

Texas' Brackish Resources Aquifer Characterization System (BRACS)

2016 Southwest Section AAPG Convention
Abilene, Texas

April 11

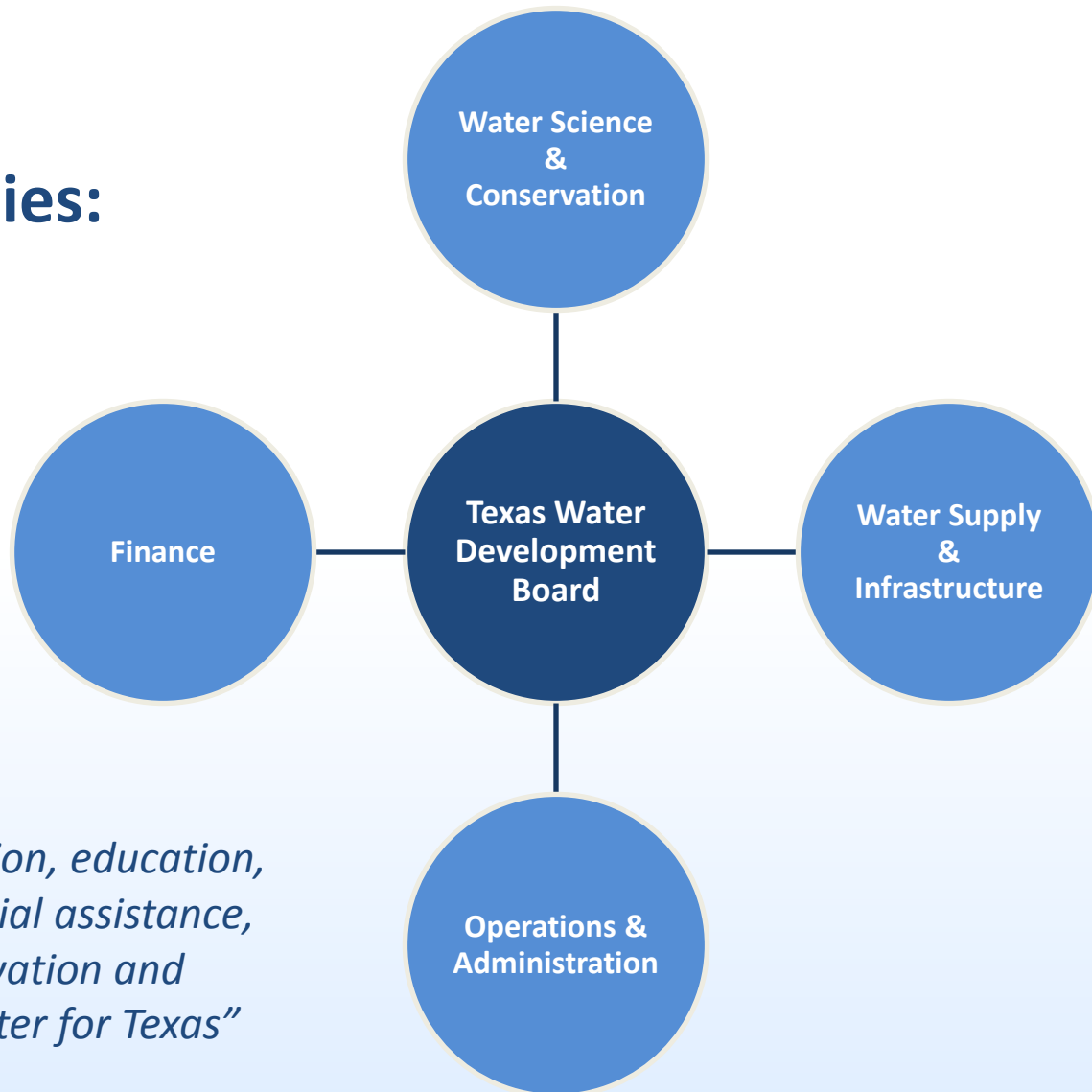
Andrea Croskrey

Texas Water 
Development Board

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:

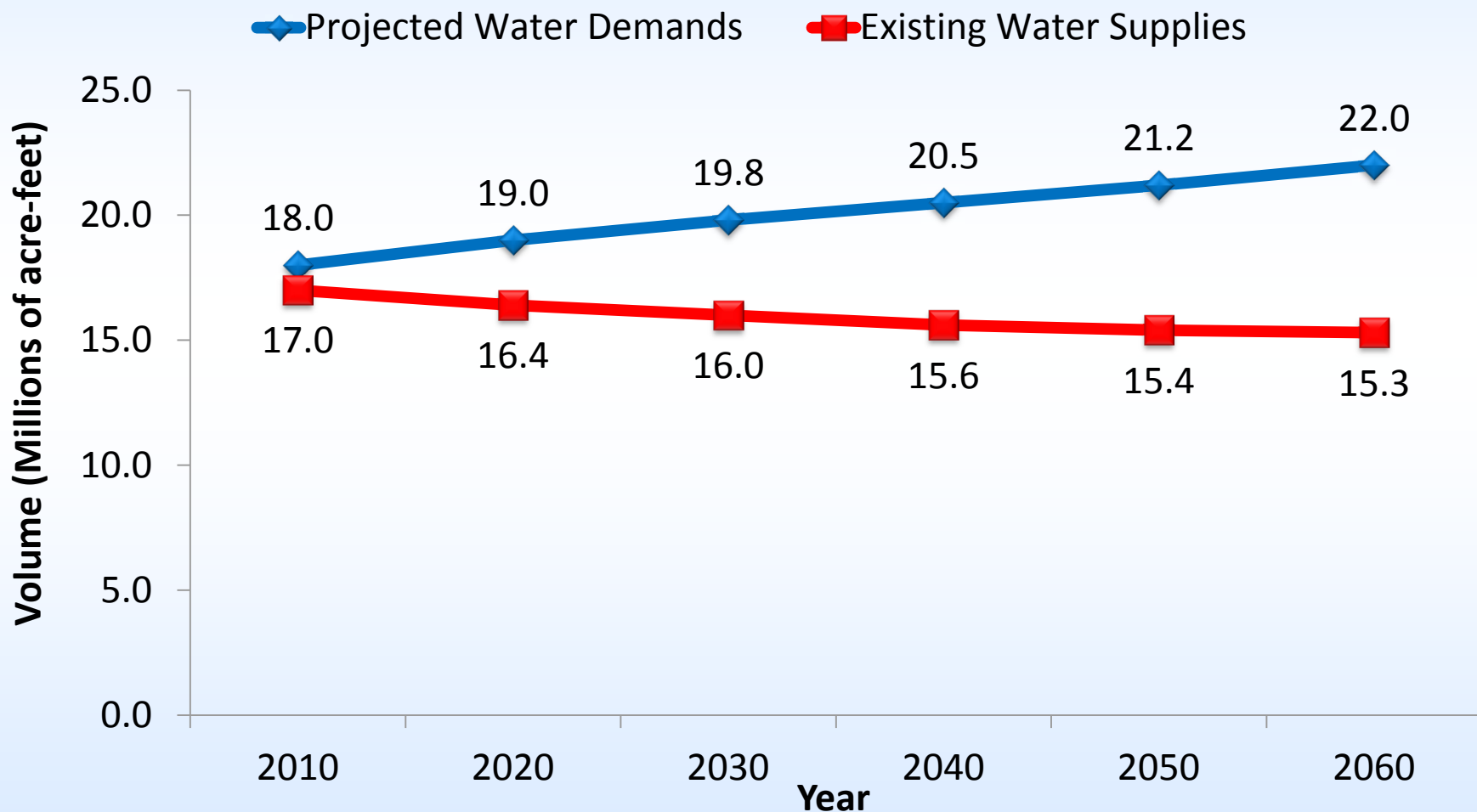
- State Water Plan
- Funding
- Water Resource Data
- Outreach



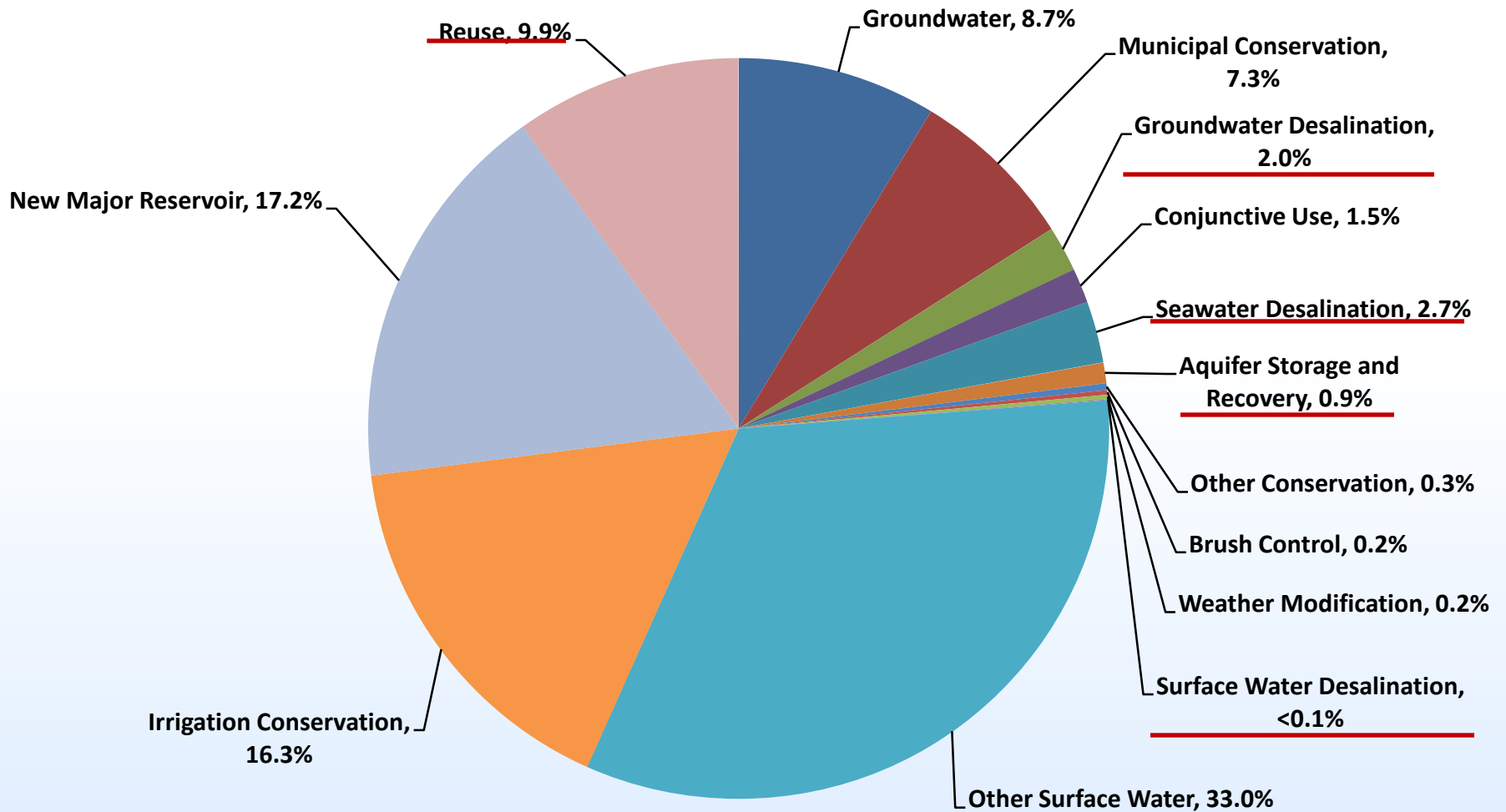
“To provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas”



Projected Water Demands and Existing Supplies



Recommended Water Management Strategies by 2060





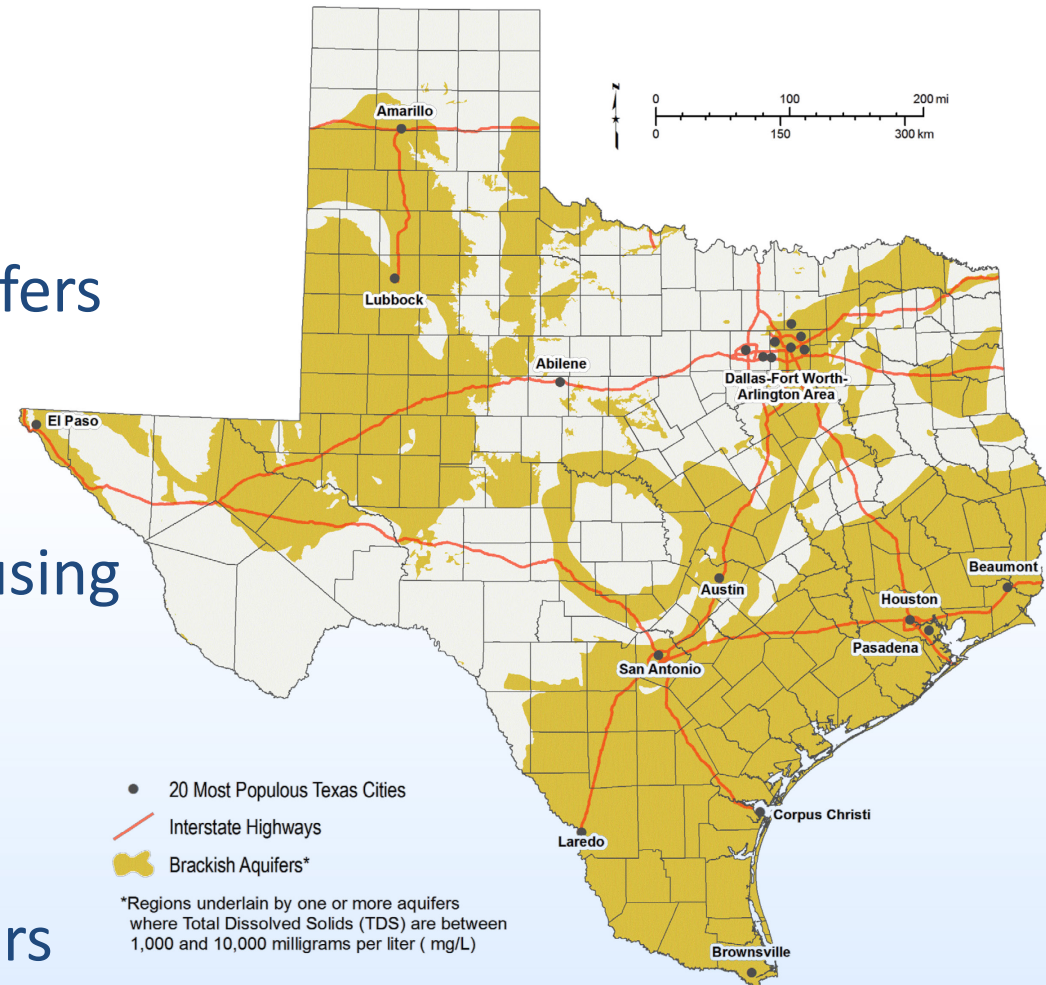
Innovative Water Technologies

“Our mission is to educate the water community on the use of nontraditional water supplies.”

- 💧 Aquifer Storage & Recovery (ASR)
- 💧 Desalination
- 💧 Water Reuse
- 💧 Rainwater Harvesting
- 💧 Brackish Resources Aquifer Characterization System (BRACS)

Brackish Resources Aquifer Characterization System

- Collect data
- Map and characterize aquifers
- Map key water quality parameters
- Estimate saturated zones using net sand analysis
- Chemical parameters important to desalination
- Provide data to stakeholders



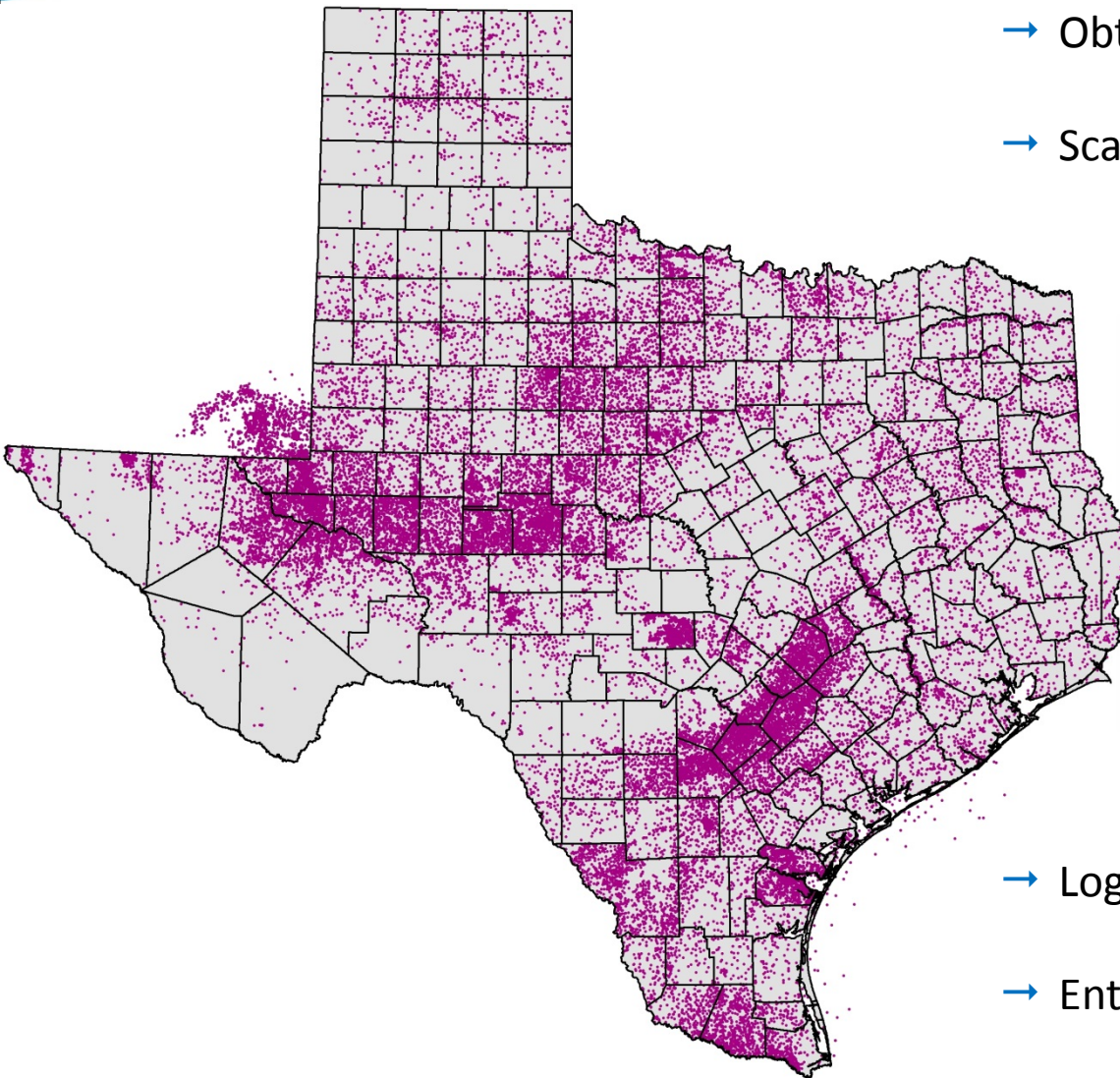
Brackish Groundwater

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	← Drinking Water Limit
Moderately Saline	MS	3,000 to 10,000	← Major/Minor Aquifer (Texas) Mapped Limit
Very Saline	VS	10,000 to 35,000	
Brine	BR	Greater than 35,000	← Seawater

BRACS Geophysical Well Log Collection

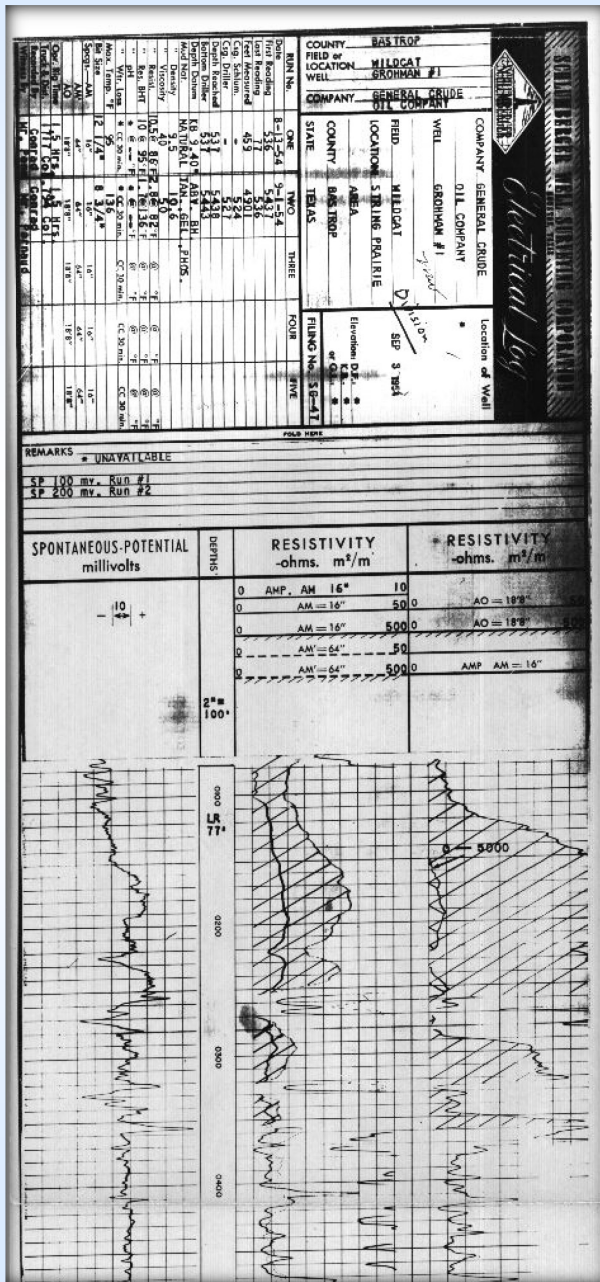
- Obtain oil, gas, and water well logs
- Scan into digital TIFF image files



- Logs must be non-confidential
- Entire collection available to the public

Total BRACS well control > 53,000 wells

Digital geophysical and water well logs



4089006D

Please use black ink.

Attention Owner: Confidentiality
 Privilege Notice on Reverse Side
 Gonzales County Water Supply Corp.

**State of Texas
WELL REPORT**

Texas Water Well Drillers Advisory Council
 P.O. Box 13087
 Austin, TX 78711-3087
 512-239-0530

1) OWNER Gonzales County Water Supply Corp. ADDRESS 1903 Sarah DeWitt Dr., Gonzales, Texas 78629
 (Name) (Street or RFD) (City) (State) (Zip)

2) ADDRESS OF WELL: 8 miles N. of Gonzales (F.M. 794 well) GRID # 67-20-9
 (Street, RFD or other) (City) (State) (Zip)

3) TYPE OF WORK (Check):
 New Well Deepening Reconditioning Plugging

4) PROPOSED USE (Check):
 Monitor Industrial Irrigation Injection Public Supply De-watering Testwell
 Environmental So/Boring Domestic Reconditioning Plugging
 If Public Supply well, were plans submitted to the TNRCC? Yes No

5) WELL LOG:

Date Drilling:	DIAMETER OF HOLE		
	Dia. (in.)	From (ft.)	To (ft.)
Started <u>10-24-1996</u>	<u>18 1/2</u>	Surface	<u>748</u>
Completed <u>11-10-1996</u>	<u>11 1/2</u>	<u>748</u>	<u>830</u>

6) DRILLING METHOD (Check):
 Air Rotary Mud Rotary Bored
 Air Hammer Cable Tool Jetted
 Other

7) Borehole Completion (Check):
 Open Hole Straight Wall
 Underreamed Gravel Packed Other
 If Gravel Packed give interval ... from _____ ft. to _____ ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gate Casting Screen
			From	To	
<u>12 1/2</u>	New	Steel	<u>4</u>	<u>748</u>	
<u>8 5/8</u>	New	Steel	<u>702</u>	<u>750</u>	
<u>8 5/8</u>	New	Screen Mfg.	<u>750</u>	<u>820</u>	

8) CEMENTING DATA [Rule 338.44(1)]
 Cemented from 0 ft. to 748 ft. No. of sacks used 420
 Method used Pressure
 Cemented by International Services, Inc.
 Distance to septic system field lines or other concentrated contamination 200 ft.
 Method of verification of above distance measured

9) TYPE PUMP: N/A
 Turbine Jet Submersible Cylinder
 Other _____
 Depth to pump bowls, cylinder, jet, etc. _____ ft.

10) WELL TESTS:
 Type test: Pump Bailer Jetted Estimated
 Yield: 1471 gpm with 252 ft. drawdown after 36 hrs.

11) WATER QUALITY:
 Did you knowingly penetrate any strata which contained undesirable constituents?
 Yes No If yes, submit 'REPORT OF UNDESIRABLE WATER'
 Type of water? Good Depth of strata 750-820
 Was a chemical analysis made? Yes No

12) SURFACE COMPLETION:
 Specified Surface Slab Installed [Rule 338.44(2)(A)]
 Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
 Pitsless Adapter Used [Rule 338.44(3)(b)]
 Approved Alternative Procedure Used [Rule 338.71]

13) WATER LEVEL:
 Static level 65 ft. below land surface Date 12-23-96
 Artesian flow _____ gpm. Date _____

14) PACKERS:
 N/A

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME Cude Drilling, Inc. WELL DRILLER'S LICENSE NO. 2738W
 (Type or print)

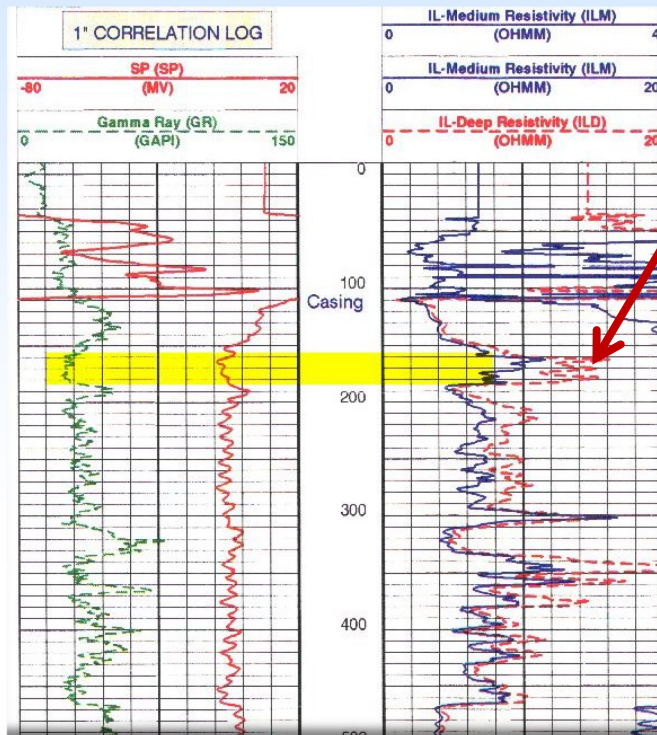
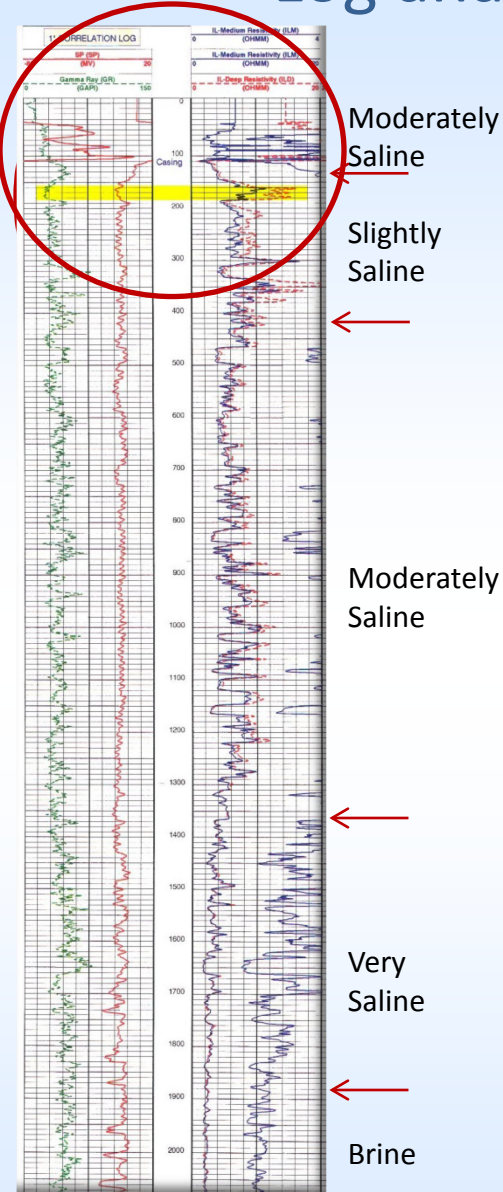
ADDRESS P. O. Box 8 Pleasanton Texas 78064
 (Street or RFD) (City) (State) (Zip)

(Signed) Richard R. R. [Signature] (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

WCC-0199 (Rev. 11-01-94)

Log analysis to interpret Total Dissolved Solids



At 160 ft = 15 ohm-meter

R_{wa} Minimum Method
 interpreted TDS = 2,500 mg/L

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

BRACS Well ID 42889

Source: Lower Rio Grande Valley BRACS Study



Close Form

BRACS Public Database

1: Select a form to display

BRACS Database Master Well Form

TWDB Report 382, 2012, Pecos Valley Aquifer, West Texas: Structure and Brackish Groundwater

- Pecos Valley Aquifer Study: Aquifer Determination Form
- Pecos Valley Aquifer Study: Net Sand Form

TWDB Technical Note 14-01, 2014, Queen City and Sparta Aquifers, Atascosa and McMullen Counties, Texas: Structure and Brackish Groundwater

- Queen City and Sparta Aquifer Study: Aquifer Determination Form
- Queen City and Sparta Aquifer Study: Net Sand Form

TWDB Open-file Report 12-01, 2012, Geologic Characterization of and Data Collection in the Corpus Christi Aquifer Storage and Recovery Conservation District and Surrounding Counties

- Gulf Coast CCASRCD Study: Aquifer Determination Form
- Gulf Coast CCASRCD Study: Net Sand Form

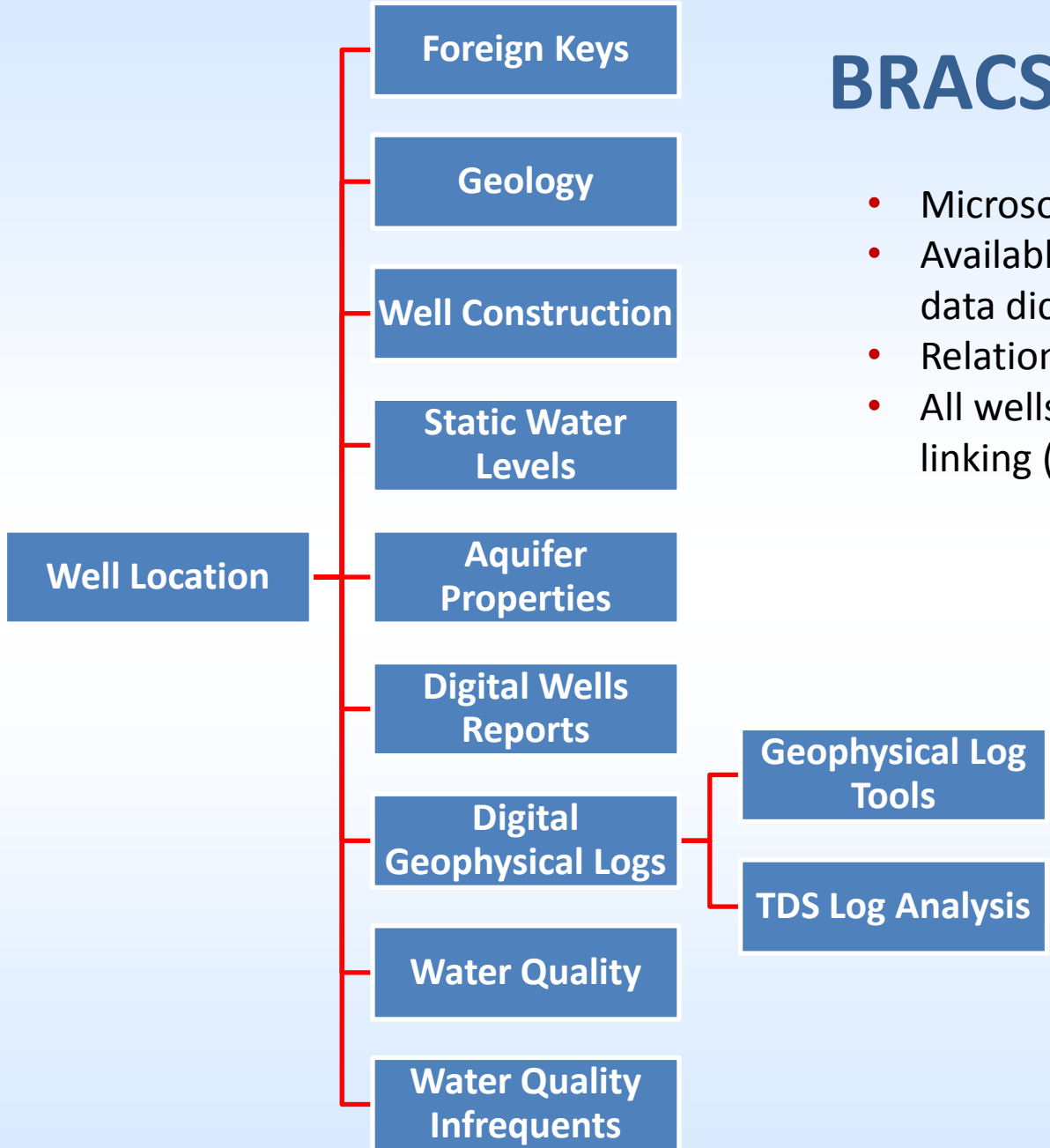
TWDB Report 383, 2014, Brackish Groundwater in the Gulf Coast Aquifer, Lower Rio Grande Valley, Texas

- Gulf Coast Lower Rio Grande Valley Study: Aquifer Determination Form
- Gulf Coast Lower Rio Grande Valley Study: Net Sand Form
- Gulf Coast Lower Rio Grande Valley Study: Salinity Zone Form

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

2: Press Button

Open Form



BRACS Database 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 (red line) records together

BRACS Supporting Databases

Texas Water Development Board (TWDB):
BRACS Database

TWDB:
Groundwater, Desalination,
Aquifer Storage & Recovery
Databases

Rail Road Commission:
Oil & Gas Well, Q Log, and
Class II Injection Well
Databases

U.S. Geological Survey:
Water Well and Produced
Water Data

Texas Commission on Environmental
Quality:
Public Water Systems Database

Texas Bureau of Economic Geology:
Integrate Core and Log Database

Groundwater Conservation
Districts:
Water Well Data

Texas Department on Licensing
and Regulation:
Water Well Report Database

University Lands:
Oil & Gas Well Database

Public Water Service Systems:
Water Well Data

New Mexico:
Oil & Gas and Water Well Databases

Water Data Interactive

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Data, Apps and Maps | Texas W... x +

www.twdb.texas.gov/mapping/index.asp

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[Home](#) [Board](#) [SWIFT](#) [Financial Assistance](#) [Water Planning](#) [Groundwater](#) [Surface Water](#) [Flood](#) [Conservation](#) [Innovative Water](#)

WATER DATA Interactive



Groundwater Data Viewer

This interactive mapping application provides access to water-related data for Texas. The viewer contains several GIS datasets relating to water resources, including TWDB groundwater data, brackish groundwater data, and data [click to show more](#)



Major Aquifer 3D Viewer

A three dimensional interactive viewer for exploring the major aquifers of Texas. After choosing an aquifer, users can choose to be re-directed to a 3D viewer that allows visual manipulation of the subsurface model. The [click to show more](#)



2012 State Water Plan

This application displays water planning information on which the 2012 State Water Plan is based. Each water user group is mapped to a single point near its primary location; therefore, an entity with a large or multiple [click to show more](#)



Water Data for Texas

This website is a product of the Texas Water Development Board (TWDB) Water Science Conservation Division and is made possible by the support of management and staff at TWDB. This project is part of our ongoing efforts to [click to show more](#)

Interactive Apps and Maps

TWDB Maps

GIS Data

Map Resources

Data Services

State Water Implementation Fund for Texas (SWIFT)

Groundwater Data Viewer

File Edit View History Bookmarks Tools Help

Groundwater Data Viewer | Tex... x +

www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer

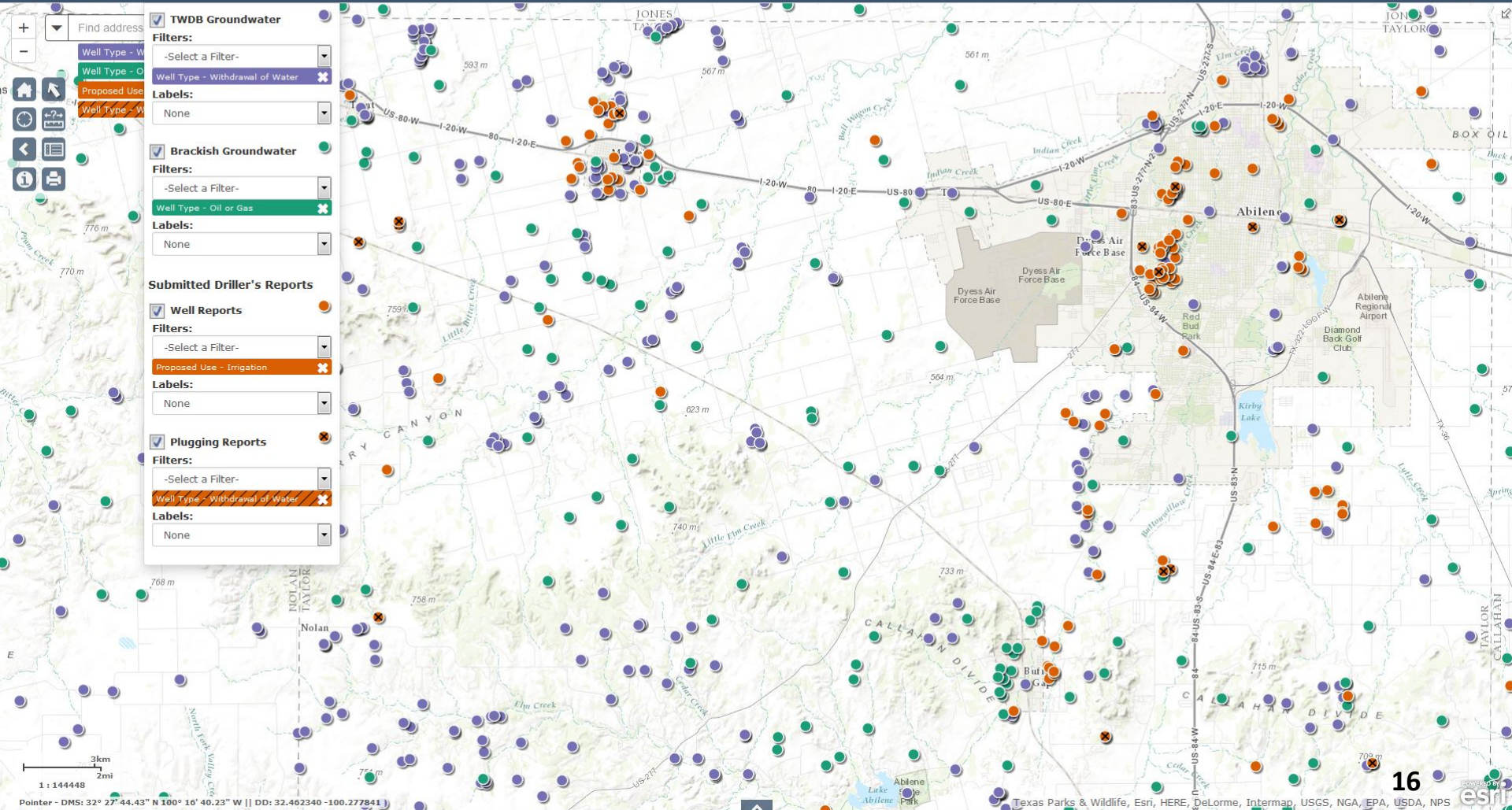
Search

WATER DATA
Interactive

Groundwater Layers Base Maps

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Texas Water
Development Board



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www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer

Search

Help Disclaimer



WATER DATA Interactive Groundwater Layers Base Maps

Find address

TWDB Groundwater
Filters: -Select a Filter-
Well Type - Withdrawal of Water
Labels: None

Brackish Groundwater
Filters: -Select a Filter-
Well Type - Oil or Gas
Labels: None

Submitted Driller's Reports
 Well Reports
Filters: -Select a Filter-
Proposed Use - Irrigation
Labels: None

Plugging Reports
Filters: -Select a Filter-
Well Type - Withdrawal of Water
Labels: None

1 : 144448
Pointer - DMS: 32° 27' 44.43" N 100° 16' 40.23" W | DD: 32.462340 -100.277841

Brackish Groundwater

Well Id: 19757 - [Logs](#)

Data Source: BEG Paper/Digital

API Number: 4244101287

County: Taylor

Well Depth (ft): 3553

Total Depth (ft): 3553

Drill Date: 12/03/1949

Kelly Bushing Height (ft): 10

Well Owner: A G HILL

Type of Well: Oil or Gas

Well Number: G. W. TEAFF 1

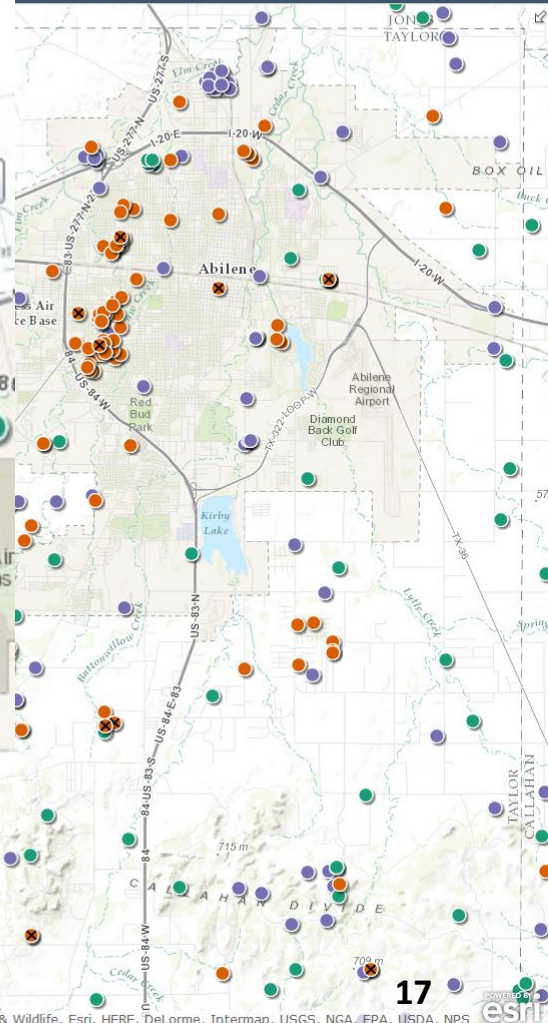
Track Number:

State Well Number:

Water Source Code:

Q Number:

[Download Well Logs](#)



Groundwater Data Viewer

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Groundwater Data Viewer | Tex... x +

www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer#

WATER DATA
Interactive

Groundwater ▾ Layers ▾ Base Maps ▾

Abilene, Texas, United S X 🔍

Brackish Groundwater

Well Id: 19757 - [Logs](#)

Geophysical Well Logs for Well Id: 19757 [close](#)

Log Id	File Type	File Size
20867 📎	tif	4 MB

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

Data Source: BEG Paper/Digital Geophysical Logs

API Number: 4244101287

County: Taylor

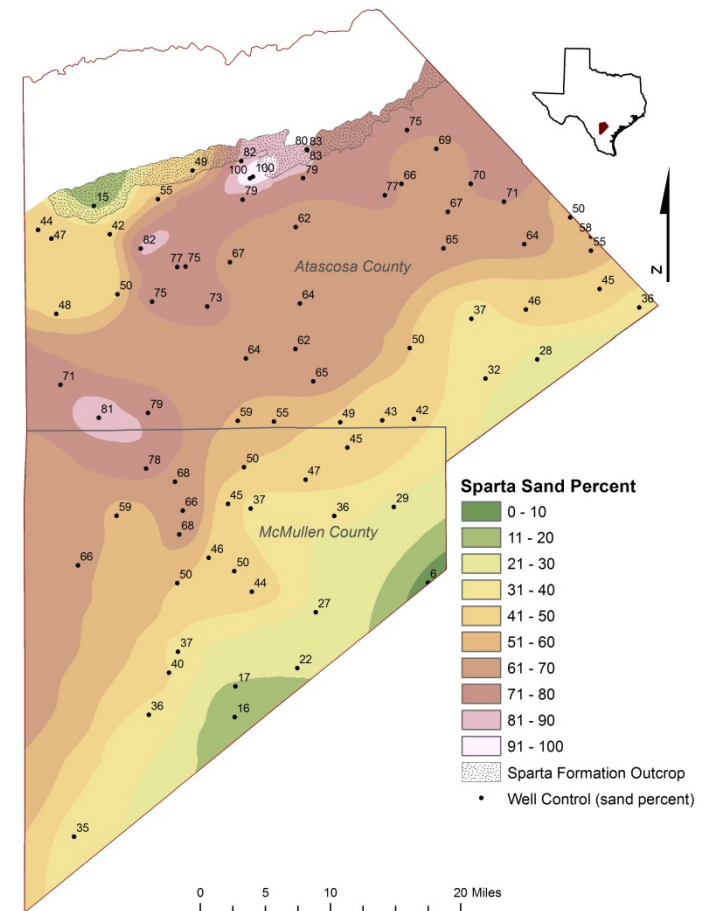
Well Depth (ft):

Total Depth (ft): 3553

Drill Date: 12/03/1949

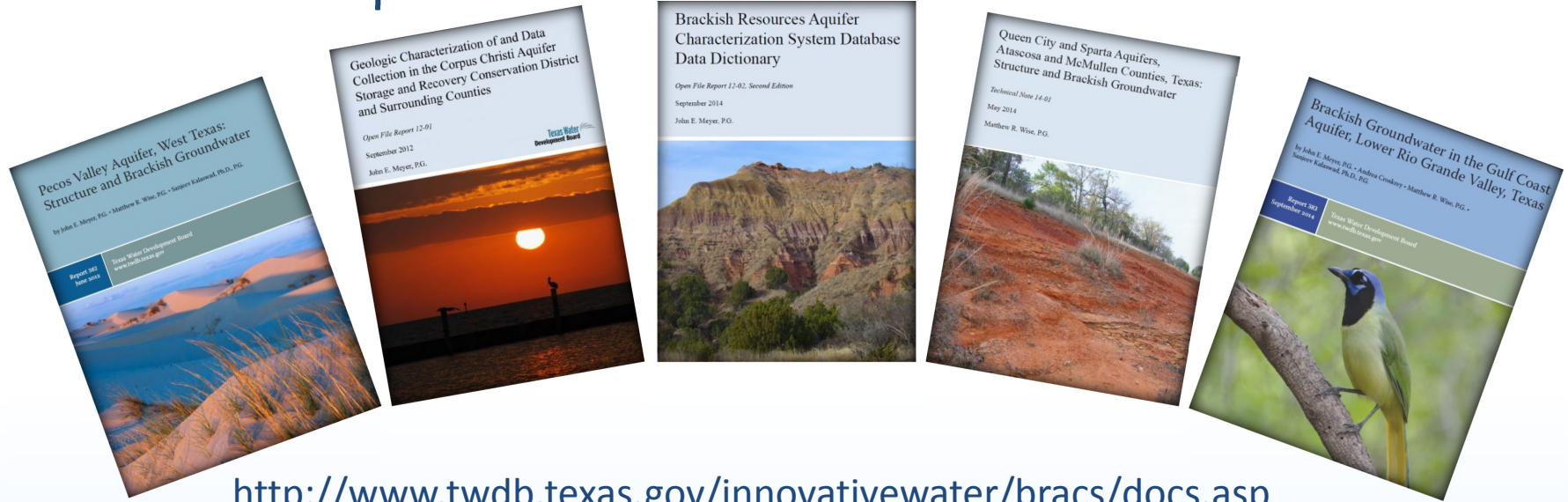
BRACS Data

- GIS data
 - Locate geophysical well logs
 - Lateral extent of brackish aquifers
 - Stratigraphy and Lithology Interpolation
 - Water quality parameters
 - Saturated Zones
- Rasters and shapefiles
- Available for download online



BRACS Studies

- Published reports



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

- GIS Datasets
- BRACS Database
- Well logs

The real value is in the data:

Stakeholders can use this to evaluate potential groundwater exploration areas.

BRACS Website for Database

File Edit View History Bookmarks Tools Help

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www.twdb.texas.gov/innovativewater/bracs/database.asp

Search



Search site Search

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BRACS Database

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 note the following disclaimer regarding the information:

Except where noted, all of the information provided is believed to be accurate and reliable; however, TWDB assumes no responsibility for any errors. Further, TWDB assumes no responsibility for the use of the information provided. PLEASE NOTE that users of these data are responsible for checking the accuracy, completeness, currency and/or suitability of all information themselves. TWDB makes no guarantees or warranties as to the accuracy, completeness, currency, or suitability of the information provided via the BRACS Database. TWDB specifically disclaims any and all liability for any claims or damages that may result from providing BRACS data or the information it contains. Well data and interpretations will be posted during the course of a BRACS study, however data is subject to change prior to publication of the study.

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](#), First Edition, TWDB Open File Report 12-02, November 2012 (13.6 MB)

If you have any questions about the database, please contact John Meyer at 512-463-8010.

Aquifer Storage and Recovery

Brackish Resources Aquifer Characterization System

- BRACS FAQs
- BRACS Studies
- BRACS Projects
- BRACS House Bill 30
- BRACS Database
- BRACS GIS Data
- BRACS Well Logs
- BRACS TWDB Documents
- BRACS Useful Links

Desalination

Rainwater Harvesting

Water Reuse

Innovative Water Technologies Staff

State Water Implementation Fund for Texas (SWIFT)

Study Reports and GIS Data

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Innovative Water Technologies... x +

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

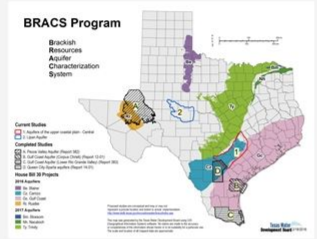
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Home Board SWIFT Financial Assistance Water Planning Groundwater Surface Water Flood Conservation Innovative Water

BRACS Studies



- [Current Studies](#)
- [Completed Studies](#)

Current Studies

Project	Start Date	End Date	Total Cost	Keywords
Wilcox, Carrizo, Queen City, Sparta, and Yegua Aquifers, Central Texas: Structure and Brackish Groundwater	Spring 2013	August 2016	In-house	Brackish, Groundwater, Aquifers
Lipan Aquifer: Structure and Brackish Groundwater	Summer 2014	August 2016	In-house	Brackish, Groundwater, Aquifers

Completed Studies

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 (127.0 MB)	383	In-house
05/ 2014	Queen City and Sparta Aquifers, Atascosa and McMullen Counties, Texas:	14-01	In-house

Aquifer Storage and Recovery

Brackish Resources Aquifer Characterization System

- BRACS FAQs
- BRACS Studies
- BRACS Projects
- BRACS House Bill 30
- [BRACS Database](#)
- BRACS GIS Data
- BRACS Well Logs
- BRACS TWDB Documents
- BRACS Useful Links

Desalination

Rainwater Harvesting

Water Reuse

Innovative Water Technologies Staff

State Water Implementation Fund for Texas (SWIFT)

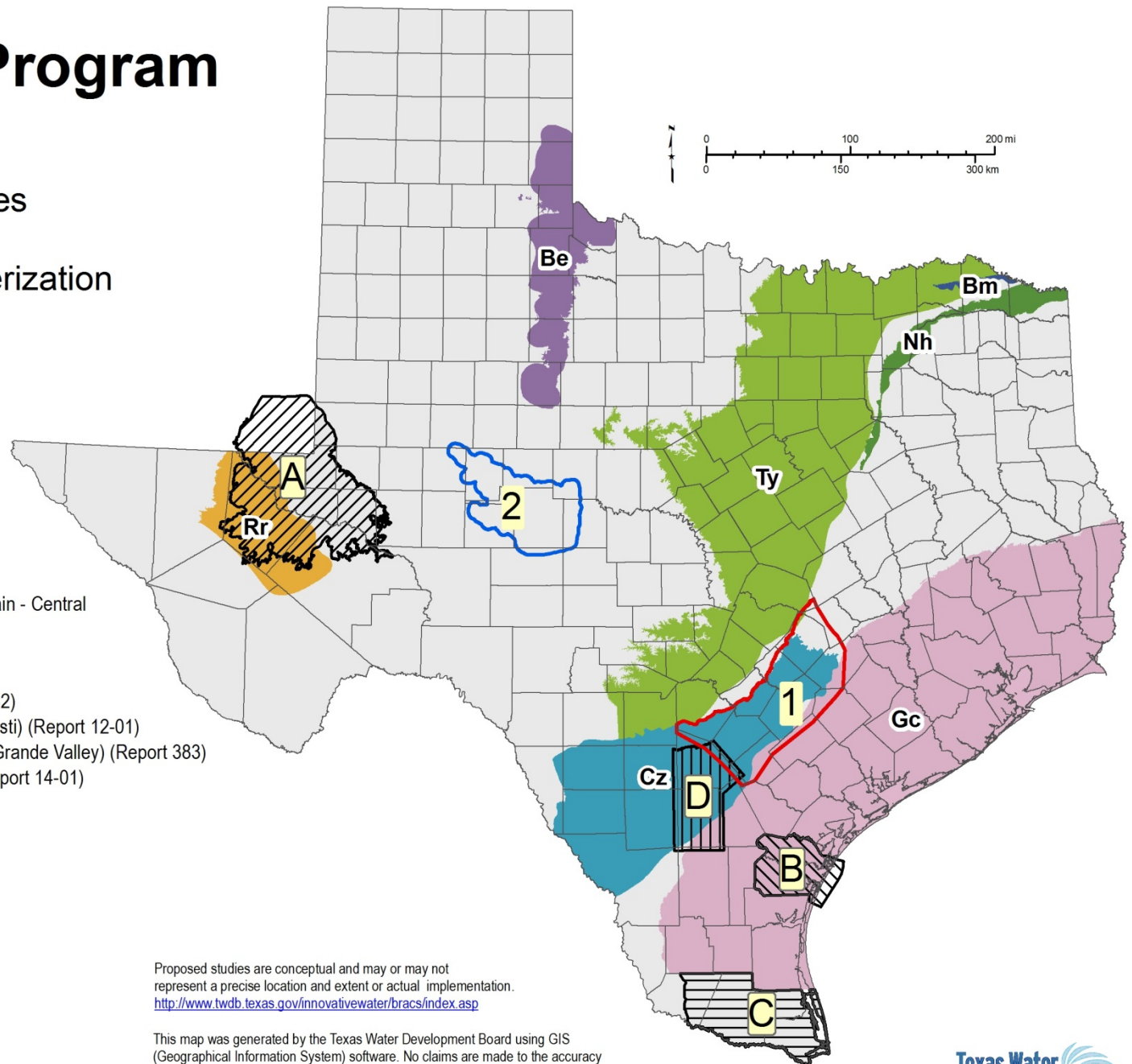
Development of Brackish Groundwater

House Bill 30 (84th Texas Legislature, 2015)

- \$2,000,000 appropriated from General Revenue Fund
- Note that \$1,681,446 was dedicated to funding the BRACS studies. The remainder paid for two FTE.
- Four aquifer projects must be completed by December 1, 2016
- Three other contracted projects - must be completed by August 31, 2017
- Map brackish groundwater production zones and estimate 30- and 50-year production without causing significant impact to water quality or water quantity in freshwater aquifers
- Include status report in every biennial desalination report, next report due December 1, 2016 (Water Code Sec. 16.060)
- Remaining aquifers in the state required to be mapped by December 1, 2022

BRACS Program

Brackish Resources Aquifer Characterization System



Current Studies

- 1 1. Aquifers of the upper coastal plain - Central
- 2 2. Lipan Aquifer

Completed Studies

- A A. Pecos Valley Aquifer (Report 382)
- B B. Gulf Coast Aquifer (Corpus Christi) (Report 12-01)
- C C. Gulf Coast Aquifer (Lower Rio Grande Valley) (Report 383)
- D D. Queen City-Sparta aquifers (Report 14-01)

House Bill 30 Projects

2016 Aquifers

- Be. Blaine
- Cz. Carrizo
- Gc. Gulf Coast
- Rr. Rustler

2017 Aquifers

- Bm. Blossom
- Nh. Nacatoch
- Ty. Trinity

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.

We appreciate data!

Andrea Croskrey

Geologist

Innovative Water Technologies

Texas Water Development Board

andrea.croskrey@twdb.texas.gov

(512) 463-2865

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

Draft 2017 Water Plan:

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