A New Frontier in Texas:
Managing and Regulating Brackish Groundwater

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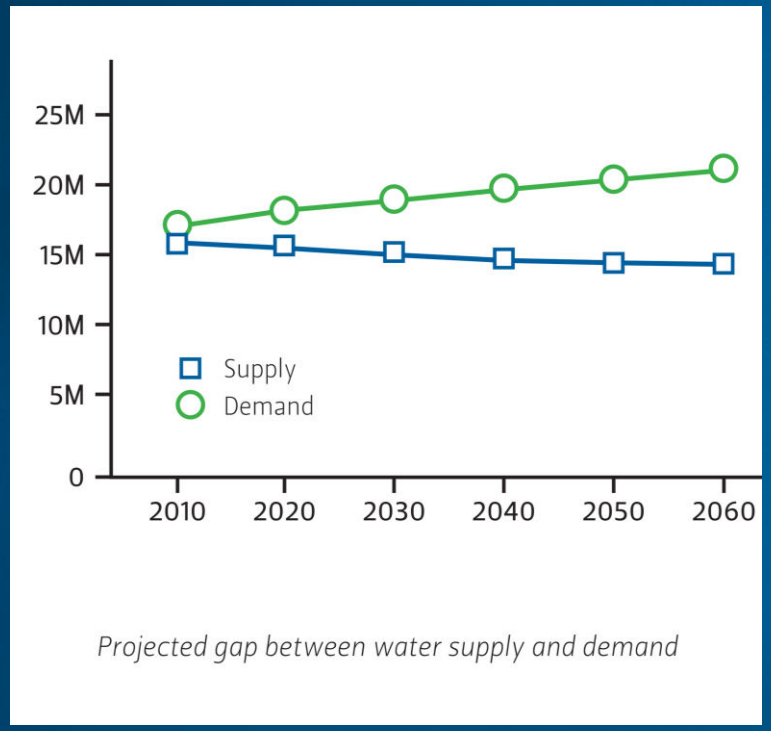
Agenda

- Texas Water: Growing Gap Between Supply and Demand
- Brackish Groundwater Resources
- Texas Groundwater Law
- Objectives and Issues in Brackish Groundwater Policy
- Recommendations

Increasing Gap Between Supply & Demand for Fresh Water in Texas



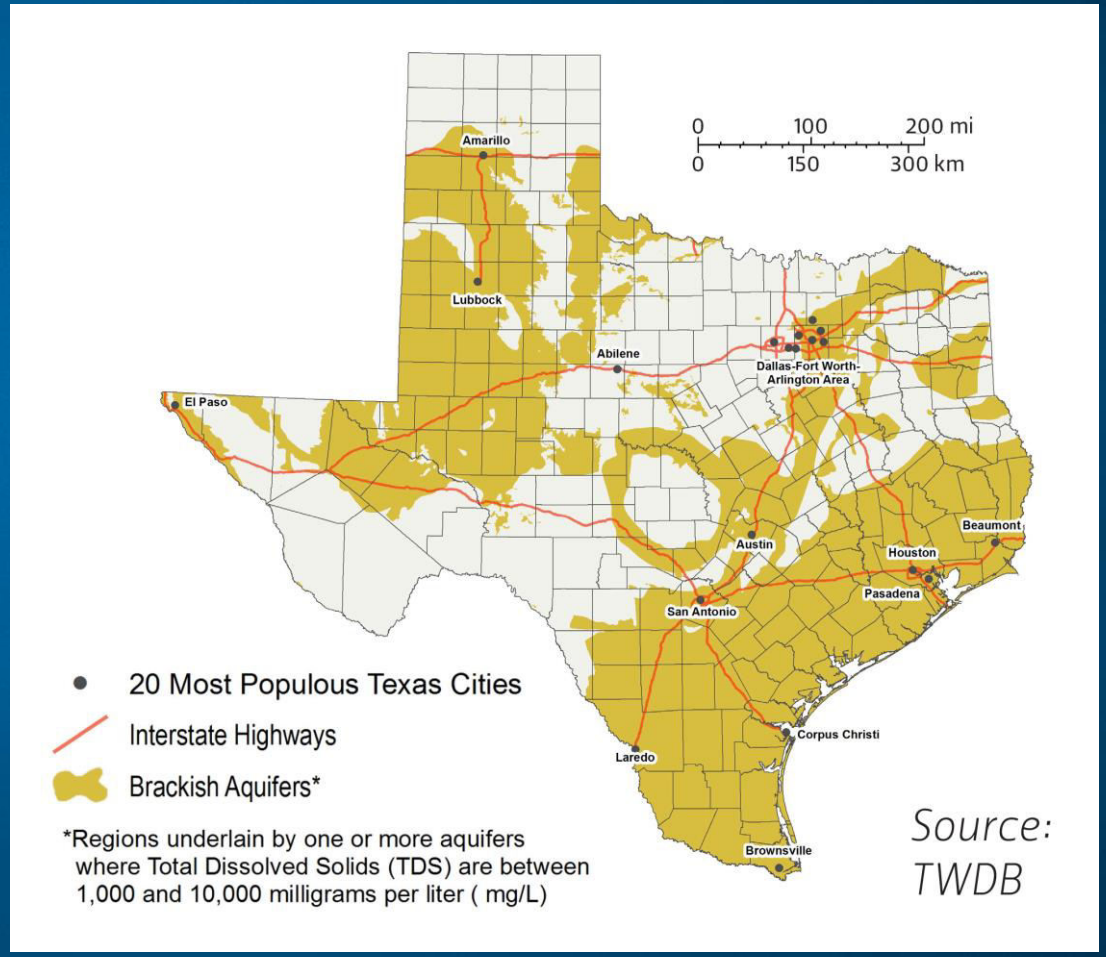
Projected gap between water supply and demand

- 17,000 MCM freshwater use in 2010 (>50% groundwater)
- Texas water supplies projected to decrease 10% 2010-2060
- Huge population growth: 25.4M (2010) to 46.3M (2016)
- Texas is water scarce
  - Gap in 2010: 1M AF (1,200 MCM)
  - Predicted gap in 2060: 6.7M AF (8,300 MCM)
  - Gap in drought in 2060: 8.3M AF (10,000 MCM)

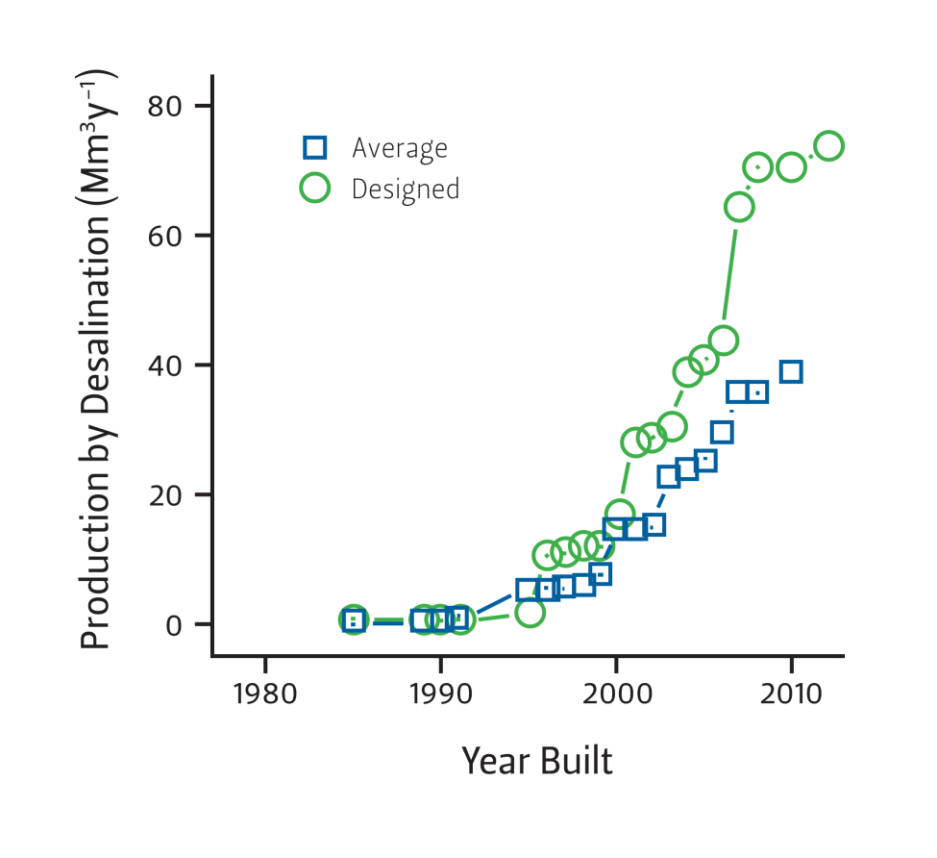
Source: TWDB, 2012 State Water Plan

Brackish Groundwater Resources in Texas are Vast

- Here defined as water containing between 1,000 and 10,000 mg L^{-1} total dissolved solid (TDS)
- 2.5 B AF (3,300,000 MCM) of brackish groundwater in Texas aquifers
- Present in nearly all major and minor aquifers
- Would meet current consumption needs for 150 years



Expanding, Multi-sector Use of Brackish Groundwater



- Brackish groundwater increasingly is an economic option
- Less energy intensive than seawater desalination
- Increased use of brackish desal
  - Municipalities – El Paso (2007), San Antonio (2021 and 2026)
  - Smaller plants common
- Use of brackish groundwater becoming more common in uses that do not require treatment, such as hydraulic fracturing

Texas Law: What a Mess!

(often said about many topics, not just groundwater)

- Surface water and groundwater are regulated separately in Texas
- Groundwater is private property in Texas; NOT owned by the State
- Default since 1904: Rule of Capture – rule of the biggest pump – You are not liable if your pumping dries up your neighbor's well
- Overlay of groundwater conservation districts to regulate locally, but there are uncertainties about extent of permissible regulation
  - Important cases: *Edwards Aquifer Authority v. Day and McDaniel* (2012); *Edwards Aquifer Authority v. Bragg* (2013)
- Questions of local vs. state control, politics

Tensions on Texas Groundwater

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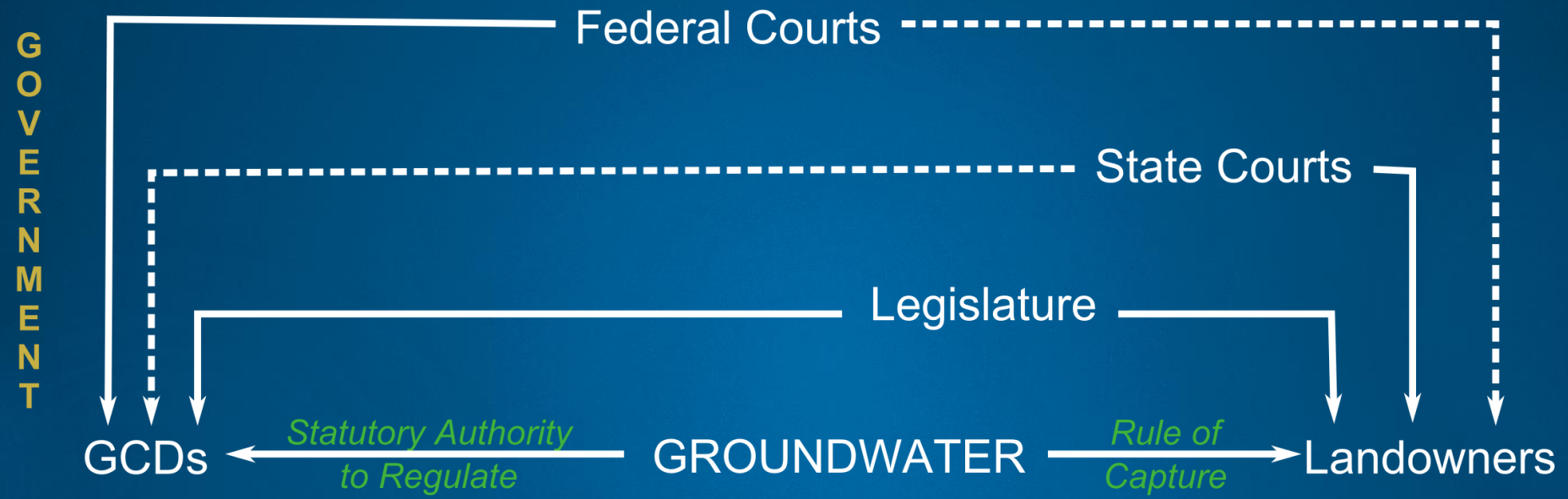

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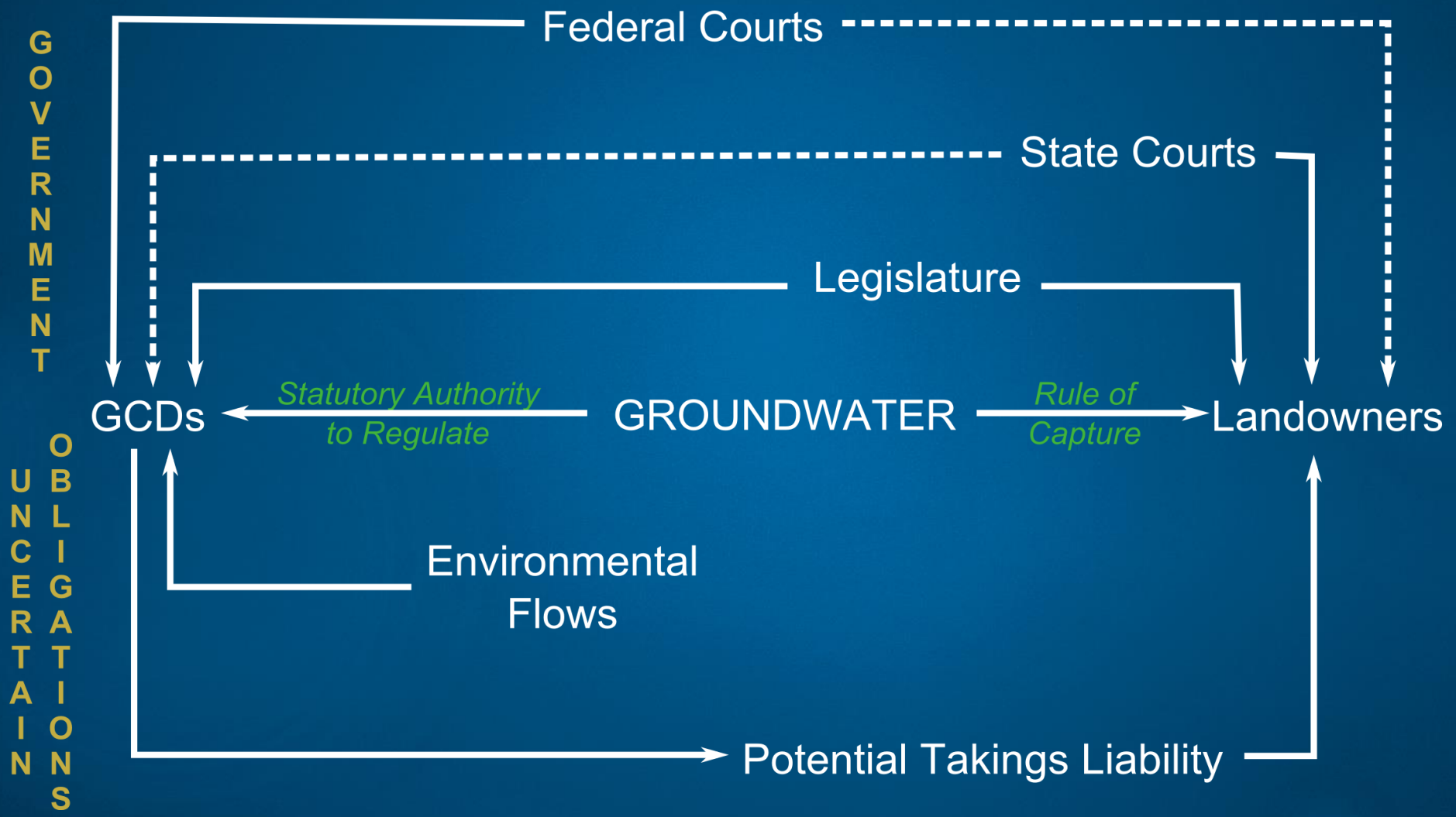
Tensions on Texas Groundwater



Where is Brackish Groundwater in Current Law?

- Texas statutes do not address brackish water directly or distinctly
- Groundwater Conservation District (GCD) Rules
  - Reviewed rules for 96 GCDs and subsidence districts in Texas
  - 9 districts (9.4%) have rules or statements specific to brackish resources

GCD	Permit Length	Production Limit	Well Spacing	Reporting	Mechanical Well Tests	Brine Disposal Plan	Casing Requirements	Monitoring Wells
Barton Springs/Edwards Aquifer								○
Coastal Plains	○	○	○	○		○	○	○
Evergreen		○	○	○	○	○	○	○
Gonzales County				○	○	○		○
Pecan Valley		○		○				
Plumb Creek		○	○					
Post Oak Savannah		○						

Some Issues/Objectives for Policymakers to Consider

- What constitutes "brackish groundwater" in Texas?
- How can we incentivize use of brackish groundwater in place of fresh water, where appropriate?
- How can we avoid potentially harmful impacts to fresh water aquifers and brackish water aquifers?
- How can we ensure private property rights are protected in accordance with state law?

Issue: What constitutes "brackish groundwater" in Texas?

- Actually?
  - Often defined as water containing between 1,000 and 10,000 mg L^{-1} TDS.
  - No water but brackish water in parts of the state
- Legally?
  - No current statutory definition
  - Stakeholders reluctant to draw a numerical line as certain sectors can use varying TDS levels

What Have Other States Done?

- Florida – groundwater is public resource
  - Statutory language underscores the importance of "alternative water supplies," defined to include brackish groundwater (Fla.Stat. §373.019)
  - Longer permitting terms available for "alternative water supplies"
- Arizona – groundwater is public; landowners have usufructory right
  - Authorized permit for "poor quality groundwater" up to 35 years for non-irrigation uses if t water cannot be used for other beneficial uses (Ariz. Rev. Stat. § 45-516)
- New Mexico – groundwater is public; legally recognizes conjunctive use
  - "Nonpotable water" defined as not less than 1,000 mg/L TDS
  - Provides for classification of "nonpotable deep aquifers" where aquifer is at depth ≥ 2500 feet; withdrawals for specified uses (usually heavier uses: industry, agriculture) are exempt from regulations (N.M. Stat. §72-12-25)

Brackish Groundwater Production Zones

- Brackish Groundwater Production Zones created by TWDB designation (H.B. 30, 84th Reg. Session, 2015)
- Statutory criteria - areas with moderate to high availability and productivity of brackish groundwater that are:
  - not already a water source >1000 mg/L TDS that is serving as a significant source of water supply for municipal, domestic, or agricultural purposes at the time of designation of the zones;
  - not located within certain political subdivisions;
  - characterized by the presence of hydrogeological barriers that prevent interaction with surrounding fresh aquifers or fresh subsections of aquifers
  - not an area designated or used for wastewater injection through the use of injection wells or disposal wells

Recommendations

- **Identify** | Clearly define "brackish groundwater" in the law.
- **Incentivize** | Pass state-wide requirement or require GCDs to adopt minimum rules that lessen and standarize regulatory impediments to production/acquisition of brackish groundwater and/or create tax or other incentives to encourage development.
- **Protect** | Create strong laws to protect aquifers from impacts of brackish production or wastewater injection wells. Support groundwater district monitoring efforts.
- **Finance** | Fund continued scientific study of brackish aquifers to better understand hydrogeology, characterization. Invest in research and technology to expand possible uses and increase energy efficiency, etc.

Conclusions

- Brackish groundwater is a resource with great potential to diversify and expand water supply in Texas.
- Texas is well-positioned in terms of technology and resources to facilitate development of this resource, but carries the burden of restrictive and poorly designed historical institutions that have created an environment that fails to account for scarcity in the value of water.
- Since legal framework and political culture are firmly entrenched and unlikely to change, creative solutions that work within the current framework to incentivize development are essential.
- Should fund additional studies to better understand the resource, learn from the past and other jurisdictions' experiences.

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