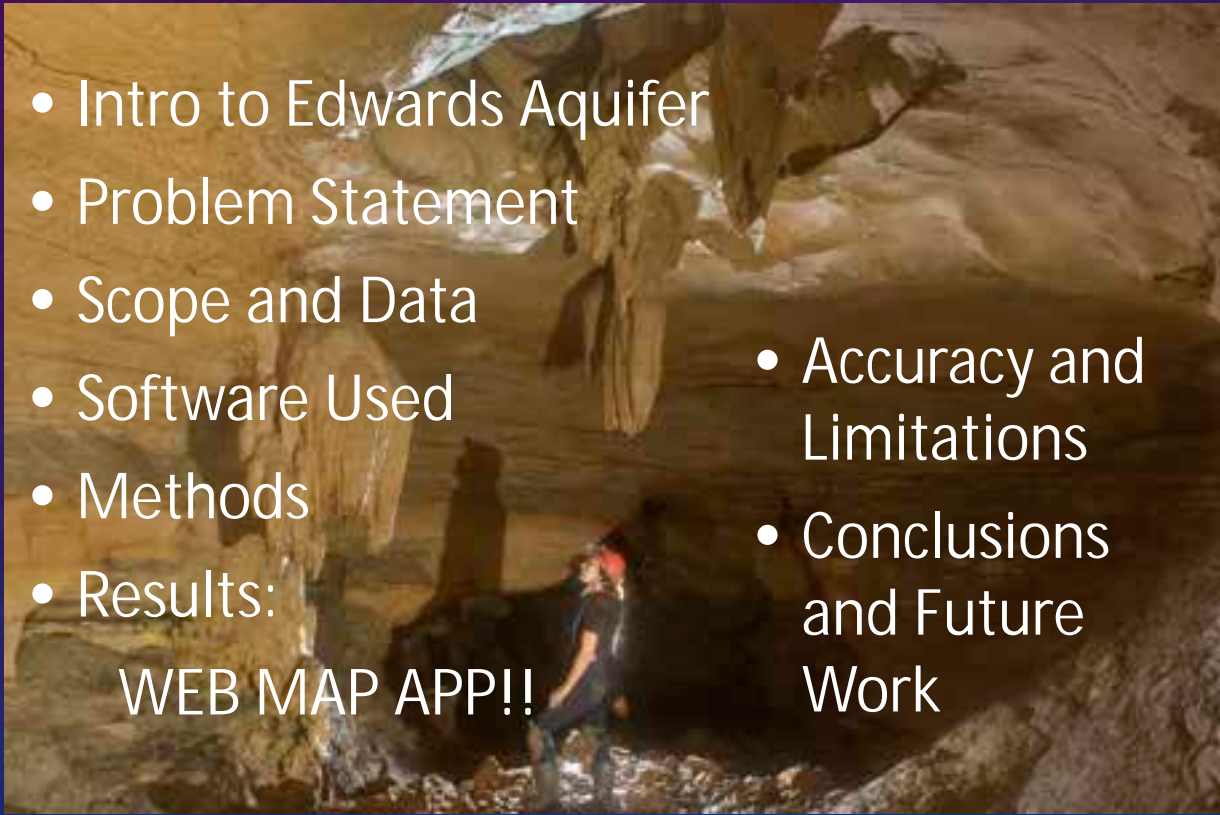
The background features a dark blue gradient with several overlapping circular patterns. Some circles are solid white, while others are dashed white. There are also numerical scales along the edges of some circles, with numbers ranging from 40 to 260. The overall aesthetic is technical and scientific.

Interactive Web Application of 3D ArcGIS Structural Mapping of Edwards Aquifer, Balcones Fault Zone, Texas, USA

ESRI User Conference, Thursday, July 23, 2014

Al Liu, Ned Troshanov and
Sarah Eason, GISP and GIS Analyst
Edwards Aquifer Authority (EAA)

OUTLINE

- 
- Intro to Edwards Aquifer
 - Problem Statement
 - Scope and Data
 - Software Used
 - Methods
 - Results:
WEB MAP APP!!
 - Accuracy and Limitations
 - Conclusions and Future Work



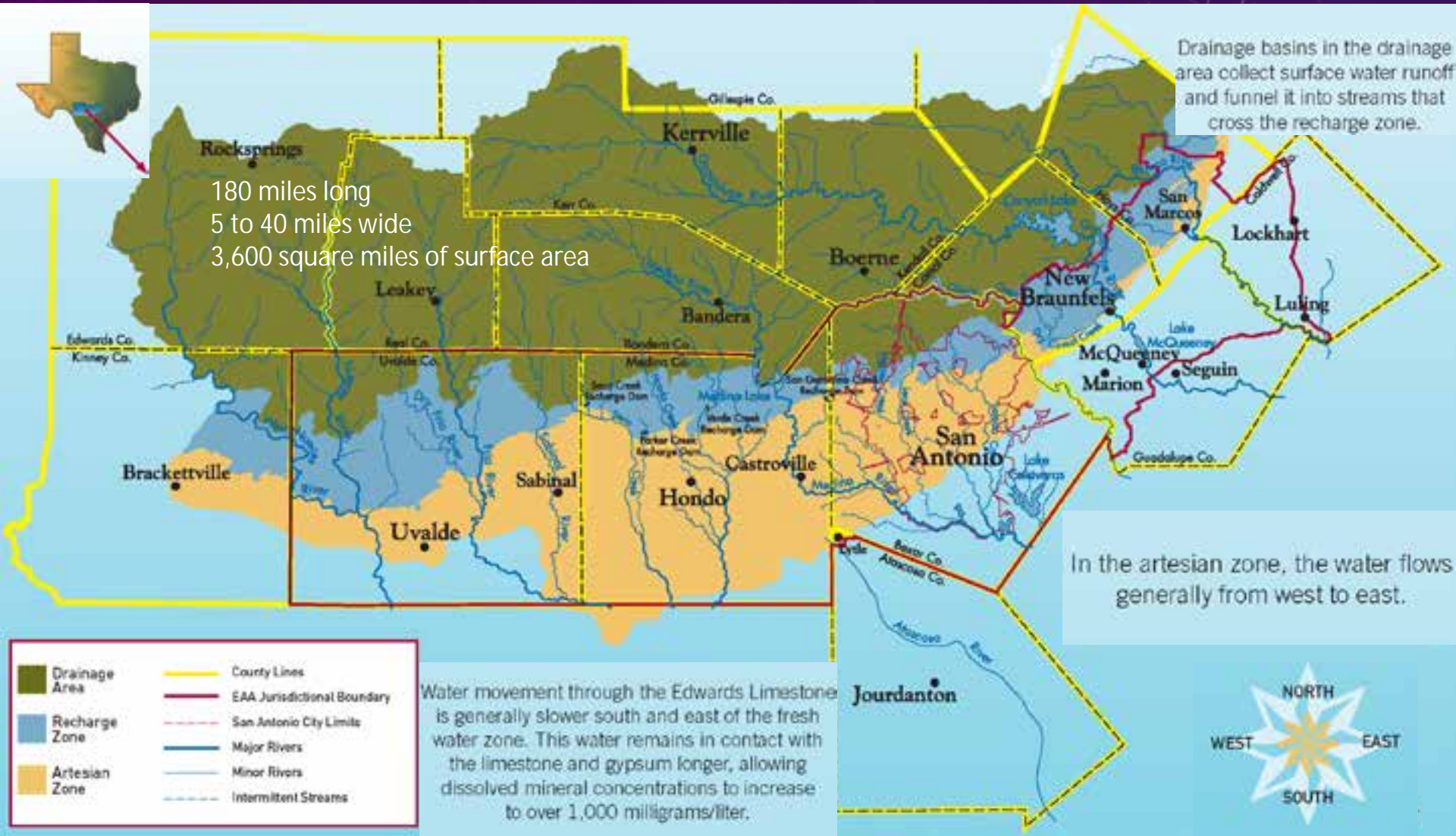
180 miles long
 5 to 40 miles wide
 3,600 square miles of surface area

Drainage basins in the drainage area collect surface water runoff and funnel it into streams that cross the recharge zone.

In the artesian zone, the water flows generally from west to east.

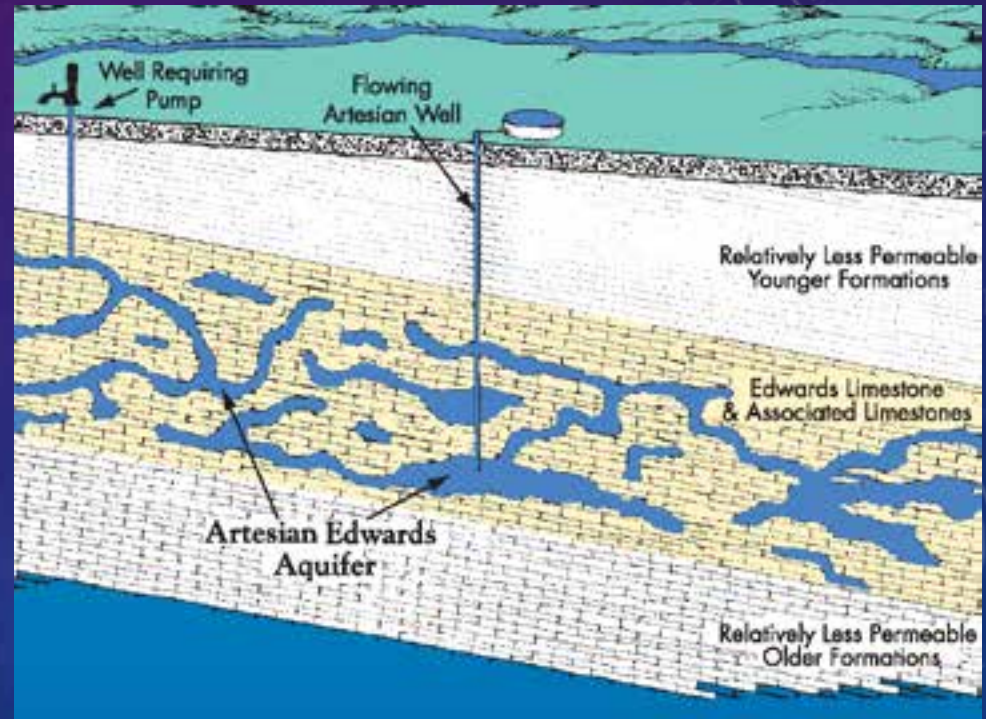
Water movement through the Edwards Limestone is generally slower south and east of the fresh water zone. This water remains in contact with the limestone and gypsum longer, allowing dissolved mineral concentrations to increase to over 1,000 milligrams/liter.

- Drainage Area
- Recharge Zone
- Artesian Zone
- County Lines
- EAA Jurisdictional Boundary
- San Antonio City Limits
- Major Rivers
- Minor Rivers
- Intermittent Streams

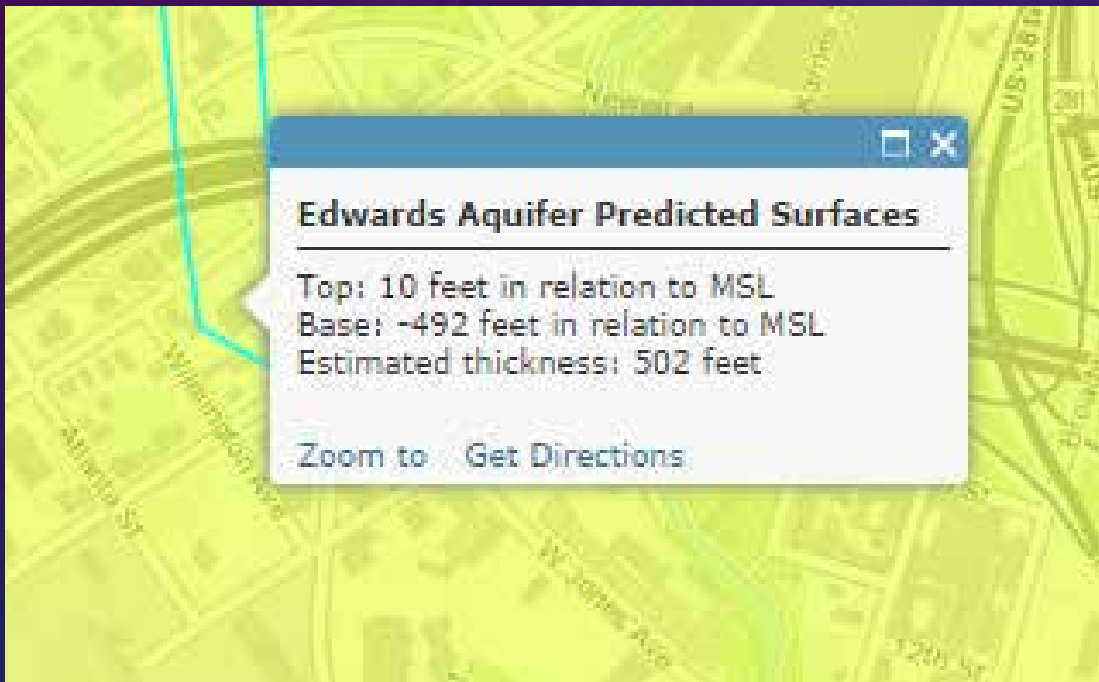


THE BIG QUESTION: WHERE DOES THE AQUIFER START?

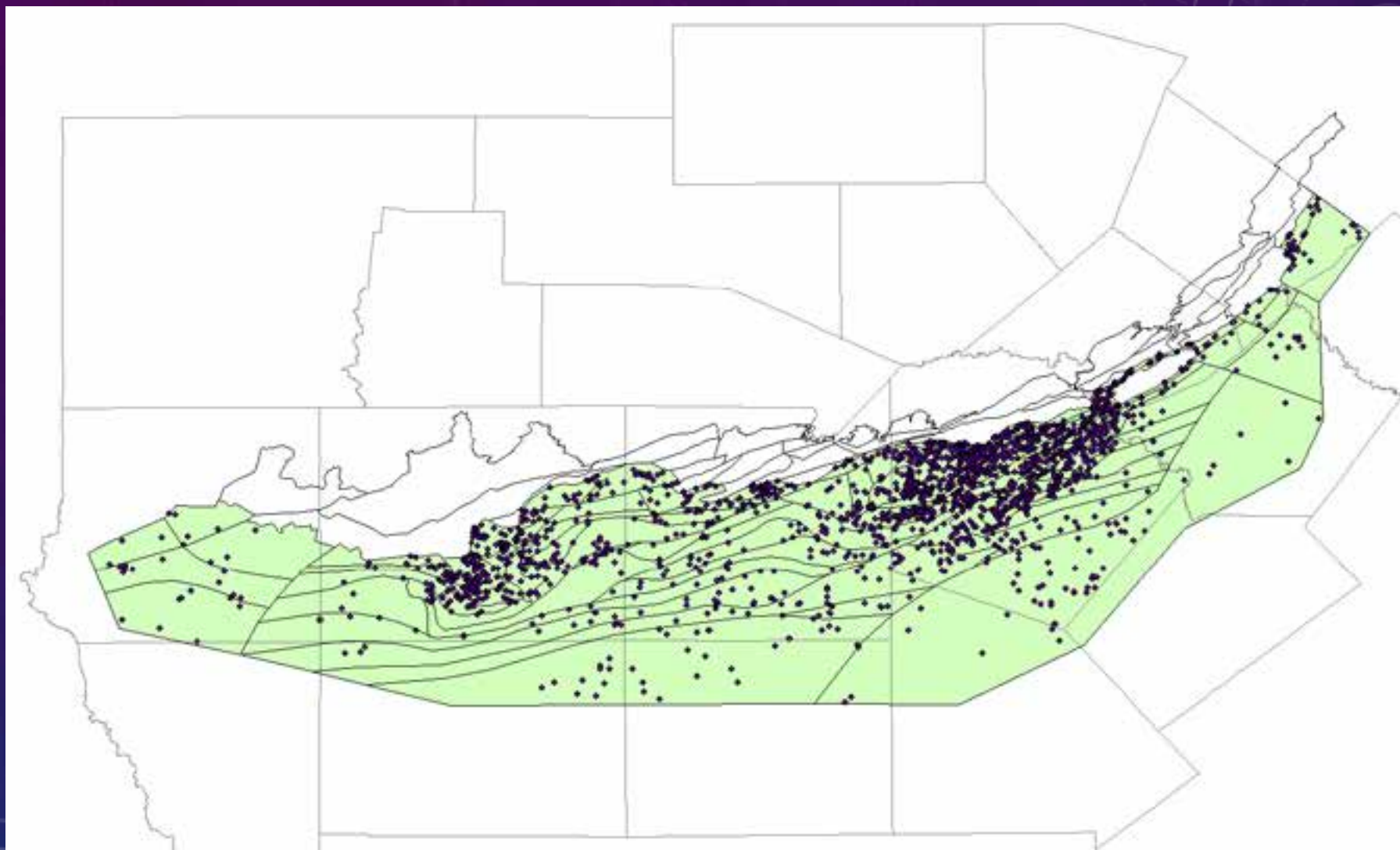
- Drillers ask EAA staff
- Staff workflow to answer:
 - Well logs and do visual interpolation
 - Thicknesses in USGS geological texts
- More detailed answers take more time to research

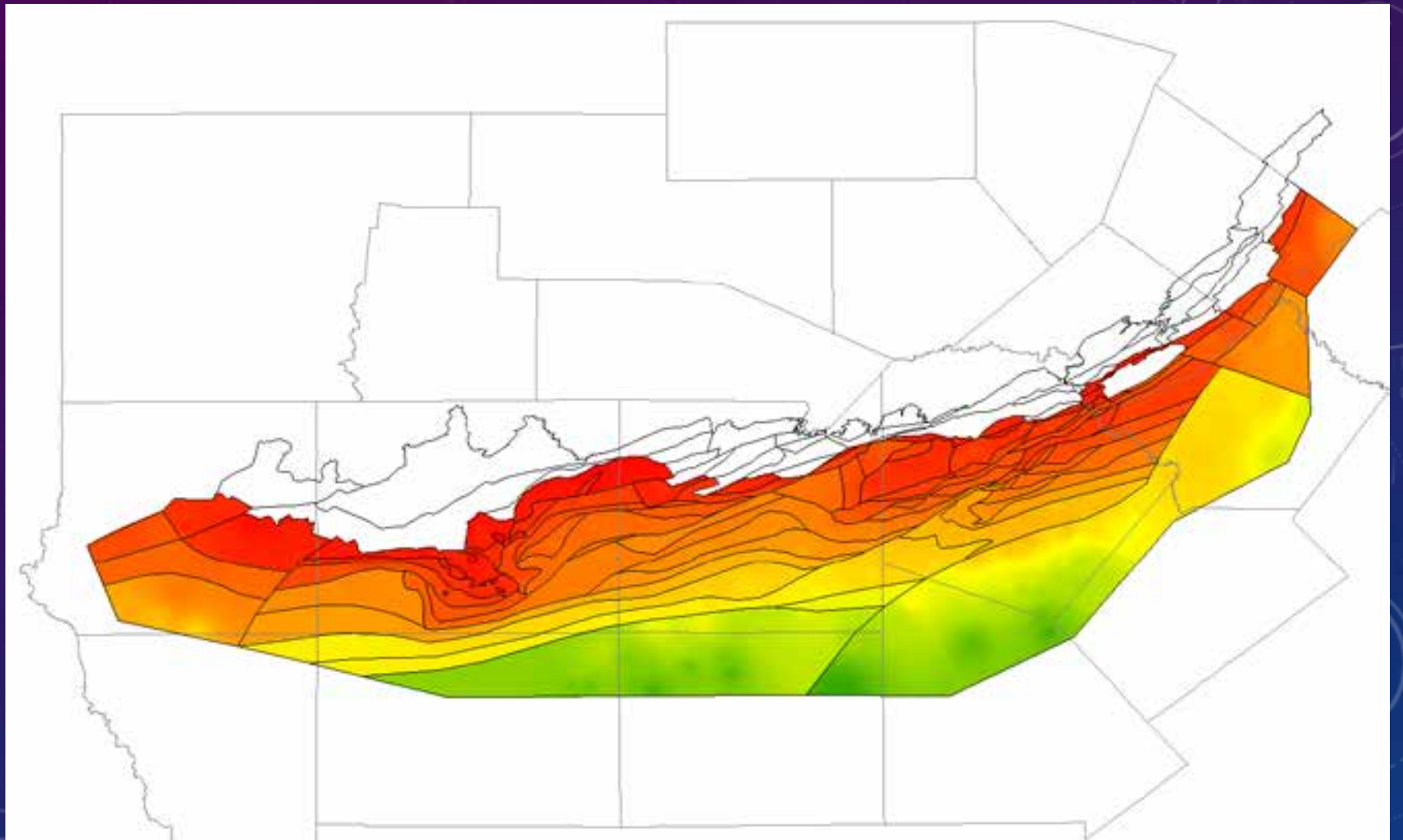


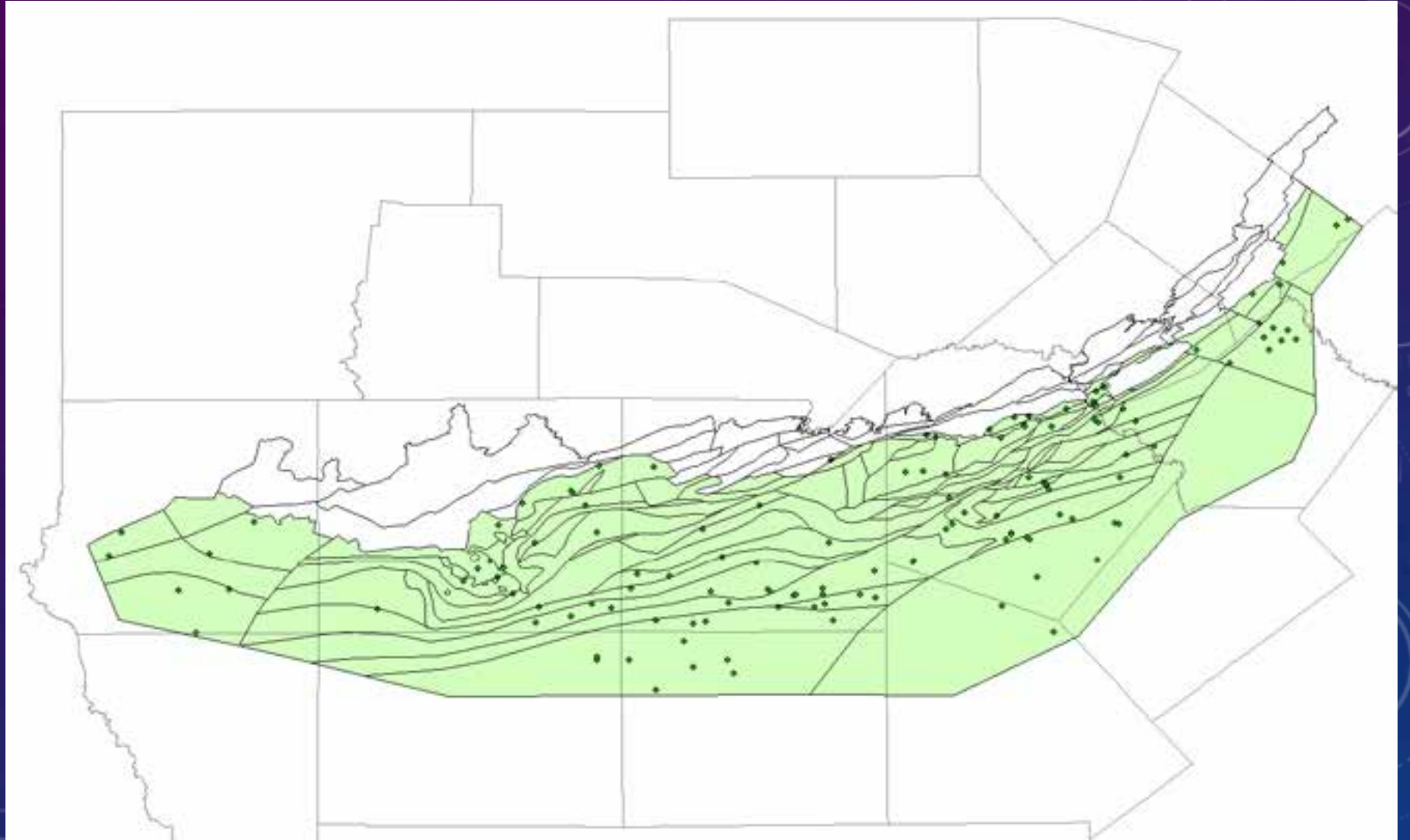
USING ARCGIS TO HELP STAFF AND WELL DRILLERS ESTIMATE DEPTH TO DRILL INTO EDWARDS AQUIFER

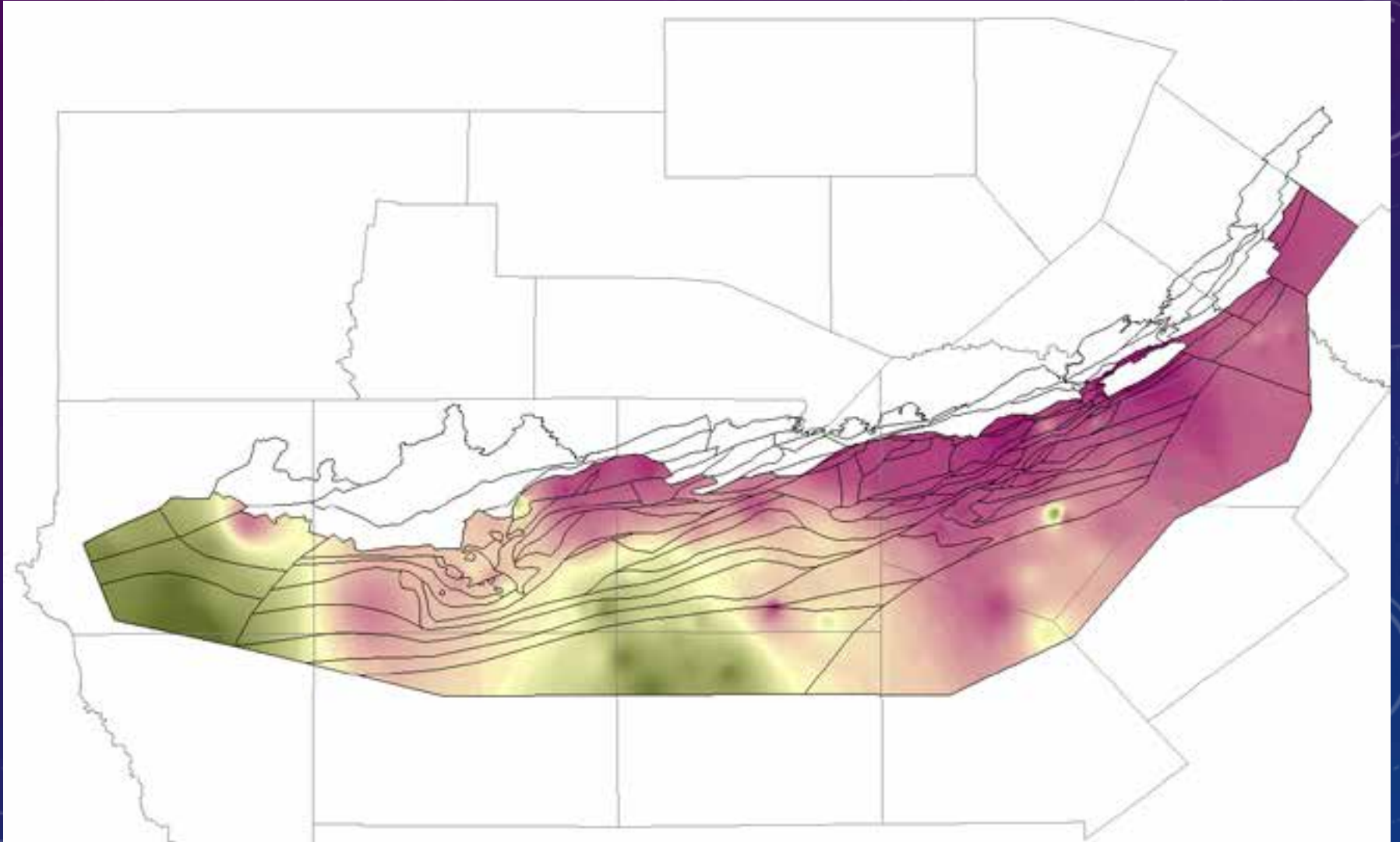


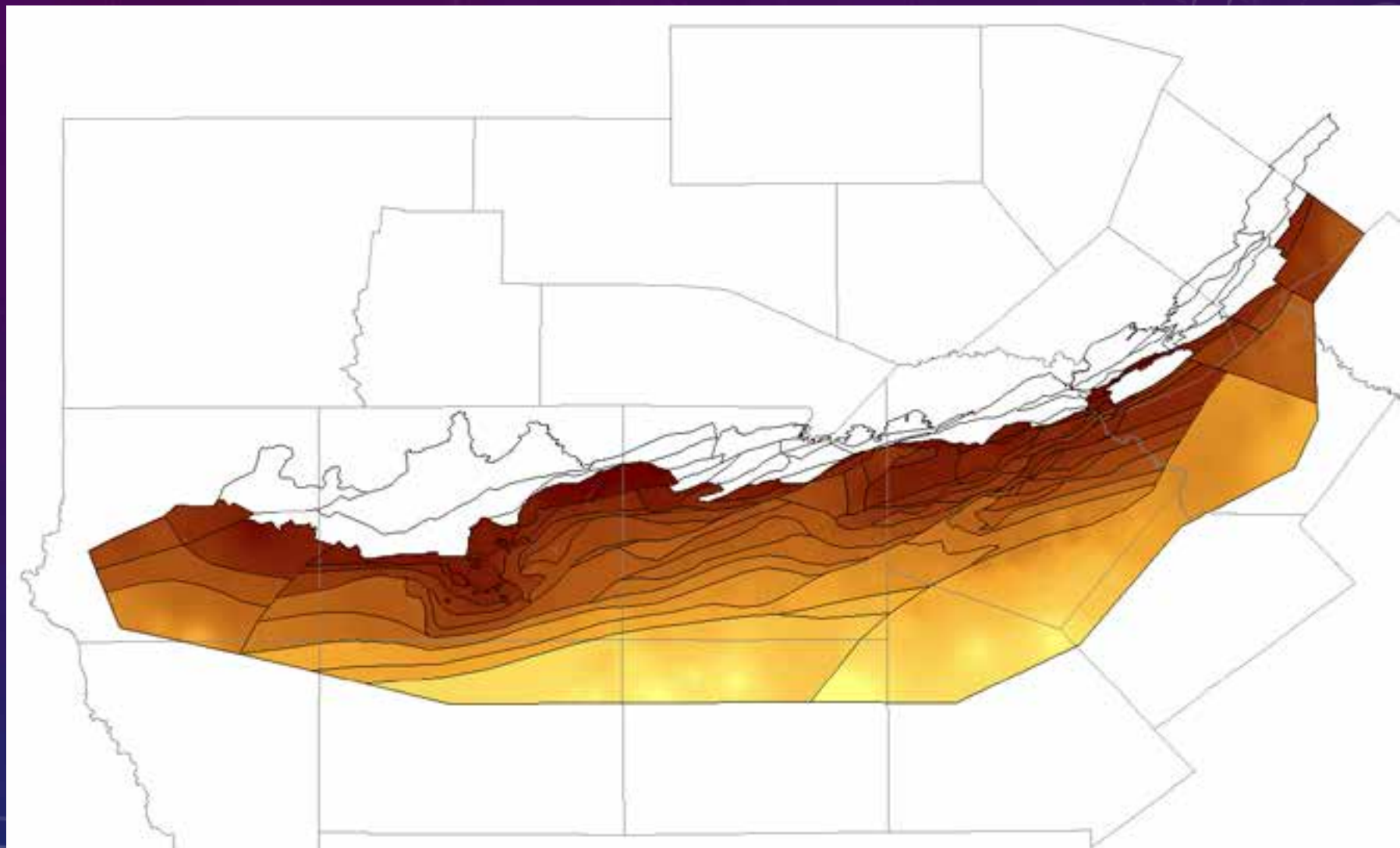
- New AGOL web map as a one-stop-shop
- Saves time and effort

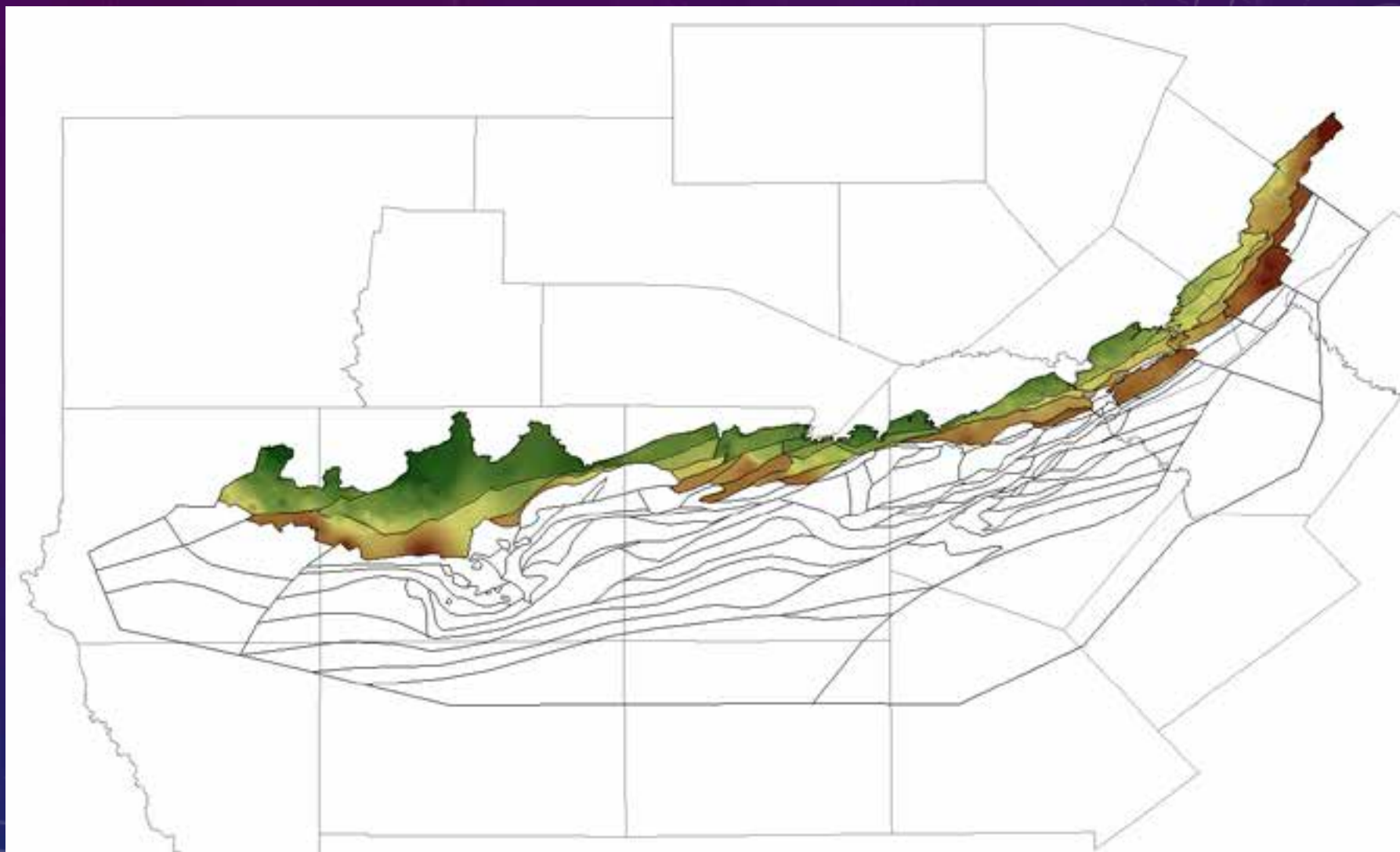














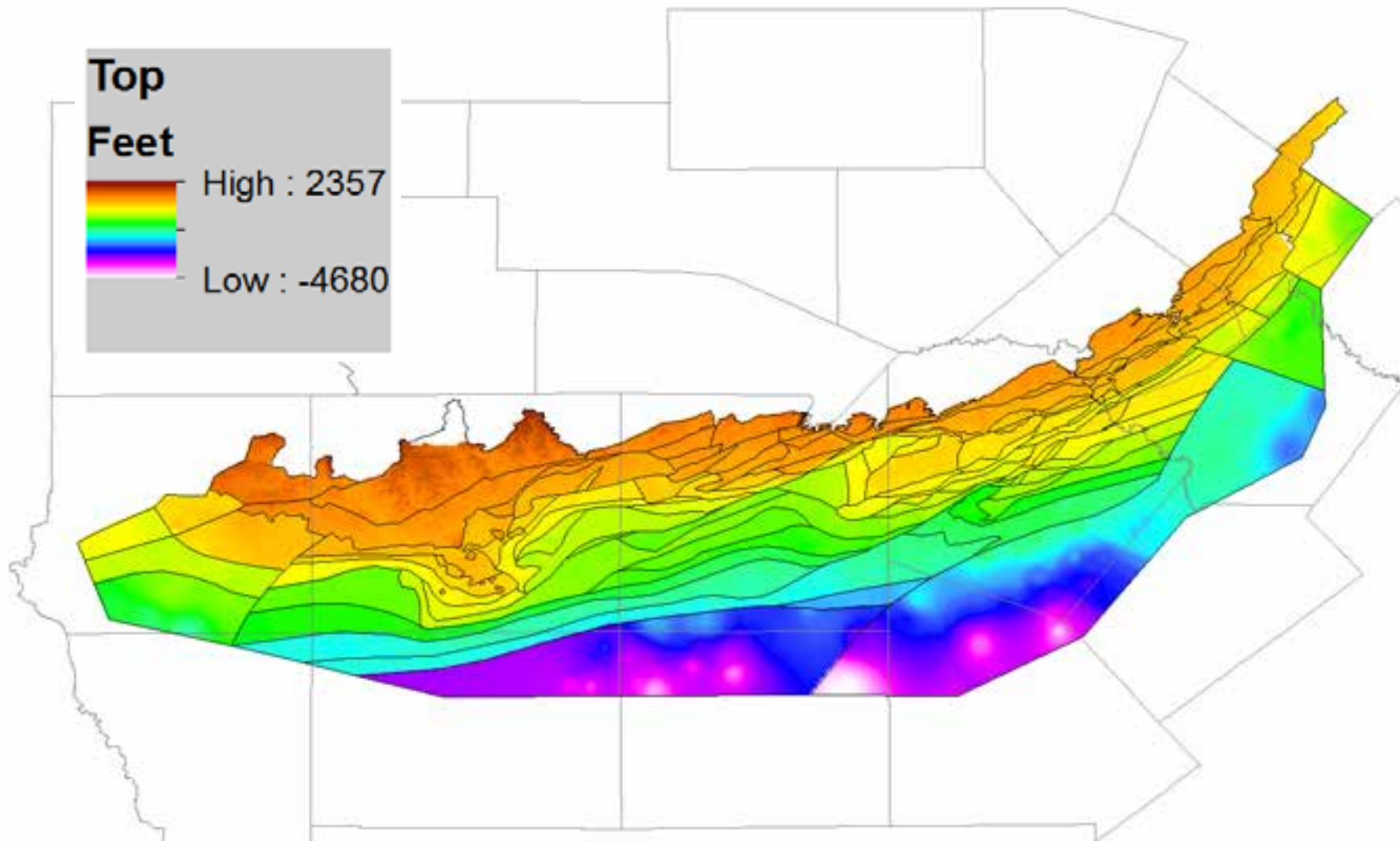
Top

Feet

High : 2357



Low : -4680



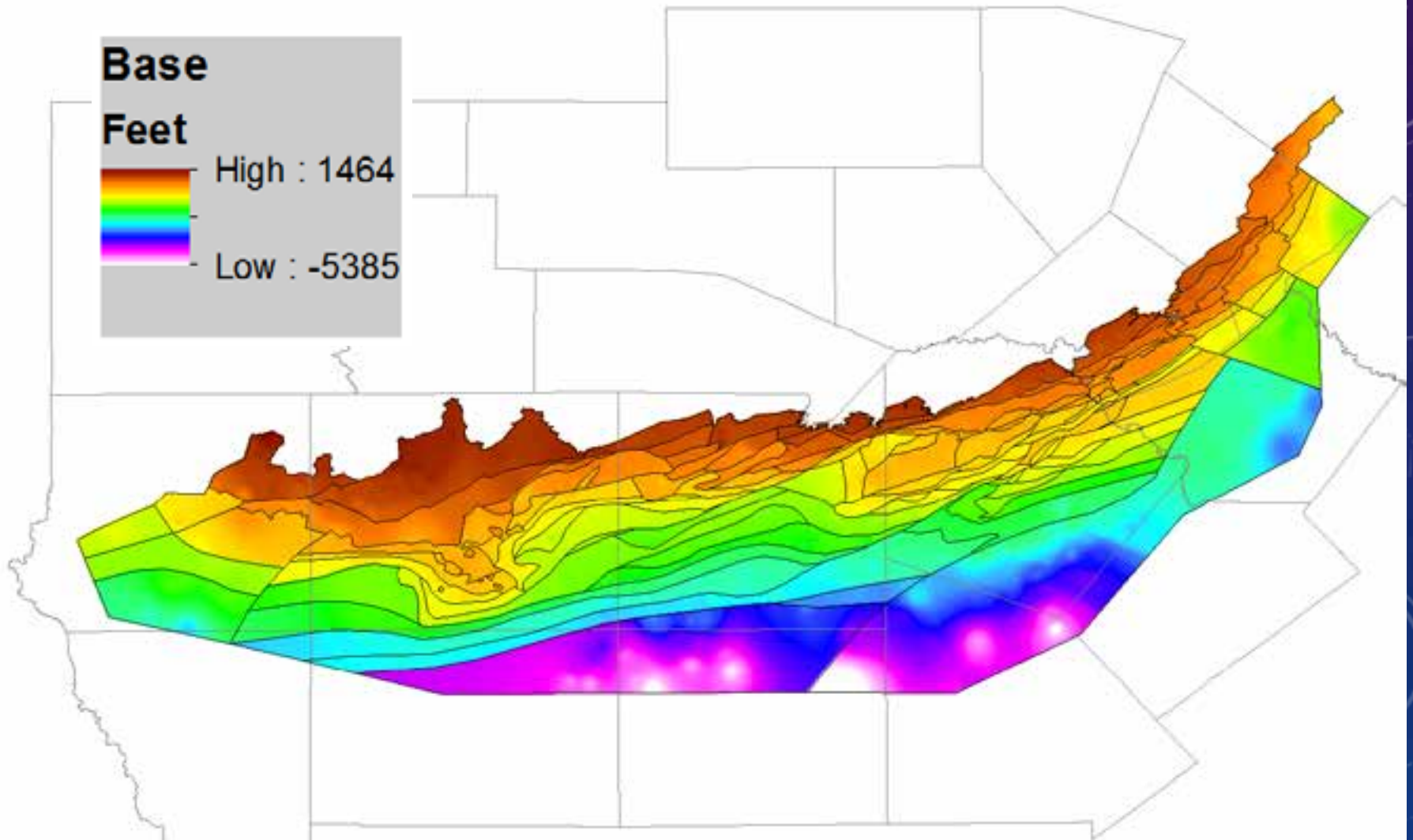
Base

Feet



High : 1464

Low : -5385

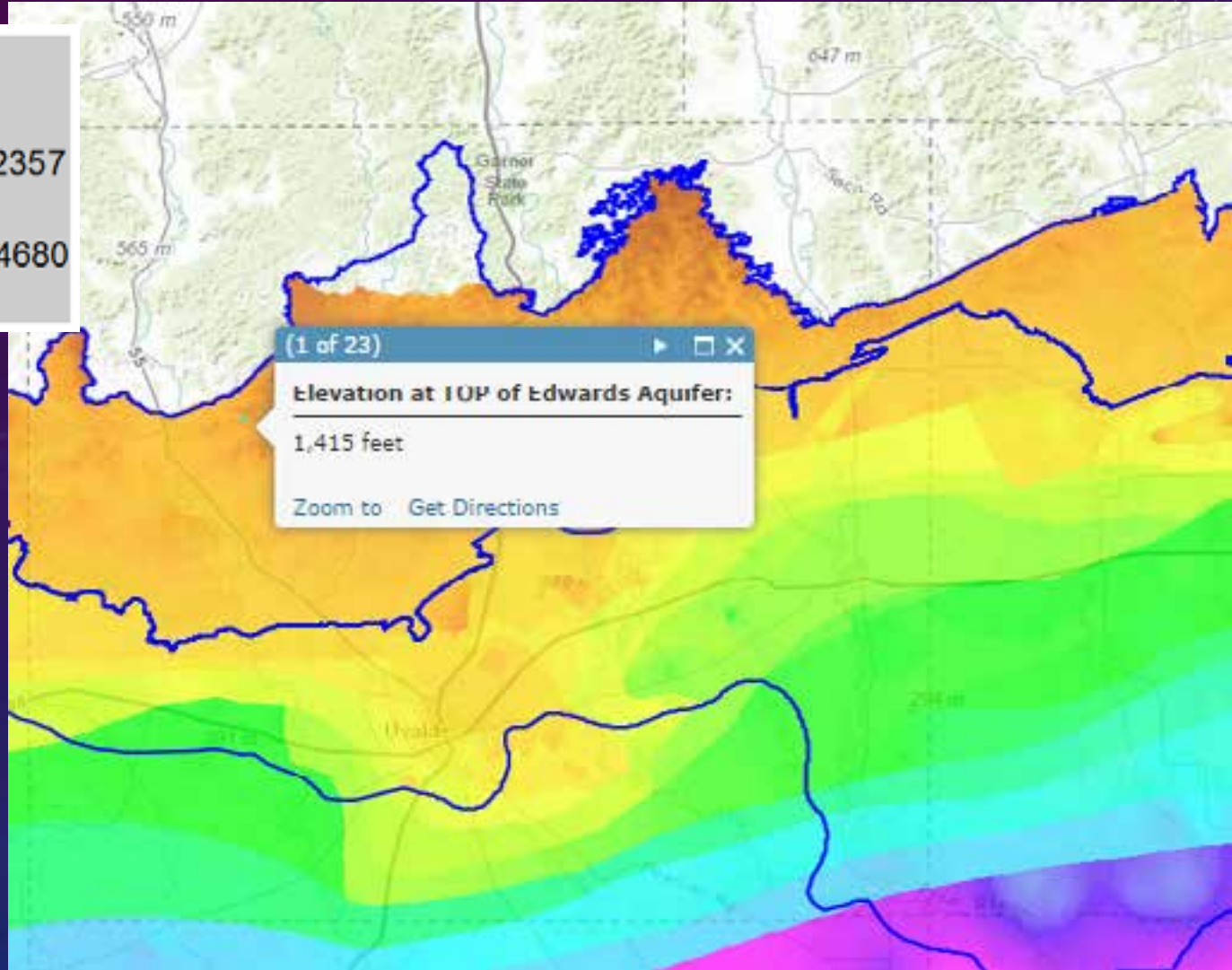


INTERACTIVE WEB MAP

- Click anywhere on map
- Or enter an address and click on property
 - Pop-up displays values for:
 - Top of Edwards
 - Base of Edwards
 - Estimated thickness of Edwards

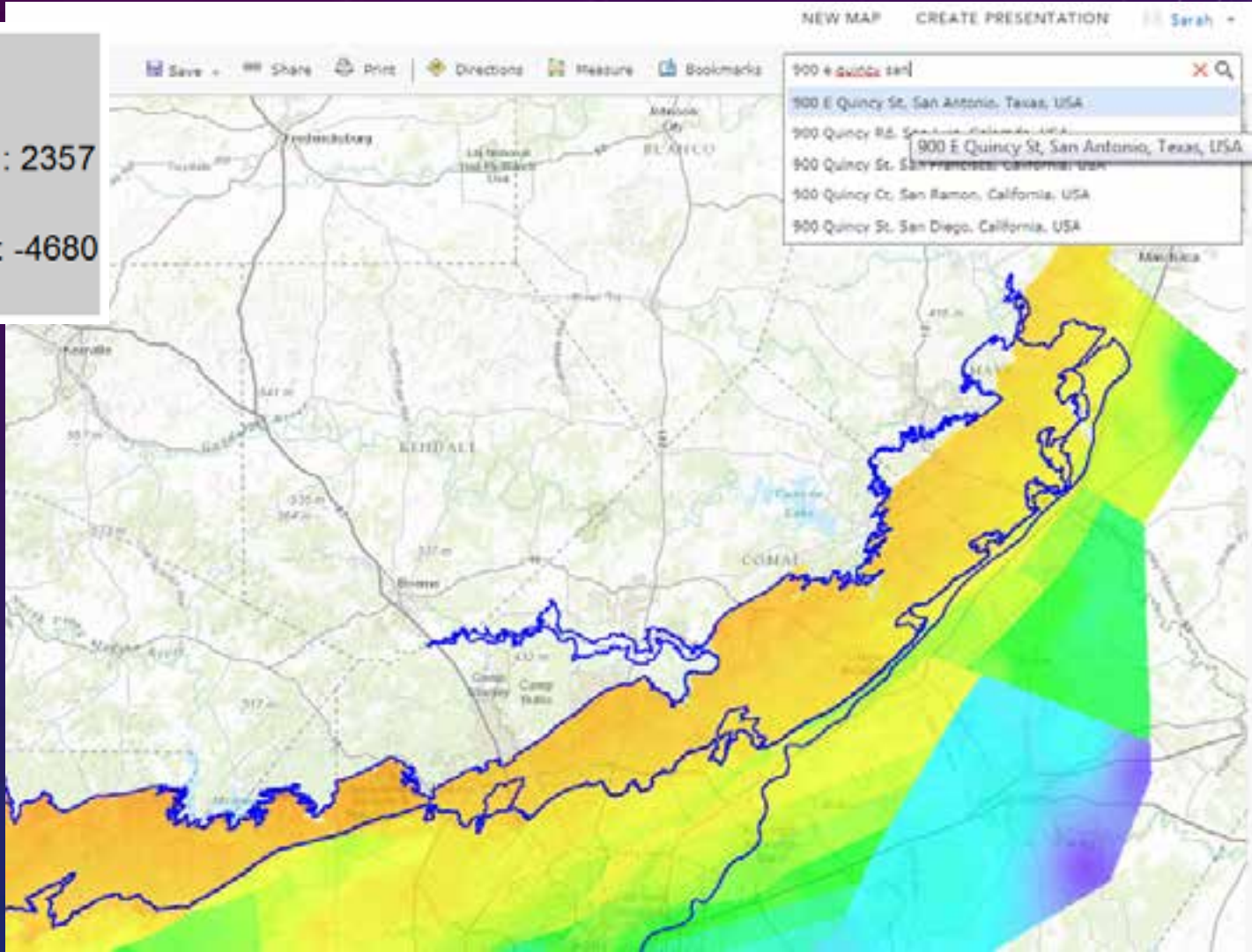
Top Feet

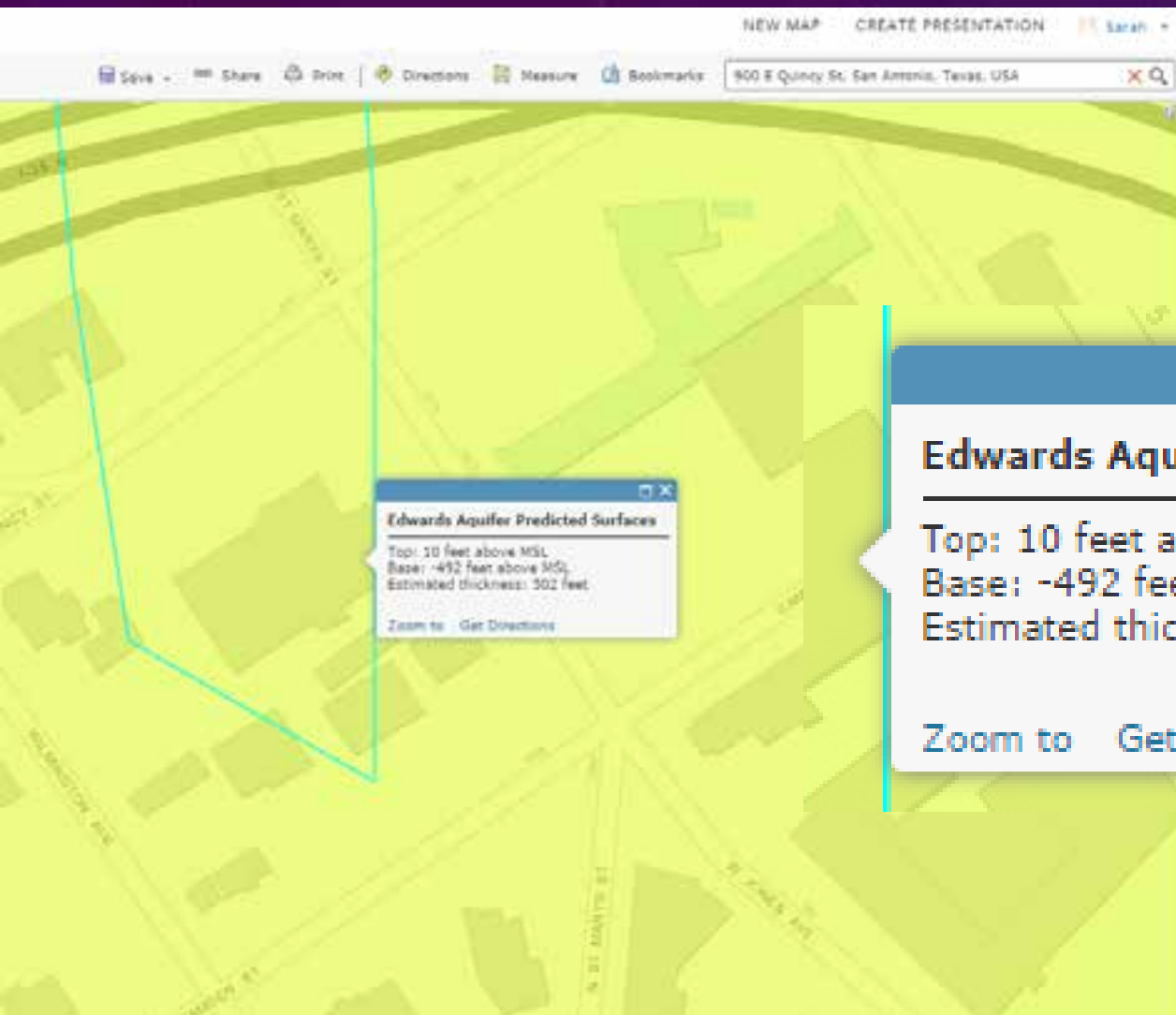
High : 2357
Low : -4680



Top Feet

High : 2357
Low : -4680





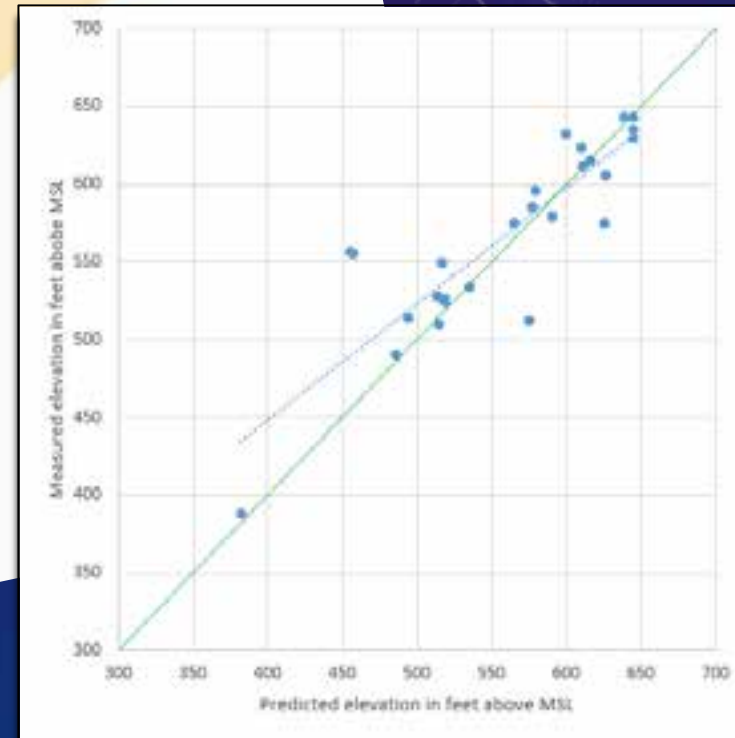
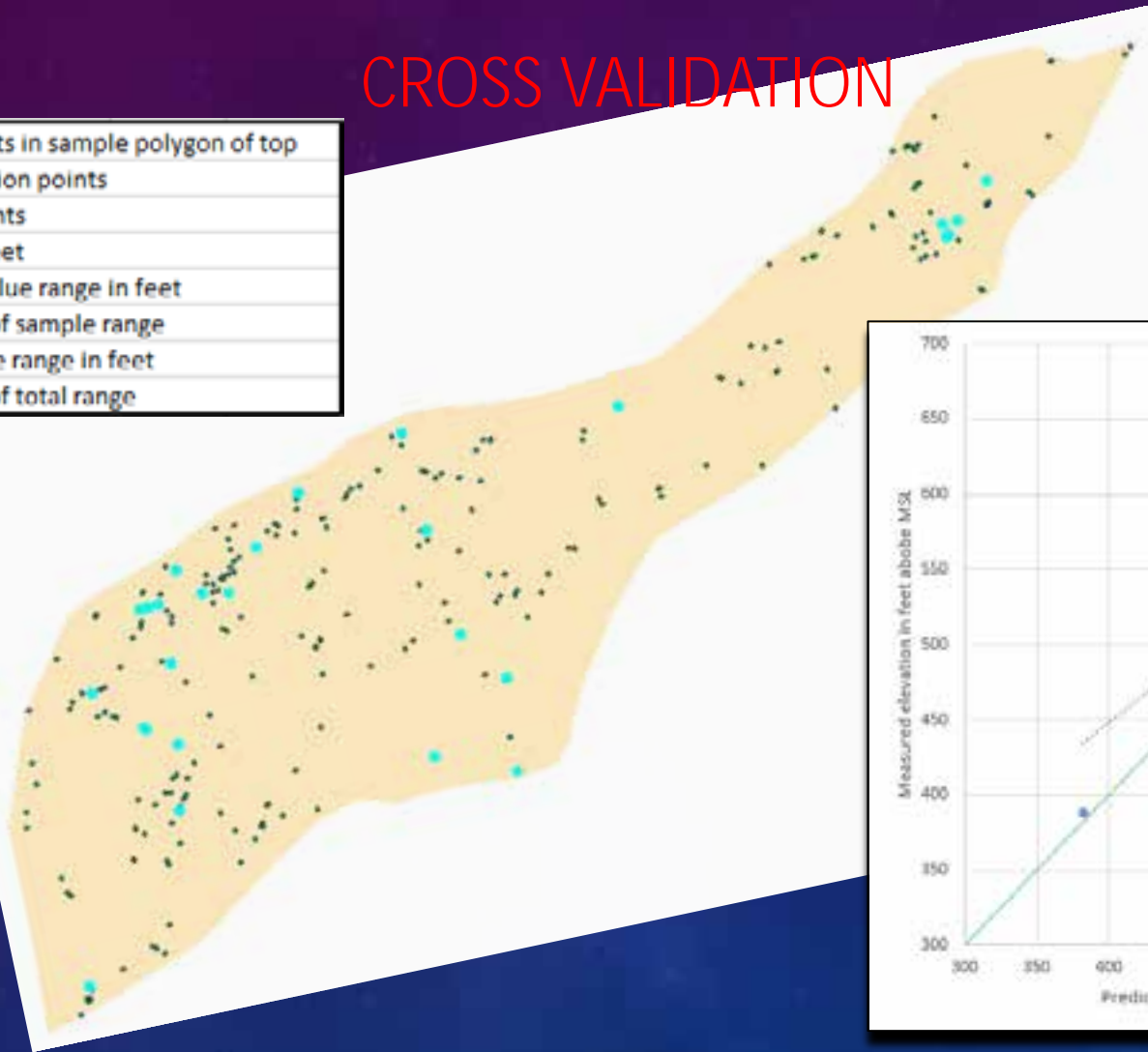
Edwards Aquifer Predicted Surfaces

Top: 10 feet above MSL
Base: -492 feet above MSL
Estimated thickness: 502 feet

[Zoom to](#) [Get Directions](#)

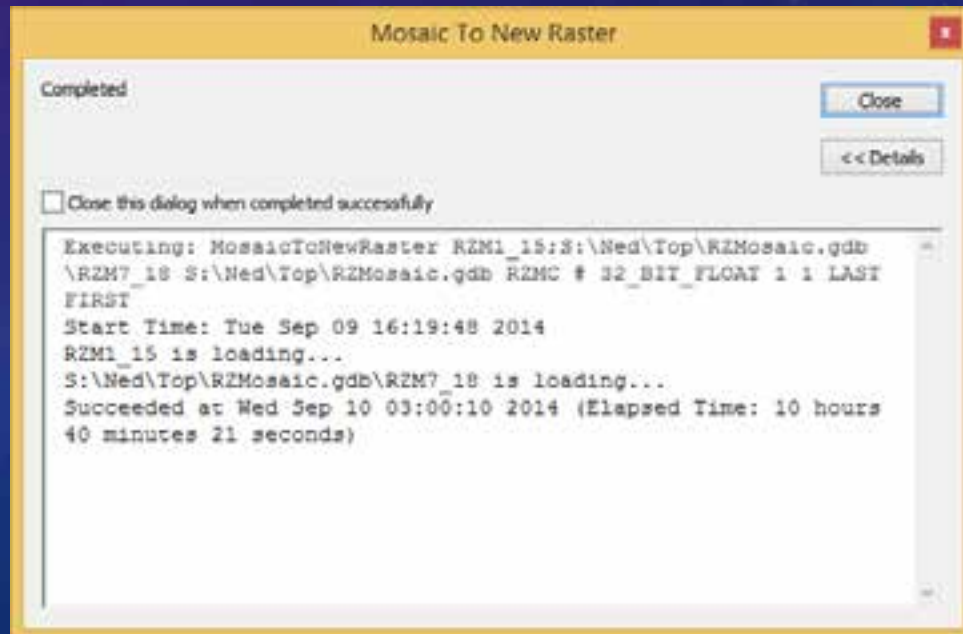
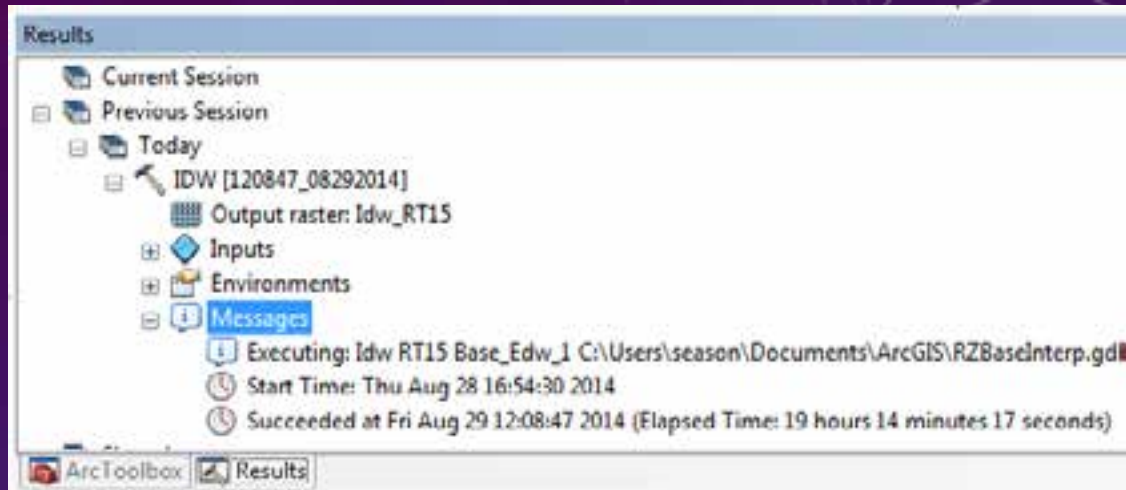
CROSS VALIDATION

270	Total points in sample polygon of top
243	Interpolation points
27	Check points
34	RMSE in feet
381 to 645	Sample value range in feet
12.80%	Error out of sample range
5385 to 1464	Total value range in feet
0.49%	Error out of total range



LIMITATIONS

- Data
 - Limited well data in many areas (south)
- Processing power
 - Cell resolution vs extent
 - Tool execution time
- Storage
 - Massive file sizes of intermediate data
- Publishing capabilities
 - AGOL service layer limitations



CONCLUSIONS AND FUTURE WORK



- More data will produce higher accuracy
- Identify areas with few or no well logs
- Seismic mapping?
- Add ground surface and depth to top to pop-up
- Improve incorporation of igneous surfaces
- More data to input to repeat the process

HIGHER RESOLUTION OF POINTS FOR INTERPOLATION

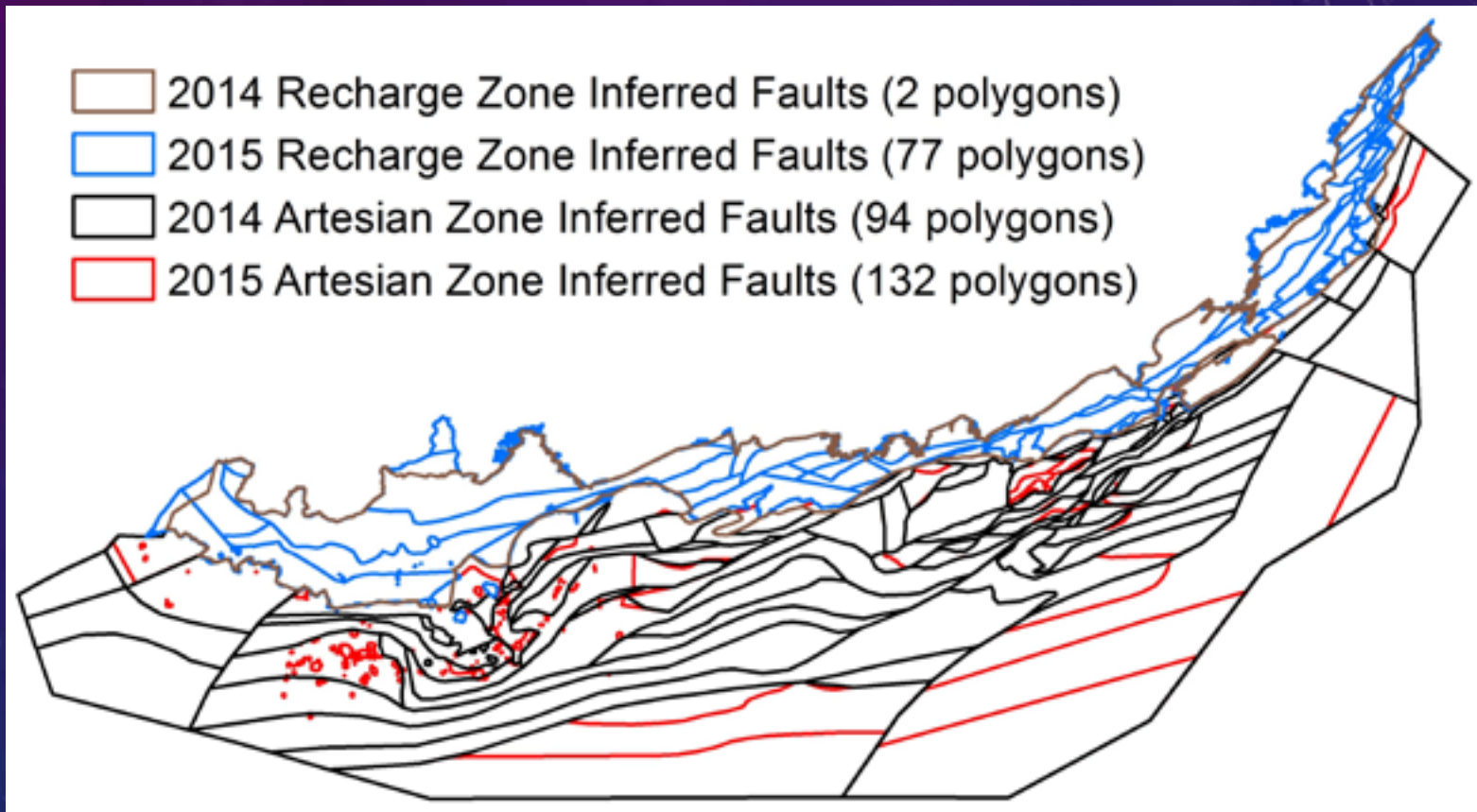
2014

- Recharge Zone Base
1468 points
- Artesian Zone Top
2585 points
- Artesian Zone Thickness
131 points

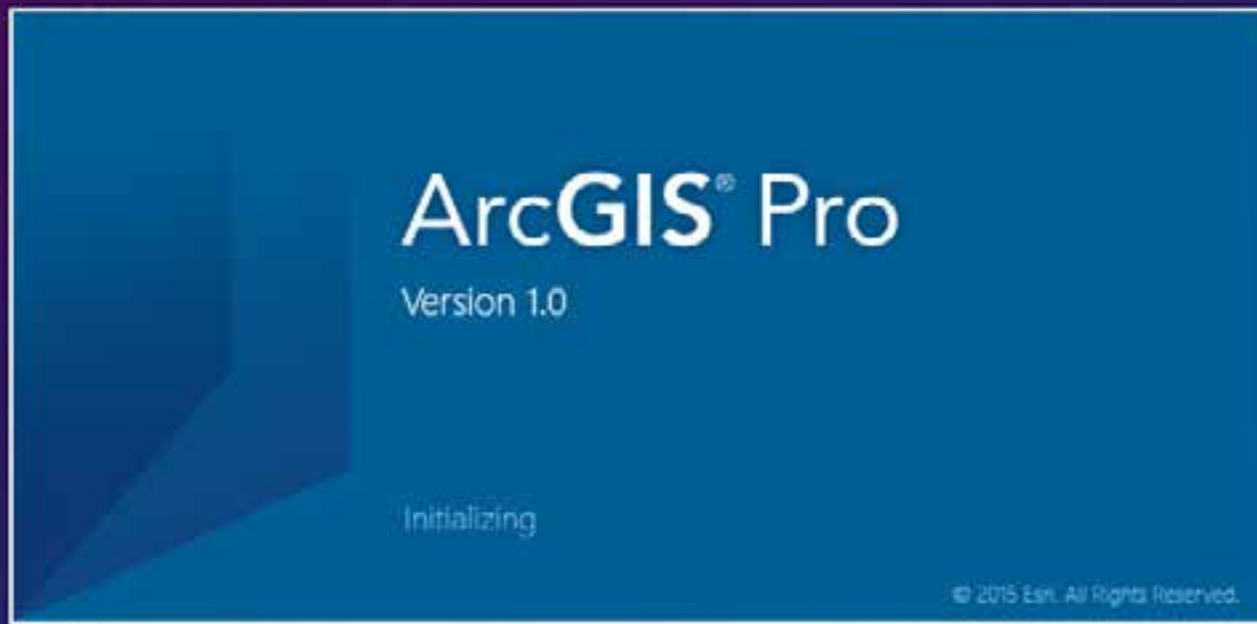
2015

- Recharge Zone Base
1909 points
- Artesian Zone Top
3108 points
- Artesian Zone Thickness
140 points

HIGHER RESOLUTION OF INFERRED FAULTS (MARKED AREAS OF UPLIFT AND DOWNSHIFTING BETWEEN WELL LOG LOCATIONS):



IMAGINE THE 3D POTENTIAL IN ARCGIS PRO!!!



REFERENCES

- Edwards Aquifer Authority
<http://www.edwardsaquifer.org/>
- ArcGIS image:
<https://encrypted-tbn3.gstatic.com/images?q=tbn:ANd9GcSGyU7YCCj05uCmmMMB4pAwffB7JYrCWa1RNf-liRNAQPvnVeET>
- ArcGIS Online image:
http://giscentric.files.wordpress.com/2012/08/arcgis_lp_cloud.png?w=300&h=168
- ArcGIS Spatial Analyst image:
<https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQp4oB3aZrl2ITkKvc5ut4disfq-hfrsOxQ-W87R8heFMXcVc87A>
- Peck's Cave Amphipod image:
[http://www.biologicaldiversity.org/species/invertebrates/Pecks_cave_amphipod/images/PecksCaveAmphipod_\(c\)JoeNFries.jpg](http://www.biologicaldiversity.org/species/invertebrates/Pecks_cave_amphipod/images/PecksCaveAmphipod_(c)JoeNFries.jpg)
- Comal Springs Riffle Beetle image:
<http://newswatch.nationalgeographic.com/files/2012/10/comal-springs-riffle-beetle.jpg>
- Comal Springs Dryopid Beetle image:
https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcTofRhugtKSJ7DmNa0HO97J5qhWImkcPC_MhXKeXyhPRd3Ad2LM
- Starship Enterprise, The Next Generation image:
<http://www.section7g.net/Next%20Generation%203%20Enterprise.jpg>

Thank you for listening.
Questions/ Comments?

