

Identifying Sensitive Aquifers in Ohio



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**Ohio EPA, Division of Drinking and
Ground Waters**

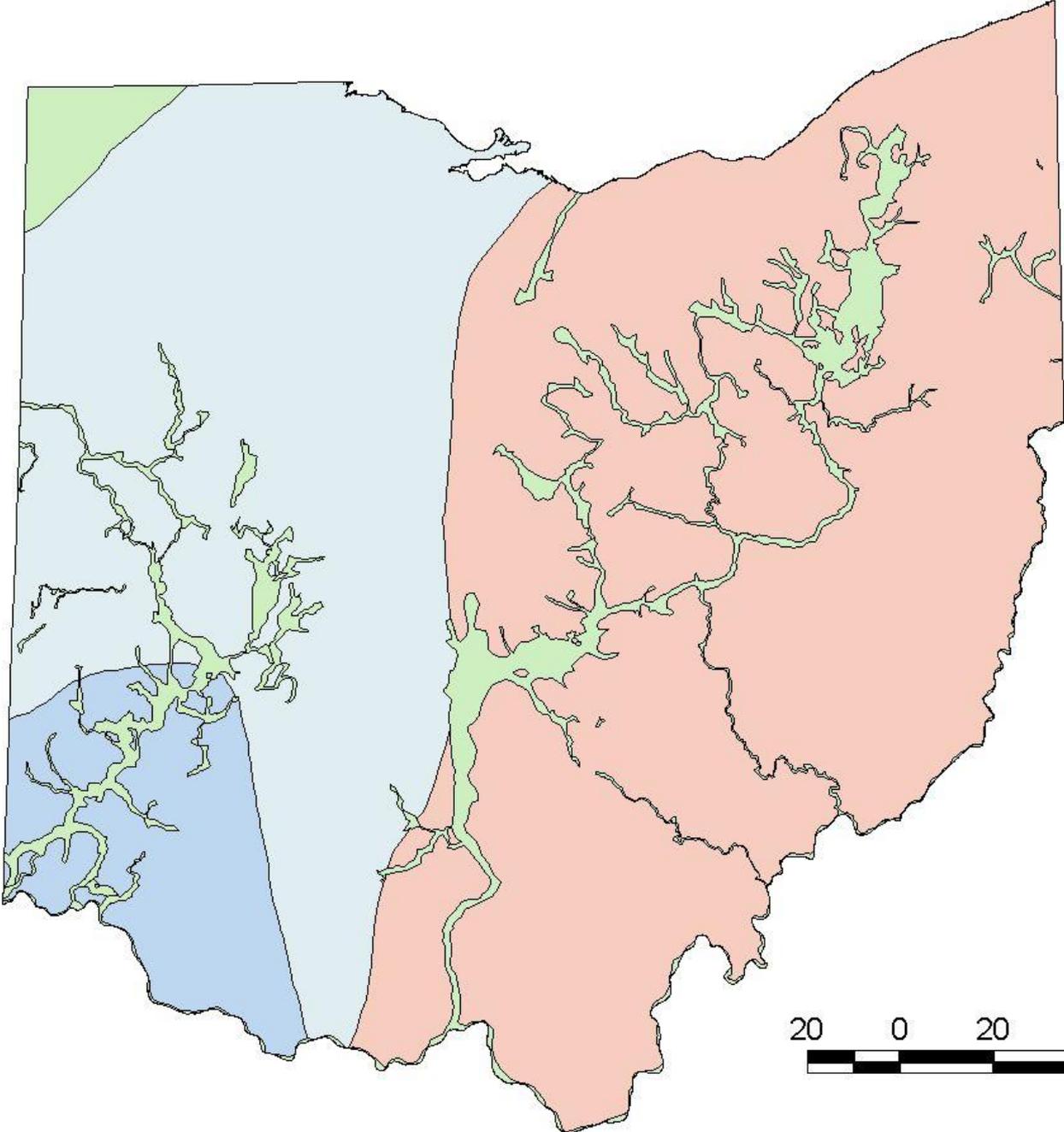
Major Aquifer Types in Ohio



Aquifer Type/Lithology

-  Sand and Gravel
-  Sandstone
-  Carbonate
-  Interbedded Shale and Carbonate

20 0 20 40 60 80 100 Miles



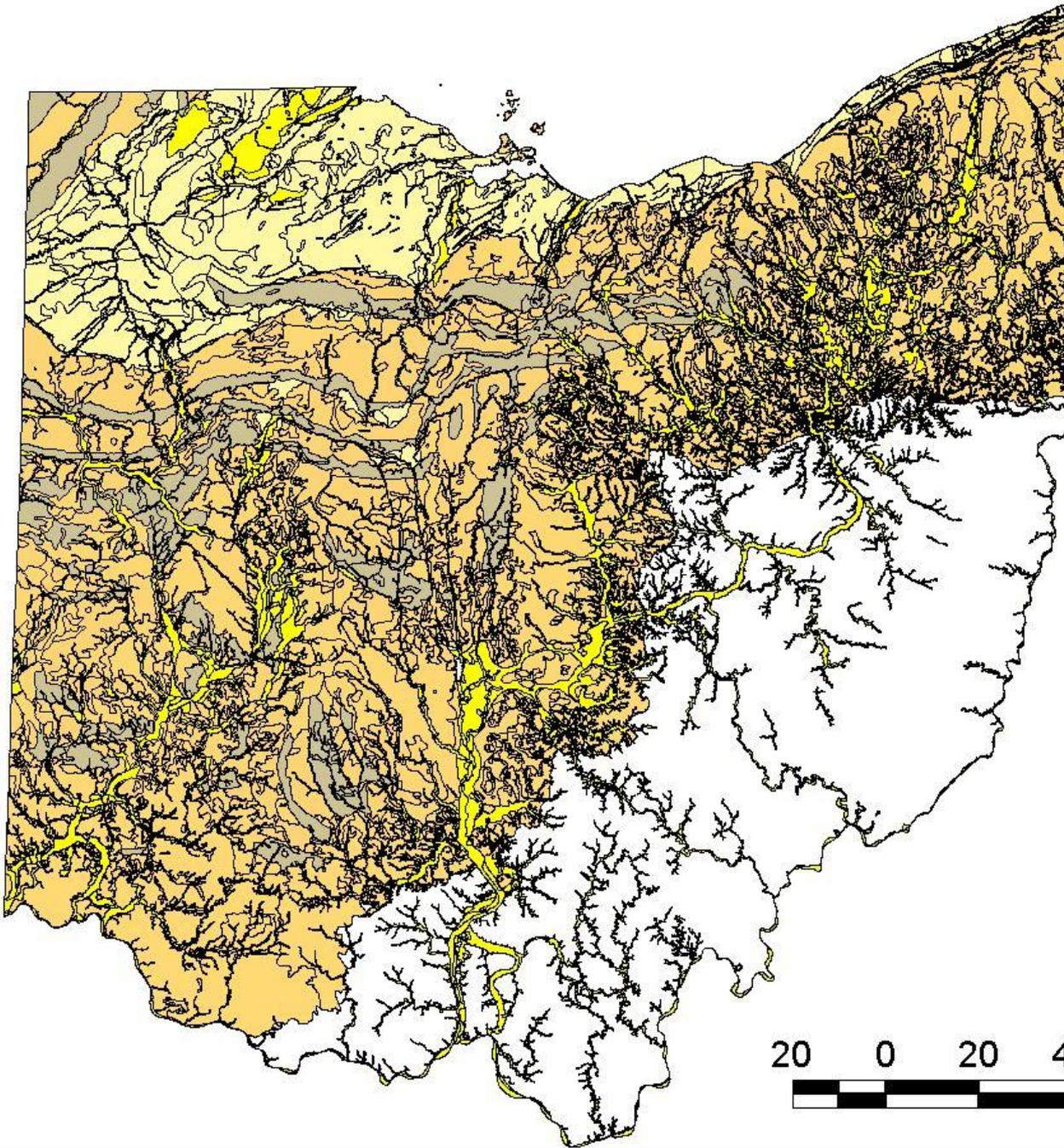
Ohio Glacial Deposits



Glacial Deposits

-  Sand and Gravel
-  Till Deposits
-  Till - End Moraine
-  Lacustrine
-  Unglaciated

20 0 20 40 60 80 Miles



Benefits of Identifying Sensitive Aquifers



- **Ground Water Rule**
 - **Karst, Fractured Bedrock, Cobbles**
- **Ground Water - Surface Water Interaction**
- **Ground Water Protection Programs**
- **Miscellaneous**

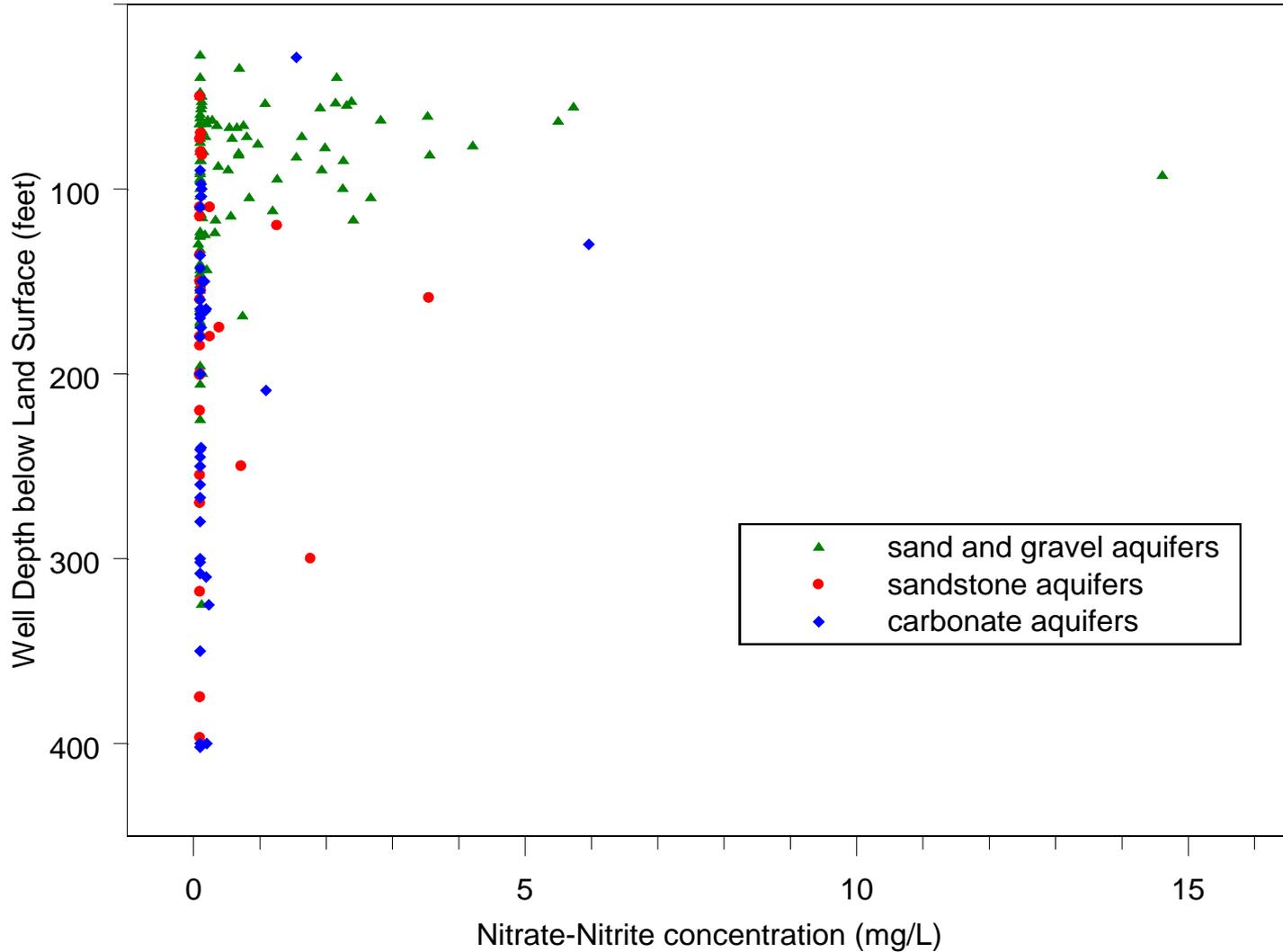
Sensitive Aquifer Map

- Data Sources

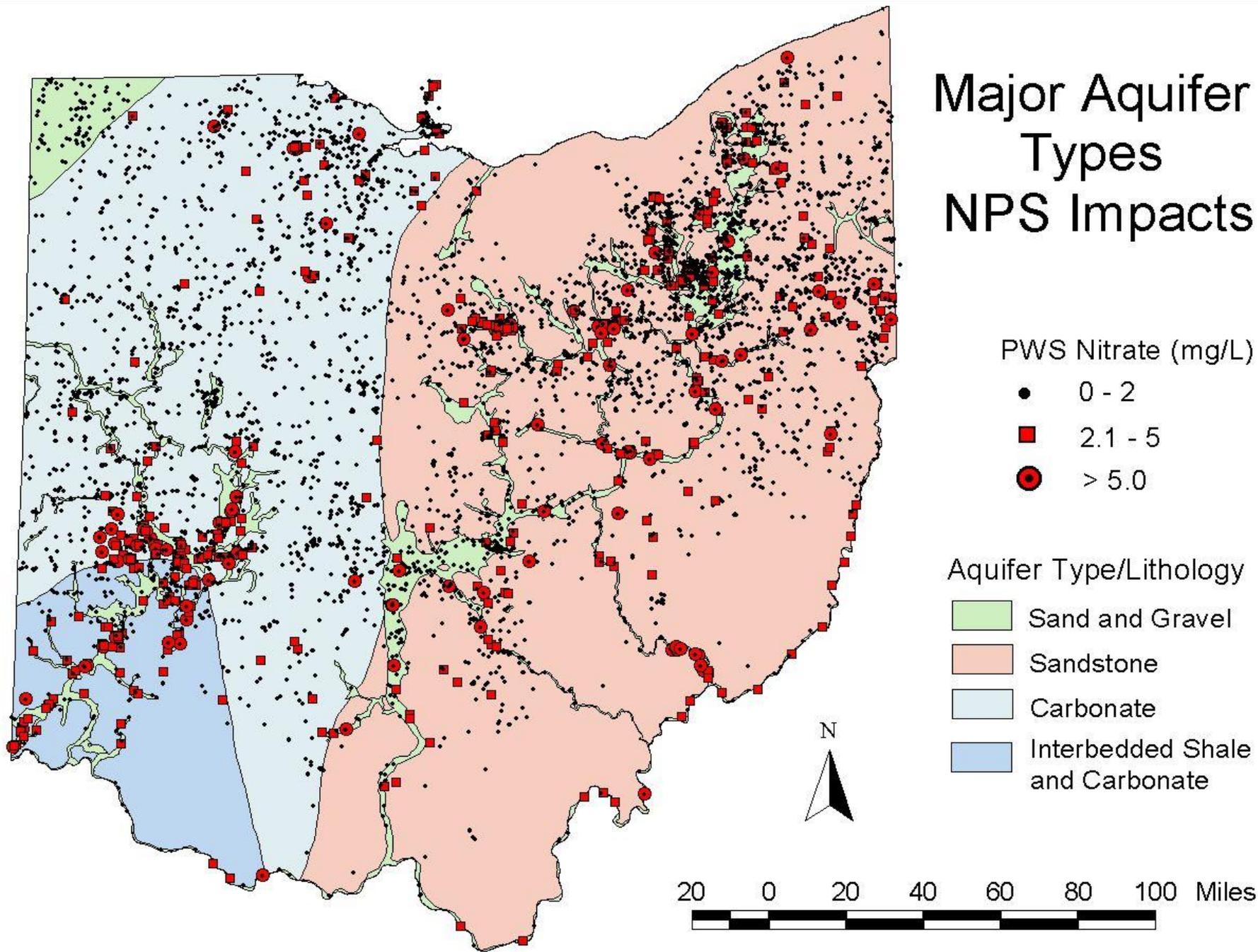


- **Compliance and Ambient Data**
 - Nitrate, VOC, SOC
- **Regulated Facility Data**
 - Landfills, Hazardous Waste Sites
- **Geologic Information**
 - ODNR Aquifer Maps
- **Special Study Knowledge**

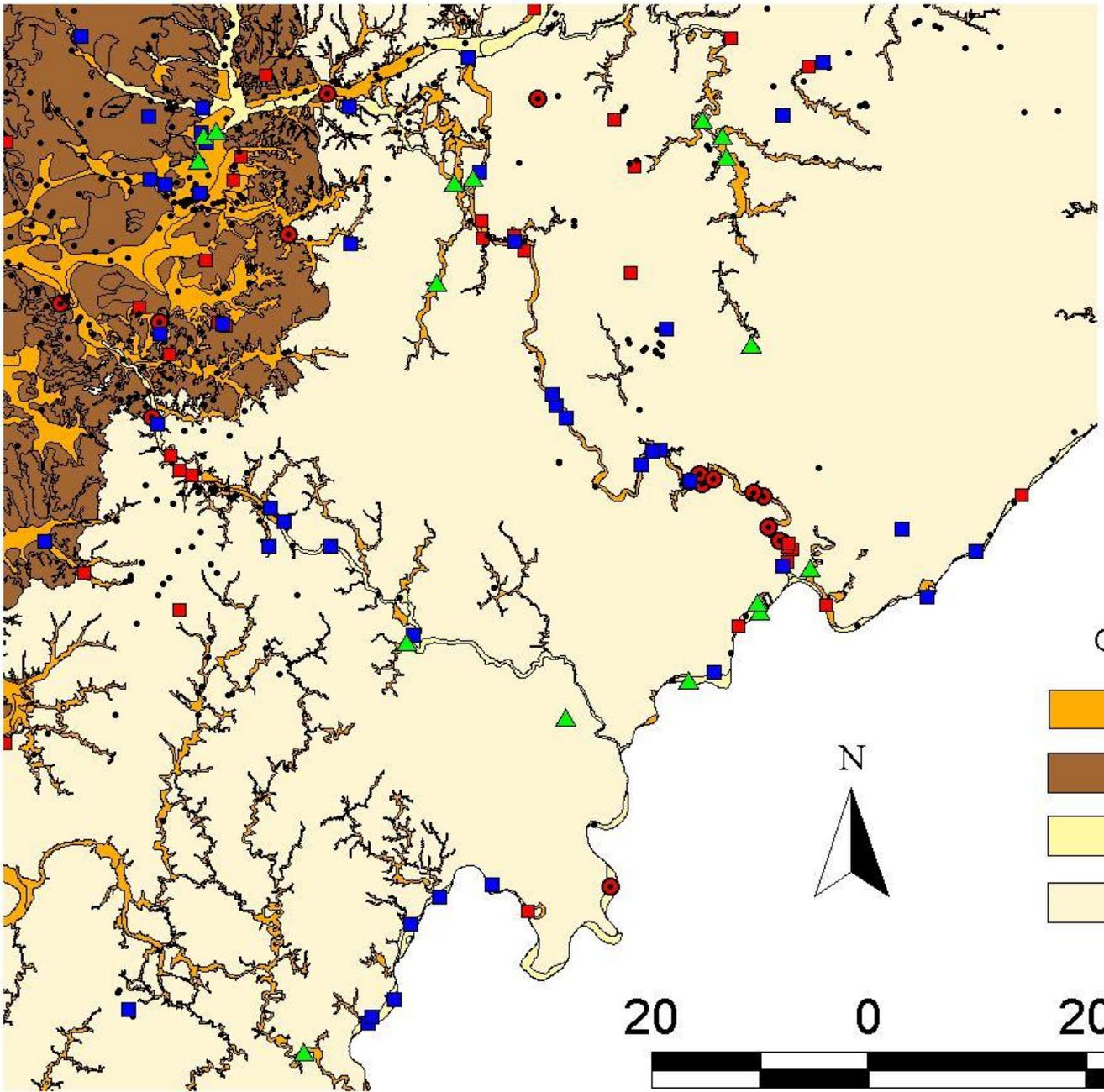
Nitrate/Nitrite - Depth Relations in Ambient Wells



Major Aquifer Types NPS Impacts



Sites in SE Ohio



▲ Impacted RCRA Sites

■ PWS - VOC Detects

PWS Nitrate (mg/L)

● 0 - 2

■ 2.1 - 5

● > 5.0

Glacial Lithology

■ Fine Grained

■ Till

■ Sand & Gravels

■ Unglaciaded

20 0 20 40 Miles



Sensitive Aquifers



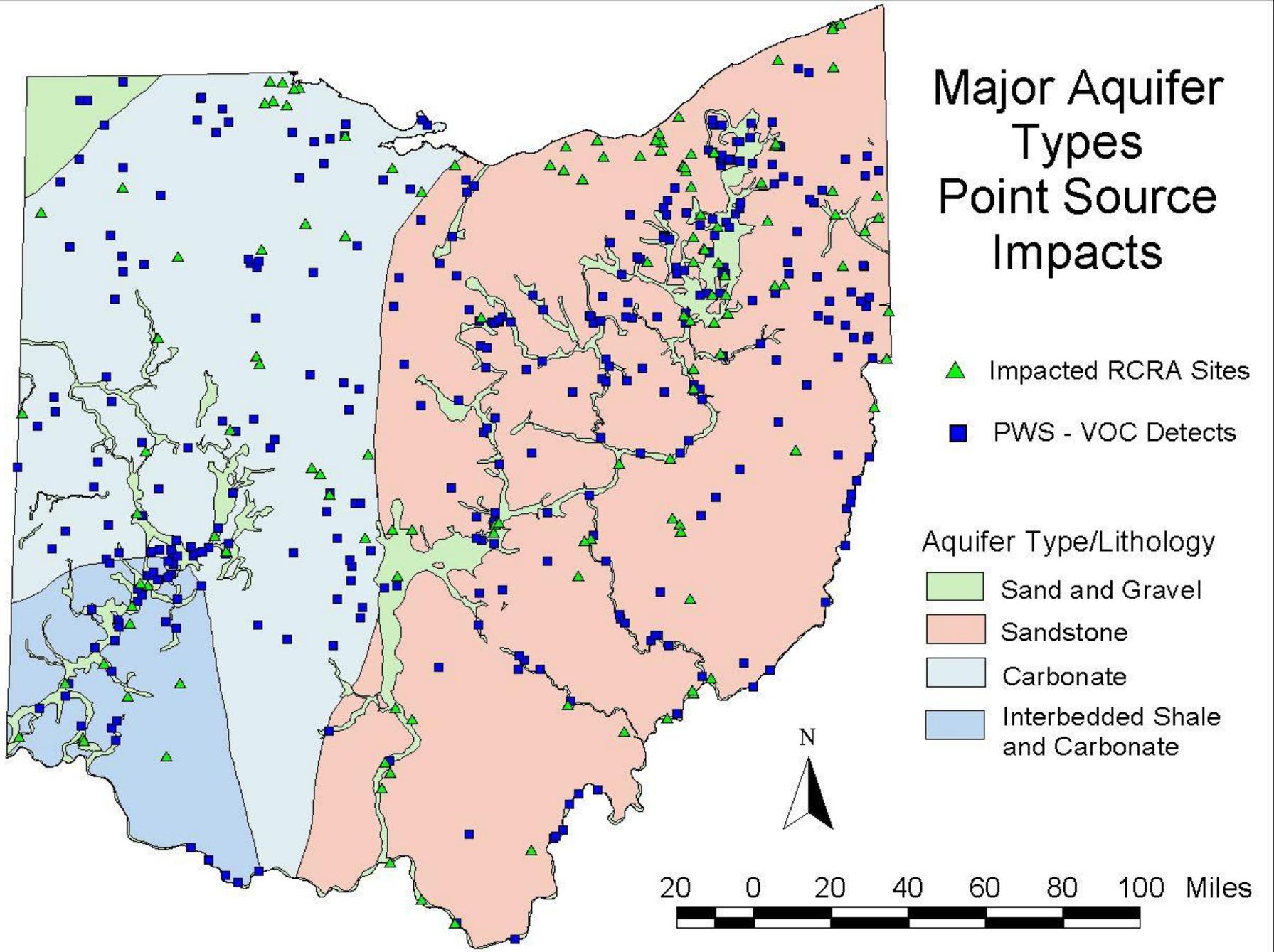
- Buried Valleys
 - Distribution of impacted sites confirms sensitivity of the sand and gravel aquifers filling glacial valleys:
 - Sensitive to nitrate, may not be sensitive to pathogens.

Major Aquifer Types Point Source Impacts

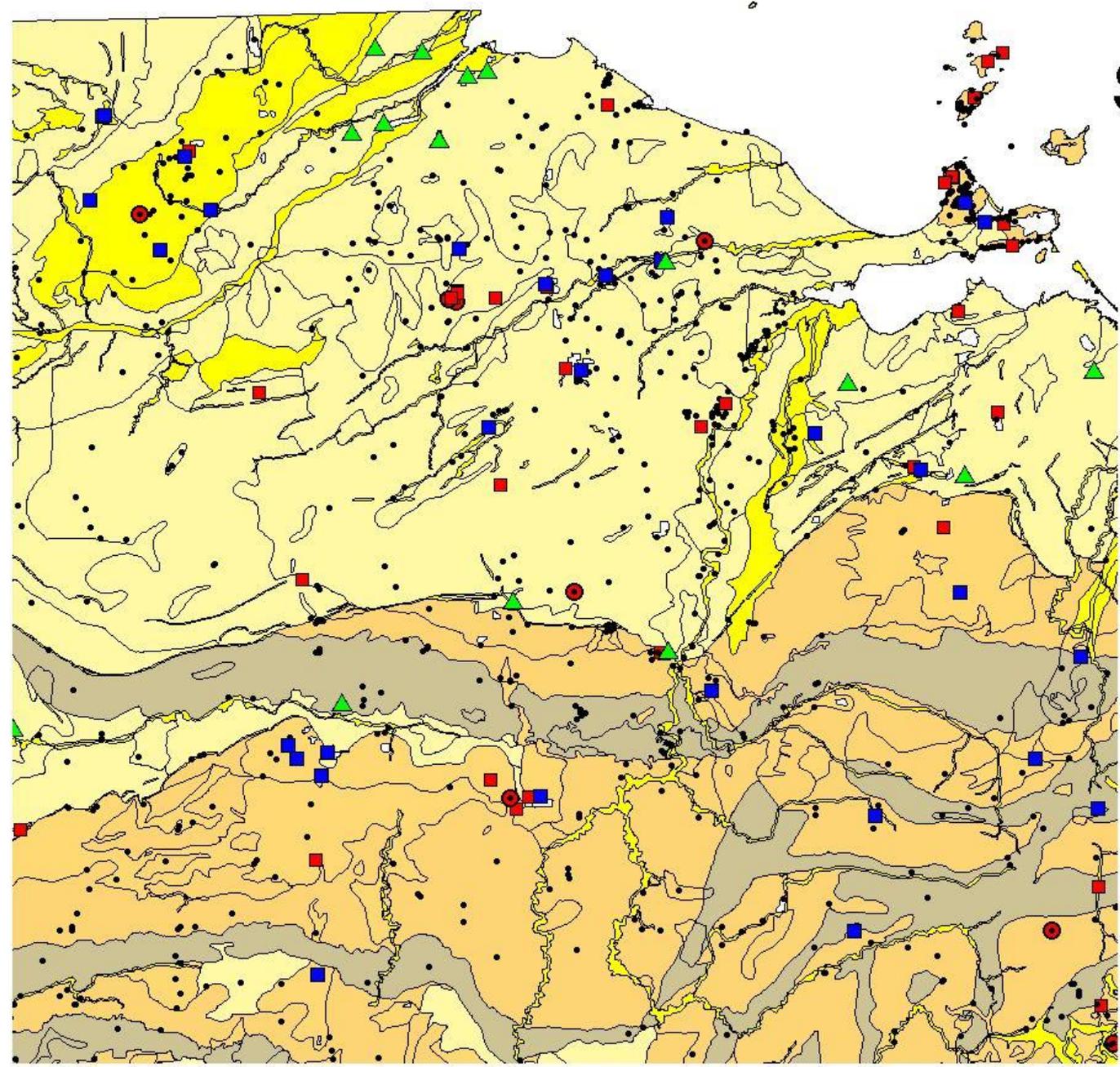
- ▲ Impacted RCRA Sites
- PWS - VOC Detects

Aquifer Type/Lithology

- Sand and Gravel
- Sandstone
- Carbonate
- Interbedded Shale and Carbonate



Sites In NW Ohio

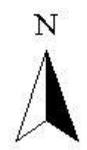


- ▲ Impacted RCRA Sites
- PWS - VOC Detects

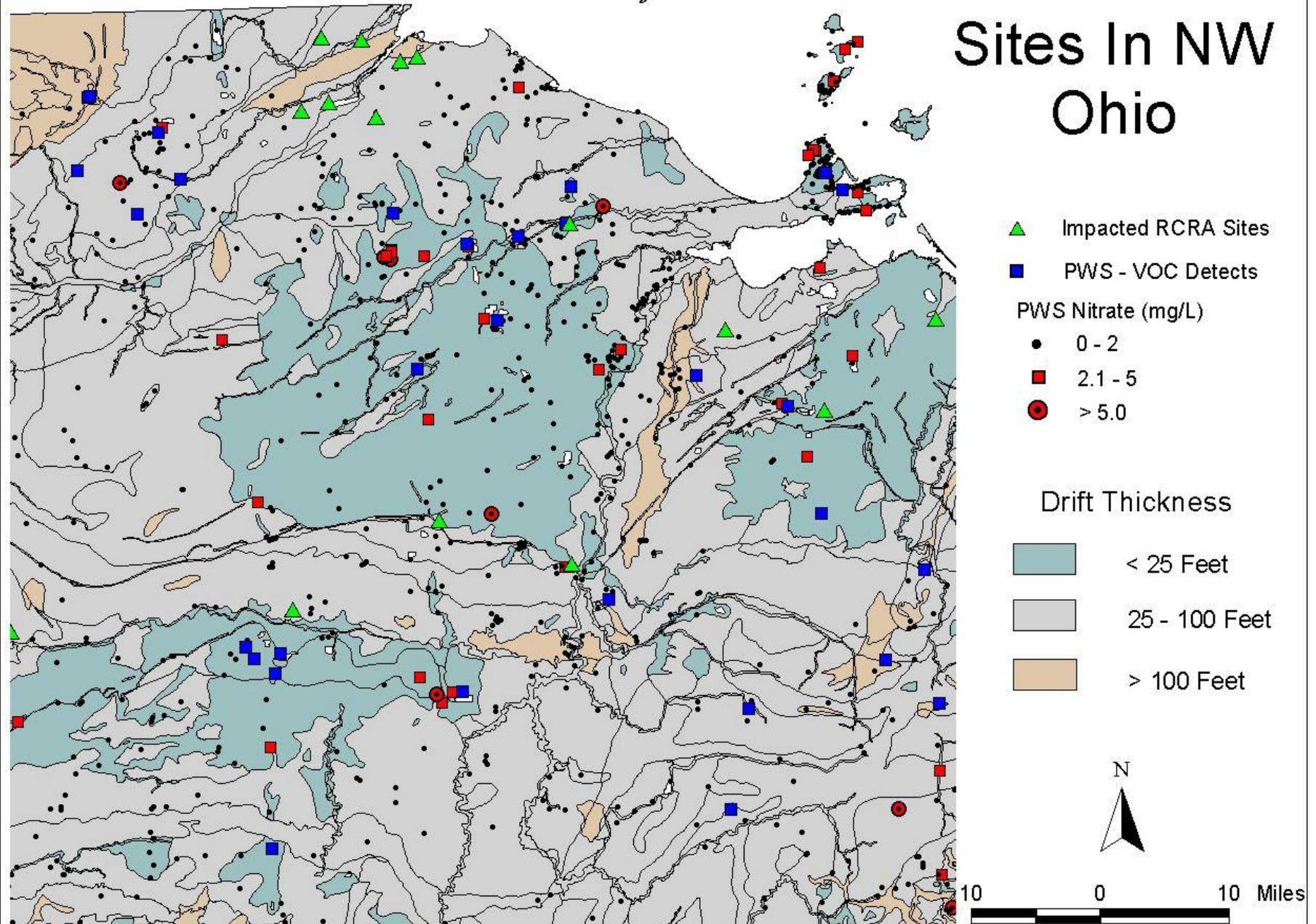
- PWS Nitrate (mg/L)
- 0 - 2
 - 2.1 - 5
 - (with red outline) > 5.0

Geologic Setting

- Buried Valley/Alluvial Beach Ridge, etc.
- Lacustrine
- End Moraine
- Ground Moraine



Sites In NW Ohio

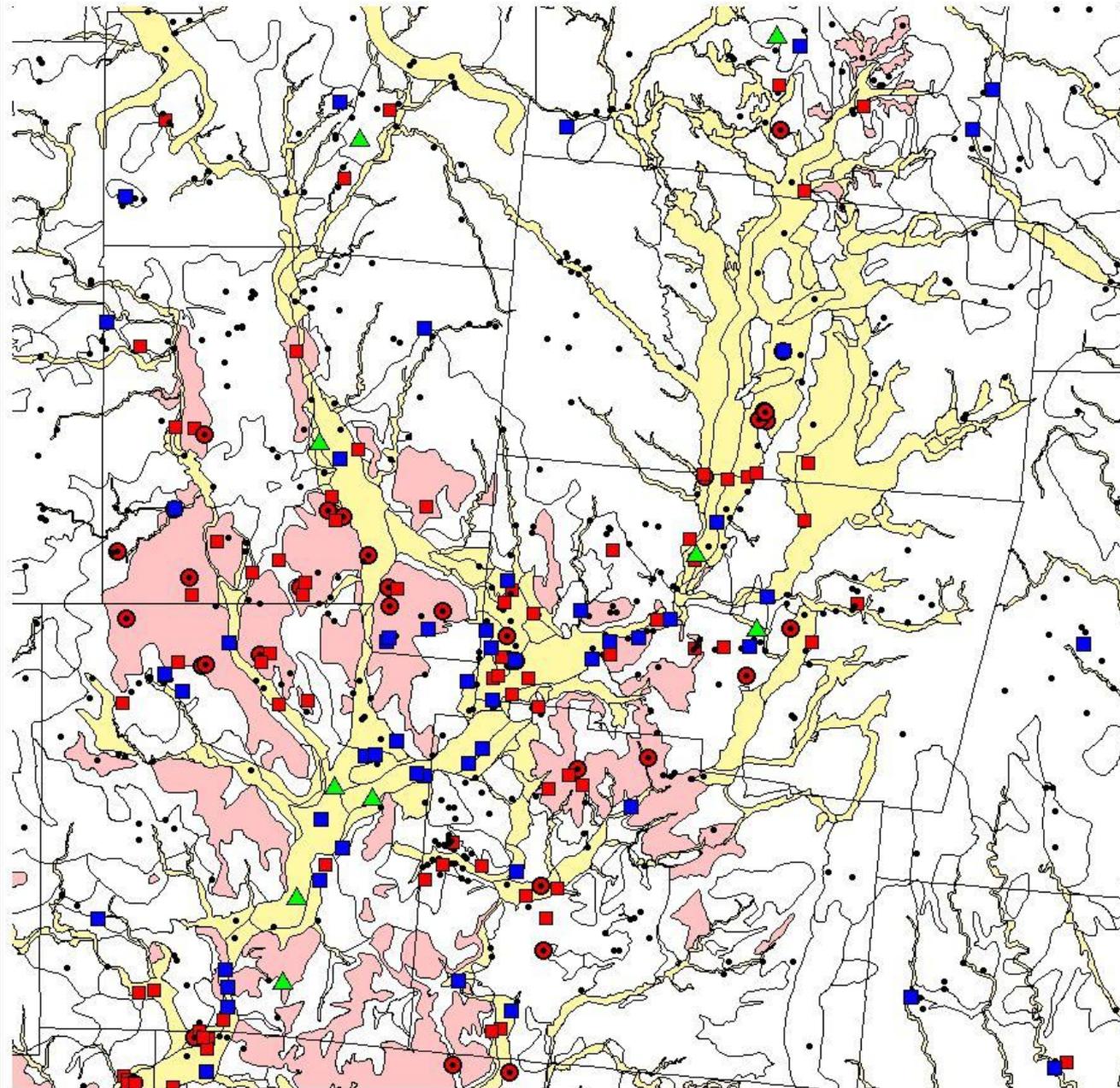


Sensitive Aquifers



- Thin Drift Over Bedrock Aquifers
 - Impacted bedrock wells are more common in areas of thin glacial drift.
 - Holds true for non-point sources more than point sources?

Sites in SW Ohio



▲ Impacted RCRA Sites

■ PWS - VOC Detects

PWS Nitrate (mg/L)

● 0 - 2

■ 2.1 - 5

● > 5.0

Hydrogeologic Settings

■ Buried Valley,
Alluvial,
Outwash/Kame

■ Thin Upland



5 0 5 10 Miles

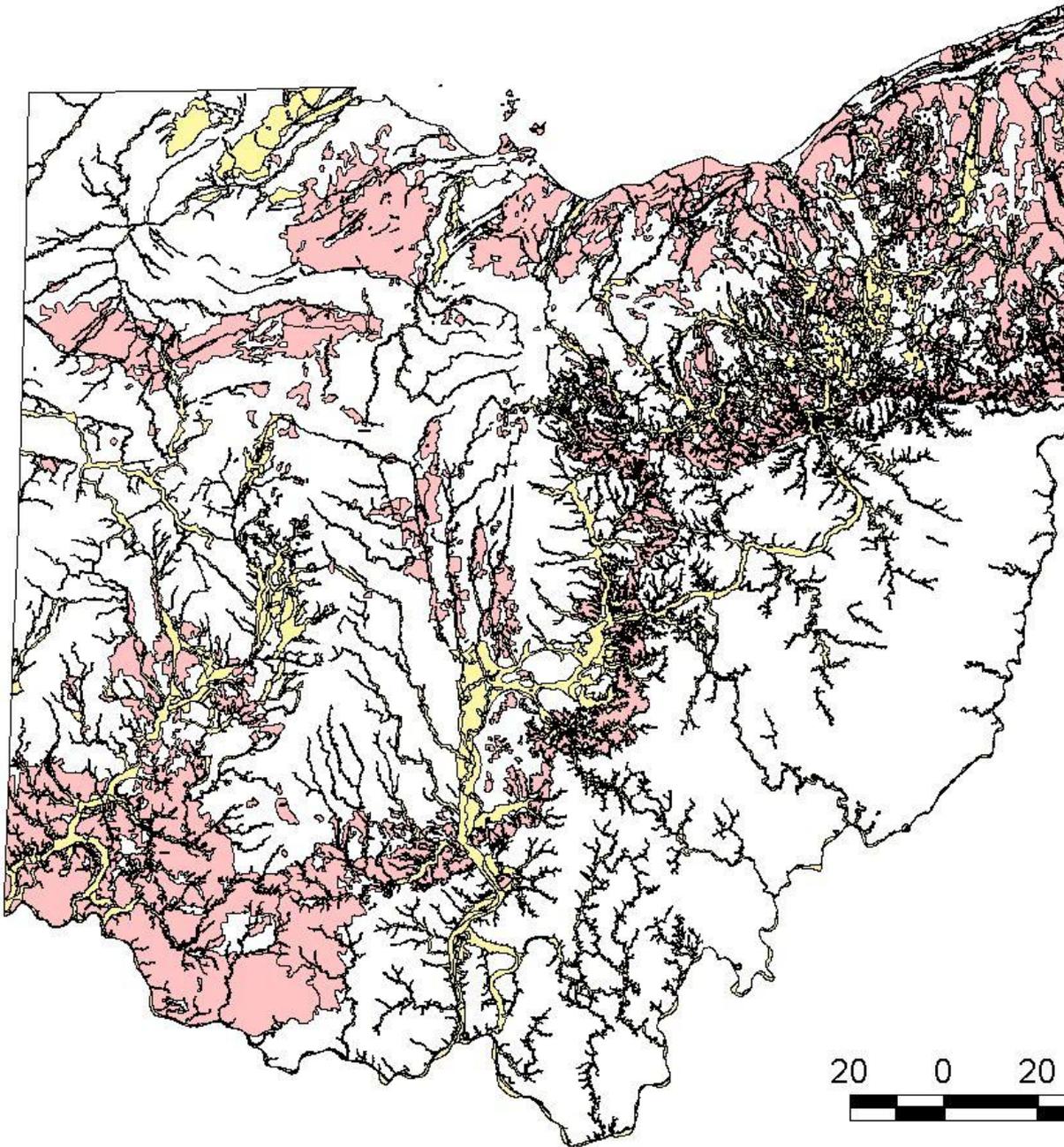
Identified Sensitive? Aquifers

Sensitive Aquifers

-  Buried Valley, Beach Ridge, Alluvial, Outwash/Kame
-  Glacial Drift < 25 Feet



20 0 20 40 60 80 100 Miles



Ongoing Efforts



- Apply GPS locations;
- Statistical analysis of sites and geologic settings/thickness;
- Incorporate well depth into analysis;
- Incorporate special study knowledge.



Acknowledgments

•**Data:**

- OEPA District Staff
- OEPA Central Office Staff
- ODNR Division of Water

GIS Support:

- DDAGW GIS Unit
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