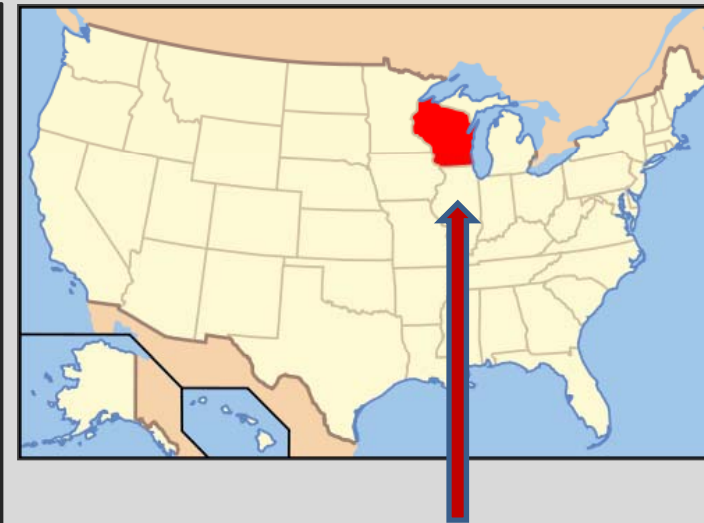
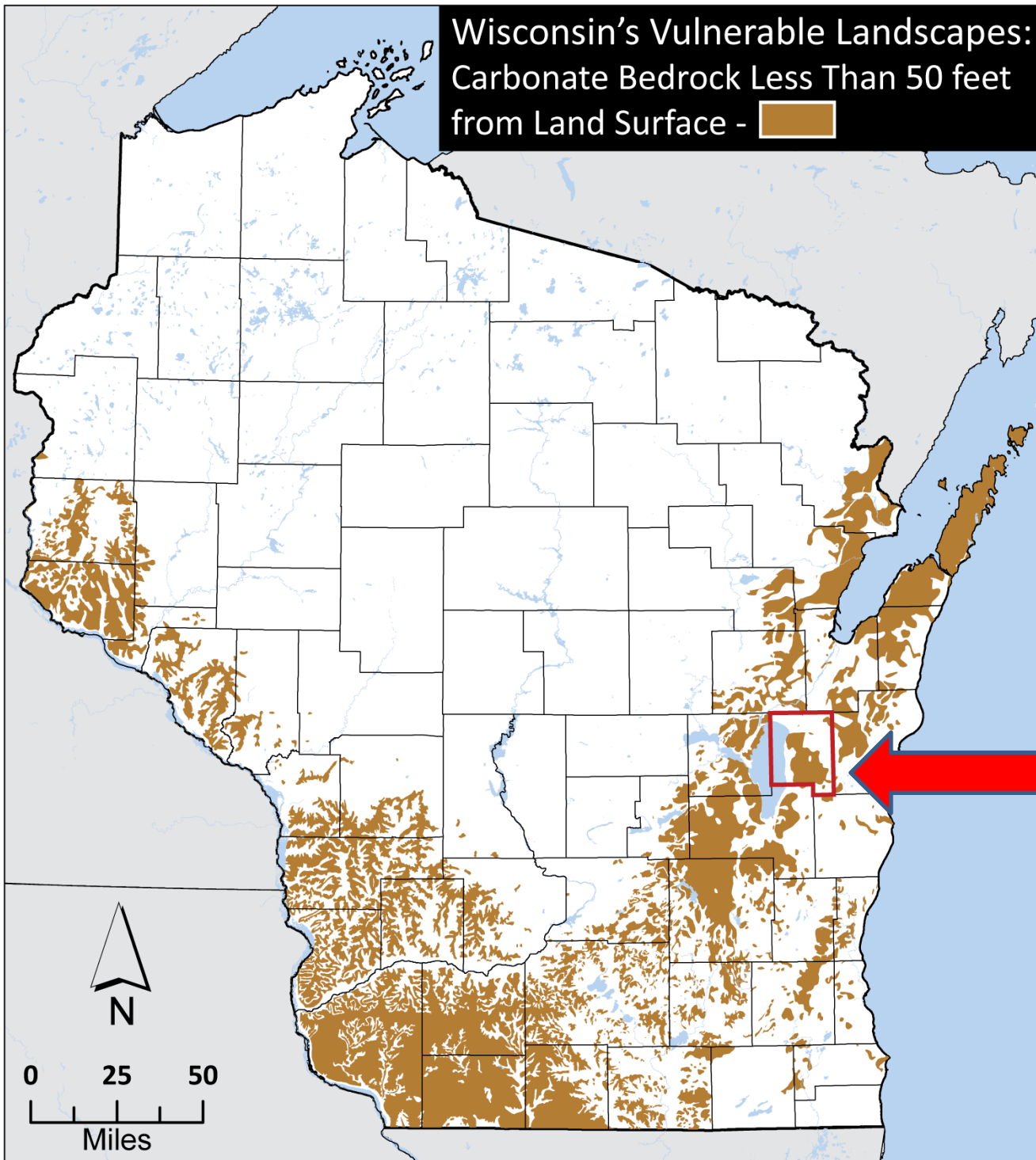


Mapping Carbonate Bedrock Surfaces in Glaciated Landscapes

University of Wisconsin – Extension
DISCOVERY
F A R M S
University of Wisconsin – Madison

Wisconsin's Vulnerable Landscapes:
Carbonate Bedrock Less Than 50 feet
from Land Surface - 



Wisconsin, USA

Calumet County

Flow Characteristics of fractured carbonate Aquifers

- Dense and ubiquitous fracture network
 - little surface runoff
 - water easily infiltrates to subsurface
- Recharge
 - exceedingly rapid
 - carries surface contaminants to the water table
- Flow within the aquifer occurs primarily along bedding plane fractures
 - Little to no attenuation of contaminants within the aquifer
- Flow rates vary from 10's to 100's of ft/day

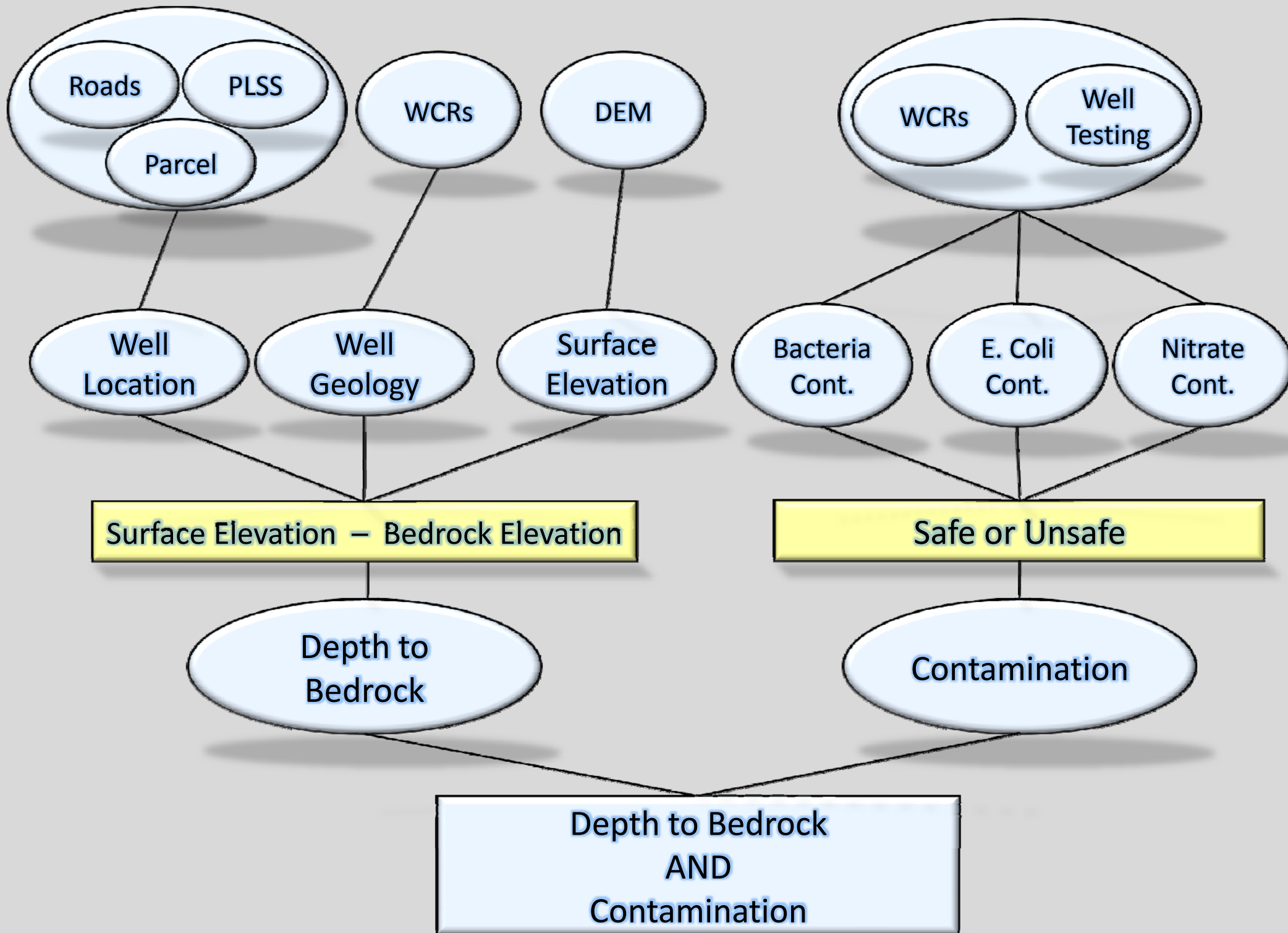
- 14,000 dairy farms
- 1.25 million milk cows.
- Each cow produces 150 lbs of waste/day







(1.25 million cows) (150 lbs. per day) (365 days)
= **34,000,000 tons of waste annually**



Digital Well Reports

2008JulyStaffData - [Wells.USE]

File Edit View Insert Format Records Scripts Window Help

Full WC: Home Browse Find Print Sort Summary List View List ALL GEO Help Quit Back Forward What does "GRN NO DETAIL" mean? Show Comments

Records: 364217 Found: 1877 Unsorted

WISCONSIN UNIQUE WELL NUMBER
SOURCE: WELL CONSTRUCTION AC346

State of WI-Private Water Systems-DG/2 Form 3300-77A
Department of Natural Resources, Box 7921 (Rev 12/00)
Madison, WI 53707

Property Owner: CITY OF BRILLION Telephone Number: 414 - 756 - 2250
Mailing Address: 130 CALUMET ST
City: BRILLION State: WI Zip Code: 54110
County of Well Location: NE Co Well Permit No: W Well Completion Date: March 22, 1991
Well Constructor: WAGNER BROTHERS License # 654 Facility ID (Public): 408022120
Address: RT 1 BOX 49 Public Well Plan Approval #: 900133
City: MT CALVARY State: WI Zip Code: 53057 Date Of Approval: 03/07/1990
Hicap Permanent Well #: 688 Common Well #: 004 47 gpm/ft

3. Well Serves # of homes and or MUNICIPALITY (eg barn, restaurant, church, school, industry, etc.)
M M=Main O=OTM H=HicapCom P=Private Z=Other X=NotPit A=Arise L=Loop H=Drillhole
High Capacity: Well? Y Property? Y

4. Is the well located upslope or downslope and not downslope from any contamination sources, including those on neighboring properties? Y
Well located in floodplain? N
Distance in feet from well to nearest: (including proposed)
1. Landfill 2. Building Overhang 3. 1=Septic 2= Holding Tank 4. Sewage Absorption Unit 5. Nonconforming Pit 6. Buried Home Heating Oil Tank 7. Buried Petroleum Tank 8. 1=Shoreline 2= Swimming Pool 9. Downspout/ Yard Hydrant 10. Privy 11. Foundation Drain to Clearwater 12. Foundation Drain to Sewer 13. Building Drain 14. 1=Cast Iron or Plastic 2=Other 1=Cast Iron or Plastic 2=Other 15. Collector Sewer: units in diam. 16. Clearwater Sump 17. Wastewater Sump 18. Paved Animal Barn Pen 19. Animal Yard or Shelter 20. Silo 21. Barn Gutter 22. Manure Pipe 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other 23. Other manure Storage 24. Ditch 25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

From (ft.)	To (ft.)	Upper Enlarged Drillhole	Lower Open Bedrock
18.0	surface	125	
17.0	125	450	
12.0	450	685	

6. Casing Liner Screen Material, Weight, Specification Manufacturer & Method of Assembly

From (ft.)	To (ft.)	Material, Weight, Specification
18.0	surface	NEW P.E. 70.59 STEEL ASTM A53 375 WALL USS
12.0	125	NEW P.E. 49.56 STEEL ASTM A53 375 WALL USS

7. Static Water Level 232.0 feet B ground surface A=Above B=Below

8. Pump Test Pumping level 312.0 ft. below surface Disinfected? Y Pumping at 375 GPM 8.00 hrs Capped? Y

9. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
R_C	RED CLAY	0	55
S	SAND	55	58
U_C	BLUE CLAY	58	101
U_CG	BLUE CLAY @ STONES	101	117
L	LIMESTONE	117	135
LT	SHALE	135	440
L	LIMESTONE	440	640
N	SAND STONE	640	680
L	LIMESTONE	680	685

Scanned Paper Well Reports

WELL CONSTRUCTOR'S REPORT FORM 3300-15

NOTE: WHITE COPY - DIVISION'S COPY GREEN COPY - TOWN'S COPY YELLOW COPY - OWNER'S COPY

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES Box 460 Madison, Wisconsin 53701

1. COUNTY Calumet CHECK ONE ☒ Town ☐ Village ☐ City NAME: Brotherhood

2. LOCATION - 1/4 Section 18N 19E Range 19E 3. OWNER AT TIME OF DRILLING: Mark Depies

OR - Grid or street no. Street name: 18th St. 19th St. 19th St. ADDRESS: 18th St. 19th St. 19th St. POST OFFICE: Chilton, Wis.

AND - If available subdivision name, lot & block no.

WELL CONSTRUCTION REPORT WISCONSIN STATE BOARD OF HEALTH OCT 1 1944 WELL DRILLING DIVISION

NOTE: Section 32 of the Wisconsin Well Drilling, Sanitary Code, having the force and effect of law, provides that within thirty days after completion of every well the driller shall submit a report covering all essential details of construction to the State Board of Health on a form provided by the Board.

Owner: Roger Weber Driller: Norman Weber

Street or RFD: Chilton, Wis. Post Office: Chilton, Wis. Date: Oct 19, 1944 Permit No. 1122

LOCATION OF PREMISES: Calumet, Brotherhood

The square below represents a section of land divided into 36 one-acre tracts. Mark the position of the well.

WELL CONSTRUCTOR'S REPORT FORM 3300-15

NOTE: WHITE COPY - DIVISION'S COPY GREEN COPY - TOWN'S COPY YELLOW COPY - OWNER'S COPY

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES Box 460 Madison, Wisconsin 53701

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OR - Grid or street no. Street name: 18th St. 19th St. 19th St. ADDRESS: 18th St. 19th St. 19th St. POST OFFICE: Chilton, Wis.

AND - If available subdivision name, lot & block no.

4. Distance in feet from well to nearest: BUILDING BARNYARD SEWER DRAIN FLOODPLAIN DRAIN FLOODPLAIN DRAIN FLOODPLAIN

5. Well is intended to supply water for: Home use

6. DRILLHOLE

From (ft.)	To (ft.)	Kind	From (ft.)	To (ft.)
10	42	Surface	0	2
6	42	1/15	0	7
6	42	1/15	0	7

7. CASING, LINER, CURBING, AND SCREEN

From (ft.)	To (ft.)	Kind and Weight
0	42	Steel Pipe - New 19:45 #8 x 1/4 T.C.

8. GROUT OR OTHER SEALING MATERIAL

From (ft.)	To (ft.)	Kind
0	42	Cement Grout

9. TYPE OF DRILLING MACHINE USED

Machine	From (ft.)	To (ft.)
Rotary - air	0	42

10. TYPE OF DRILLING MACHINE USED

Machine	From (ft.)	To (ft.)
Rotary - air	0	42

11. MISCELLANEOUS DATA

Yield test: 18 lbs. at 18 GPM

Depth from surface to normal water level: 30 ft.

Depth to water level when pumping: 40 ft.

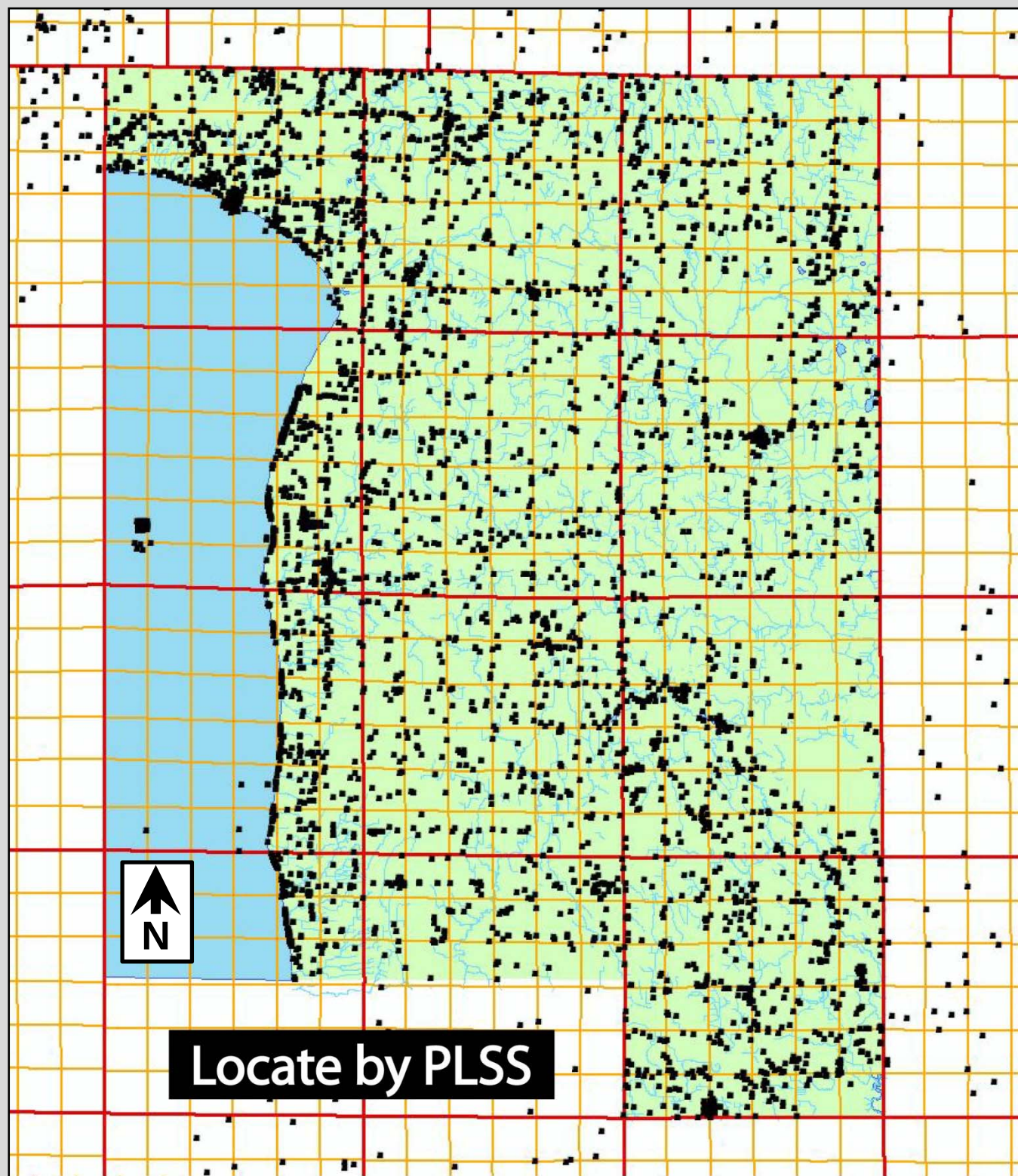
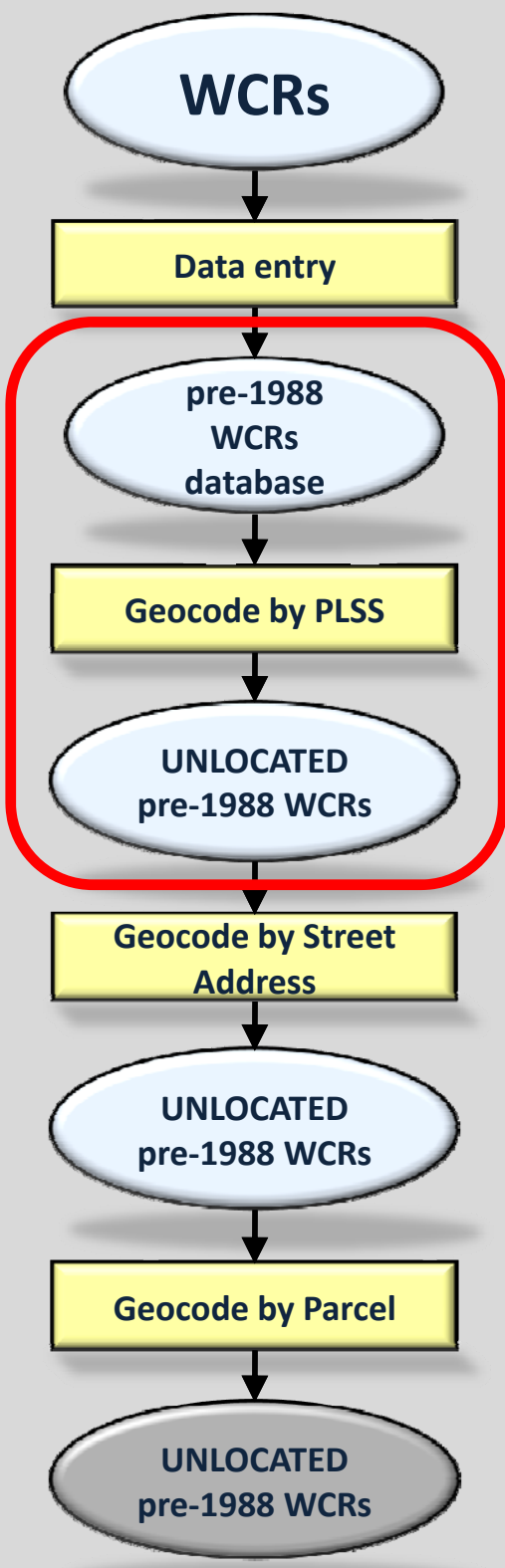
Water sample sent to: Madison laboratory on: May 7 1973

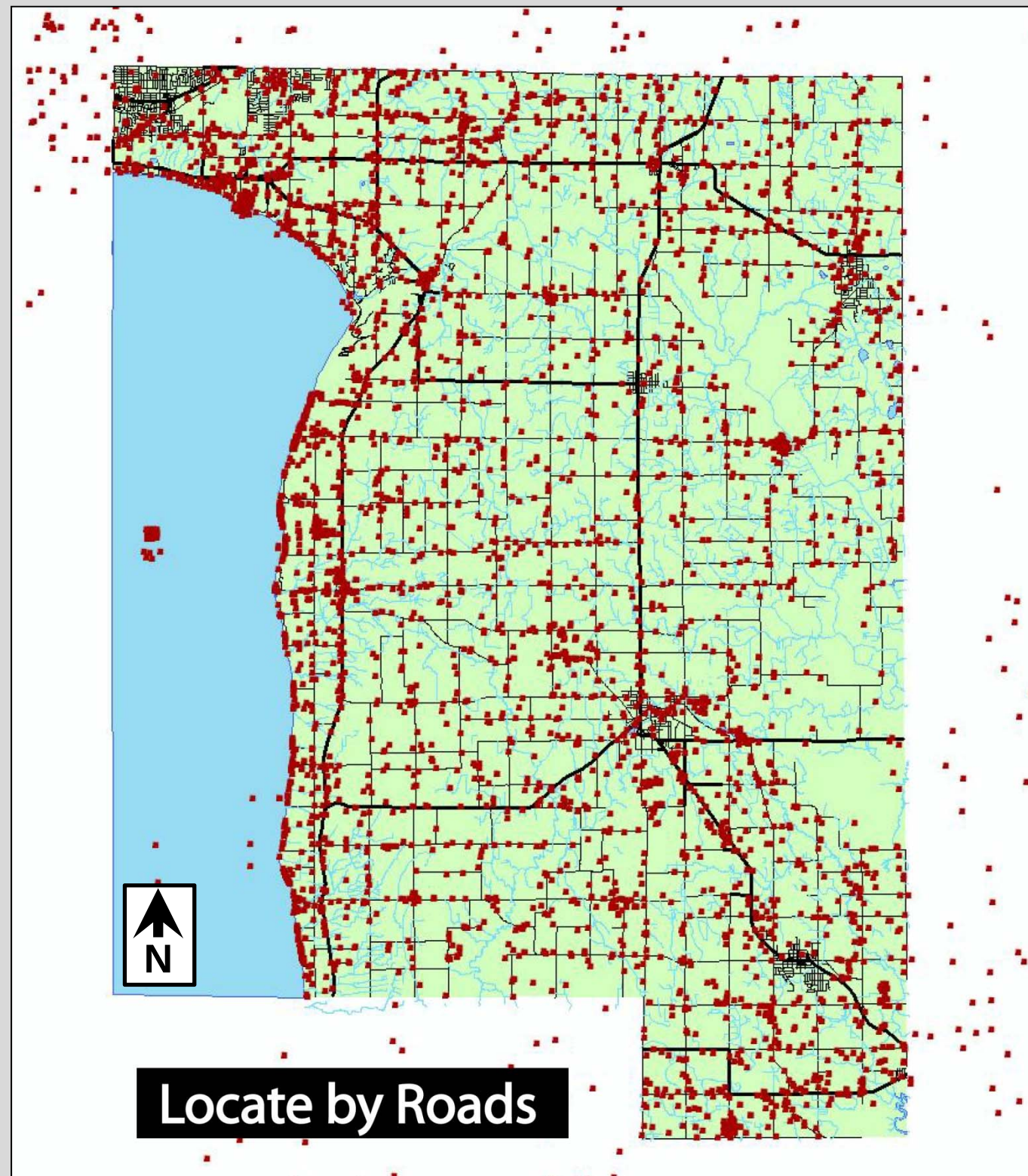
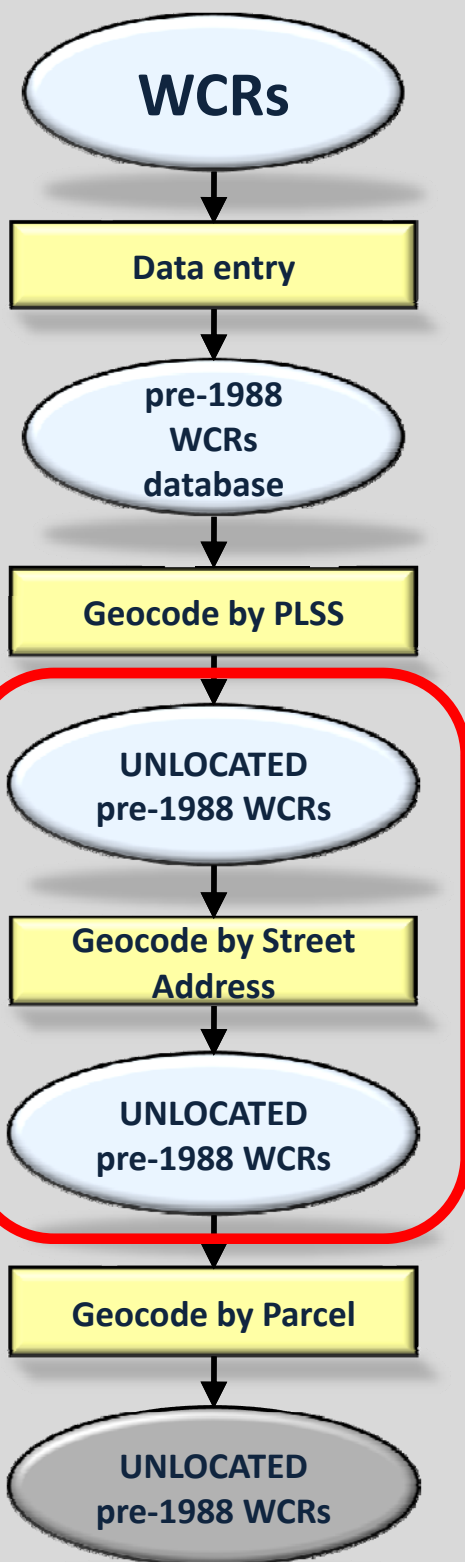
Signature: Norman Weber, Son COMPLETE MAIL ADDRESS: R#2 Chilton, Wis.

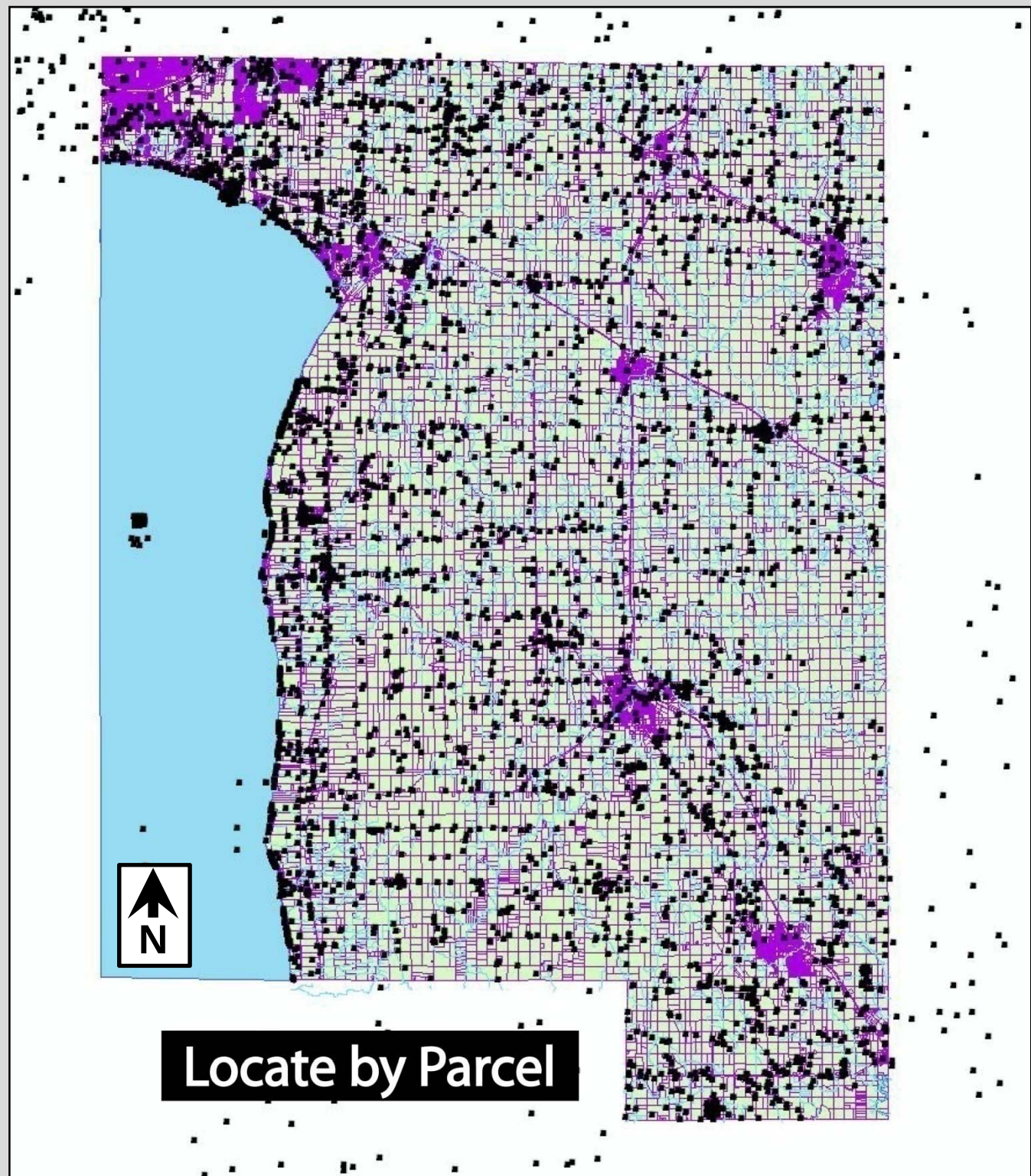
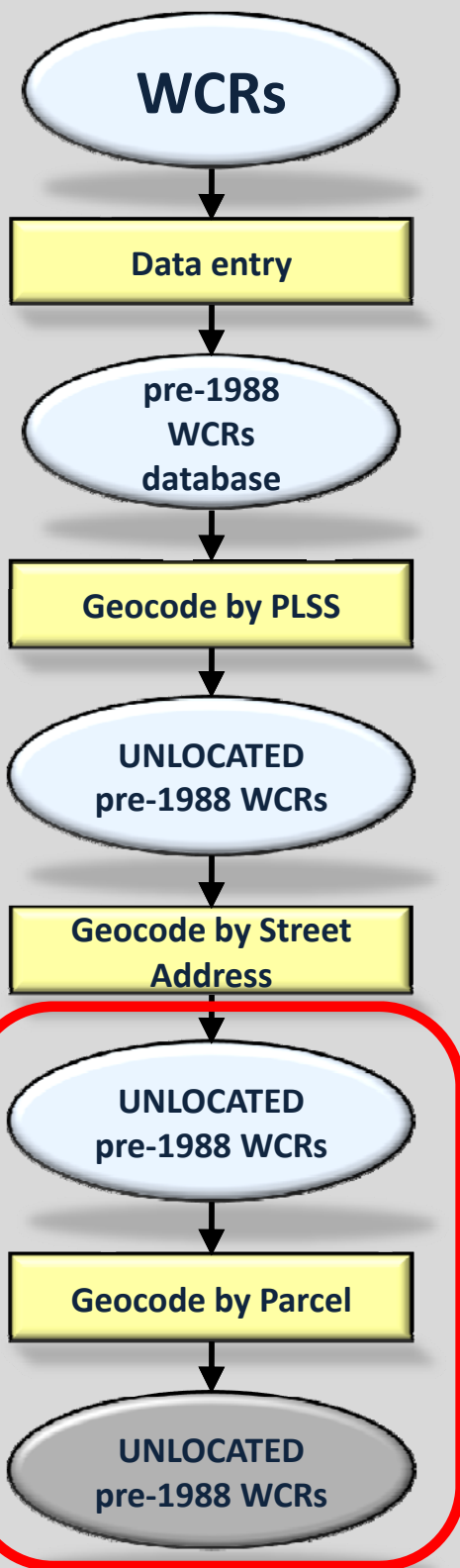
REGISTERED WELL DRILLER: R#2 Chilton, Wis.

CONFIRMED: R#2 Chilton, Wis.

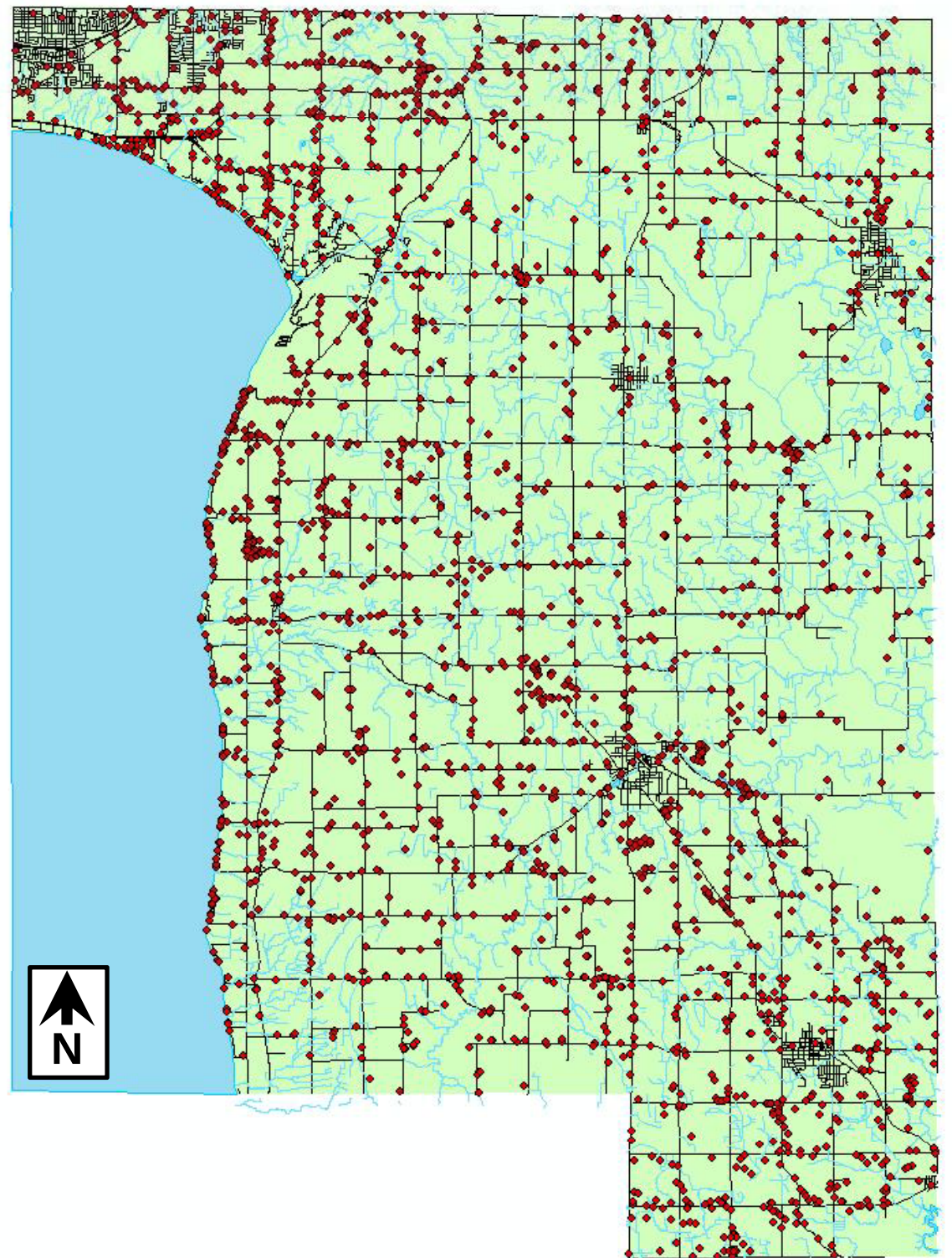
REMARKS: 1972

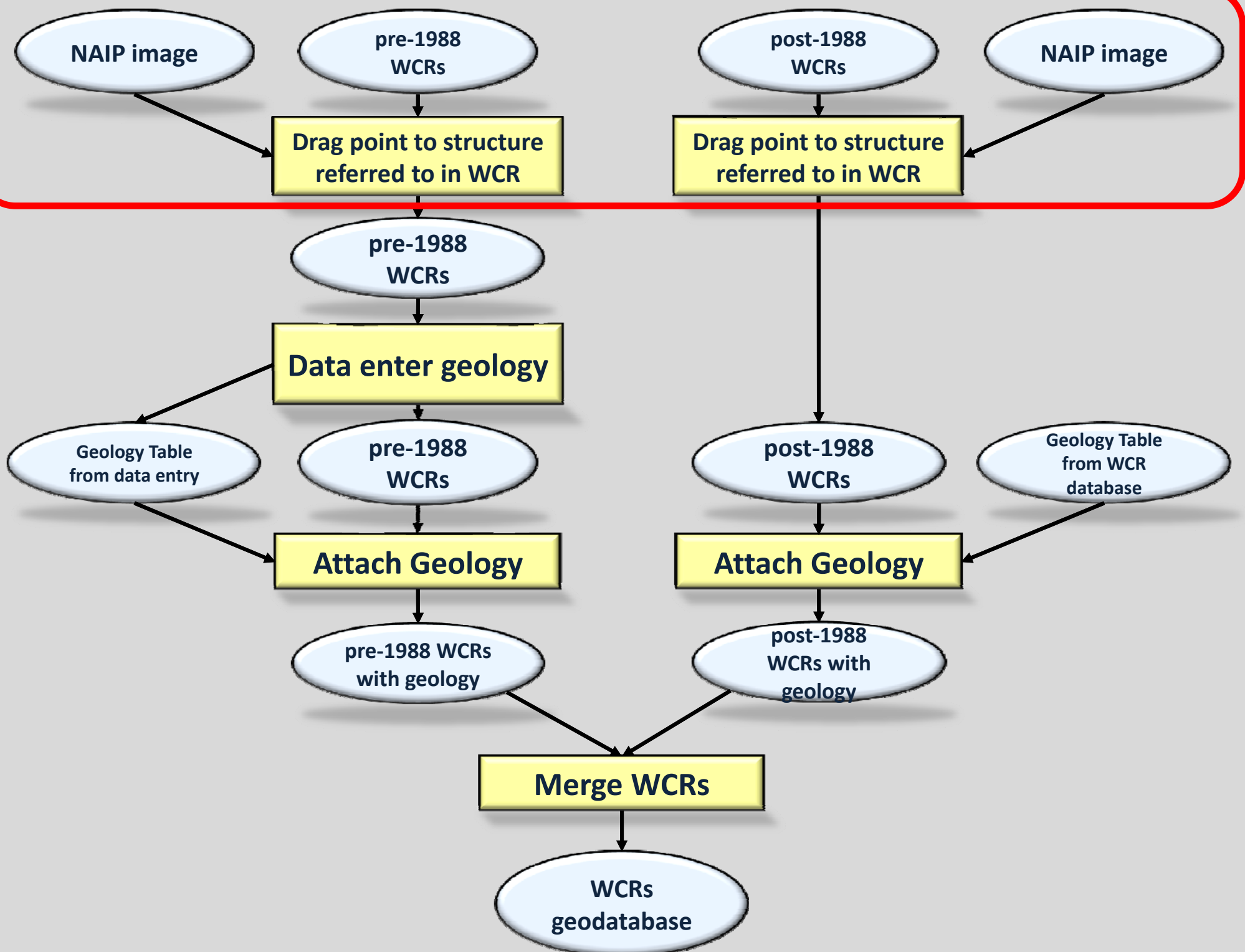






**2800+
Geocoded Well
Data Points**





NAIP image

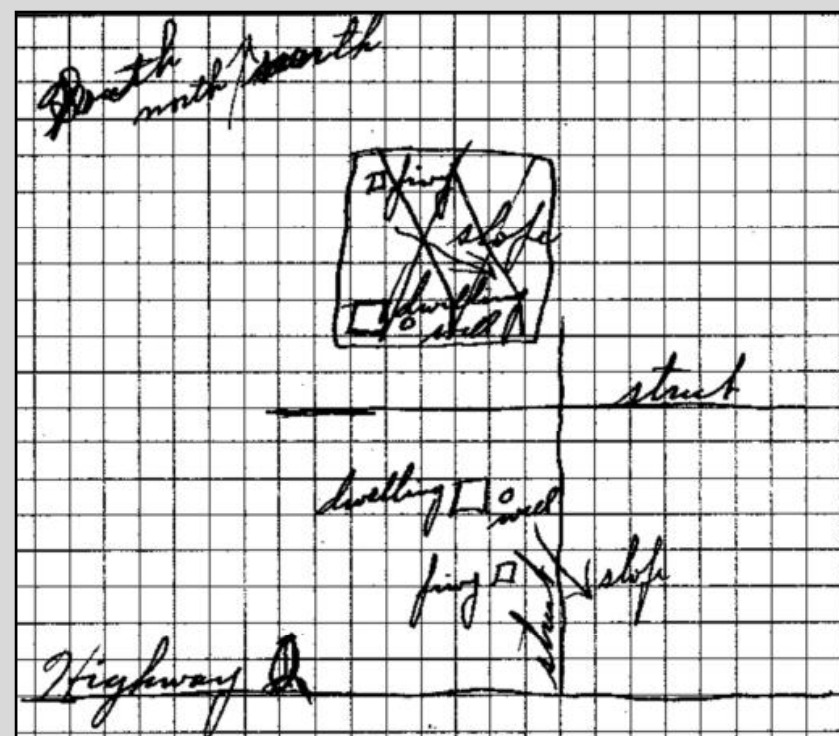
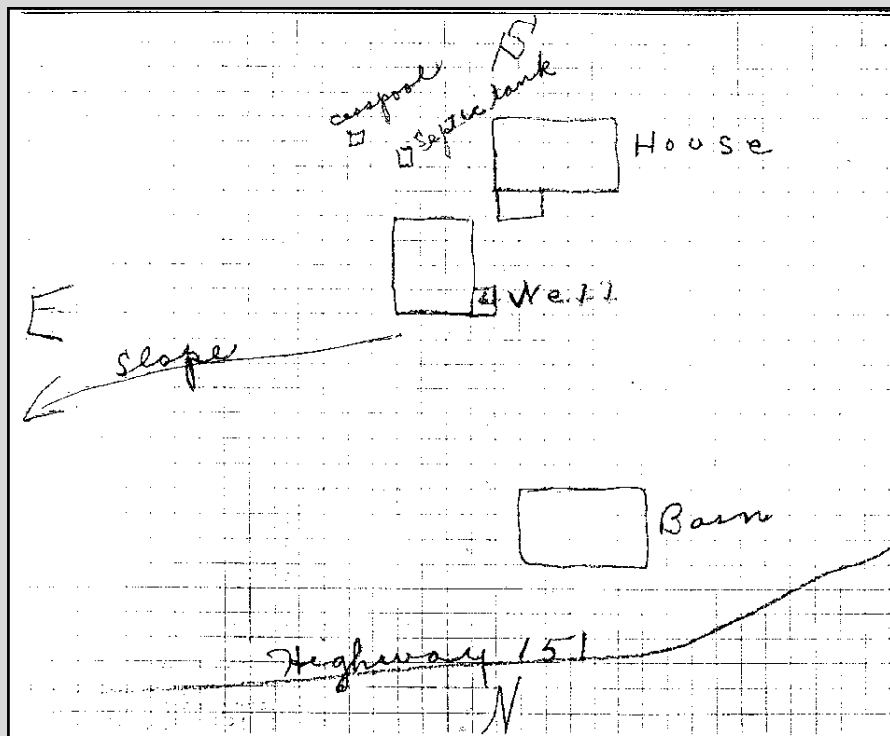
pre-1988
WCRs

Drag point to structure
referred to in WCR

post-1988
WCRs

NAIP image

Drag point to structure
referred to in WCR



4. Distance in feet from well to nearest:

(Record answer in appropriate block)

BUILDING

SANITARY SEWER

FLOOR DRAIN

FOUNDATION DRAIN

WASTE WATER DRAIN

C. I.

TILE

C. I.

TILE

SEWER CONNECTED

INDEPENDENT

C. I.

TILE

8

—

—

—

—

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—

—

CLEAR WATER DRAIN

SEPTIC TANK

PRIVY

SEEPAGE PIT

ABSORPTION FIELD

BARN

SILLO

ABANDONED WELL

SINK HOLE

C. I.

TILE

70

—

100

125

150

175

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OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

none

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5. Well is intended to supply water for:

farm

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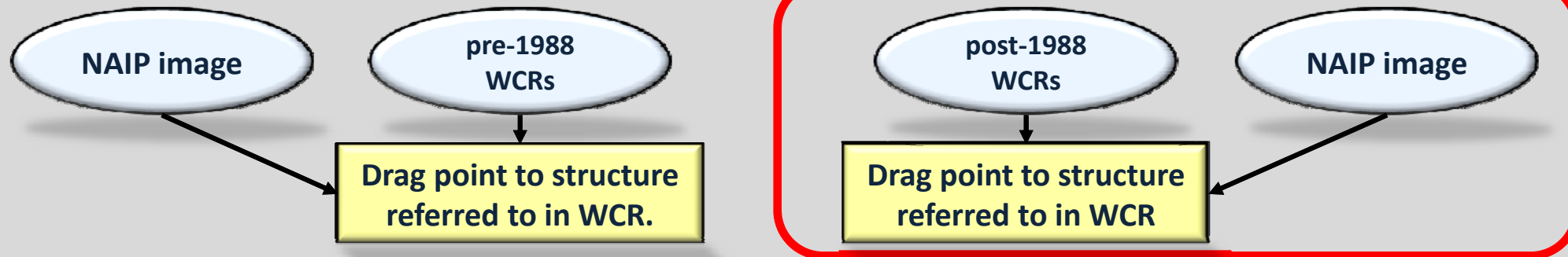
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3. Well Serves # of homes and or BARN (eg: barn, restaurant, church, school, industry, etc.) P M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole		High Capacity: Well? N Property? N	Reason for replaced or reconstructed well? NEED MORE WATER 1 1=Drilled 2=Driven Point 3=Jetted 4=Other
4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? Y Well located in floodplain? N Distance in feet from well to nearest: (including proposed)			
1. Landfill 75 2. Building Overhang 90 3. 1=Septic 2= Holding Tank 100 4. Sewage Absorption Unit 5. Nonconforming Pit 6. Buried Home Heating Oil Tank 135 7. Buried Petroleum Tank 8. 1=Shoreline 2= Swimming Pool		9. Downspout/ Yard Hydrant 10. Privy 11. Foundation Drain to Clearwater 12. Foundation Drain to Sewer 13. Building Drain 1=Cast Iron or Plastic 2=Other 14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other 15. Collector Sewer: ___ units ___ in. diam. 16. Clearwater Sump	
		17. Wastewater Sump 82 18. Paved Animal Barn Pen 102 19. Animal Yard or Shelter 140 20. Silo SEALED 135 21. Barn Gutter 22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other 260 23. Other manure Storage 24. Ditch 25. Other NR 812 Waste Source	

3. Well Serves # of homes and or POND (eg: barn, restaurant, church, school, industry, etc.) P M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole		High Capacity: Well? N Property? N	Reason for replaced or reconstructed well? POND WELL 1 1=Drilled 2=Driven Point 3=Jetted 4=Other
4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? Y Well located in floodplain? N Distance in feet from well to nearest: (including proposed)			
1. Landfill 300 2. Building Overhang 3. 1=Septic 2= Holding Tank 4. Sewage Absorption Unit 5. Nonconforming Pit 6. Buried Home Heating Oil Tank 7. Buried Petroleum Tank 35 8. 1=Shoreline 2= Swimming Pool		9. Downspout/ Yard Hydrant 10. Privy 11. Foundation Drain to Clearwater 12. Foundation Drain to Sewer 13. Building Drain 1=Cast Iron or Plastic 2=Other 14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other 15. Collector Sewer: ___ units ___ in. diam. 16. Clearwater Sump	
		17. Wastewater Sump 18. Paved Animal Barn Pen 19. Animal Yard or Shelter 20. Silo 21. Barn Gutter 22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other 23. Other manure Storage 24. Ditch 25. Other NR 812 Waste Source	

NAIP image

pre-1988
WCRs

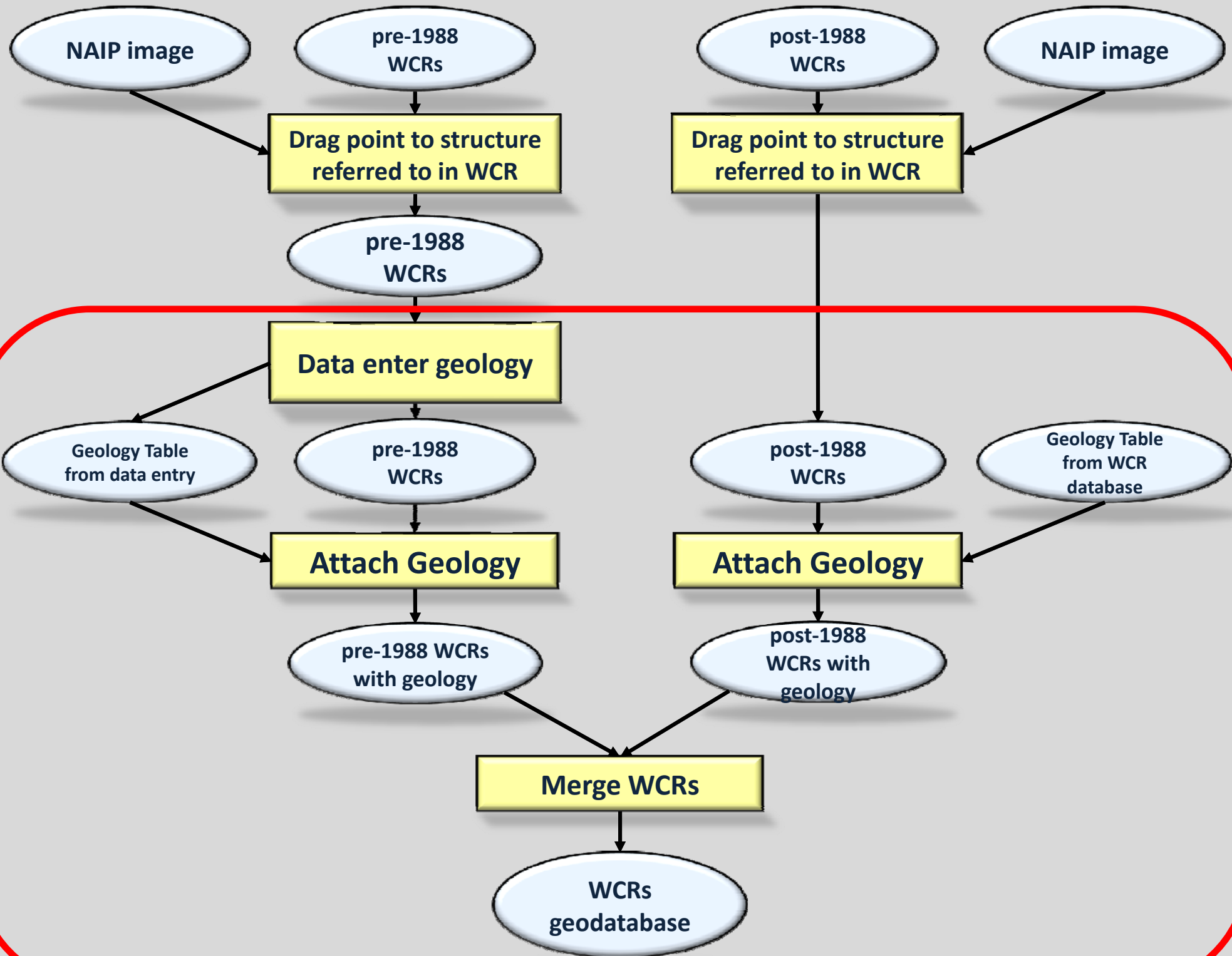
post-1988
WCRs

NAIP image

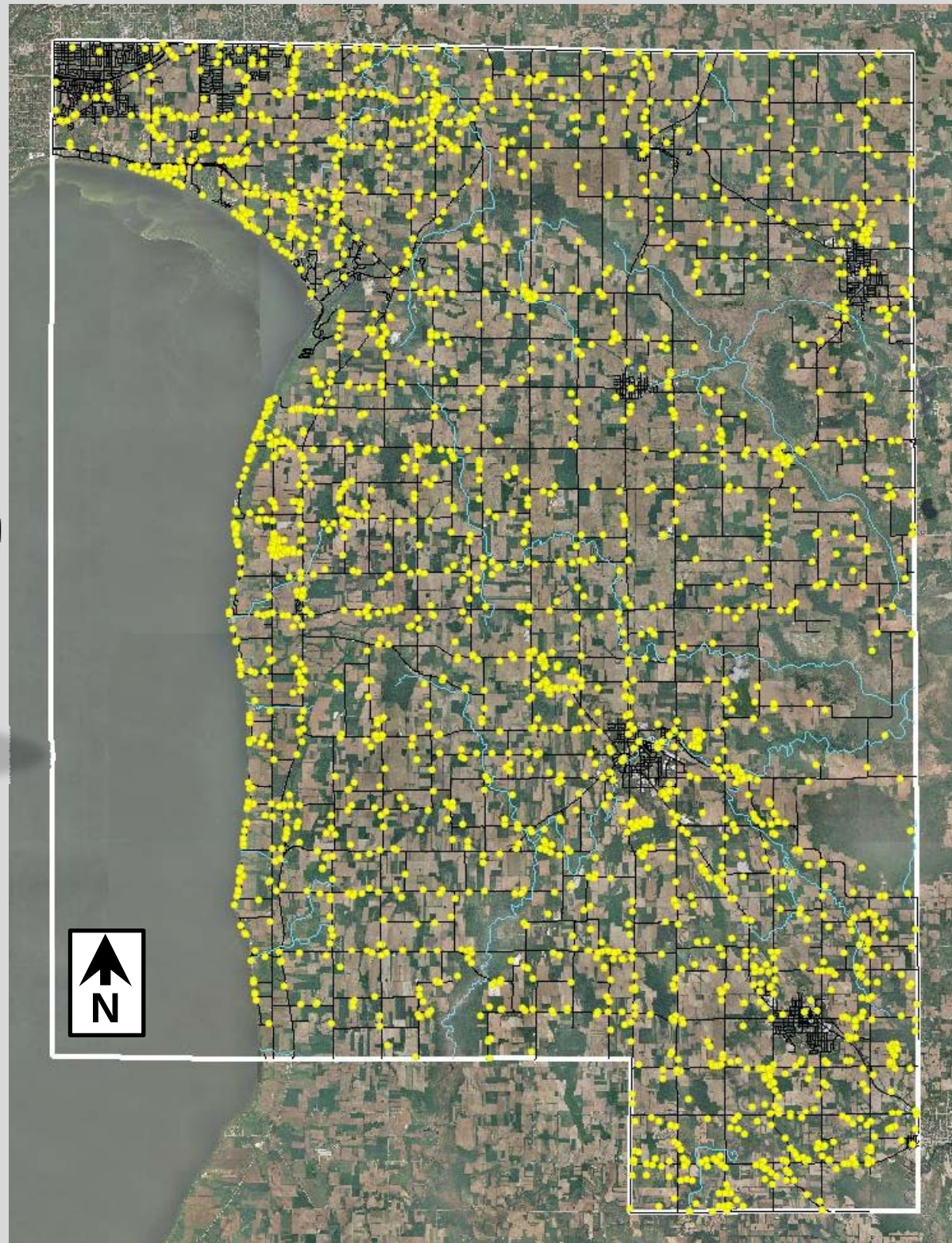
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referred to in WCR

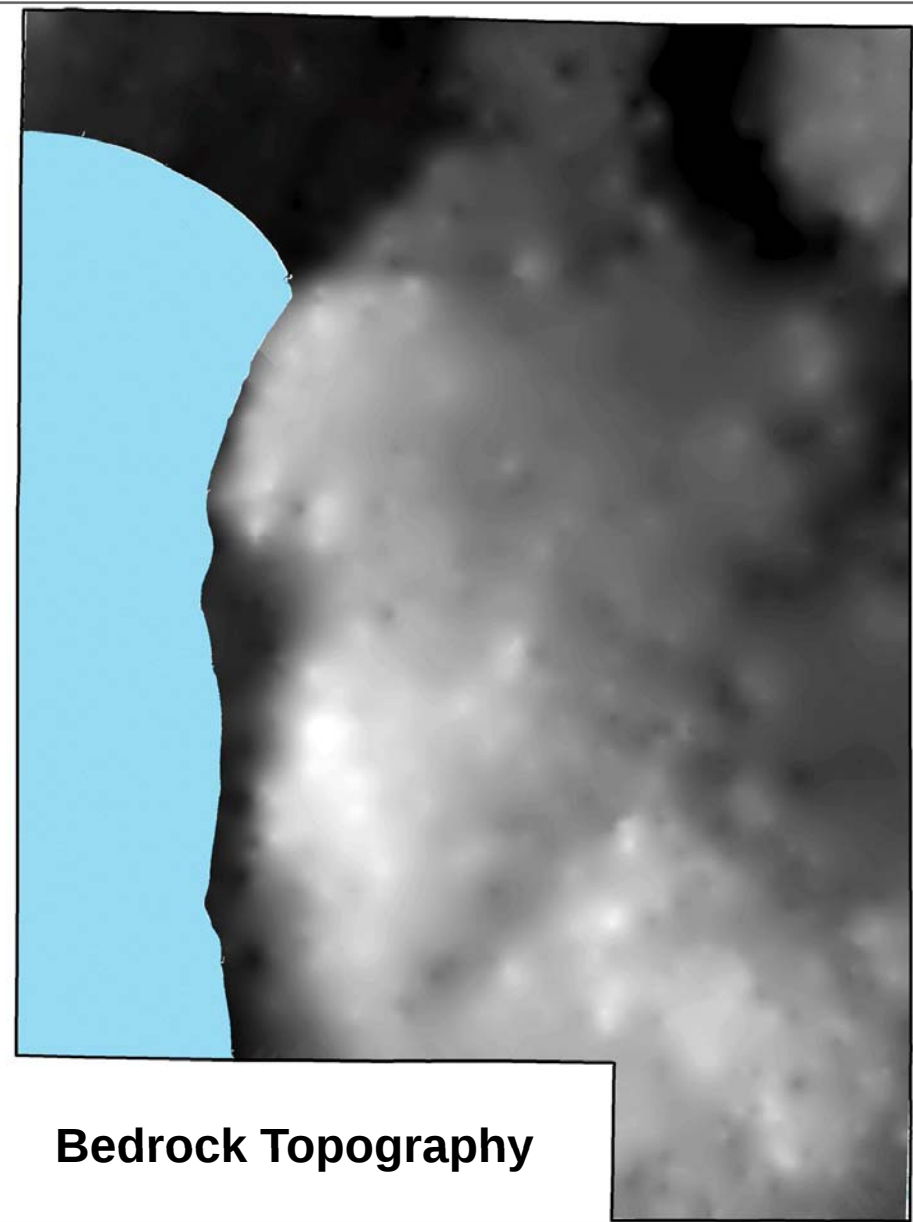
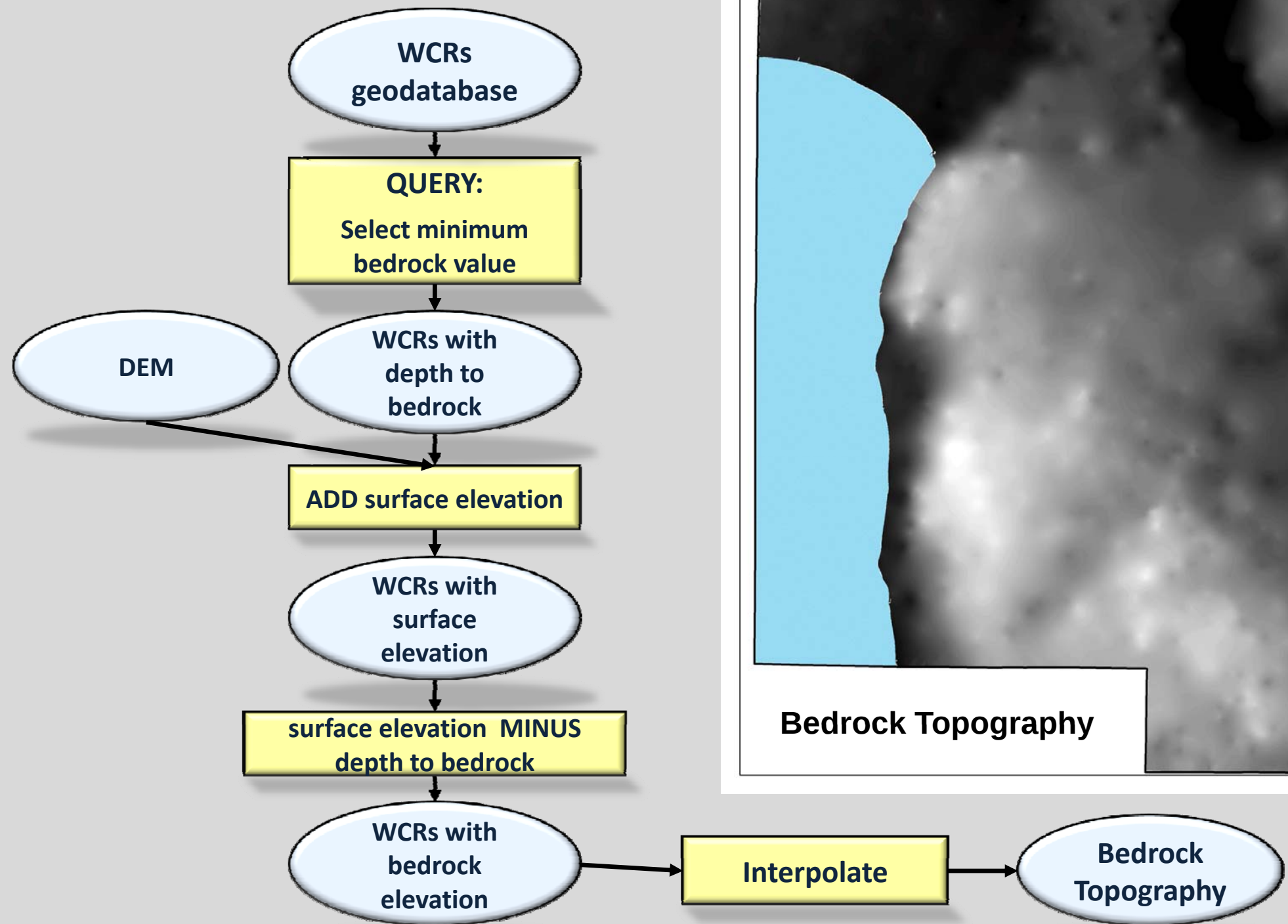
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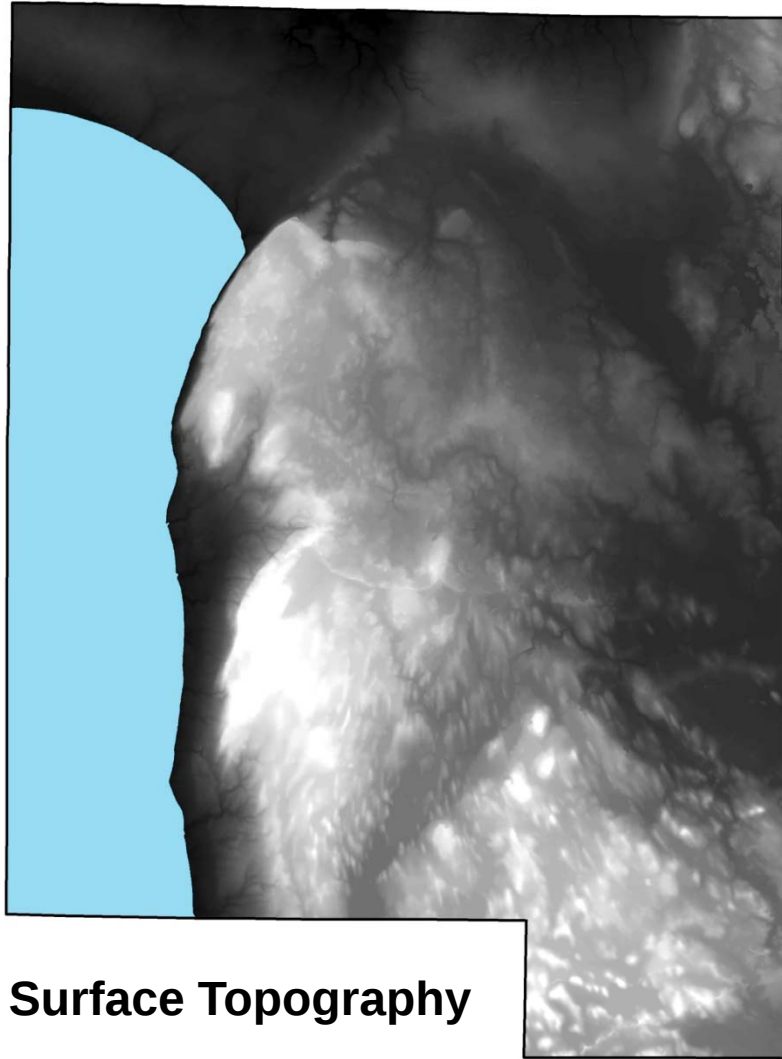




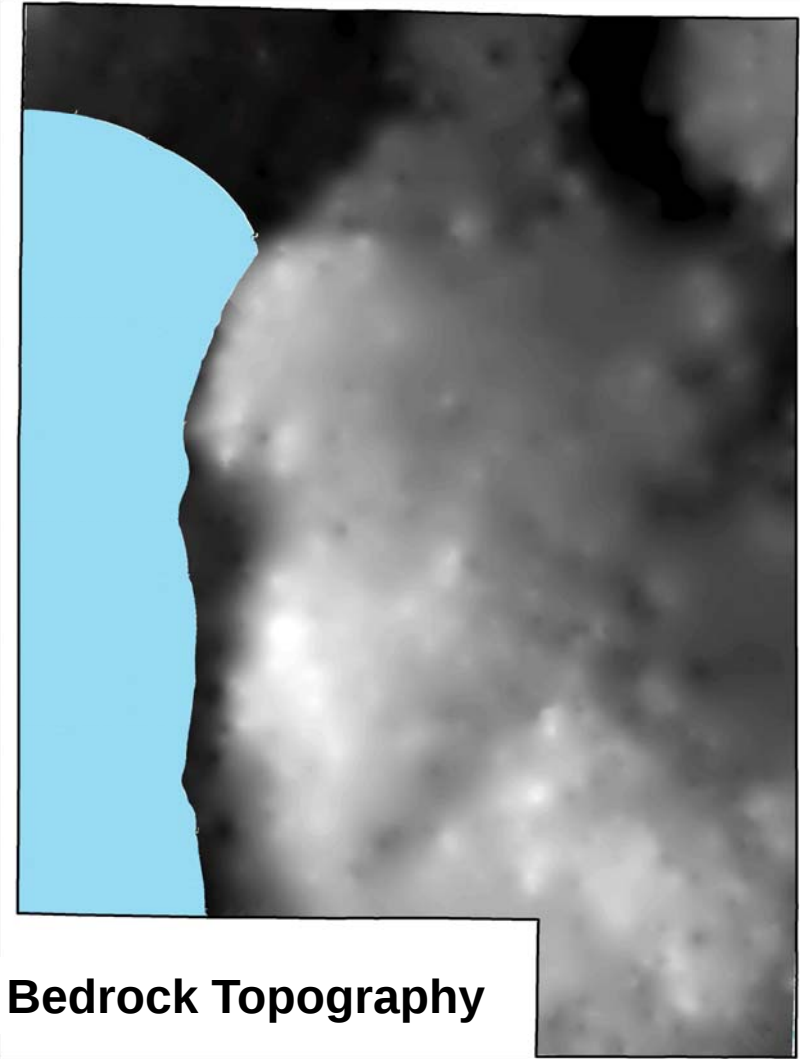
**2339 Well Data
Points w/geology**







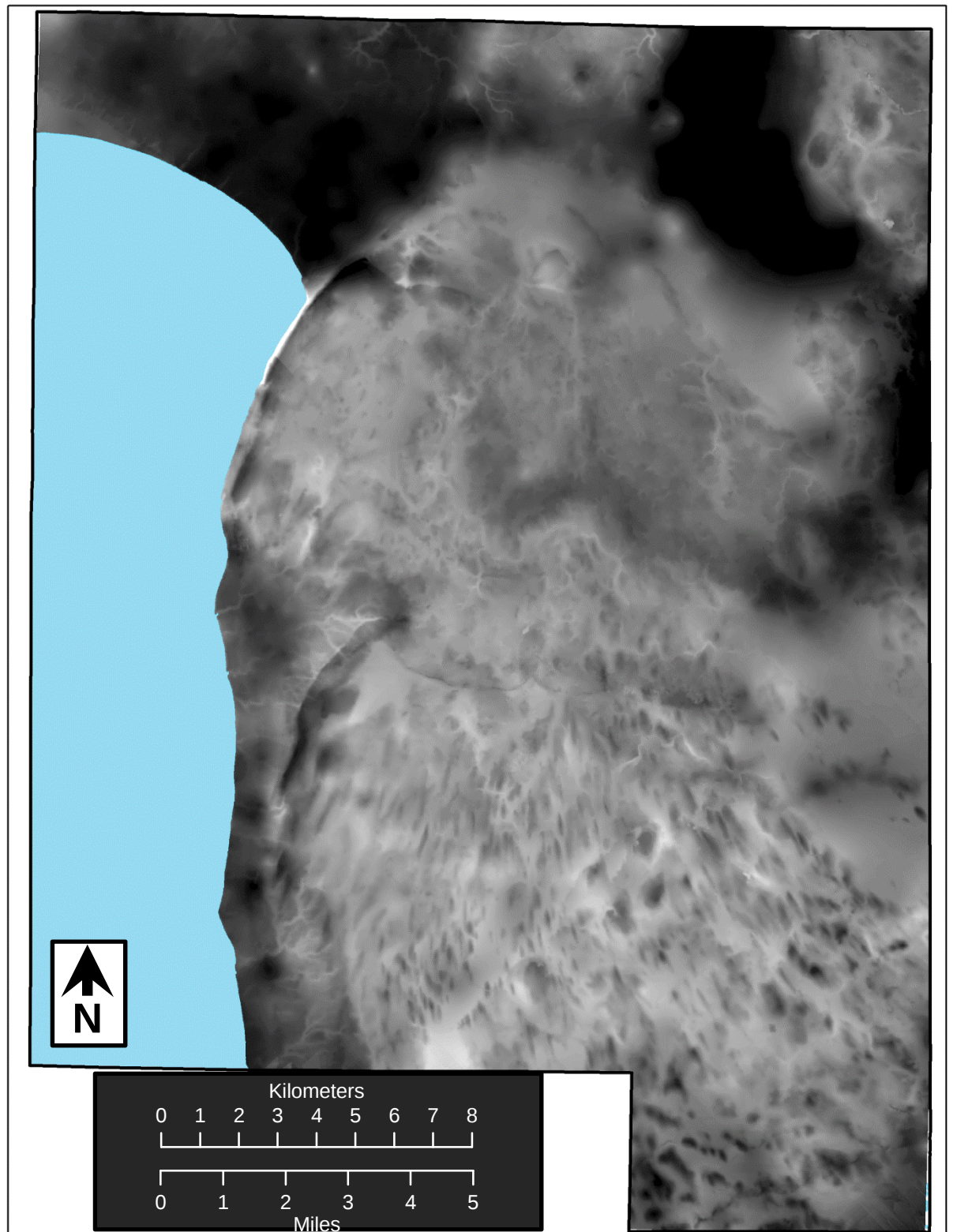
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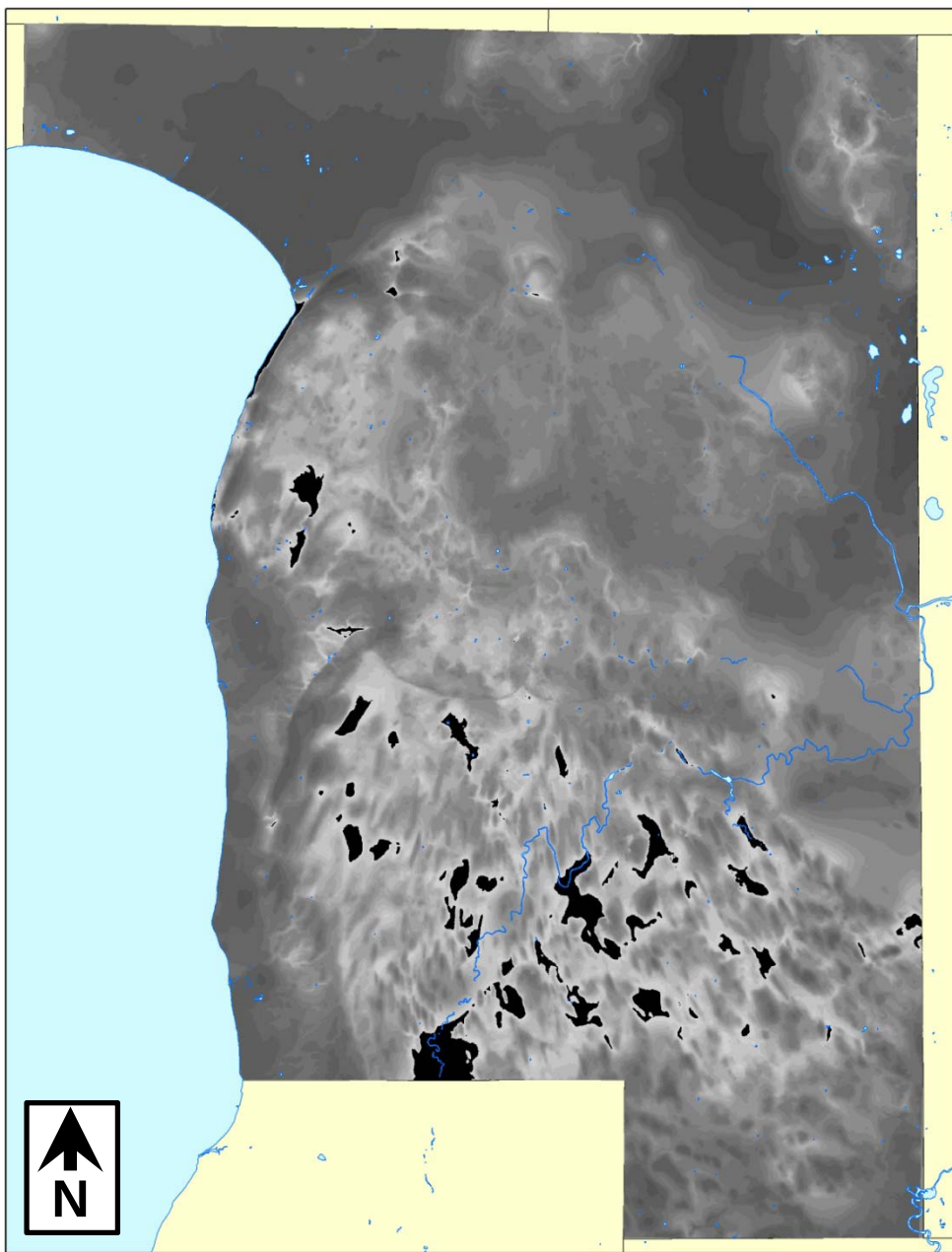


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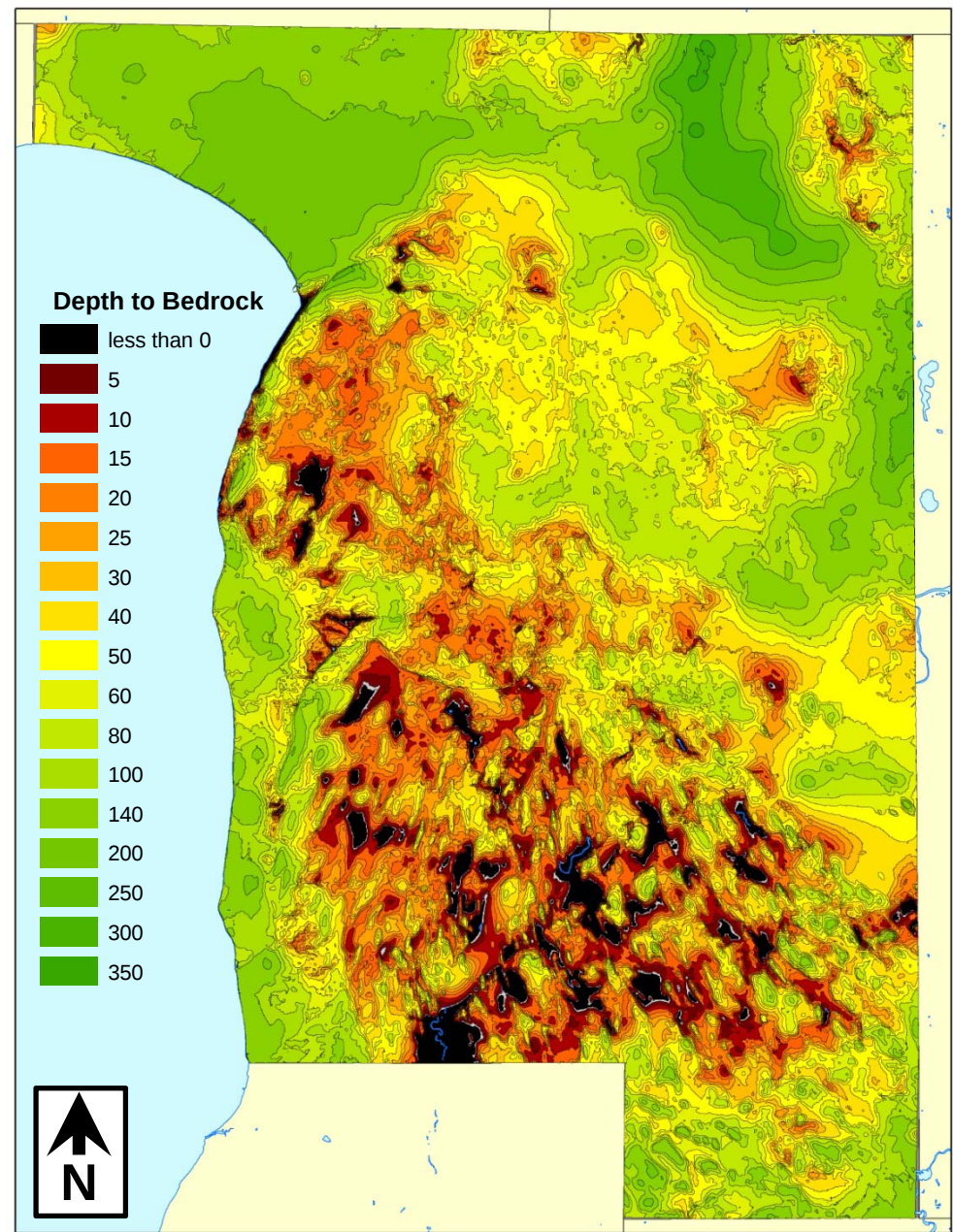
Surface Topography MINUS Bedrock Topography EQUALS

Depth to Bedrock

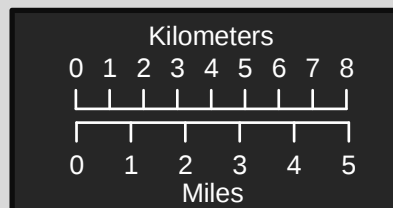




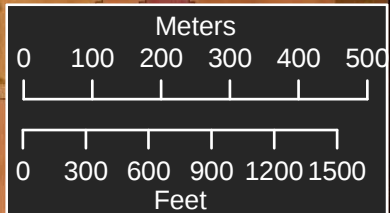
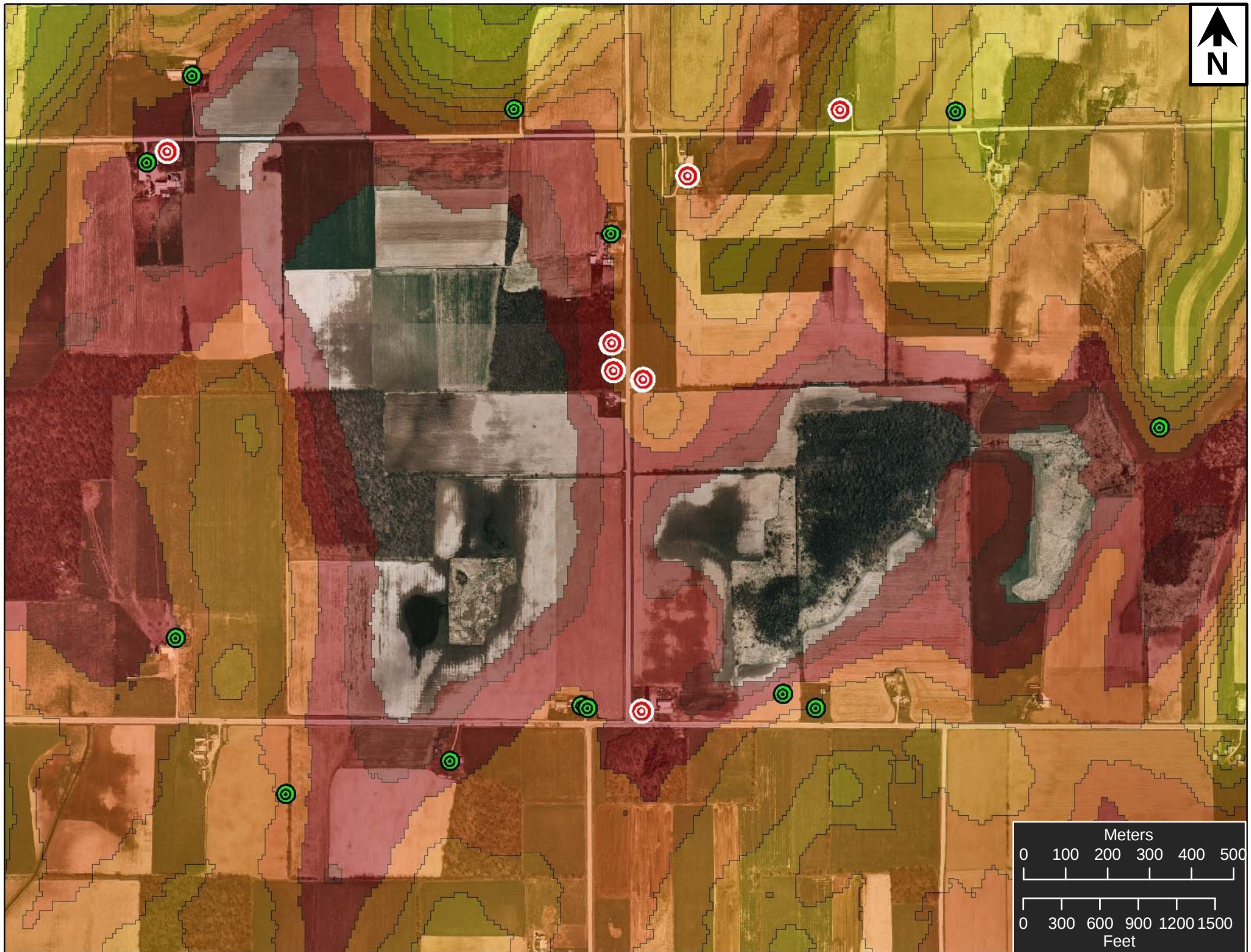
Bedrock at the land surface

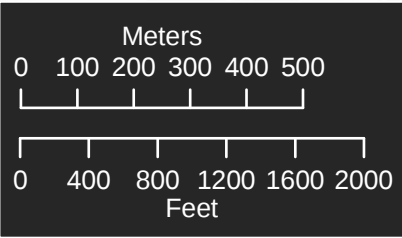


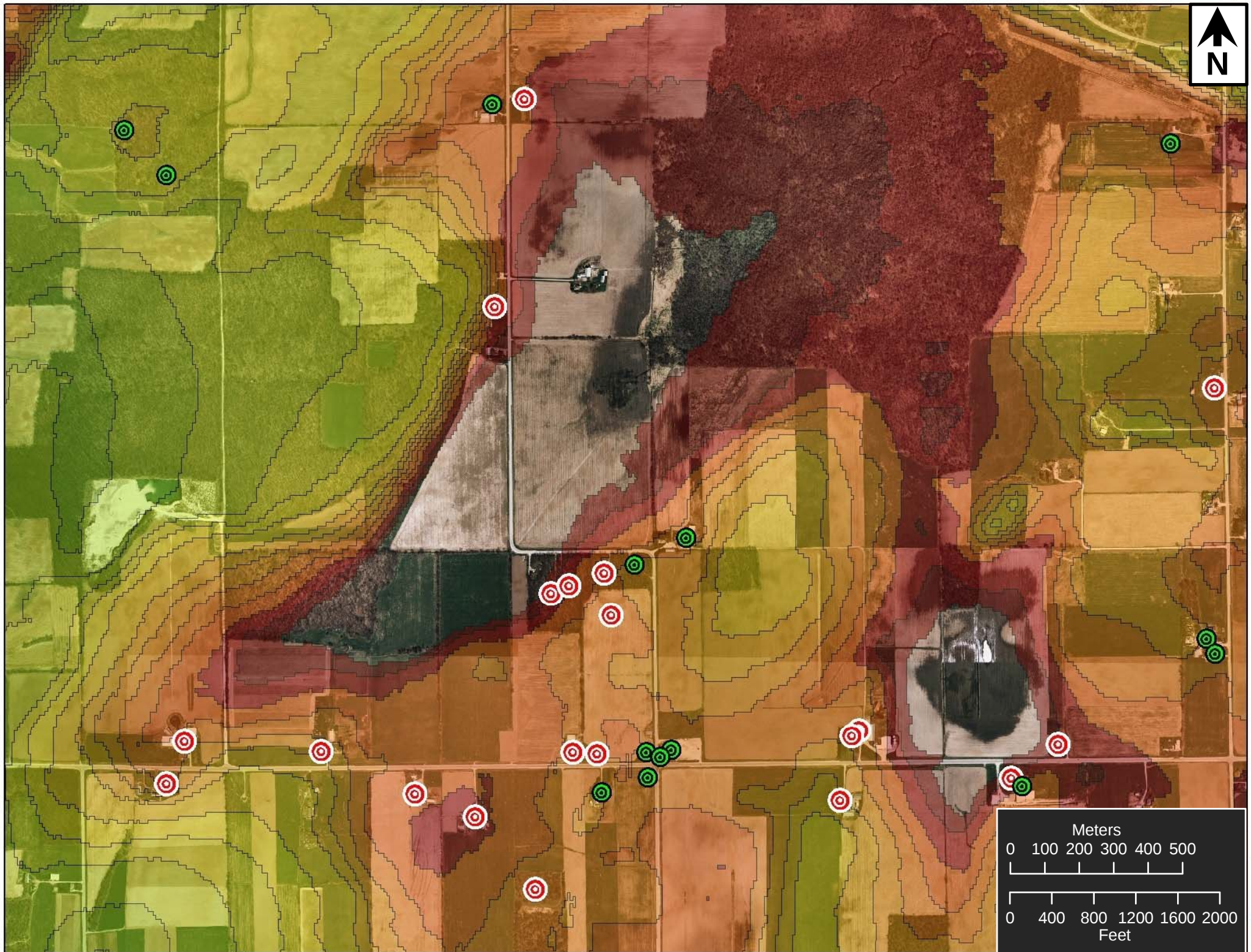
Depth to Bedrock

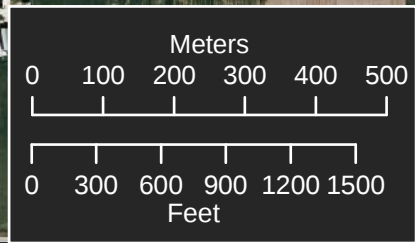
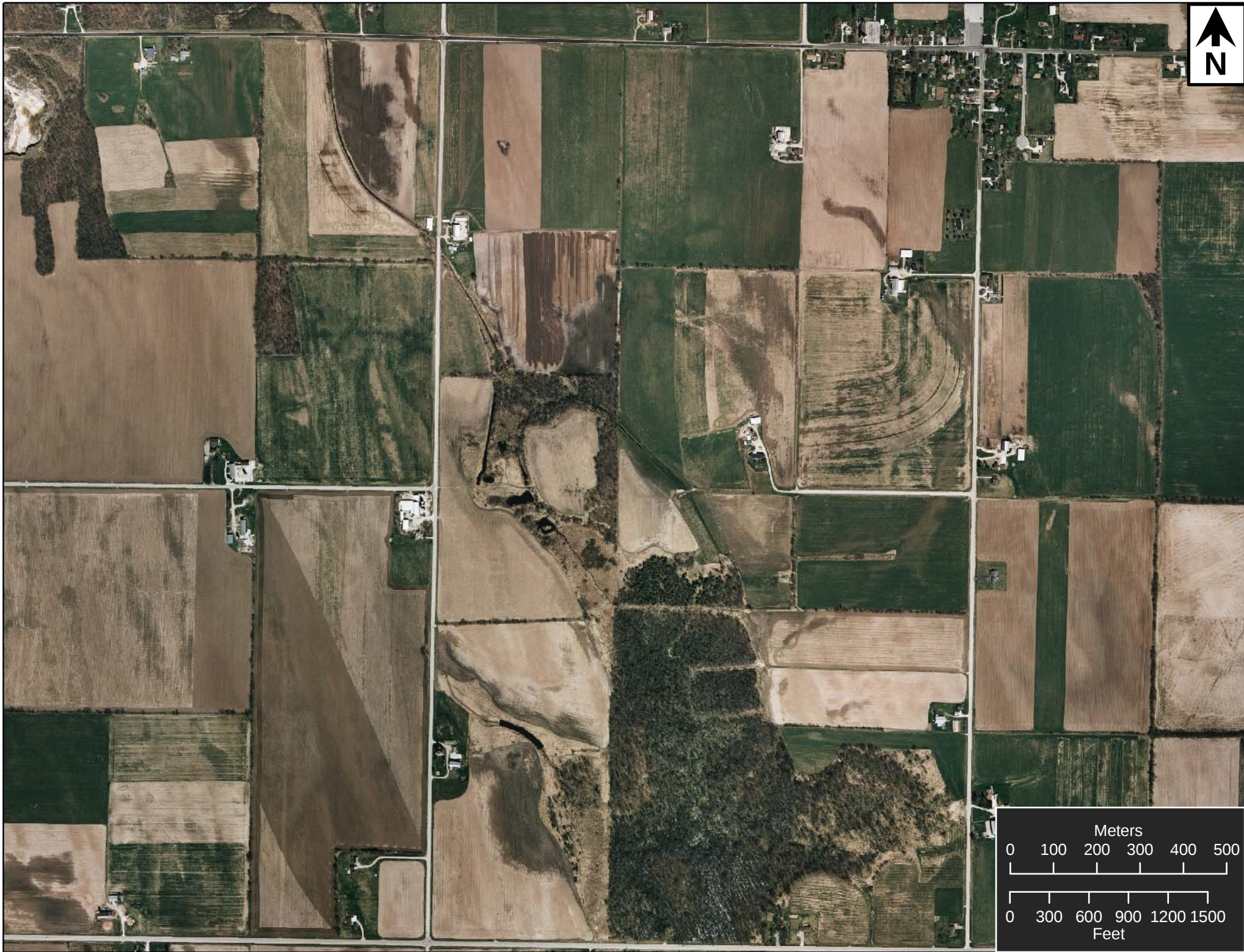


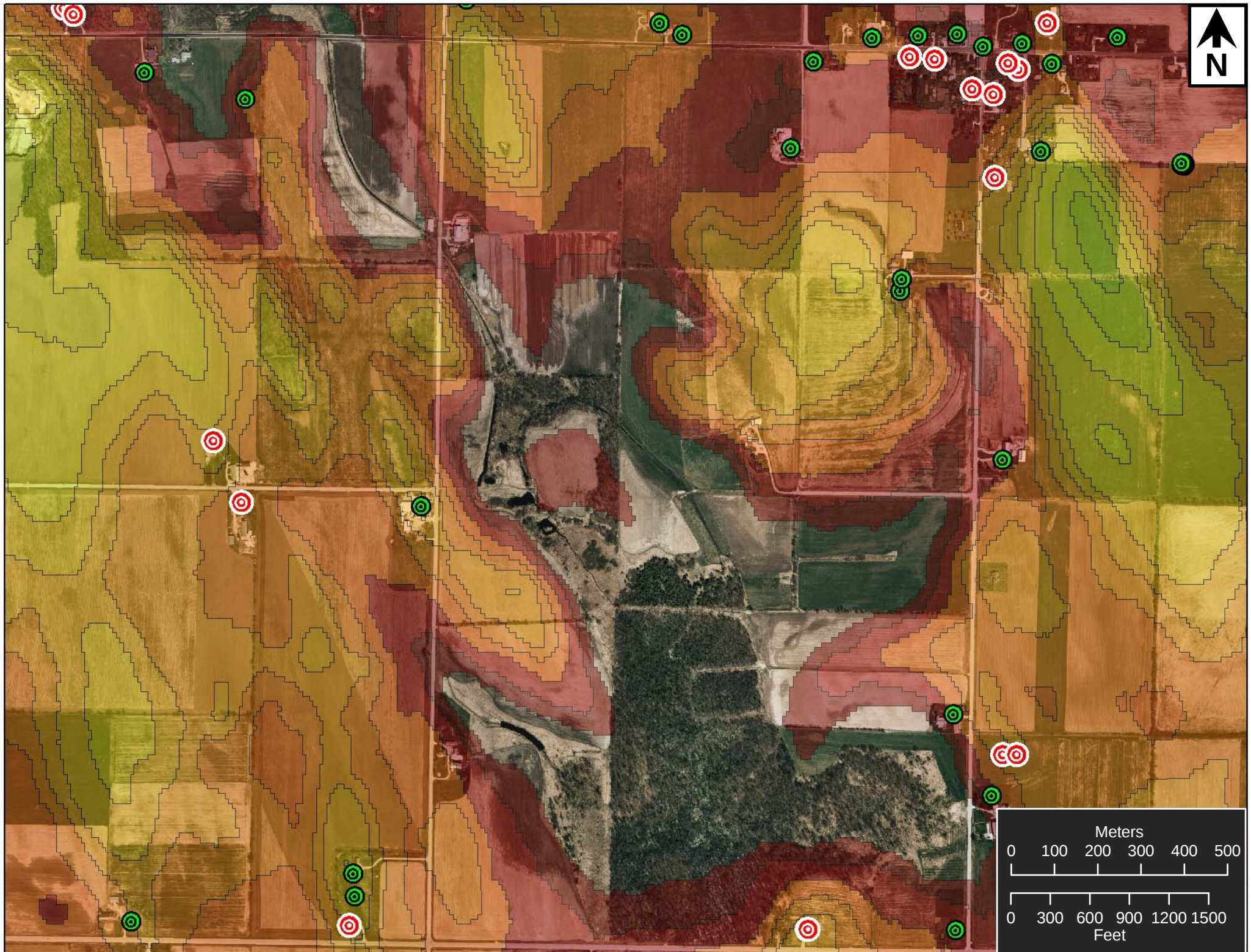


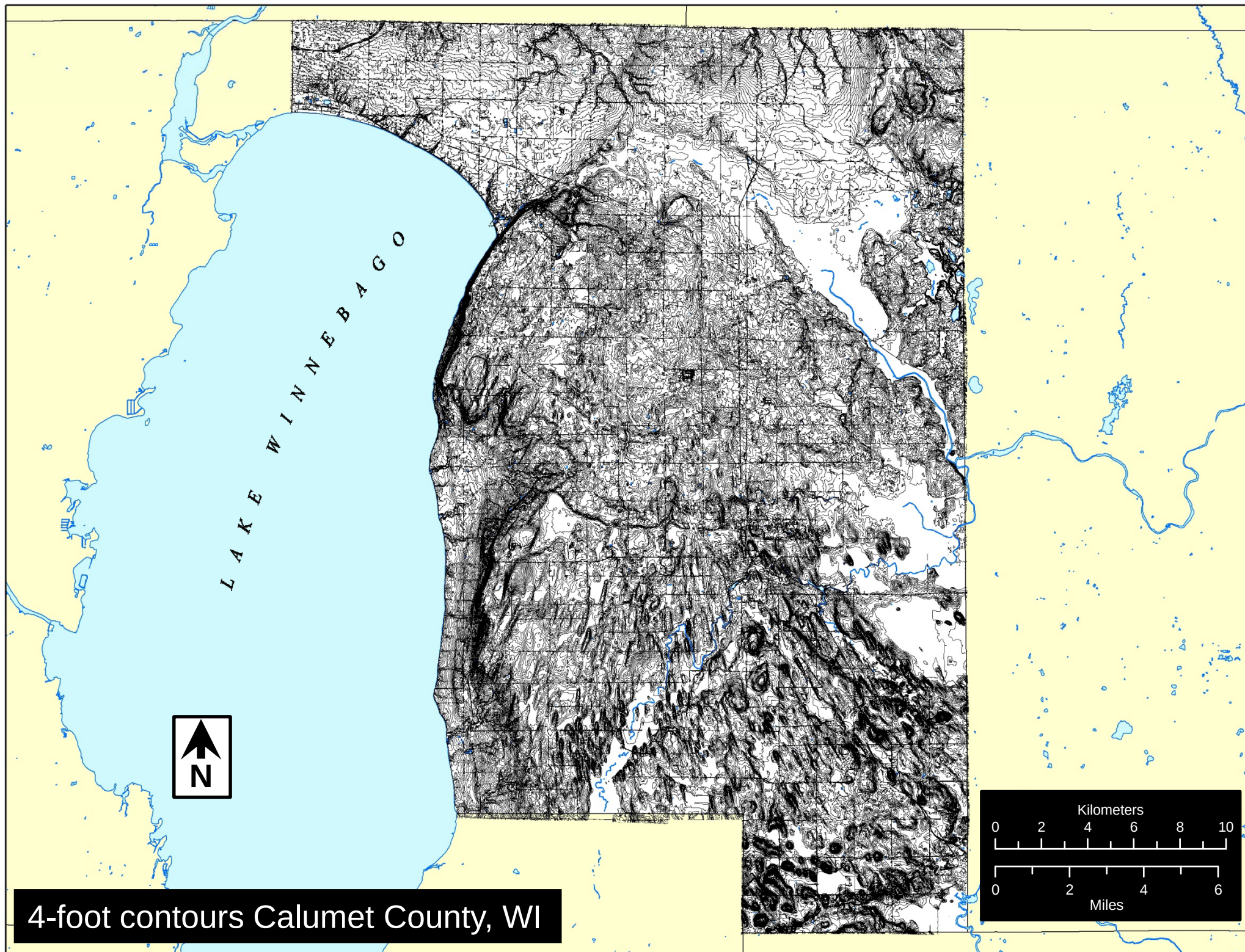


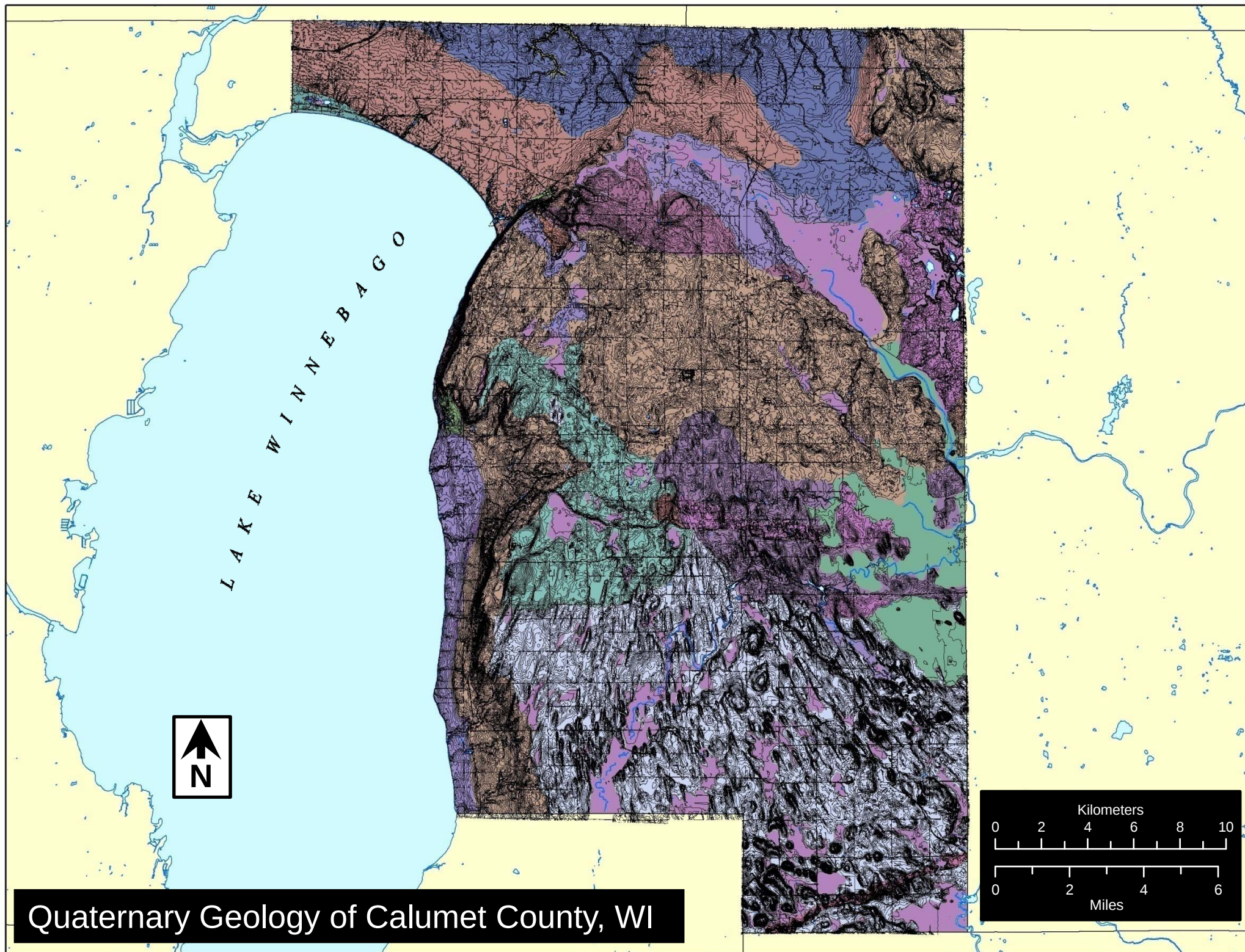


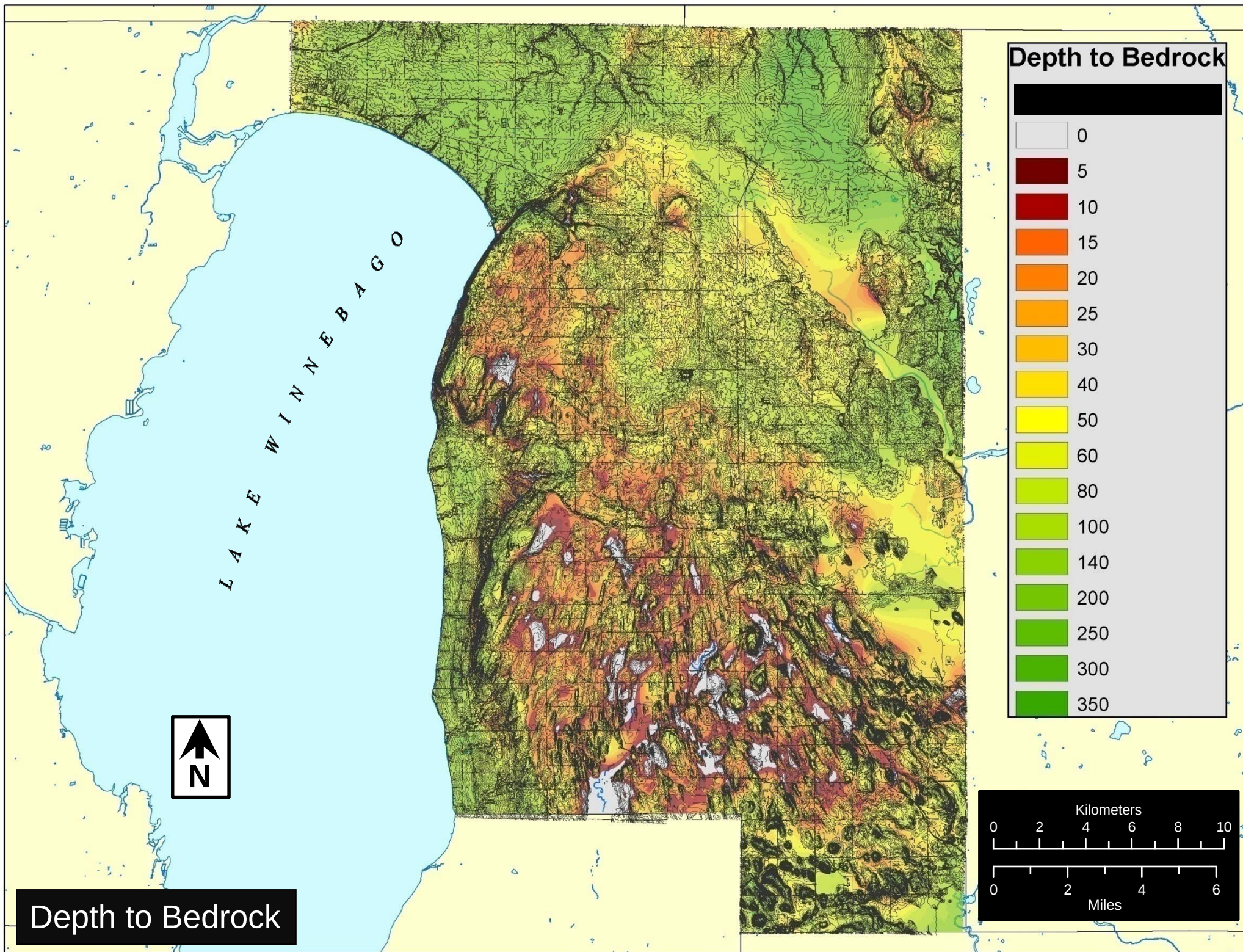


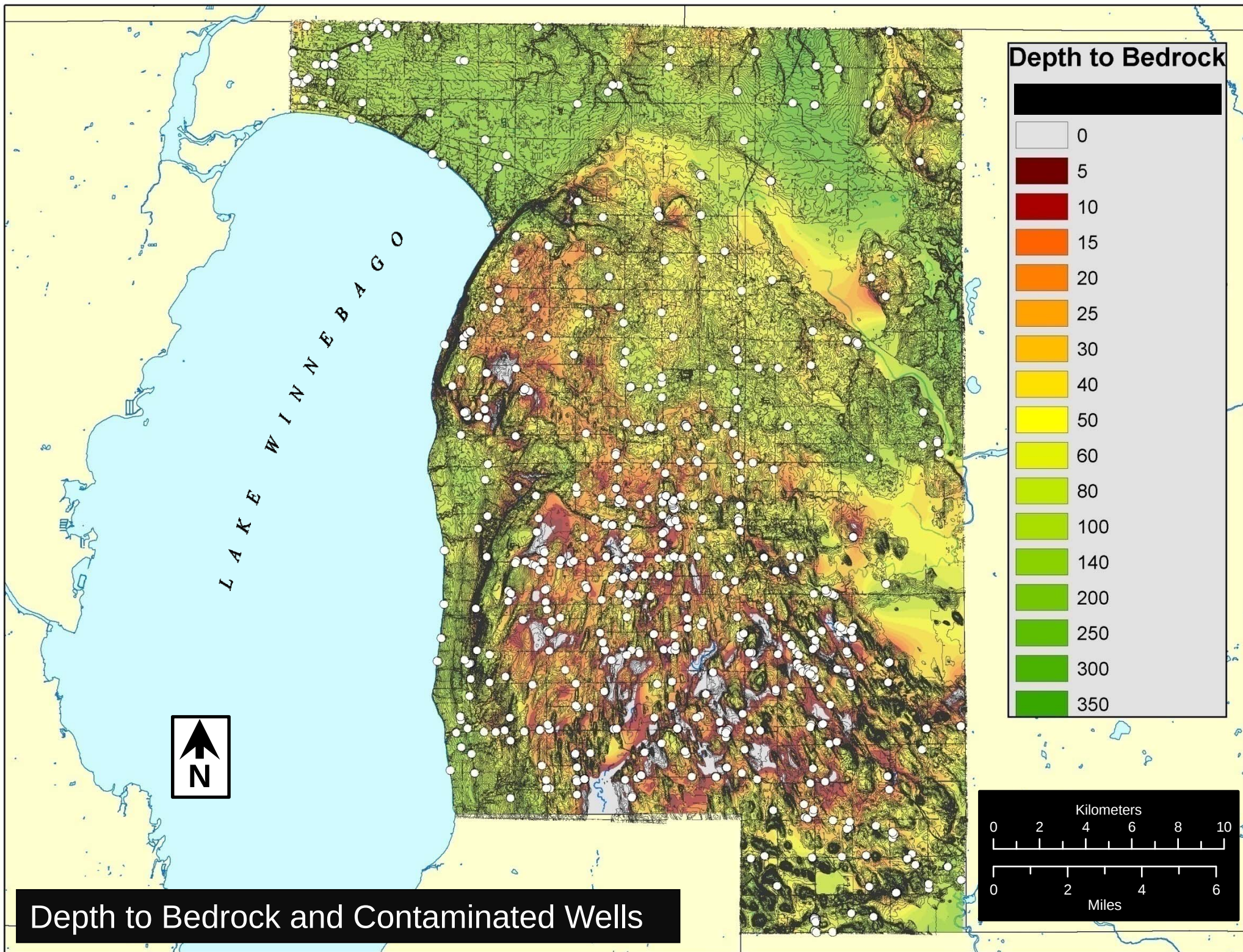












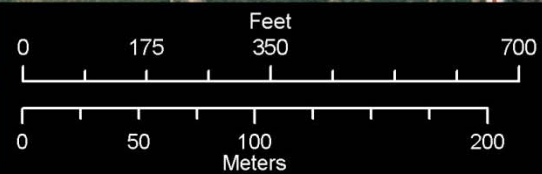


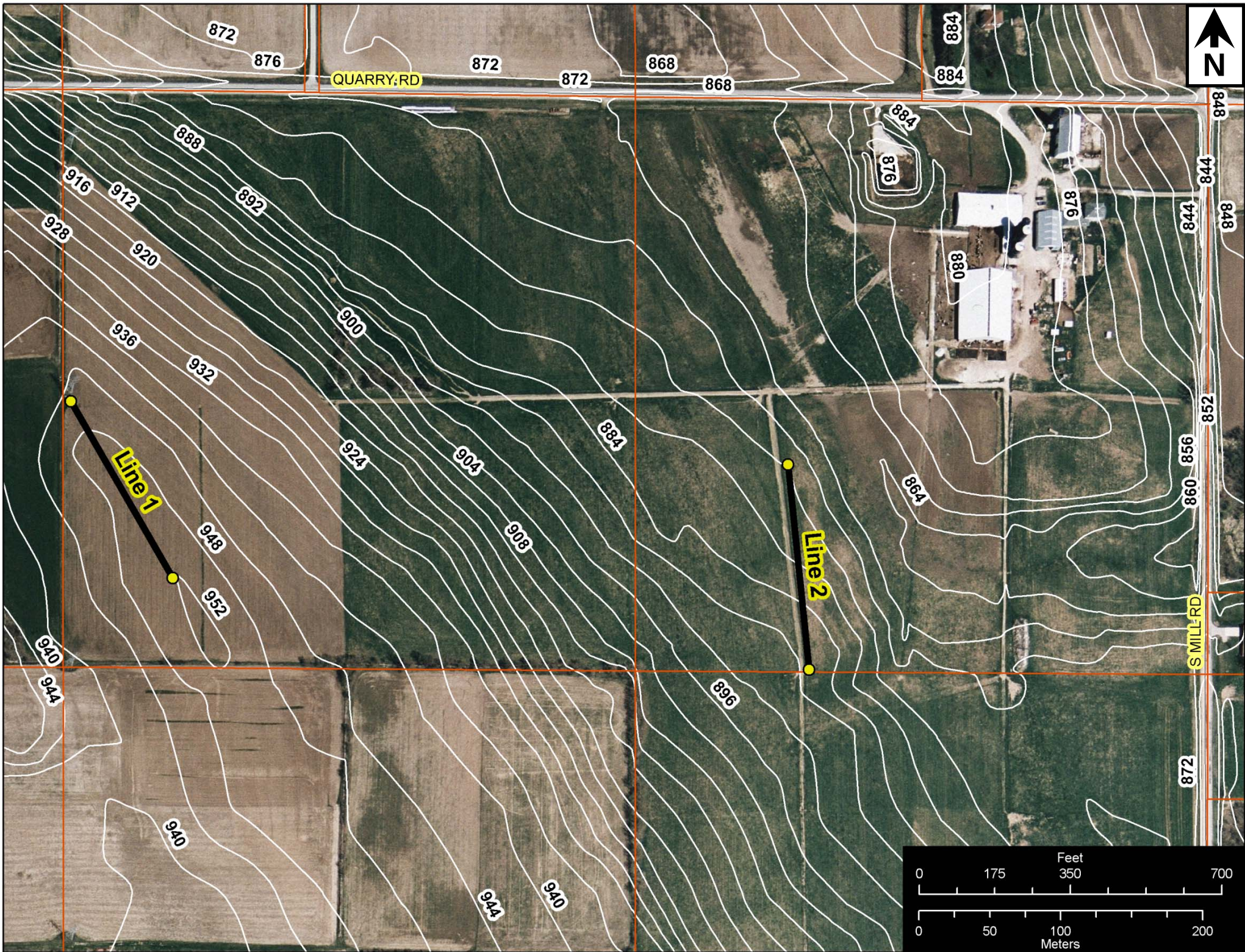
QUARRY RD

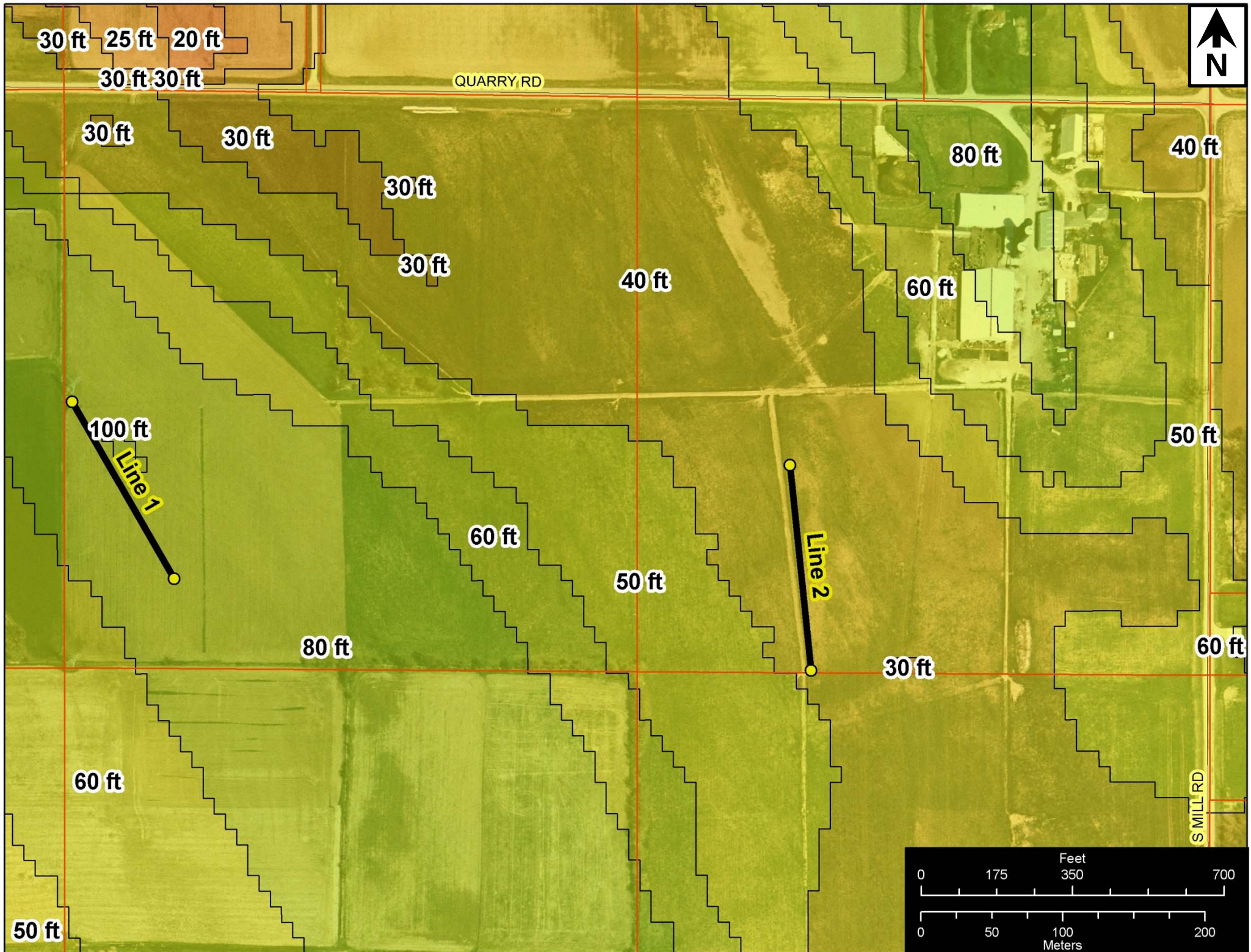
S MILL RD

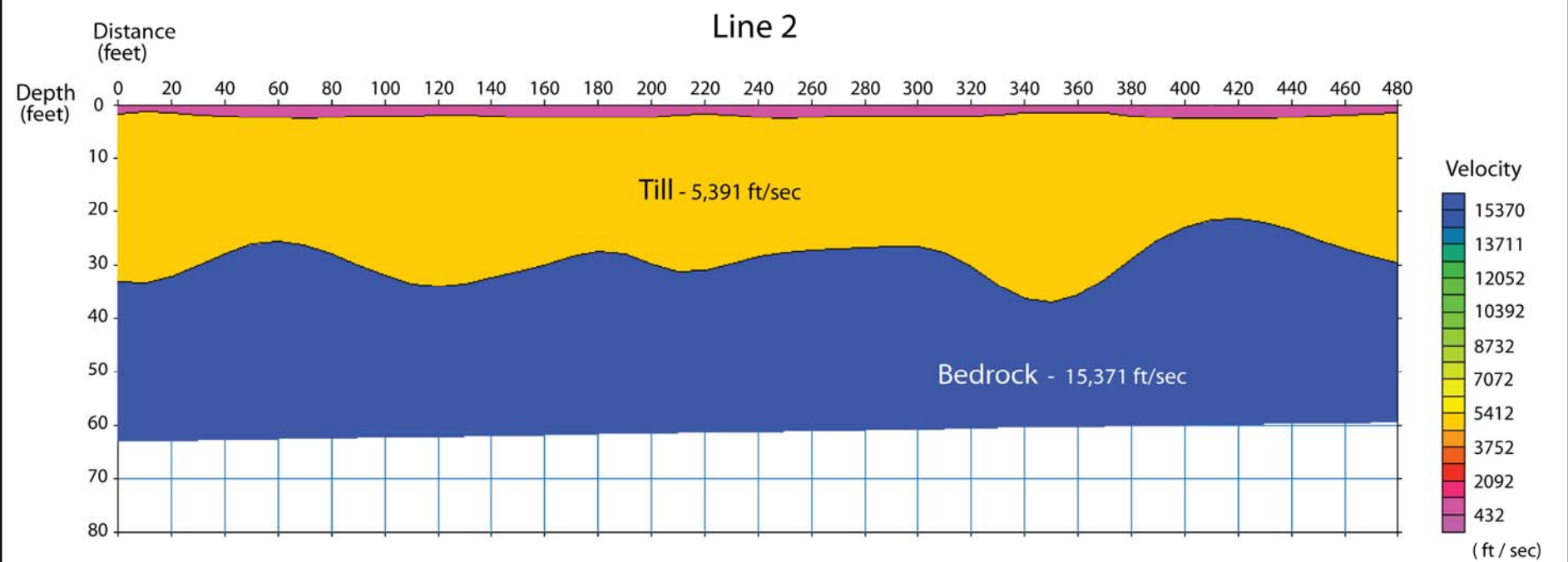
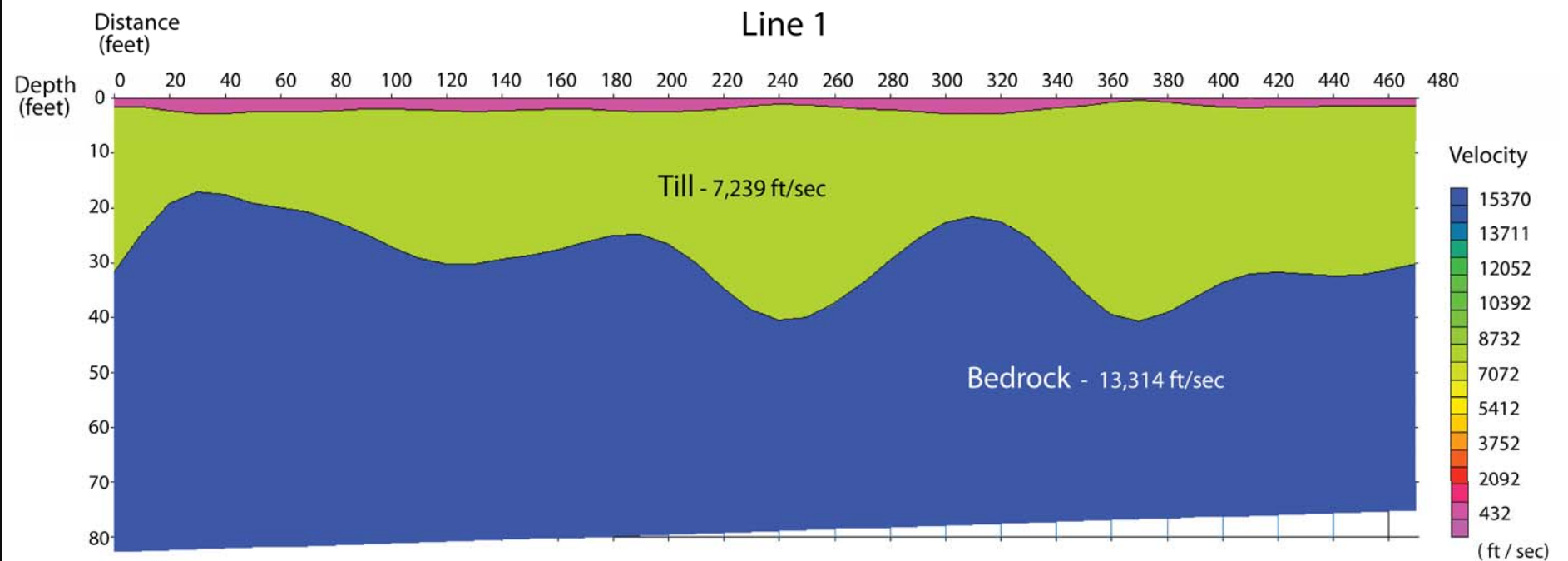
Line 1

Line 2









Private Well Test Results

**Nitrate-N
Concentration
(mg/L)**

- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- > 20



Center for
Watershed Science
and Education

2007

0 1 2 4 6 8
Miles

Disclaimer: This map for educational purposes only. It represents private well testing results in the Center for Watershed Science and Education database it does not represent a scientific study.

Private Well Test Results

**Nitrate-N
Concentration
(mg/L)**

- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- > 20

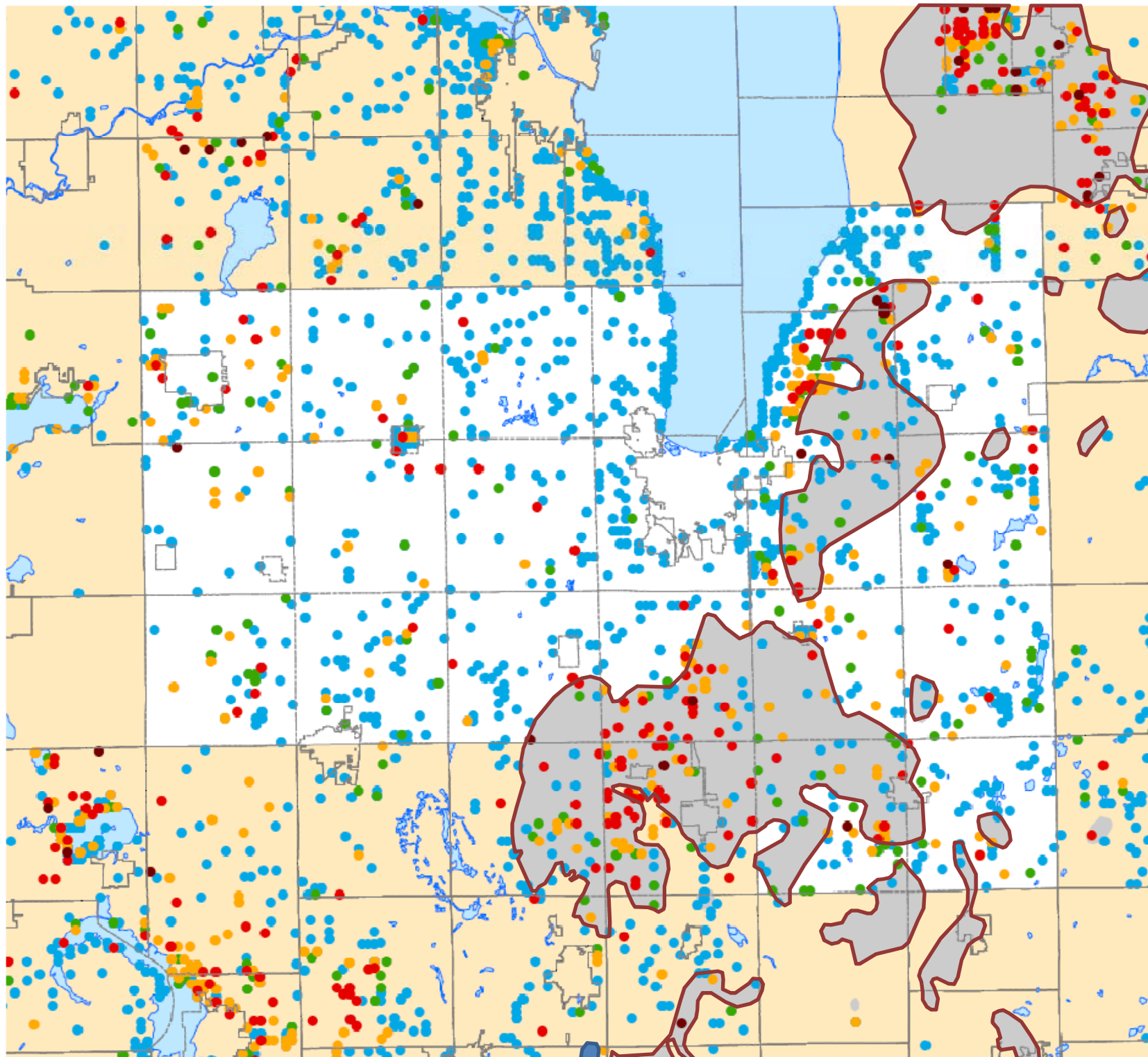
■ Silurian <50 ft



Center for
Watershed Science
and Education

2007

0 1 2 4 6 8
Miles



Disclaimer: This map for educational purposes only. It represents private well testing results in the Center for Watershed Science and Education database it does not represent a scientific study.

University of Wisconsin – Extension



University of Wisconsin – Madison

Thank You !