

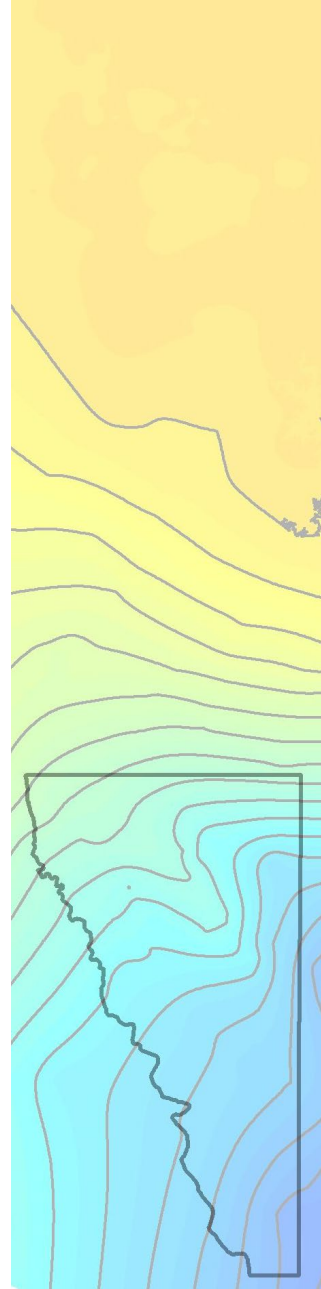
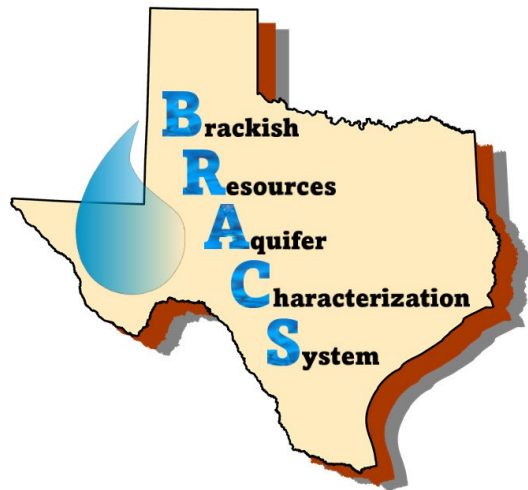
TWDB Webinar on the Maverick Basin Aquifer Contracted Study by INTERA

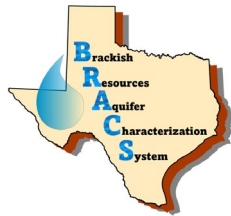
May 8, 2024

Hosts:

Evan Strickland, P.G., TWDB,
BRACS

Cody Draper, P.G., INTERA

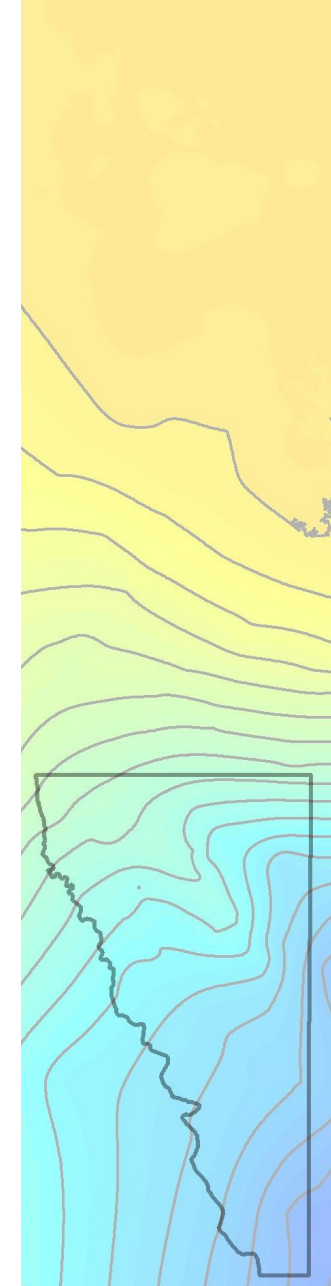




Webinar Highlights



- Historic fresh-slightly saline produced water exists in the Glen Rose Formation at 5,000 – 8,000 feet in Maverick County
- Producing wells show an initial oil burst that gives way to water
- Water commonly flows to surface without a pump
- Water production is focused along a shear zone with secondary porosity likely developed from alteration by hydrothermal fluids



TWDB Webinar on the Maverick Basin Aquifer Contracted Study by INTERA

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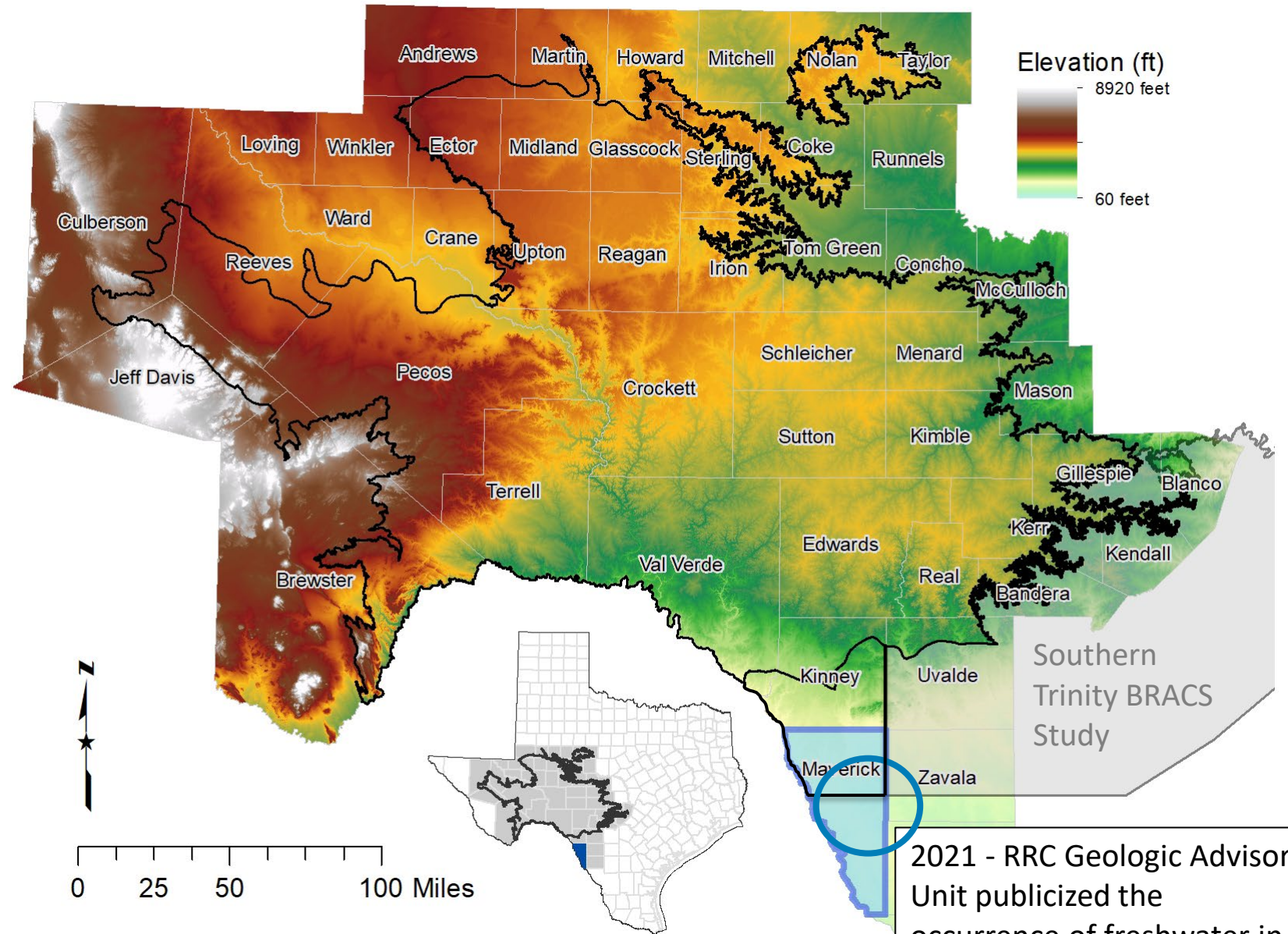
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Edwards-Trinity (Plateau) Brackish Groundwater Study

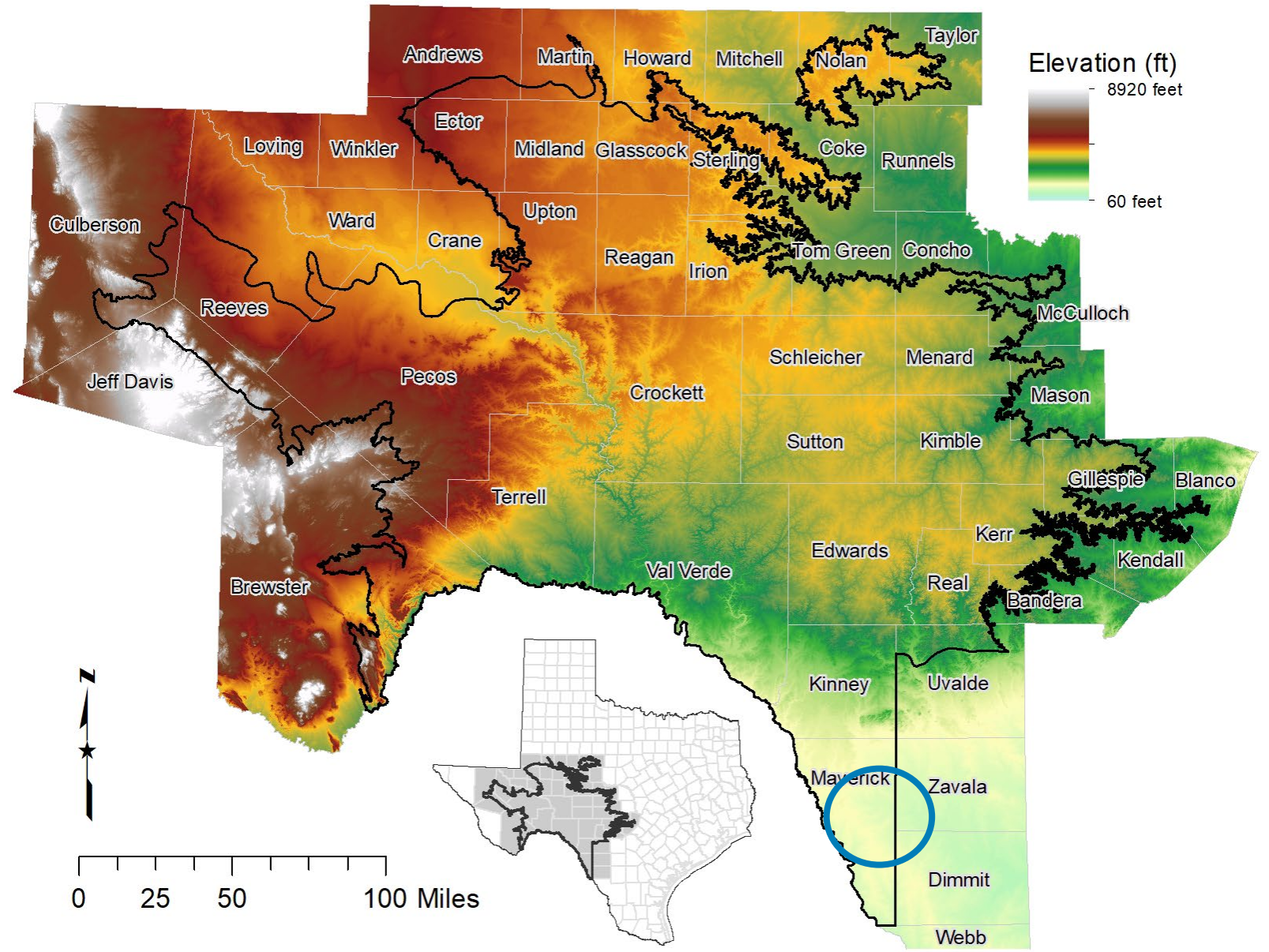
- Edwards-Trinity (Plateau) study area extended to match Southern Trinity BRACS study



2021 - RRC Geologic Advisory Unit publicized the occurrence of freshwater in the deep Glen Rose formation

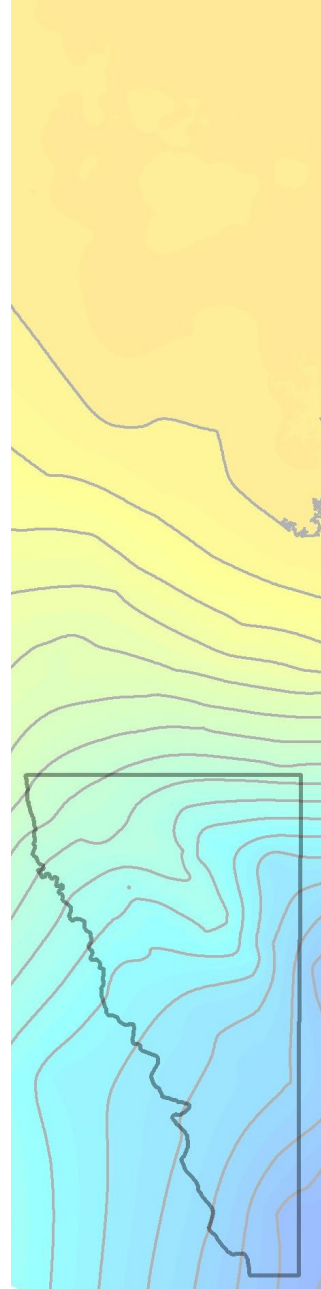
Edwards-Trinity (Plateau) Brackish Groundwater Study

- Modified Edwards-Trinity (Plateau) BRACS study to include all of Maverick County
- TWDB BRACS contracted with INTERA to summarize known information



Acknowledgements

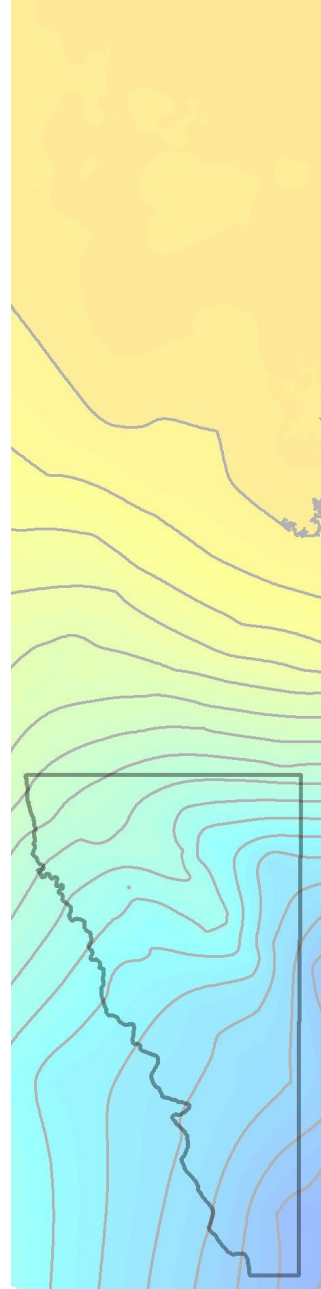
- The Railroad Commission's Geologic Advisory Unit
 - James Harcourt
 - Cris Astorga
 - Katy Ward
- Bureau of Economic Geology
 - J.P. Nicot
- Permanent Forum on Binational Waters
 - Dr. Rosario Sanchez
- Saxet
 - Robert O'Brien
- CMR Energy
 - Teresa Montemayor



TWDB Webinar on the Maverick Basin Aquifer Contracted Study by INTERA

Presenter:

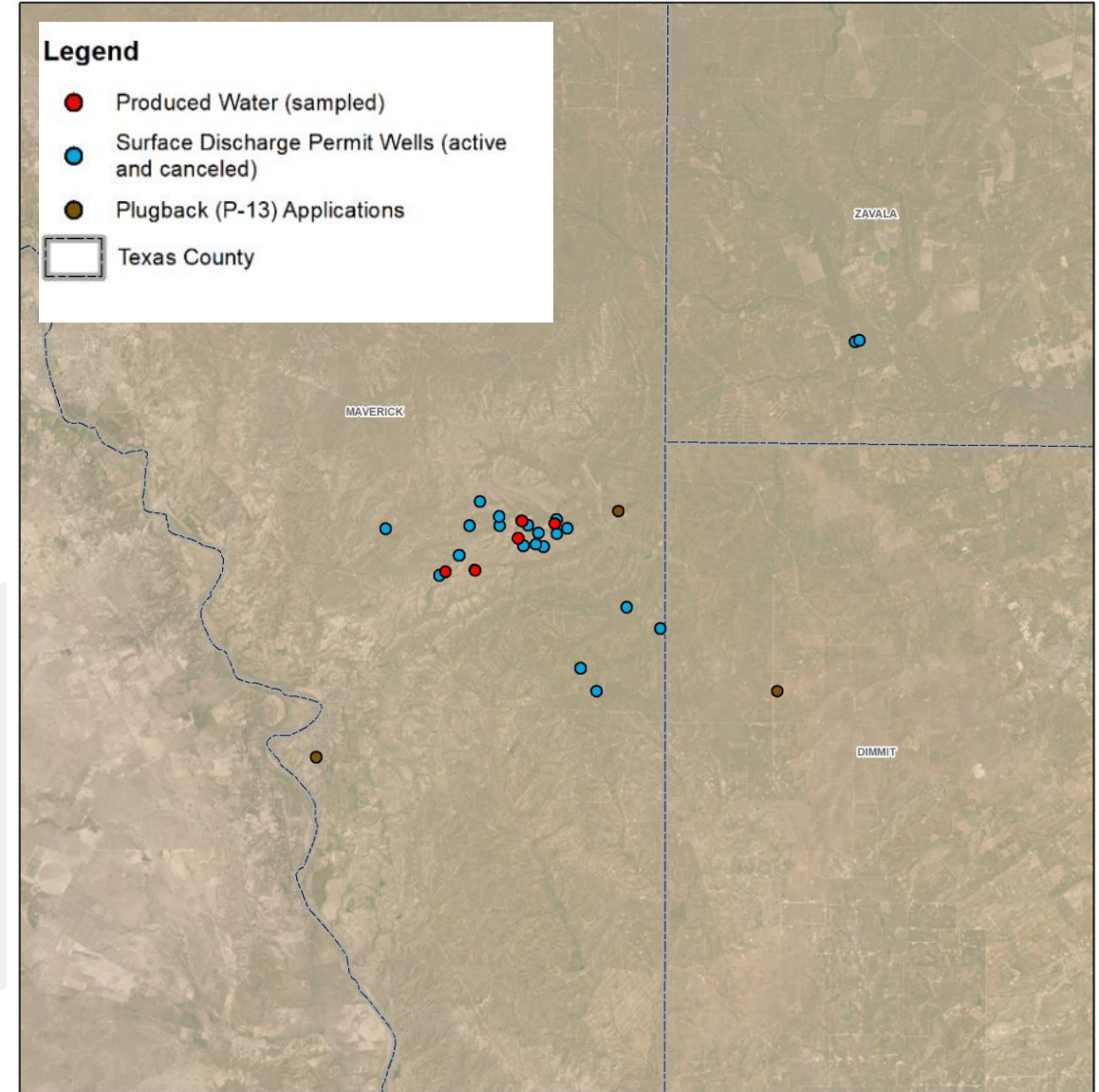
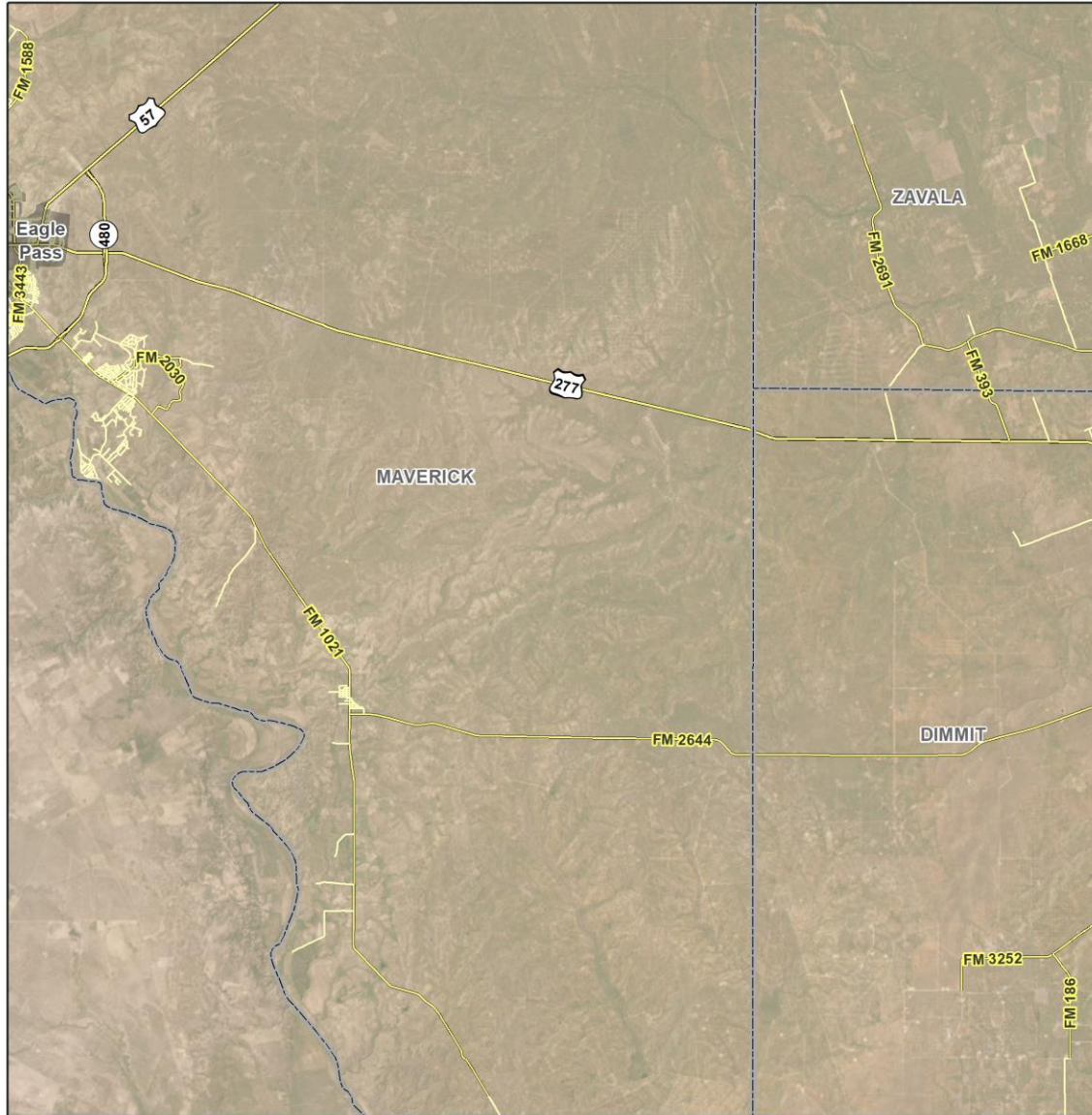
Cody Draper, P.G.



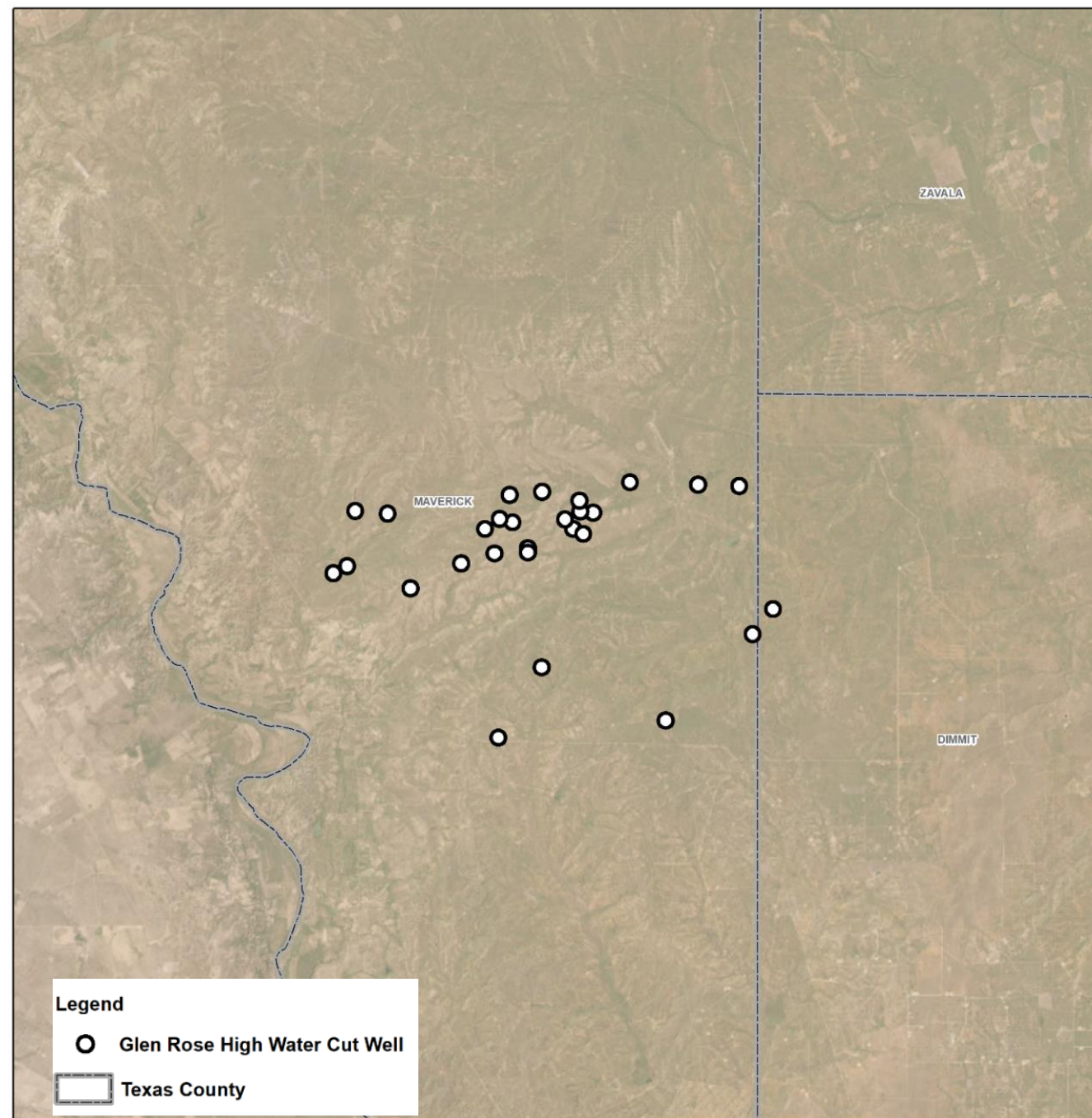
Water Deficit

Deficits Region L and M (acre-ft/yr)						
County	2020	2030	2040	2050	2060	2070
Maverick	18,686	17,630	17,041	15,750	14,477	13,514
Dimmit	9,473	9,561	8,901	7,393	5,888	5,330
Zavala	21,235	21,350	21,209	20,733	20,148	19,865

Wells of Interest

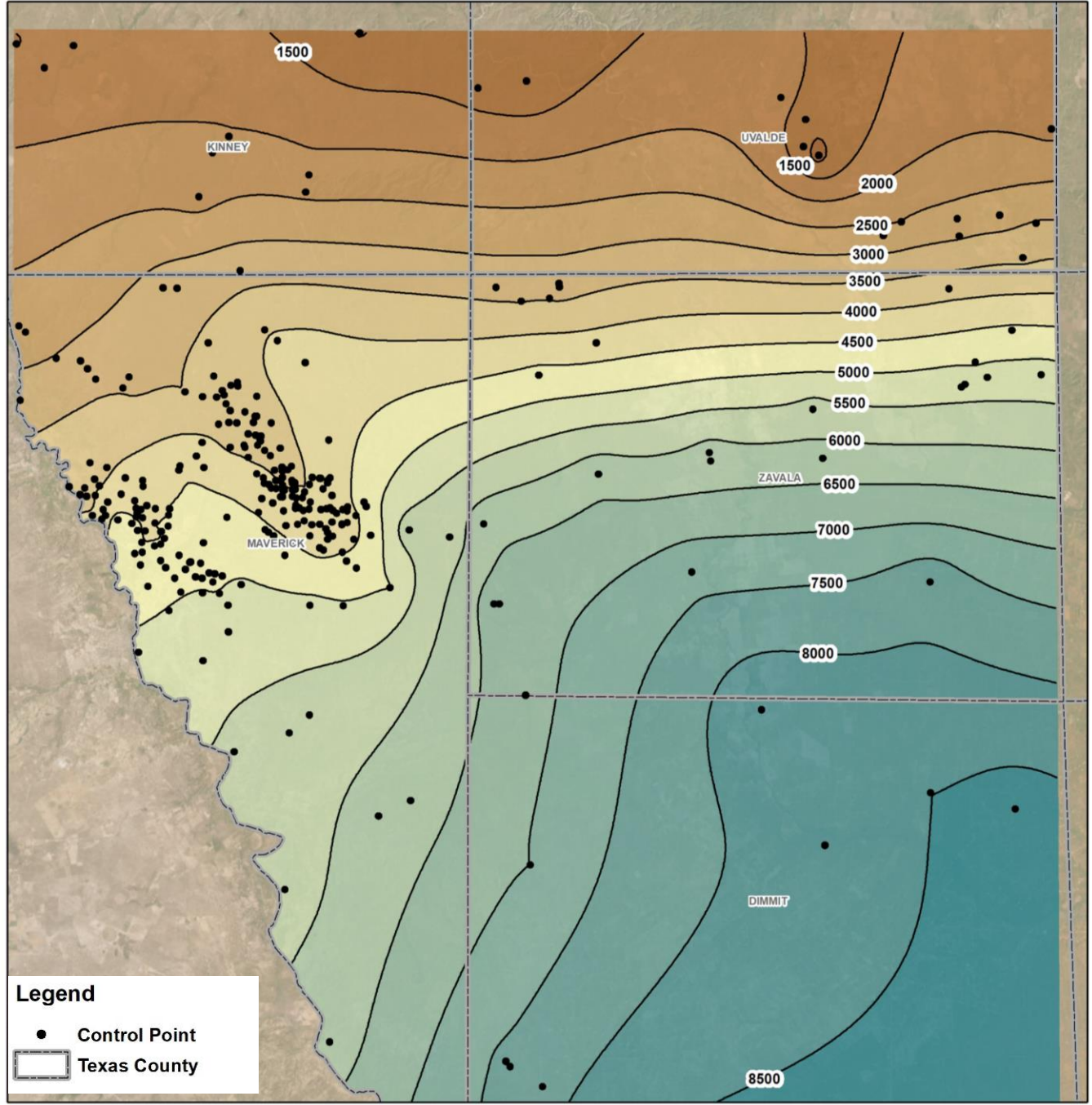


Glen Rose Water Cuts >90%

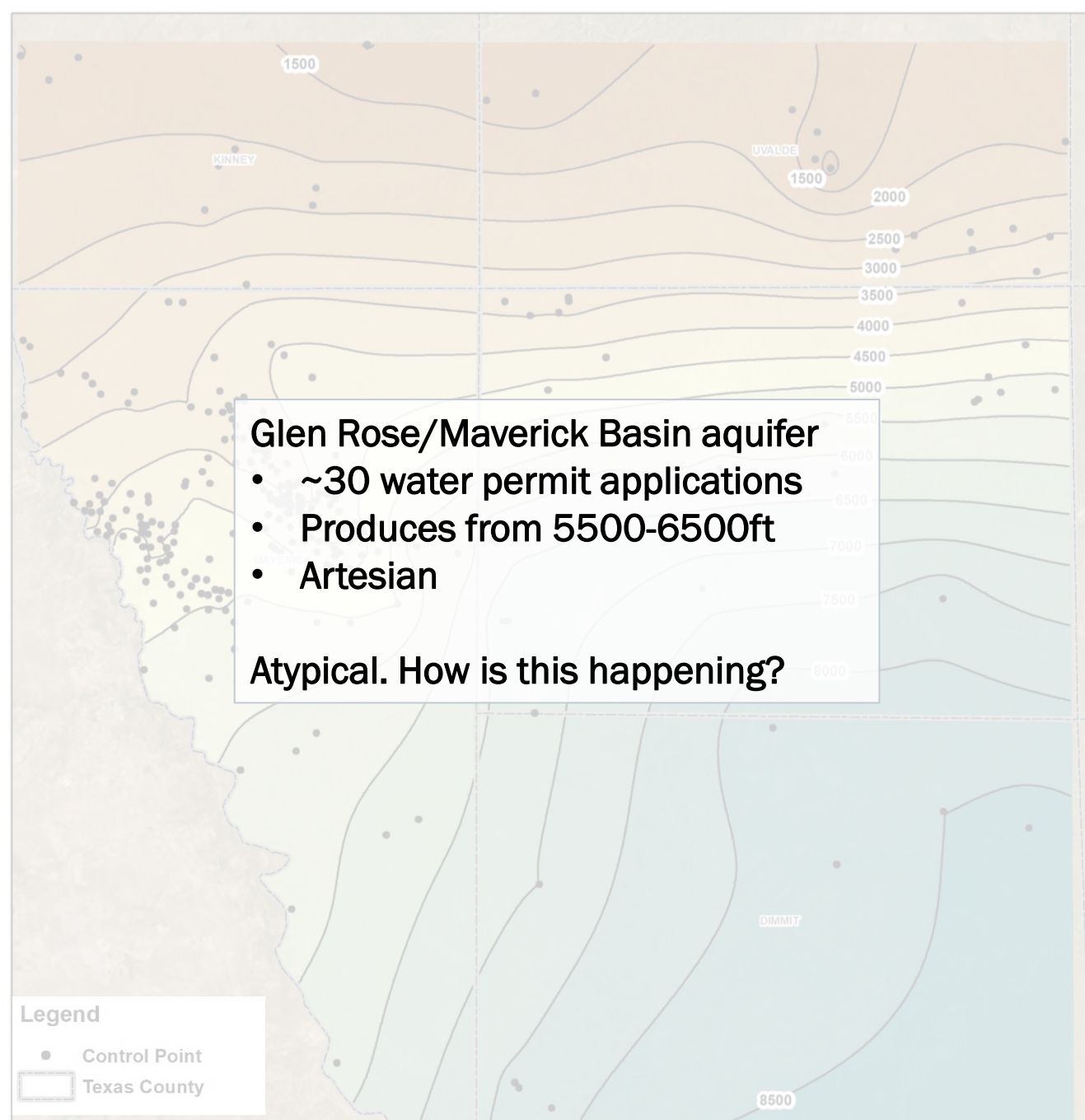


3

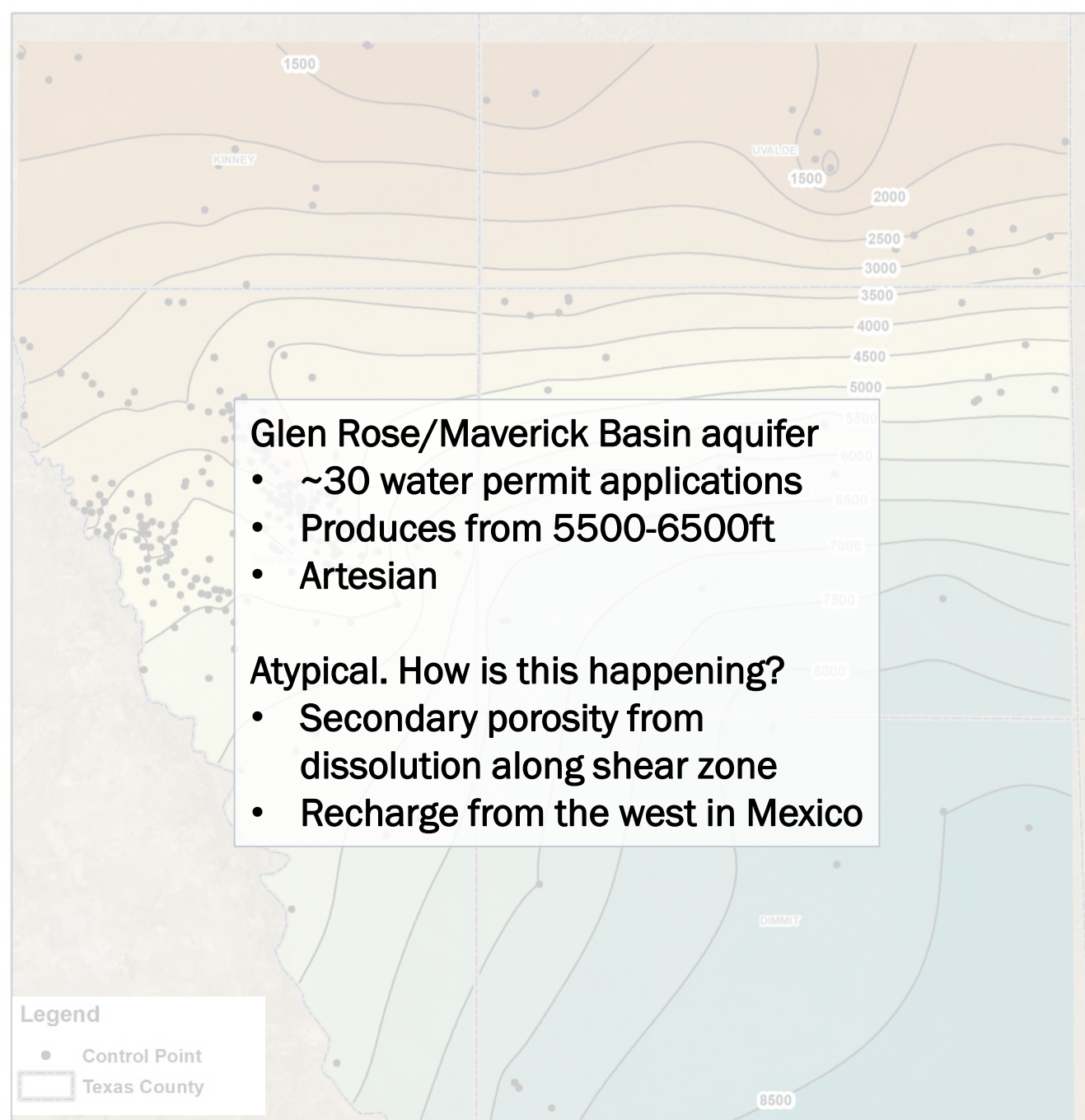
Top Glen Rose



Top Glen Rose

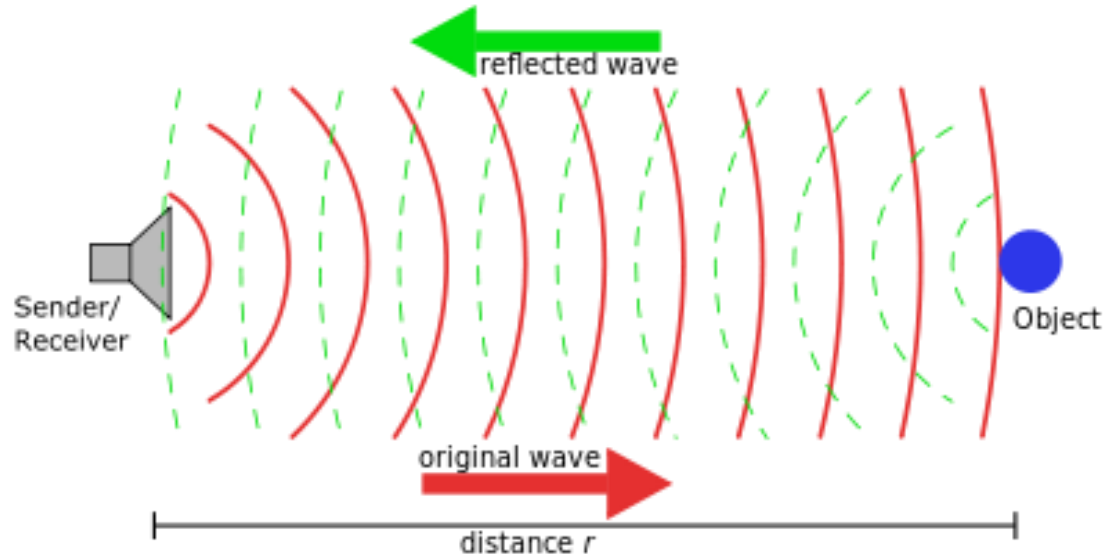


Top Glen Rose

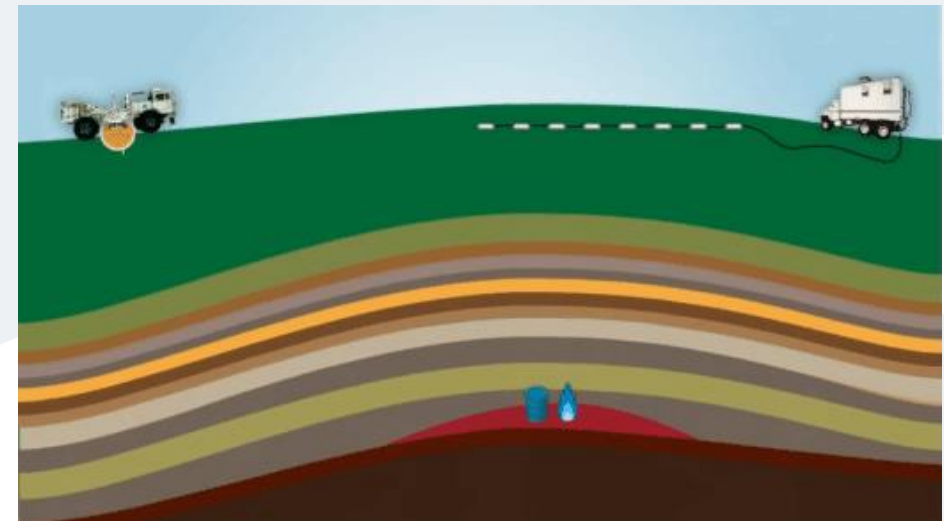
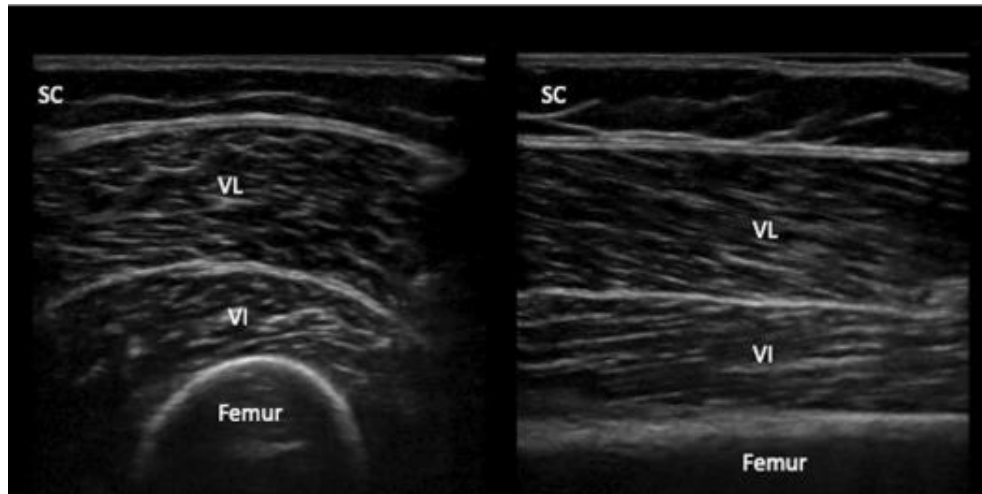
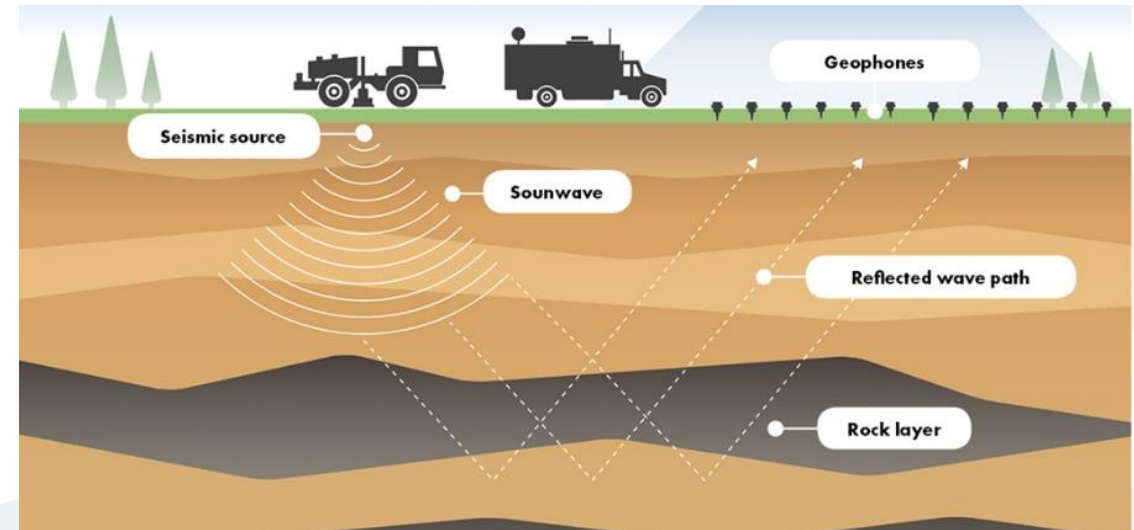


What is Seismic Data?

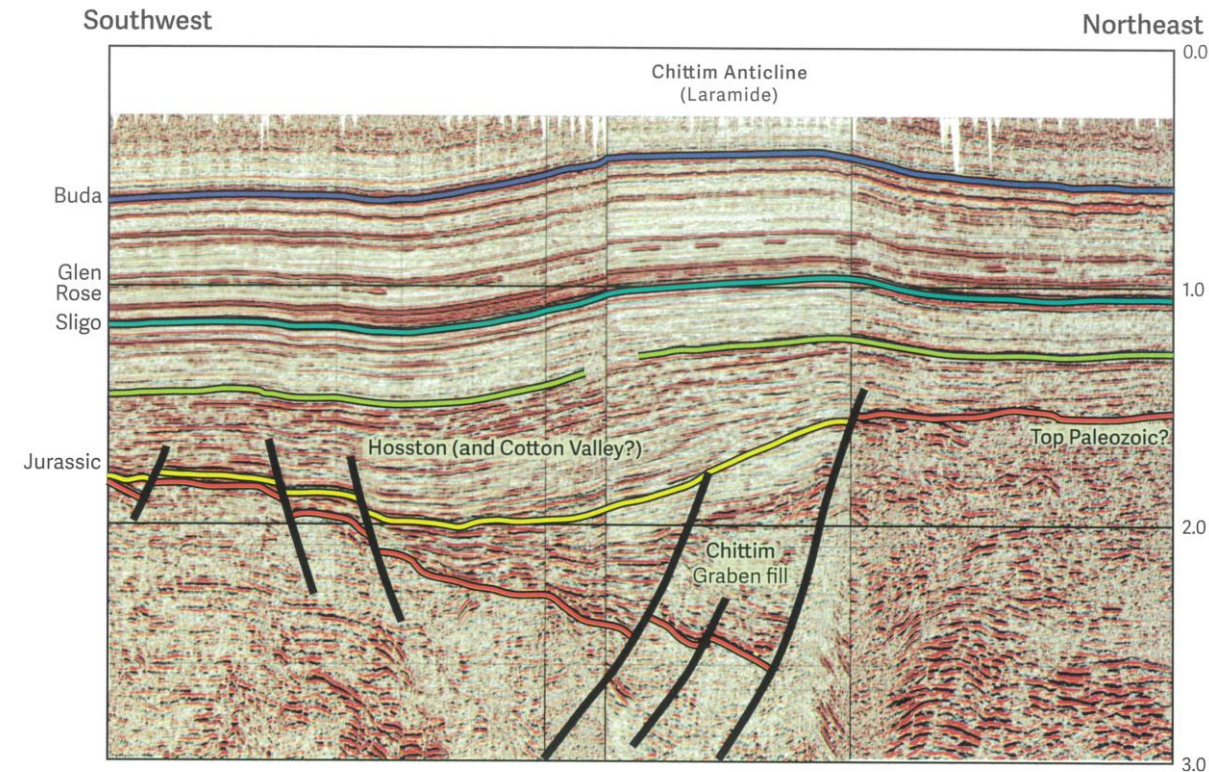
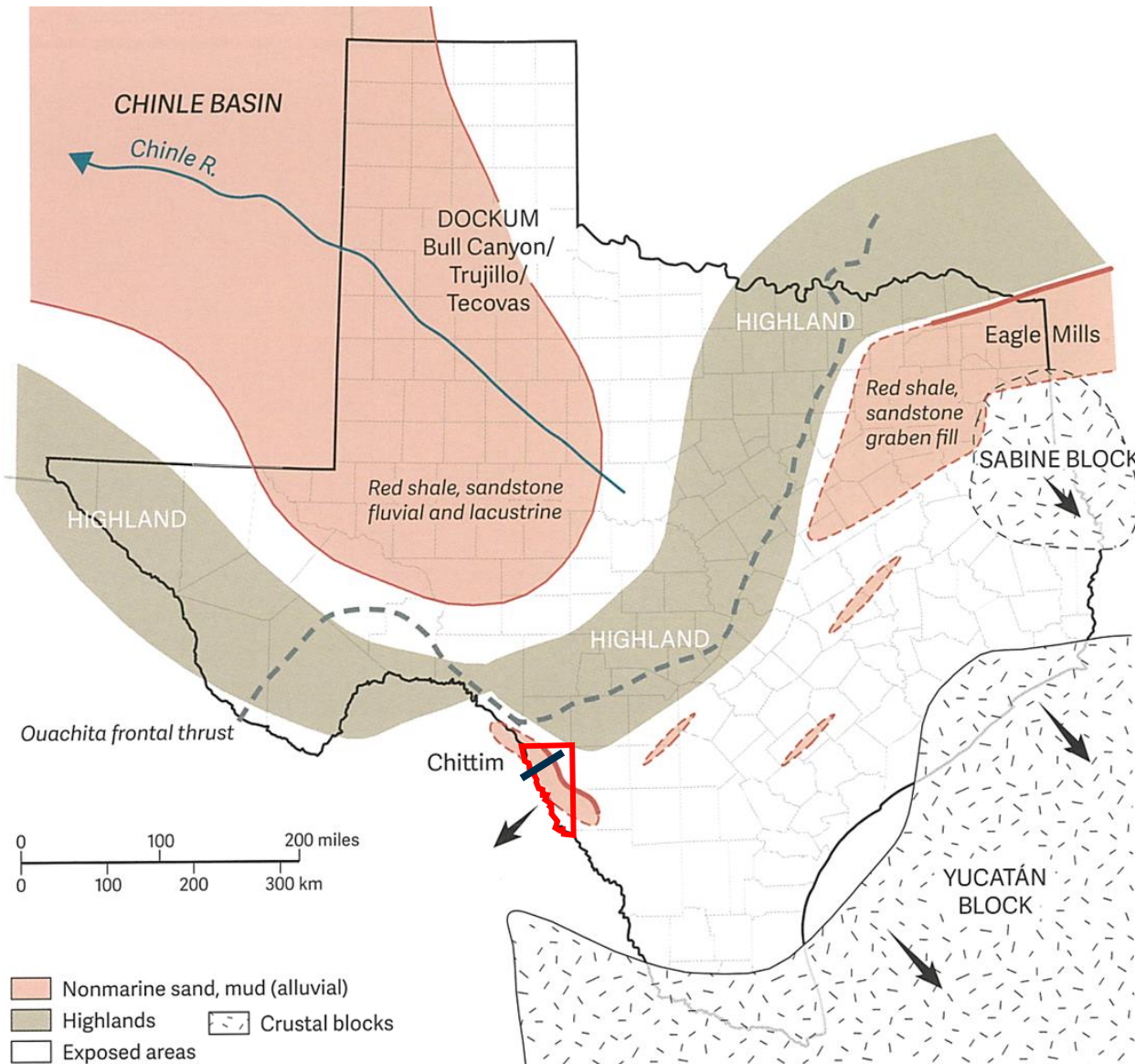
Medical Ultrasound



Seismic Data

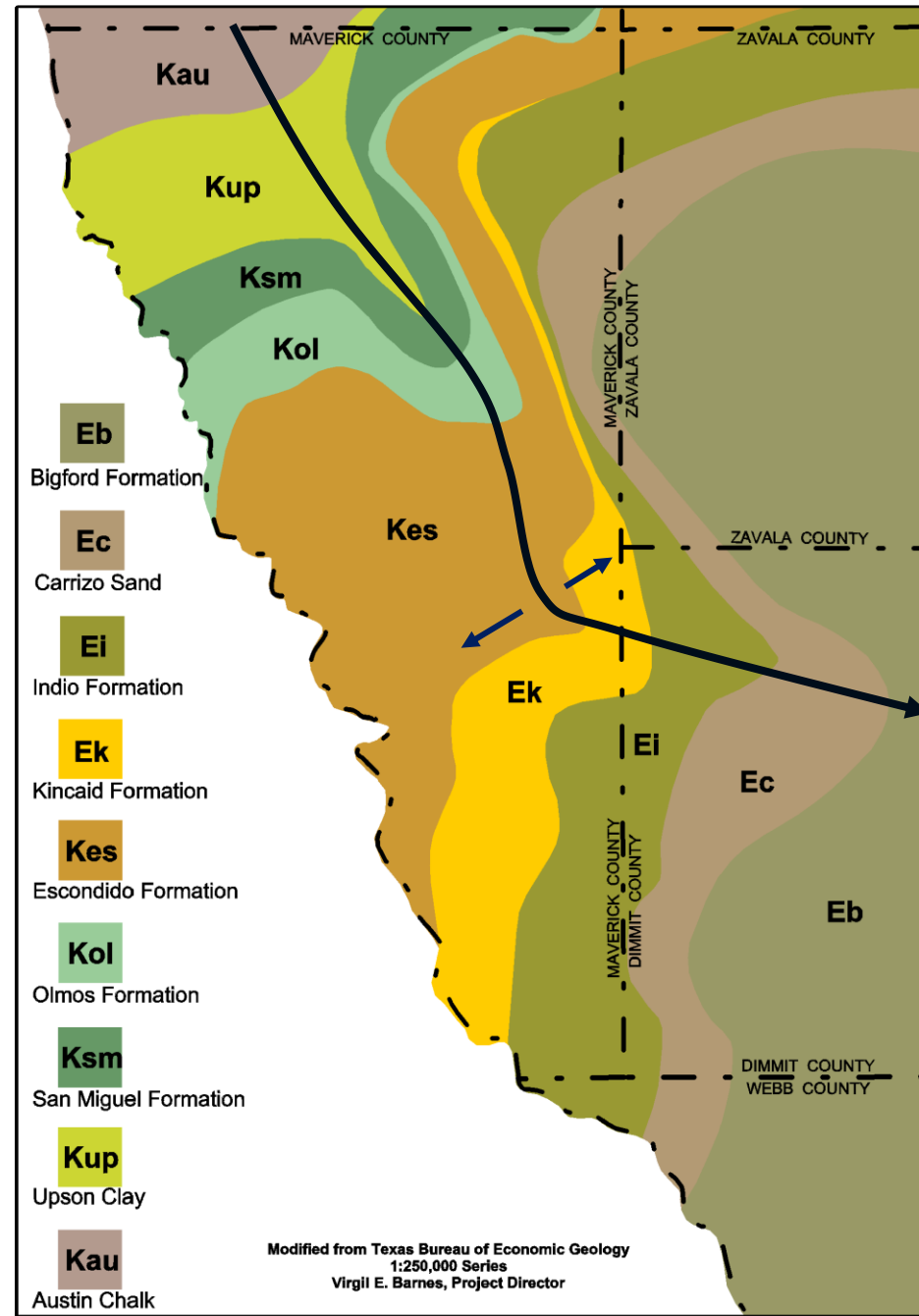


Triassic



Laramide Orogeny

NE-directed
Laramide
Compression

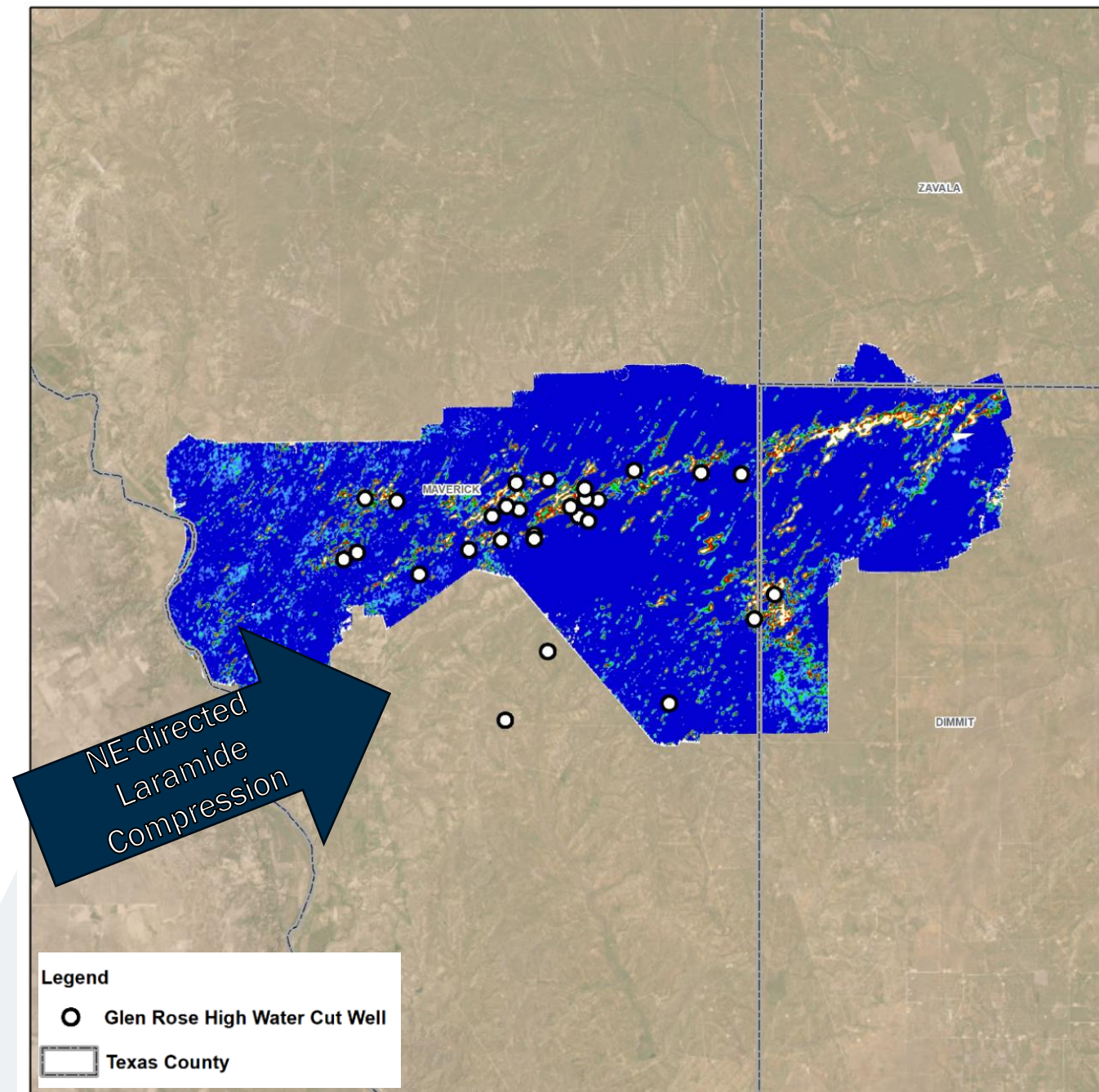


Structure Control

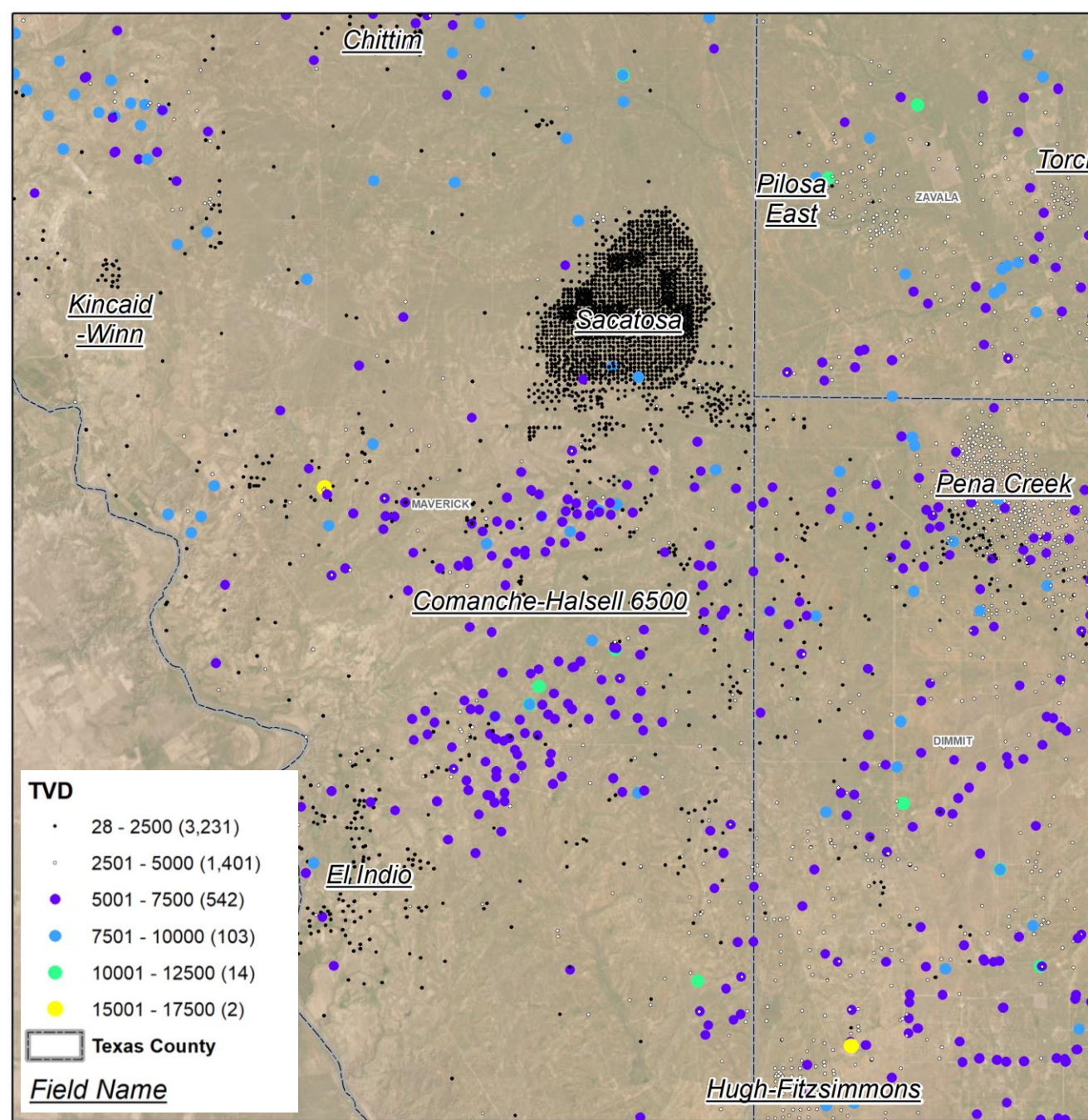
“A total of five wells were cored and there were a number of similarities in all cases... The rock can be described as a micritic, mixed skeletal–peloidal wackestone to packstone with molluscs, echinoids and scattered planktic microfossils. This type of rock is not likely to be a high porosity and permeability reservoir. Petrographic studies found evidence of advanced diagenetic changes. The thin sections showed the presence of authigenic quartz, iron sulfides, saddle dolomite, and replacive dolomite. Porosities in the 30% range were not uncommon and the porosity was frequently filled with bitumen and pyrobitumen. All of the above substances and porosity are diagenetic events often associated with dissolution of the host limestone by mineral rich, high temperature acidic fluids.”



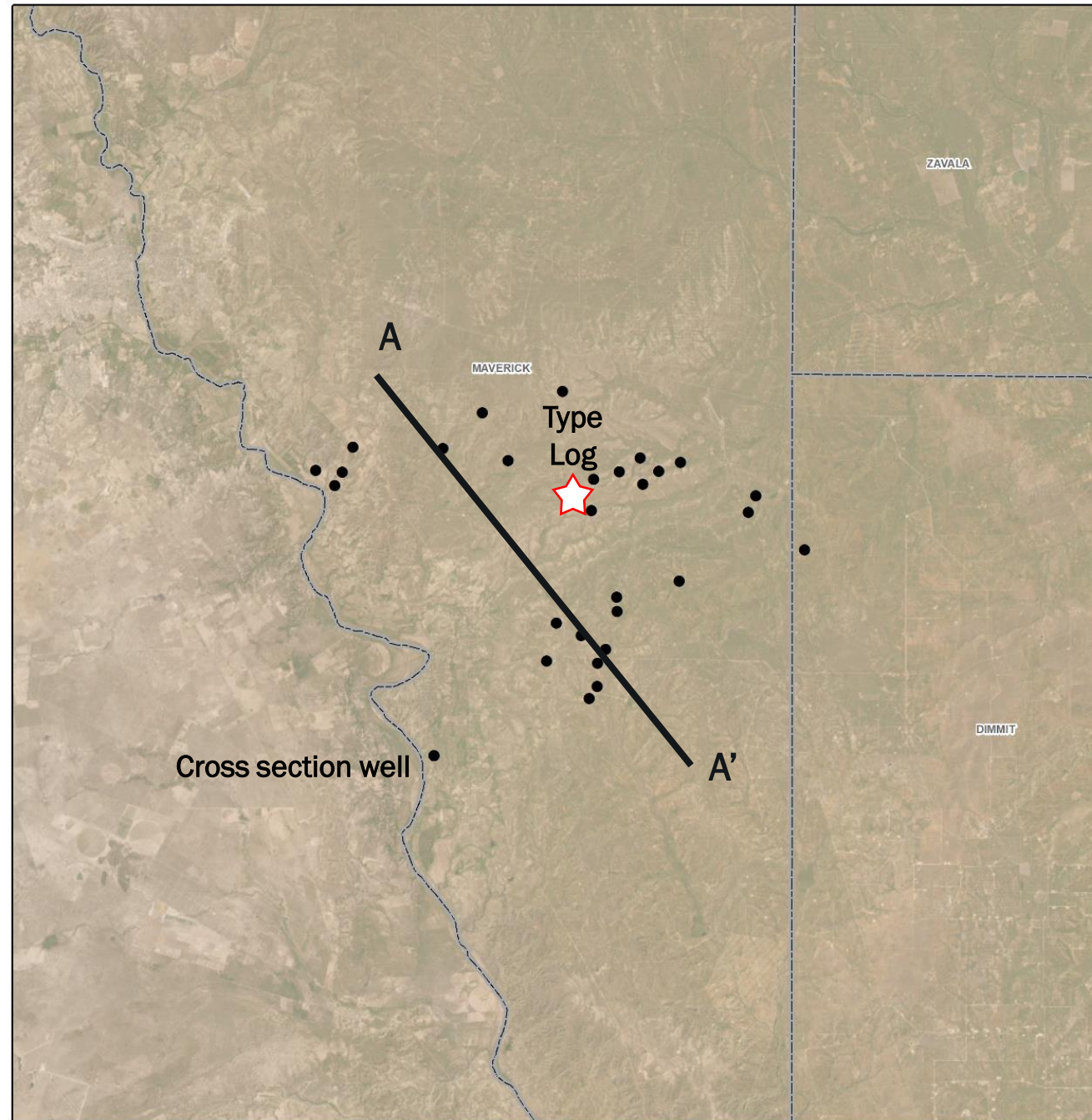
10



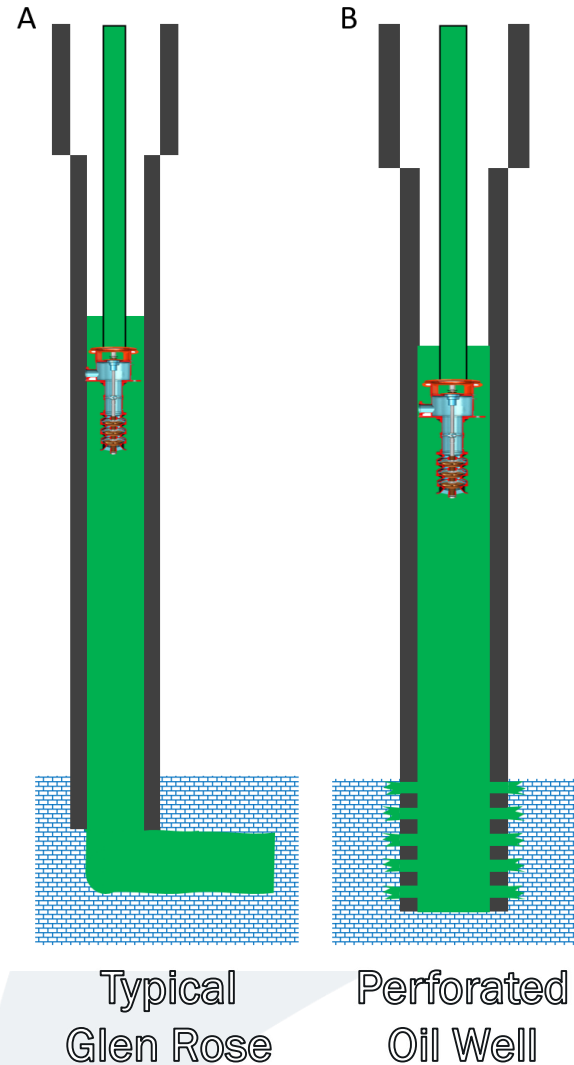
Wells by TVD



Cross Section Map & Type Log

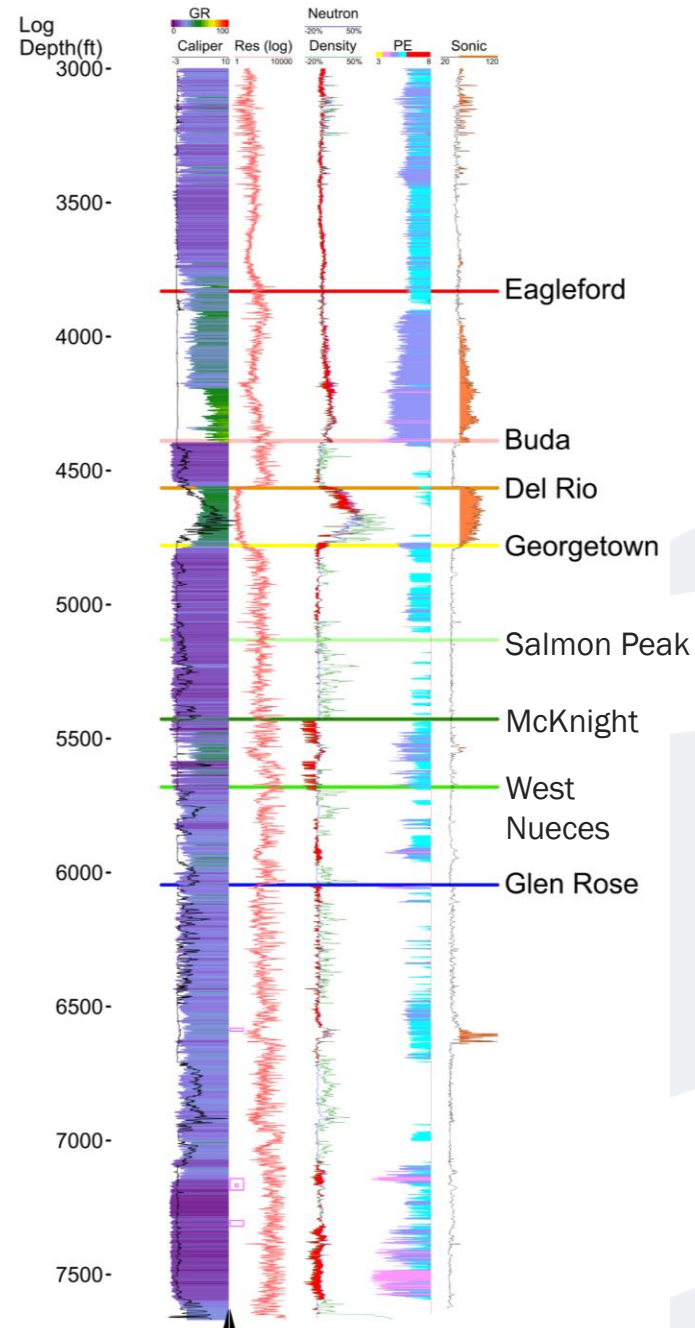


Completion Styles

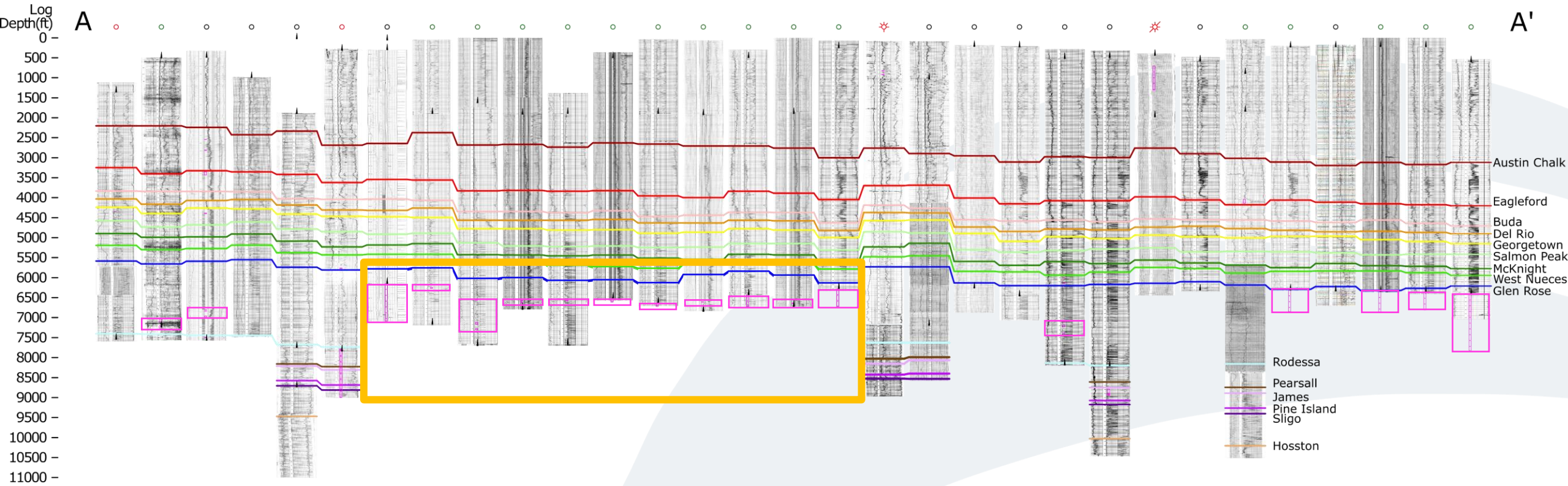


13

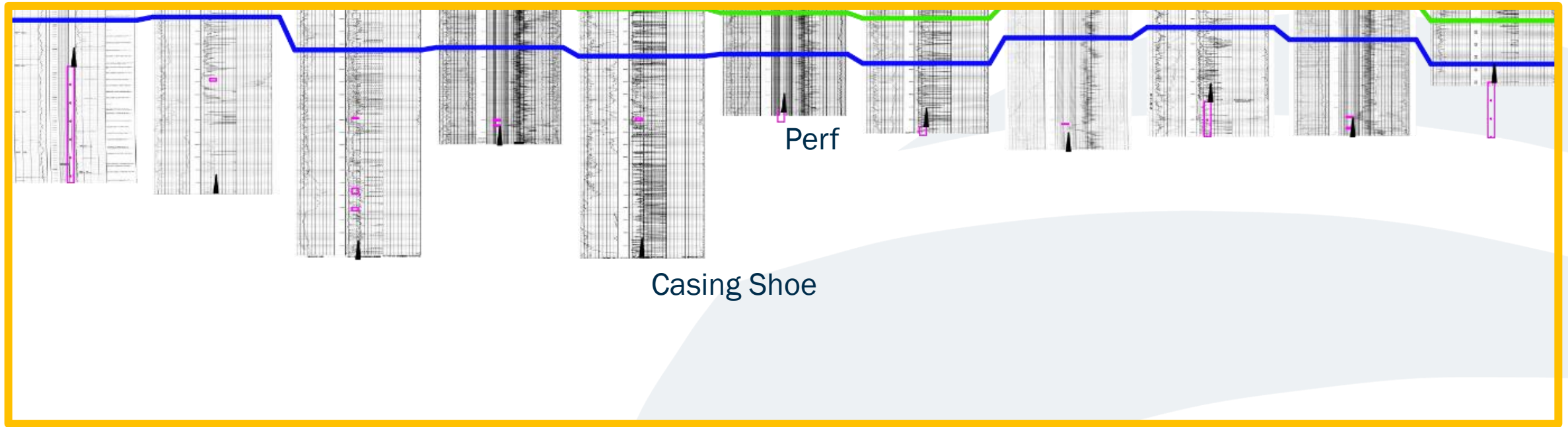
Type Log



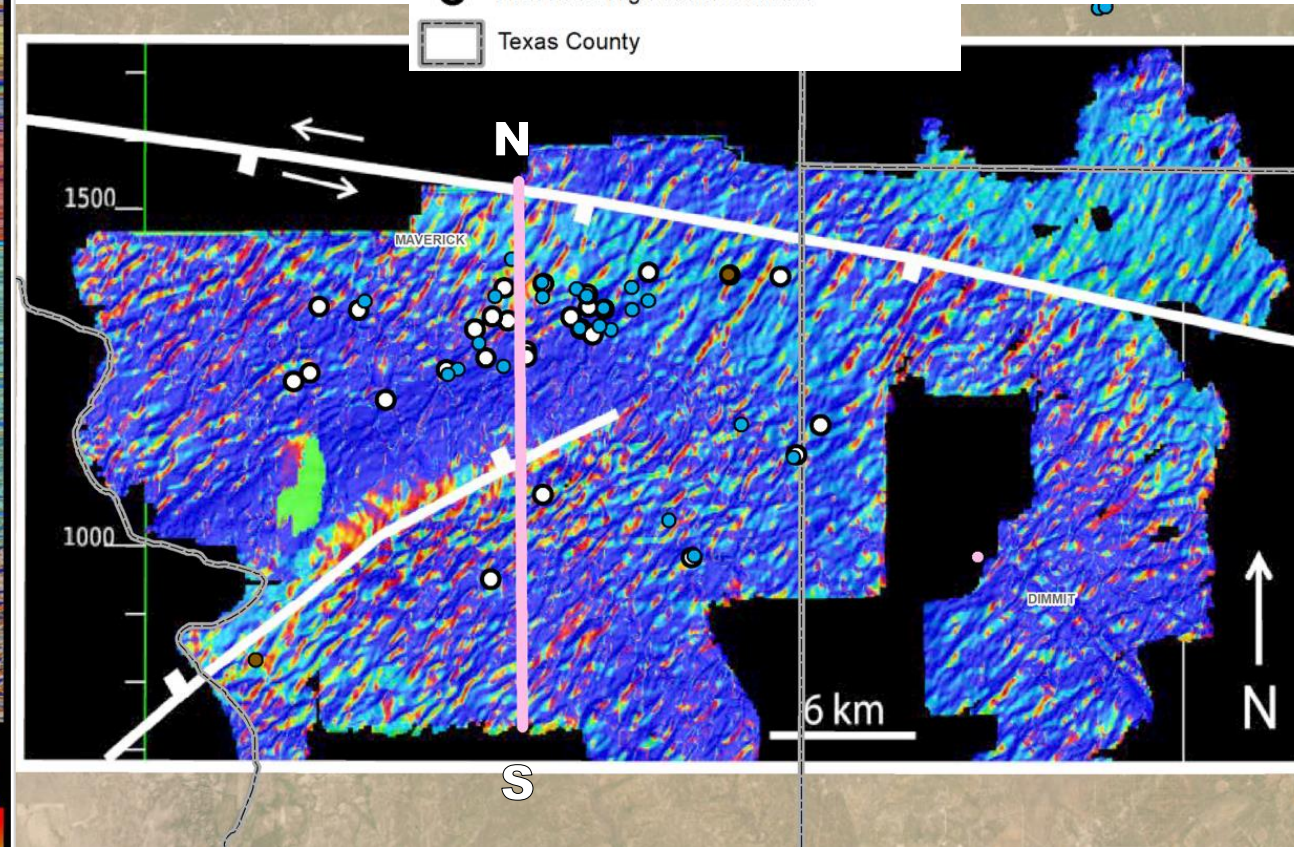
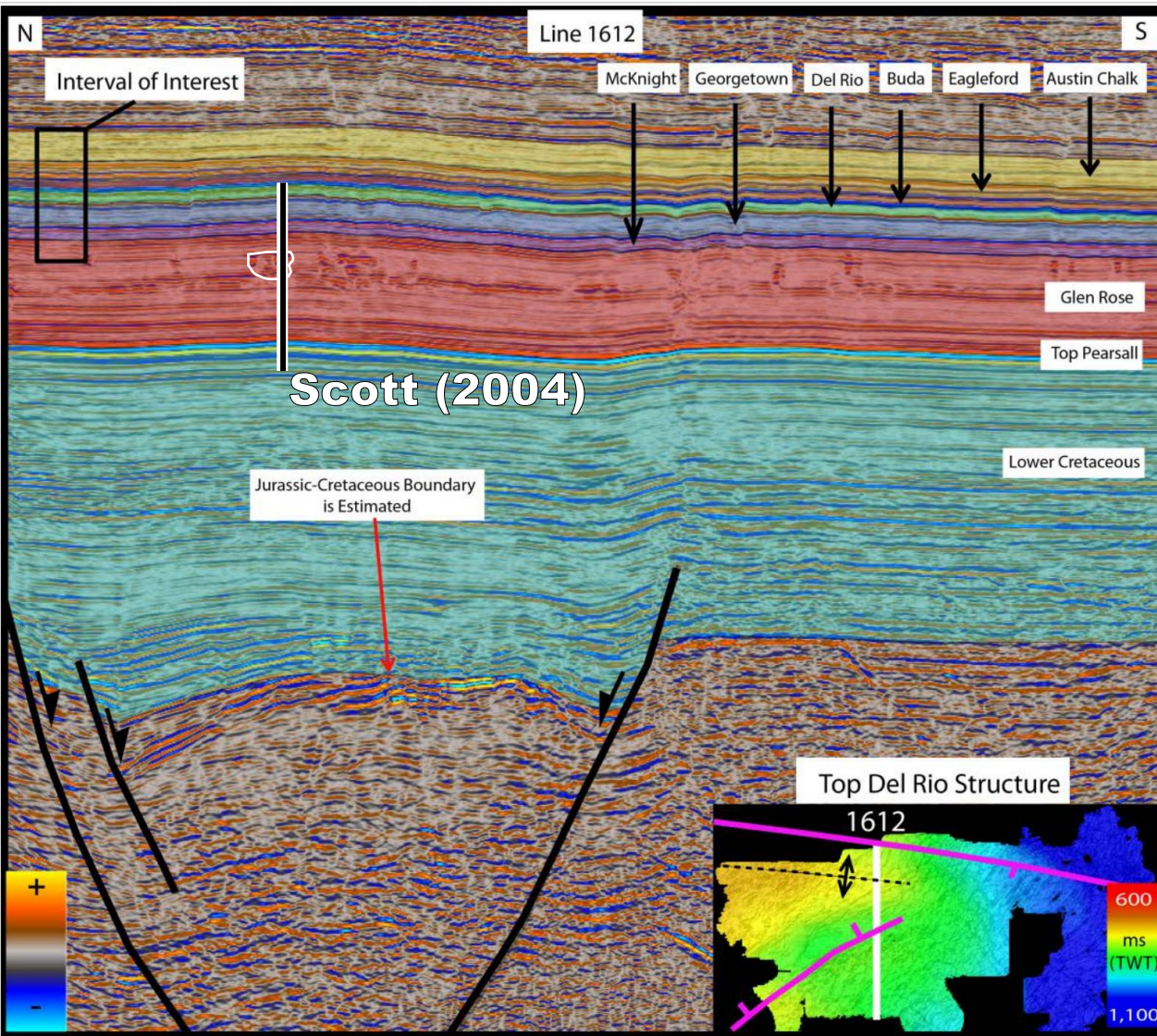
Cross Section



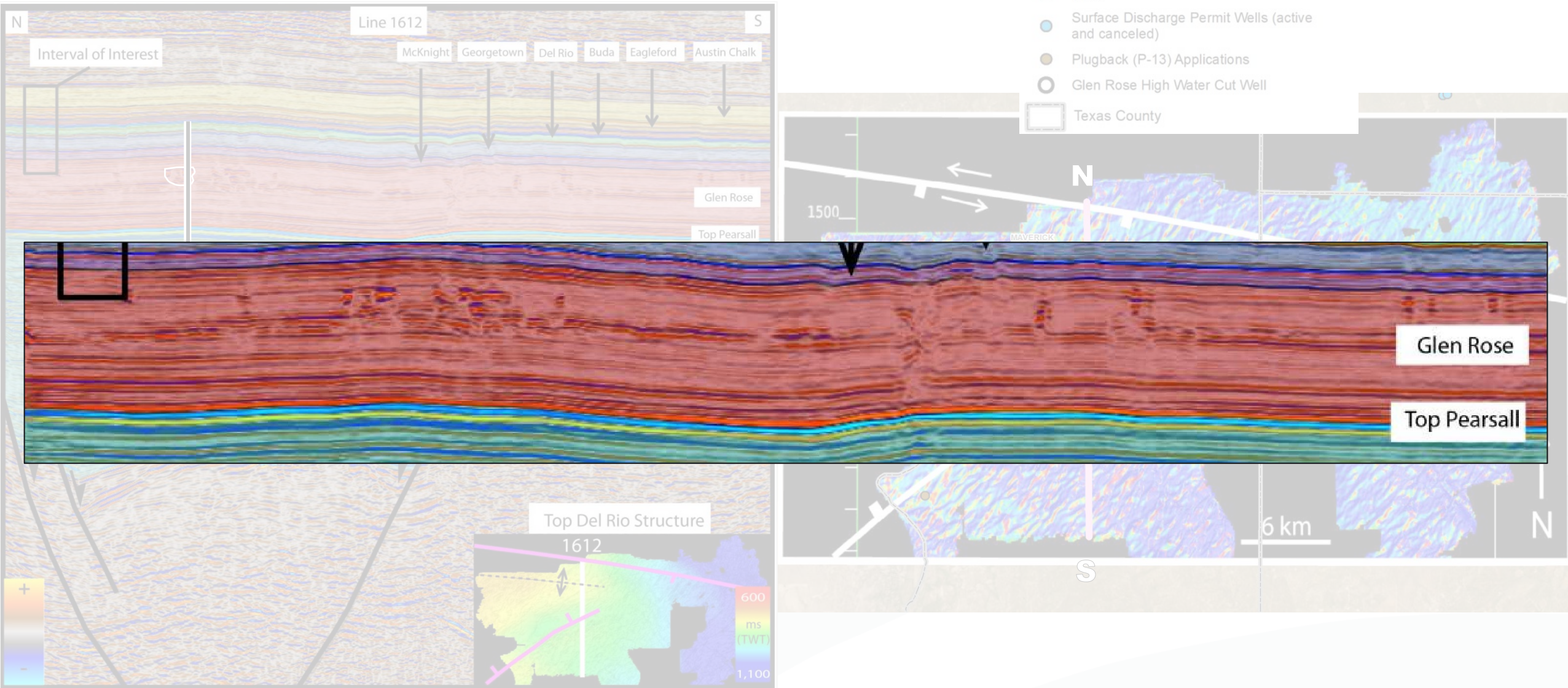
Cross Section



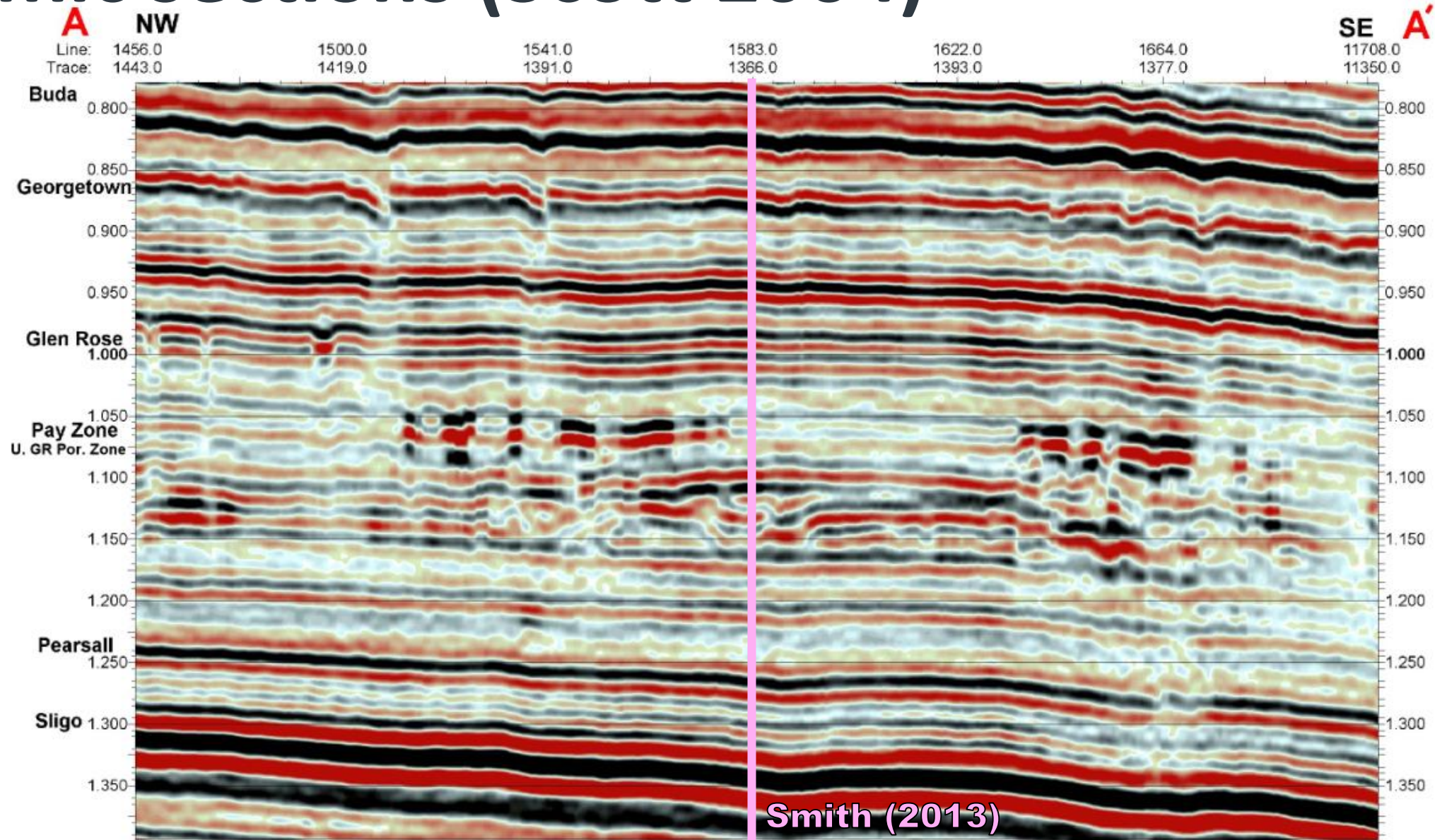
Seismic sections (Smith 2013)



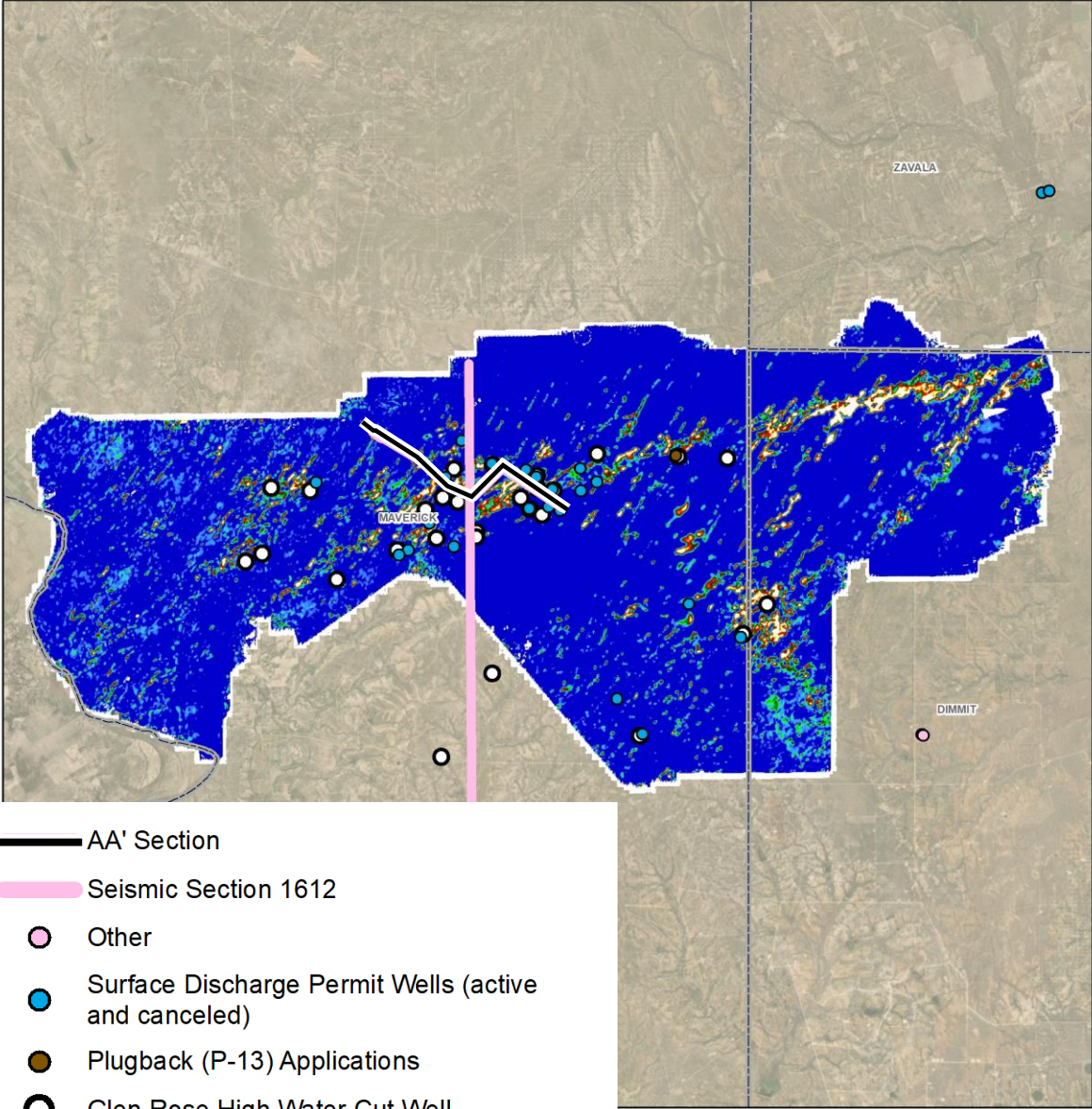
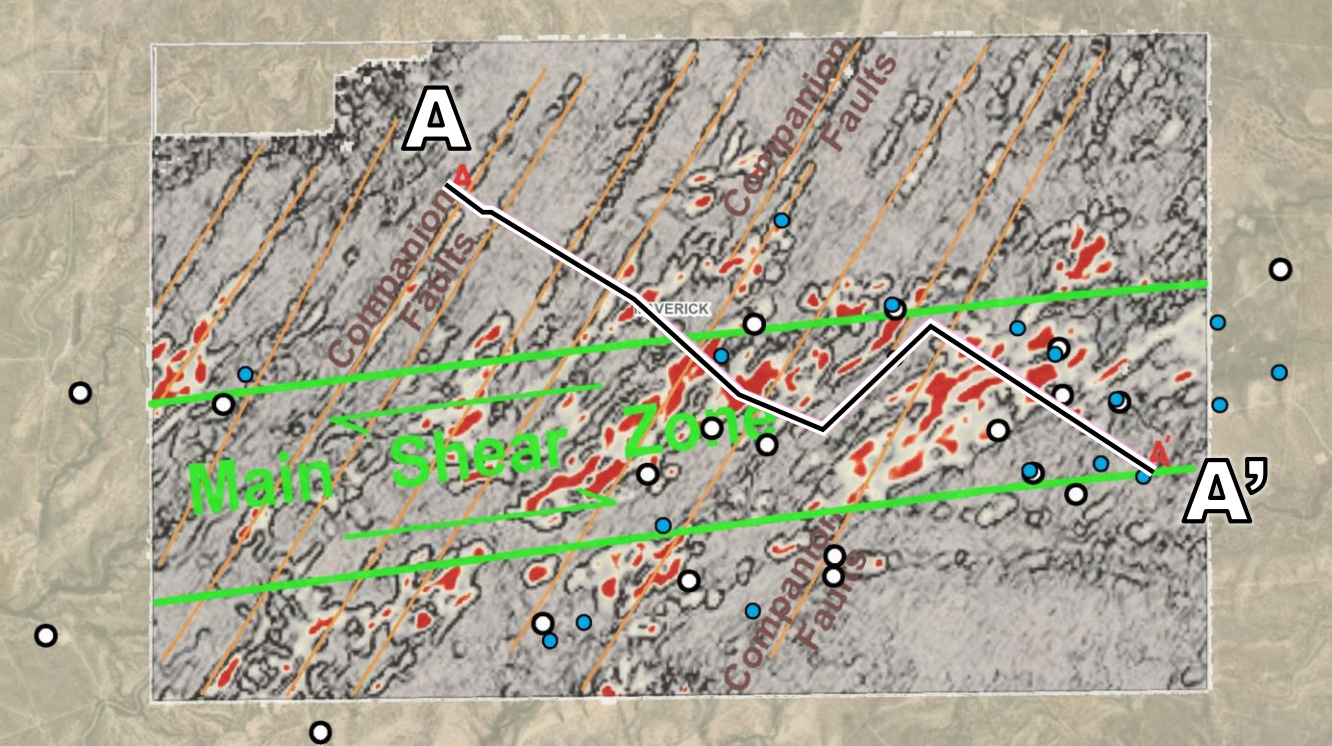
Seismic sections (Smith 2013)



Seismic sections (Scott 2004)

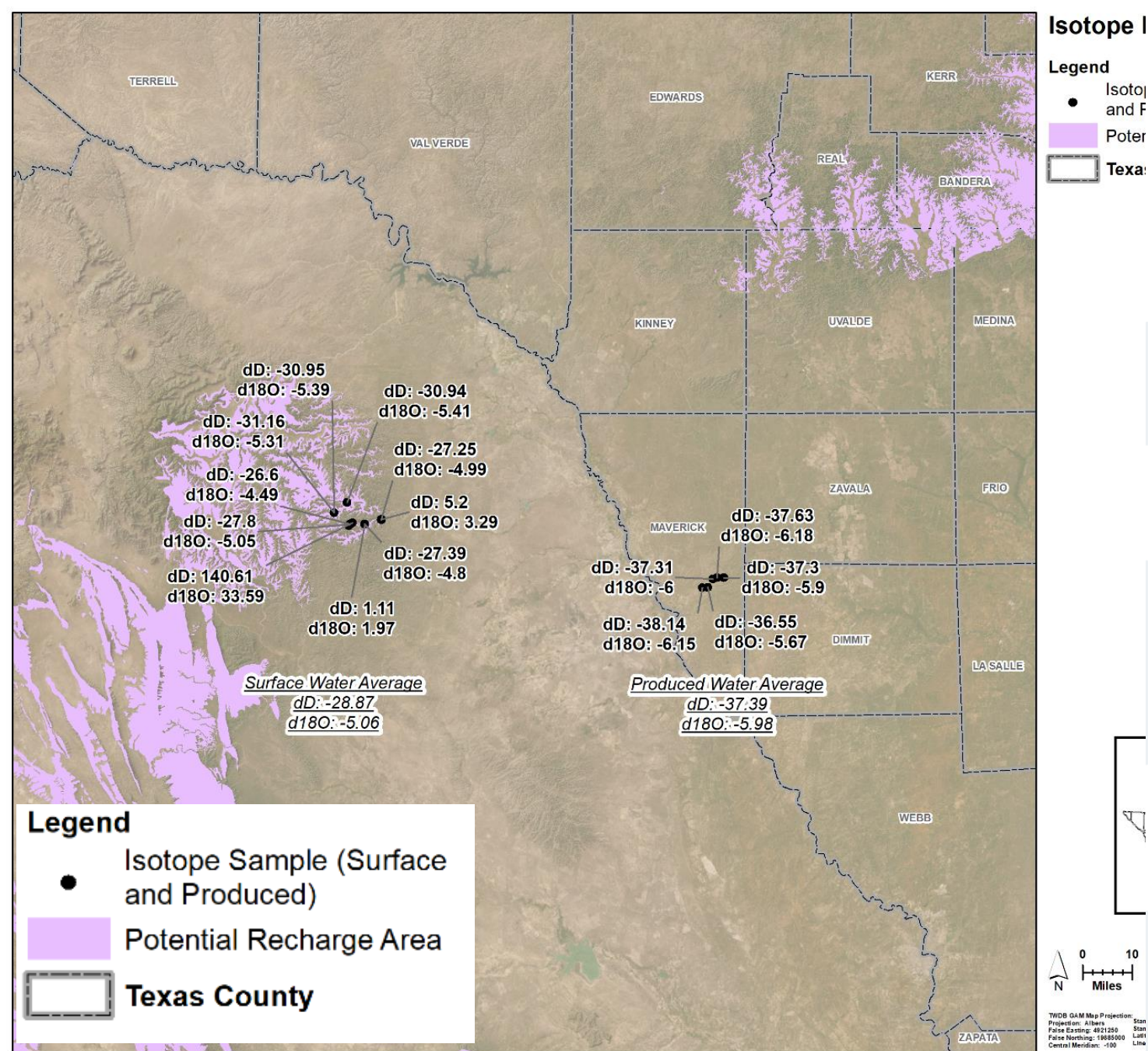


Seismic sections (Scott 2004)

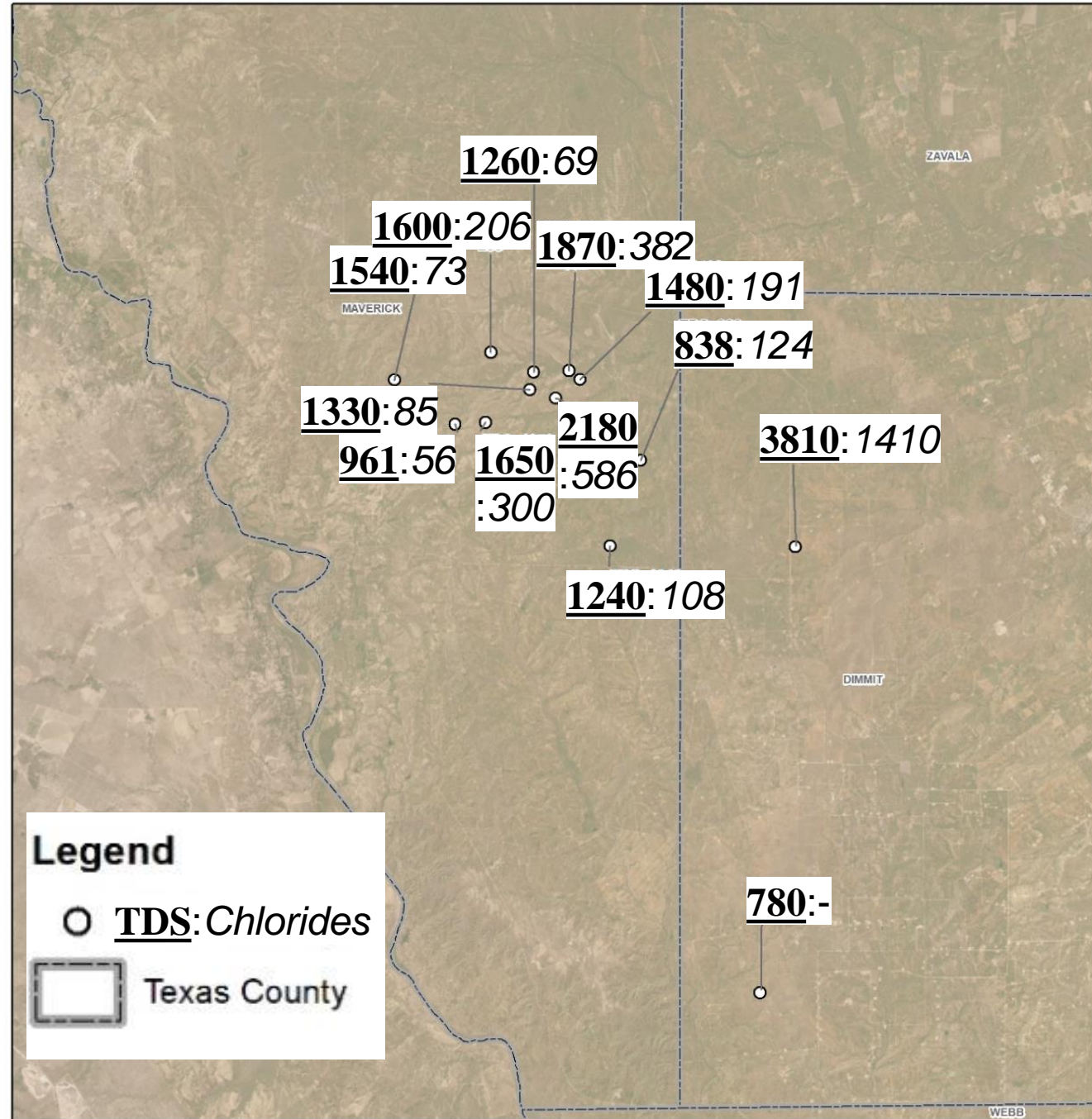


- AA' Section
- Seismic Section 1612
- Other
- Surface Discharge Permit Wells (active and canceled)
- Plugback (P-13) Applications
- Glen Rose High Water Cut Well
- Texas County

Isotopes - Outcrop & Produced



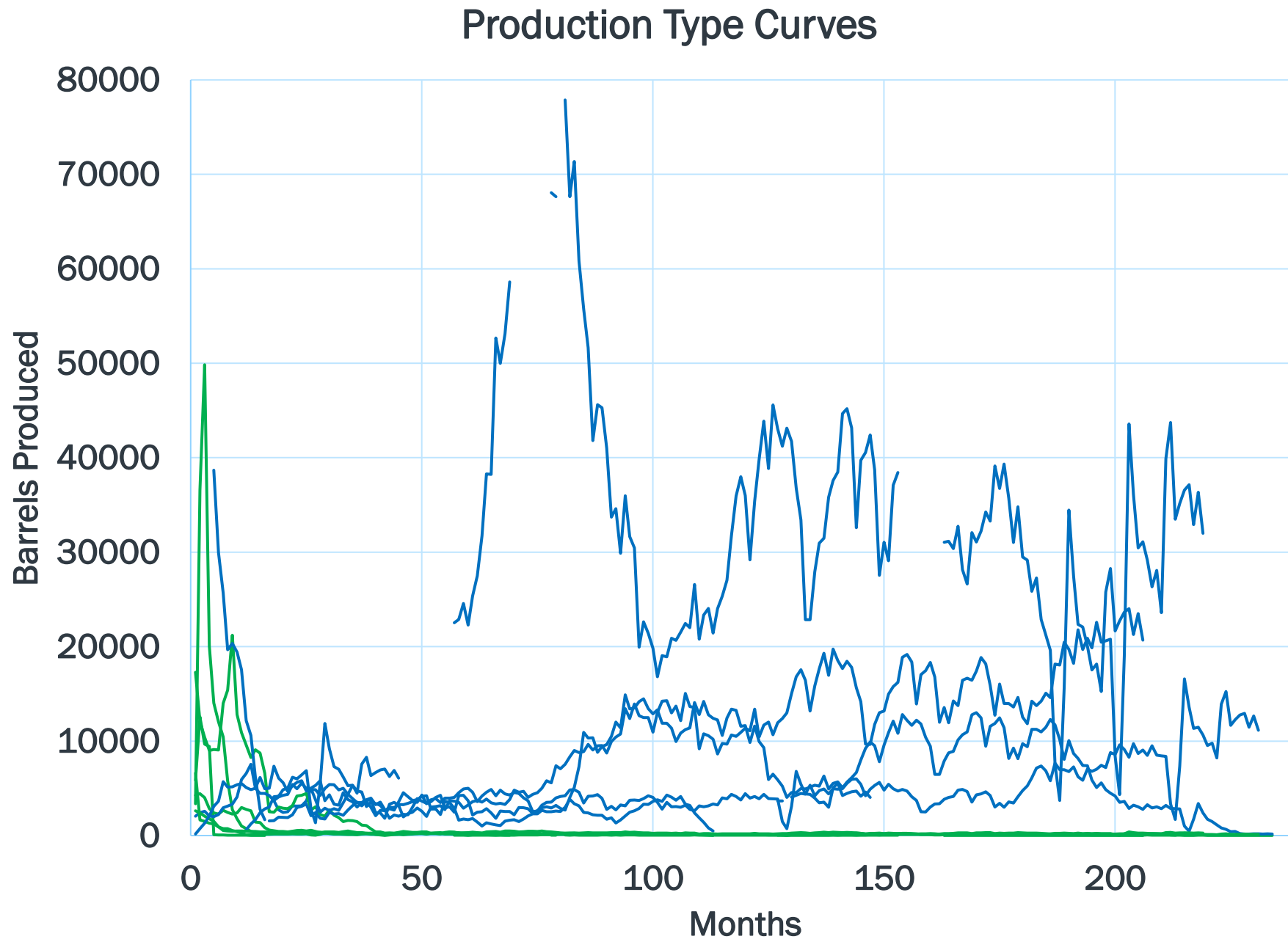
Produced Water Quality



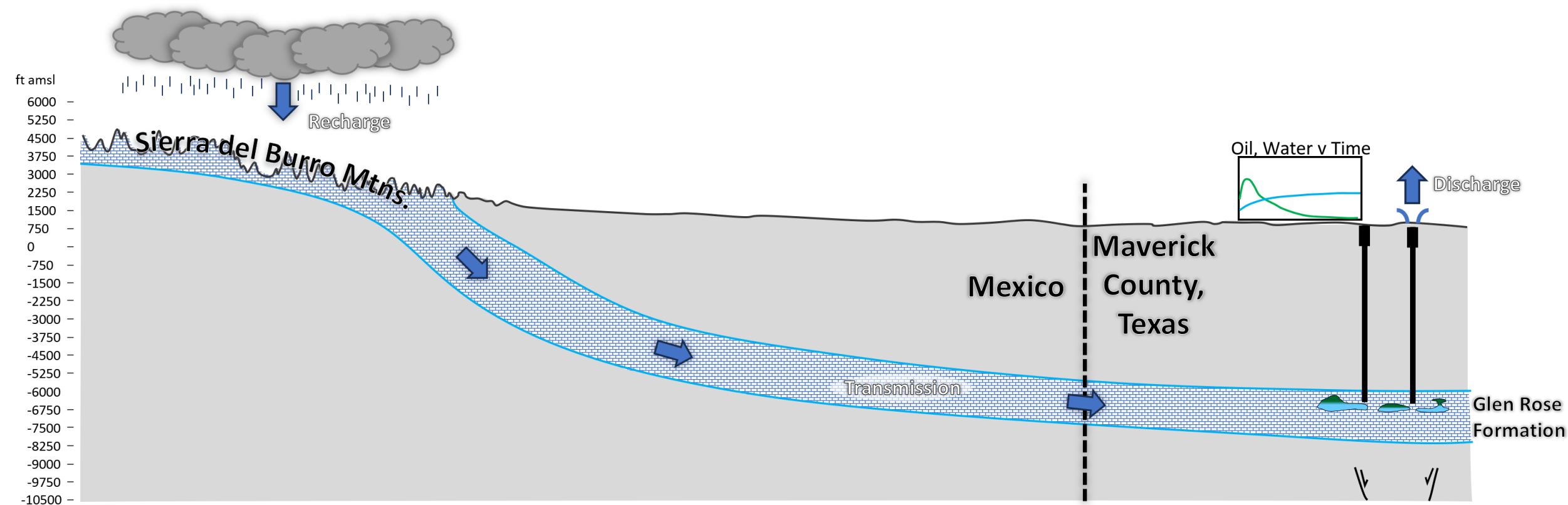
Legend

○ TDS:Chlorides

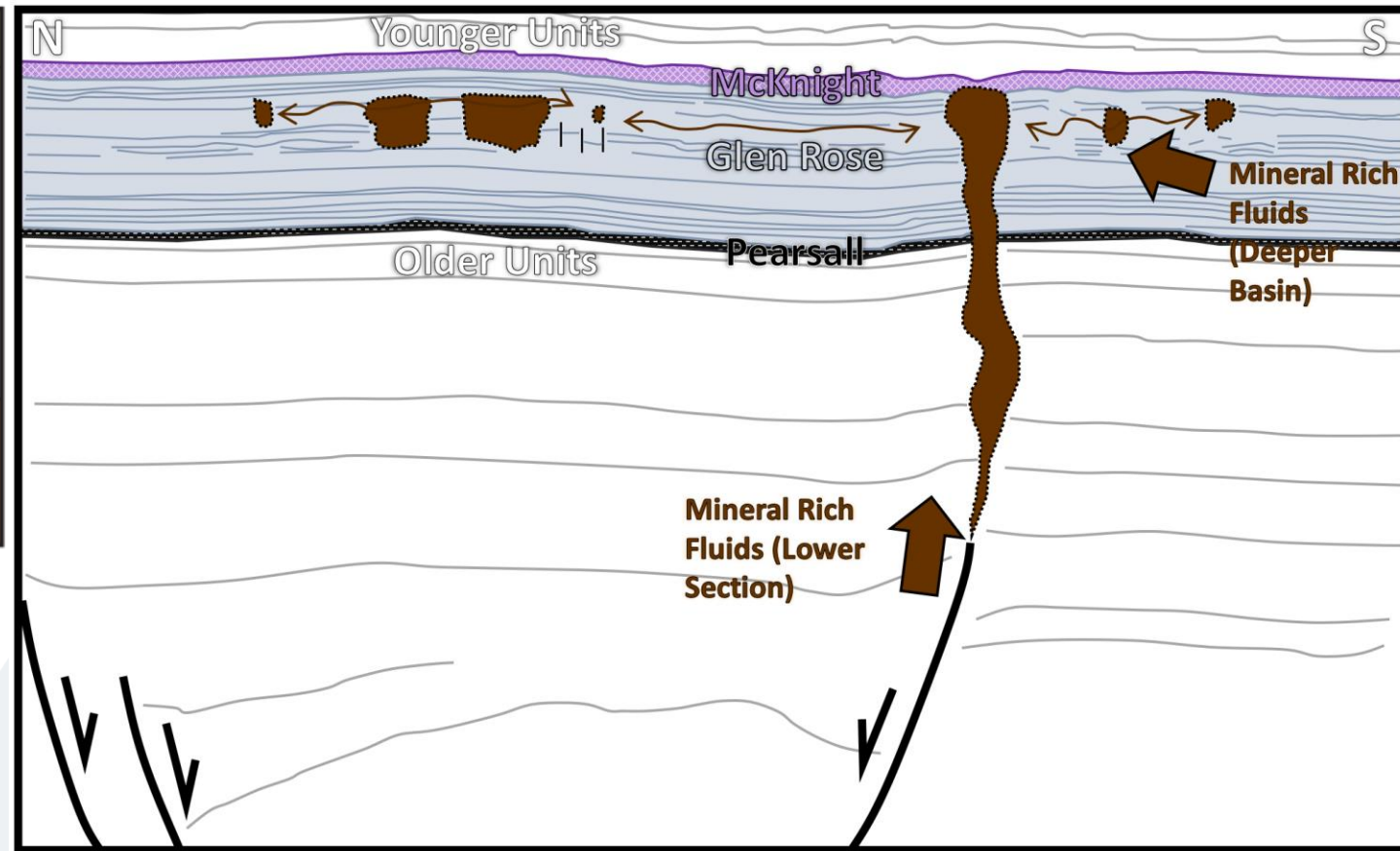
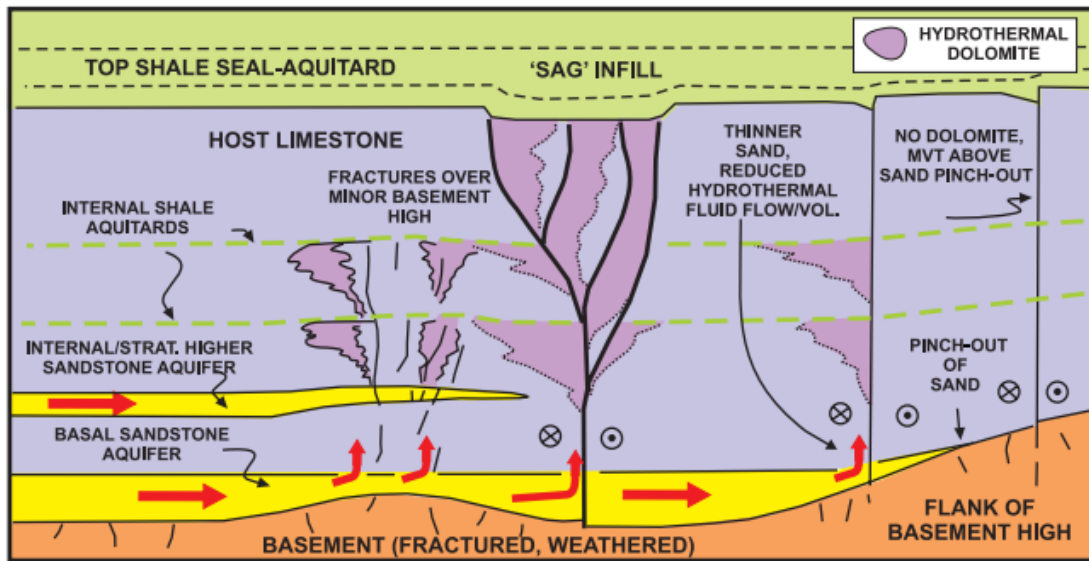
□ Texas County



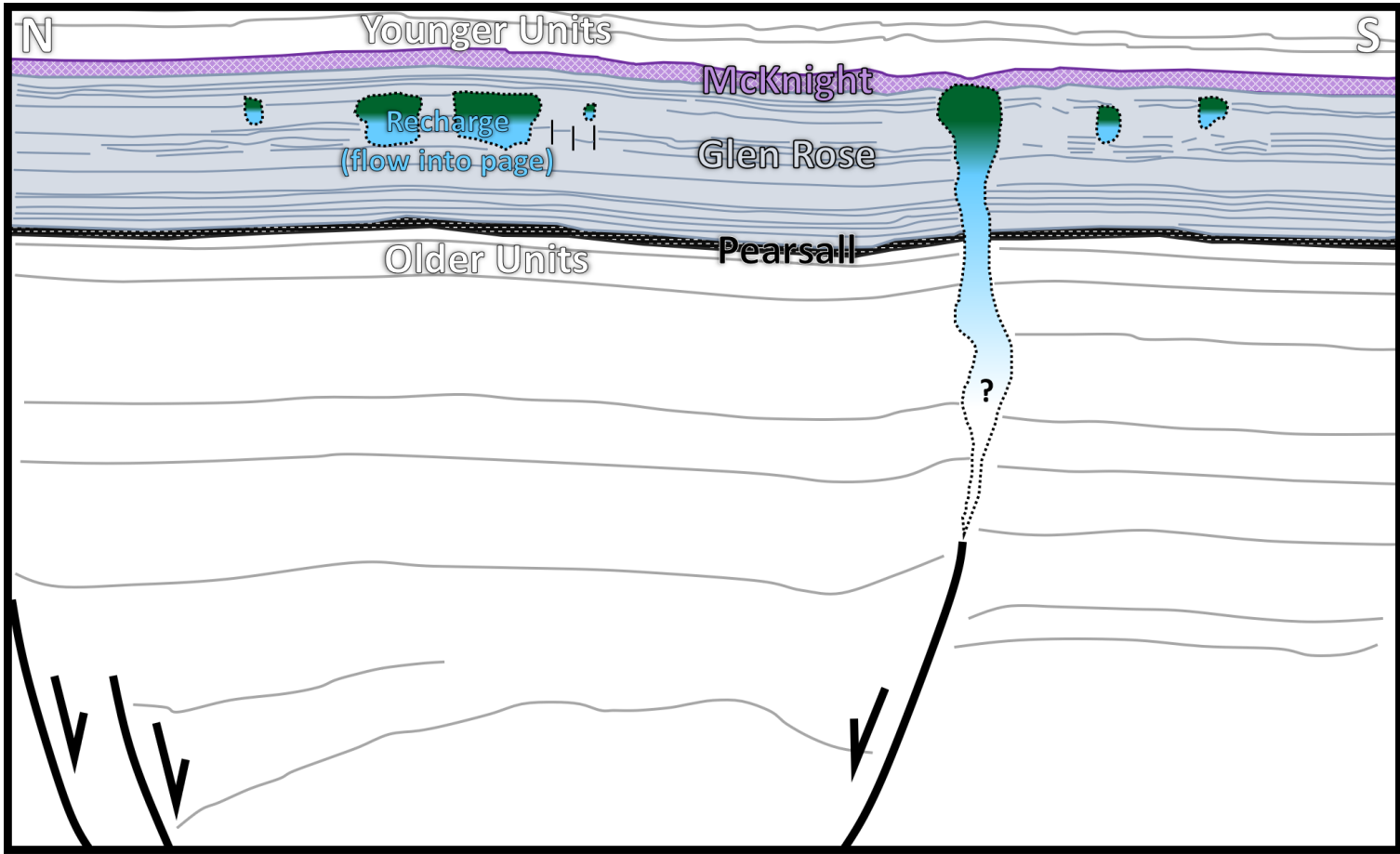
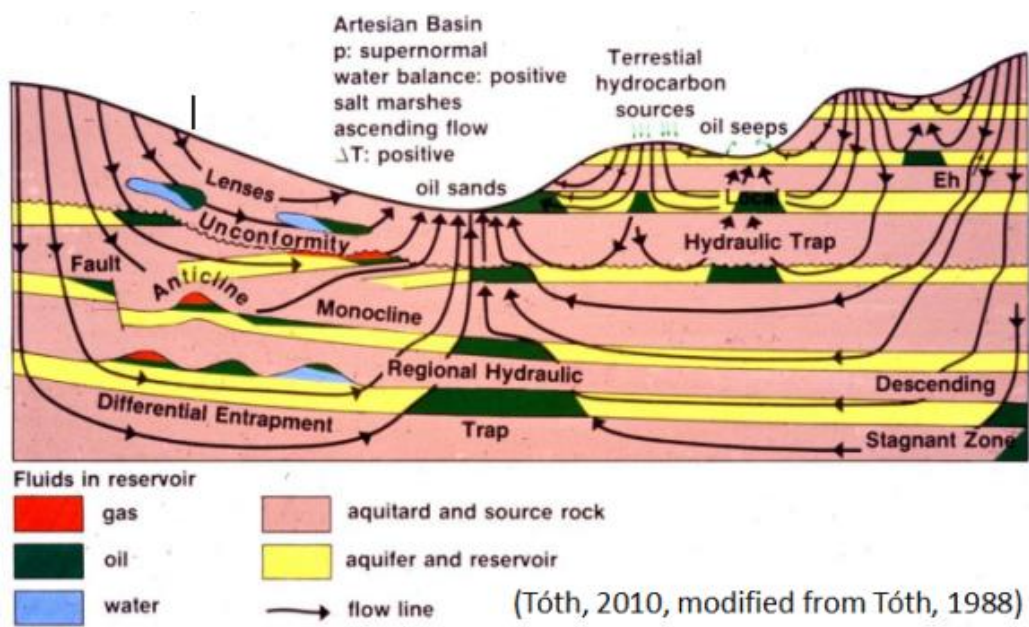
Schematic conceptual model



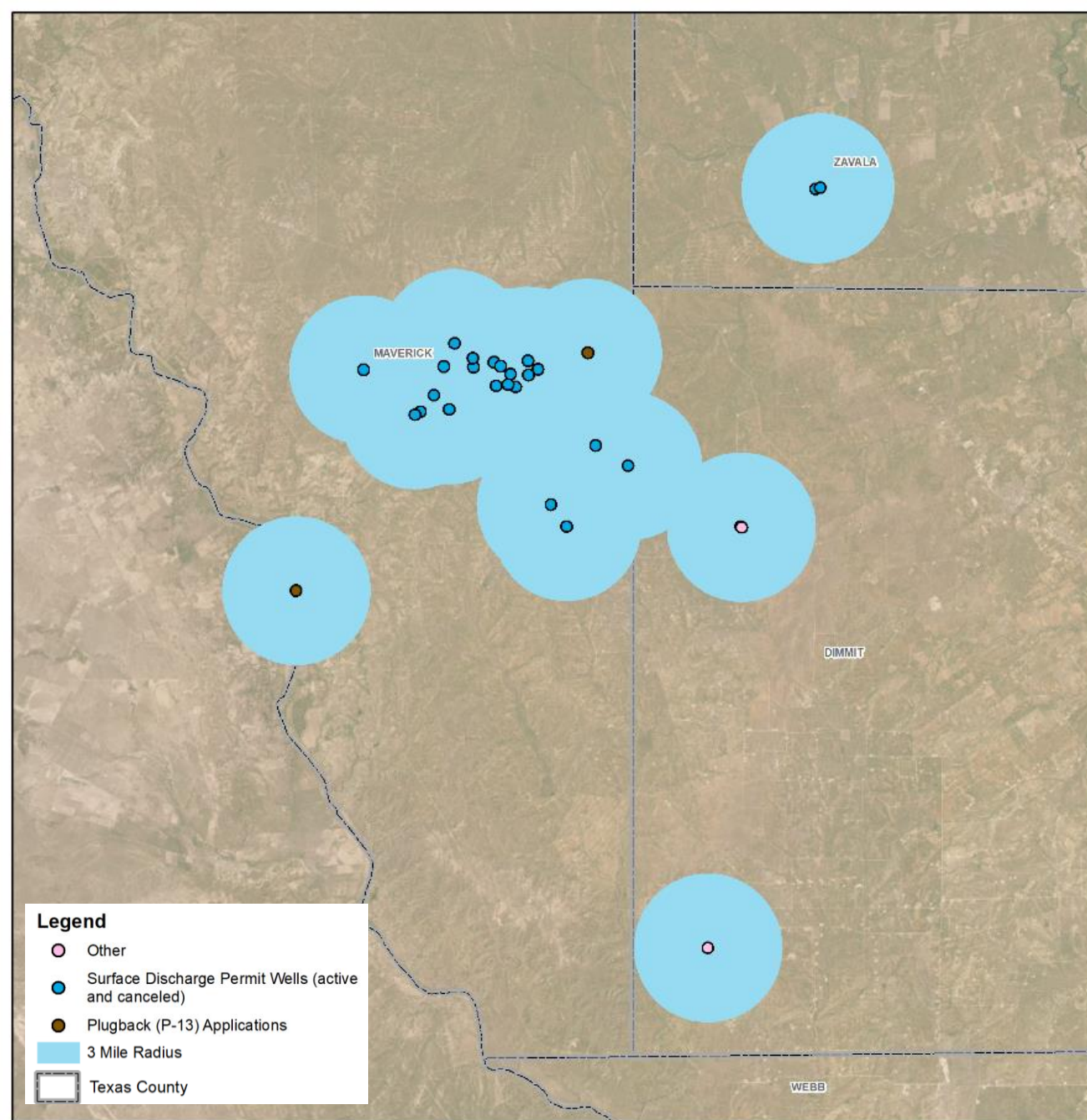
Hydrothermal alteration



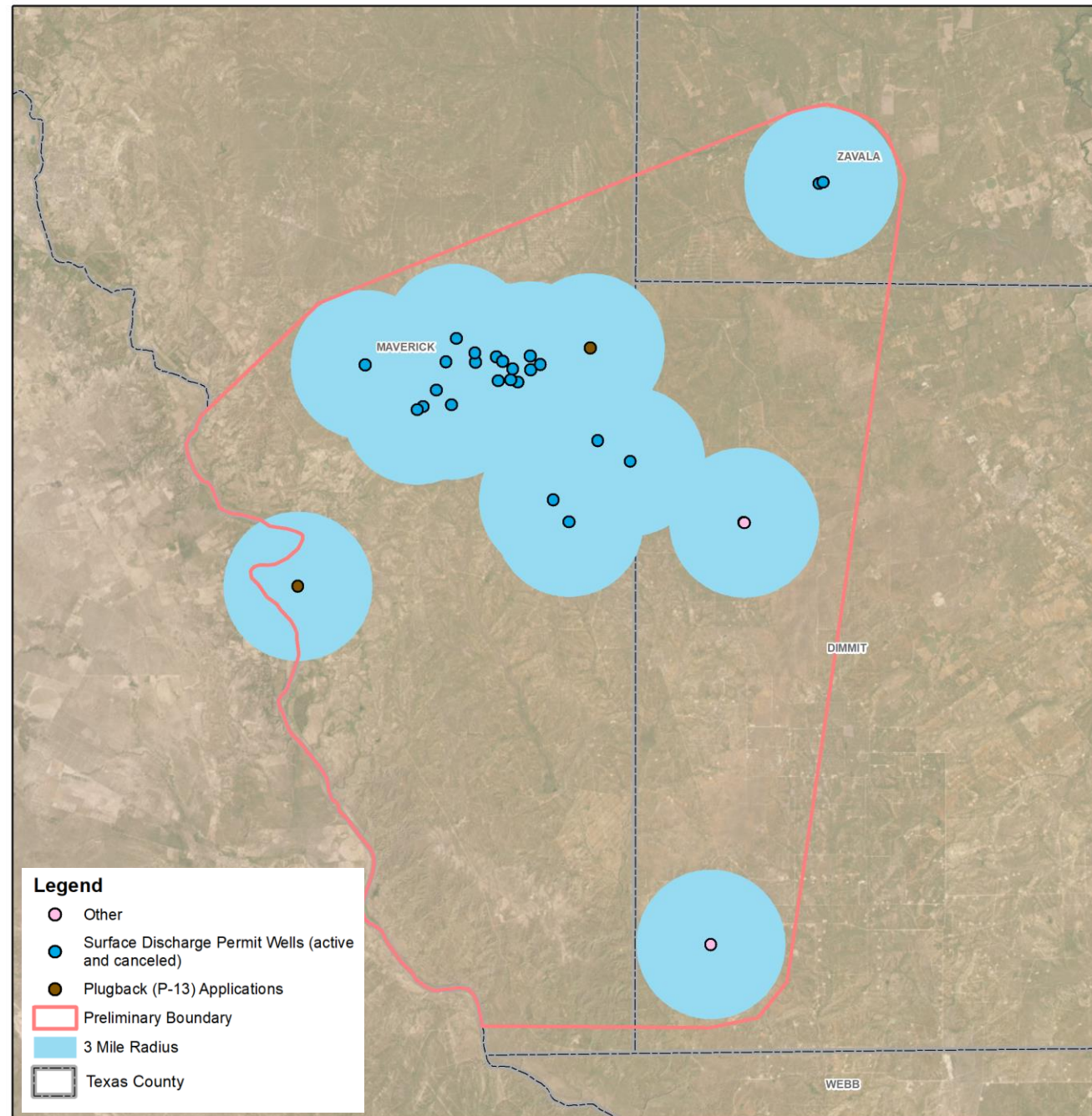
It's all one system



3mi Radii



Prelim Aquifer Boundary



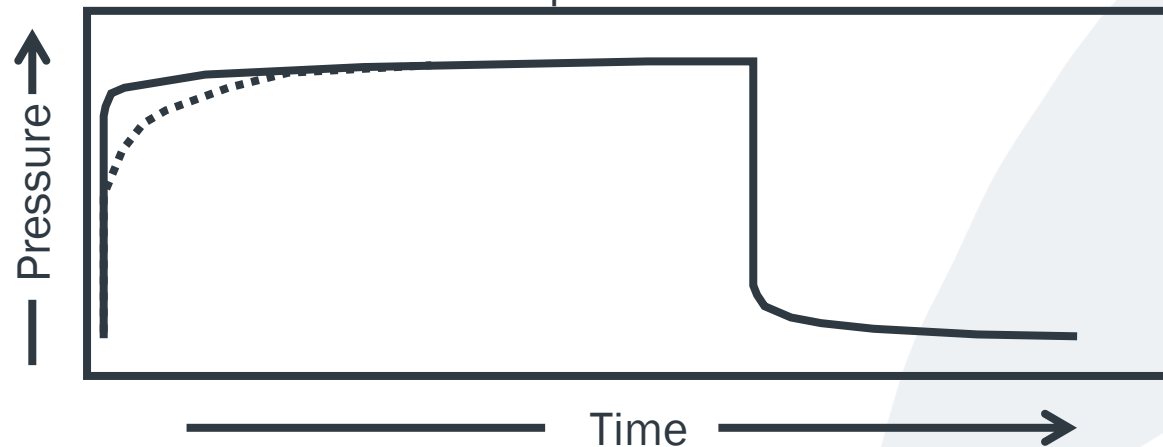
Data Collection

Easy to collect:

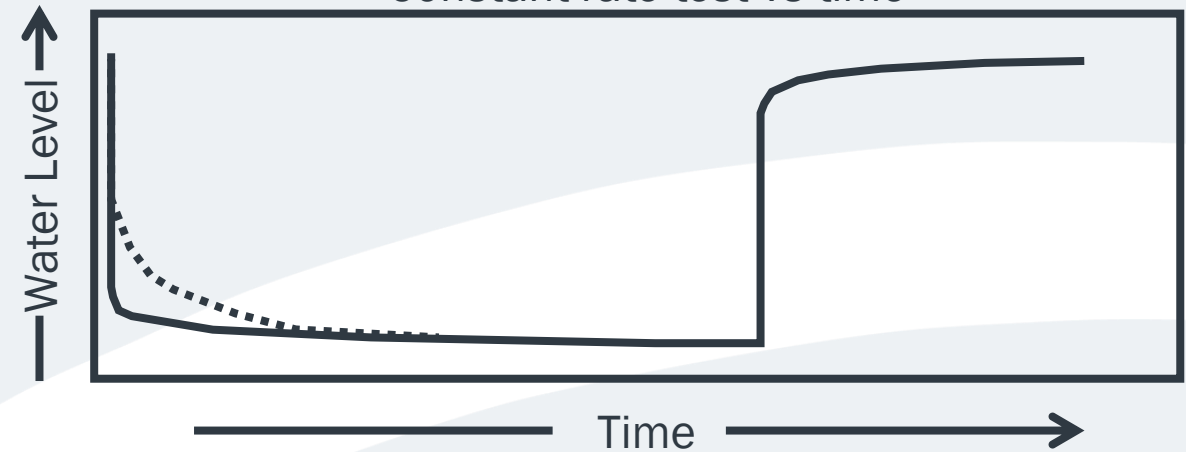
- Shut-in pressure at each well – can be used to examine flow rate vs pressure
 - 2.3ft head per psi
 - 10gpm at 1psi (shut in) is 10gpm/2.3ft drawdown
- Is the well available for pump testing?



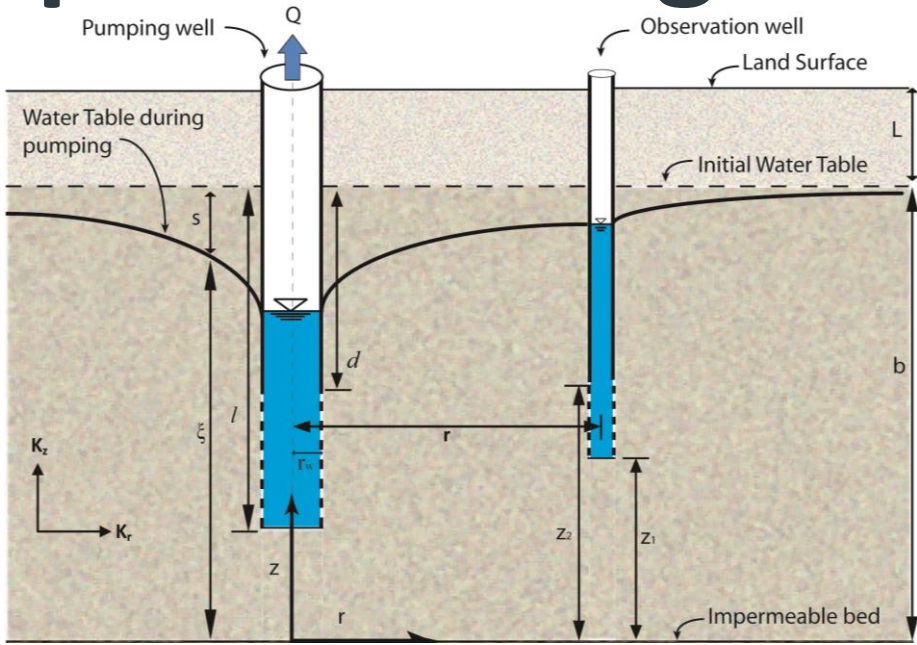
Shut-in pressure vs time



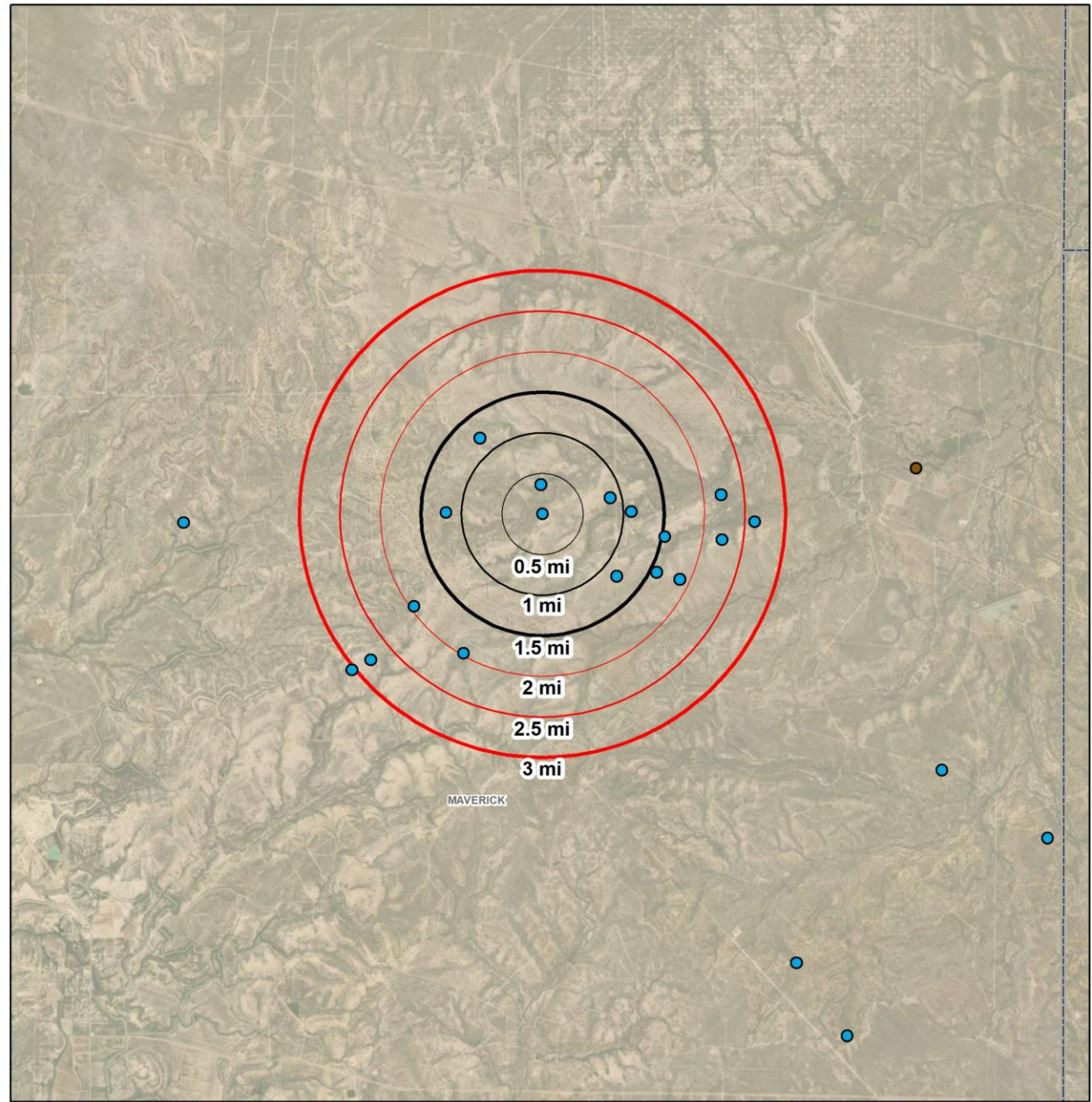
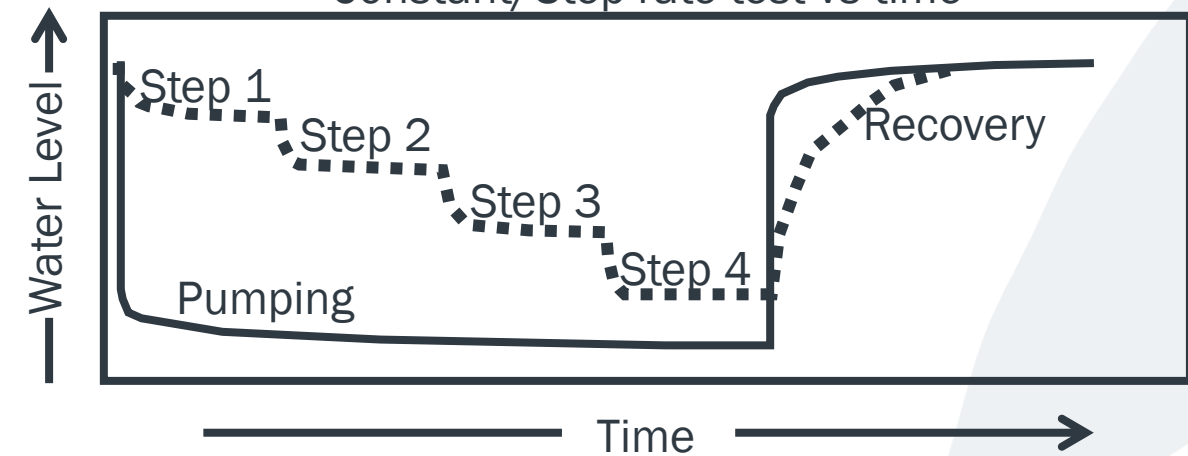
Constant rate test vs time



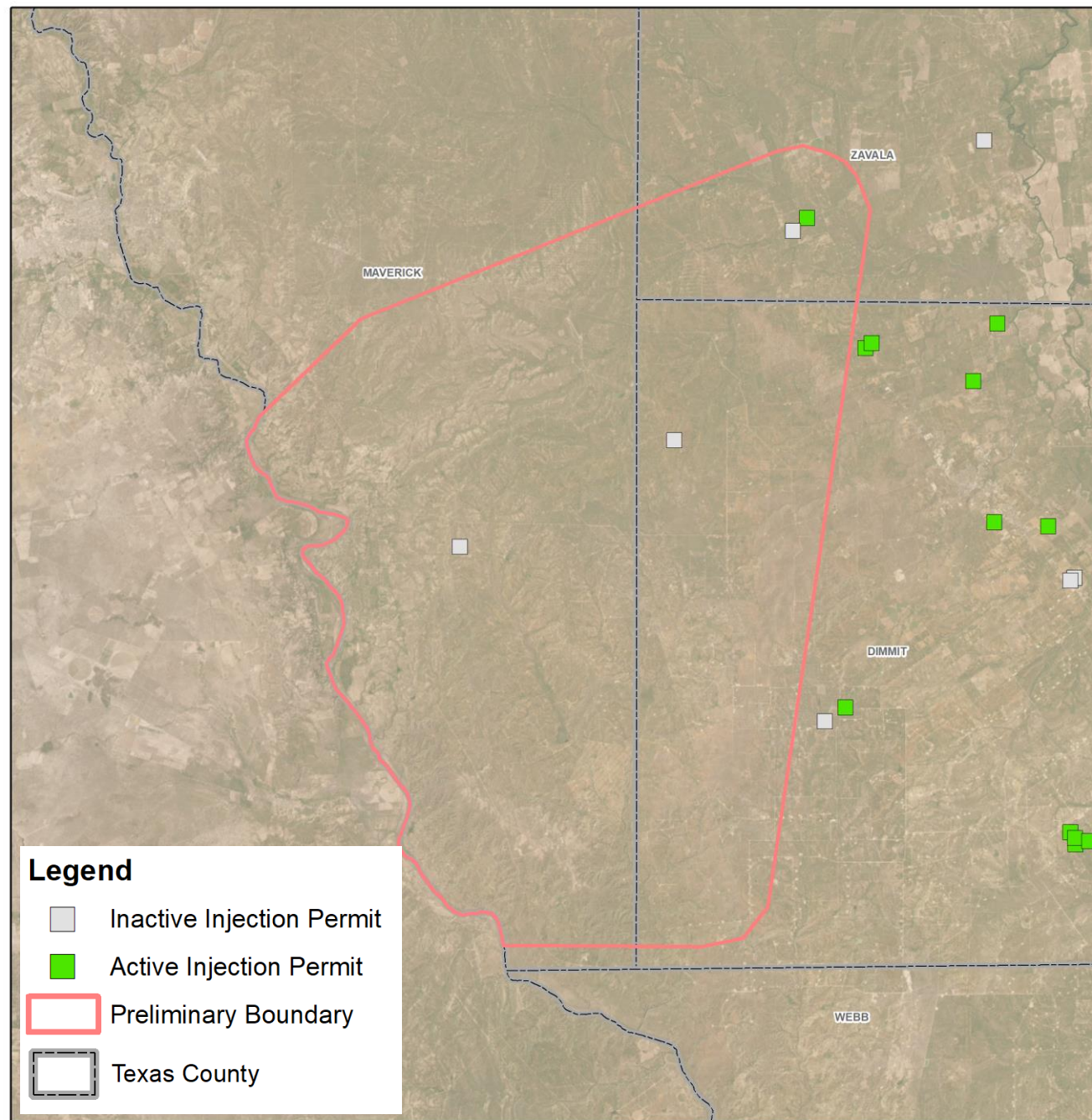
Aquifer Testing



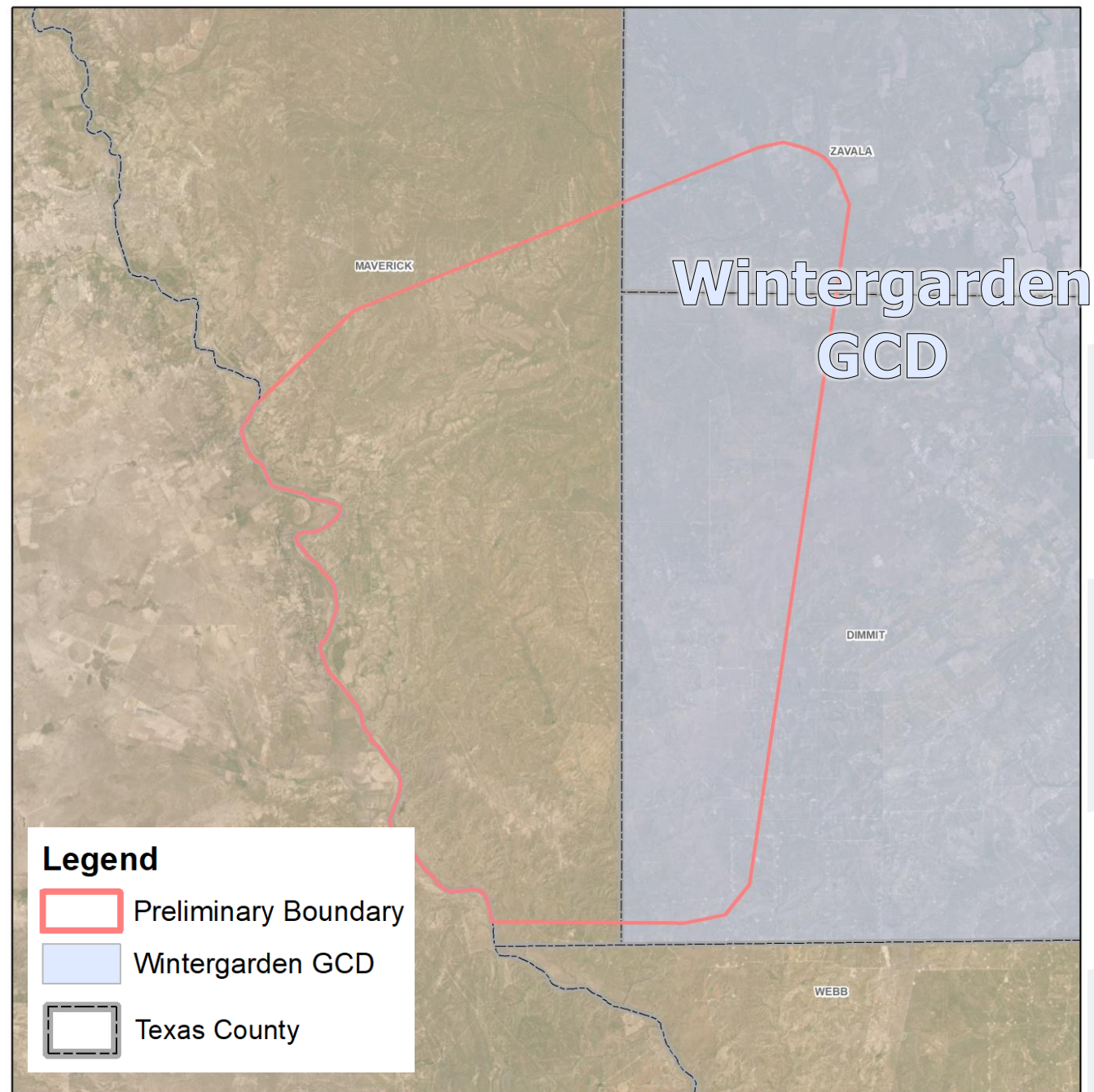
Constant/Step rate test vs time



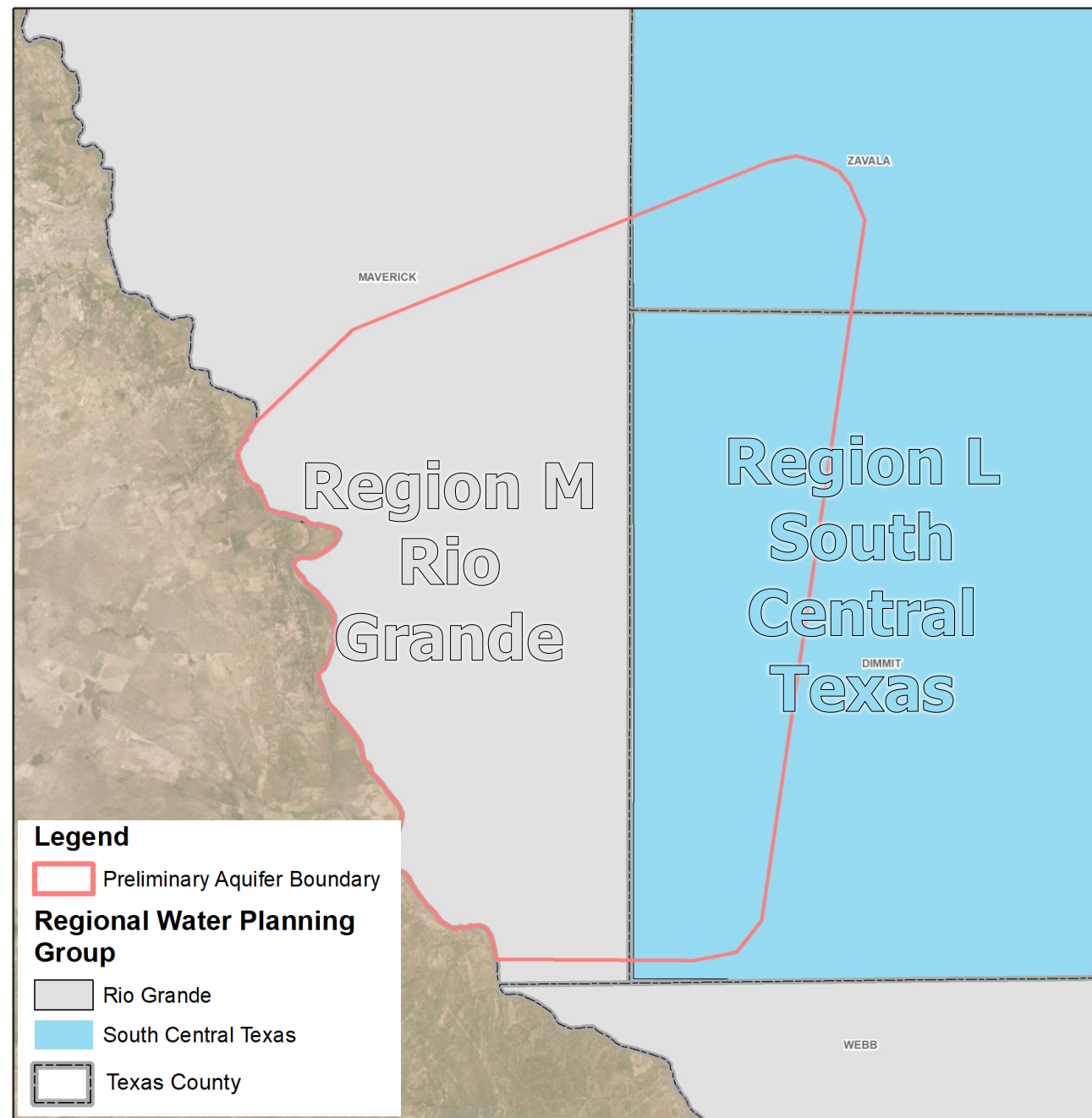
RRC Injection Wells



GCDs



Regional Water Planning Groups



Far Future Work

- Increased data between Comanche Halsell 6500 and recharge zone
- Further analysis of high-quality produced water

Special Thanks

- Evan Strickland
- Robert O'Brien, Saxet Petroleum
- Teresa Montemayor, CMR Energy
- Dr. Rosario Sanchez
- RRC GAU, James Harcourt

