



“Techniques for Mapping and Characterizing Brackish Aquifers through the Mining of Existing Geophysical Data”

Brackish Groundwater Characterization System (BRACS)

by
Mark Robinson

*TGWA Annual Convention & Trade Show
January 25, 2015*

A decorative graphic at the bottom of the slide consisting of several overlapping, wavy lines in various shades of blue, creating a sense of movement and depth.



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.

Source: TWDB General Counsel

A decorative graphic at the bottom of the slide consisting of several overlapping, wavy lines in various shades of blue, creating a sense of movement and depth.

Who are we?

**Why do we study brackish
aquifers?**

**How do we study brackish
aquifers?**

Innovative Water Technologies Team



Erika Mancha, Manager IWT

John Meyer, P.G. - Geoscientist

Andrea Croskrey - Geoscientist

Matthew Webb - Hydrologist

Nathaniel van Oort - Hydrologist

Jean Perez - Hydrologist

Mark Robinson, P.G. - Geoscientist

Alan Andrews - Hydrogeologist

Alysa Suydam - Hydrogeologist

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 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

Groundwater Desalination Plants

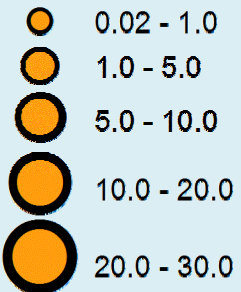
Existing and Recommended Strategies 2012 State Water Plan

Projects from the 2012 State Water Plan are conceptual and may or may not represent a precise site being considered for a plant.

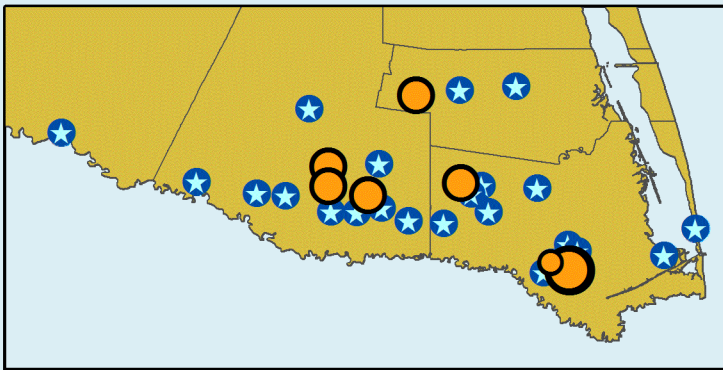
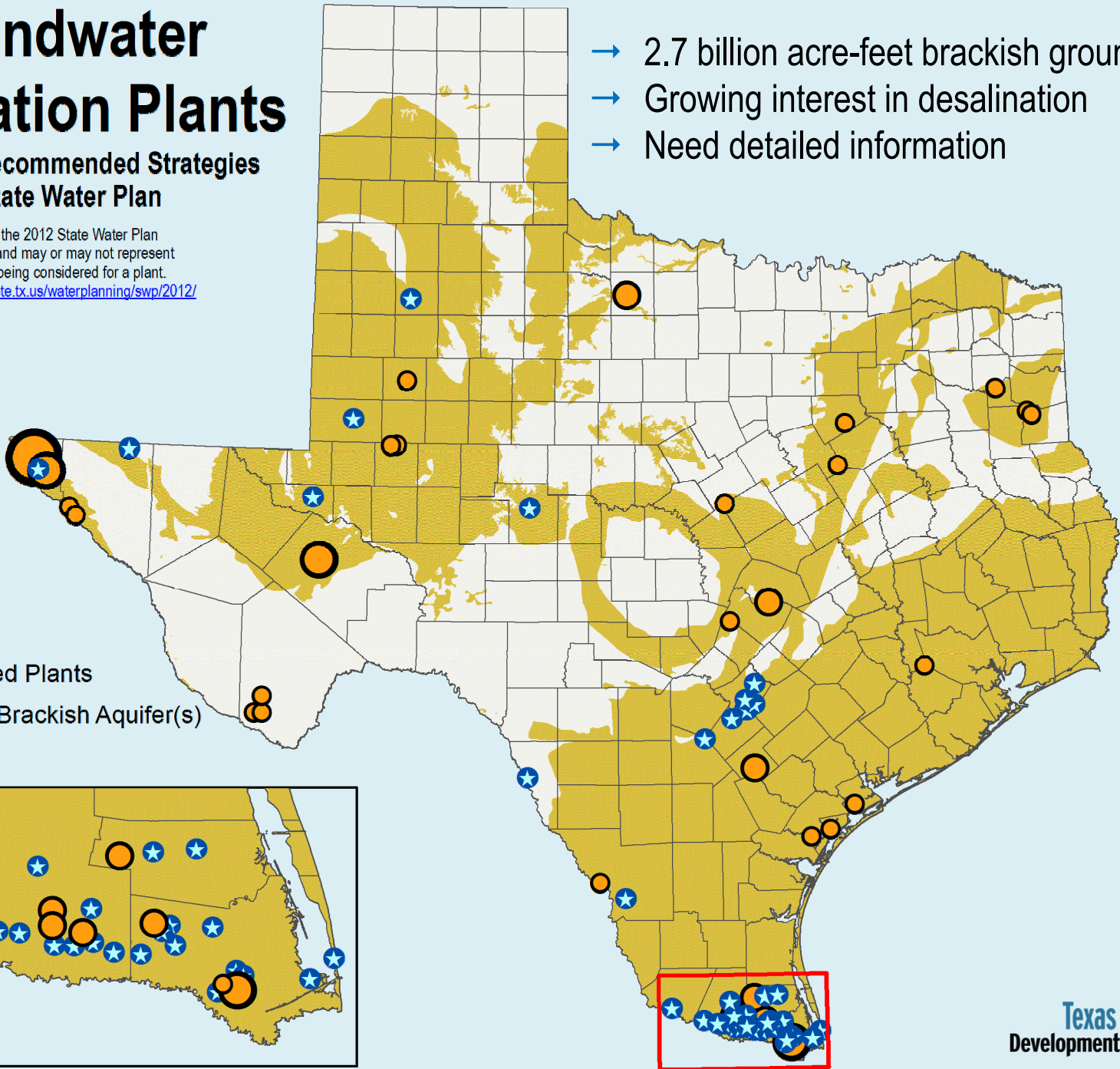
<http://www.twdb.state.tx.us/waterplanning/swp/2012/>

- 2.7 billion acre-feet brackish groundwater
- Growing interest in desalination
- Need detailed information

Existing Plants (MGD)



- ★ Recommended Plants
- Underlain by Brackish Aquifer(s)



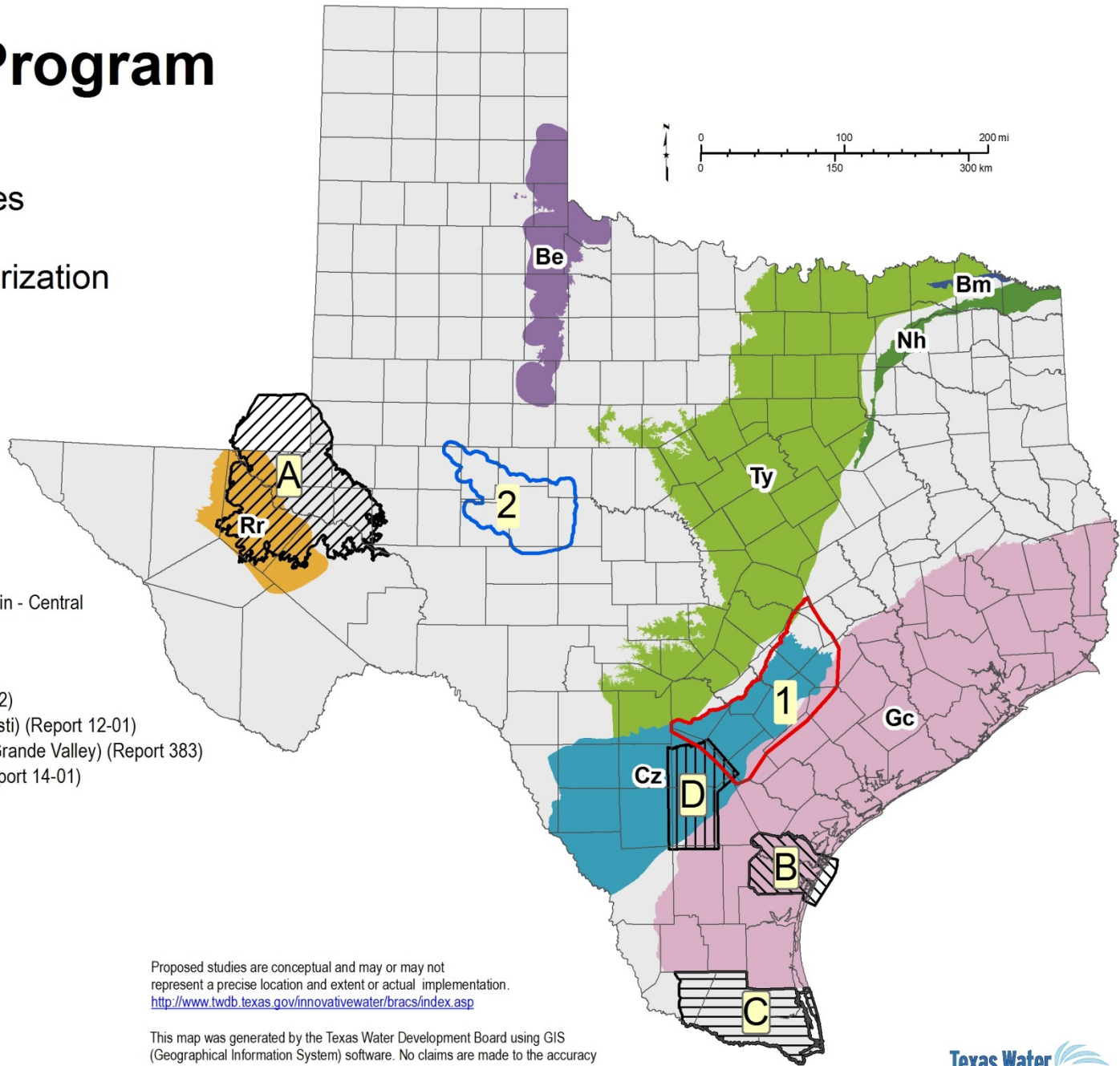
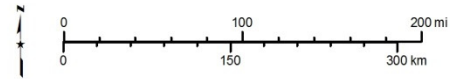
Development of Brackish Groundwater

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

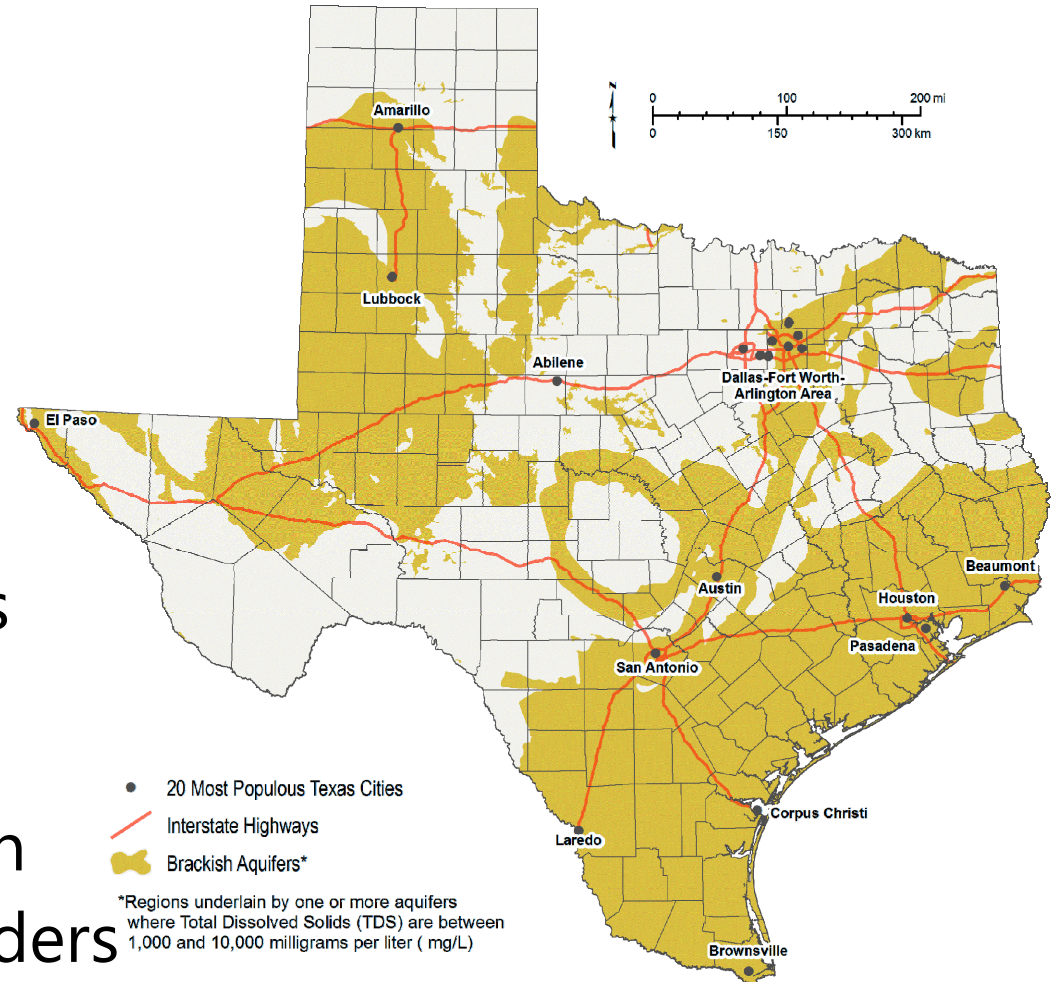
- Bm. Blossom
- Nh. Nacatoch
- Ty. Trinity

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.

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



Study Reports and GIS Data

The screenshot shows the Texas Water Development Board website. The header includes the organization's name and logo, a search bar, and social media links. A navigation menu lists various services like SWIFT, Financial Assistance, and Water Planning. The main content area is titled 'BRACS Studies' and features a map of Texas with study areas highlighted. Below the map are links for 'Current Studies' and 'Completed Studies'. A table lists current studies with columns for Project, Start Date, End Date, Total Cost, and Keywords. A sidebar on the right contains a list of links for 'Aquifer Storage and Recovery' and 'Brackish Resources Aquifer Characterization System'. At the bottom right, there is a link for the 'State Water Implementation Fund for Texas (SWIFT)' and a large number '11'.

Texas Water Development Board

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

BRACS Studies

BRACS Program
Brackish Resources Aquifer Characterization System

Current Studies

- Wilcox, Carrizo, Queen City, Sparta, and Yegua Aquifers, Central Texas: Structure and Brackish Groundwater
- Liban Aquifer: Structure and Brackish Groundwater

Completed Studies

- Brackish Groundwater in the Gulf Coast Aquifer, Lower Rio Grande Valley, Texas
- Queen City and Sparta Aquifers, Atascosa and McMullen Counties, Texas

- [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
Liban 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

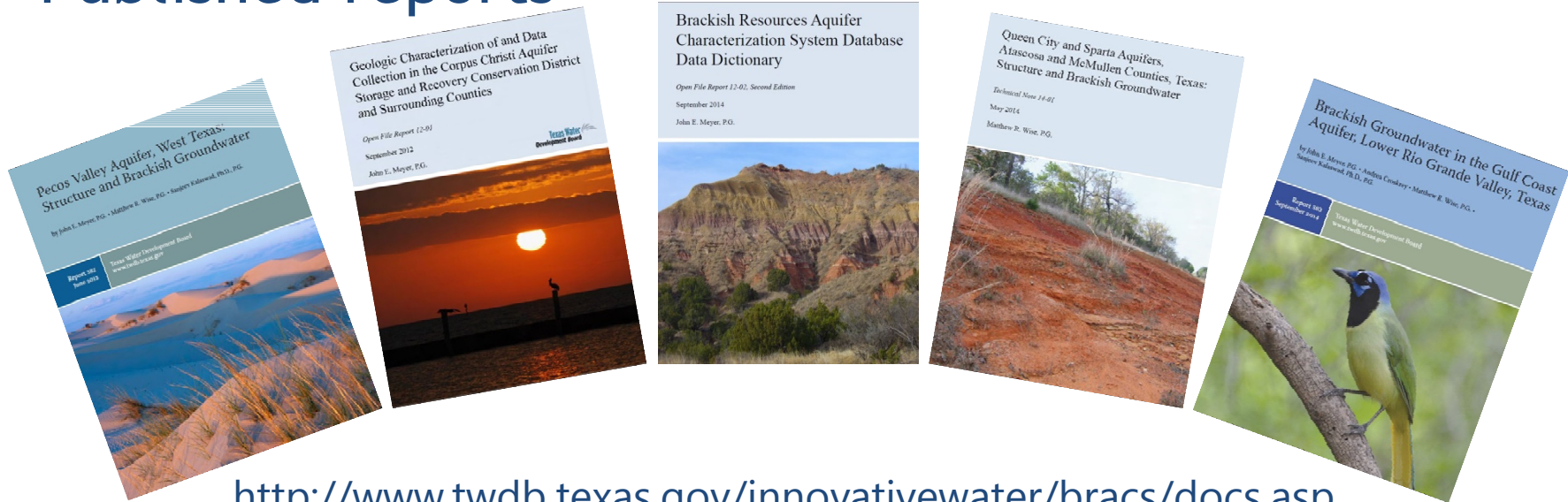
Innovative Water Technologies Staff

State Water Implementation Fund for Texas (SWIFT)

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BRACS Studies

- Published reports



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

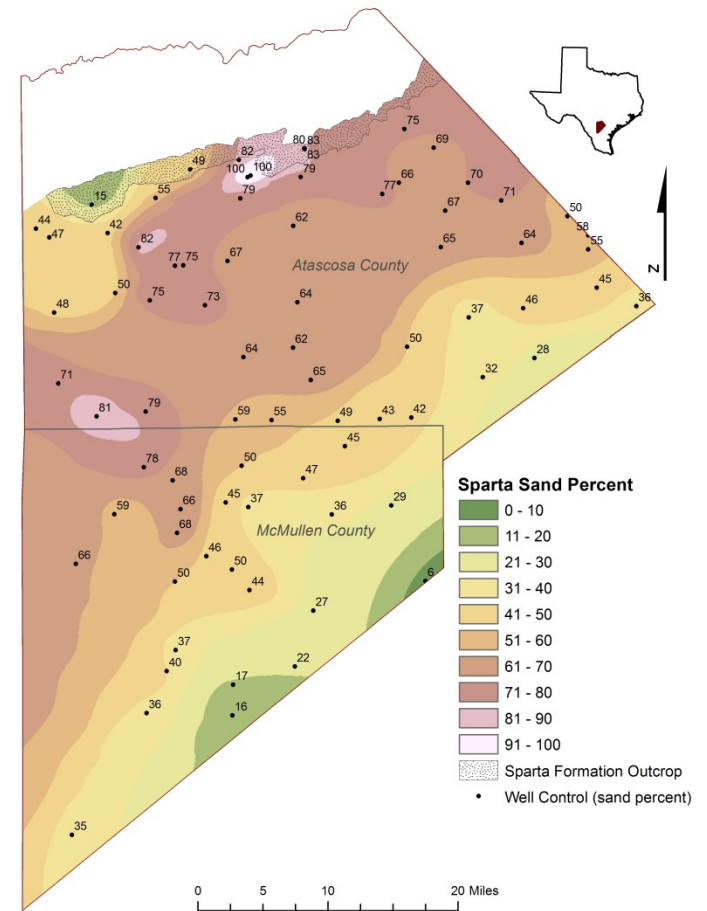
- GIS Datasets
- BRACS Database
- Well logs

The real value is in the data:

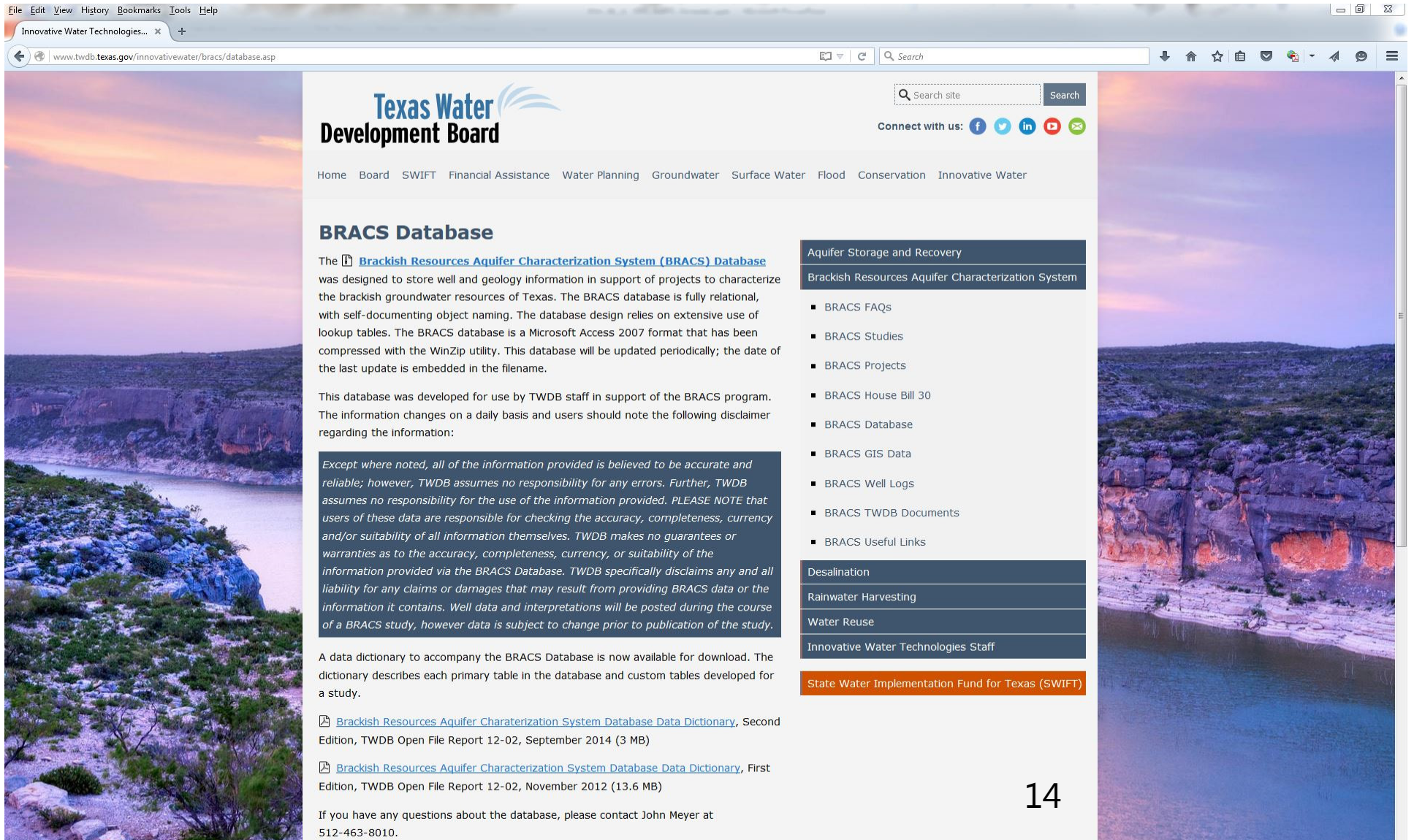
Stakeholders can use this to evaluate potential groundwater exploration areas.

BRACS 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 Website for Database



File Edit View History Bookmarks Tools Help

Innovative Water Technologies... x +

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

Search

Search site Search

Connect with us: f t in y e

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

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
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- BRACS Projects
- BRACS House Bill 30
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- 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)

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BRACS Public Database

frmSelection_PU

BRACS Database, Navigation to Forms Close Form

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

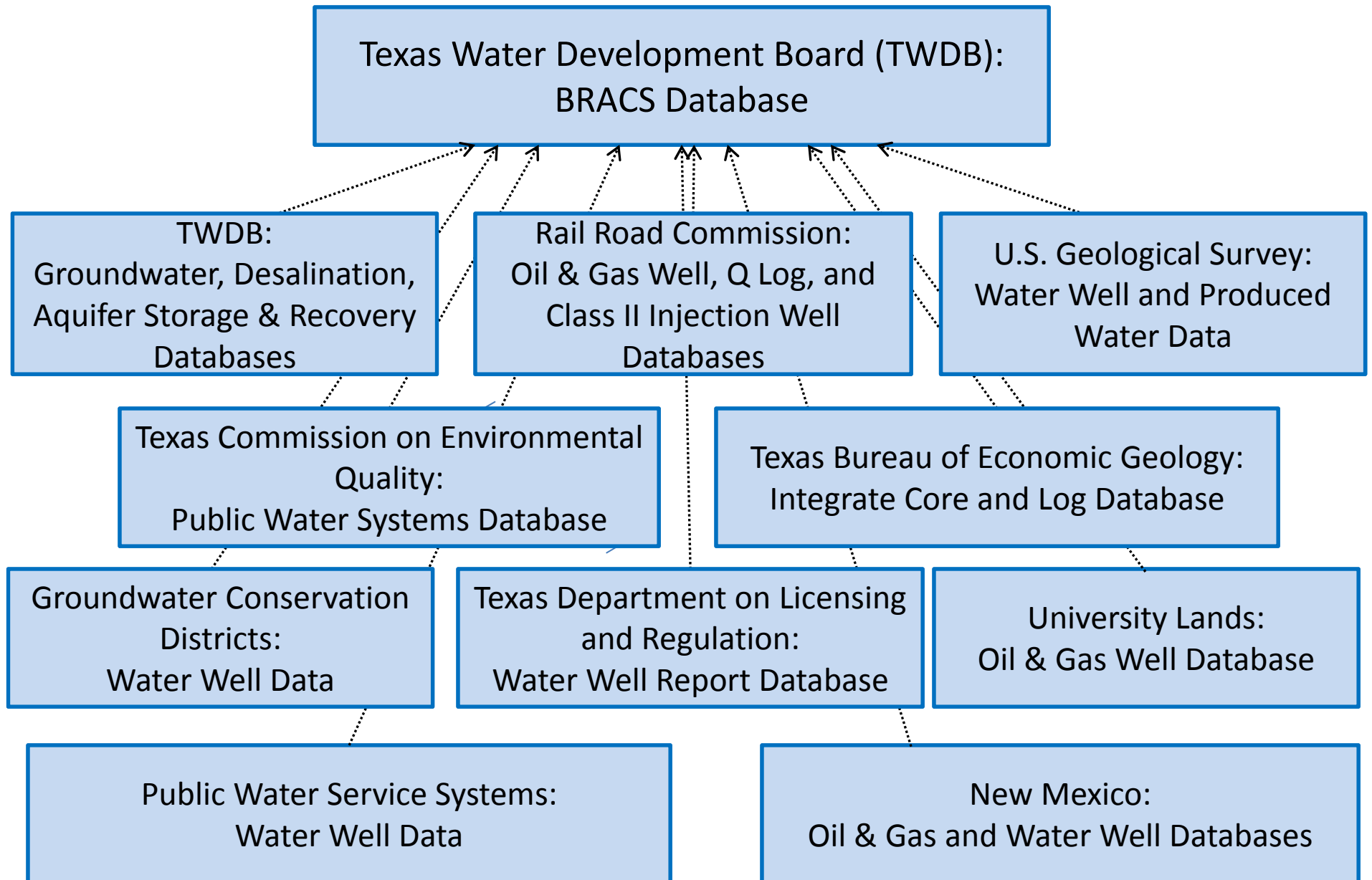
- Gulf Coast Lower Rio Grande Valley Study: Aquifer Determination Form
- Gulf Coast Lower Rio Grande Valley Study: Net Sand Form
- Gulf Coast Lower Rio Grande Valley Study: Salinity Zone Form

2: Press Button

Open Form

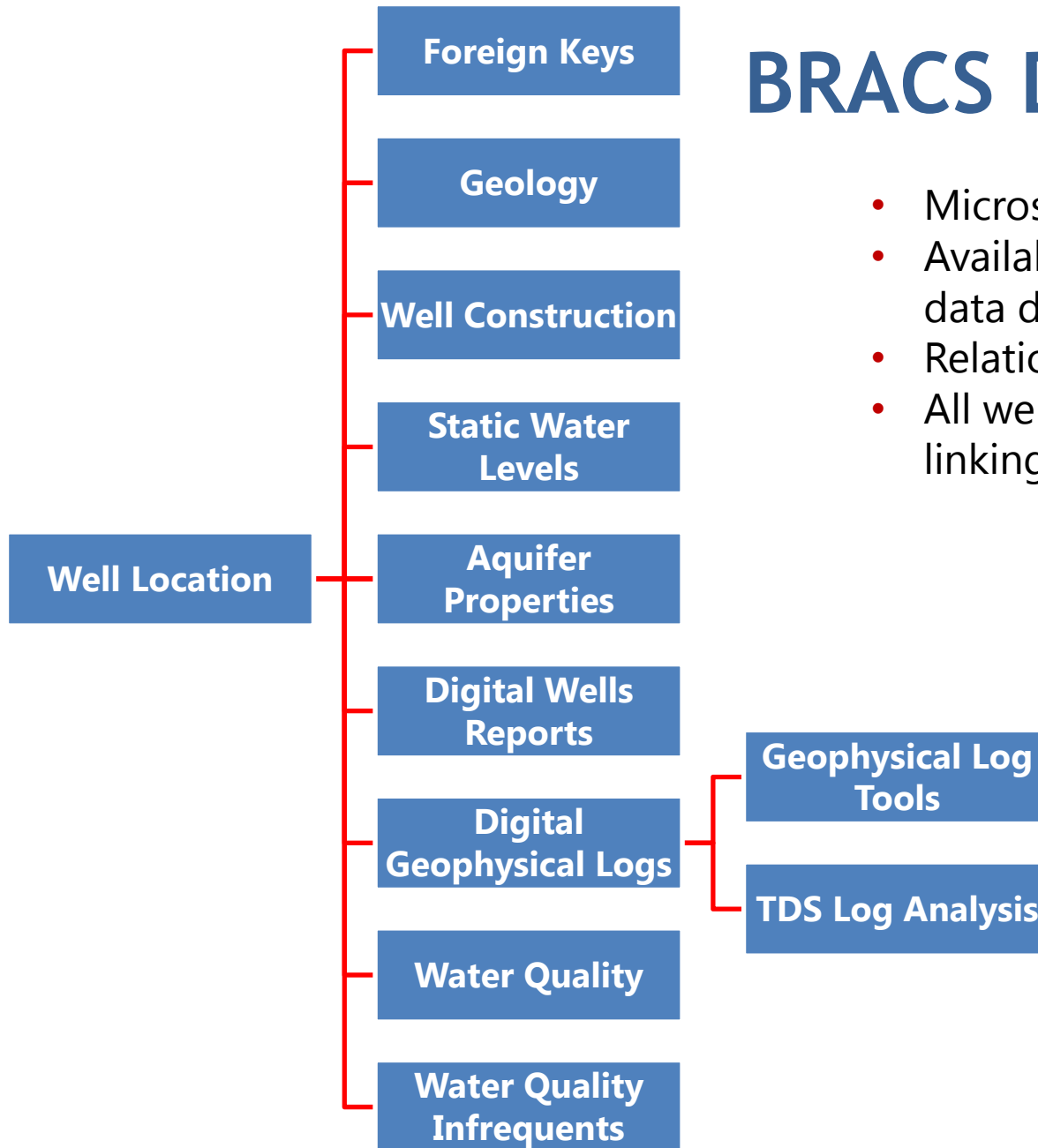
<http://www.twdb.texas.gov/innovativewater/bracs/database.asp>

BRACS Supporting Databases



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 Database: Location and Foreign Key tables

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | **Lithology and Stratigraphy** | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

Location Attributes

Source of Well Data: TCEQ PWS Water Wells

Owner: NORTH CAMERON REGIONAL WATER TREATMENT FACILITY

State Name: Texas | Latitude: 26.24930796

County Name: CAMERON | Longitude: -97.7818281

Depth Total: 600 | Horizontal Datum: 83

Depth Well: 601 | Location Method: GPS-S

Drill Date: 07/19/2005 | Agency: TCEQ | Location Date: 6/12/2008

Kelly Bushing: 5 | Elevation: 43

Well Type: Withdrawal of Water | Vertical Datum: 29

2.5' Grid Cell: 88-50-3 | Elevation Method: D | Elevation Agency: TWDB | Elevation Date: 5/7/2012

Remarks: pumping tests plotted in BRACS pdf files. Driller's lithology replaced by geophysical log simplified lithology. Driller's log available in PDF file.

Foreign Keys

ID Name	Foreign Key Id (Text)	Remarks
ID Agency	Foreign Key Id (Numeric)	
WELL_NUMBER	1	
OWNER		
TRACK_NUMBER	180500	
TDLR	180500	
STATE_WELL_NUMBER	8850305	
TWDB	8850305	
WATER_SOURCE	G0310152A	
TCEQ		
*		

Refer to Brackish Resources Aquifer Characterization System Data Dictionary for Table Definitions
 Refer to Brackish Groundwater Resources of the Pecos Valley Aquifer, West Texas for Pilot Project Description

BRACS Database: Water quality tables

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | **Water Quality** | Static Water Level | Well Construction

BRACS Water Quality

State Well Number	8850305			Sample Date	5/7/2012			Sample Number				
				Month	Day	Year						
Source Data	Driller/Engineer Well Development Sample			9	16	2005	1					
Silica	Calcium	Magnesium	Sodium	Potassium	Bicarbonate	Sulfate	Chloride	Nitrate	TDS	Spec. C.	pH	
13.7	155	81	1070	17.9	250	1120	1230	0.05	3818	6000	7.3	

Record: 1 of 1 | No Filter | Search

BRACS Infrequent Constituents

State Well Number	8850305			Sample Date				Sample Number				
				Month	Day	Year						
Source Data	Driller/Engineer Well Development Sample			9	16	2005	1					
Storet Code	00405	Iron = 01045										
flag												
Value	245											
plus / minus												

Record: 1 of 32 | No Filter | Search

BRACS Database: Static water level table

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

Static Water Level	Date Measured	Method	Agency	Remarks	State Well Number	Track Number	Water Source
-22.85	9/1/2005	07	DRILL		8850305	0	
*						0	

BRACS Database: Well construction table

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

Group	CSO	Diam	Top Depth	Bottom Depth
1	C	24	0	56
2	C	16	0	285
3	C	11	250	290
4	S	11	290	301
5	c	11	301	385
6	s	11	385	439
7	c	11	439	478
8	s	11	478	531
9	c	11	531	601

Note:

C = casing

S = screen

BRACS Database: Geology table

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | **Lithology and Stratigraphy** | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

Lithologic Description

Record Number	Geologic Pick	Top Depth Bottom Depth Thickness	Lithologic Description Simplified Lithologic Description Source of Data Remarks	Last Change
22	Lithologic	70 70	No Record GEOPHYSICAL WELL LOG	12/20/2013
23	Lithologic	70 110 40	Sand with Clay GEOPHYSICAL WELL LOG	12/20/2013
24	Lithologic	110 130 20	Clay GEOPHYSICAL WELL LOG	12/20/2013
25	Lithologic	130 180 50	Sand with Clay GEOPHYSICAL WELL LOG	12/20/2013
26	Lithologic	180 196 16	Clay GEOPHYSICAL WELL LOG	12/20/2013
27	Lithologic	196 210 14	Sand with Clay GEOPHYSICAL WELL LOG	12/20/2013
28	Lithologic	210		

Stratigraphic Description

Record Number	Geologic Pick	Top Depth Bottom Depth GT Flag Thickness	Stratigraphic Description Source of Data	Last Change
17	STRATIGRAPHIC	0 406 406	Beaumont Formation PUBLISHED REPORT	5/7/2012
18	STRATIGRAPHIC	406 732 326	Lissie Formation PUBLISHED REPORT	5/7/2012
*				

Simplified Lithologic Description

Lithologic Description

Record Number	Geologic Pick	Top Depth	Lithologic Description	Bottom Depth	Simplified Lithologic Description	Source of Data	Remarks	Last Change
		Thickness						
1	LITHOLOGIC	0	SAND	3	Sand	3	WATER WELL LOG, DRILLER	3/23/2012
2	LITHOLOGIC	3	RED CLAY	8	Clay	5	WATER WELL LOG, DRILLER	3/23/2012
3	LITHOLOGIC	8	RED CLAY AND SAND MIX	12	Sand and Clay	4	WATER WELL LOG, DRILLER	3/23/2012
4	LITHOLOGIC	12	YELLOW CLAY	15	Clay	3	WATER WELL LOG, DRILLER	3/23/2012
5	LITHOLOGIC	15	RED SAND	36	Sand	21	WATER WELL LOG, DRILLER	3/23/2012
6	LITHOLOGIC	36	YELLOW SAND	40	Sand	4	WATER WELL LOG, DRILLER	3/23/2012
7	LITHOLOGIC	40	CHOPPY TAN SAND WITH OCC. CLAY STREAK					

Description from well report

Simplified description from well report or geophysical log interpretation

Stratigraphic Picks: *Link map to log to database*

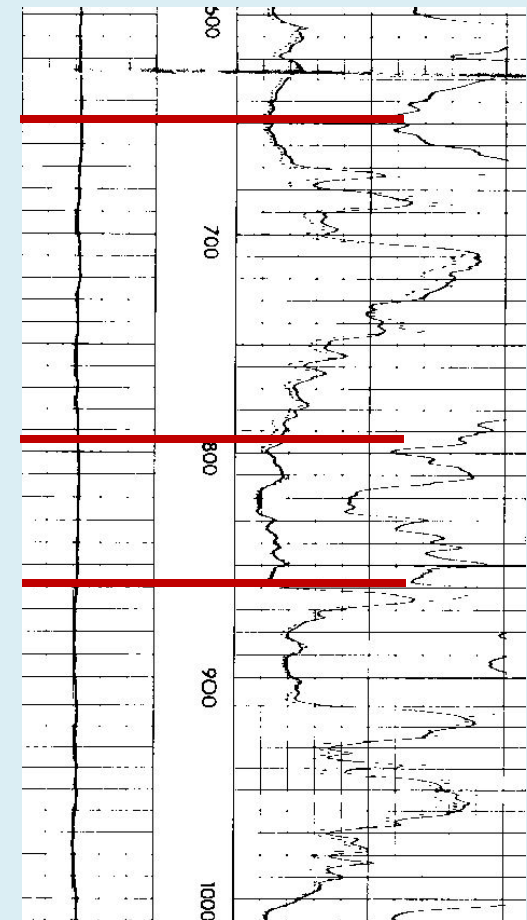
Stratigraphic Description

Record Number	Geologic Pick	Top Depth Bottom Depth Thickness	Stratigraphic Description Source of Data Initials Last Change
1	Stratigraphic	0	Yegua Formation Geophysical Well Log #####
2	Stratigraphic	650	Cook Mountain Formation Geophysical Well Log #####
3	Stratigraphic	650 797 147	Sparta Formation Geophysical Well Log 3/18/2013
4	Stratigraphic	797 860 63	Weches Formation Geophysical Well Log 3/18/2013
5	Stratigraphic	860 1450 590	Queen City Formation Geophysical Well Log 3/18/2013
6	Stratigraphic	1450 1740 290	Reklaw Formation Geophysical Well Log 3/18/2013
7	Stratigraphic	1740 2460 720	Carrizo Formation Geophysical Well Log #####
8	Stratigraphic	2460 4790 2330	Wilcox Group Geophysical Well Log #####
9	Stratigraphic	4790	Midway Formation Geophysical Well Log #####
*			

Sparta

Weches

Queen City



BRACS Database: Digital log tables

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

Digital Geophysical Well Logs

1014 Log File Type: TIF IMAGE GL Folder Name: 42_061 REMARKS: no BHT on GL header; use Gg from BRACS 3999. Ts from Larkin, LP-192 avg annual temp 73-74 F.

File Name: G0310152A_

GL_HYPERLINK: B:\GeophysicalWellLogs\42_061\G0310152A .tif

Geophysical Log	Top Depth	Bottom Depth	Remarks
GAMMA RAY OR GAMMA	0	552	N/A
INDUCTION	70	600	N/A
SPONTANEOUS POTENTIAL	70	576	N/A
*	0	0	N/A

Record: 1 of 1 No Filter Search

Digital Water Well Logs

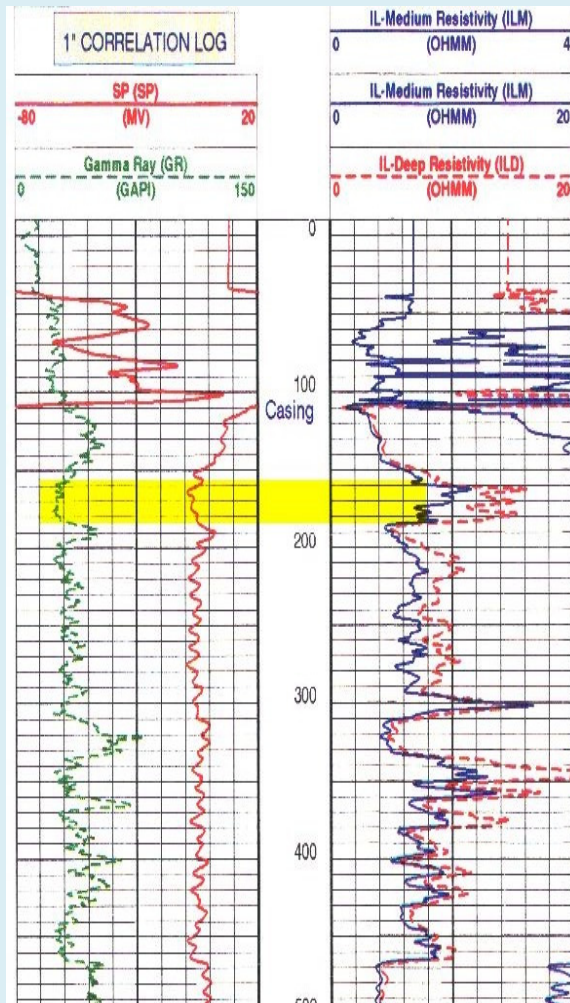
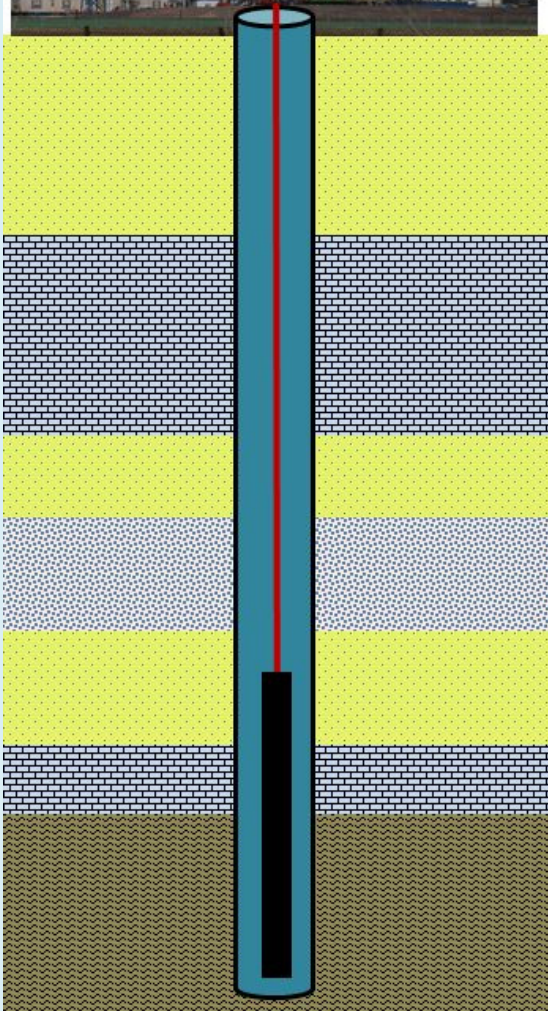
756 Log File Type: PDF Image WW folder: 42_061 Remarks:

File Name: G0310152A

WW Hyperlink: B:\DrillerWellLogs\42_061\G0310152A.pdf

Record: 1 of 1 No Filter Search

What is a Geophysical Well Log?



A tool or combination of tools lowered into a borehole on a wireline and retrieved to the surface.

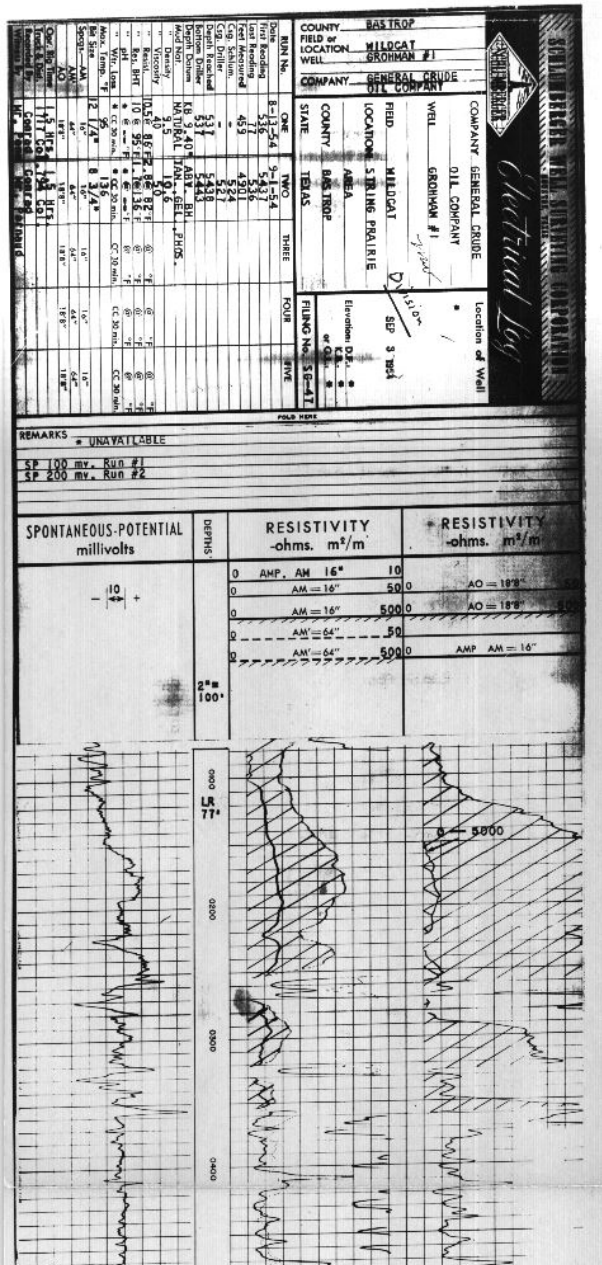
Tools are designed to record specific parameters.

Also known as: electrical logging; wireline logging.

Logs must be corrected for a number of parameters.

Tool response recorded in left and right tracks.

Digital geophysical and water well logs



4089006D

State of Texas
WELL REPORT

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

OWNER: Gonzales County Water Supply Corp. ADDRESS: 1903 Sarah DeWitt Dr., Gonzales, Texas 78629

ADDRESS OF WELL: 8 miles N. of Gonzales (F.M. 794 well) GRID # 67-20-9

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

PROPOSED USE (Check):
 Monitor Industrial Irrigation Injection Public Supply De-watering Testwell

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

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>

Borehole Completion (Check):
 Open Hole Straight Wall

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Cage Casting Screen
			From	To	
<u>12 1/4</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>	

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

TYPE PUMP: N/A

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

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

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

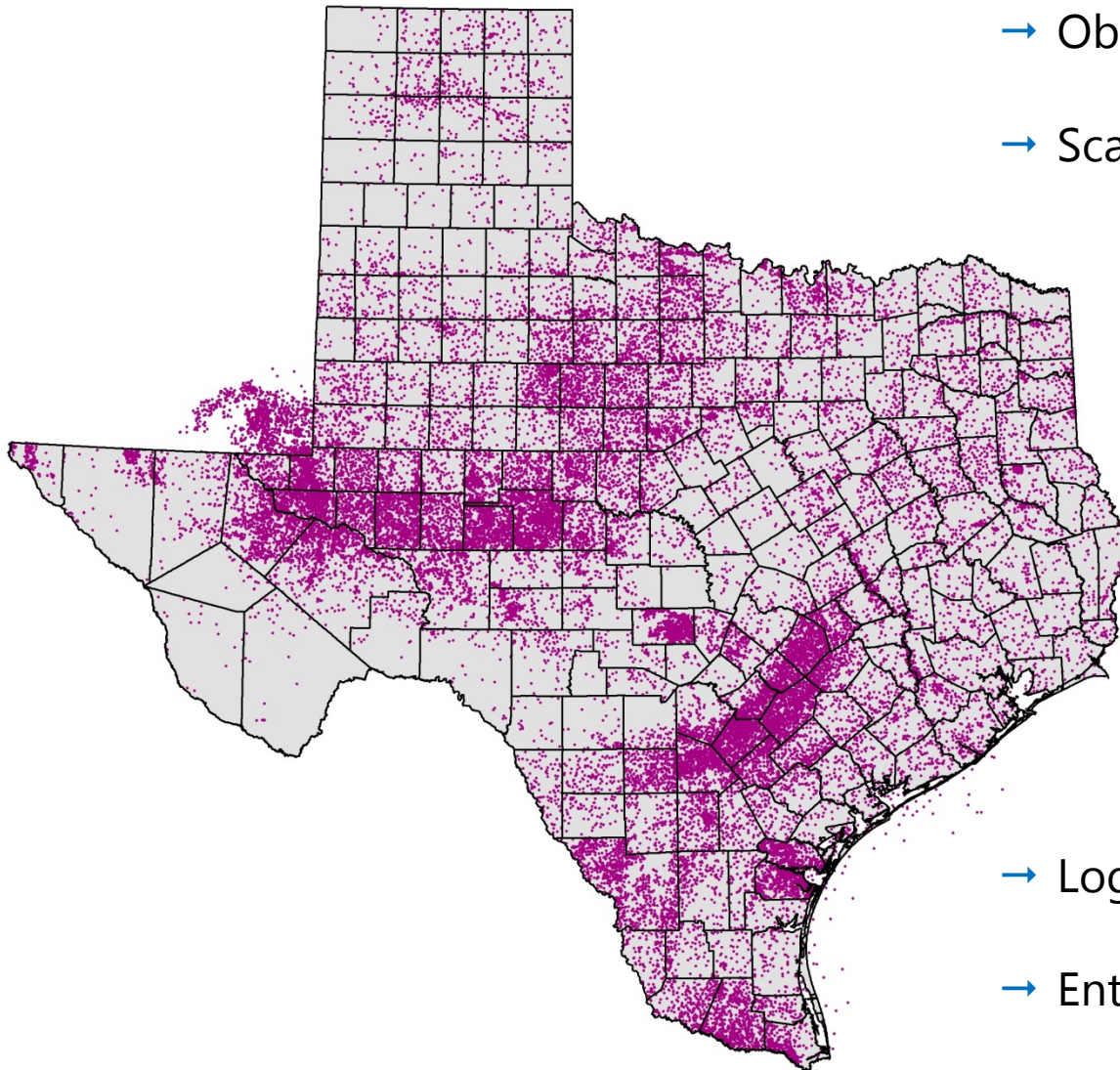
ADDRESS P. O. Box 8 Pleasanton Texas 78064

(Signed) Richard R. Bostons (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

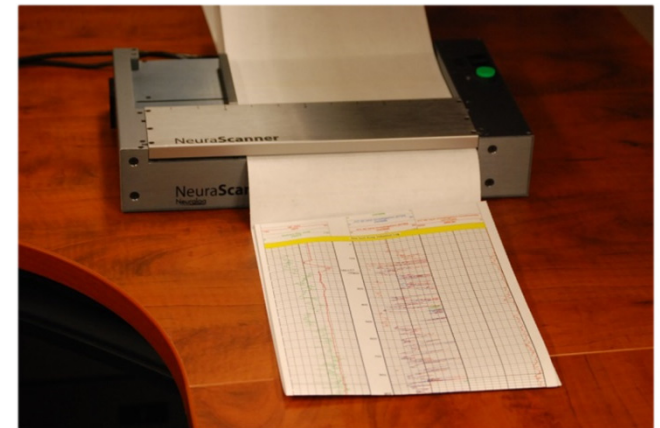
Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC 0199 (Rev. 11-01-94)

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 > 62,700 wells (January 2017)

BRACS Database: Log analysis to interpret Total Dissolved Solids

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | Aquifer Test Information | Water Quality | Static Water Level | Well Construction

GL NUMBER: 1014 GL FILE TYPE: TIF IMAGE GL Co: Baker Hughes
 GL FILE NAME: G0310152A_ Remarks: no BHT on GL header; use Gg from BRACS 3999. Ts from Larkin, LP-192 avg annual temp 73-74 F.

Depth Total: 603 Rmf: 0.7
 Temperature Surface: 74 Rmf Temperature: 75
 Temperature Bottom Hole: 81 Rm: 0.9
 Rm Temperature: 75 Mud Type: water base

Depth Formation (DF): 296 TDS Interpreted: 0 TF: 77
 Thickness Lithologic Unit: 12 Consensus TDS Method: N/A Rmf TF: 0 Remarks: N/A

TDS Method: Rwa Method Rwe: 1.08 Rw: 0.92 Rw75: 0.94 Cw: 10638.3 TDS: 5638
 Geophysical Log Used: INDUCTION

Correction Factors

SP: 0 K (Temperature): SP Method
 Rxo: 0 Rwe Rw: Sp, Alger Harrison, and Rwa Minimum Methods
 Ro: 6 Rmf: SP and Alger Harrison Methods
 Rxo/Ro: 0 ct: Many Methods
 m: 1.6296 Invasion Zone: Alger Harrison Method
 Source m: Eq. 1.18 (Esteepp, 1998) m correction factor: Esteepp Method high anion waters
 Porosity: 0.35 Ro: Mean Ro Method
 Source Porosity: N/A

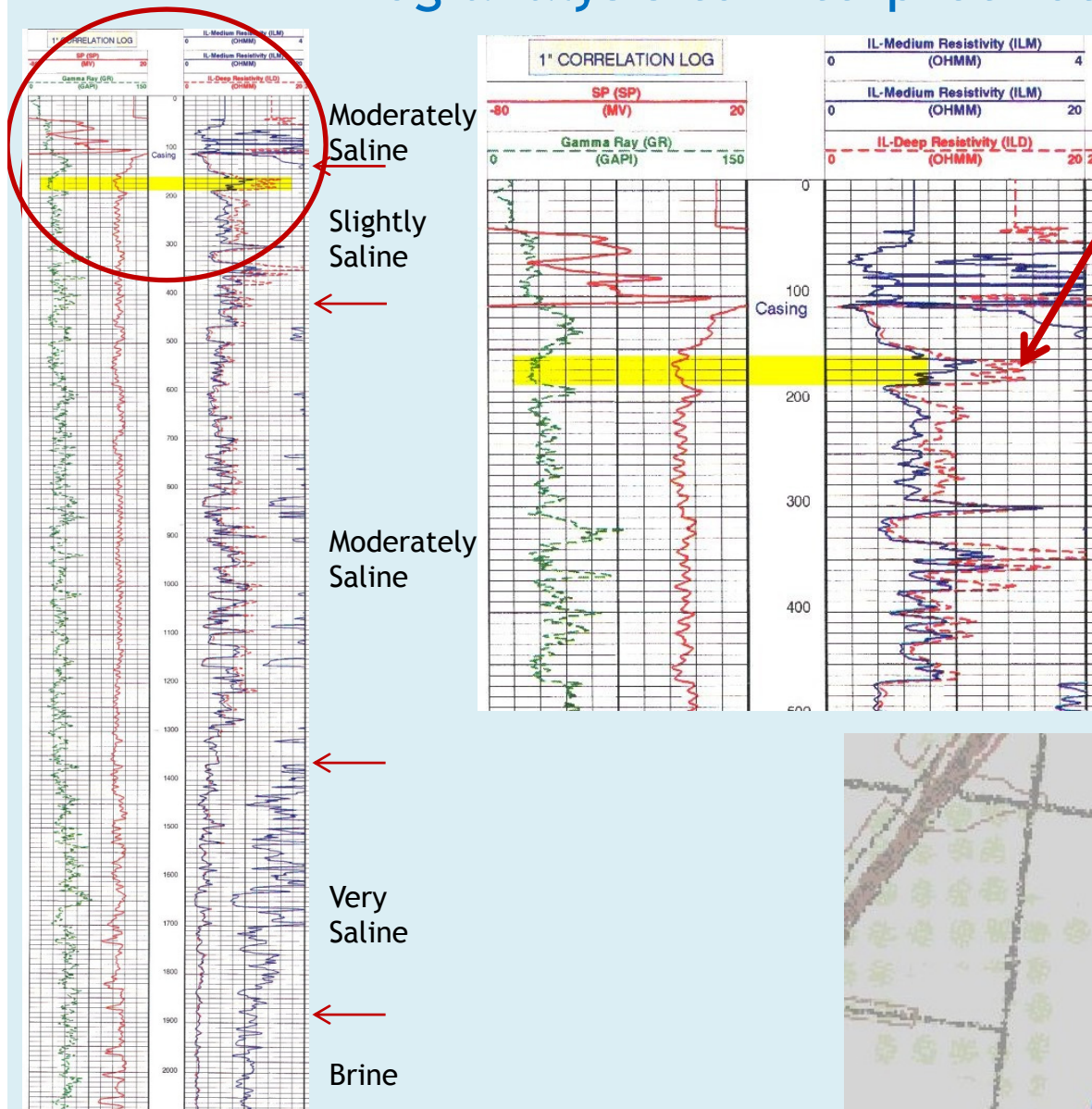
Chart: N/A
 Remarks: WQ: 8850305 (2005) TDS: 3817 ct: 0.53
 HCO3/TDS: 0.04 SO4/TDS: 0.35 Rwe NaCl cf: 1.17

Record: 1 of 1 | No Filter | Search

Record: 1 of 3 | No Filter | Search

Record: 1 of 1 | No Filter | Search

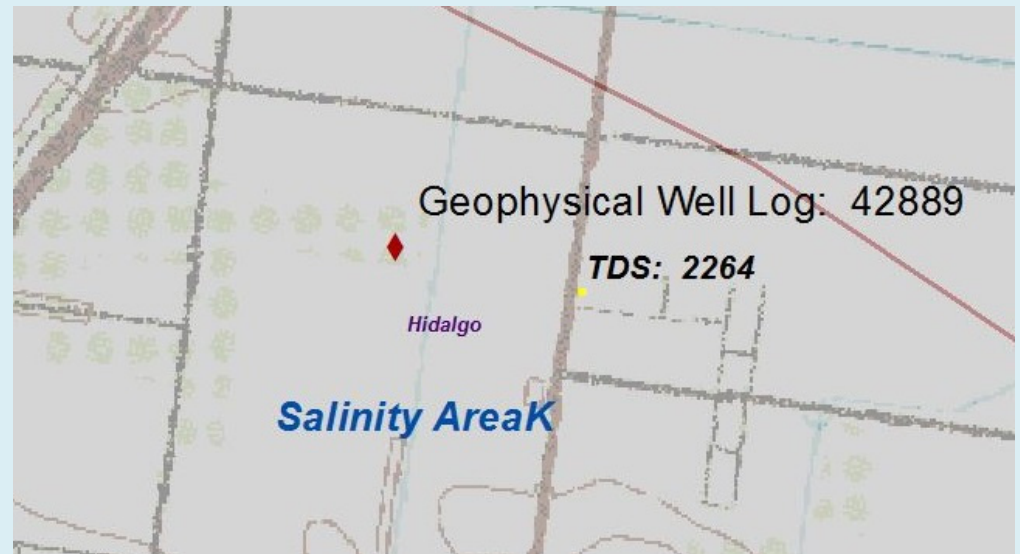
Log analysis to interpret Total Dissolved Solids



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 Well ID 42889

Source: Lower Rio Grande Valley BRACS Study

BRACS Database: Aquifer properties table

TWDB WSC IWT BRACS Geophysical Log Search Task

1737 Close Form

BRACS Well ID

Location and Well IDs | Lithology and Stratigraphy | Digital Well Logs | TDS Analysis using Geophysical Well Logs | **Aquifer Test Information** | Water Quality | Static Water Level | Well Construction

Record Number: 0 State Well Number: 8850305 Source AT Data: TWDB Groundwater Database

Date Test	09/01/2005	Test Length	36	Depth Well	541
Pumping Rate	1476	Static Water Level	-22.85	Screen Top	364
Well Yield Method	Pumped	Pumping Water Level	-168.15	Screen Bottom	541
		Drawdown	145	D/R	D

Transmissivity: -99999 Units: [v] * If T is expressed as a range of values, then place larger value in [Transmissivity] field and smaller value in [Transmissivity 2] field

Transmissivity 2*: -99999

Hydraulic Conductivity: -99999 Units: [v]

Storage Coefficient: -99999

Specific Yield: -99999

Specific Capacity: 10.17 Units: gpm/ft

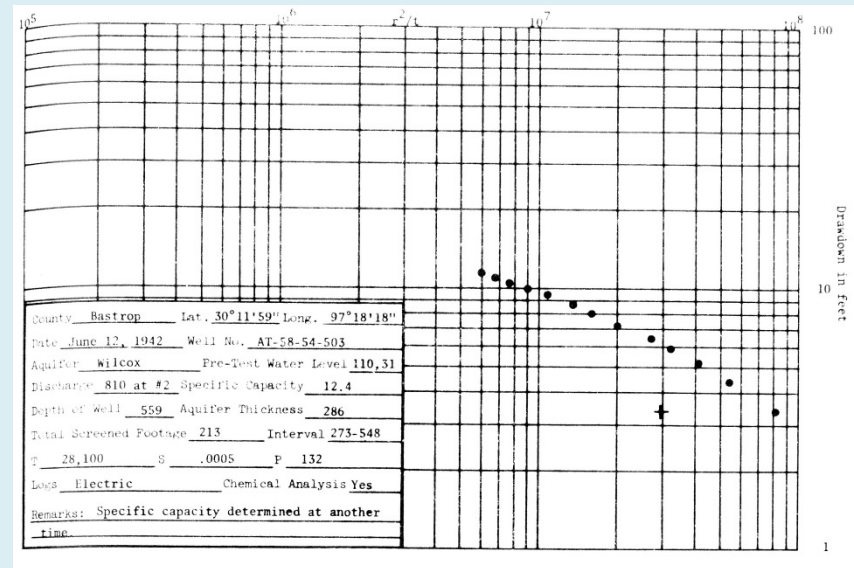
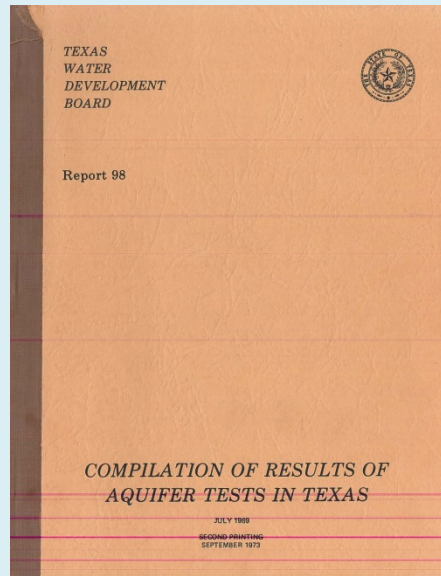
Remarks: [Empty Text Area]

Analysis Remarks: [Empty Text Area]

Report 98 Page No: [Empty Text Area]

Record: 14 1 of 2 No Filter Search

Link
aquifer
properties
to
the
source
of
information



frmBracsAT_DE

Well ID: 39245 Owner: Univ. of Texas Cancer

BRACS Aquifer Test Data Entry

Record Number: 0 State Well Number: 5854503 Source AT Data: TWDB Published Reports

Date Test: 06/12/1942 Test Length: 0 Depth Well: 559
Pumping Rate: 810 Static Water Level: -110.31 Screen Top: 273
Well Yield Method: Drawdown: -99999 D/R: Screen Bottom: 548
Pumping Water Level:

Transmissivity: 28100 Units: gpd/ft
Transmissivity 2*: -99999 Units:

Hydraulic Conductivity: 132 Units: gpd/ft2
Storage Coefficient: 0.0005 Units:

Specific Yield: -99999
Specific Capacity: -99999 Units:

Remarks:

Analysis Remarks: Test results only in TWDB files. Also R 109, Table 6, p. 30

Report 98 Page No: 63

Specific Capacity

* If T is expressed as a range of values, then place larger value in [Transmissivity] field and smaller value in [Transmissivity 2] field

BRACS Database: Project aquifer determination table

TWDB WSC IWT BRACS Aquifer Determination CCASR

BRACS Aquifer Determination Code
Lower Rio Grande Valley BRACS Study

State Well Number: 8850305
BRACS Well ID: 1737
Well Owner: NORTH CAMERON REGIONAL WATER TREATMENT FACILITY

Aquifer: 112GLFC
Aquifer (New): B L

Remarks:

Close Form

Depth Well: 601
Depth Hole: 600
Screen Top: 290
Screen Bottom: 531
Multiple Screens: Yes
ELEVATION: 43

<i>Chicot Aquifer</i> Yes	<i>Beaumont Fm.</i>	B_T_D: 0	Caq_T_D: 0
		B_B_D: 406	
	<i>Lissie Fm.</i>	L_T_D: 406	
		L_B_D: 732	
	<i>Willis Fm.</i>	W_T_D: 732	
		W_B_D: 1137	Caq_B_D: 1137
<i>EvangelineA quifer</i> No	<i>Upper Goliad Fm.</i>	UG_T_D: 1137	Eaq_T_D: 1137
		UG_B_D: 2251	
	<i>Lower Goliad Fm.</i>	LG_T_D: 2251	
		LG_B_D: 3270	
	<i>Upper Lagarto Fm.</i>	UL_T_D: 3270	
		UL_B_D: 4080	Eaq_B_D: 4080
<i>Burkeville Confining Unit</i> #####	<i>Middle Lagarto Fm.</i>	ML_T_D: 4080	
		ML_B_D: 4936	
<i>Jasper Aquifer</i> No	<i>Lower Lagarto Fm.</i>	LL_T_D: 4936	Jaq_T_D: 4936
		LL_B_D: 5660	
	<i>Oakville Fm.</i>	OK_T_D: 5660	
		OK_B_D: 6906	Jaq_B_D: 6906

- Compare wells completed in same aquifer
- Consistent evaluation of aquifer water quality and properties
- Many new wells do not have TWDB aquifer code
- Some wells have incorrect TWDB aquifer code

BRACS Database: Project net sand determination tables

TWDB WSC IWT BRACS Net Sand Determination

BRACS Well ID

Lower Rio Grande Valley BRACS Study Net Sand Gulf Coast Aquifer

Close Form

Net Sand Processing Table

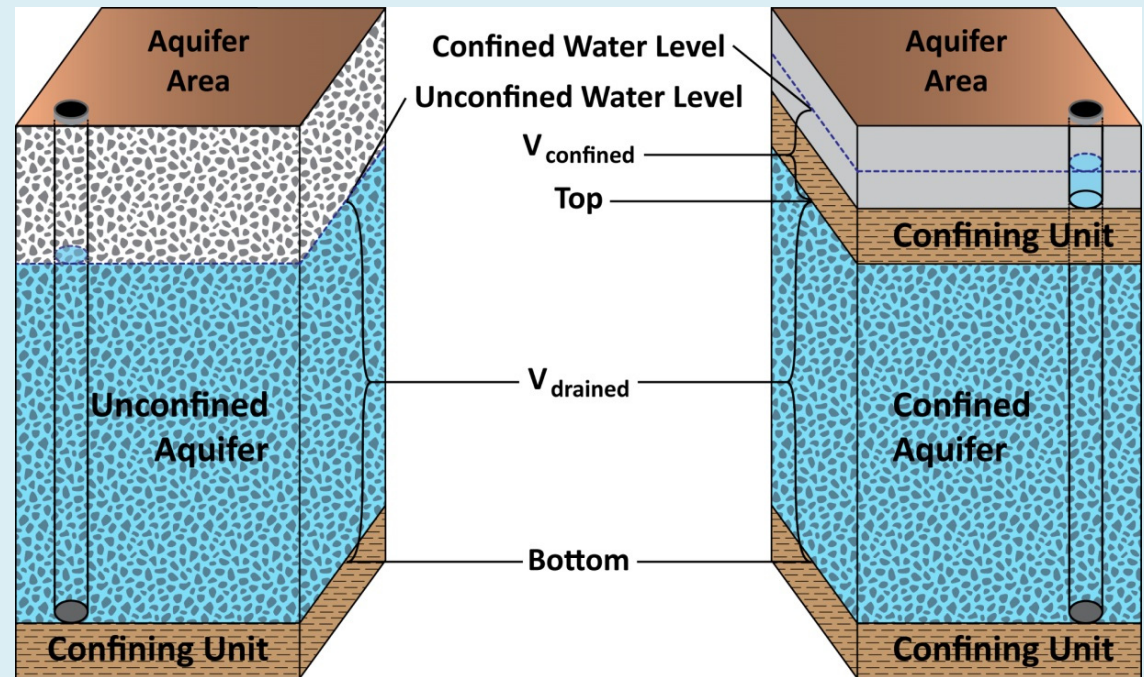
Record Number	Simplified Lithologic Description	Top Bottom Thickness	Sand %
23	Sand with Clay	65 105 40	0.65
25	Sand with Clay	125 175 50	0.65
27	Sand with Clay	191 205 14	0.65
28	Sand	205 215 10	1
29	Clay with Sand	215 285 70	0.35
30	Sand	285 349 64	1

Formation Net Sand	Formation Present	Partial Geology Desc	Aquifer Net Sand	Aquifer Present	Aquifer Determination Table									
Sand %	Well Partial Penetration		Sand %	Well Partial Penetration	Depth Well	B_T_D:	Depth Hole	B_B_D:	Screen Top	L_T_D:	Screen Bottom	L_B_D:	W_T_D:	W_B_D:
Chicot Aquifer														
Beaumont Fm	<input type="text" value="200"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="No"/>	<input type="text" value="Yes"/>	<input type="text" value="300"/> <input type="text" value="26"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>									
Lissie Fm	<input type="text" value="100"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											
Willis Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											
Evangeline Aquifer														
Upper Goliad Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											
Lower Goliad Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>	<input type="text" value="0"/> <input type="text" value="0"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>									
Upper Lagarto Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											
Burkeville Confining Unit														
Middle Lagarto Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											
Jasper Aquifer														
Lower Lagarto Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>	<input type="text" value="0"/> <input type="text" value="0"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>									
Oakville Fm	<input type="text" value="0"/> <input type="text" value="-99999"/>	<input type="text" value="Yes"/> <input type="text" value="Yes"/>	<input type="text" value="No"/>											

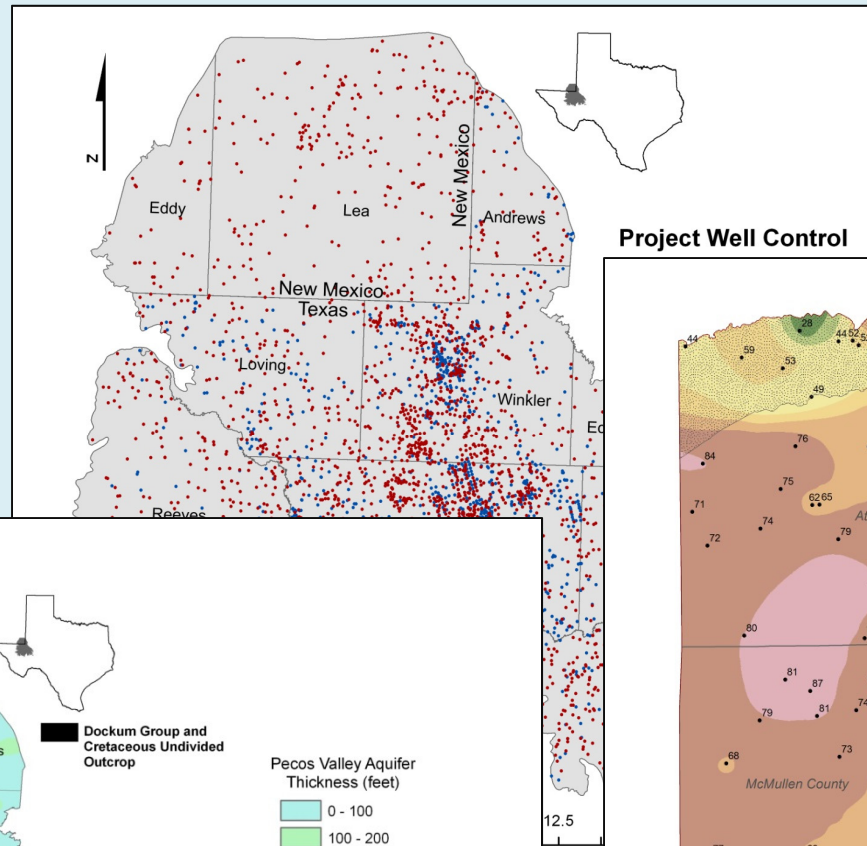
Estimated Groundwater Volumes

Five TDS Ranges (mg/L):

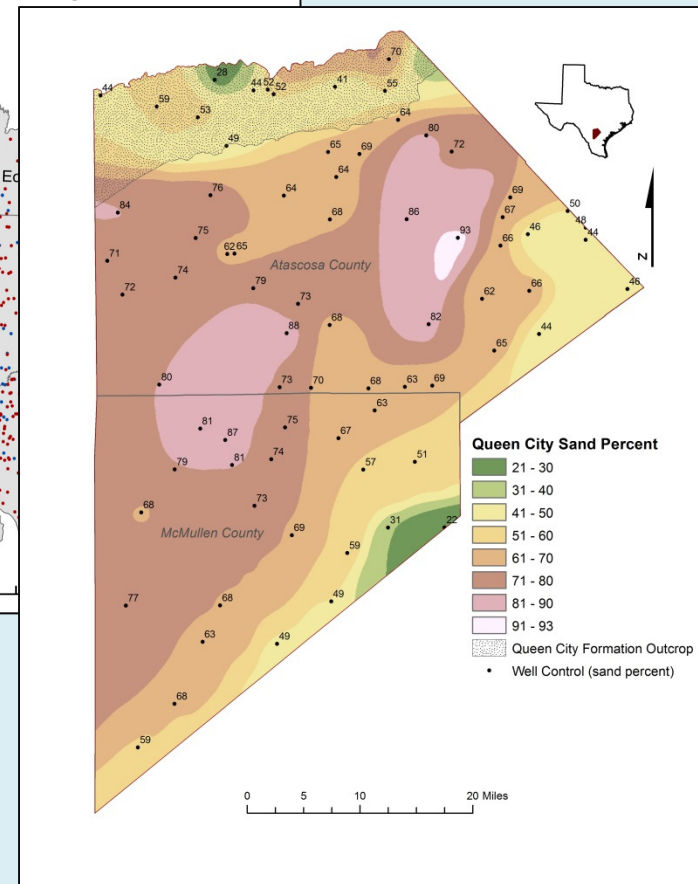
- Fresh 0-999
- Slightly Saline 1,000 -2,999
- Moderately Saline 3,000 – 9,999
- Very Saline 10,000 – 35,000
- Brine > 35,000



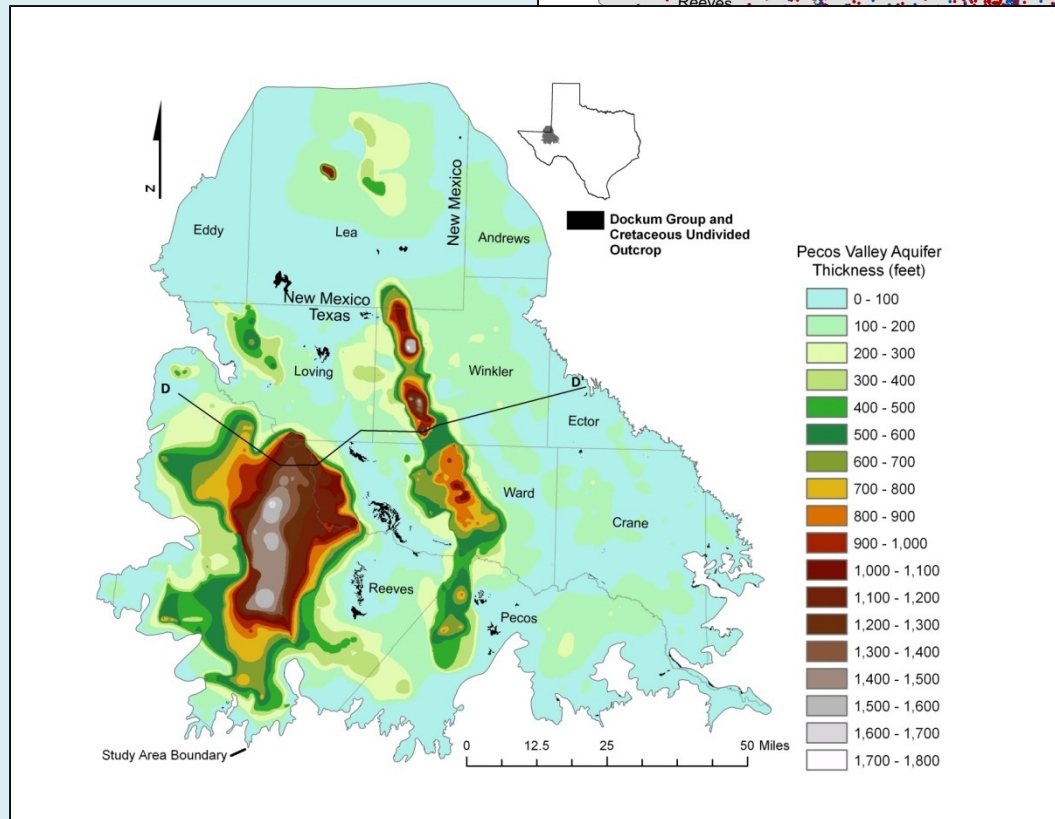
BRACS GIS



Project Well Control



Queen City Sand Percent



Pecos Valley Aquifer Thickness (feet)

Dockum Group and Cretaceous Undivided Outcrop

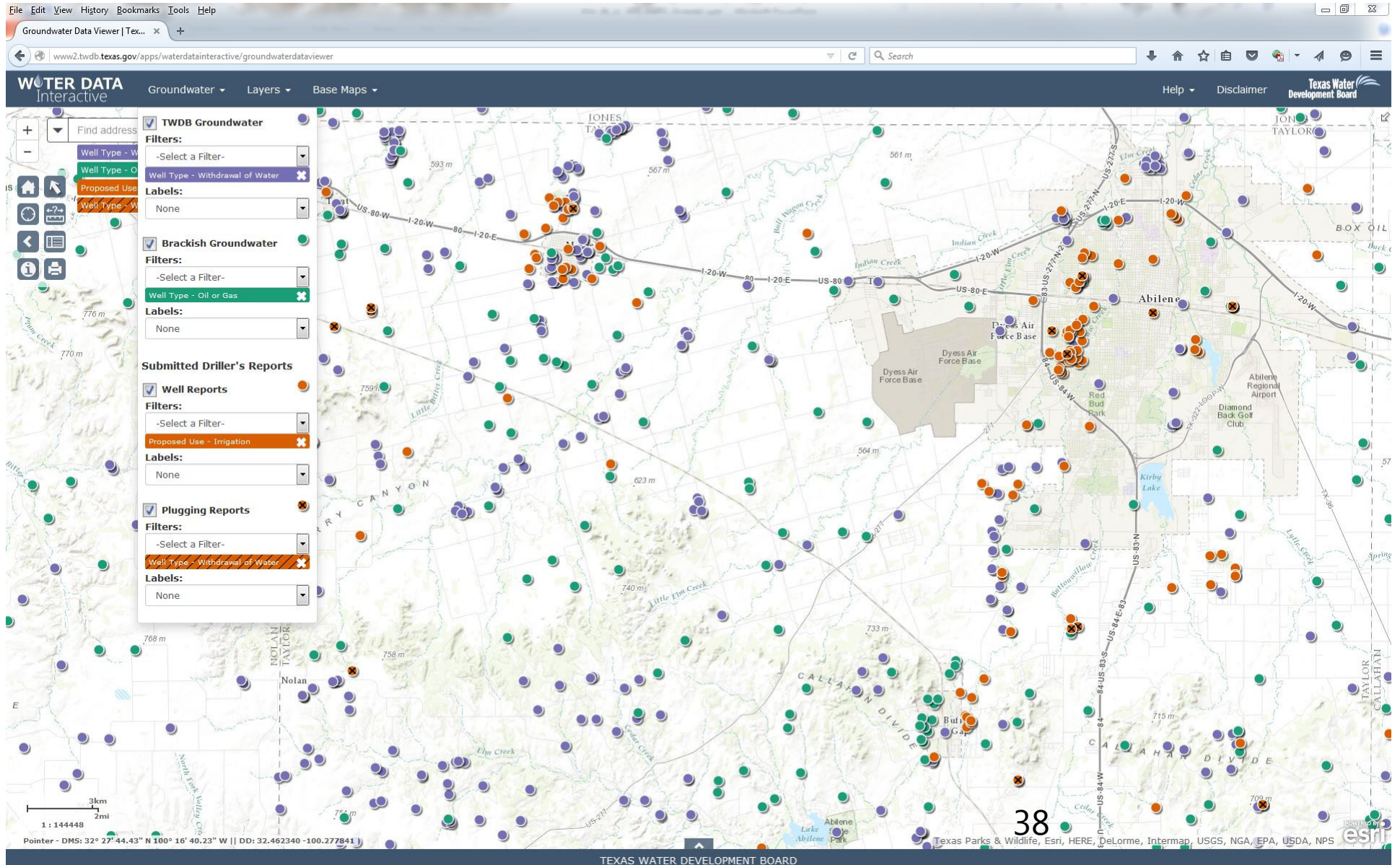
Water Data Interactive

The screenshot shows a web browser window displaying the Texas Water Development Board (TWDB) website. The page features a navigation menu with links to Home, Board, SWIFT, Financial Assistance, Water Planning, Groundwater, Surface Water, Flood, Conservation, and Innovative Water. The main content area is titled "WATER DATA Interactive" and includes several interactive tools:

- Groundwater Data Viewer:** An interactive mapping application providing access to water-related data for Texas, 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 Trinity Aquifer is highlighted. 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 location; 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.

On the right side of the page, there is a sidebar with a search bar and social media links. Below the search bar, there is a "Connect with us:" section with icons for Facebook, Twitter, LinkedIn, YouTube, and Email. Further down, there is a "State Water Implementation Fund for Texas (SWIFT)" button. The page is framed by a large landscape image of a river and rocky terrain.

Groundwater Data Viewer



Groundwater Data Viewer

The screenshot displays the 'Groundwater Data Viewer' web application. The interface includes a search bar, navigation tools, and filter panels for 'TWDB Groundwater', 'Brackish Groundwater', and 'Submitted Driller's Reports'. A central popup window titled 'Brackish Groundwater' provides detailed information for a specific well.

Field	Value
Well Id:	19757 - Logs
Data Source:	BEG Paper/Digital
API Number:	Geophysical
County:	Taylor
Well Depth (ft):	
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:	

The map background shows Taylor County, Texas, with various well locations marked by colored dots. A scale bar indicates 1:144448. The footer includes the Texas Water Development Board logo and a list of data sources: Texas Parks & Wildlife, Esri, HERE, DeLorme, Intermap, USGS, NGA, EPA, USDA, NPS, and Esri.

Groundwater Data Viewer

The screenshot displays the Groundwater Data Viewer web application. The browser address bar shows the URL: www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer#. The application header includes the logo "WATER DATA Interactive" and navigation menus for "Groundwater", "Layers", and "Base Maps".

The main interface features a map of Abilene, Texas, with numerous green circular markers representing wells. A search bar at the top left contains the text "Abilene, Texas, United S X". A popup window titled "Brackish Groundwater" is open, displaying details for well 19757. The popup includes a table of geophysical well logs and contact information for assistance.

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

Who are we?

Texas Water Development Board

Why do we study brackish aquifers?

**Groundwater Desalination is part of the
Texas Water Plan**

How do we study brackish aquifers?

Well Logs, Databases, Geospatial Data

www.twdb.texas.gov

We appreciate data!

Mark Robinson

Geologist

Innovative Water Technologies

Texas Water Development Board

Mark.robinson@twdb.texas.gov

(512) 463-7657

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

Draft 2017 Water Plan:

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