

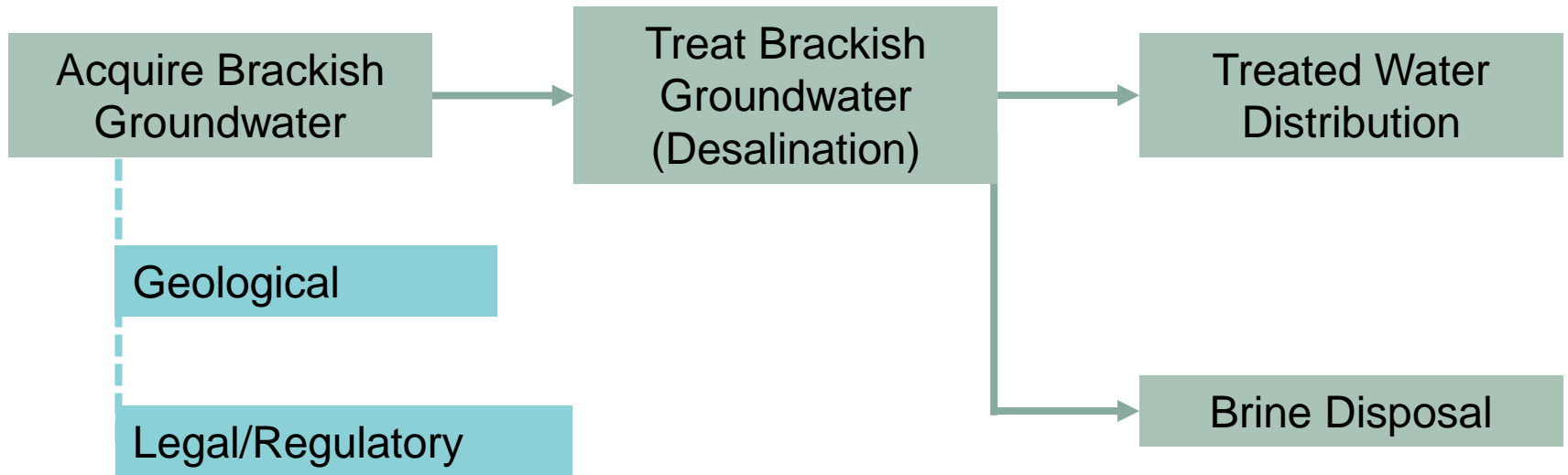


Brackish Groundwater Desalination in Texas

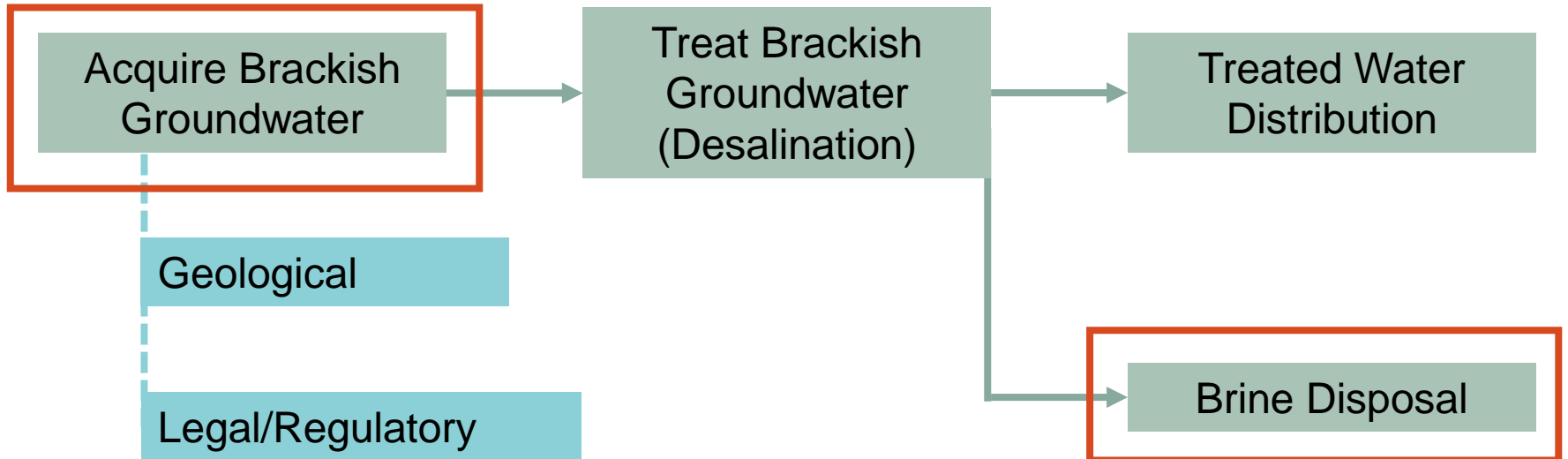
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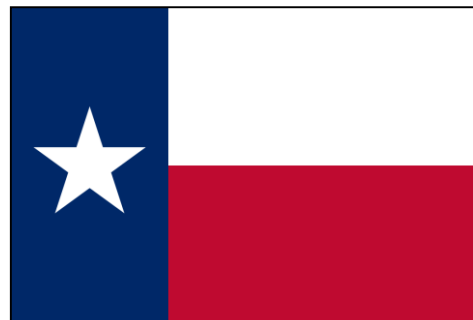
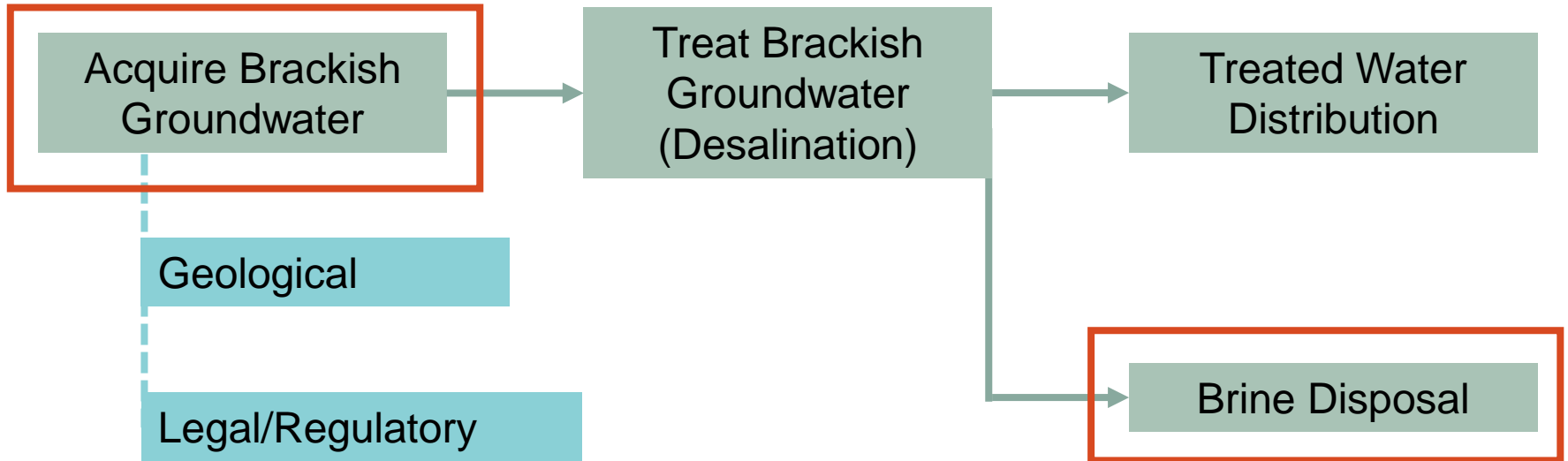
Outline



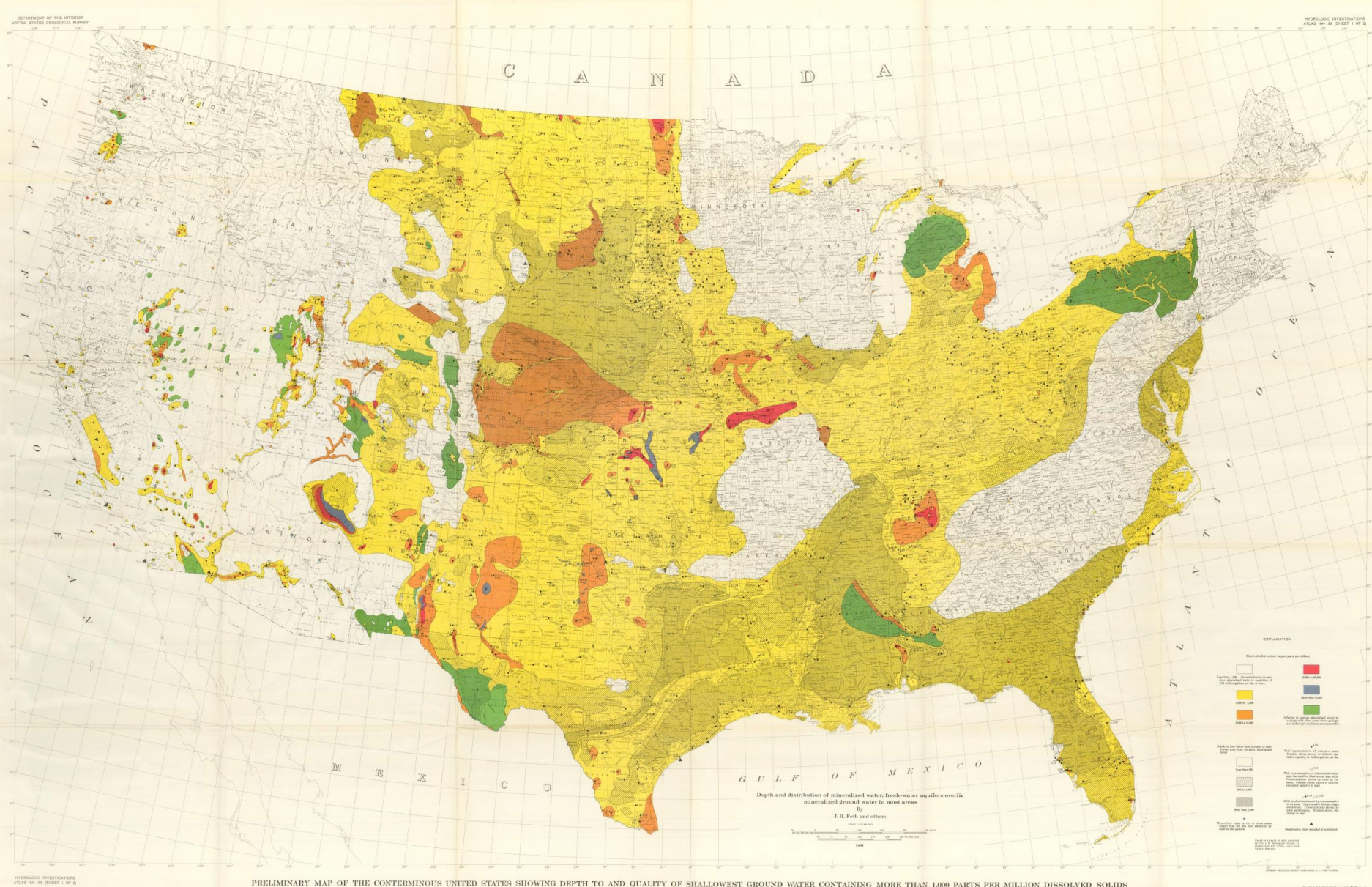
Outline



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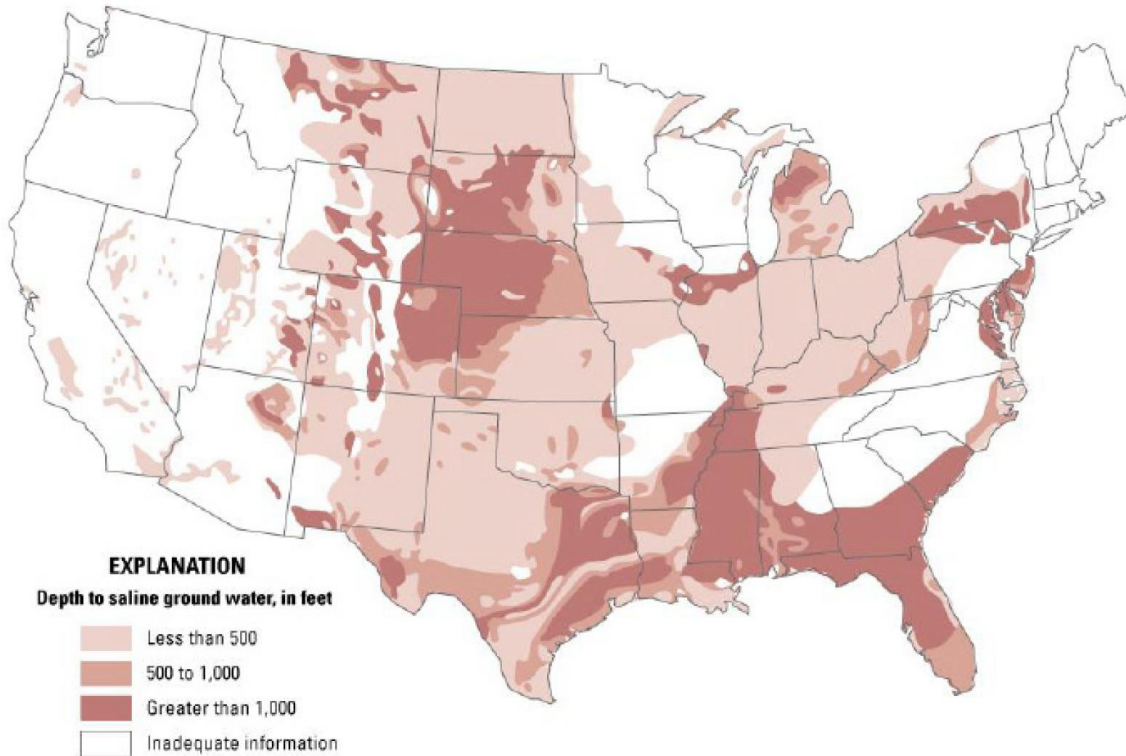


Estimated Brackish Groundwater

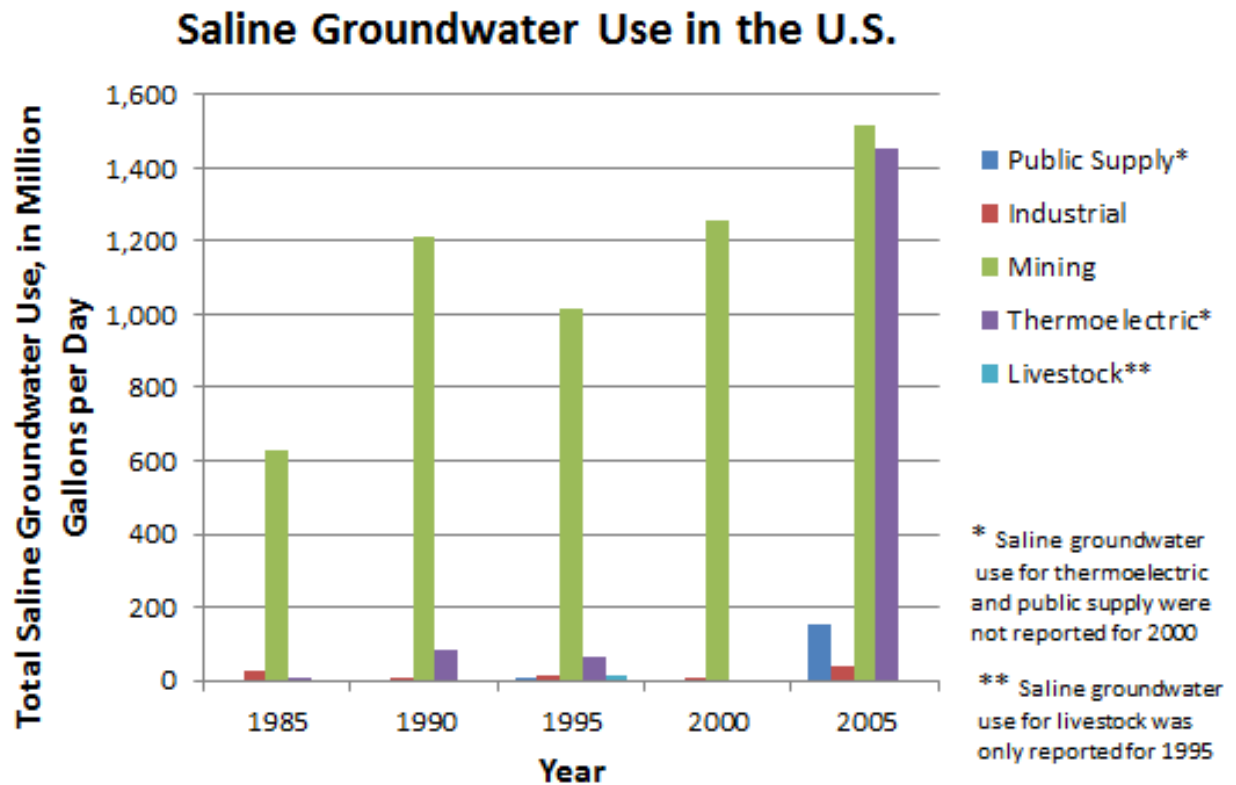
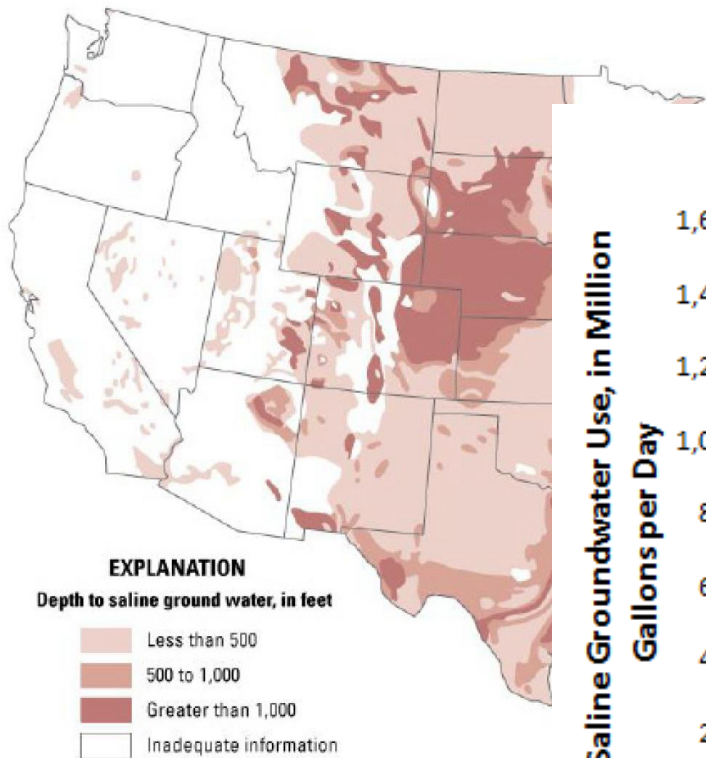


Felder et al. (1965) Preliminary map of the conterminous United States showing depth to and quality of shallowest ground water containing more than 1,000 parts per million dissolved solids. Hydrologic Atlas 199.

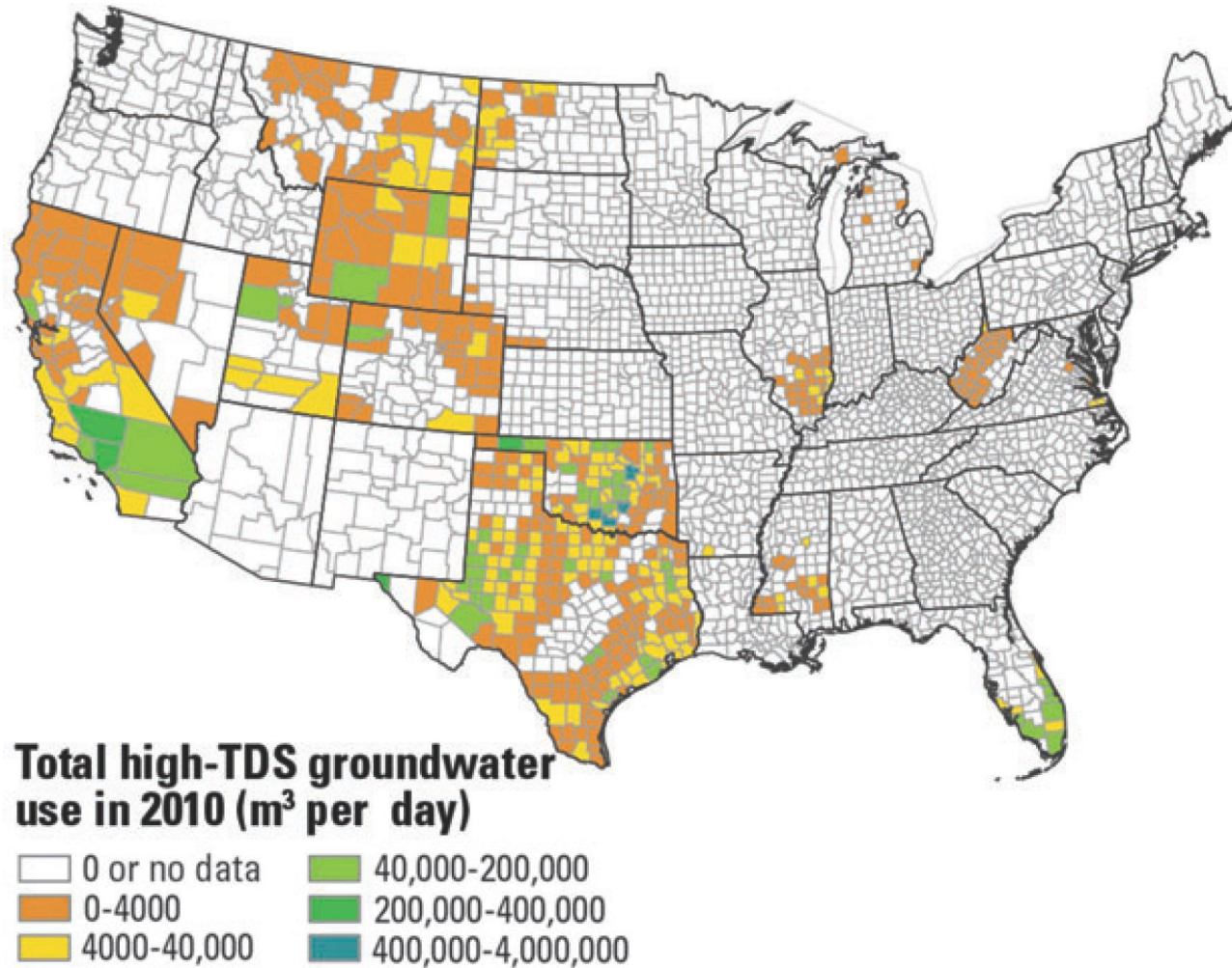
Estimated Brackish Groundwater



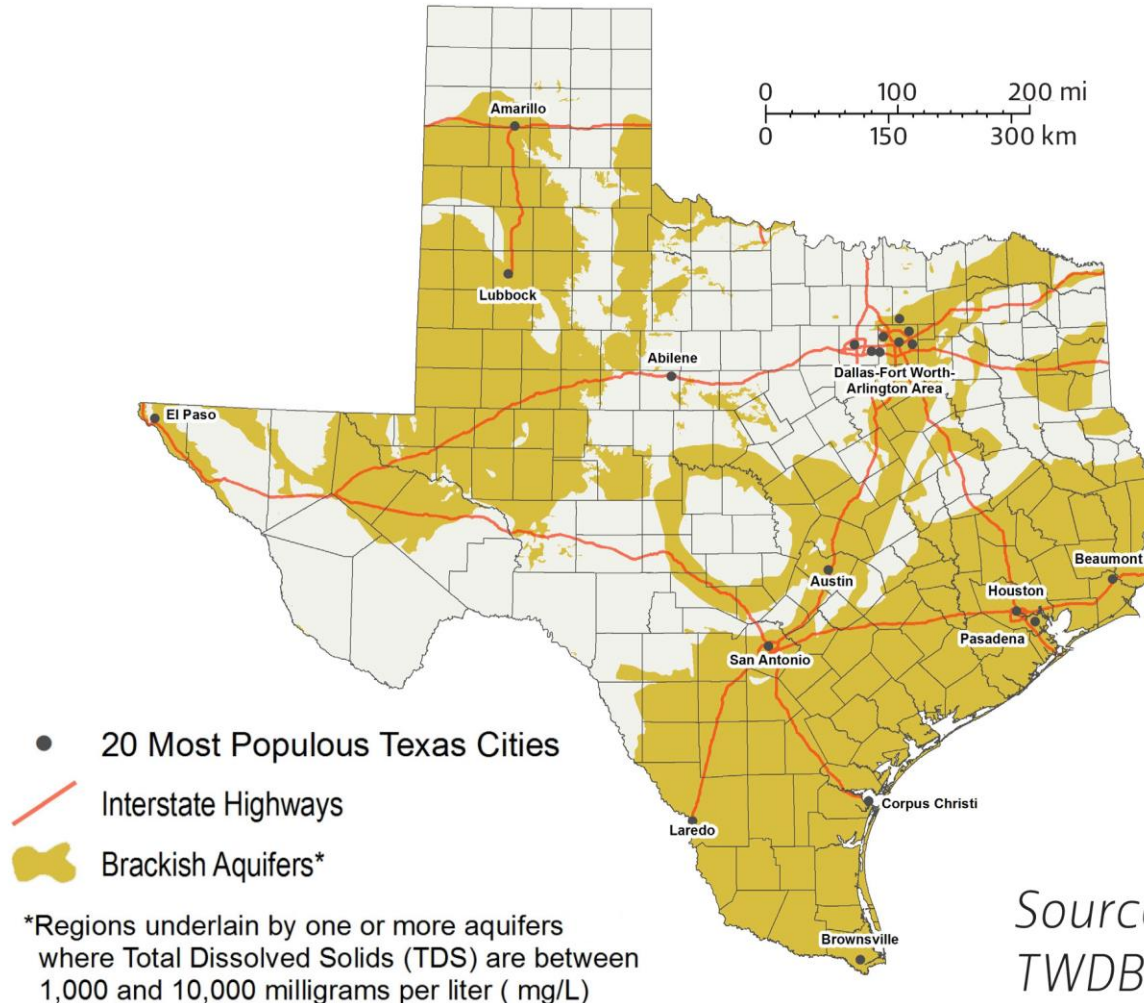
Estimated Brackish Groundwater



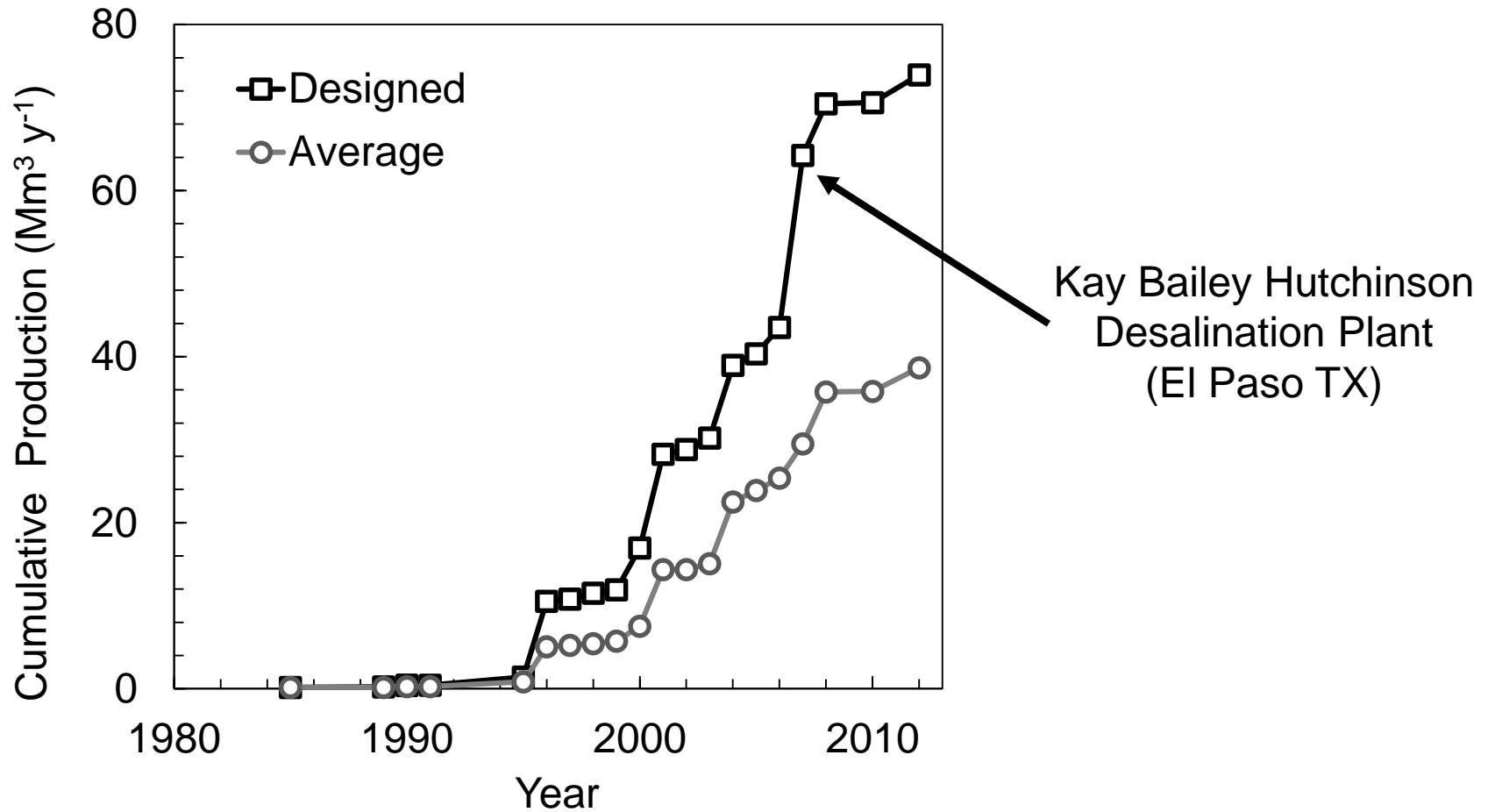
4% Groundwater Withdrawn, High TDS



Vast Brackish Groundwater Resources in Texas

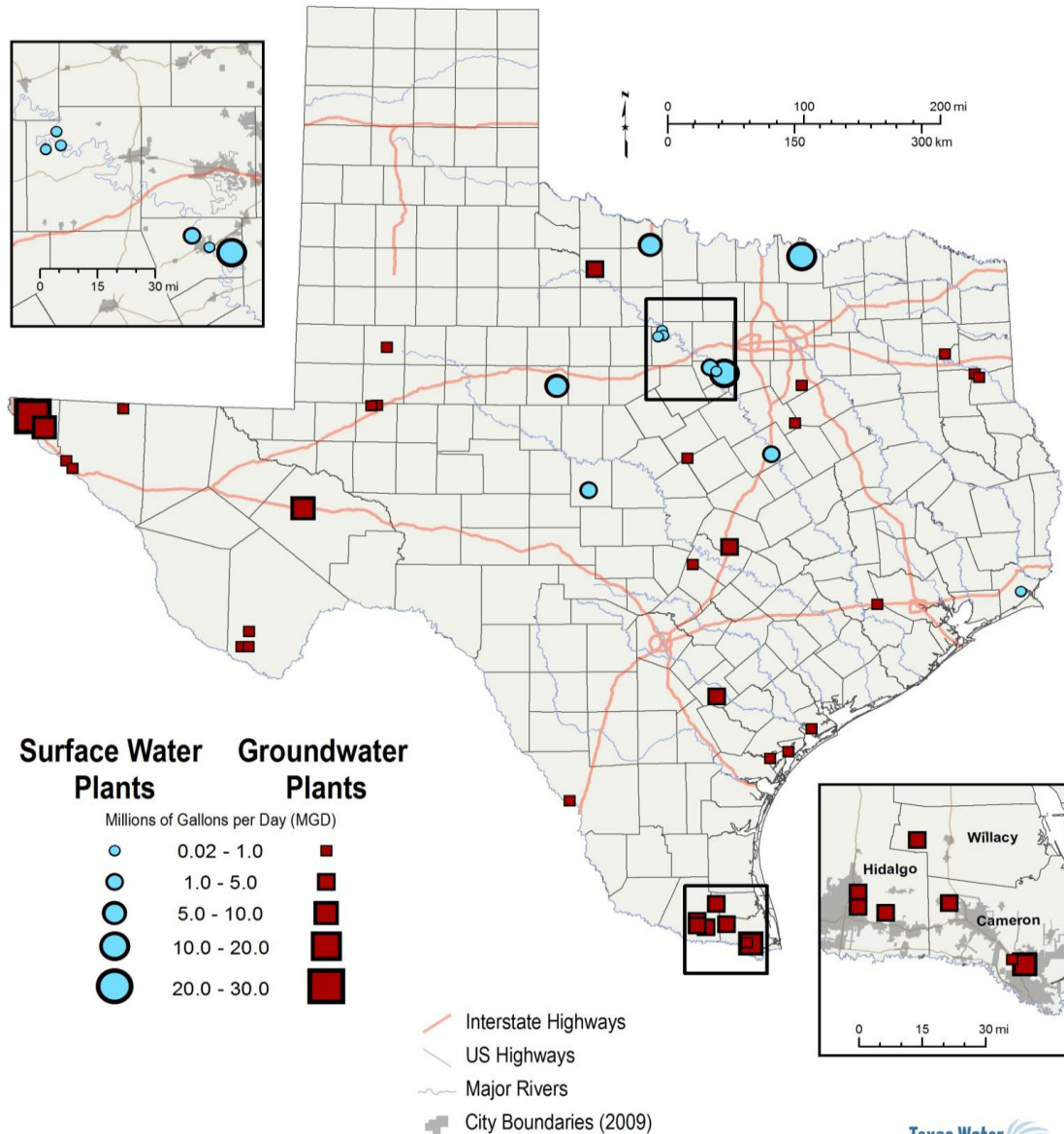


Expanding, Multi-sector Use of Brackish Groundwater in Texas

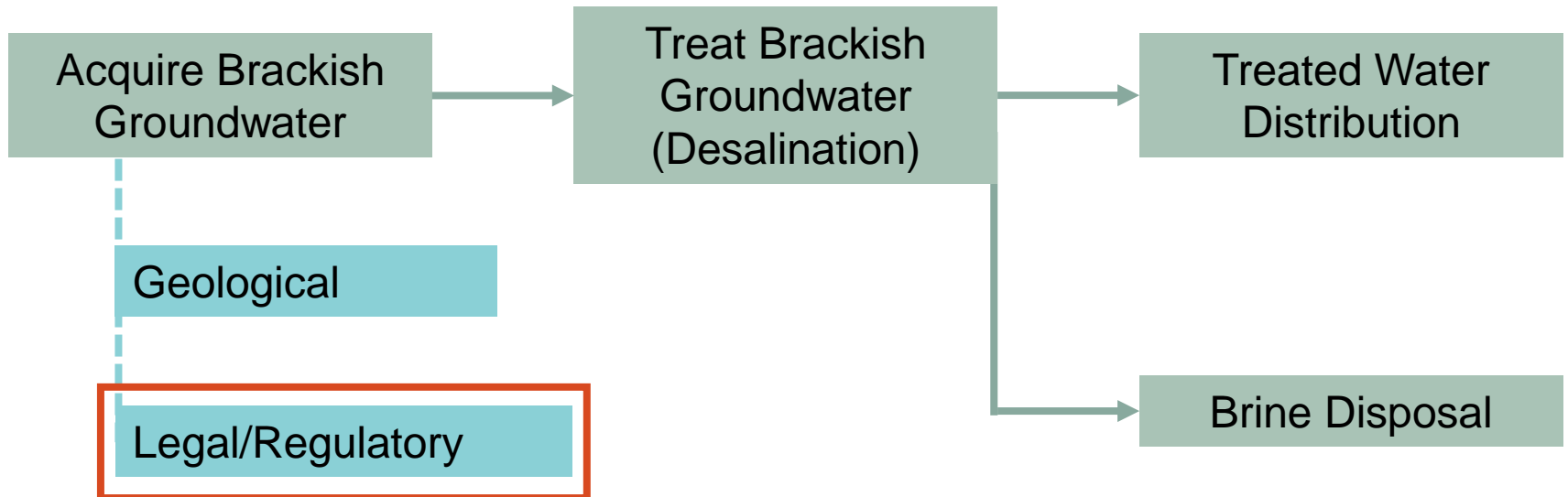


Buono, Zodrow, et al. (2016) A New Frontier in Texas: Managing and Regulating Brackish Groundwater. *Water Policy* 727-749.
Texas Desalination Plant Database.

Desalination Plants in Texas



Outline



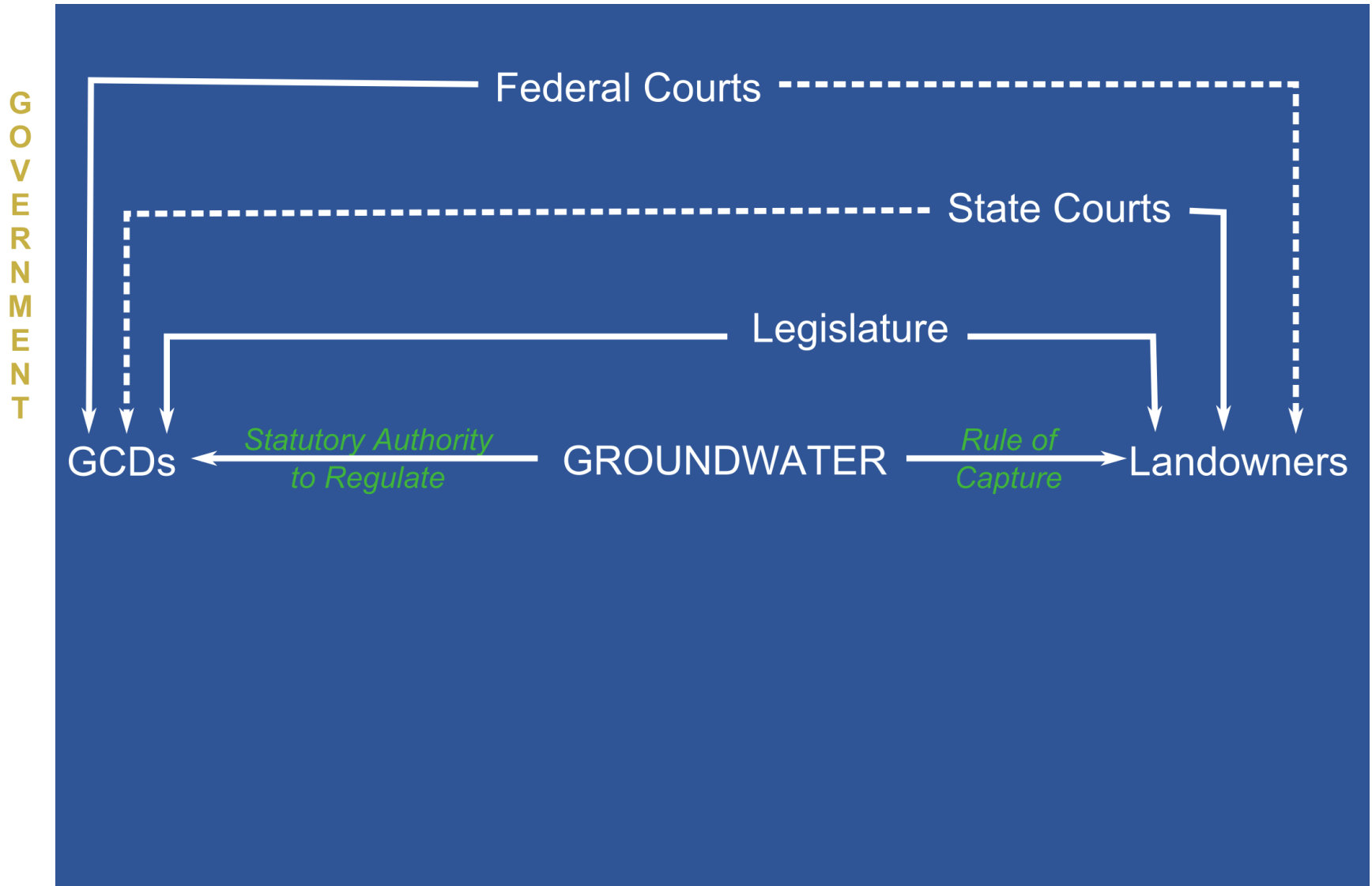
Tensions on Texas Groundwater

GROUNDWATER $\xrightarrow{\text{Rule of Capture}}$ Landowners

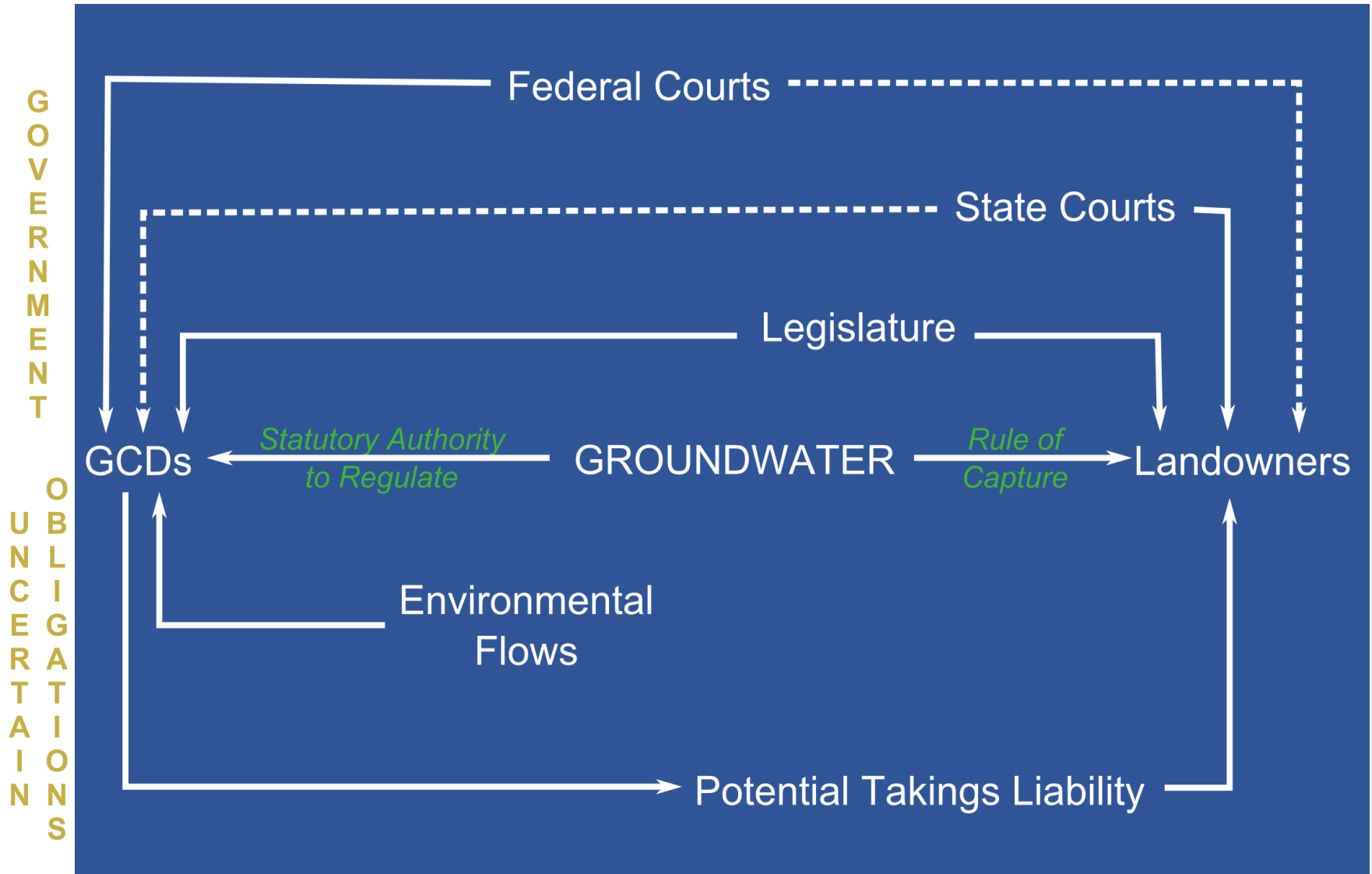
Tensions on Texas Groundwater



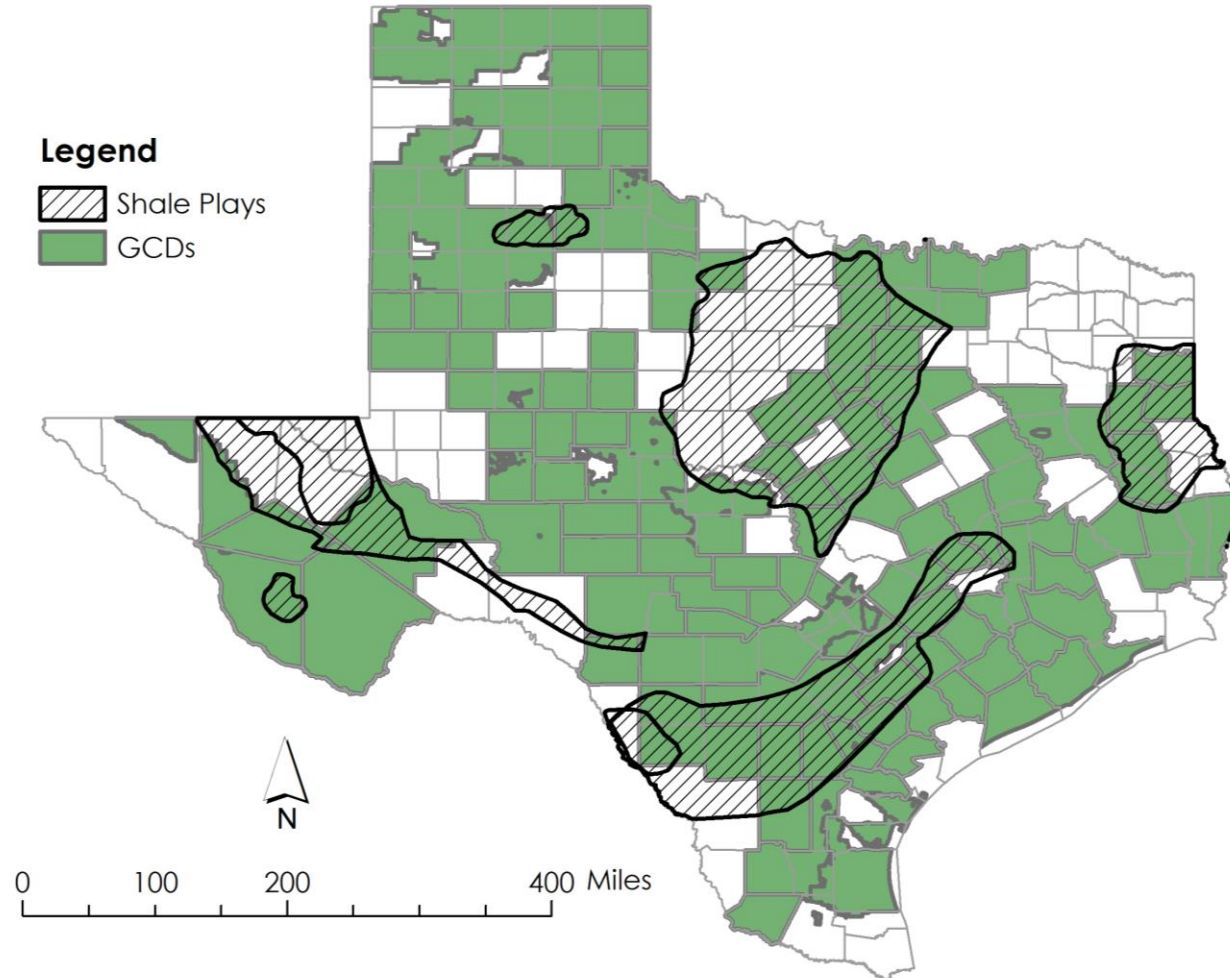
Tensions on Texas Groundwater



Tensions on Texas Groundwater



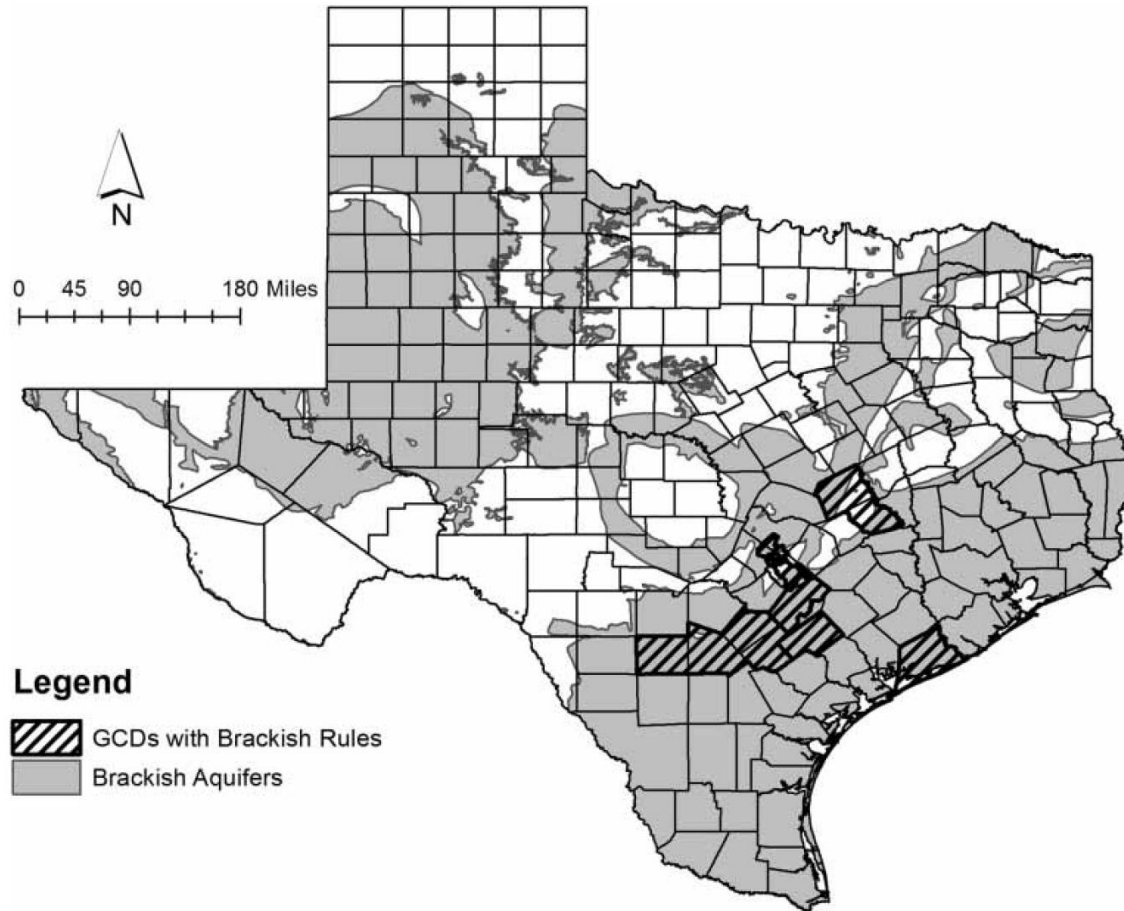
Map of TX Groundwater Conservation Districts



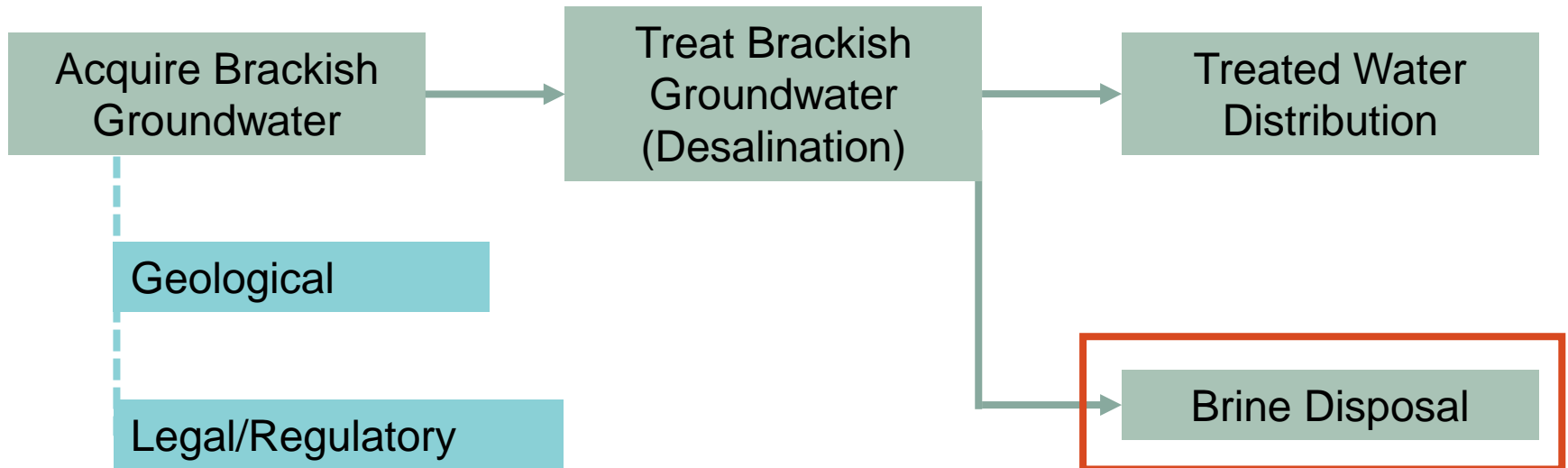
9 Groundwater Conservation Districts have Brackish Rules

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		○						

9 Groundwater Conservation Districts have Brackish Rules



Outline

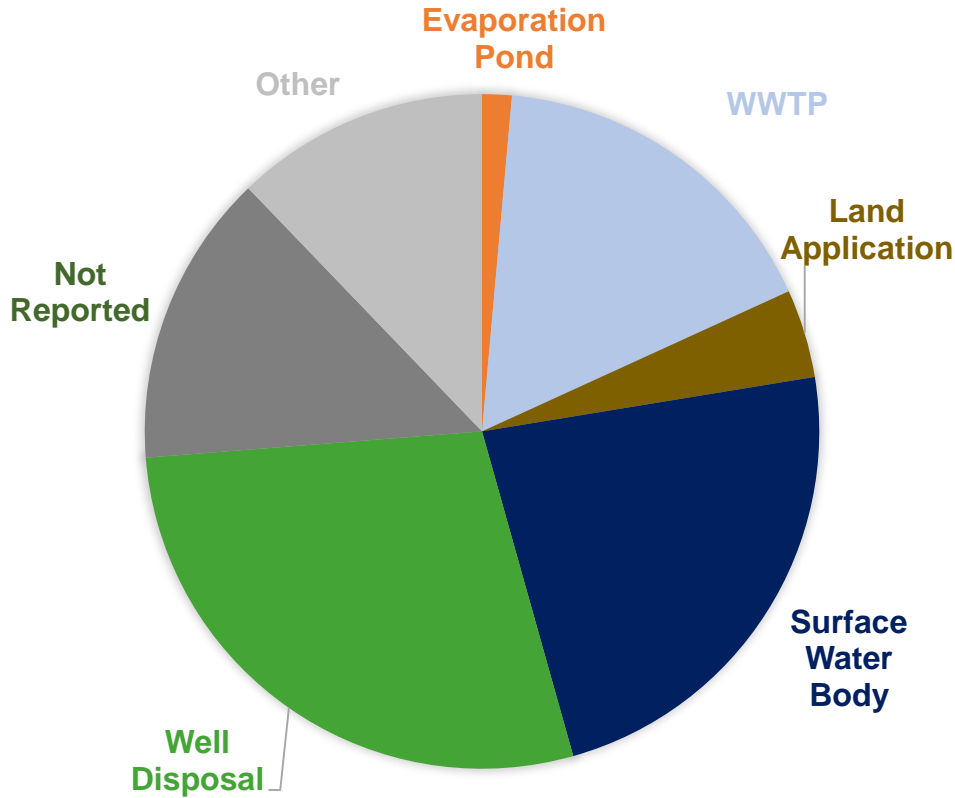


Brine Disposal Considers Cost and Environmental Impact

- Surface Water Body (Inland vs. Coastal)
- Evaporation Ponds
- Deep Well Disposal (El Paso)
- [Wastewater Treatment Plant]
- [Land Application]

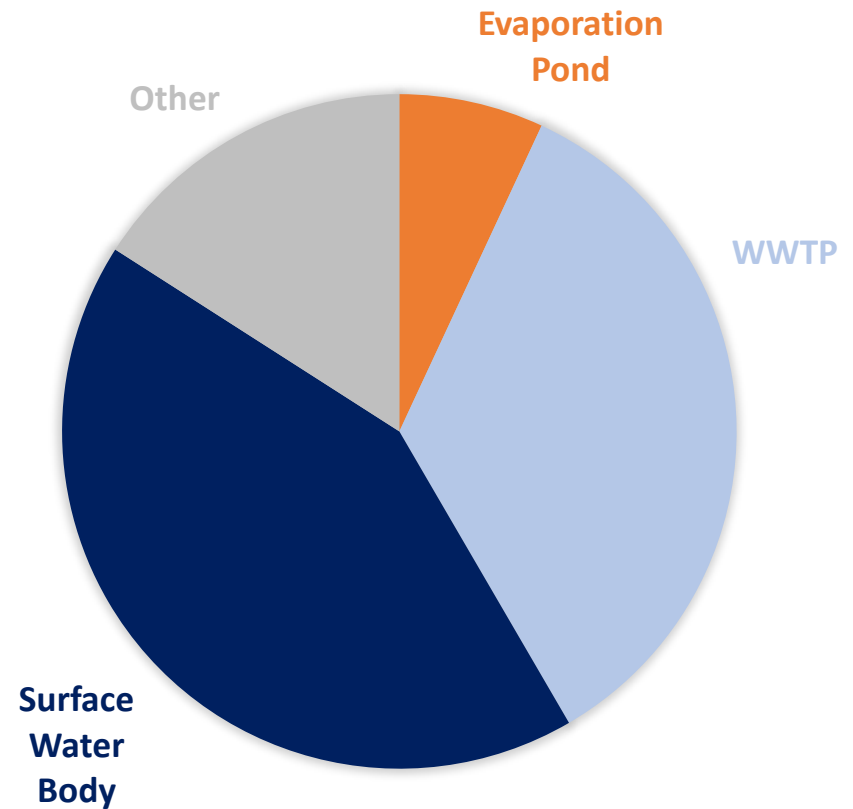
Brine Disposal in Texas

Groundwater Plants Disposal (Designed Production)



Total: 53 MGD

Surface Water Plants Disposal (Designed Production)



Total: 22 MGD

Conclusion

- Brackish groundwater is prolific and a potentially game-changing resource in Texas
- Brackish groundwater can be used for mining and cooling with minimal treatment
- Desalination of brackish groundwater for public supply is steadily increasing
- Since legal framework is firmly entrenched and unlikely to change, creative solutions that work within the current framework to incentivize development of brackish groundwater resources are essential

Acknowledgements

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