

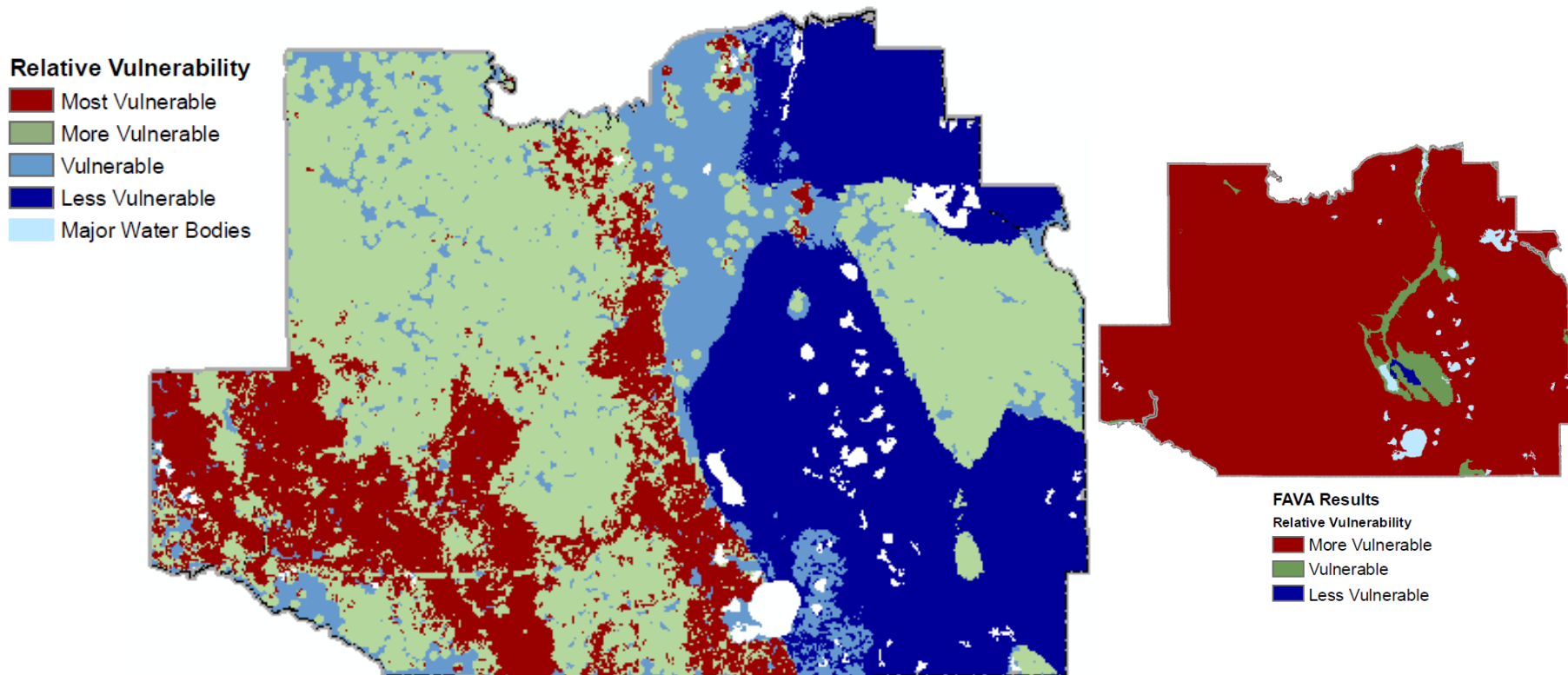
Marion County Aquifer Vulnerability Assessment

March 14, 2013

MCAVA

Marion County Aquifer Vulnerability Assessment

- Characterizing the natural vulnerability of the Florida Aquifer System.



Aquifer vulnerability assessments benefit:

- Wellhead protection
- Source-water protection
- Land-use planning (Springs Protection)
- Environmental protection
- Sensitive land acquisition - regional or local scales

Marion County Stormwater uses to:

- Establish watershed management priorities
- Prioritize stormwater retrofits/construction

Project Approach

- Data acquisition/development
- Modeling
 - Training points
 - Evidential themes
 - Response themes
 - Sensitivity Analysis and Validation
- TAC

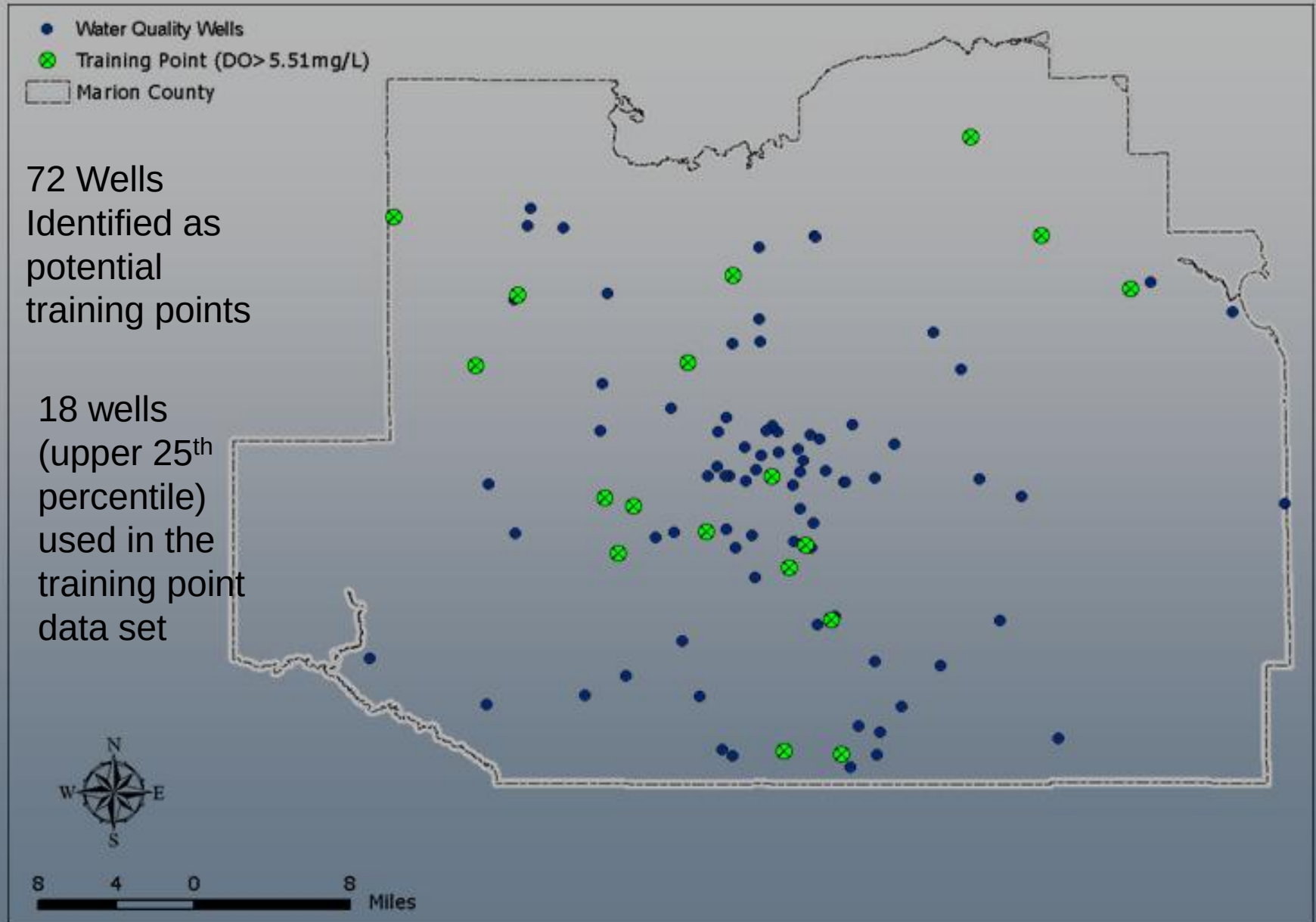
Data Acquisition and Development

- Digital elevation data
- Aquifer recharge
- Confinement or overburden thickness
- Karst features
- Water quality data
- Soil hydraulic conductivity

Training Point Theme

- Groundwater wells tapping the FAS
- Water quality data indicative of high recharge
- Dissolved oxygen (DO) serve as the training point data
- Dissolved nitrogen is used for validation

Training Points and Source Dataset



Themes

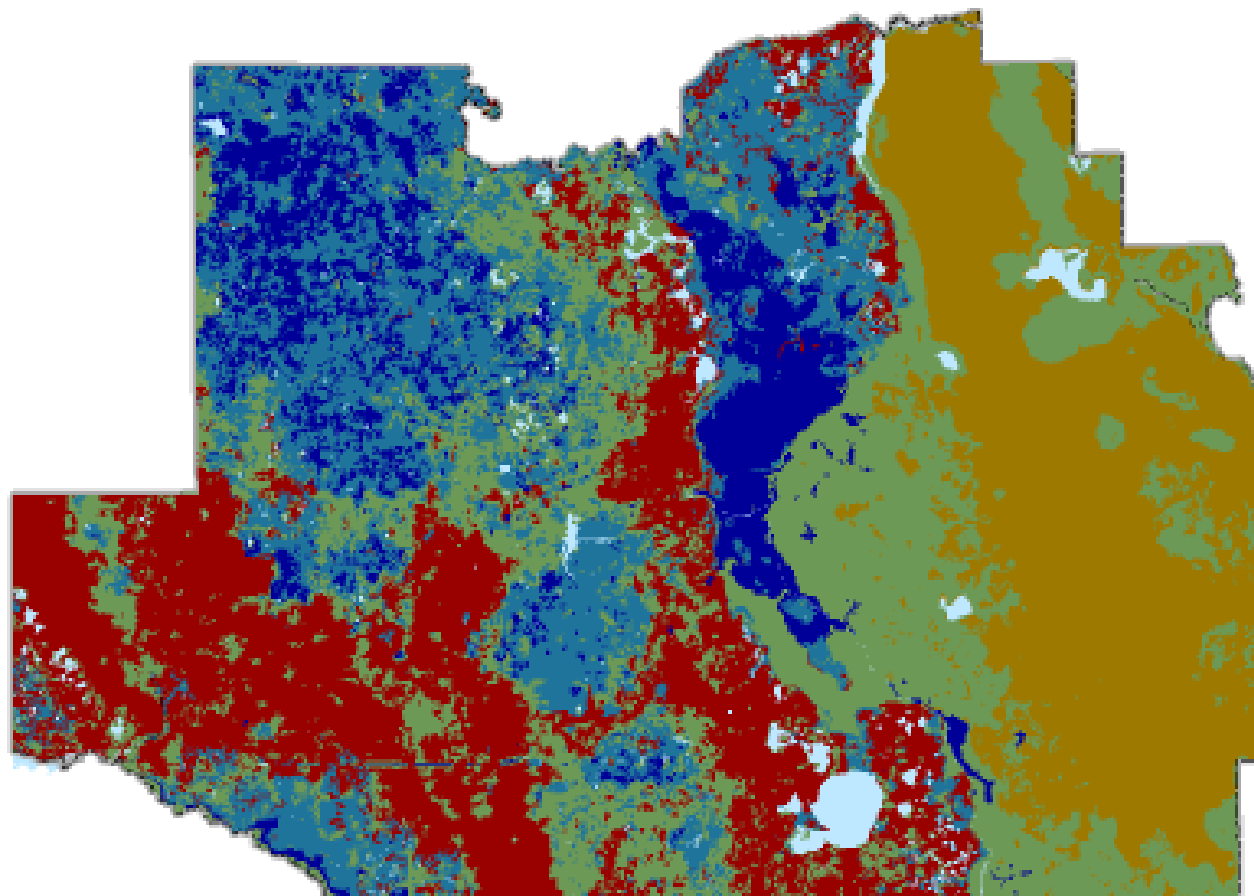
- Evidential theme
 - Set of continuous spatial data that is associated with the location of the training points
- Response Themes (vulnerability maps)
 - Weights of evidence were applied to generate the response theme.

Final Evidential Themes

- Soil Hydraulic Conductivity
- Intermediate Confining Unit Thickness
- Effective Karst Feature

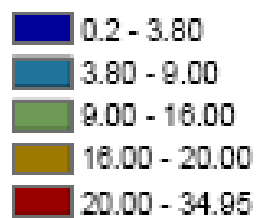
Soil Hydraulic Conductivity

Evidential and Response Themes



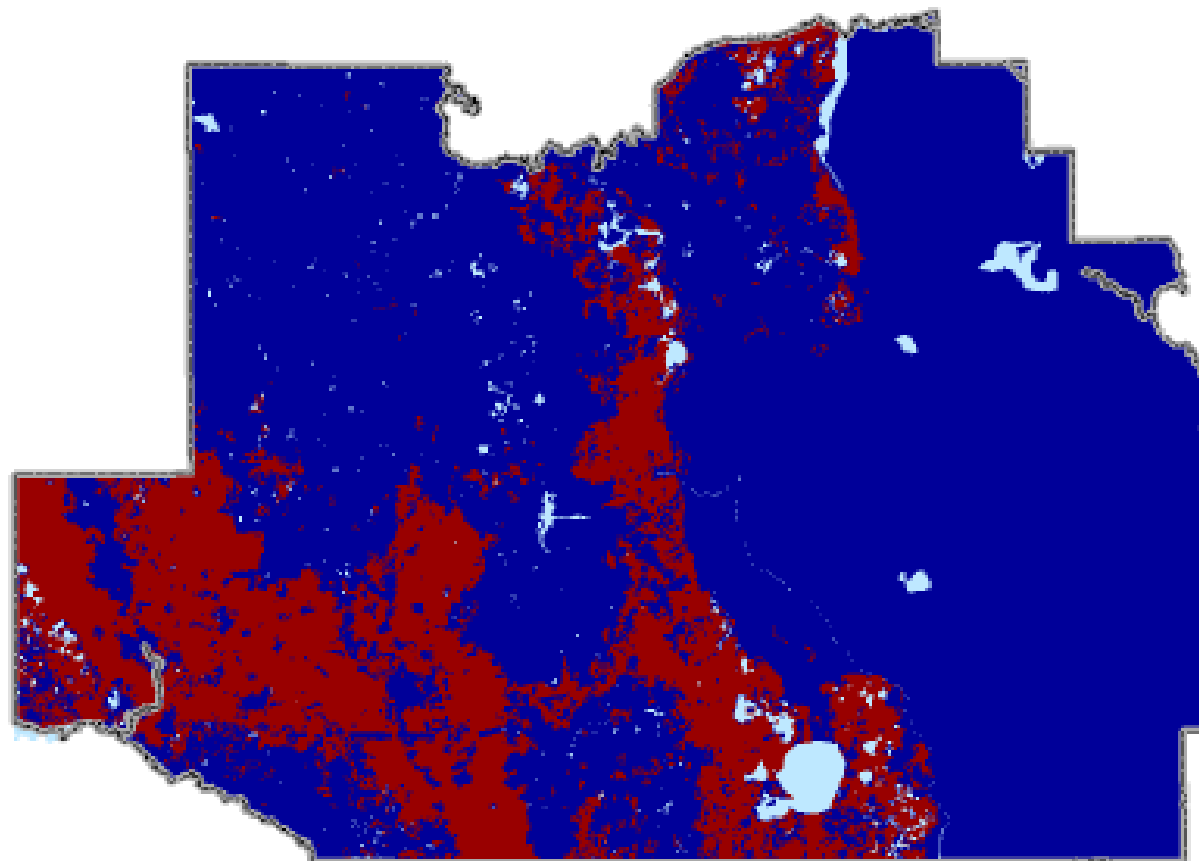
Soil Hydraulic Conductivity

in/hr



Major Water Bodies





Soil Hydraulic Conductivity
in/hr

0 - 31.36

31.37 - 34.95

Major Water Bodies

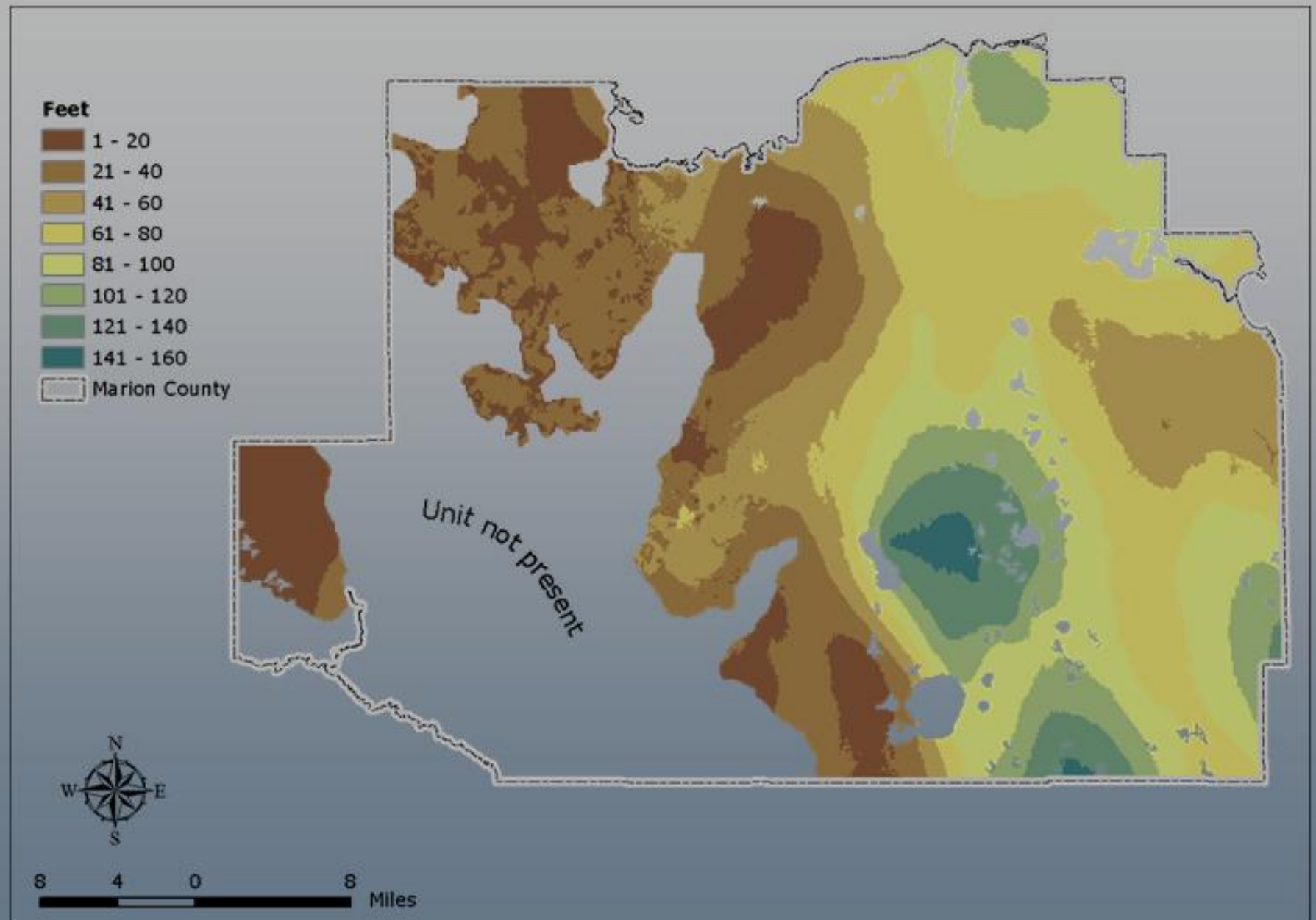


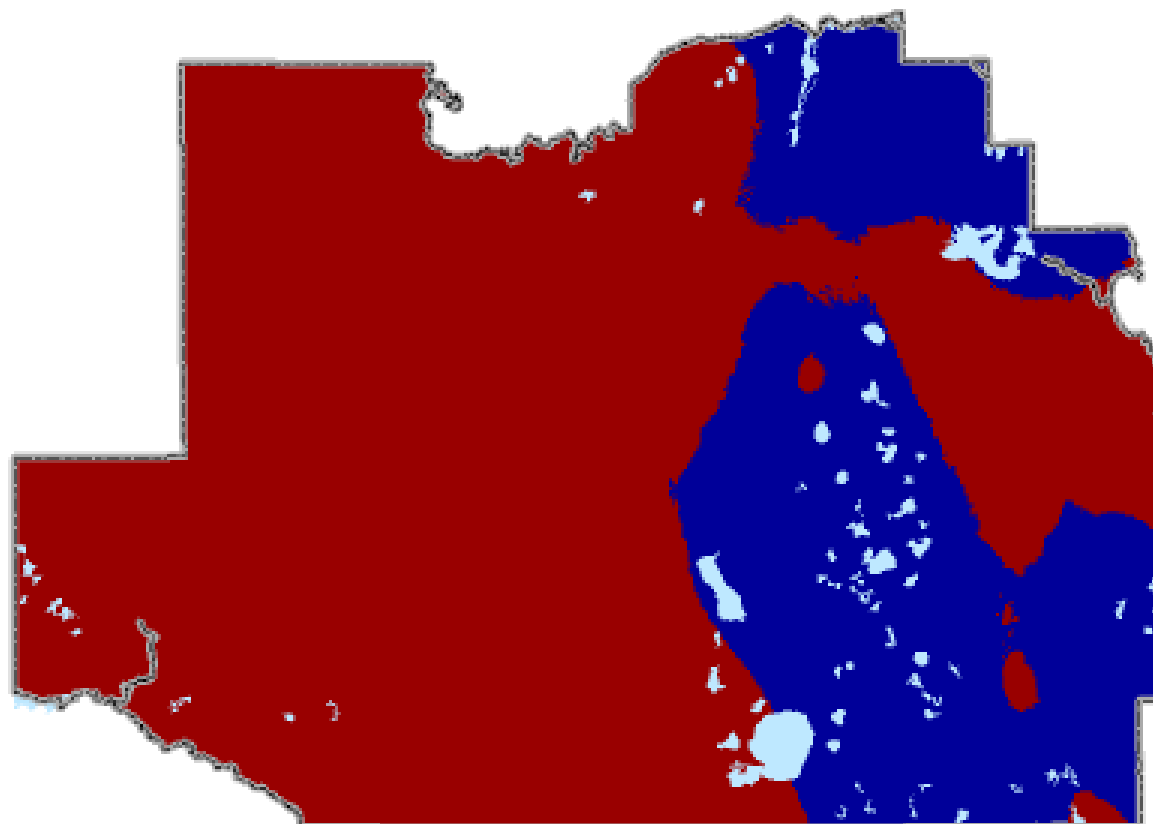
10 5 0 10
Miles

Intermediate Confining Unit Thickness

Evidential and Response Themes

Thickness of ICU





Intermediate Confining Unit
Thickness In feet

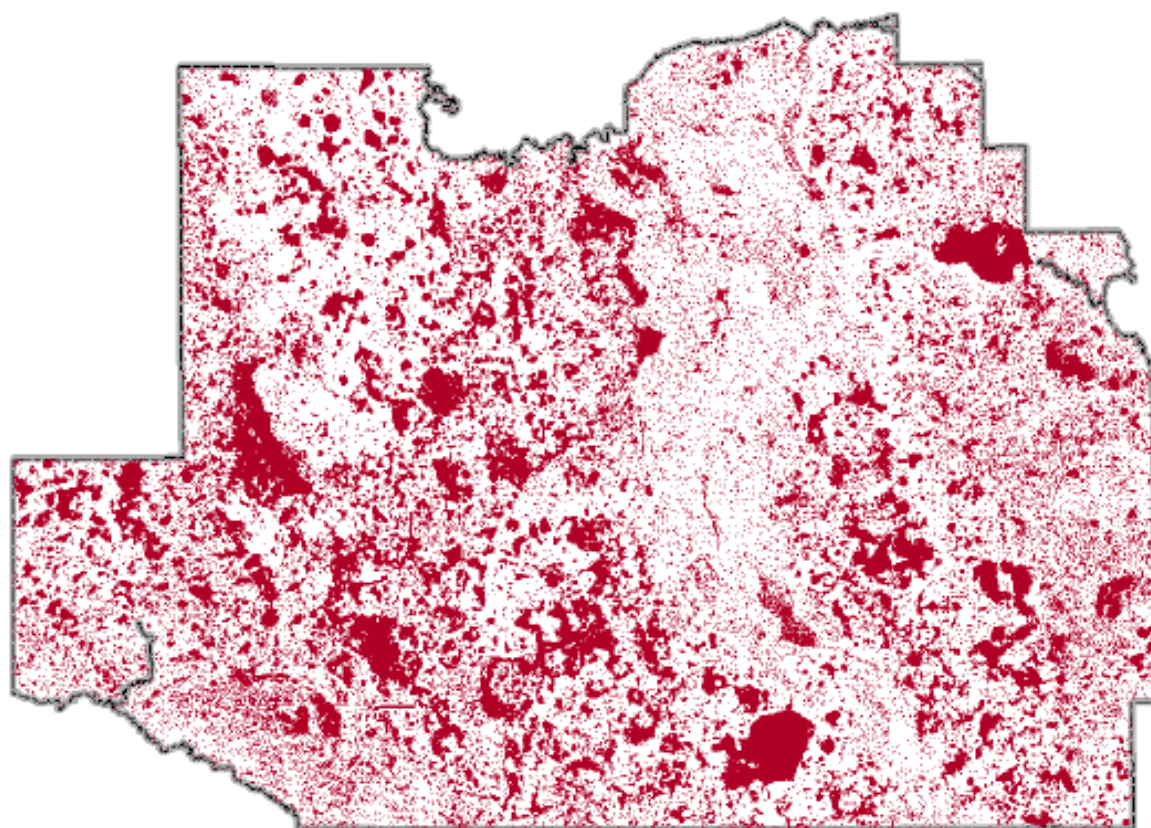
0 - 72
73 - 145
Major Water Bodies



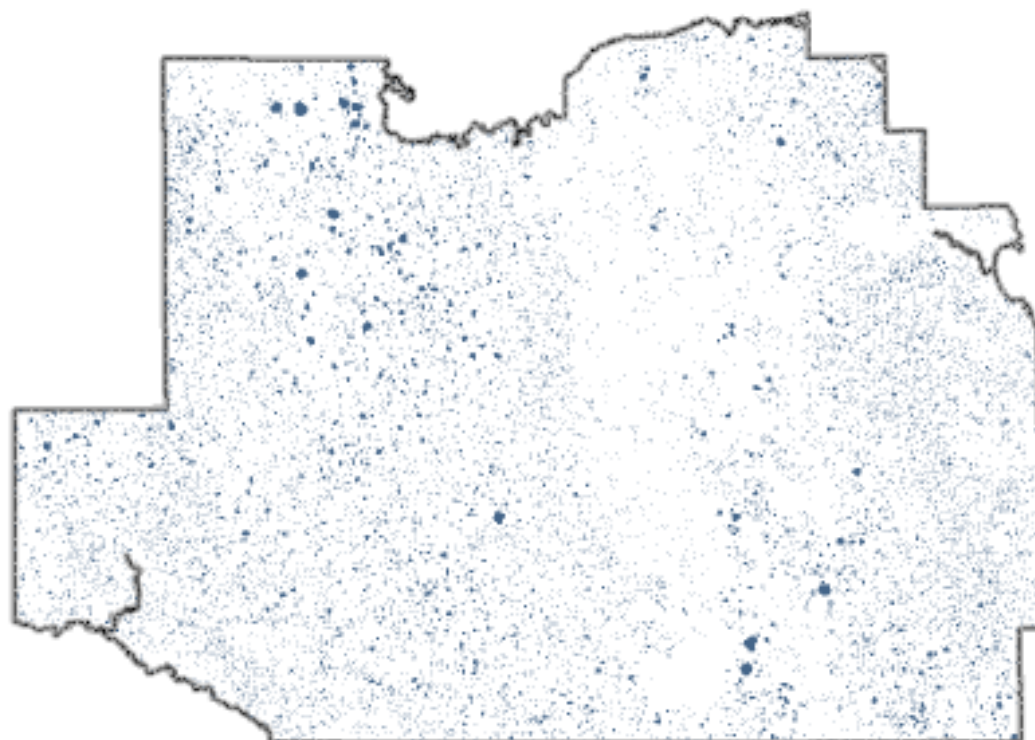
10 5 0 10 Miles

Effective Karst Feature

Evidential and Response Themes



 Closed Topographic Depressions

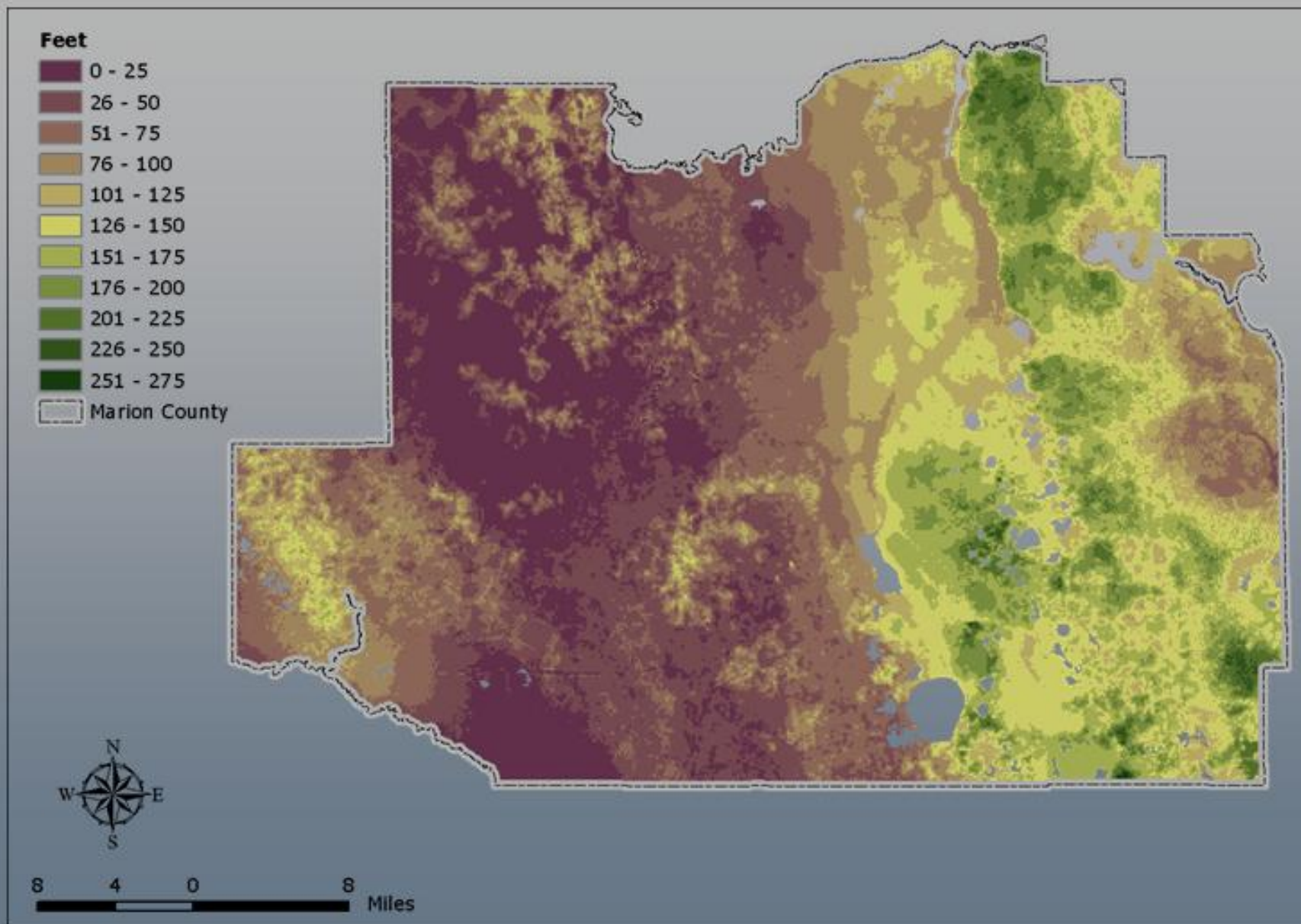


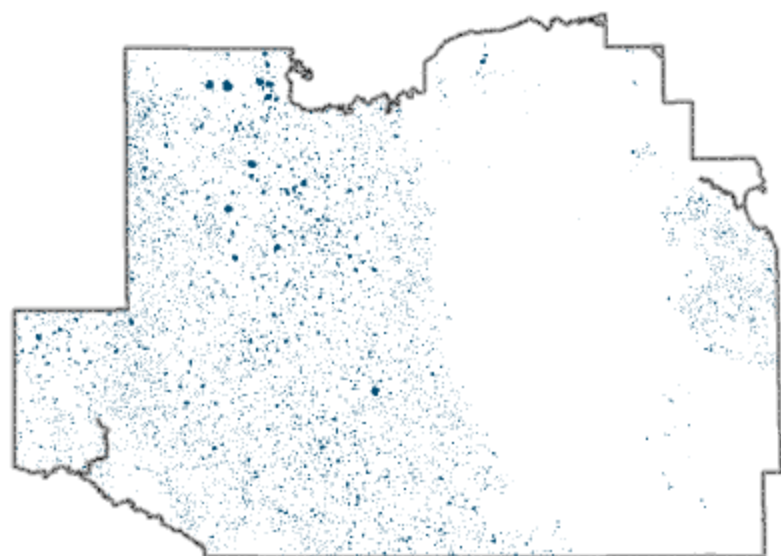
Effective Karst Features
Overburden filter not used



10 5 0 10 Miles

Thickness of Overburden

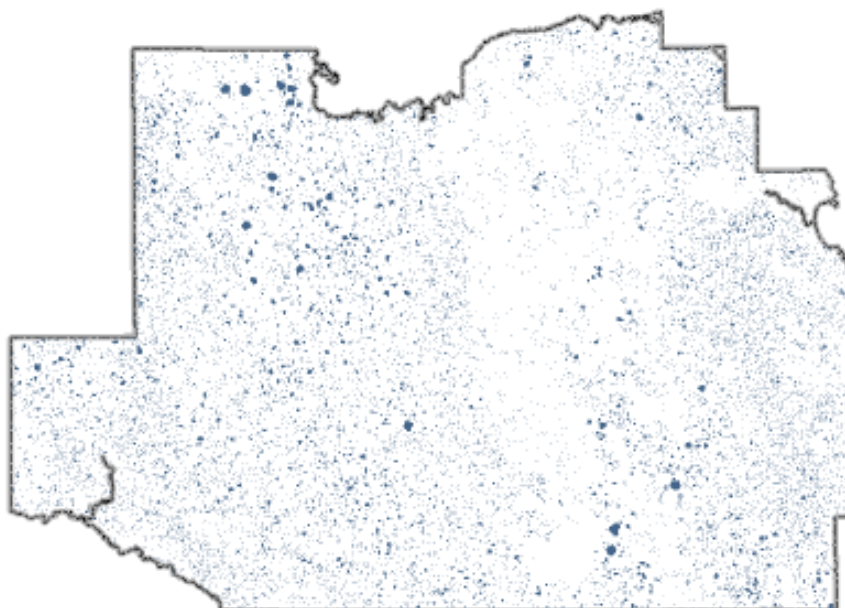




Effective Karst Features
Underlain by <100' of overburden



10 5 0 10 Miles

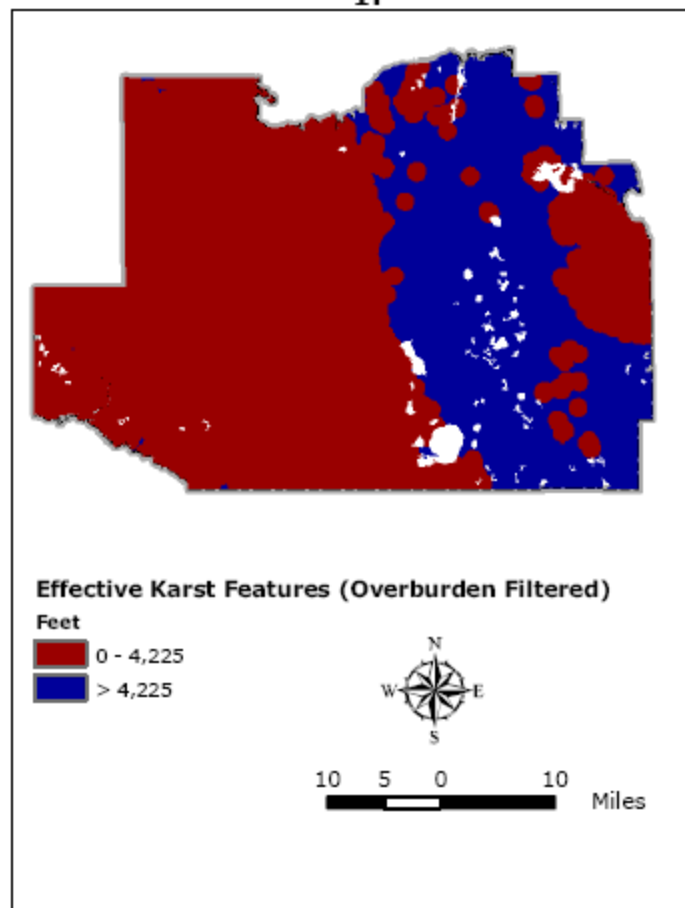


Effective Karst Features
Overburden filter not used

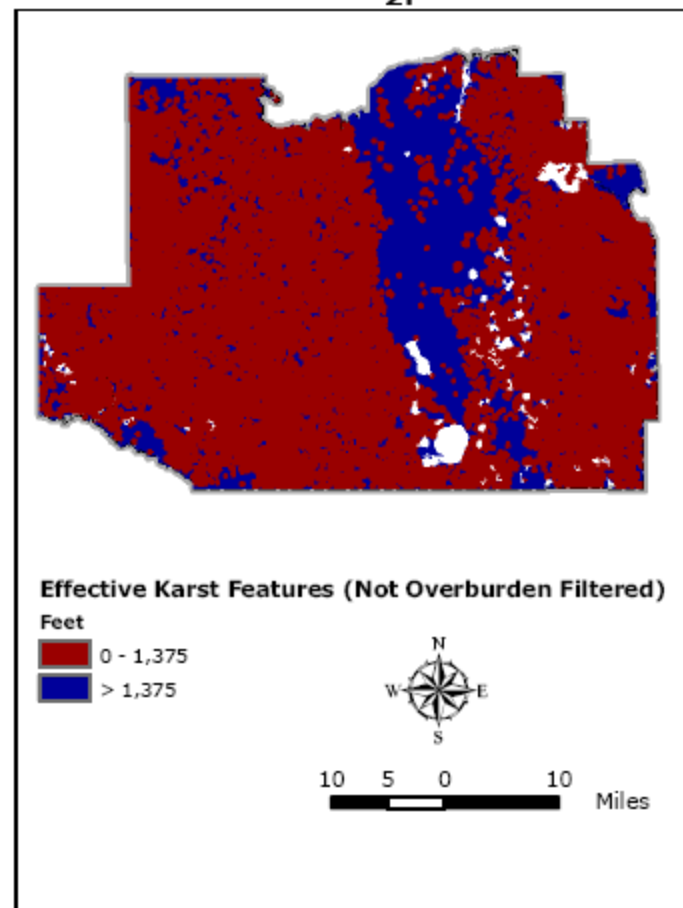


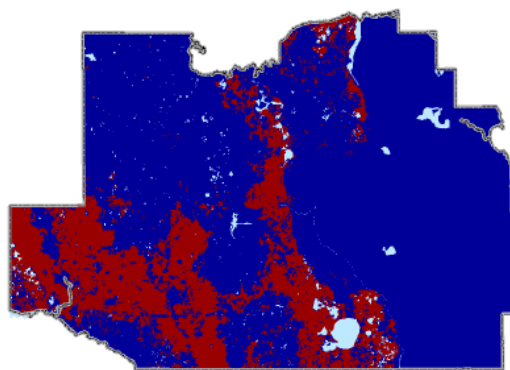
10 5 0 10 Miles

1.



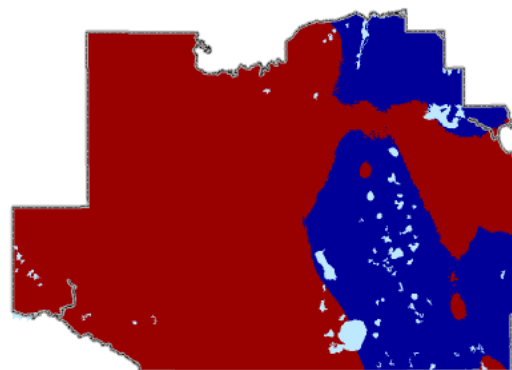
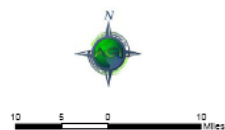
2.





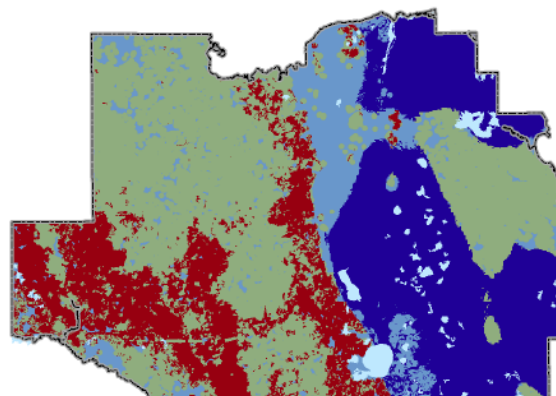
Soil Hydraulic Conductivity
In/hr

- 0 - 31.36
- 31.37 - 34.95
- Major Water Bodies



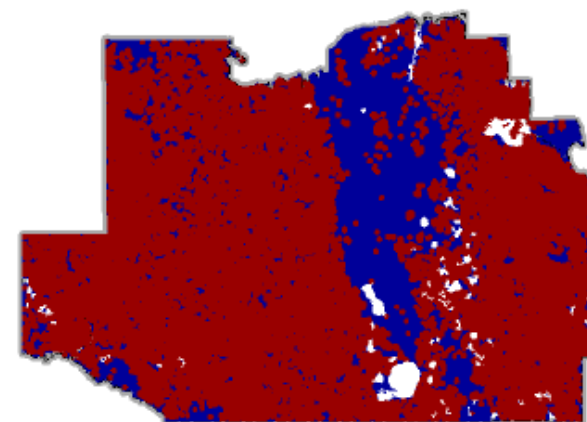
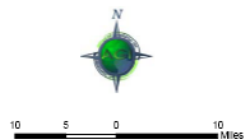
Intermediate Confining Unit
Thickness in feet

- 0 - 72
- 73 - 145
- Major Water Bodies



Relative Vulnerability

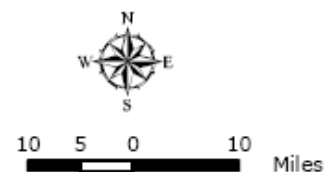
- Most Vulnerable
- More Vulnerable
- Vulnerable
- Less Vulnerable
- Major Water Bodies



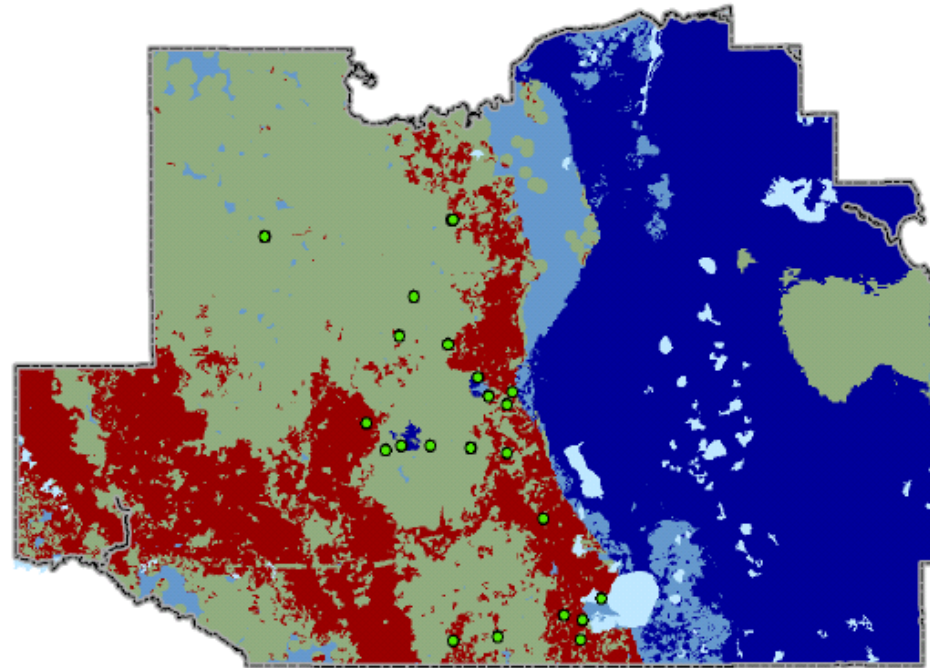
Effective Karst Features (Not Overburden Filtered)

Feet

- 0 - 1,375
- > 1,375



Validation



Dissolved Nitrogen Model

Relative Vulnerability

■ Most Vulnerable

■ More Vulnerable

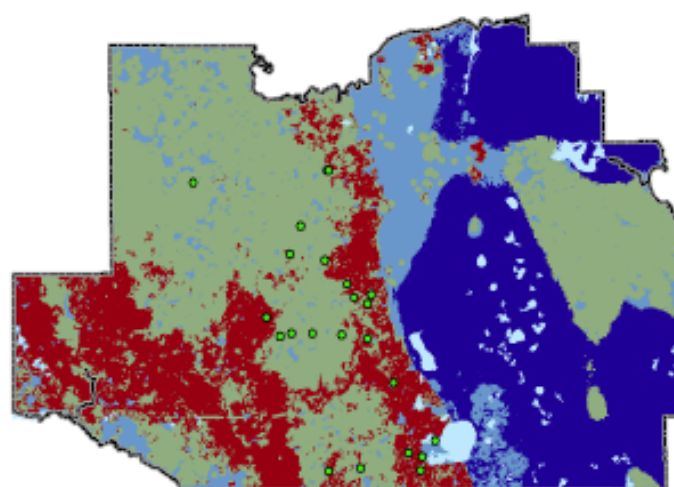
■ Vulnerable

■ Less Vulnerable

● Validation Training Points

■ Major Water Bodies





Relative Vulnerability

- Most Vulnerable
- More Vulnerable
- Vulnerable
- Less Vulnerable
- Validation Training Points
- Major Water Bodies

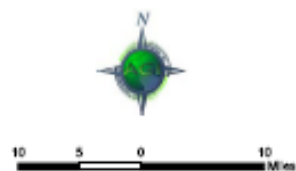
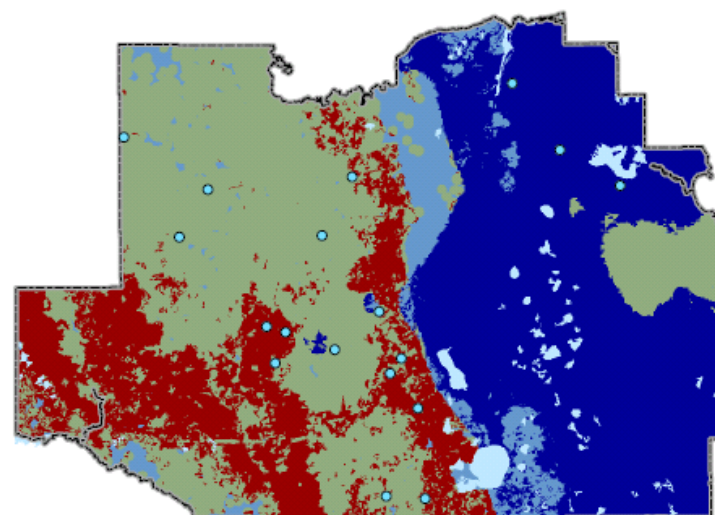


Figure 23. Dissolved nitrogen validation training points plotted in the dissolved oxygen response theme. Comparison reveals 20 of 22 wells, or 91% are located in vulnerable or more vulnerable areas.



Dissolved Nitrogen Model

Relative Vulnerability

- Most Vulnerable
- More Vulnerable
- Vulnerable
- Less Vulnerable
- Model Training Points
- Major Water Bodies



Figure 24. Dissolved oxygen training points plotted in the dissolved nitrogen response theme. Comparison reveals 15 of 18 wells, or 83% are located in vulnerable or more vulnerable areas.

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