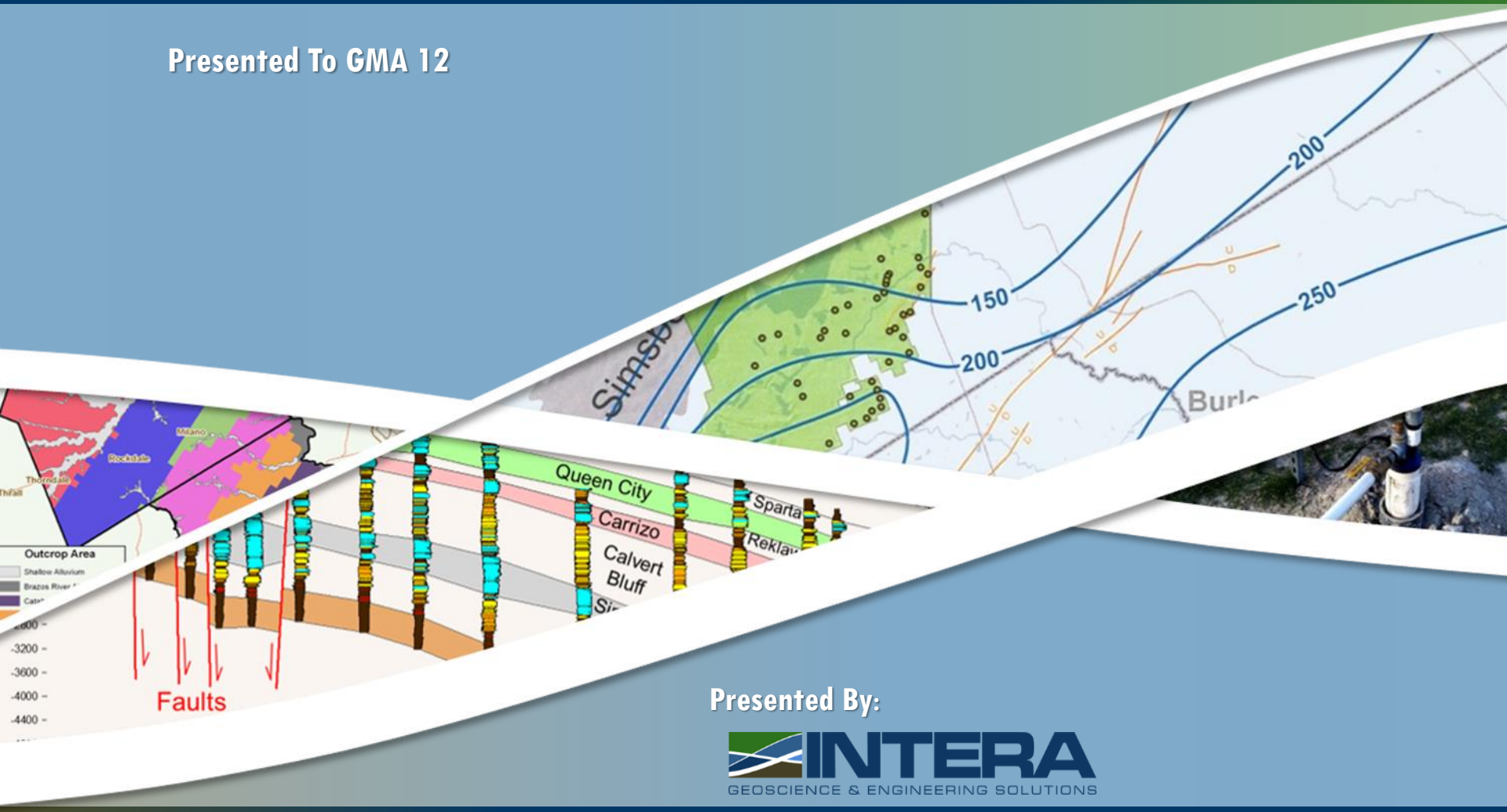
Update on POSGCD Aquifer Science: Groundwater Modeling

Presented To GMA 12



Presented By:

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

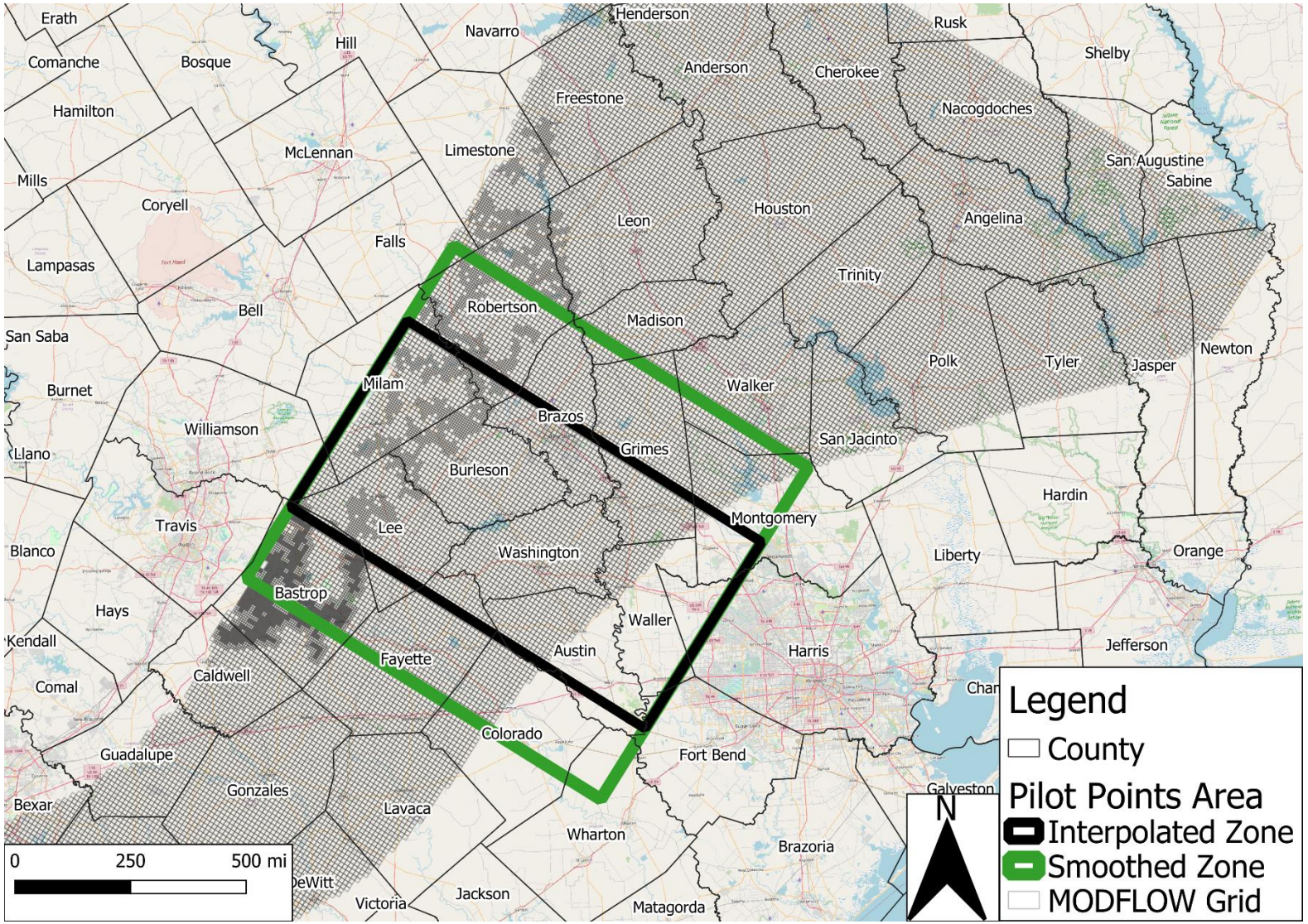
October 6, 2021

Groundwater Modeling Scope of Work

- 2021 Scope of Work
  - Focus on Improved Calibration of GAM on POSGCD area
  - Focus Recalibration on Impacts caused by Vista Ridge Pumping
  - Assess Uncertainty in Predicted Drawdown

- Possible 2022 Scope of Work
  - Evaluate Logs for Aquifer Top and Bottoms
  - Develop Historical Pumping File for GMA 12 through 2020
  - Recalibrate Model Based Using Multiple Calibration Data Sets

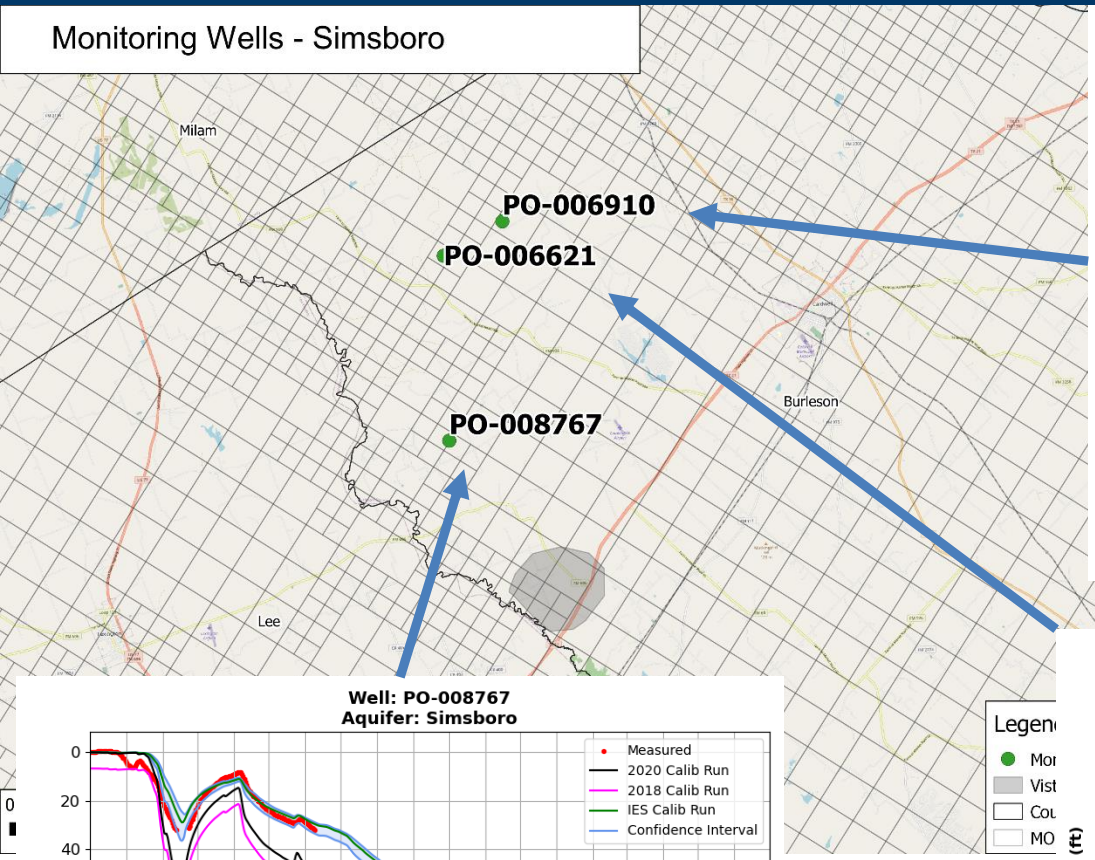
GAM Recalibration Area for Aquifer Hydraulic Properties

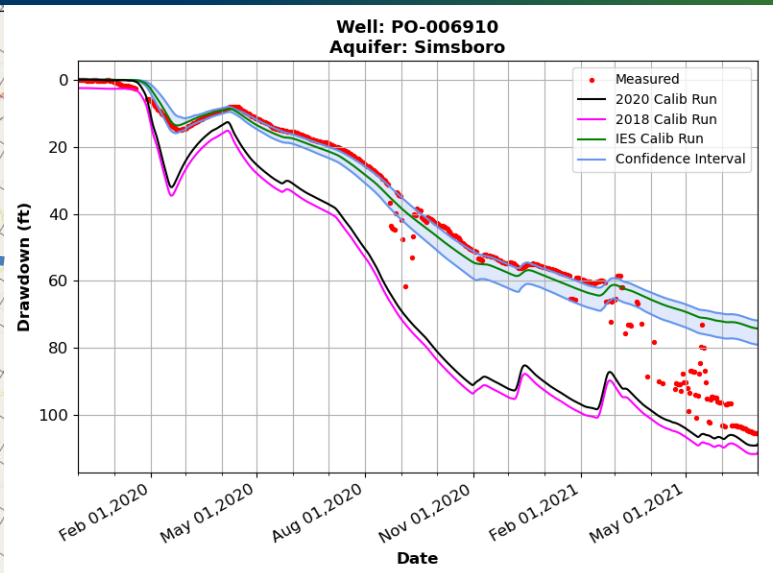


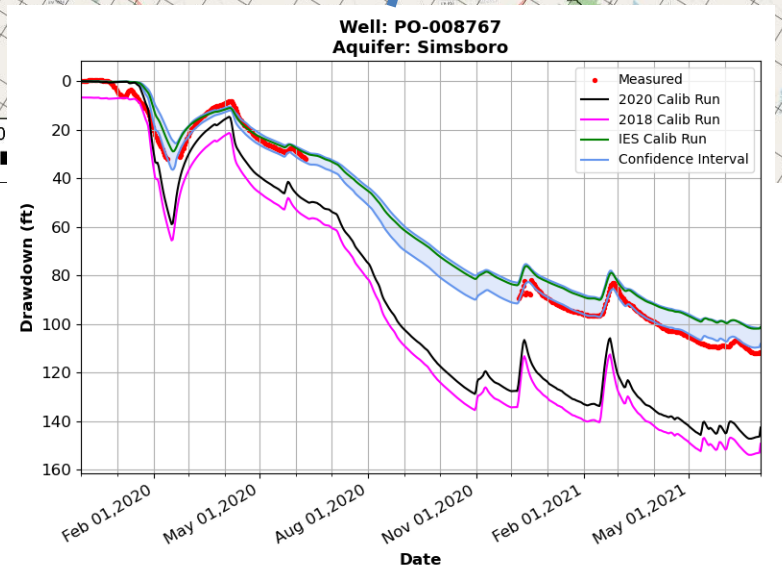
GAM Recalibration Data Sets for 2021

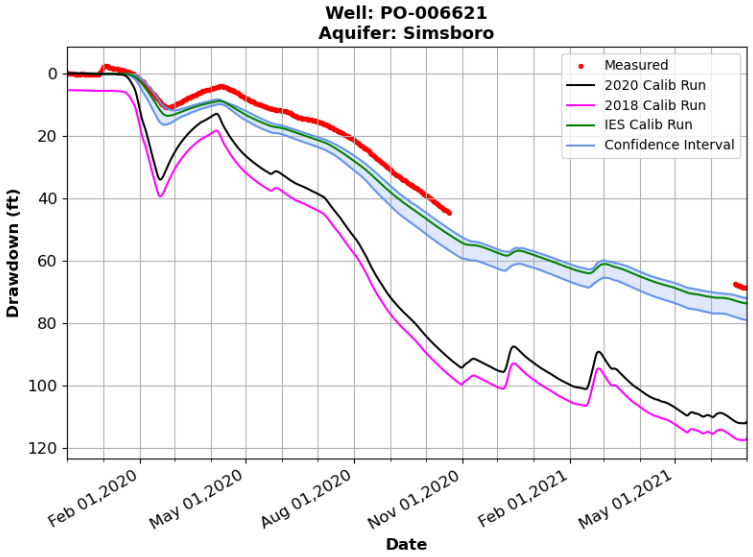
- Same historical data used to calibrate the 2018 GAM from 1929 to 2010
- Aquifer test data from Vista Ridge Simsboro wells used in 2020 GAM Update Plus Vista Ridge Carrizo Wells
- Predictions of drawdown from Vista Ridge Wells from December 2019 to June 2021
  - ignores pumping from other wells
  - monthly time steps with constant pumping

Measured and Modelled Drawdown in Simsboro Wells Since December 2019

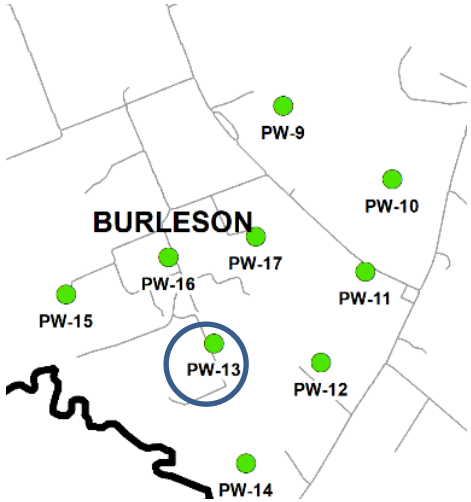


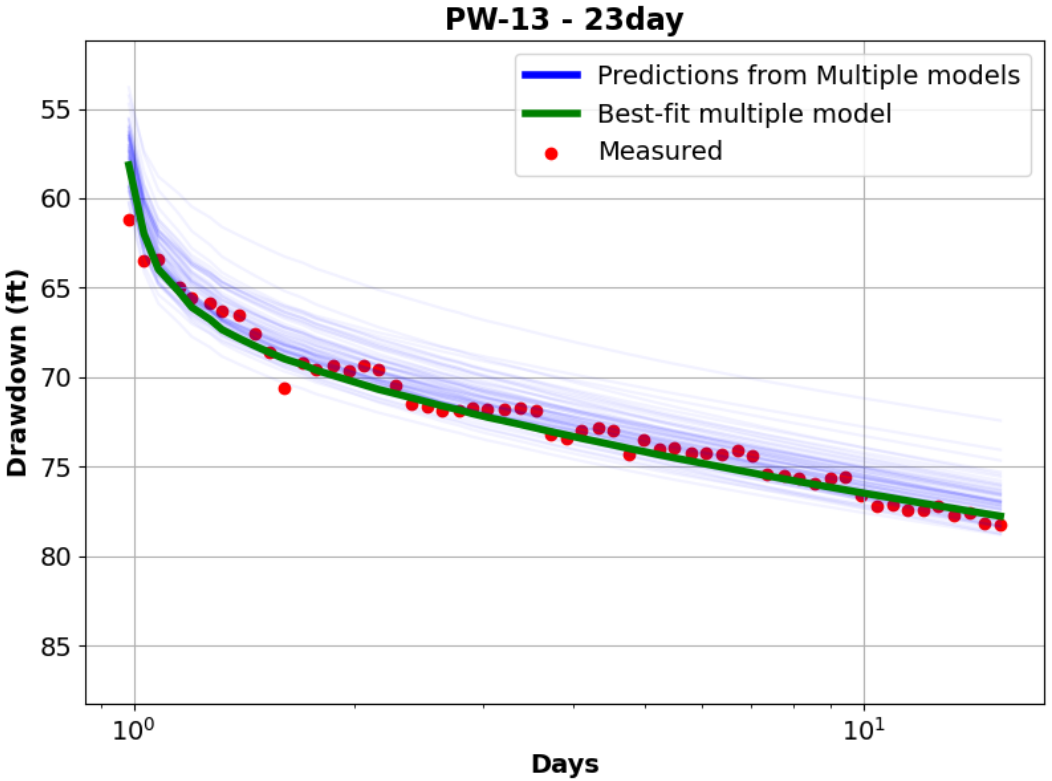


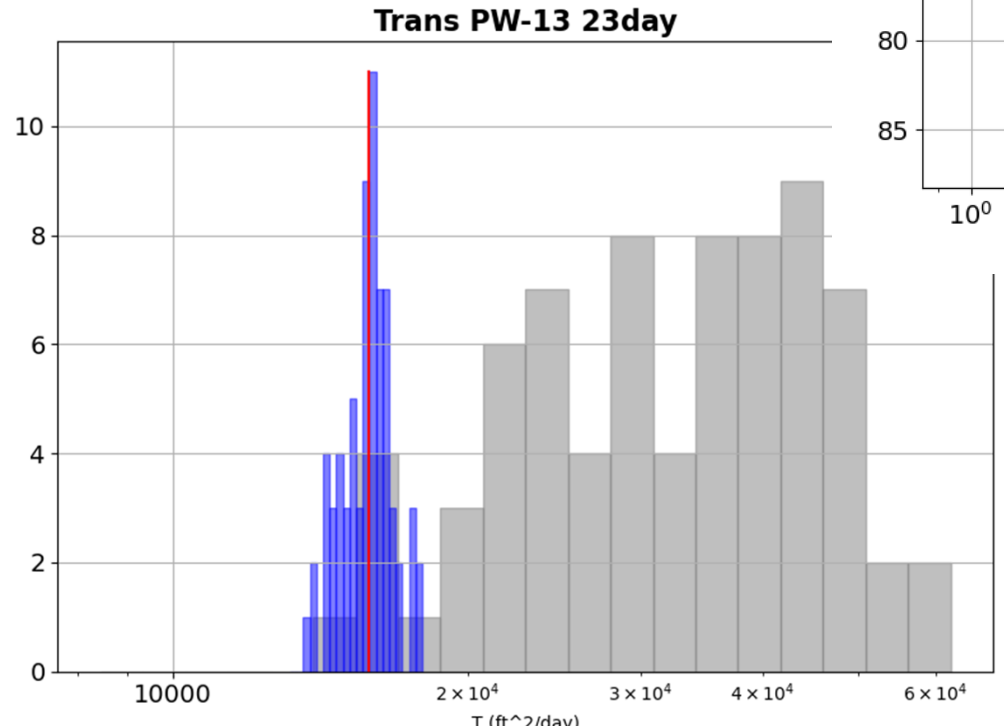




Measured & Simulated Drawdown for 23-day Aquifer Pumping Test at Vista Ridge Pumping Well PW-13:

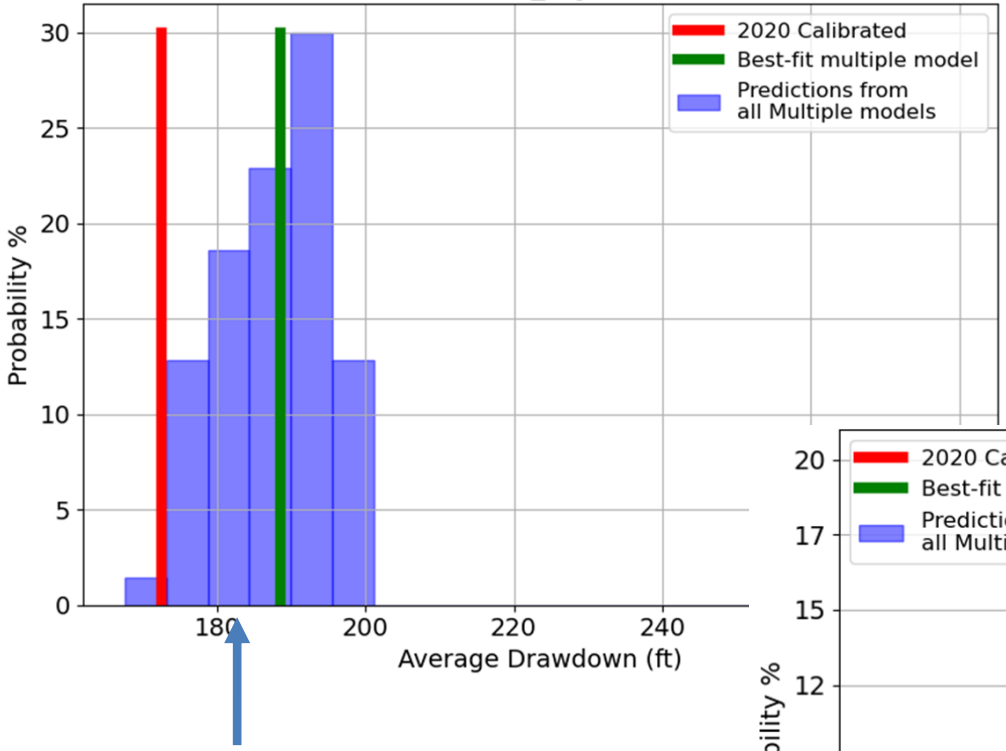






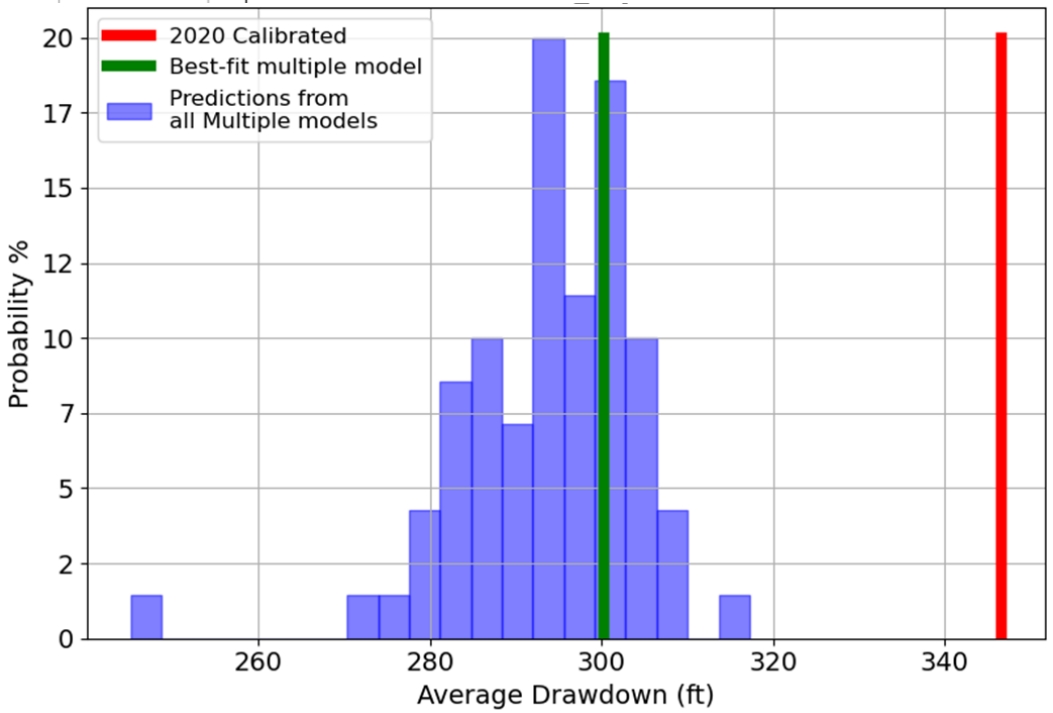
Prediction of DFCs from 70 Calibrated Models

Carrizo



Development of a method to investigate predicted uncertainty in GAMs -- should consider what are major sources of uncertainty and error account for them

Simsboro



These results are only accounting for uncertainty in the aquifer properties

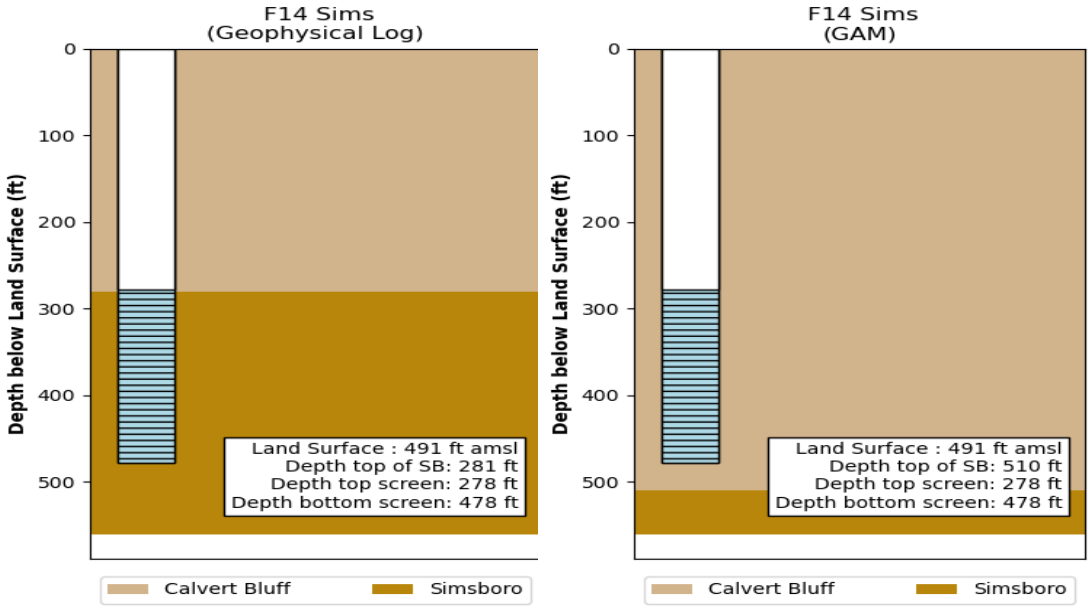
Possible SOW for 2022

- Evaluate Logs for Aquifer Top and Bottoms
- Adjust GAM surfaces as Appropriate
- Develop Historical Pumping File for GMA 12 through 2020
- Check/Resolve Differences Between TWDB & GCD Annual Productions
- Recalibrate Model Based Using Multiple Calibration Data Sets

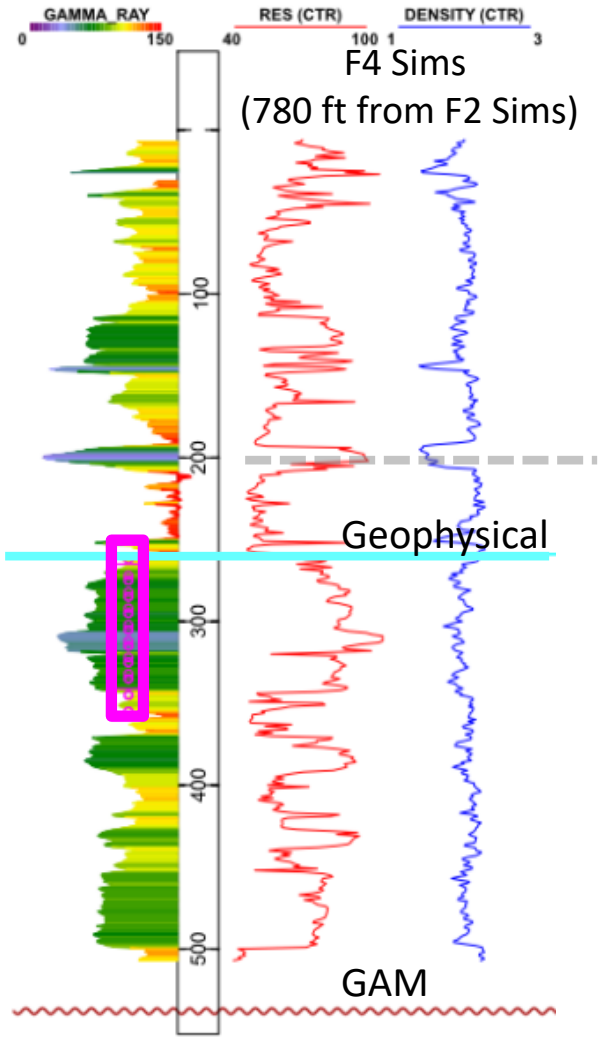
Evaluation of Aquifer Surfaces in SP/QC/CW GAM

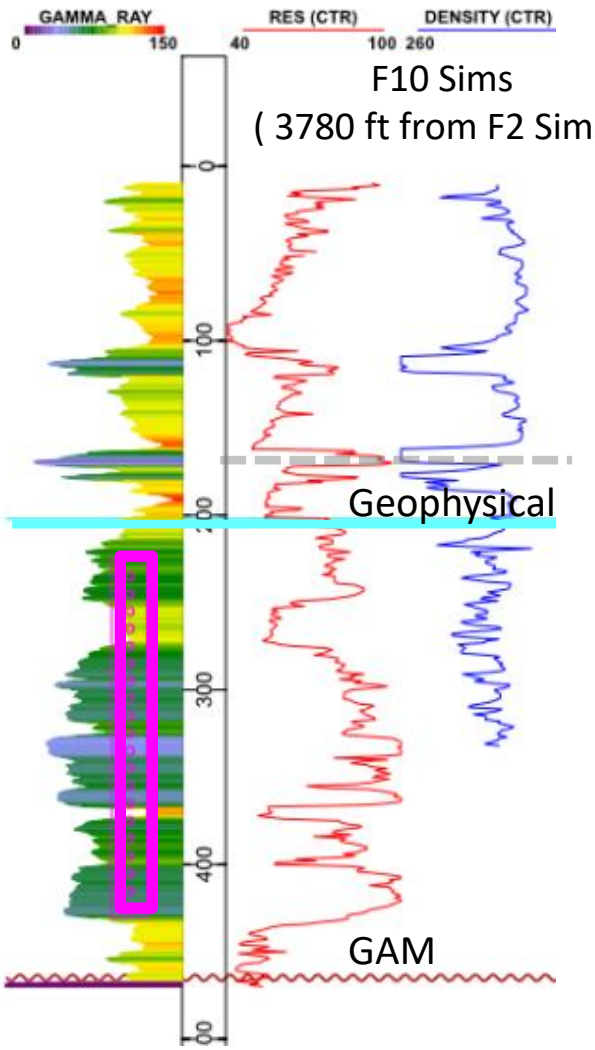
- In 2016-2017 GAM aquifer surfaces required adjustment in several areas
  - Several areas where Simsboro thickness of 100 feet in “old” GAM was increase to about “500 feet” in the “updated” GAM –included small areas near the Gause Wel and Vista Ridge well field
  - Change coordinated with GMA 15 consultants prior to discussion with TWDB

11 out of 33 of the ALCOA Simsboro Wells mapped into the Calvert Bluff based on GAM Surfaces



Example of Geophysical Logs



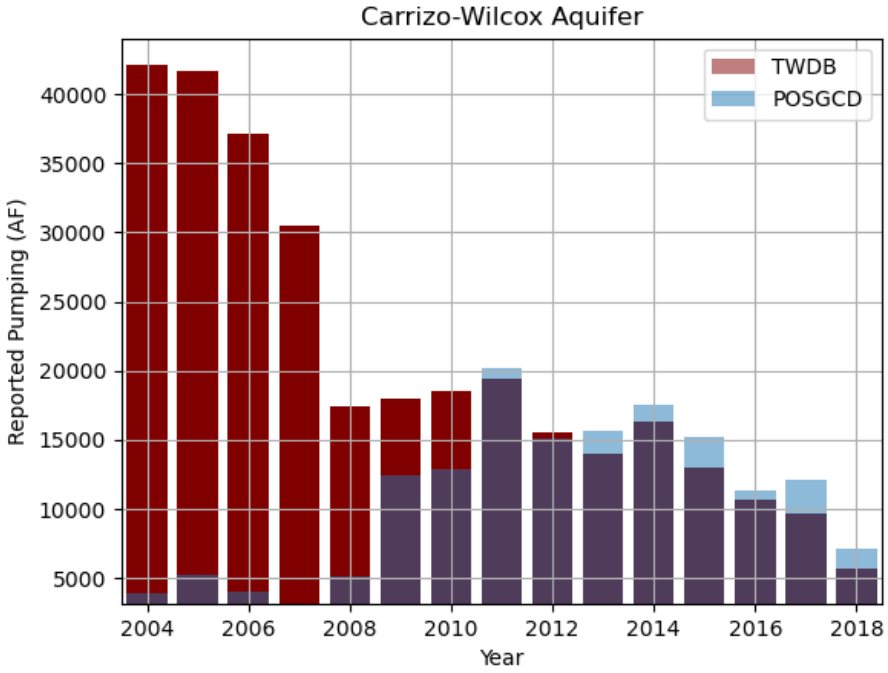


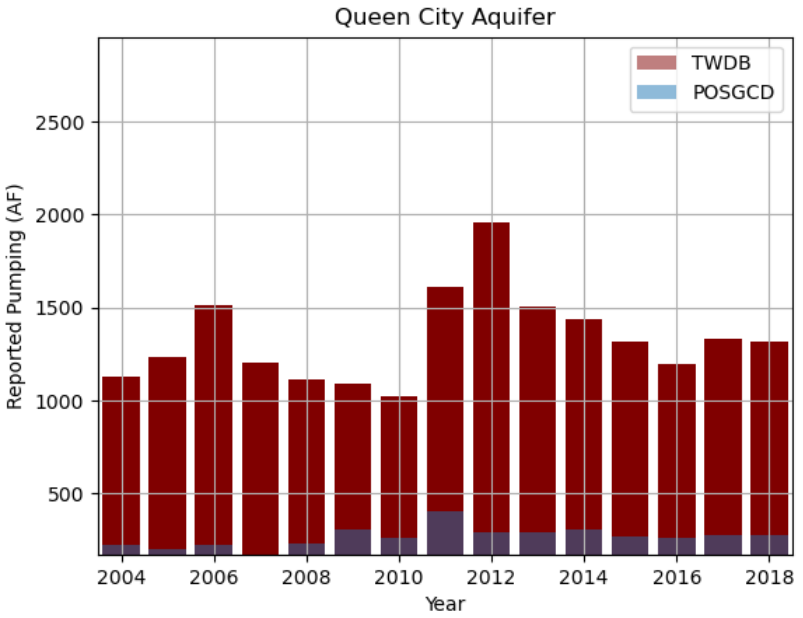
Top of Simsboro (geophysical logs)

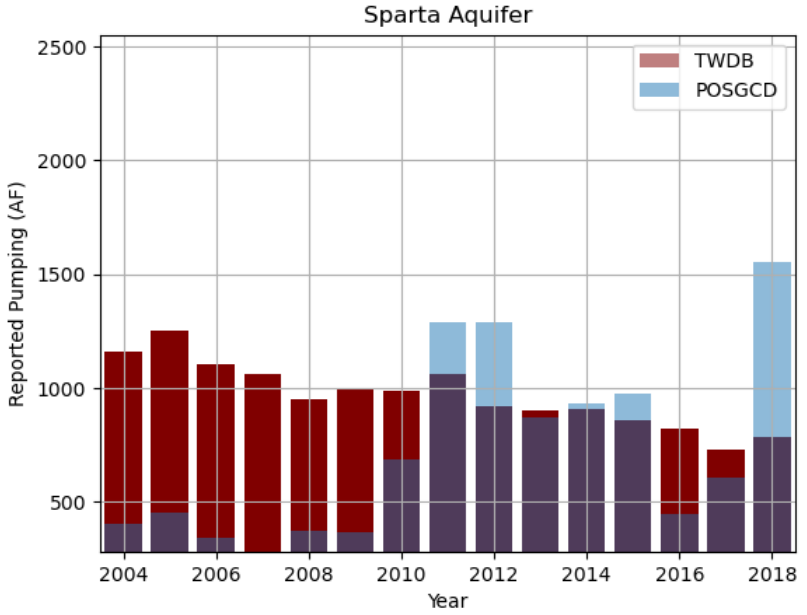
Top of Simsboro (GAM)

Main Coal Seam

Comparison of GCD and TWDB Report Pumping





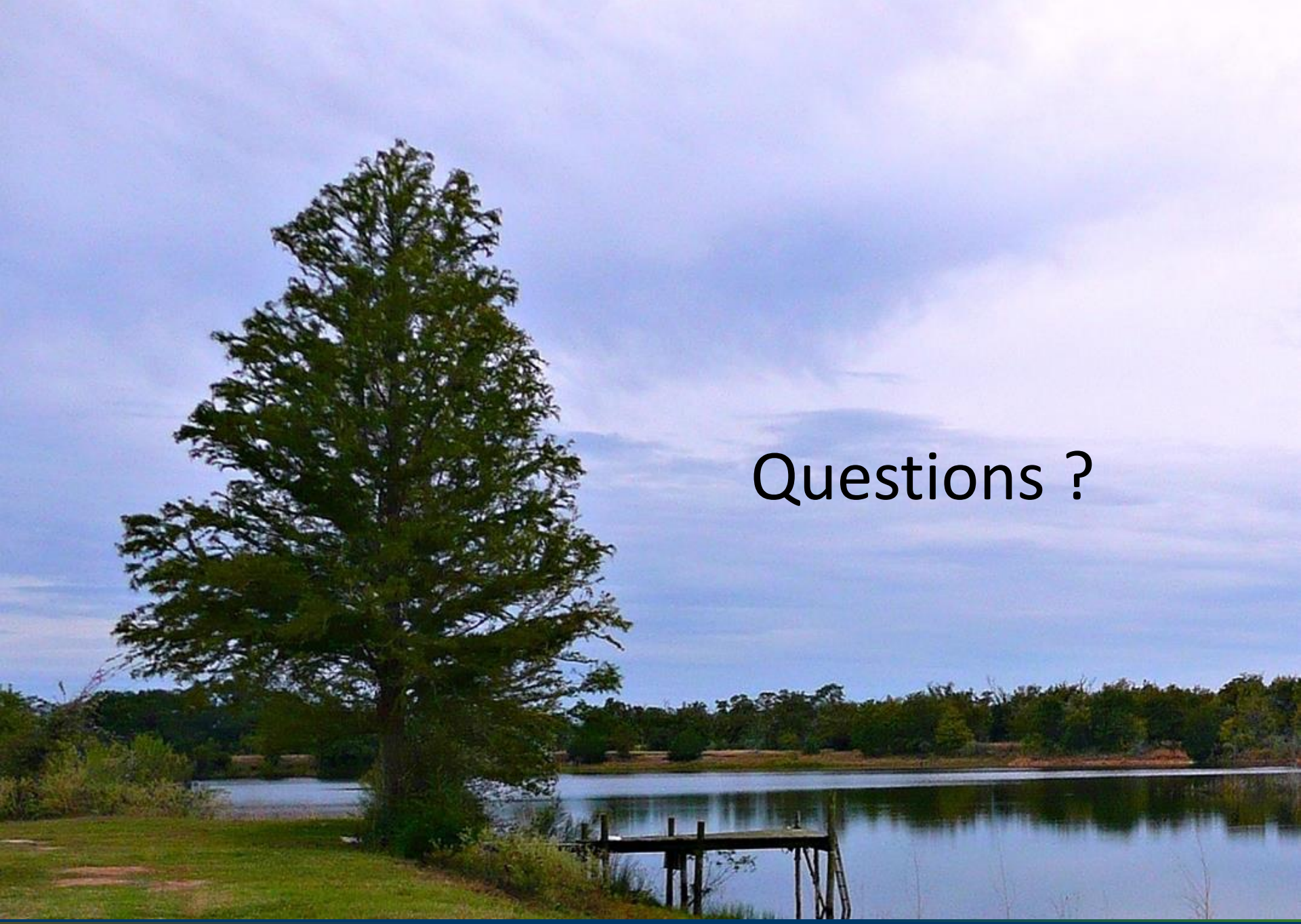


GAM Recalibration for 2022

- Historical period from 1930 to 2020
- Vista Ridge Weekly from December 2019
- Aquifer Pumping Test

Opportunities for Collaboration Among Districts

- Hydrogeologica Data
  - Reported Pumping Rates
  - Geophysical Logs/ Surfaces
  - Aquifer Pumping Tests
- Technical Analyses
  - Aquifer Surfaces
  - Aquifer Assignments to Wells


Questions ?

Geophysical Log for Well AX 10-5

Interpretation of Geophysical Logs

- Gamma Log – measures radioactive signatures - higher values and kicks to the right indicate clayey materials
- Resistivity – measures electrical conductance – lower values and kicks to the left indicate shaly material
- Density – measures density of formation – lower values and kicks to the left indicate lignite or carbonate

Observation

- Top of thick sand agrees with kicks in the resistivity and gamma ray and top of Simsboro (geophysical)
- Lignite layer agrees with kicks in gamma ray, resistivity, and density
- Majority of the screen is in the Simsboro formation
- Main coal layer is in the Calvert Bluff