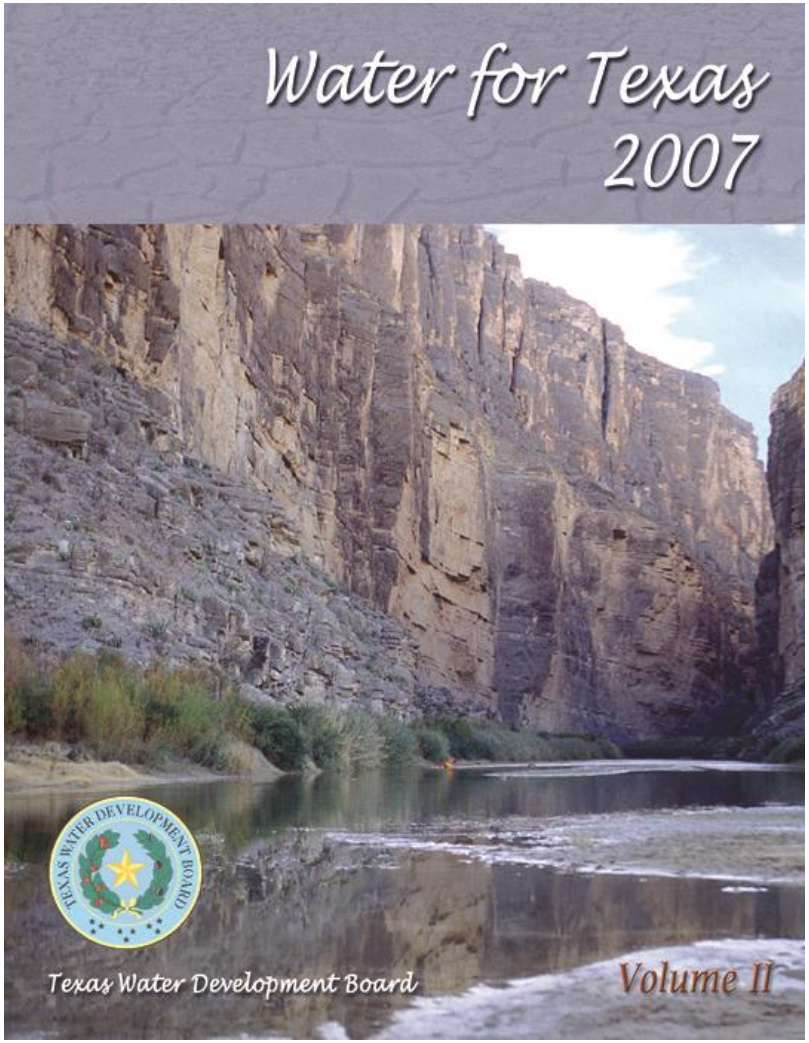
Texas Water Development Board

Brackish Groundwater Desalination in Texas

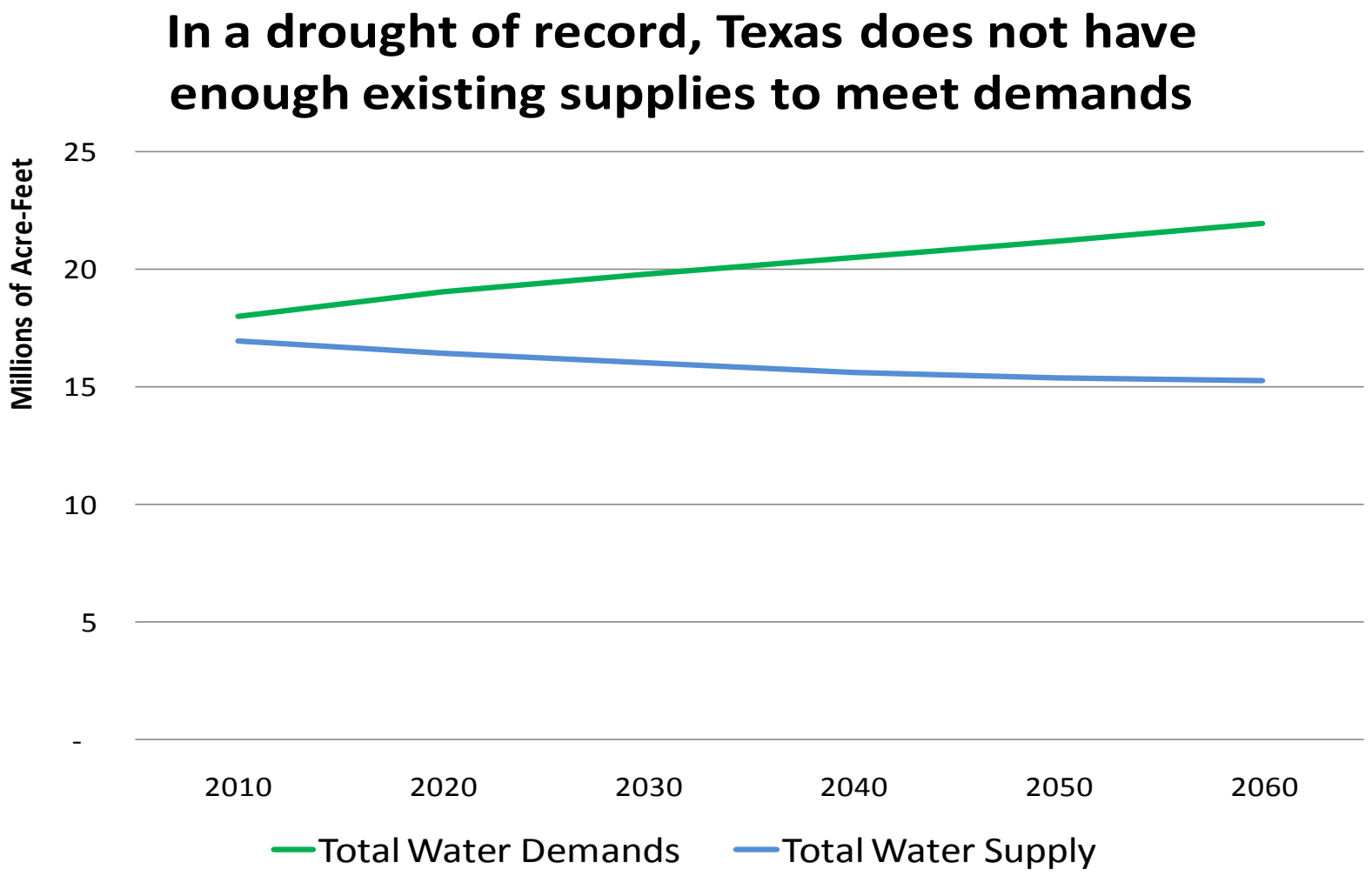
J. Kevin Ward

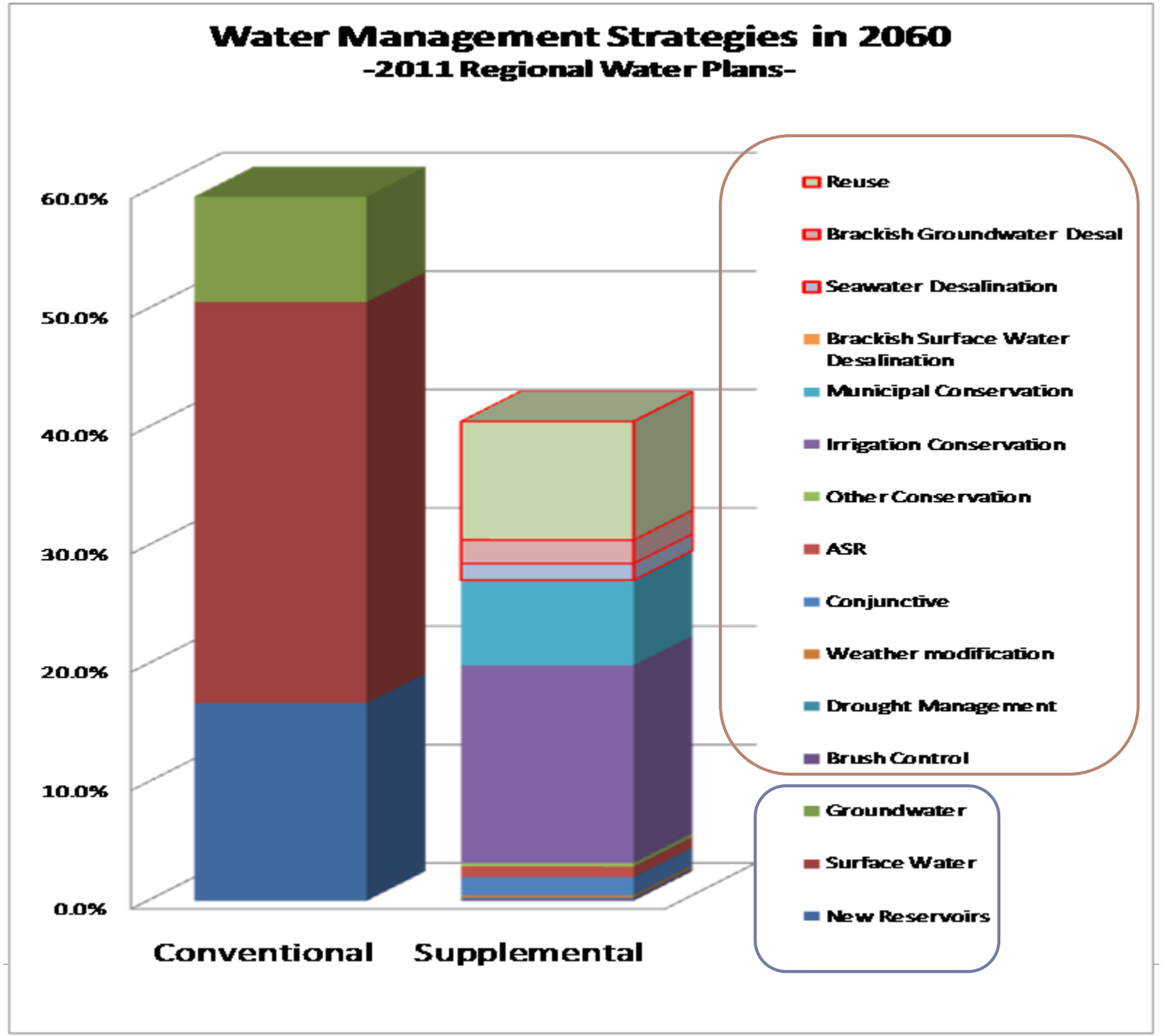


Texas Water Development Board

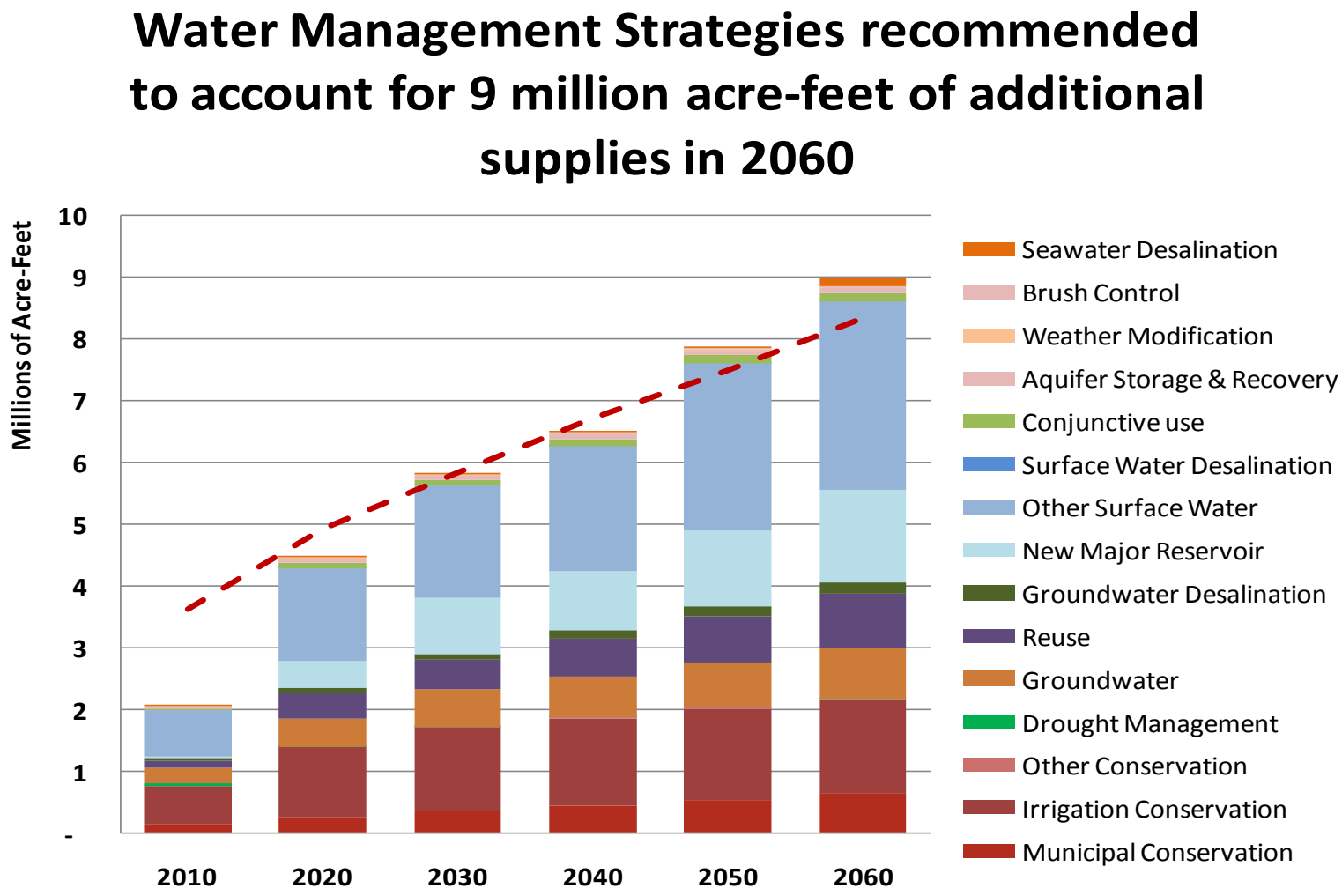
To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas

2011 Regional Water Plans

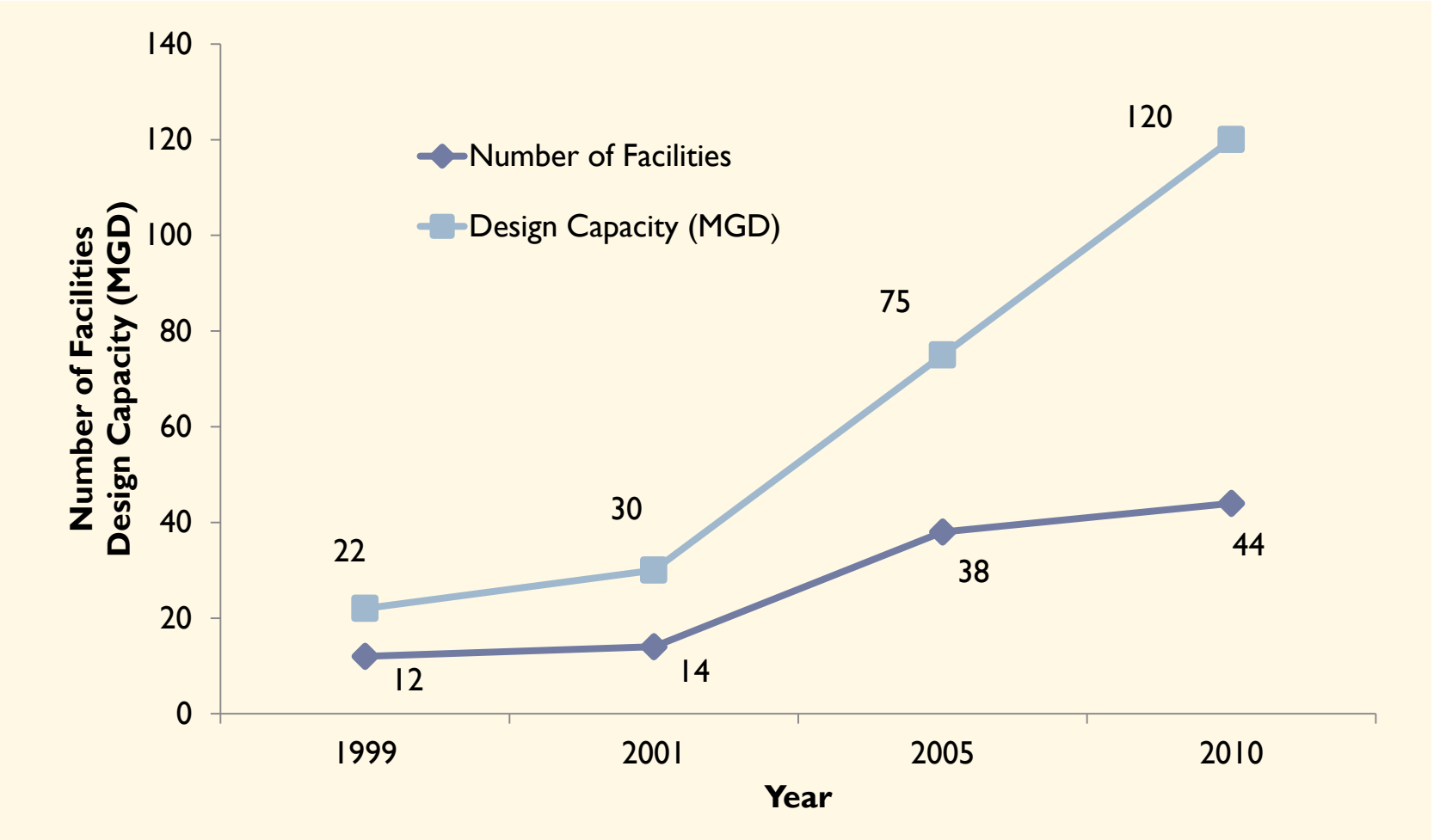



Water Management Strategies in 2060
-2011 Regional Water Plans-
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Conventional
Supplemental
Reuse
Brackish Groundwater Desal
Seawater Desalination
Brackish Surface Water Desalination
Municipal Conservation
Irrigation Conservation
Other Conservation
ASR
Conjunctive
Weather modification
Drought Management
Brush Control
Groundwater
Surface Water
New Reservoirs

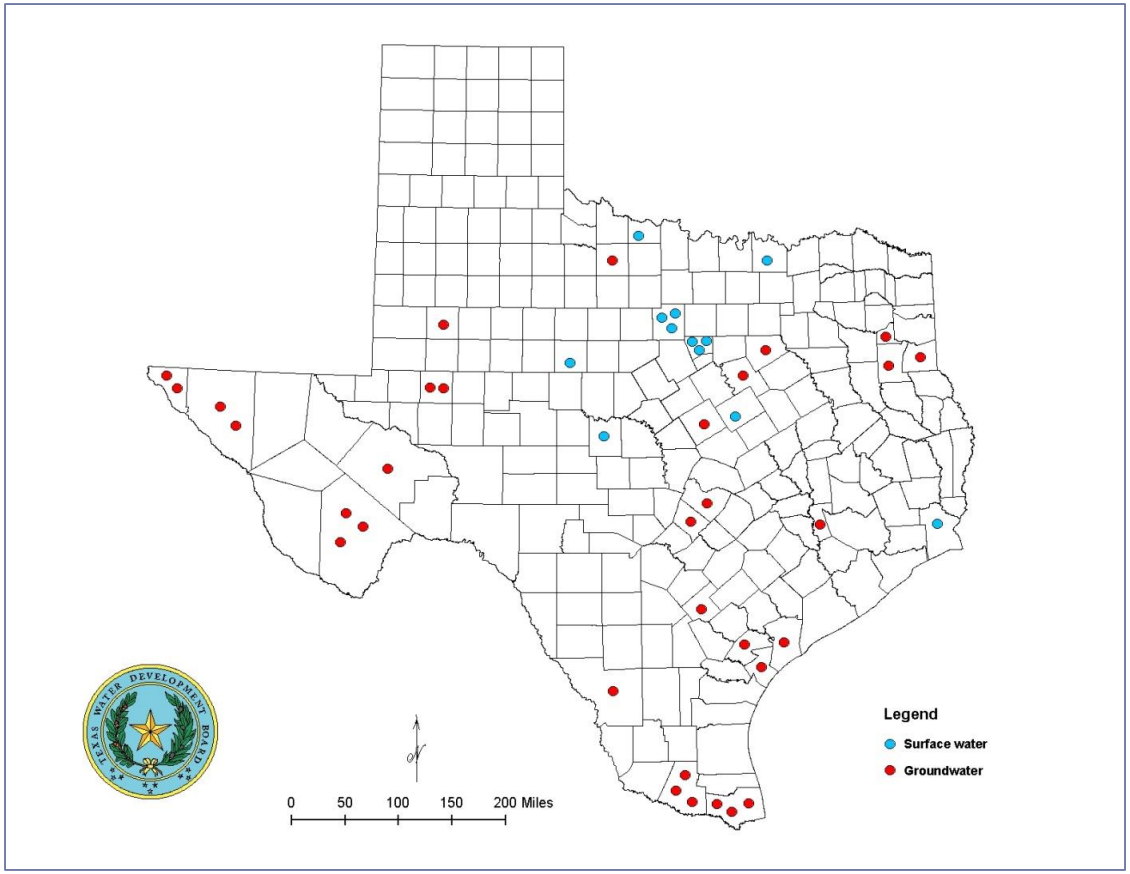
2011 Regional Water Plans



Growth of desalination capacity in Texas



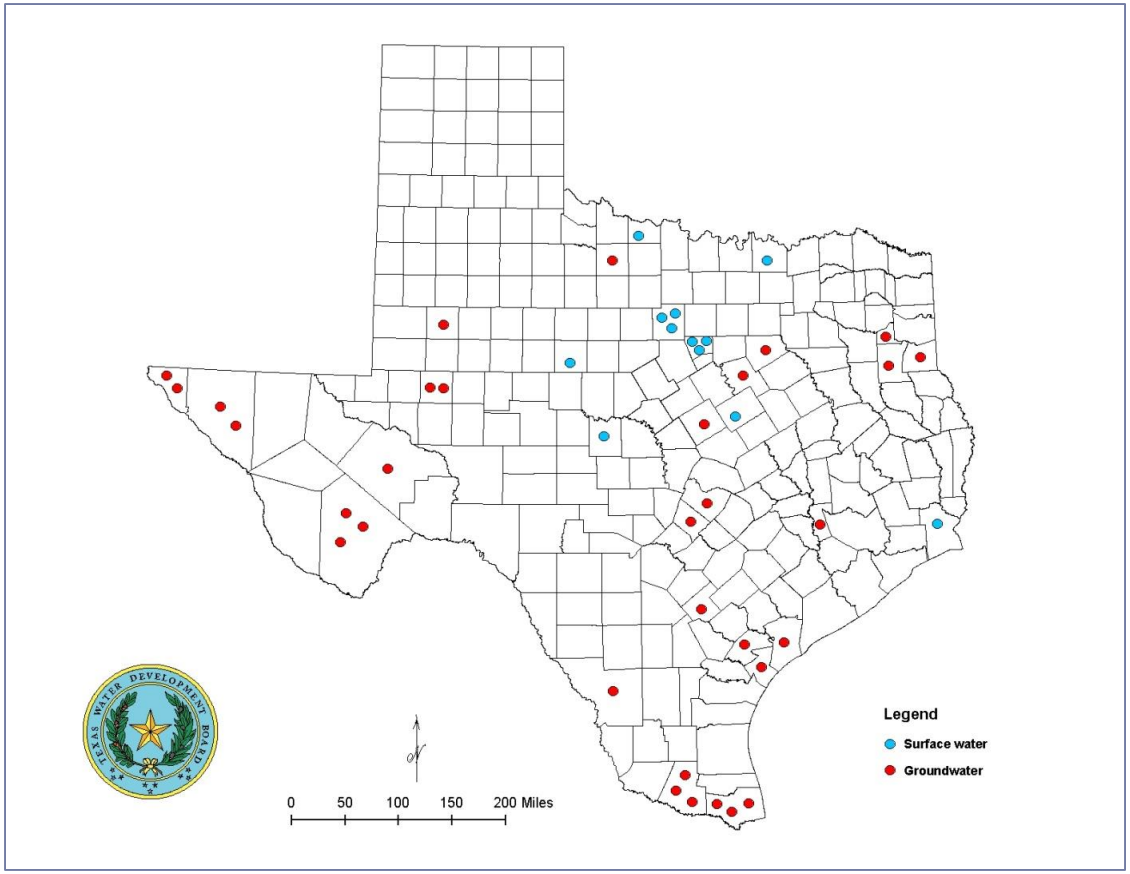
Current desalination capacity in Texas
Facilities ≥ 25,000 gallons per day



Existing facilities

- 44 facilities
- 120 mgd

Current desalination capacity in Texas
Facilities ≥ 25,000 gallons per day



Surface water
12 facilities
50 mgd
Brackish groundwater
32 facilities
70 mgd

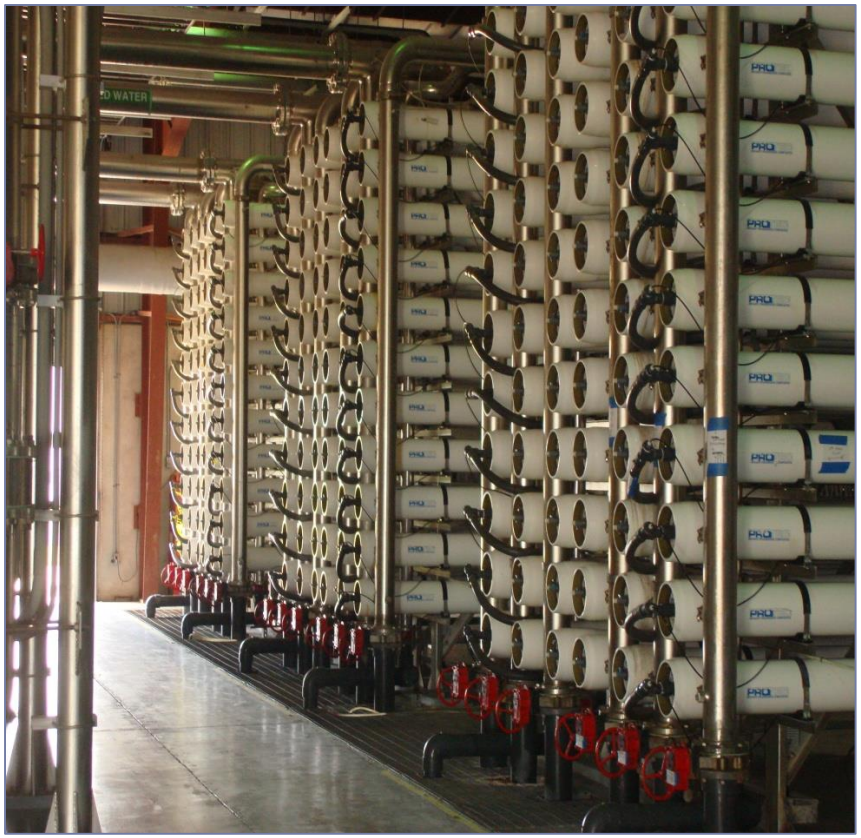
Electrodialysis Reversal
2 facilities
11.1 mgd
Reverse osmosis
42 facilities
108.9 mgd

Key challenges to brackish groundwater desalination in Texas

- Concentrate
- Energy
- Cost
- Permitting and regulations
- Source characterization

Courtesy: North Alamo WSC

TWDB's Brackish Groundwater Desalination Program



Courtesy: Southmost Regional WSC

Purpose

- Identify challenges to implementing brackish groundwater desalination
- develop and demonstrate practical solutions

Funding

- ~$1,800,000 specific for brackish demonstration projects
- ~$800,000 for brackish groundwater characterization
- Other funds: Research & Planning Program

Projects funded

Funded organizations	Scopes of projects (examples)
Operational Challenges	
City of Kenedy and San Antonio River Authority	Economics of replacing aging technology with modern equipment
Texas Tech University	Operational efficiency of small-scale desalination systems
Concentrate Management	
San Antonio Water System El Paso Water Utilities	Increase recovery and concentrate volume reduction by mechanical means
University of Texas at Austin	Increase recovery and concentrate volume reduction by chemical means
Bureau of Economic Geology	Self-sealing mechanisms of evaporation ponds
Energy Management	
Affordable Desalination Collaboration	Assessing and optimizing energy management in reverse osmosis desalination of brackish sources

Projects funded

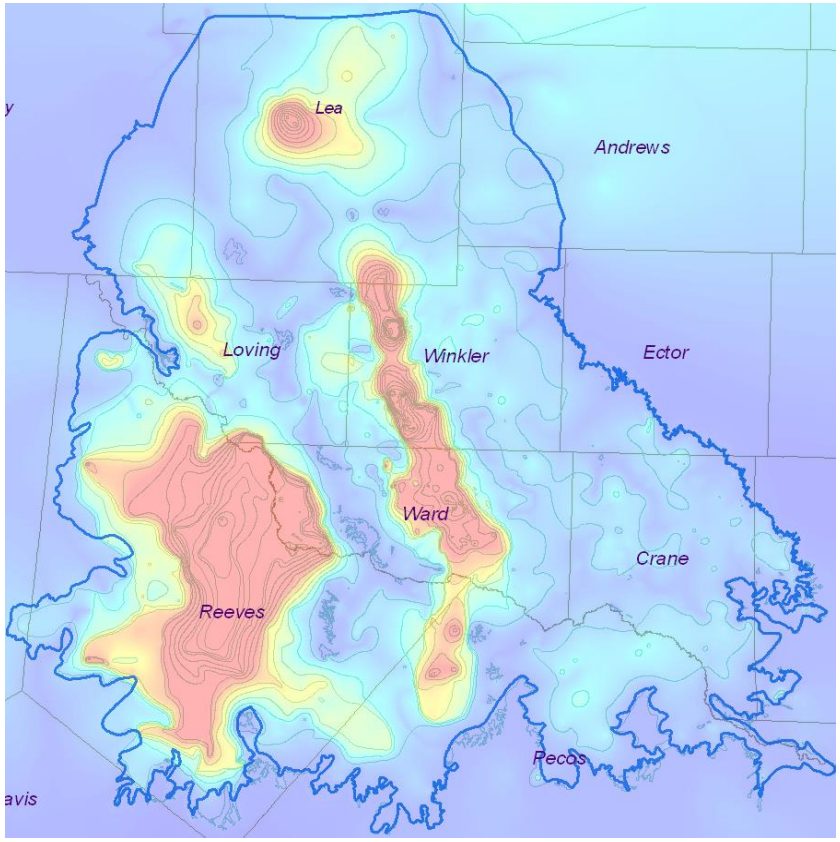
Funded organizations	Scopes of projects (examples)
Technology and Outreach	
North Cameron Regional WSC	Desalination Guidance Manual
Bureau of Economic Geology	Texas Desalination Database
Source Characterization	
City of San Angelo	Source Characterization Guidance
City of Seminole	Dockum aquifer data
Post-Treatment	
Carollo Engineers	Study of calcite contactor beds and design guidance
Regulations and Permitting	
CDM	Test of regulations for use of Class II well for concentrate disposal
North Alamo WSC	Assessment of fiberglass casing for brackish wells

Brackish Resources Aquifer Characterization System

- Characterize the brackish waters in much greater detail (to 10,000 mg/L total dissolved solids)
- Design database and GIS to process this new information
- Collect comprehensive well information statewide
- Research and develop methods of data analysis
- Document results in reports
- Provide access to raw and processed information
- Build replicable numerical groundwater flow models to estimate aquifer productivity
- Develop parameter-screening tool to help communities assess the viability of brackish groundwater desalination supplies
- Present study results nationwide

Brackish Resources Aquifer Characterization System

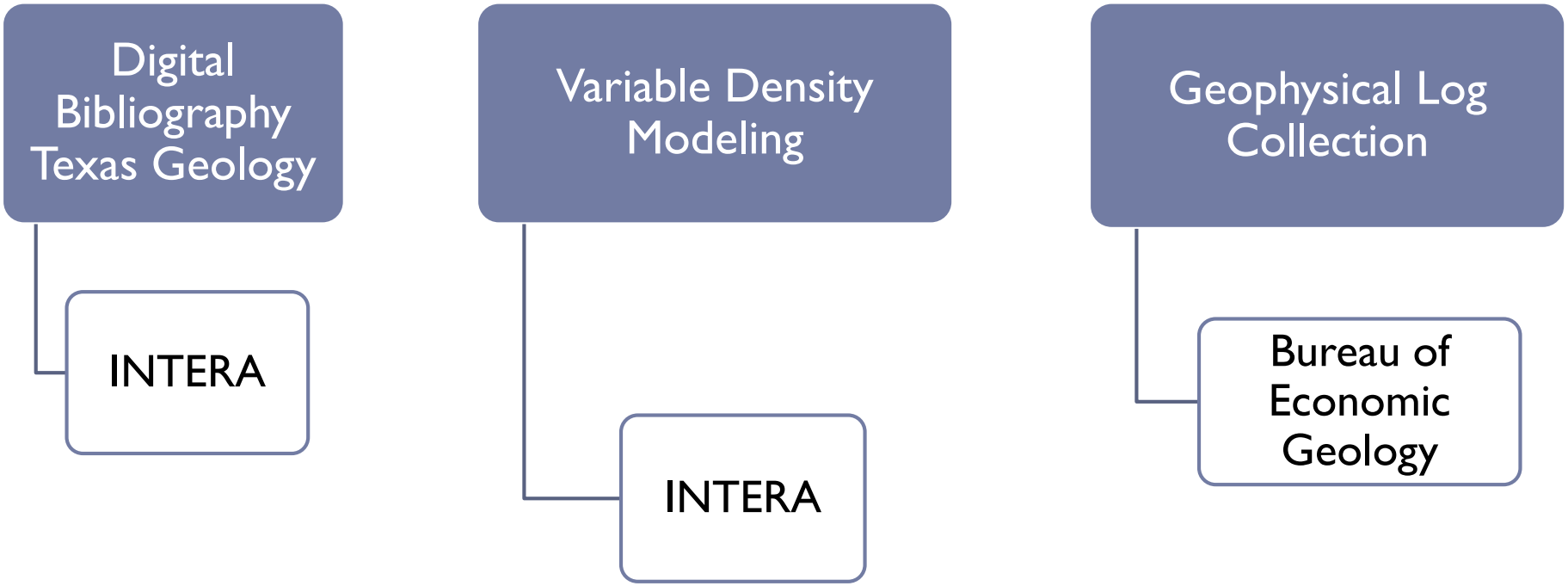
- Technical Review Panel to provide technical guidance
- Pecos Valley Aquifer chosen as pilot study area
- Three contracts awarded for data collection and model support



Pecos Valley Aquifer, Depth to Bottom

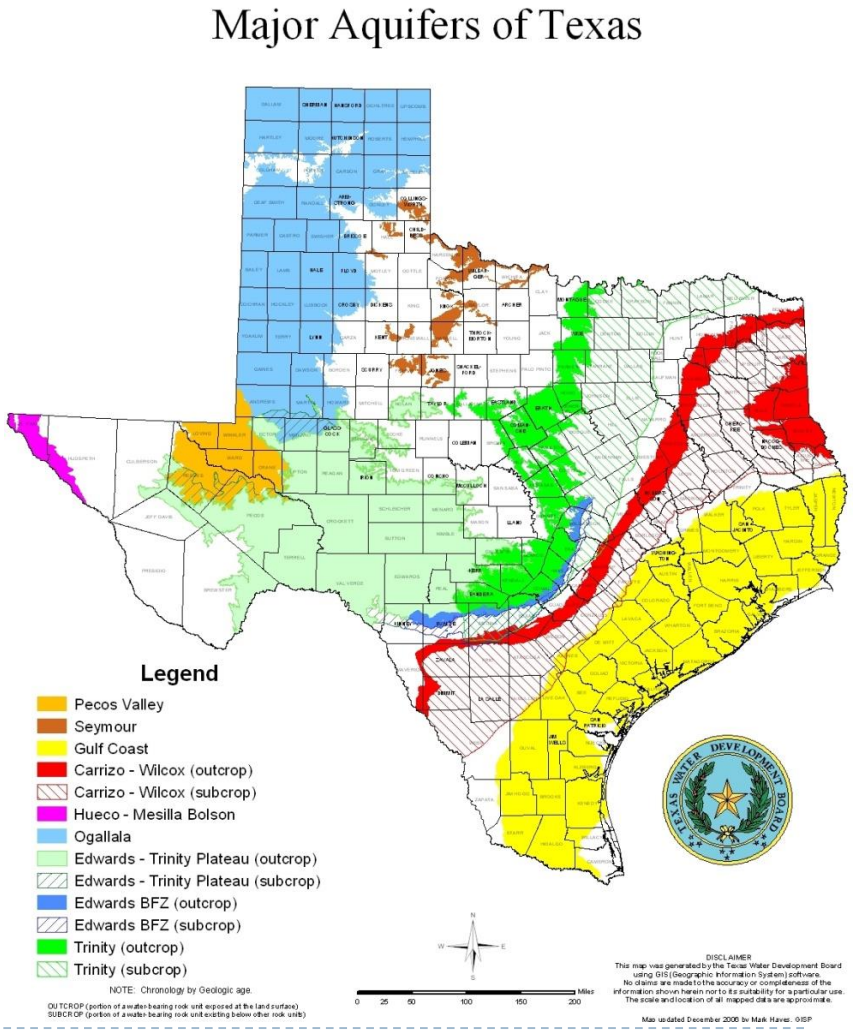
Shallow
Deep

Awarded contracts (BRACS)



Future Work

- Characterize the brackish portions of all aquifers in Texas
- Integrate the BRACS database with the future groundwater database design
- Provide Web access to BRACS data
- Provide detailed methodology on BRACS characterization in written reports
- Provide more accurate estimates of the brackish resource in Texas



TWDB and Bureau of Reclamation Collaboration

- Technical assistance
  - Review of technical reports
  - Partnering in seminars and workshops
- Funding
  - Concentrate management (Please Pass the Salt)
- Collaboration
  - Variable salinity desalination process

Water Science and Conservation
Innovative Water Technologies

Innovative Water Technologies

To research, develop, and disseminate information to advance the development of innovative water management strategies in Texas

Jorge Arroyo 512-475-3003

Sanjeev Kalaswad 512-936-0838
Matthew Wise 512-936-9488
Saqib Shirazi 512-463-7932
John Meyer 512-463-8010