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 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
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

- Other surface water: 30.5%
- Irrigation conservation: 15.7%
- New major reservoir: 13.0%
- Municipal conservation: 9.6%
- Indirect reuse: 7.6%
- Other direct reuse: 4.4%
- Drought management: 2.7%
- Other conservation: 2.4%
- Seawater desalination: 1.4%
- Groundwater desalination: 1.3%
- Direct potable reuse: 1.0%
- Conjunctive use: 0.8%
- Other strategies: 0.6%

2017 State Water Plan
“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

For more information about aquifer storage and recovery in Texas, please visit: http://www.twdb.texas.gov/innovativewater/asrindex.asp
Rainwater Harvesting

http://www.lcra.org/about/overview/Pages/redbud-center.aspx
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
# 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 999</td>
</tr>
<tr>
<td>Slightly Saline</td>
<td>SS</td>
<td>1,000 to 2,999</td>
</tr>
<tr>
<td>Moderately Saline</td>
<td>MS</td>
<td>3,000 to 9,999</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>

Modified from Winslow and Kister, 1956

Drinking Water Limit

Major/Minor Aquifer (Texas) Mapped Limit

Seawater
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

Current studies and projects:
- Bm, Blossom Aquifer (Contract No. 1600011651)
- Lp, Lipan Aquifer
- Nh, Nacatech Aquifer (Contract No. 1600011652)
- Ty, Trinity Aquifer (Contract No. 1600011650)
- UCP, Upper Coastal Plain Aquifers

Completed studies and projects:
- Be, Blaine Aquifer (Contract No. 1600011946)
- Cz, Carizzo-Wilcox Aquifer (Contract No. 1548301855)
- GC1, Gulf Coast Aquifer (Report 12-01)
- GC2, Gulf Coast Aquifer (Report 363)
- GC3, Gulf Coast Aquifer (Contract No. 1600011947)
- PV, Pecos Valley Aquifer (Report 362)
- QS, Queen City-Sparta Aquifer (Report 14-01)
- Rr, Ruskell Aquifer (Contract No. 1600011949)

Proposed studies are conceptual and may or may not represent a precise location and number or actual implementation. Visit http://www.twdb.texas.gov/edrcs/water/texaswaterindex.asp for more information.

This map was generated by the Texas Water Development Board using C3S (Geographical Information System) software. No claims are made to the accuracy or completeness of the information shown herein or its availability for a particular view. The scales and location of all mapped data are approximate.
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
- GIS Datasets
- BRACS Database
- Well logs

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

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:

In an indirect reuse project, reclaimed water does enter a stream or waterbody prior to beneficial reuse.

In a direct reuse project, reclaimed water does not enter a stream or waterbody prior to beneficial reuse.
Direct Potable Water Reuse
Existing and Proposed Facilities

Raw Water Production Facility
∞ Operational May 2013

Proposed Facility
▲ Not Implemented

Temporary Facility*
● Operational June 2014

*Direct Potable Reuse Water Treatment Plant permitted for a period of 6 months

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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