

Lost Pines GCD

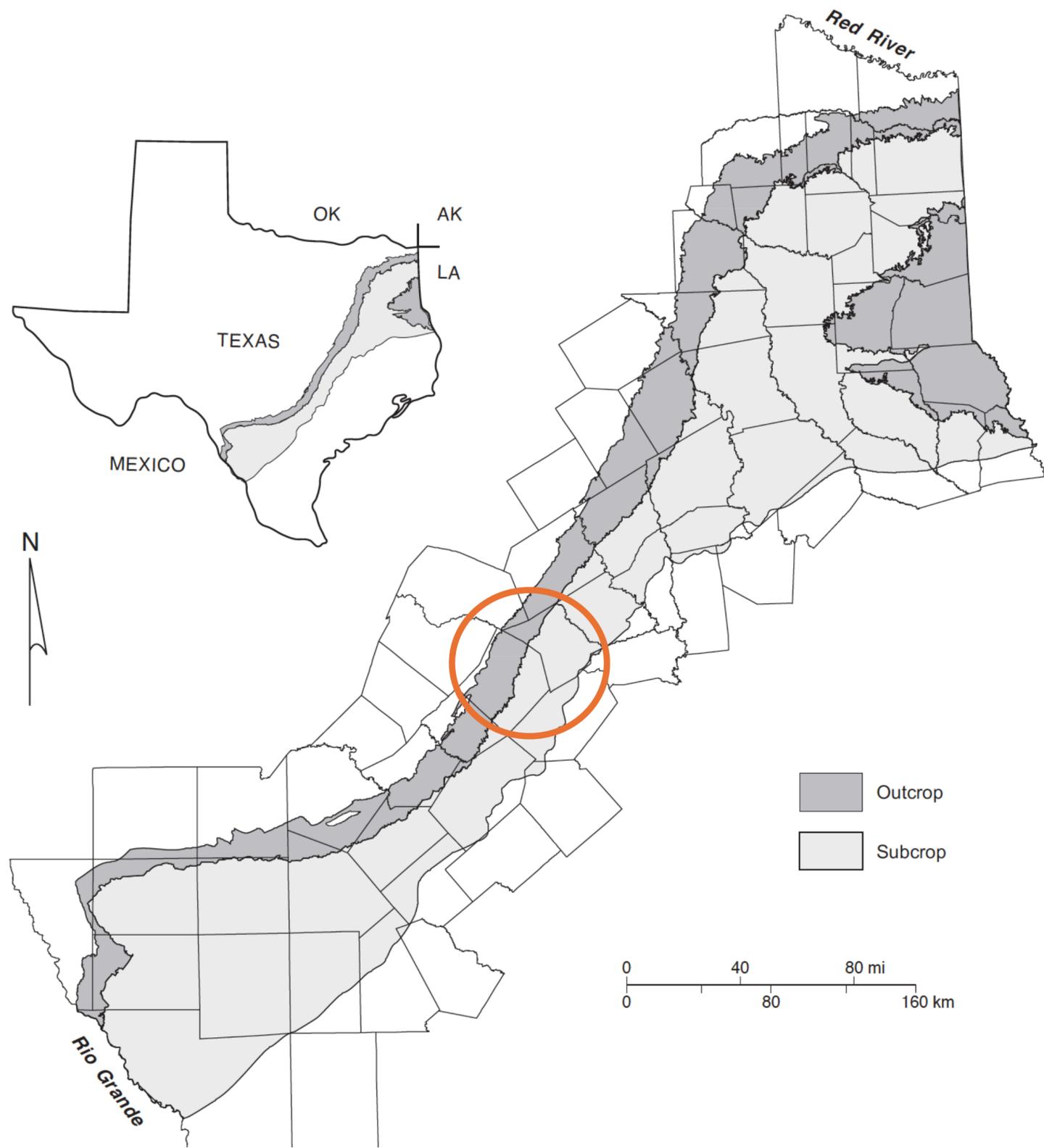
How Science is Shaping Groundwater Management in Bastrop and Lee Counties

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LRE Water

Elvis Hernandez, Lost Pines GCD





Importance of the Carrizo-Wilcox for the Bastrop & Lee Counties

- Just east of Austin, TX
- Lee County is mostly rural
- Bastrop County is experiencing rapid growth; Colorado River
- Several large export permits (which have not yet begun):

Recharge - 25,000 ac-ft/yr

Gatehouse - 18,500 ac-ft/
yr

LCRA - 8,000 ac-ft/yr

What are the impacts of large permits to Lost Pines Groundwater Conservation District aquifers and wells?

Which aquifers are our wells completed in?

What are the impacts of a 240-foot DFC drawdown in the Simsboro aquifer to the aquifers and for well owners?

What locations should official DFC monitoring wells be at?



LPGCD had questions...

3D Mapping Project

- The LPGCD needed a plan to address the missing pieces and database gaps.
- LRE Water was hired to provide modeling expertise and guidance.
- A timeline was created to address the gaps. The foundation was the 3D map.

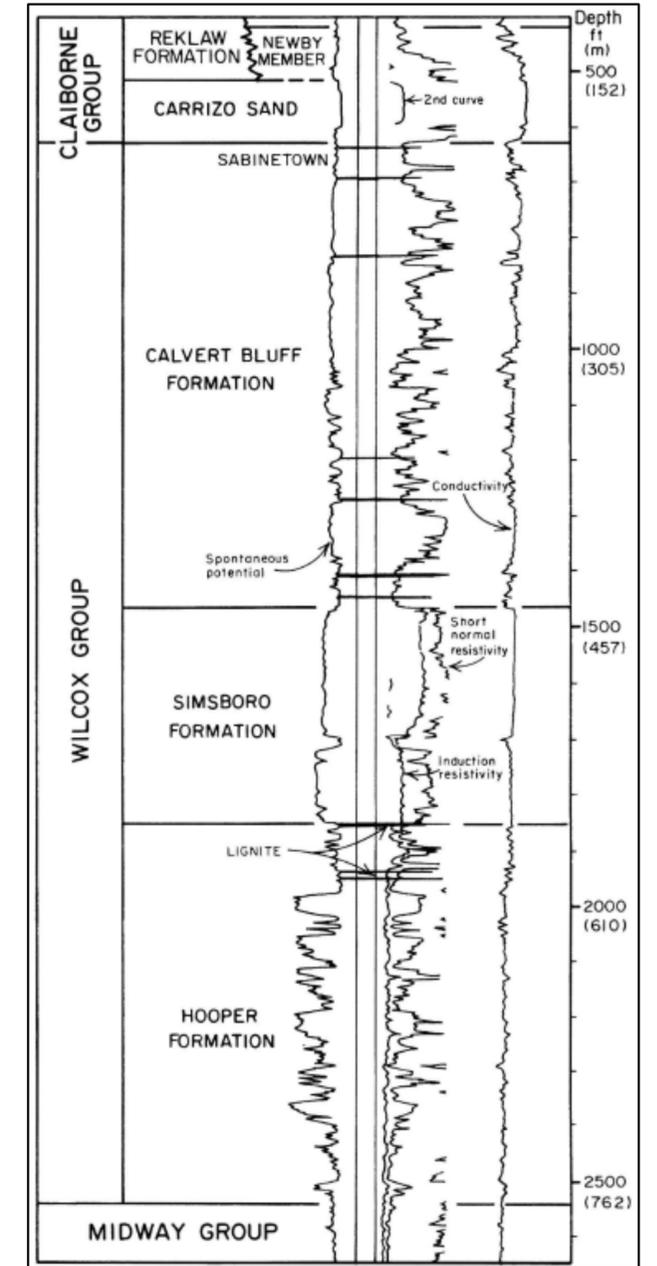
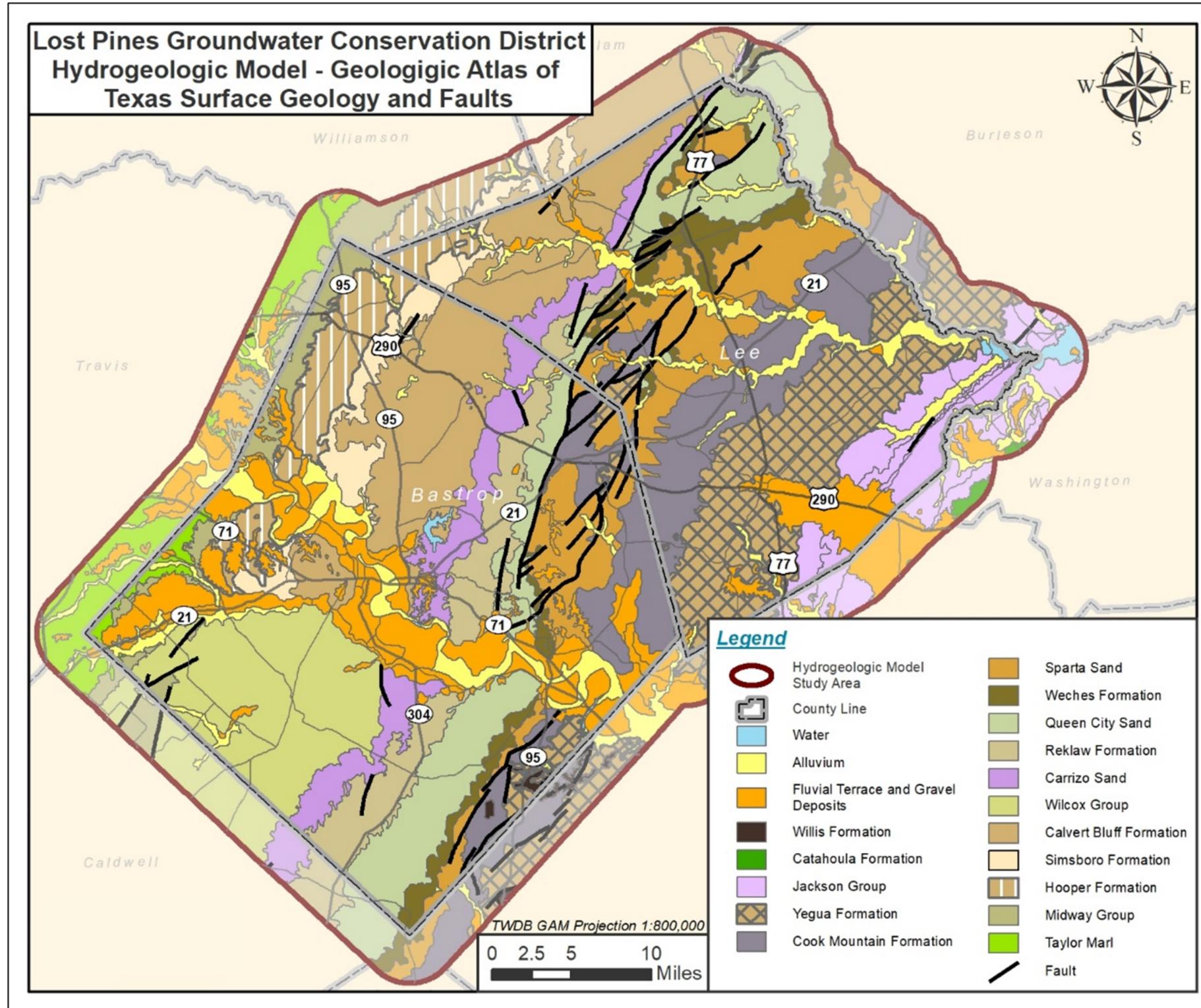
Analyzed 2,000+ geophysical logs

Duration: 1 year

Foundation for all future studies

Mapped aquifer depths and thickness which provided the data to assign aquifers to most wells.

3D Mapping Project



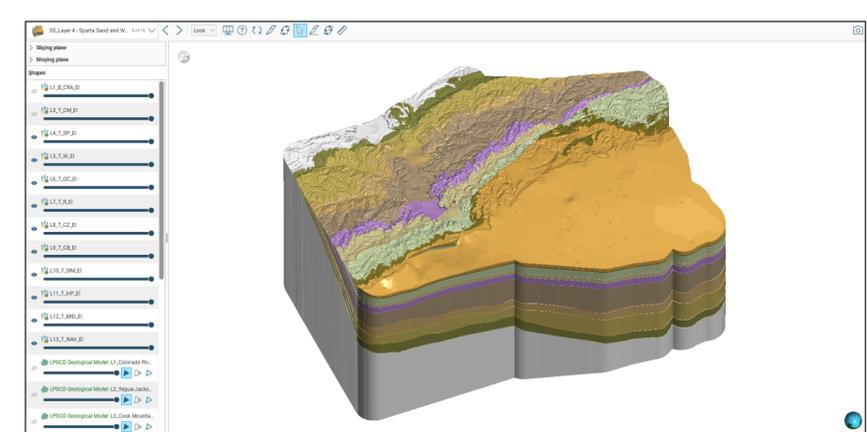
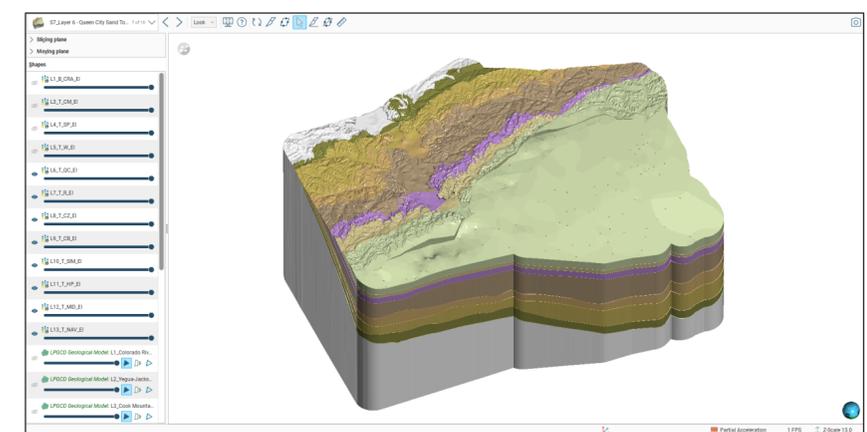
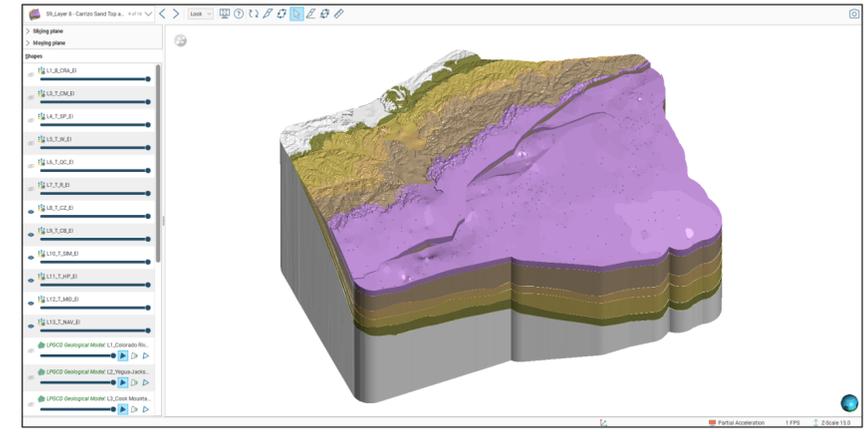
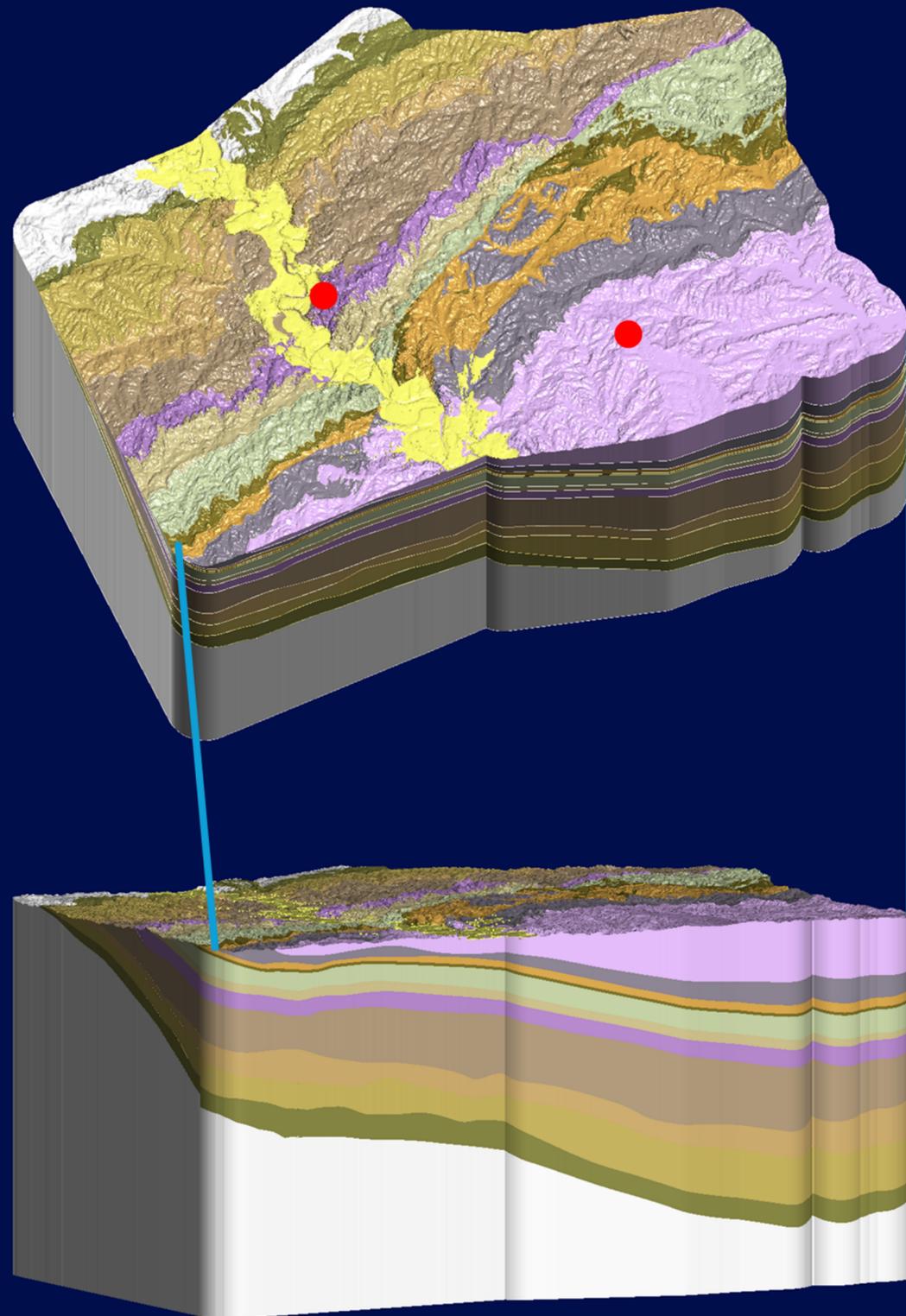
Geophysical "Type Log" for the Carrizo-Wilcox Aquifer (Ayers and Lewis, 1985)

3D Mapping Project

LPGCD Geological Model

- L1_Colorado River Alluvium
- L2_Yegua-Jackson
- L3_Cook Mountain
- L4_Sparta Sand
- L5>Weches
- L6_Queen City Sand
- L7_Reklaw
- L8_Carrizo Sand
- L9_Wilcox, Calvert Bluff
- L10_Wilcox, Simsboro
- L11_Wilcox, Hooper
- L12_Midway Group
- L13_Undifferentiated Cretaceous

● County Seats (Giddings and Bastrop)



Understanding Drawdown Differently

The Challenge

Drawdown measured in feet (e.g., 240 feet in the Simsboro by 2070) can be difficult for the public and stakeholders to visualize or understand.

A Clearer Approach

Drawdown can be converted to % remaining artesian head and vice-versa. Expressing drawdown as a percentage of remaining artesian head is more intuitive.

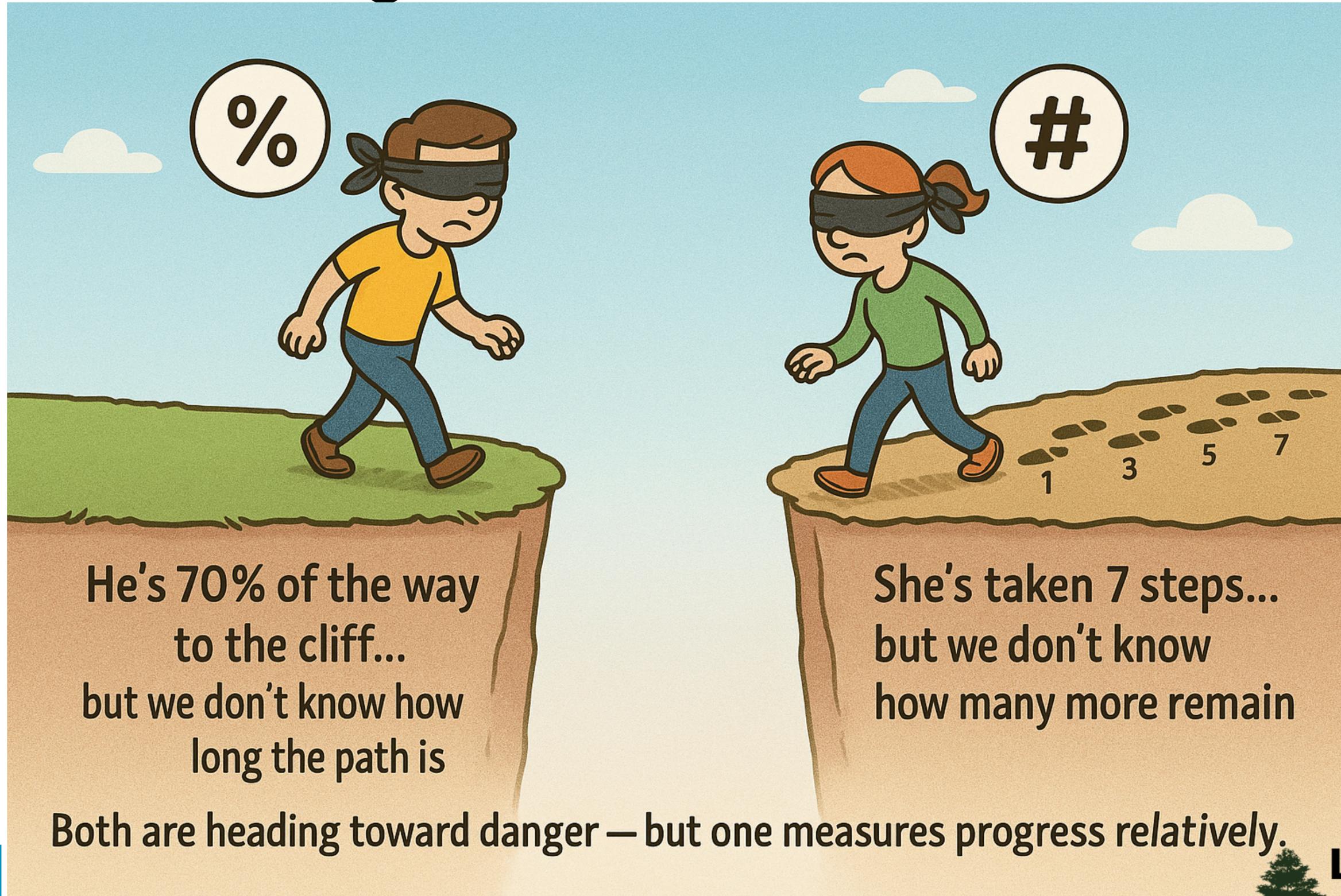
Our Goal

The LPGCD Desired Future Conditions (DFCs) will, on average, keep 50% of the artesian head in District wells by 2070.

Why It Matters

Framing drawdown this way helps stakeholders better grasp the long-term impacts on groundwater availability and sustainability

% remaining artesian head vs. drawdown



Both are heading toward danger — but one measures progress *relatively*.

Aquifer & Well Impact Studies

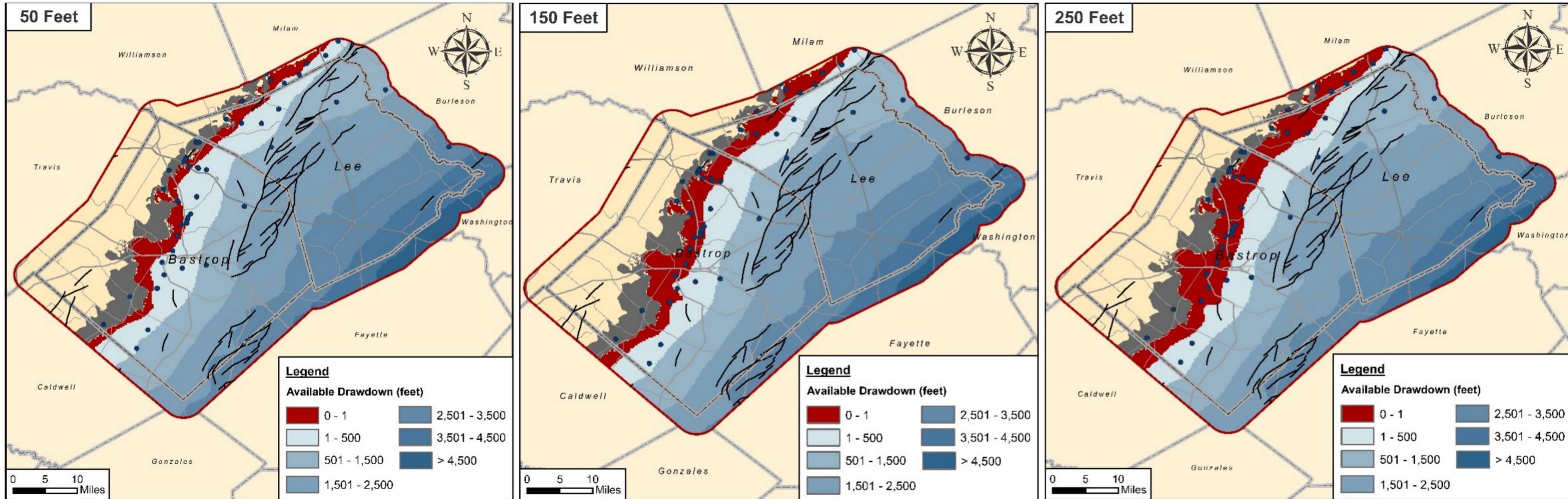
Purpose

- To evaluate the effects of groundwater permits and Desired Future Conditions (DFCs) on aquifers and individual wells across the District.

Findings

- Areas along the outcrop are most vulnerable, with some areas projected to reach zero remaining artesian head.
- Without curtailment, DFCs will be exceeded well before 2070.

Projected Well Impacts - Simsboro



Expanding the Monitoring Network

Purpose

- Conduct a detailed study to identify optimal monitoring well locations across all aquifers and regions of the District.

Plan

- Expand the current network from 20-30 wells to over 100 DFC monitoring wells.

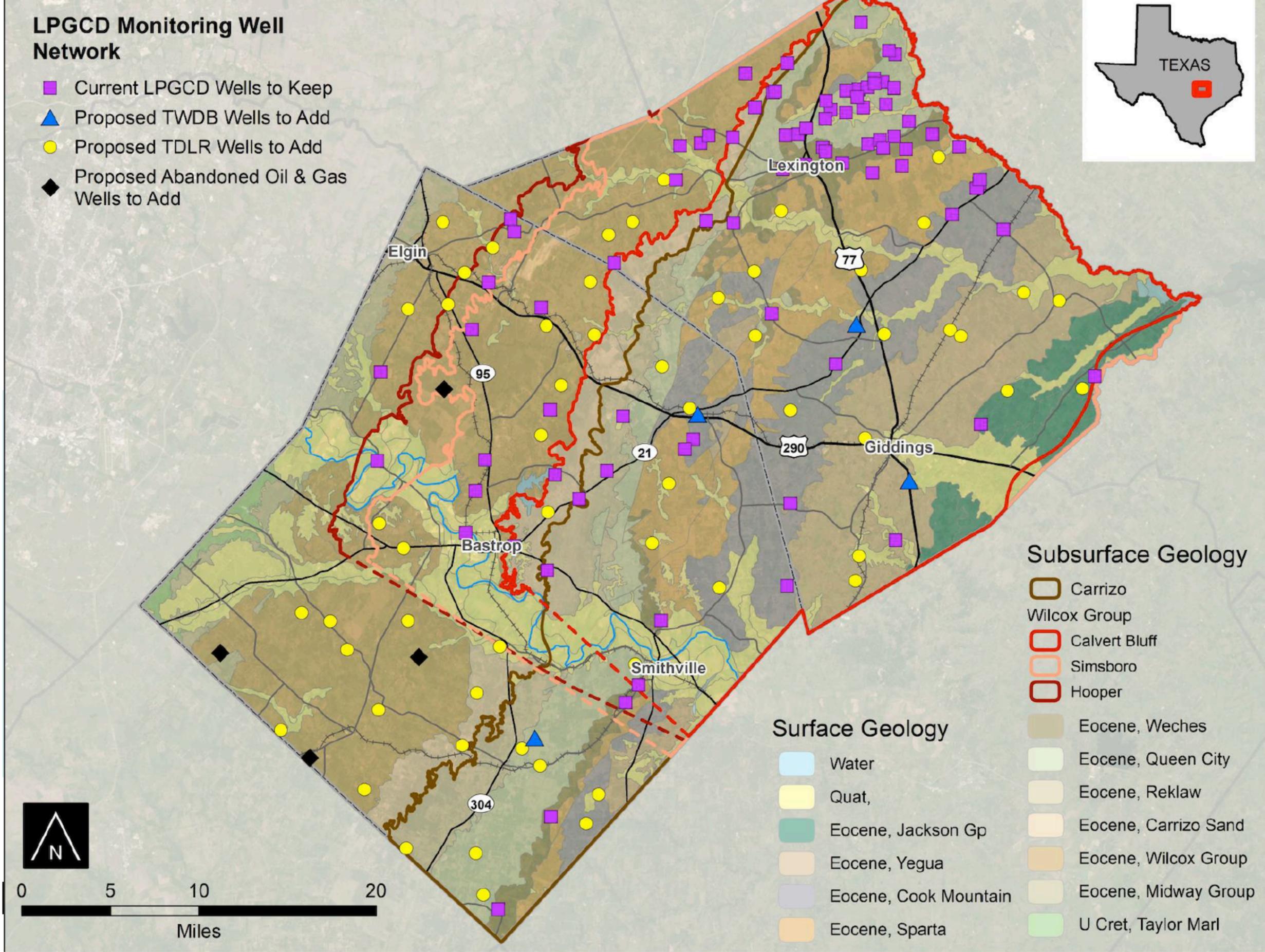
Monitoring Strategy

- Biannual water level measurements
- Baseline water quality sampling for all new monitoring wells



LPGCD Monitoring Well Network

- Current LPGCD Wells to Keep
- ▲ Proposed TWDB Wells to Add
- Proposed TDLR Wells to Add
- ◆ Proposed Abandoned Oil & Gas Wells to Add



Subsurface Geology

- Carrizo
- Wilcox Group
- Calvert Bluff
- Simsboro
- Hooper
- Eocene, Weches
- Eocene, Queen City
- Eocene, Reklaw
- Eocene, Carrizo Sand
- Eocene, Wilcox Group
- Eocene, Midway Group
- U Cret, Taylor Marl

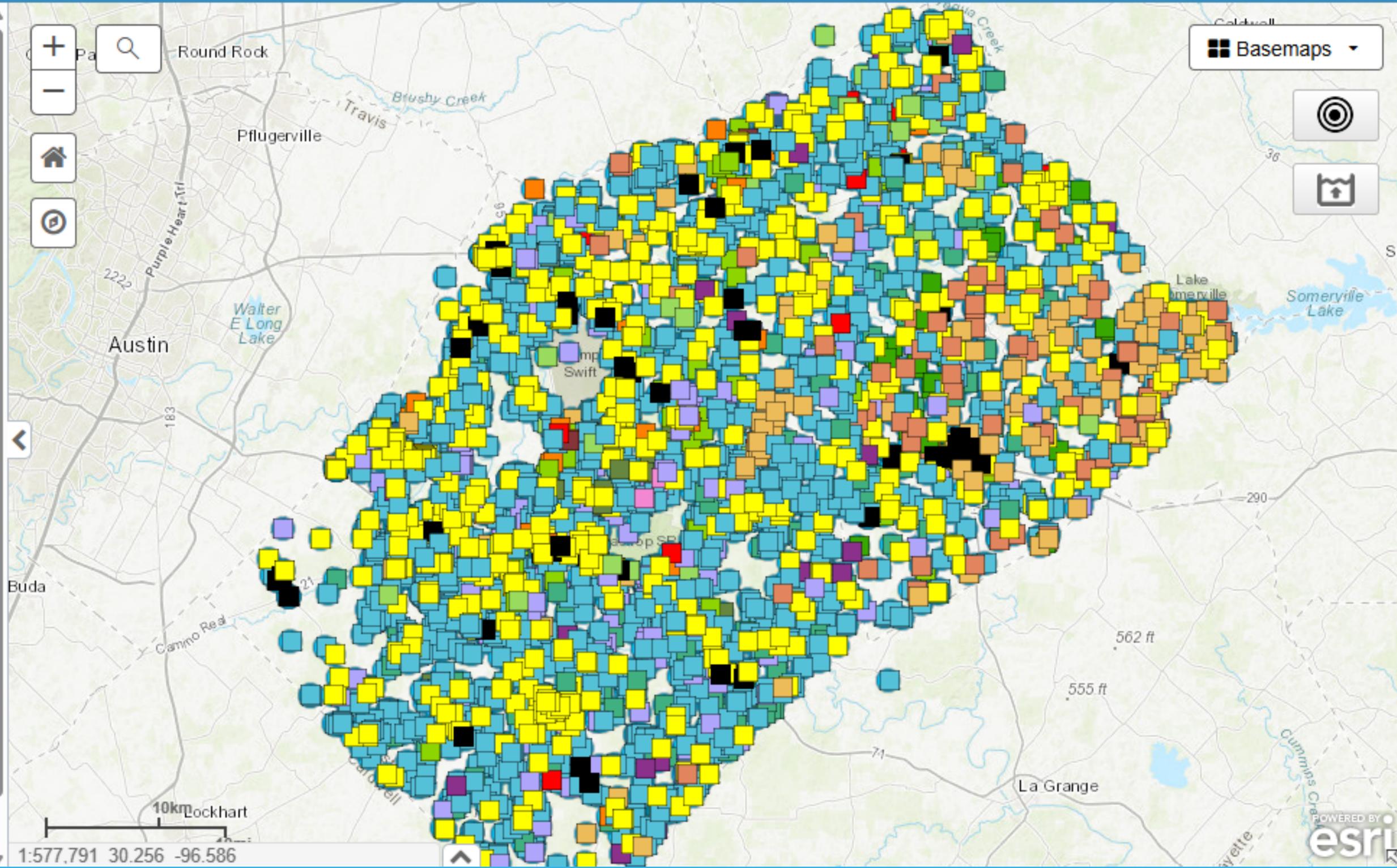
Surface Geology

- Water
- Quat,
- Eocene, Jackson Gp
- Eocene, Yegua
- Eocene, Cook Mountain
- Eocene, Sparta

Data Management Overhaul

- Integrated the Halff database in 2022
- Incorporated 3D map data into the Bore Tool
- Major database update in 2024 added aquifer settings and well construction details
- Board resolution to archive comprehensive well information
- Added a bulk upload tool of water level and production data
- Began tracking unregistered wells in the database

- Layers
- Legend
- Bookmarks
- Identify
- Find
- Draw
- Measurement
- Print
- Google Street View
- Open External Map
- Radius Rings
- Go To Coordinate
- Search
- Radar Rainfall Loop





LPGCD Virtual Bore

Giddings, TX

Approximate Ground Surface Elevation

498.22

Top Elev. (ft)	Bottom Elev. (ft)	Depth to Formation (ft)*	Formation Thickness (ft)*	Formation (Geologic Unit)
498.2	133.4	0	364.8	Yegua-Jackson
133.4	-145.6	364.8	279	Cook Mountain
-145.6	-339.1	643.9	193.5	Sparta Sand
-339.1	-419.1	837.3	80	Weches
-419.1	-879	917.3	459.9	Queen City Sand
-879	-1111.4	1377.2	232.4	Reklaw
-1111.4	-1517.1	1609.6	405.7	Carrizo Sand
-1517.1	-2717.8	2015.3	1200.7	Wilcox, Calvert Bluff
-2717.8	-3572.7	3216.1	854.8	Wilcox, Simsboro
-3572.7	-4525.4	4070.9	952.7	Wilcox, Hooper
-4525.4	-5011.0	5009.6	485.9	Midway Group

3D map data incorporated into the Halff well database Bore Tool

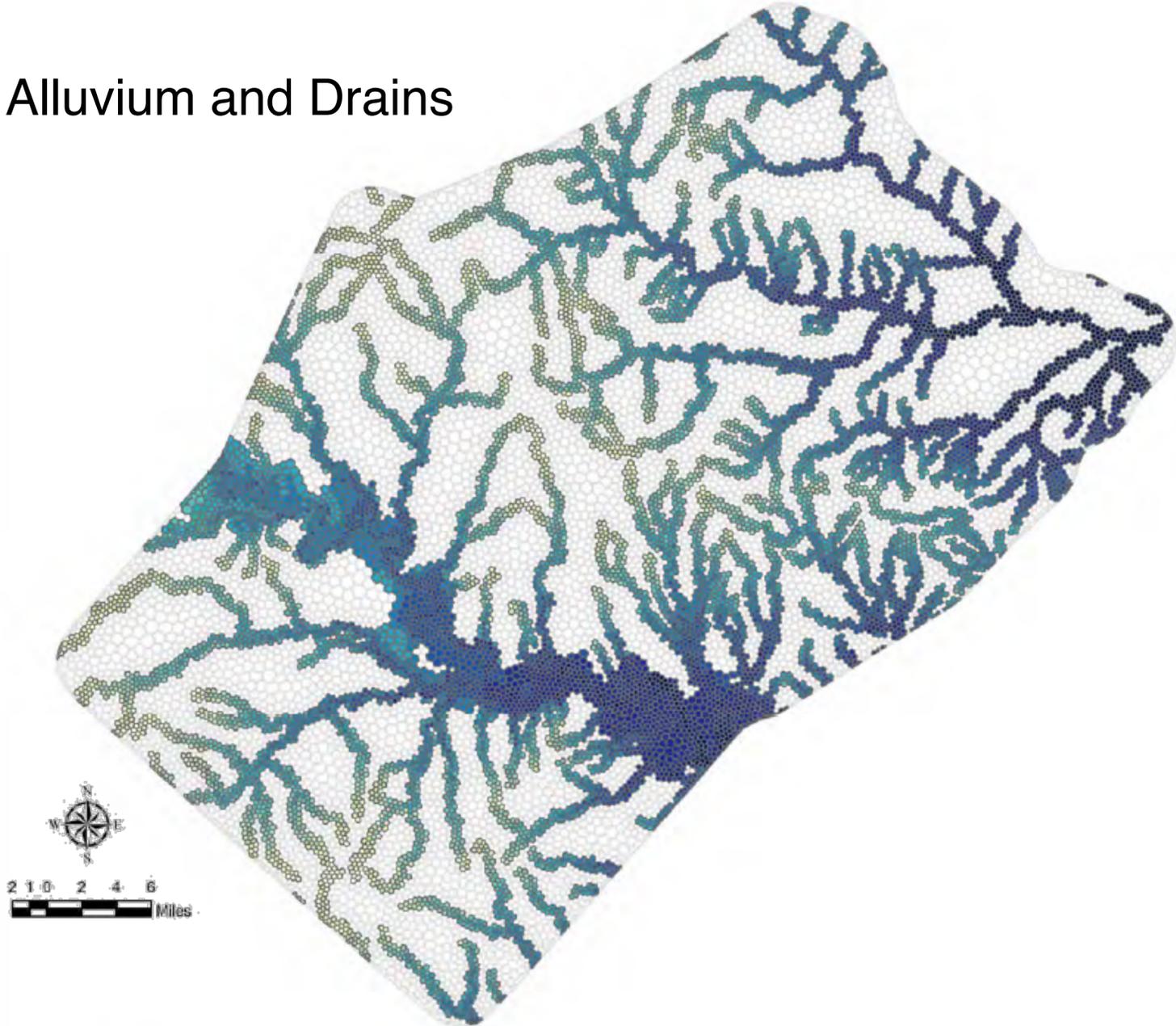
Creating a Local Groundwater Availability Model

- 2024: Received a \$150,000 matching grant from the Federal Bureau of Reclamation to create a local LPGCD model.
- Model upgrades: Transition to MODFLOW 6, high-resolution Voronoi grid
- Completion target: 2026
- Outcome: More accurate scenario analysis to support permitting decisions and conservation planning

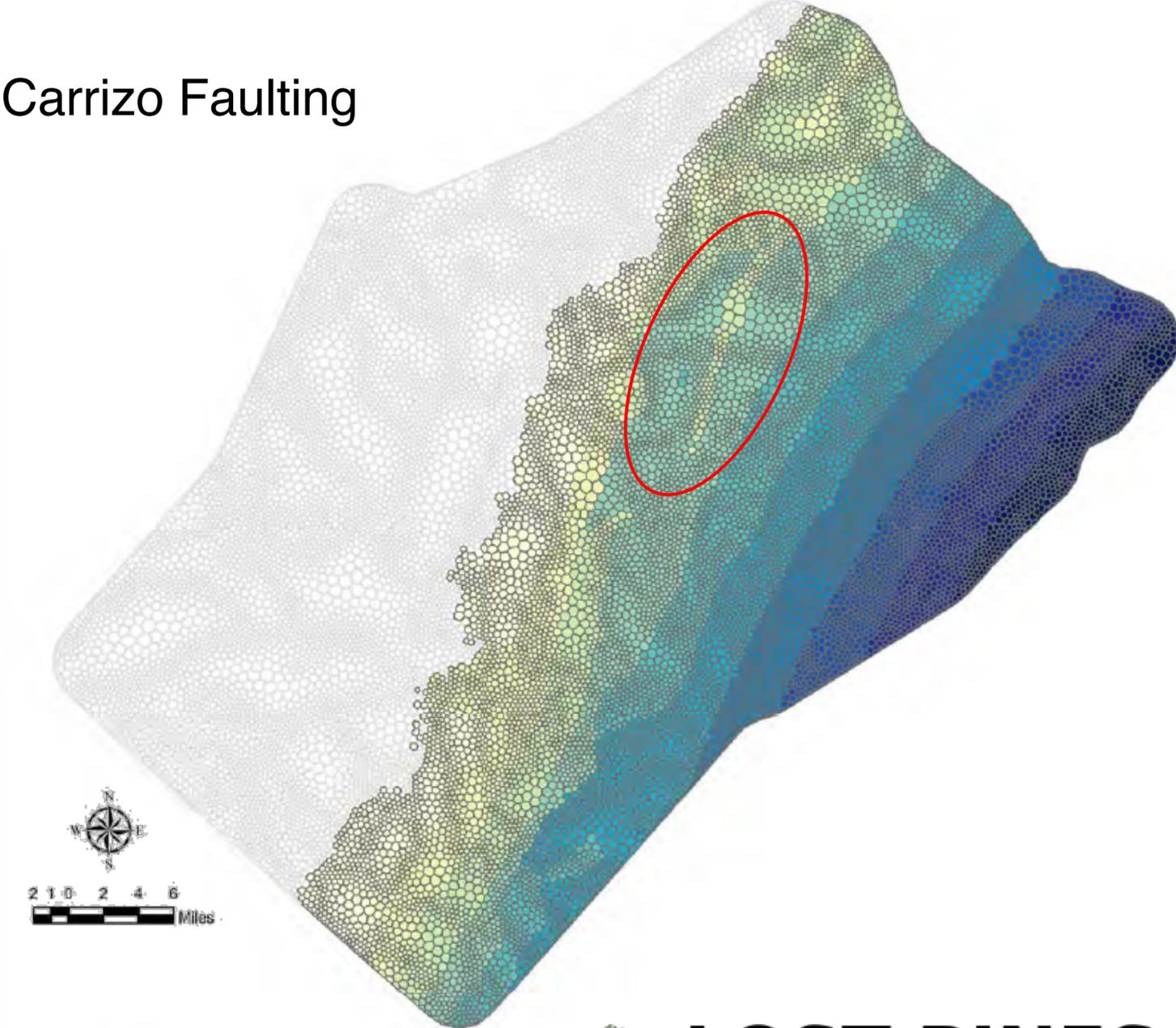


Creating a Local Groundwater Availability Model

Alluvium and Drains



Carrizo Faulting



Today's Data Is Tomorrow's Foundation

- Groundwater sustainability depends on consistent, high-quality data collection, archive and reporting.
- Continued partnerships and funding are essential to expand monitoring and improve models.
- Our work today is the foundation for informed decision and resilient water management tomorrow.





2025

TEXAS GROUNDWATER SUMMIT

Hyatt Regency Hill Country Resort • San Antonio, TX • August 19-21

Questions?

www.lostpineswater.org

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