


Innovative Water Technologies Programs

CIGMAT Conference 2017
Houston, Texas
March 3
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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.

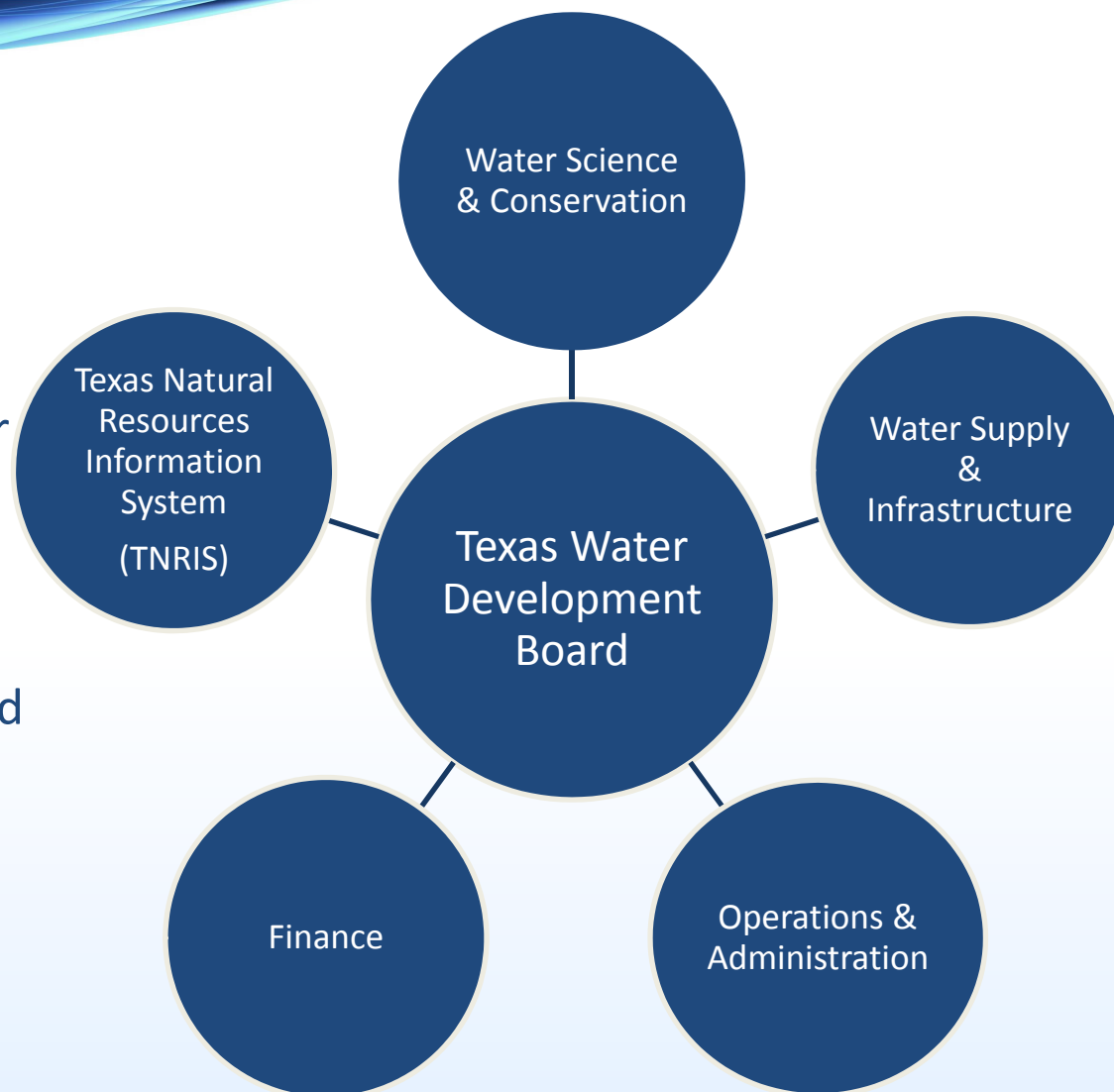
Texas Water Development Board

- **Background**
 - 1950s: Texas suffered the most severe drought in the state's history
 - 1957: Creation of TWDB
 - \$200 million Water Development Fund
 - Development of a statewide water plan



TWDB primary functions:

- Development of a statewide water plan
- Administering water funds for the state
- The collection of water resource data
- Outreach for conservation and responsible development of water



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

State Water Plan

- **State water planning**
 - 5-year planning cycle
 - 50-year planning horizon
 - Categories of water use: municipal, manufacturing, irrigation, mining, livestock, steam-electric power
 - Meet drought of record water needs



2017 State Water Plan

Quick facts

- Texas' population expected to increase more than 70% between 2020 and 2070
- Water demands to increase 17%
- Existing water supplies to decrease 11%
- If strategies in plan not implemented:
 - Approximately 1/3 of Texans would have less than half of required supply with drought of record conditions in 2070.
 - Economic losses could be \$151 billion
- \$1.9 billion in financial assistance since 2012



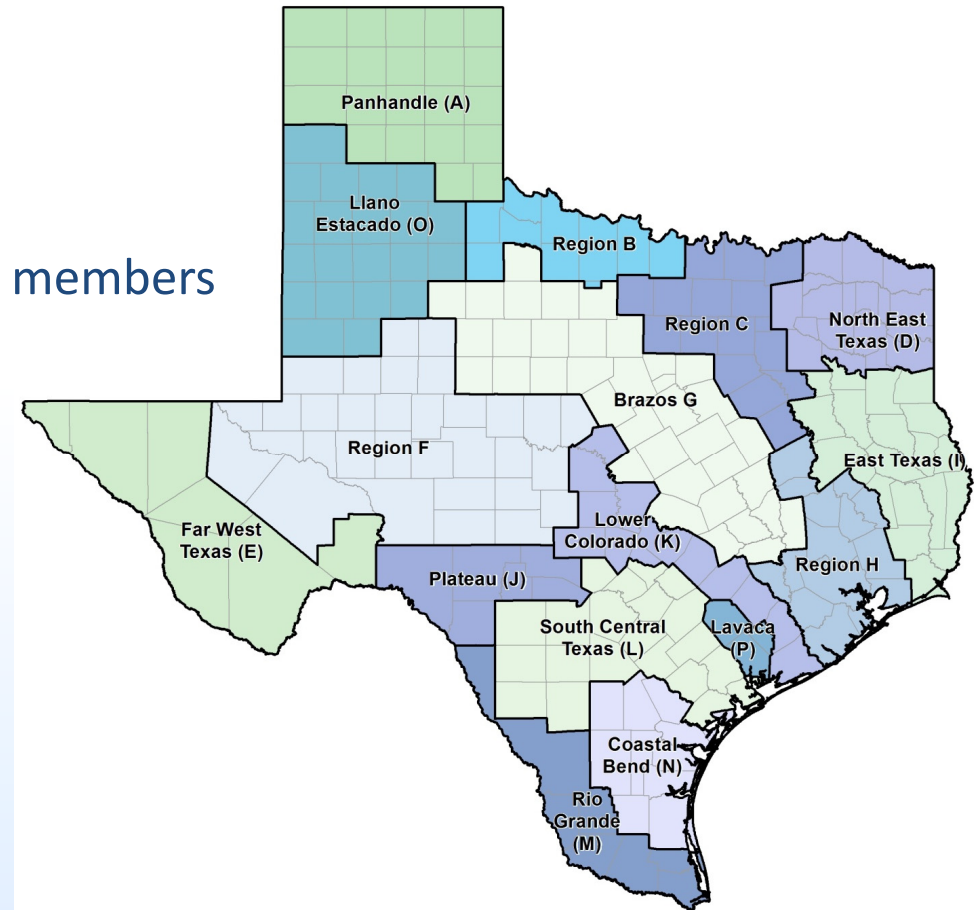
Regional water planning:

16 regional water planning groups

450 voting/non-voting planning group members

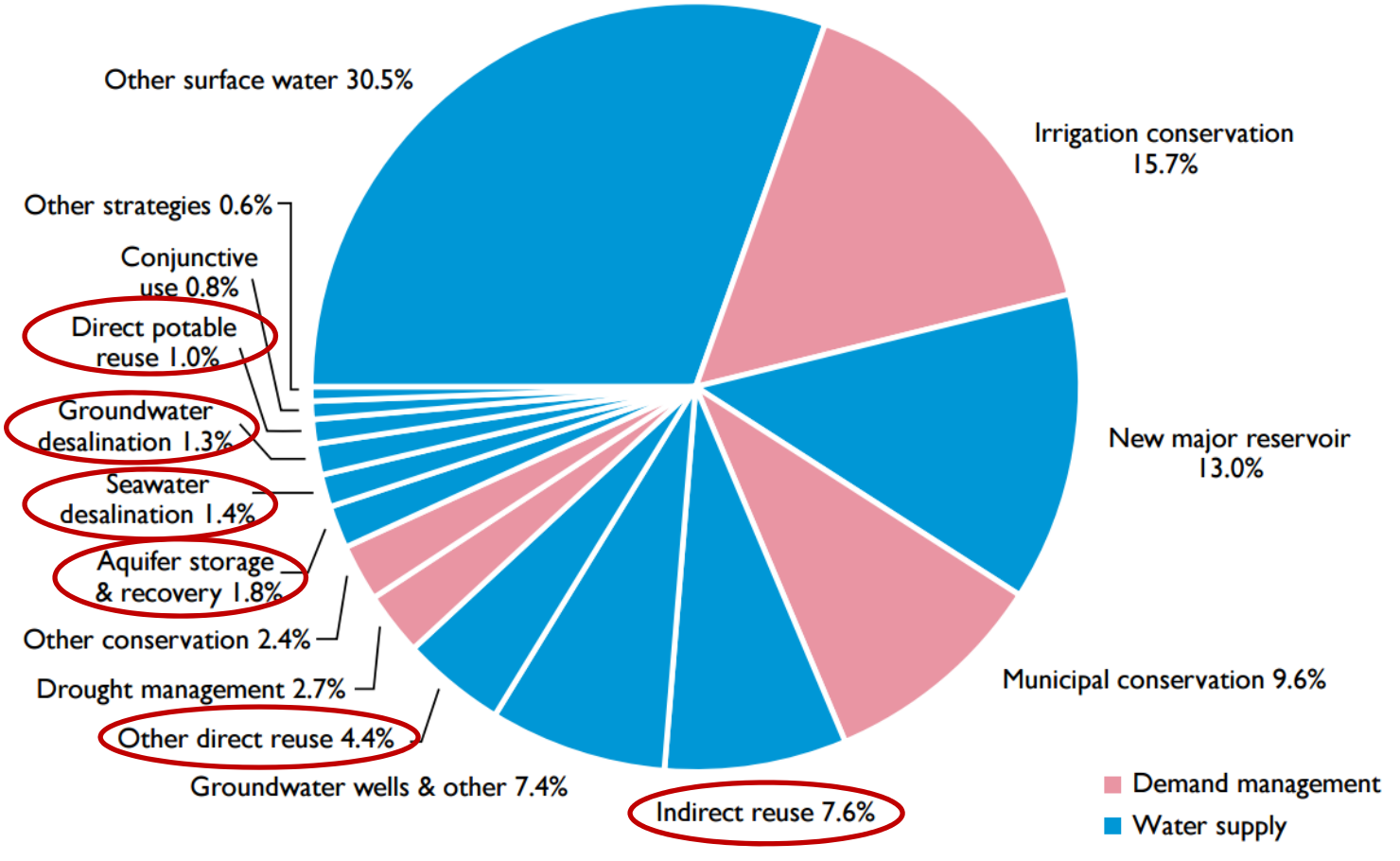
3,000 water user groups

6 water user categories

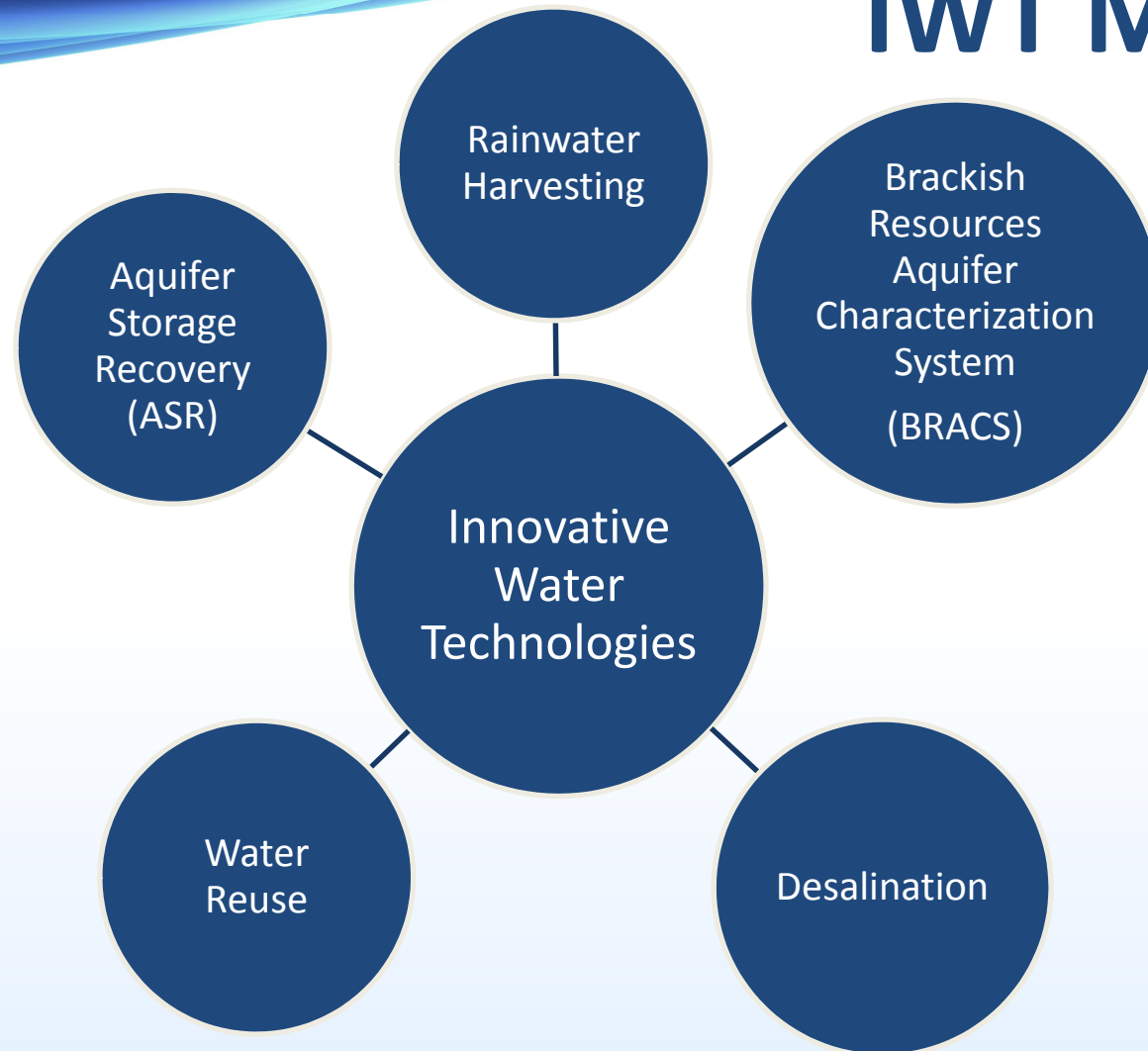


Recommended Water Management Strategies by 2070

Figure ES.7 - Share of recommended water management strategies by strategy type in 2070



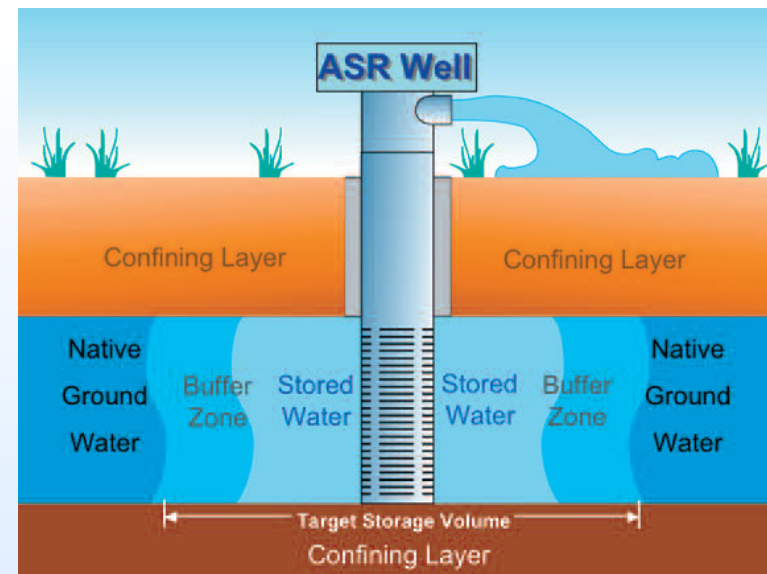
IWT Mission



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

What is ASR?

- Aquifer Storage and Recovery
 - Storage of water in a suitable aquifer and recovery of that water when it is needed
 - Source water can be reclaimed, groundwater, or surface water

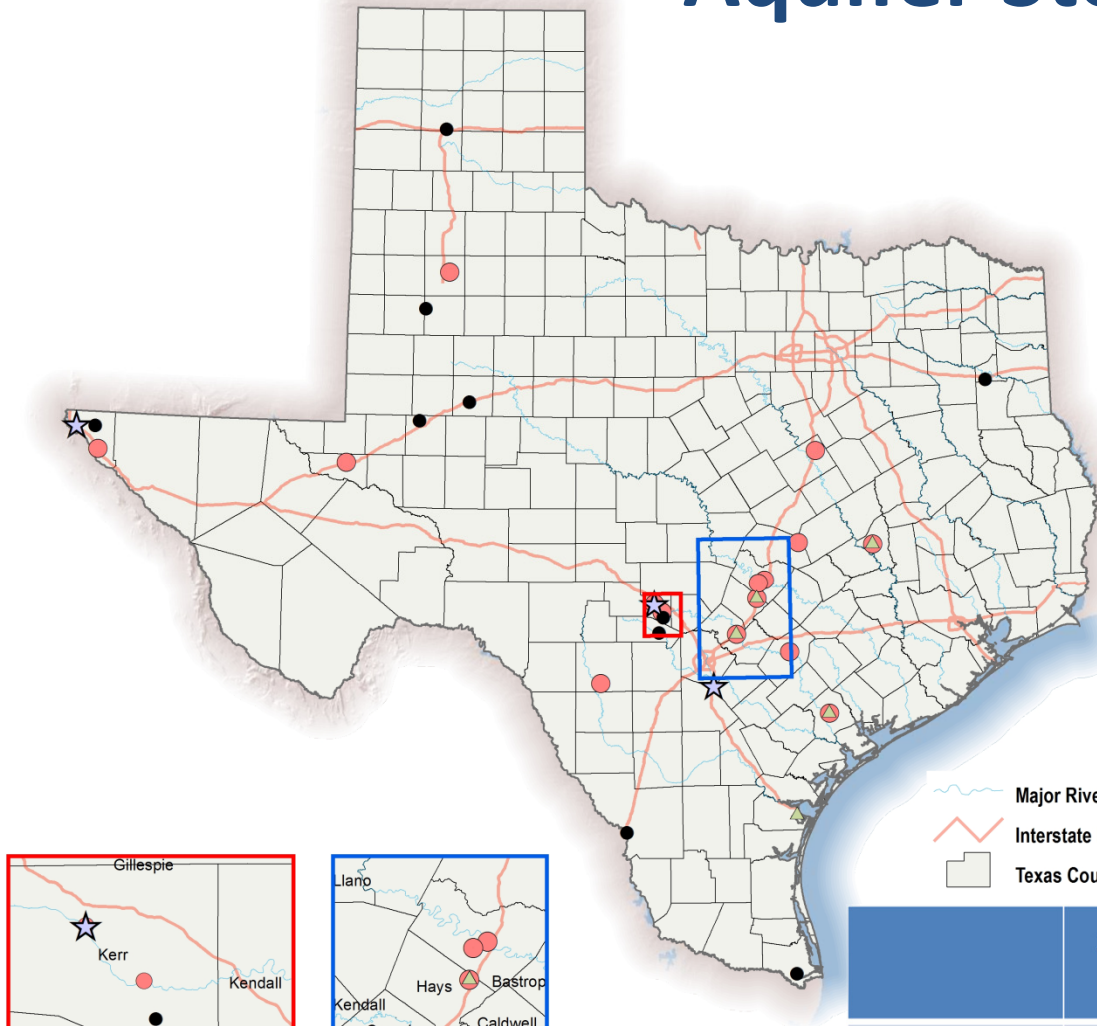


Source: NGWA

ASR Benefits and Challenges

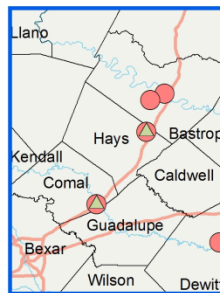
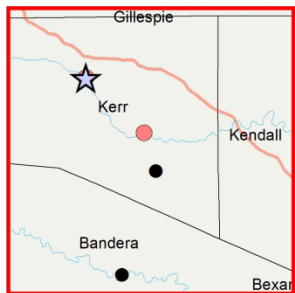
- Benefits
 - Prevents evaporation loss of water supply
 - Mitigates surface inundation (Useable land surface)
 - Emergency supply
- Challenges
 - Geological constraints
 - Geochemical interaction between water injected for storage and existing groundwater
 - Offers no flood control
 - Stored water migration
 - Stored water protection

Aquifer Storage and Recovery Activities in Texas



- ★ Operating Facilities
- Completed Studies
- ▲ Ongoing Studies
- 2017 Recommended Water Management Projects

- Major Rivers
- Interstate Highways
- Texas Counties



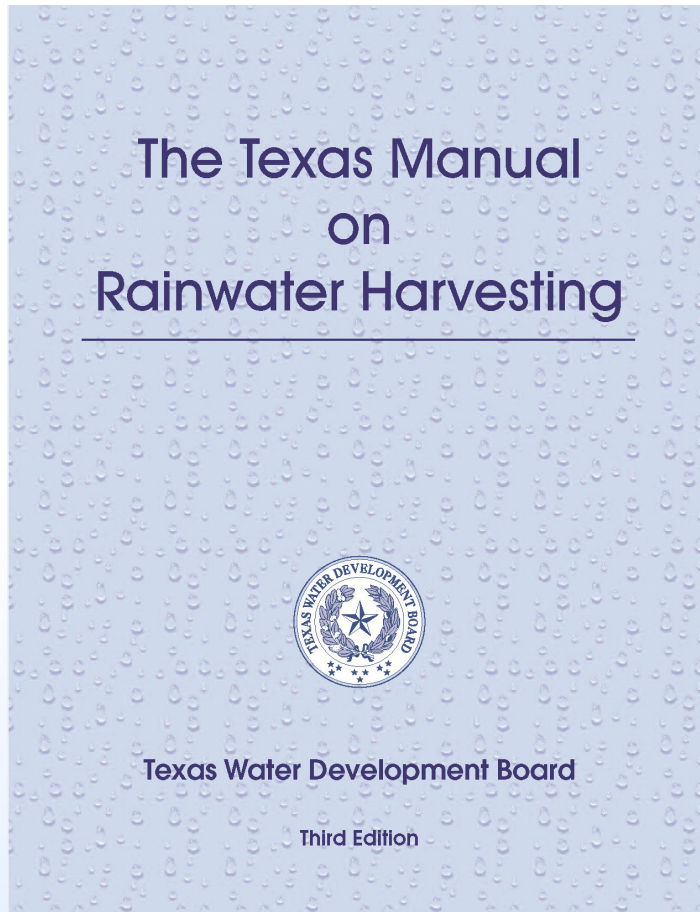
	San Antonio Water Systems	City of Kerrville	El Paso Water Utilities
Production Capacity	60 MGD	2.65 MGD	12 MGD
Operational	2004	1998	1985
Source	Groundwater	Treated surface water	Treated Wastewater
Aquifer	Carrizo	Lower Trinity	Hueco Bolson

For more information about aquifer storage and recovery in Texas, please visit:
<http://www.twdb.texas.gov/innovativewater/asr/index.asp>

Rainwater Harvesting



Rainwater Harvesting Manual



- An introduction to rainwater harvesting
- Includes ideas for those considering building a rainwater harvesting system
- Rainwater calculator
- Free and online!



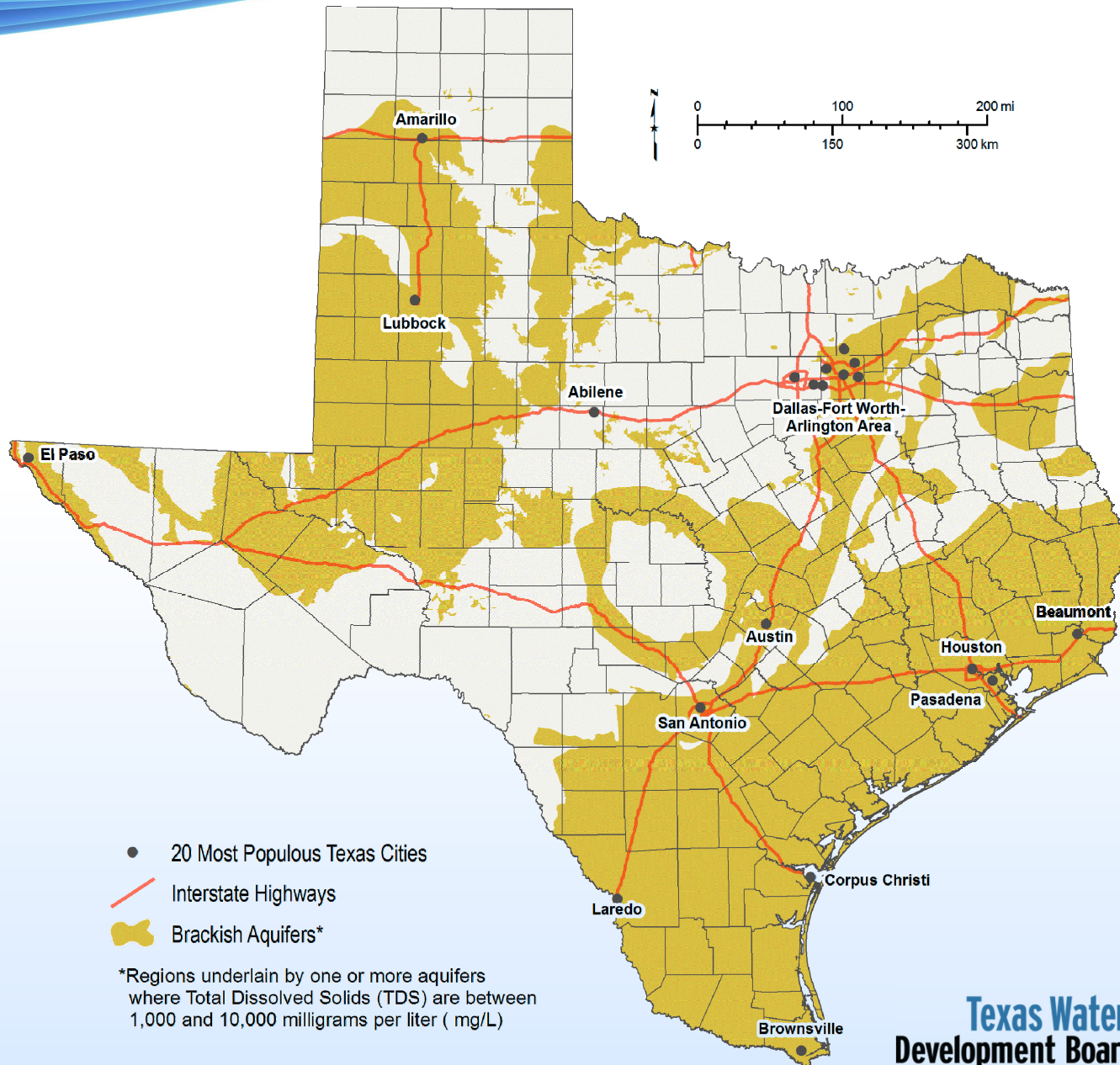
<http://www.twdb.texas.gov/innovativewater/rainwater/docs.asp>

Rainwater Harvesting



- Annual competition program established in October 1, 2007
- Open to all individuals, companies, organizations, municipalities, and local/state governmental entities in Texas
- Three categories
 - Residential,
 - Commercial/industrial, and
 - Educational/governmental
- Manual and Judging criteria available on the website
- Winners announced at our board meeting in spring and featured on TWDB's website

BRACS



- 20 Most Populous Texas Cities
- Interstate Highways
- Brackish Aquifers*

*Regions underlain by one or more aquifers where Total Dissolved Solids (TDS) are between 1,000 and 10,000 milligrams per liter (mg/L)

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 999	← Drinking Water Limit
Slightly Saline	SS	1,000 to 2,999	← Major/Minor Aquifer (Texas) Mapped Limit
Moderately Saline	MS	3,000 to 9,999	
Very Saline	VS	10,000 to 35,000	← Seawater
Brine	BR	Greater than 35,000	



BRACS

Brackish Resources Aquifer Characterization System

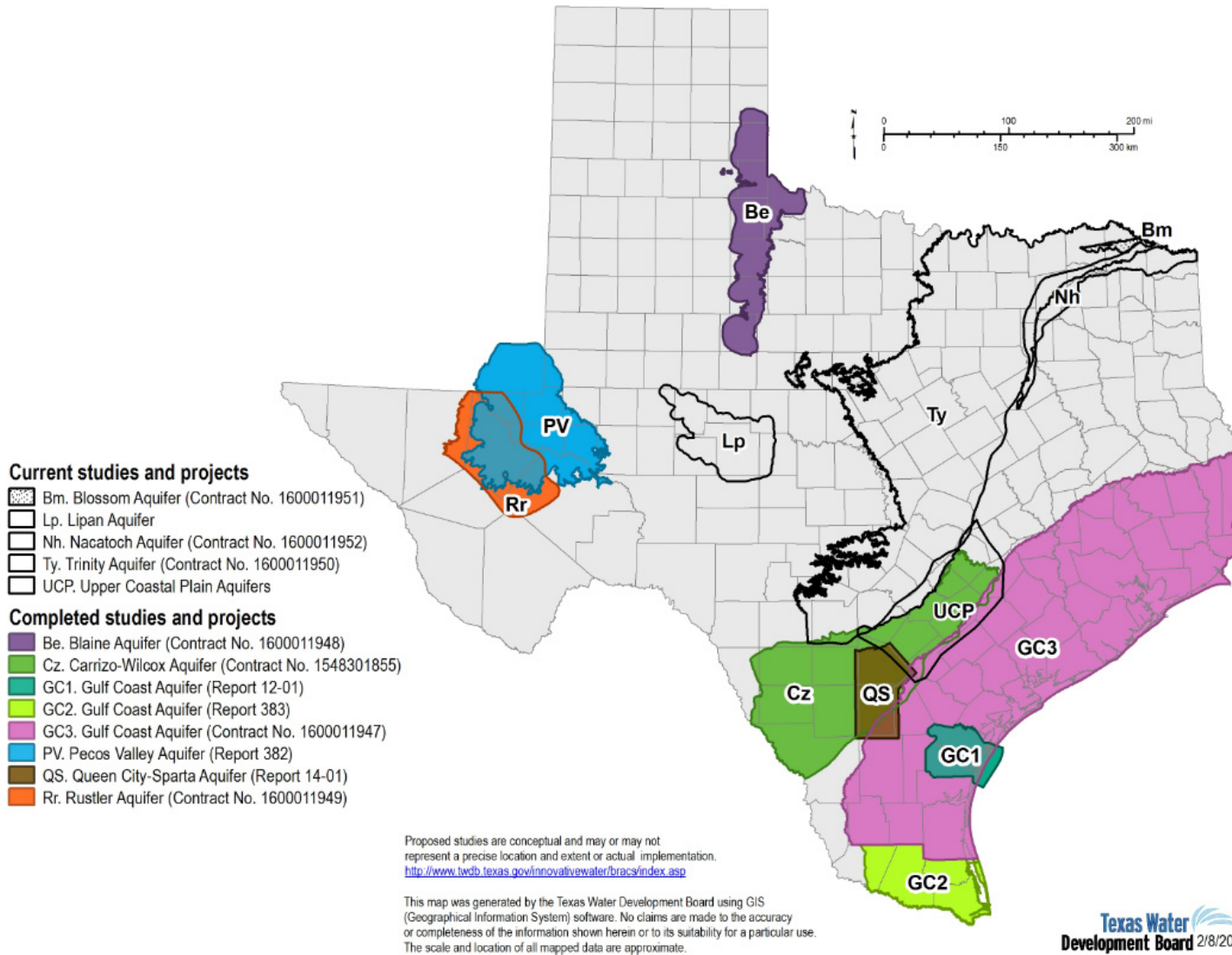
- Collect data
- Map and characterize existing aquifers
- Map key water quality parameters
- Estimate saturated zones using net sand analysis
- Chemical parameters important to desalination
- Provide data to stakeholders

Development of Brackish Groundwater

House Bill 30 (84th Texas Legislature, 2015)

- \$2,000,000 grant from General Revenue Fund
- Carrizo-Wilcox Aquifer, the Gulf Coast Aquifer System, the Blaine Aquifer, and the Rustler Aquifer studies were completed in 2016
- Remaining aquifer brackish resource studies to be completed by December 1, 2022 for the entire state
- Blossom Aquifer, Nacatoch Aquifer, and the Trinity Aquifer will be completed by August 31, 2017
- Estimate 30-year and 50-year production without causing significant impact to water quality or water quantity in freshwater aquifers
- Include status report in every biennial desalination, last report completed in 2016

BRACS Program Aquifers

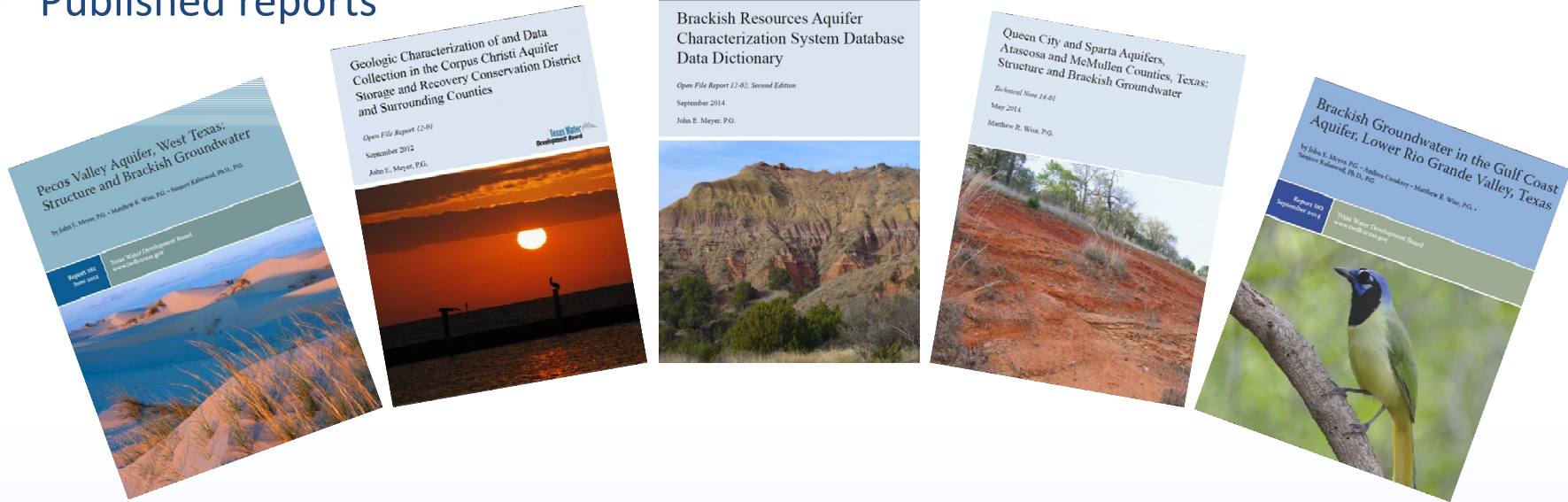


BRACS Data

- Data Management
 - Microsoft Access Database (2007 format)
 - >60,000 data records
 - Well data (oil/gas, water, injection wells)
- GIS data
 - Well control
 - Lateral extent of brackish aquifers
 - Lithology
 - Water quality parameters
 - Saturated Zones
- Published Reports

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:

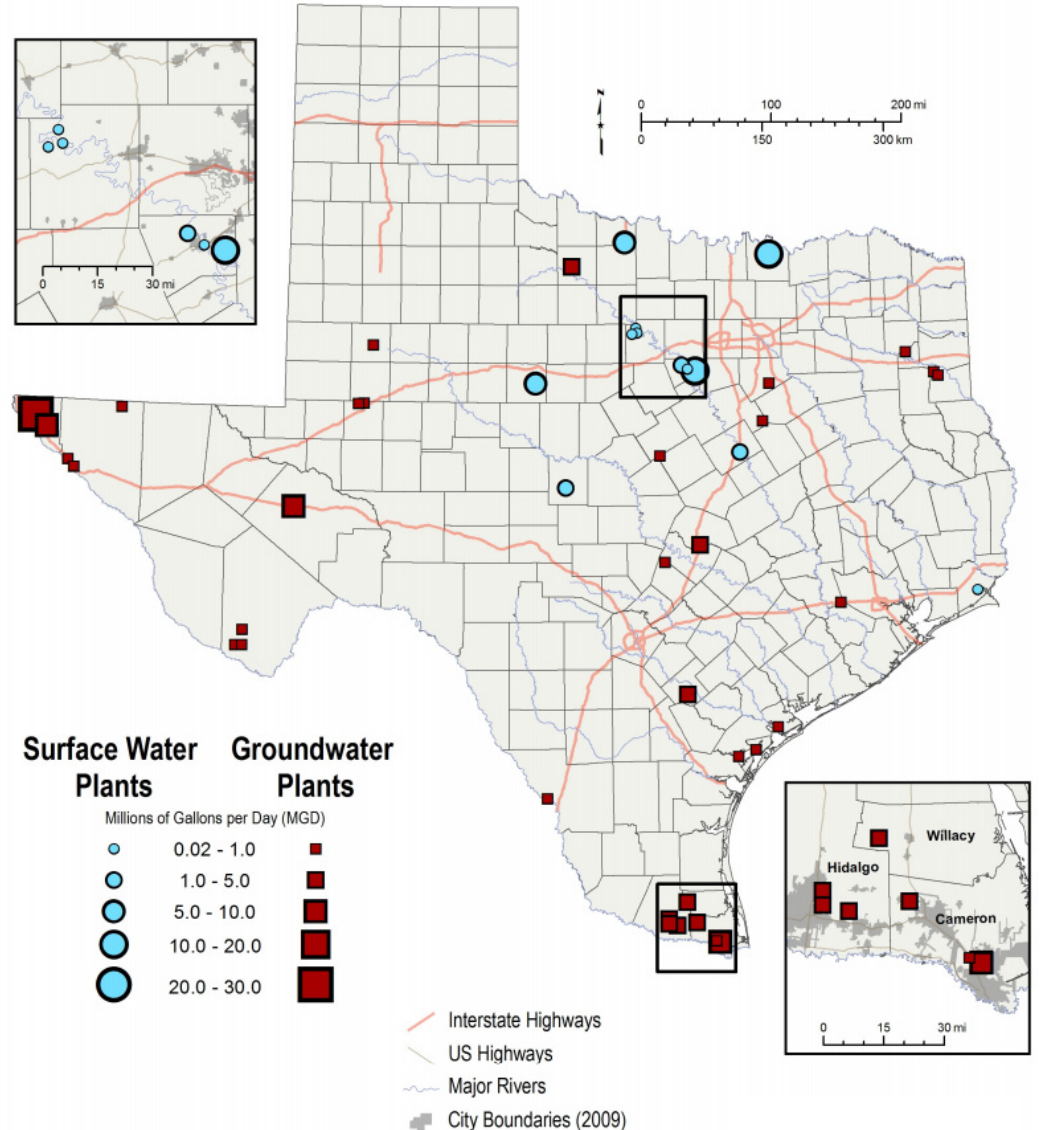
Stakeholders can use this to evaluate potential groundwater exploration areas.

TWDB Groundwater Data Viewer

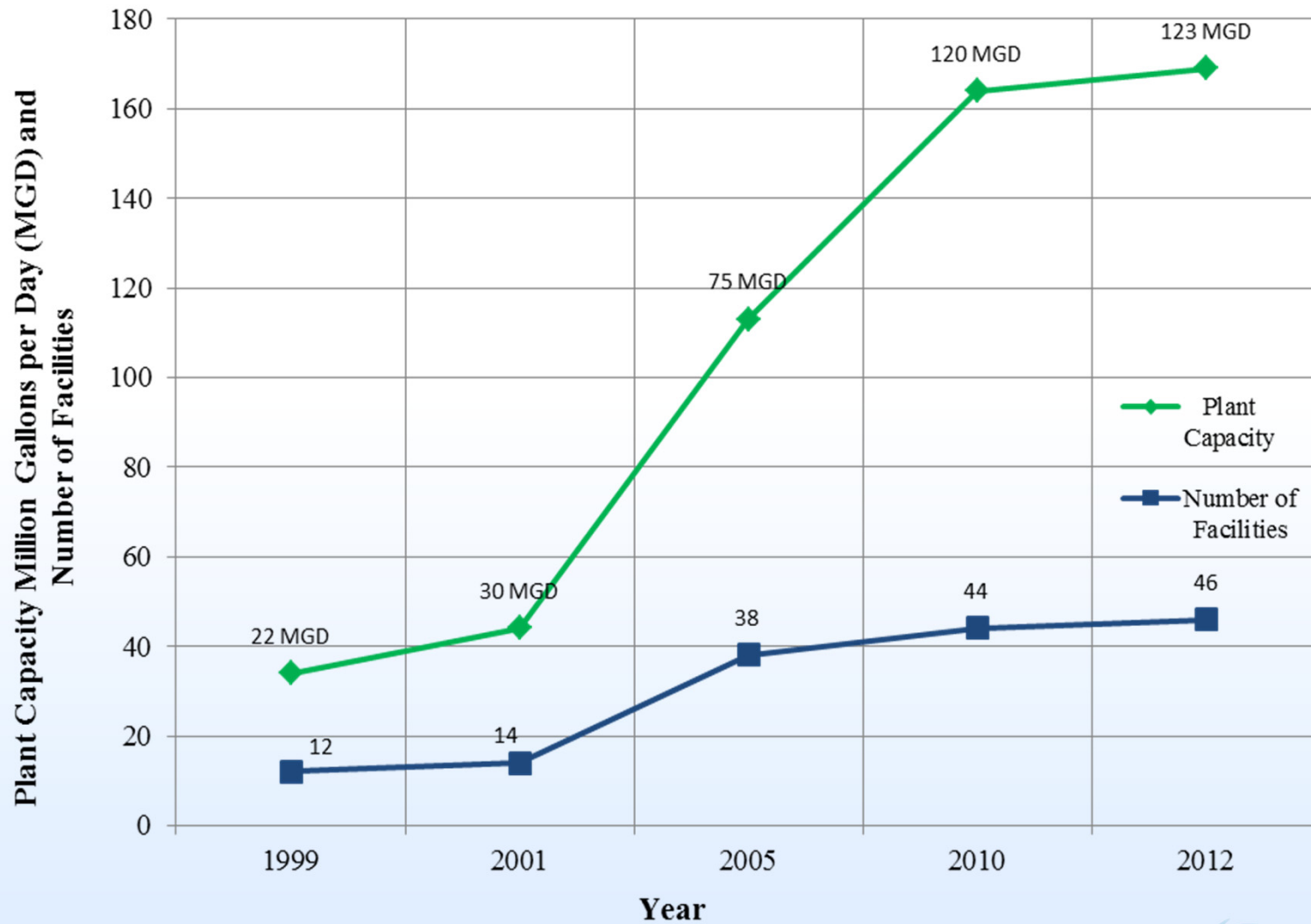
<http://www2.twdb.texas.gov/apps/waterdatainteractive/groundwaterdataviewer>

Desalination in Texas

- 12 desalination plants with surface water as source (blue circles)
- 34 groundwater desalination plants (red squares)
- Total municipal capacity: 123 MGD
- The Kay Bailey Hutchinson Desalination Plant is largest inland brackish desalination plant in USA
- Texas does not have currently a seawater desalination facility

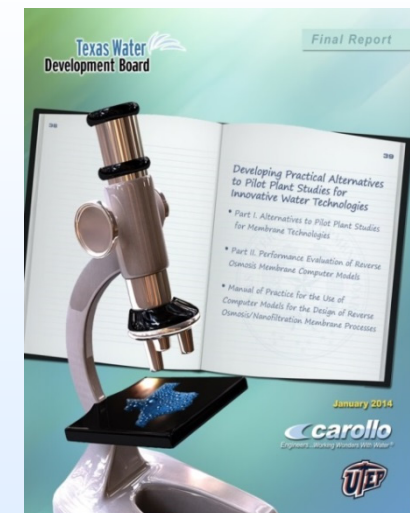
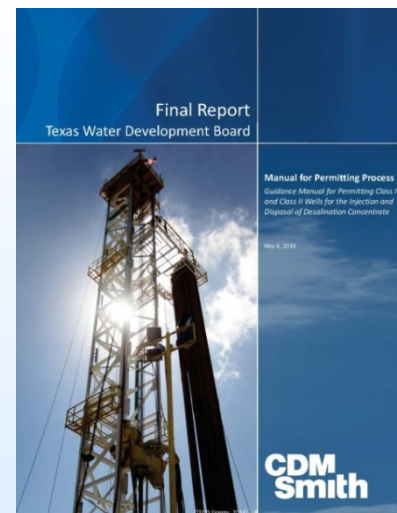


Desalination in Texas



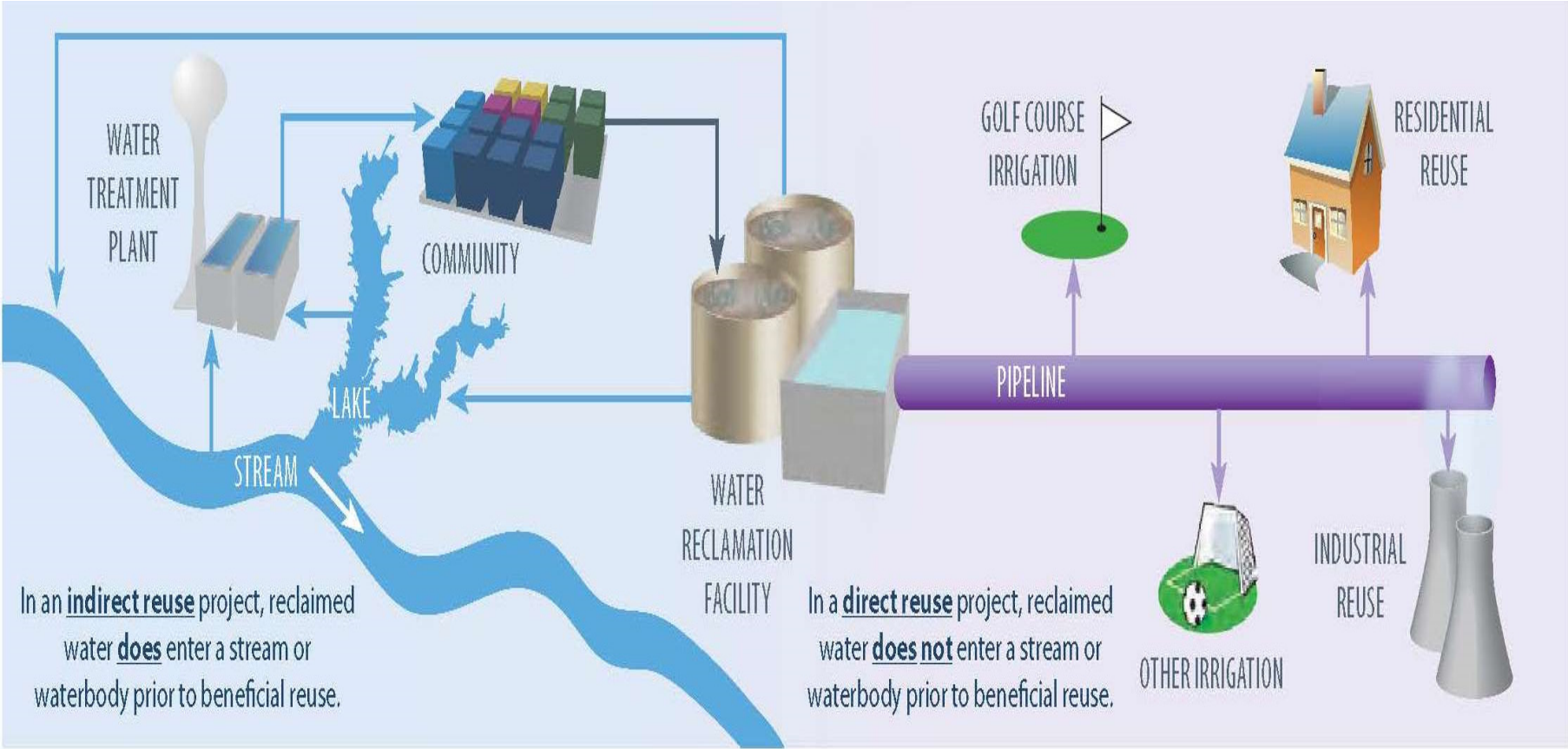
Desalination Reports

- Biennial Report on Seawater Desalination
- Guidance Manual for Permitting Injection and Disposal of Desalination Concentrate
- Practical Alternatives to Pilot Plant Studies



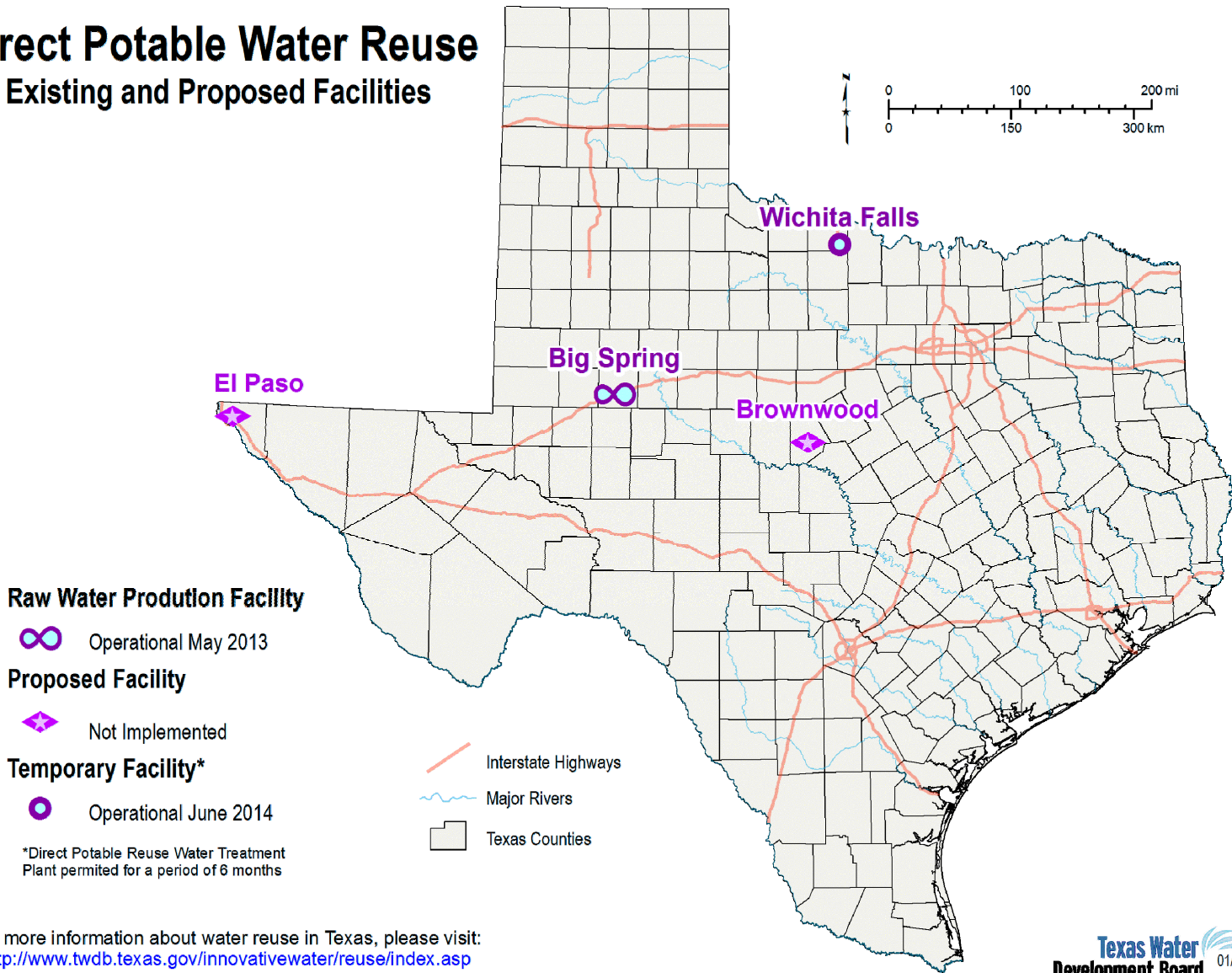
Water Reuse

Two Types:



Direct Potable Reuse

Direct Potable Water Reuse Existing and Proposed Facilities



For more information about water reuse in Texas, please visit:
<http://www.twdb.texas.gov/innovativewater/reuse/index.asp>

Direct Reuse and Water Quality Study

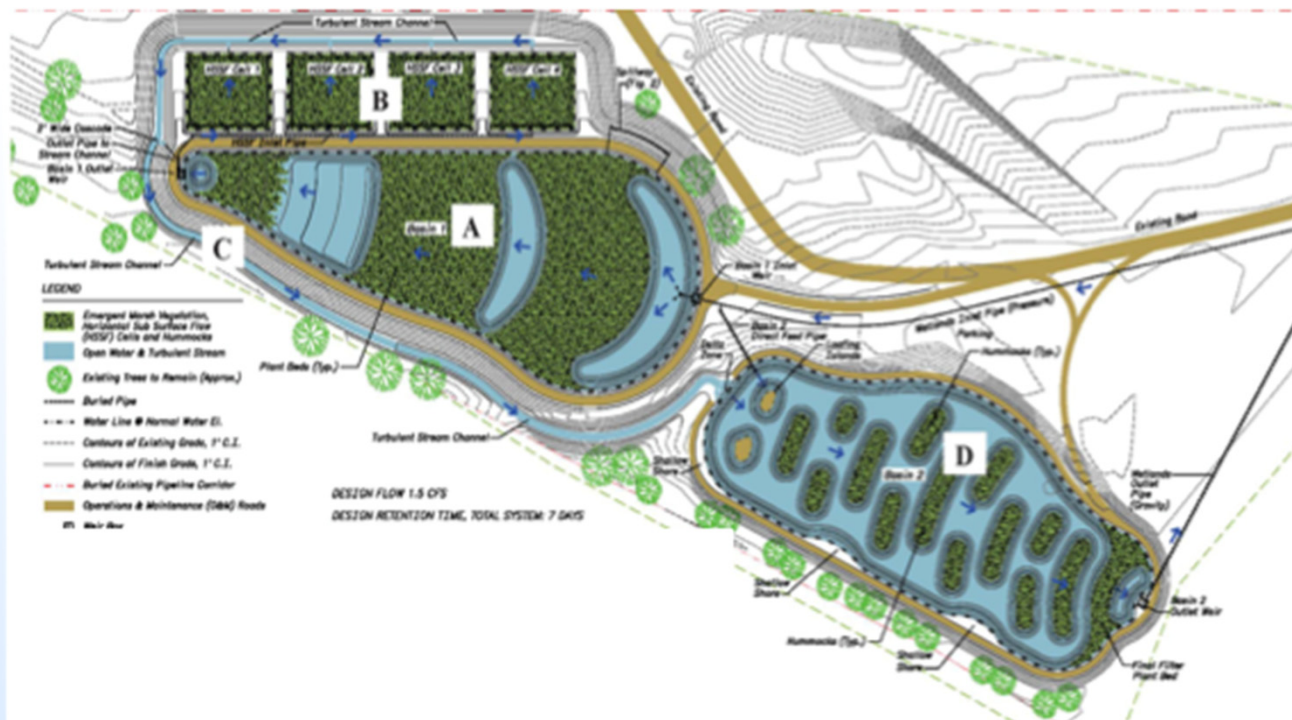
- First direct reuse plant in Texas and USA
- \$300k from TWDB
- Safe and viable alternative for producing potable water in Texas
 - Feasibility Study
 - Testing and Monitoring
 - Chemicals of Emerging Concern
 - Microbial pathogens



Indirect Reuse

Brazos River Research Wetland

- Engineered wetland in Waco, Texas
- ~\$588k Financing from TWDB
- To evaluate how endocrine disrupting compounds can be reduced from treated wastewater effluent.





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