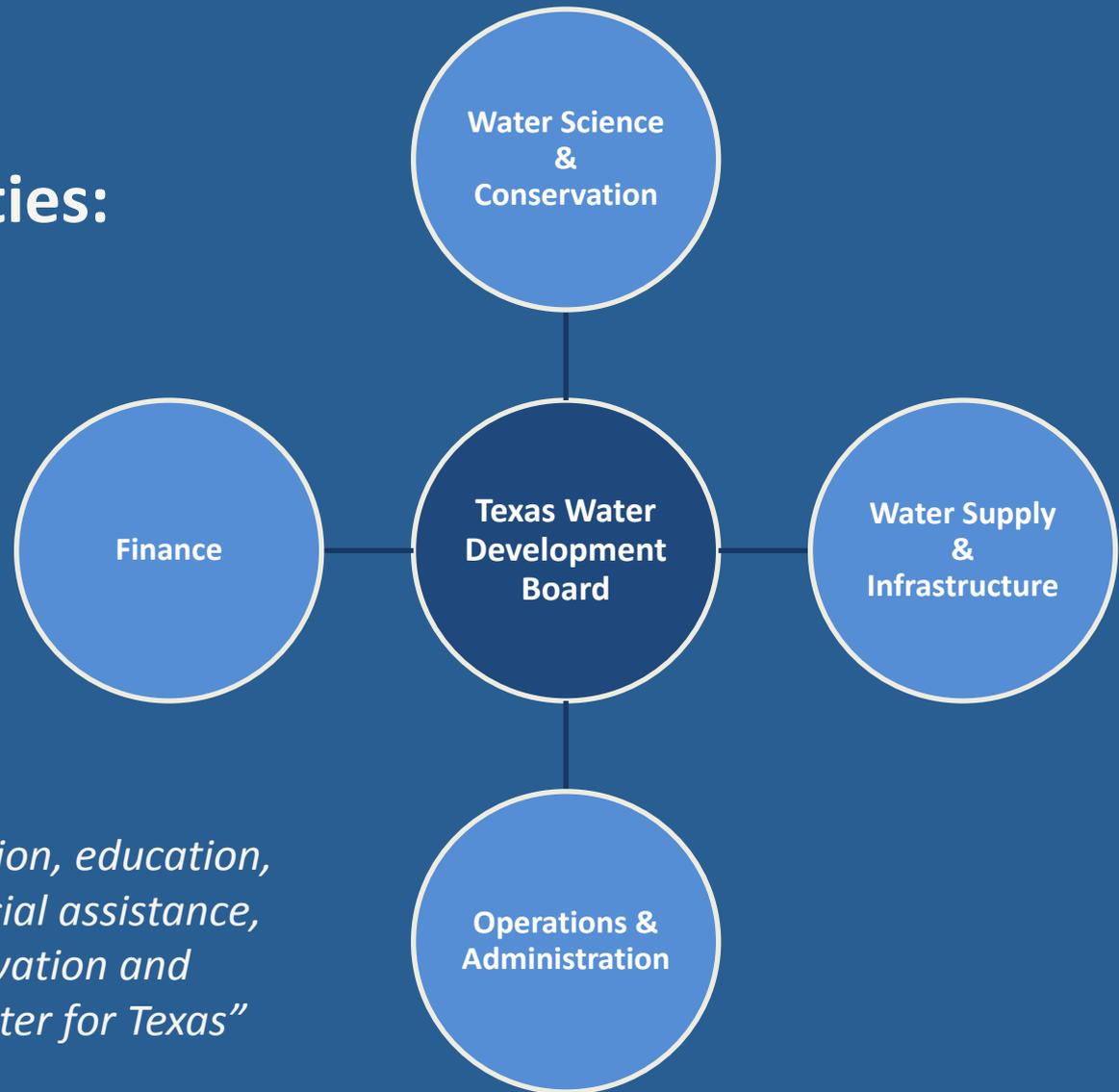
Monday March 13th

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.

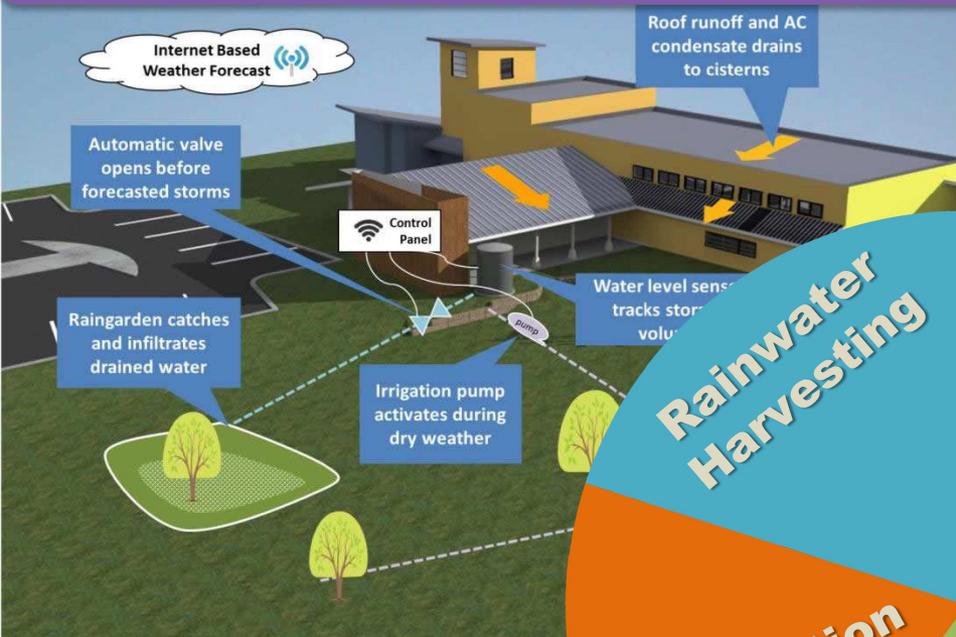
Primary Responsibilities:

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

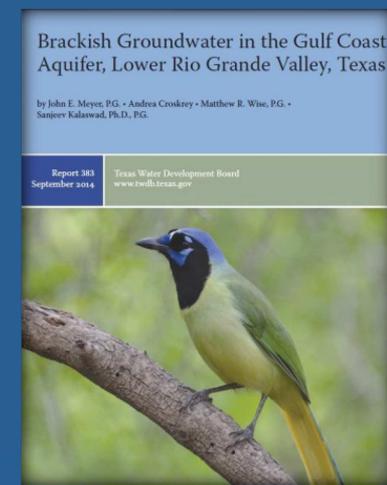
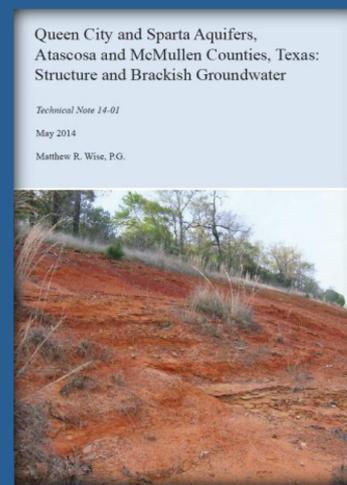
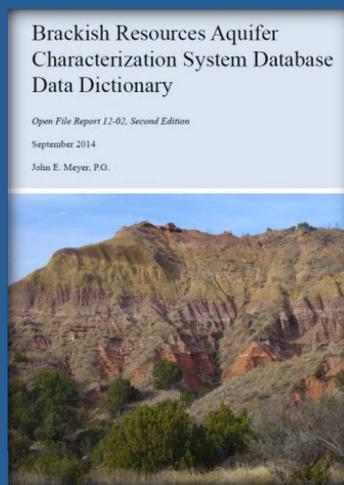
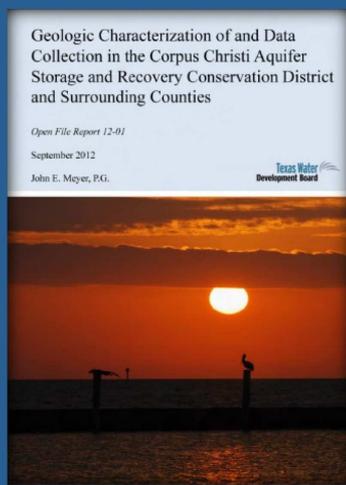
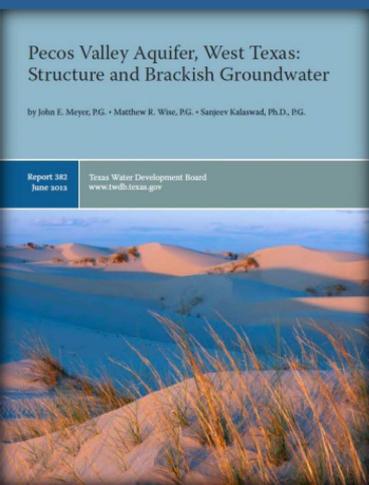


“To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas”

Innovative Water Technologies



"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

House Bill 30

(84th Texas Legislature, 2015)

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

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

← Drinking Water Limit

← Major/Minor Aquifer Mapped Limit

← Seawater

Groundwater Salinity Classification

Source: modified from Winslow and Kister, 1956

BRACS Program

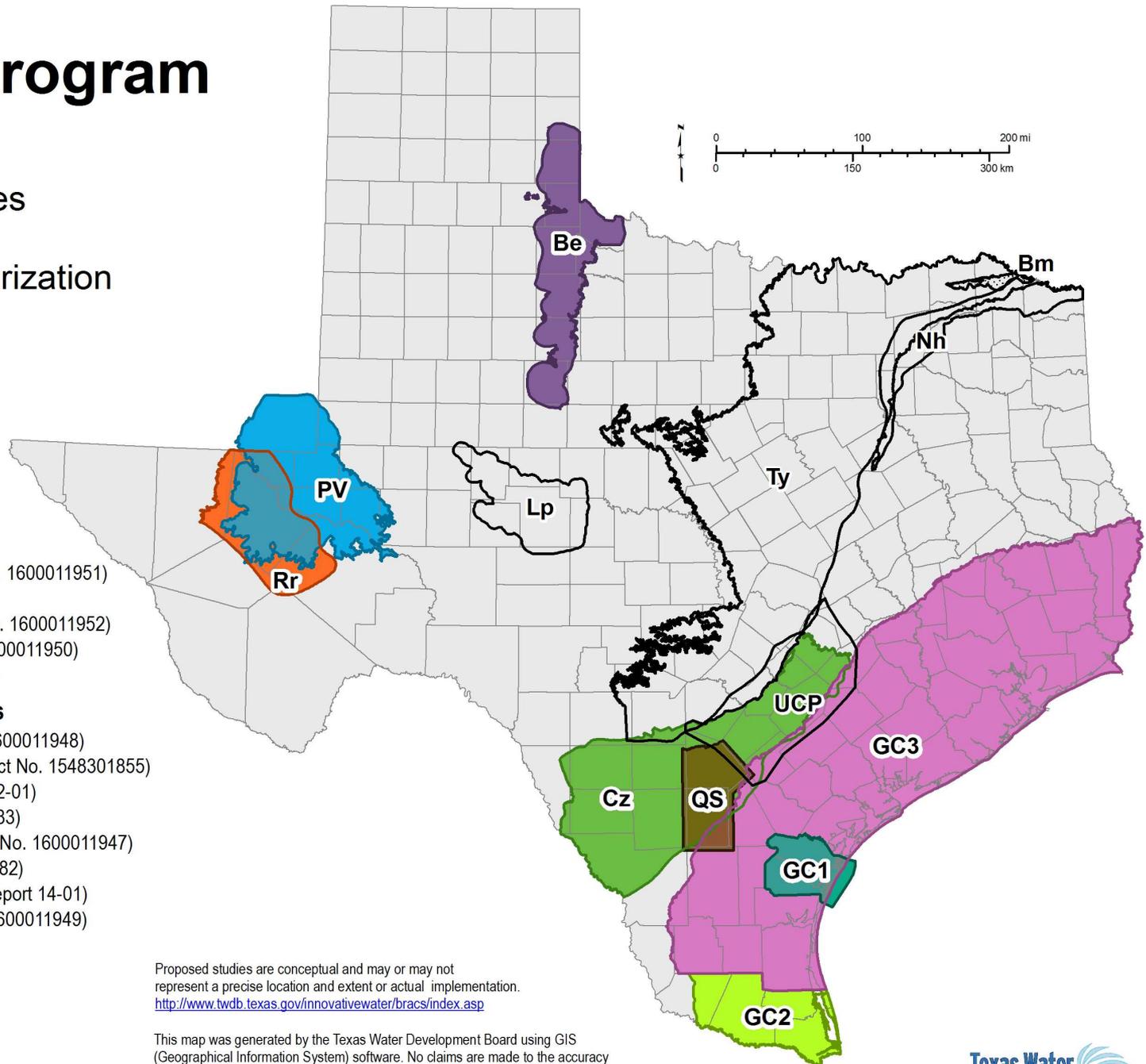
Brackish Resources Aquifer Characterization System

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

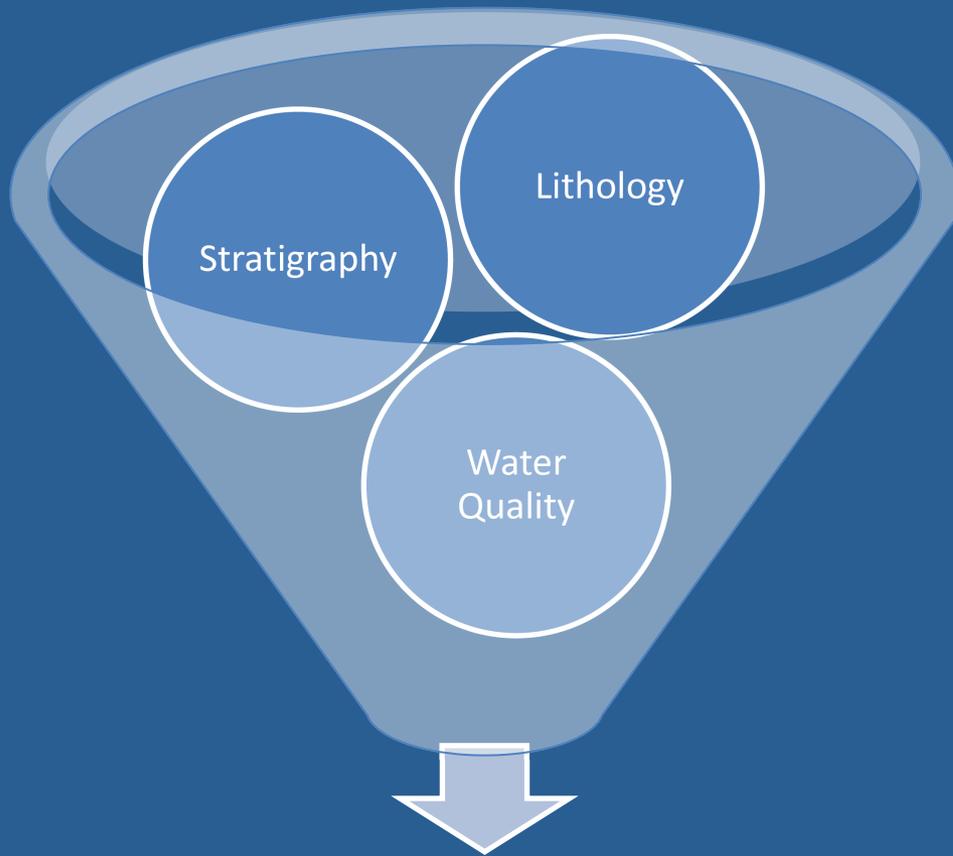
-  Be. Blaine Aquifer (Contract No. 1600011948)
-  Cz. Carrizo-Wilcox Aquifer (Contract No. 1548301855)
-  GC1. Gulf Coast Aquifer (Report 12-01)
-  GC2. Gulf Coast Aquifer (Report 383)
-  GC3. Gulf Coast Aquifer (Contract No. 1600011947)
-  PV. Pecos Valley Aquifer (Report 382)
-  QS. Queen City-Sparta 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.
<http://www.twdb.texas.gov/innovativewater/bracs/index.asp>

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

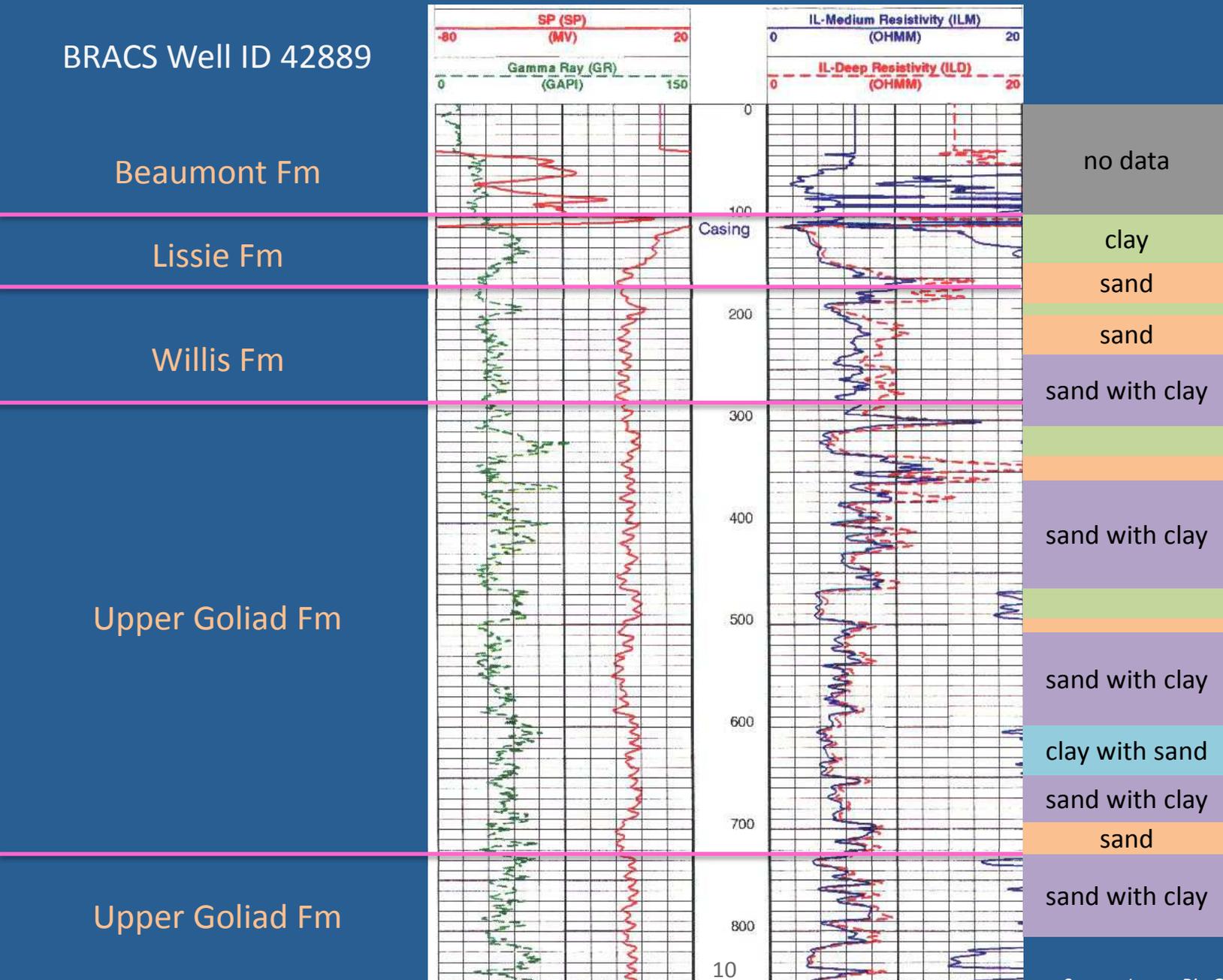


Volume and Quality of
Brackish Groundwater

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

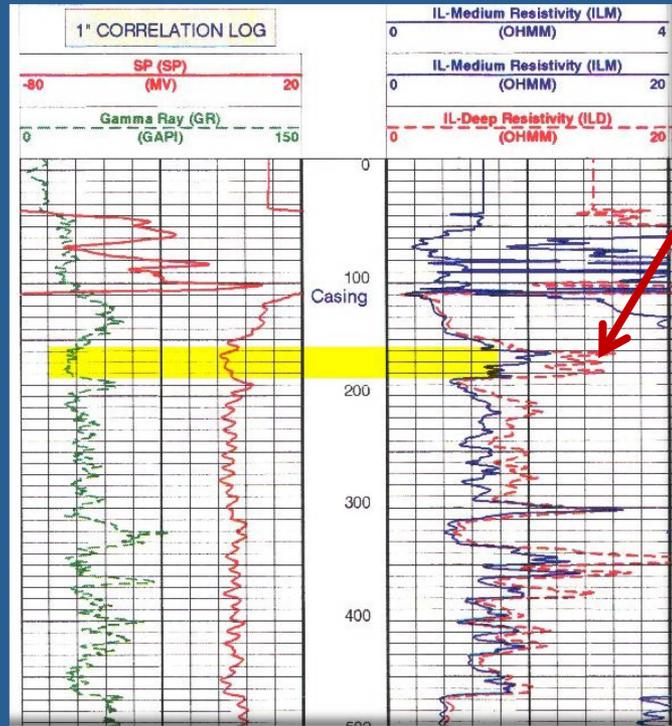
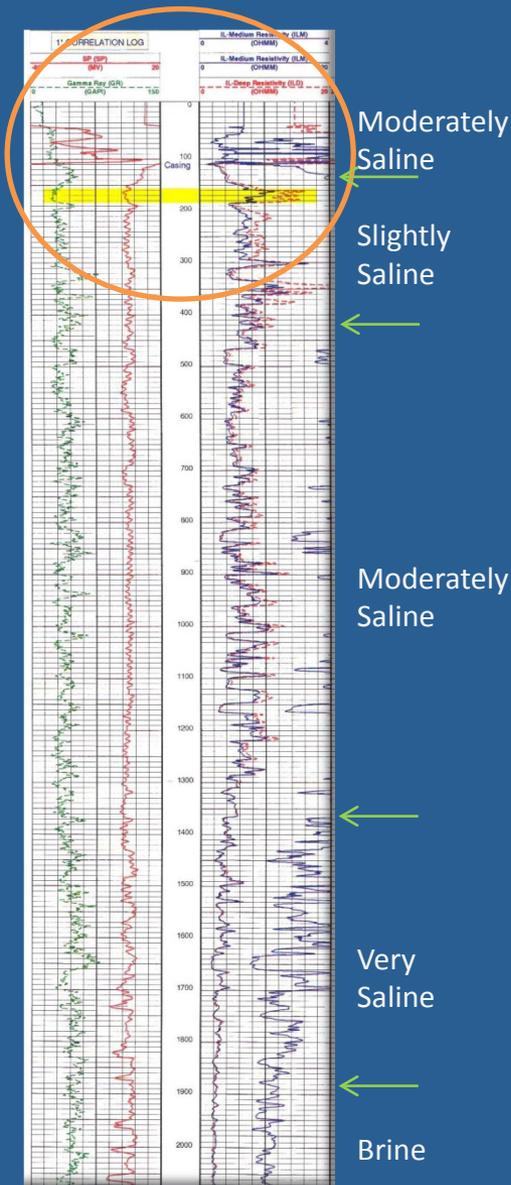
Log analysis: Stratigraphy and Lithology

BRACS Well ID 42889



Log analysis: Calculated TDS

BRACS Well ID 42889



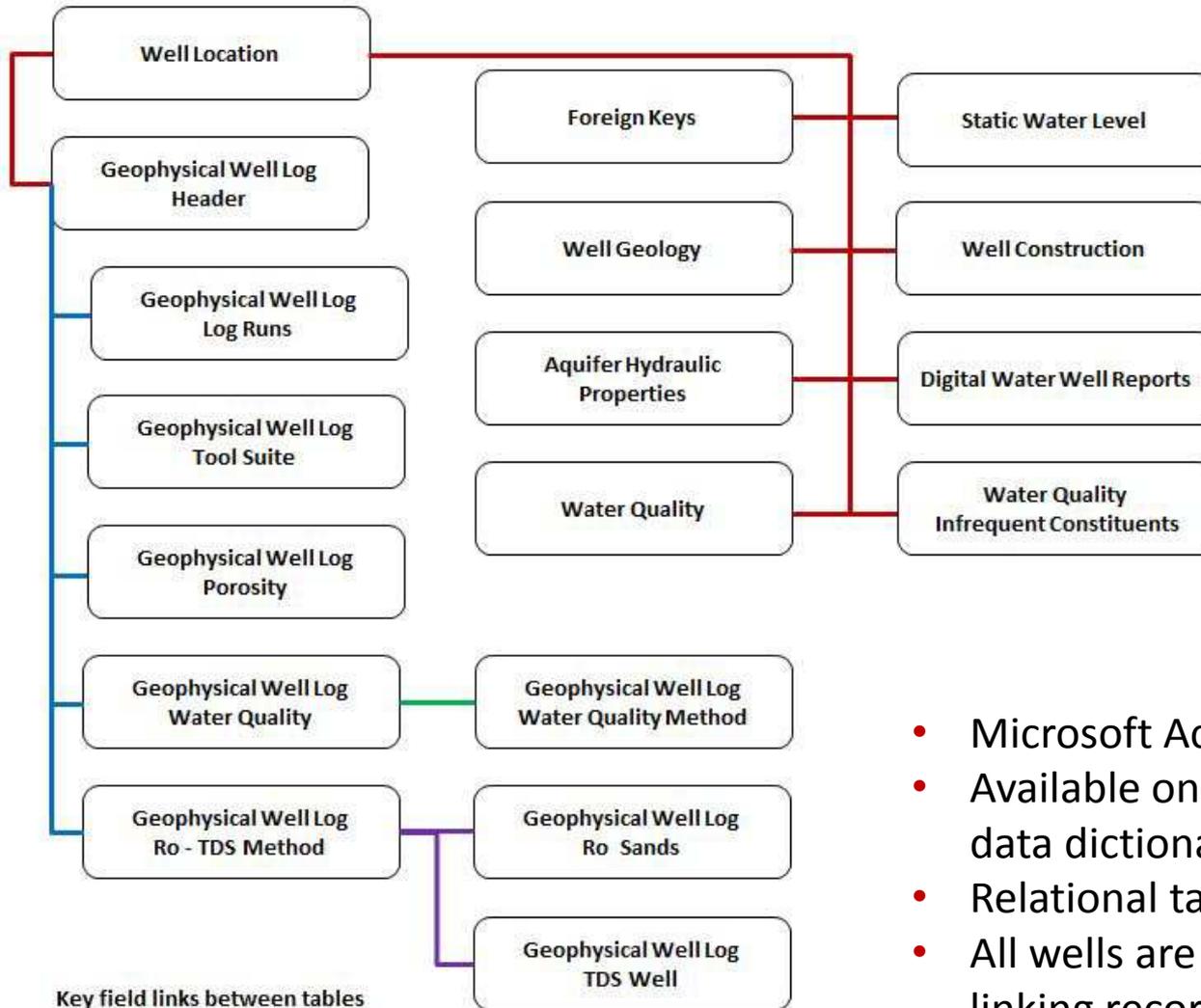
At 160 ft = 15 ohm-meter

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

Water Well
TDS concentration = 2,264 mg/L
(well screen 170-349 ft)

Source: Lower Rio Grande Valley BRACS Study

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

BRACS Database: Water Quality Log Analysis Calculations

Geophysical Resistivity Analysis | TWDB WSC IWT BRACS TDS Analysis Data Entry

BRACS Geophysical Log Analysis for TDS Calculations

White Field: fill in | Blue Field: Auto Loaded | Gray Field: Calculated by CPU

Buttons: [SP Method](#) | [Mean Ro](#) | [Alger - Harrison](#) | [Rwa Method](#) | [Esteppe](#)

Initials: JEM

Buttons: [Load The New Data](#) | [Close Form](#)

Well Id: 32293 | GL Number: 48924 | Depth Formation (Df): 1680

Thickness Lithologic Unit: 40

Ts: 69 | Dt: 3034

Tf: 97 | Rmf: 5.58

Tbh: 120 | Rmf_Temp: 75 | Rmf Tf: 0

Formation: Carrizo Formation

Remarks: N/A

TDS Interpreted: 0

Consensus TDS Method: N/A

Buttons: [m using Eq. 1.18](#)

TDS Method: Rwa Method

Rwe: 4.93 | Rw: 3.62 | Rw75: 4.68 | Cw: 2136.75 | TDS: 1154

Initials: JEM

Geophysical Log Used: INDUCTION

Correction Factors

SP: 0

Rxo: 0

Ro: 30

Rxo / Ro: 0

m: 1.5

Source m: N/A

Porosity: 0.3

Source Porosity: N/A

0 K (Temperature): SP Method

1.36 Rwe Rw: Sp, Alger Harrison, and Rwa Minimum Methods

0 Rmf: SP and Alger Harrison Methods

0.54 ct: Many Methods

99 Invasion Zone: Alger Harrison Method

1 m correction factor: Esteppe Method high anion waters

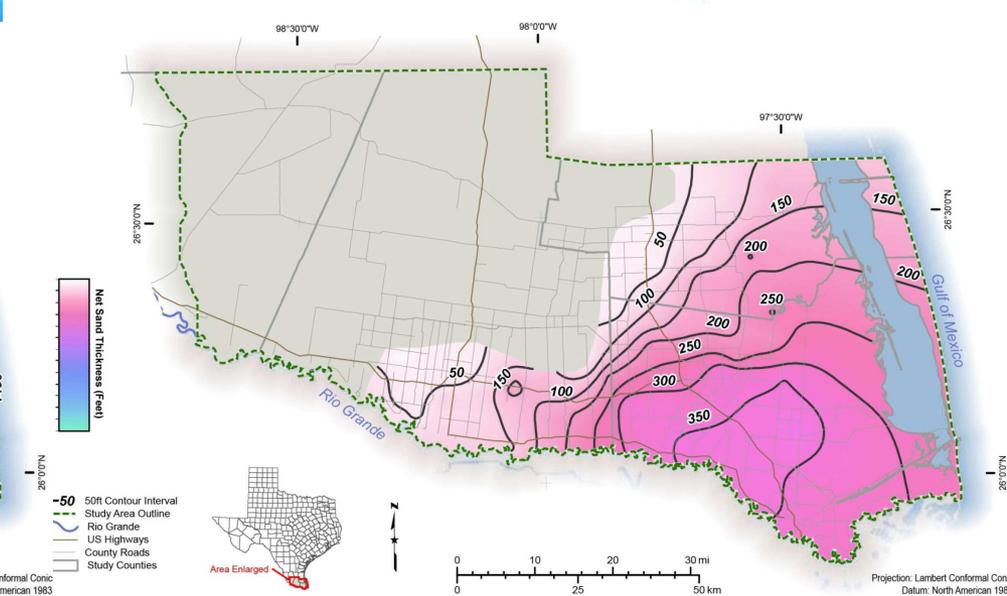
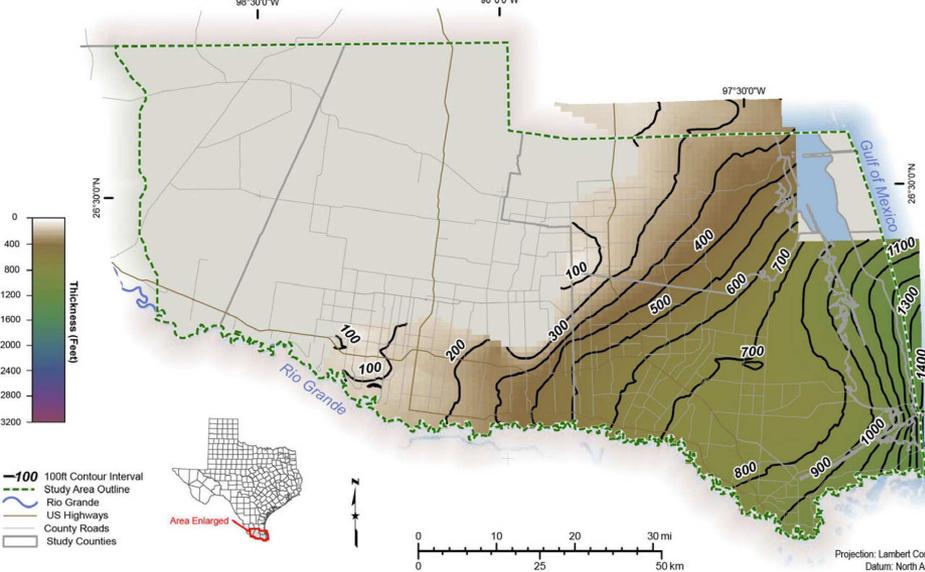
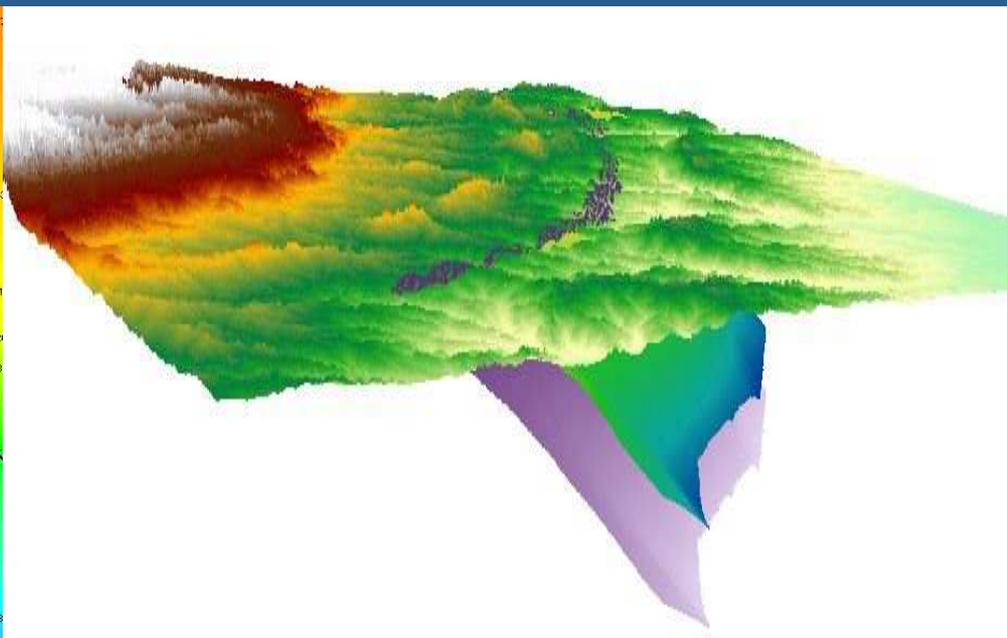
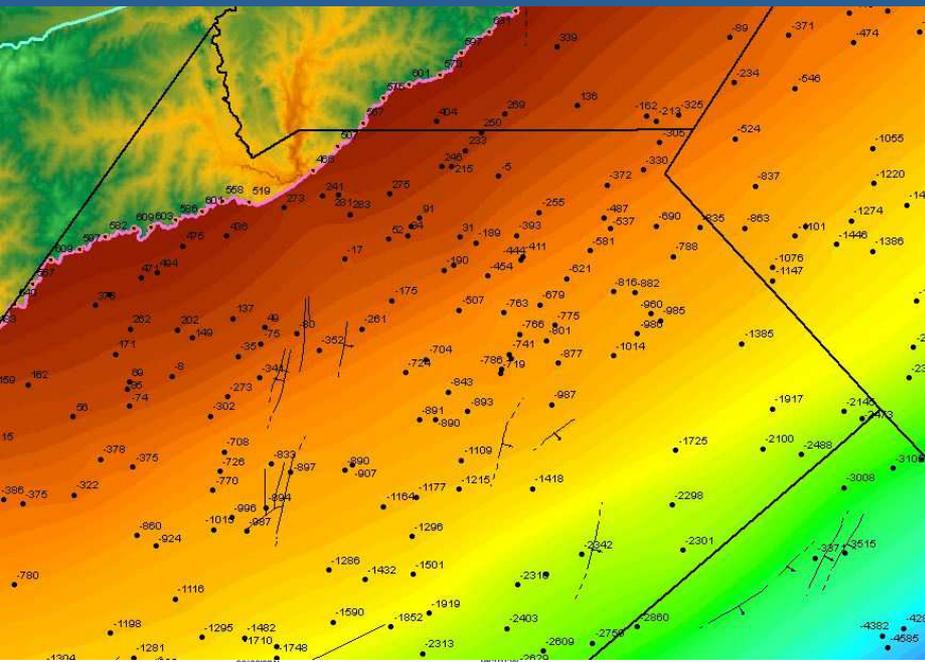
1 Ro: Mean Ro Method [Mean Ro Nomograph](#)

Chart: N/A

Remarks: see 6716404, 1100 TDS at 2000'

Record: 14 | 1 of 1 | No Filter | Search

GIS: Interpolate Points to make Rasters



Download Our Database!

<http://www.twdb.texas.gov/innovativewater/bracs/database.asp>

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.

 [Brackish Resources Aquifer Characterization System Database Data Dictionary, Second Edition, TWDB Open File Report 12-02, September 2014 \(3 MB\)](#)

Brackish Resources Aquifer Characterization System Database Data Dictionary

Open File Report 12-02, Second Edition

September 2014

John E. Meyer, P.G.



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>

The screenshot displays the Water Data Interactive website interface. The top navigation bar includes "Groundwater", "Layers", and "Base Maps". The left sidebar contains a search bar with "Find address" and a map navigation panel with icons for home, pan, zoom, and print. The main map area shows a cluster of green well markers in Texas. A filter panel is open, showing "TWDB Groundwater" (unchecked), "Brackish Groundwater" (checked), "Filters:" (dropdown menu), "Labels:" (dropdown menu), and "Submitted Driller's Reports" (Well Reports and Plugging Reports, both unchecked). A popup window titled "Brackish Groundwater" is open, displaying details for Well Id: 59287 - Logs. The popup includes a table of Geophysical Well Logs for Well Id: 59287, with columns for Log Id, File Type, and File Size. The table shows one entry: Log Id 72129, File Type tif, and File Size 0.1 MB. Below the table, there is contact information for assistance: BRACS-SUPPORT@twdb.texas.gov. The popup also displays metadata: Data Source: RRC GAU Q Paper/Digital Geophysical Logs, API Number, County: WINKLER, Well Depth (ft): 8661, Total Depth (ft): 8661, and Drill Date: 10/19/1950.

Log Id	File Type	File Size
72129	tif	0.1 MB

For Geophysical Well Log assistance contact:
BRACS-SUPPORT@twdb.texas.gov

Data Source: RRC GAU Q Paper/Digital Geophysical Logs
API Number:
County: WINKLER
Well Depth (ft):
Total Depth (ft): 8661
Drill Date: 10/19/1950

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>

Complete Date	Project	Report Number	Funding
09/2014	Brackish Groundwater in the Gulf Coast Aquifer, Lower Rio Grande Valley, Texas  Gulf Coast Aquifer GIS Datasets (128.0 MB)	383	In-house

Current and Completed Contracted Projects

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

11/2016	Identification of Potential Brackish Groundwater Production Areas - Rustler Aquifer	1600011949	INTERA, Inc.	\$200,000
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We need your data!

Andrea Croskrey

Geologist

Innovative Water Technologies

Texas Water Development Board

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(512) 463-2865

<http://www.twdb.texas.gov/innovativewater/index.asp>

Interactive 2017 Water Plan:

<https://2017.texasstatewaterplan.org/statewide>