Extension
UNIVERSITY OF WISCONSIN-MADISON

Evaluation of observation wells used in the Hydrograph Procedure (SPS 385.60(4)) and depth-to-water in parts of Adams, Juneau, Portage, Waushara, Wood, and Marquette counties

August 7, 2025

Wisconsin Geological and Natural History Survey

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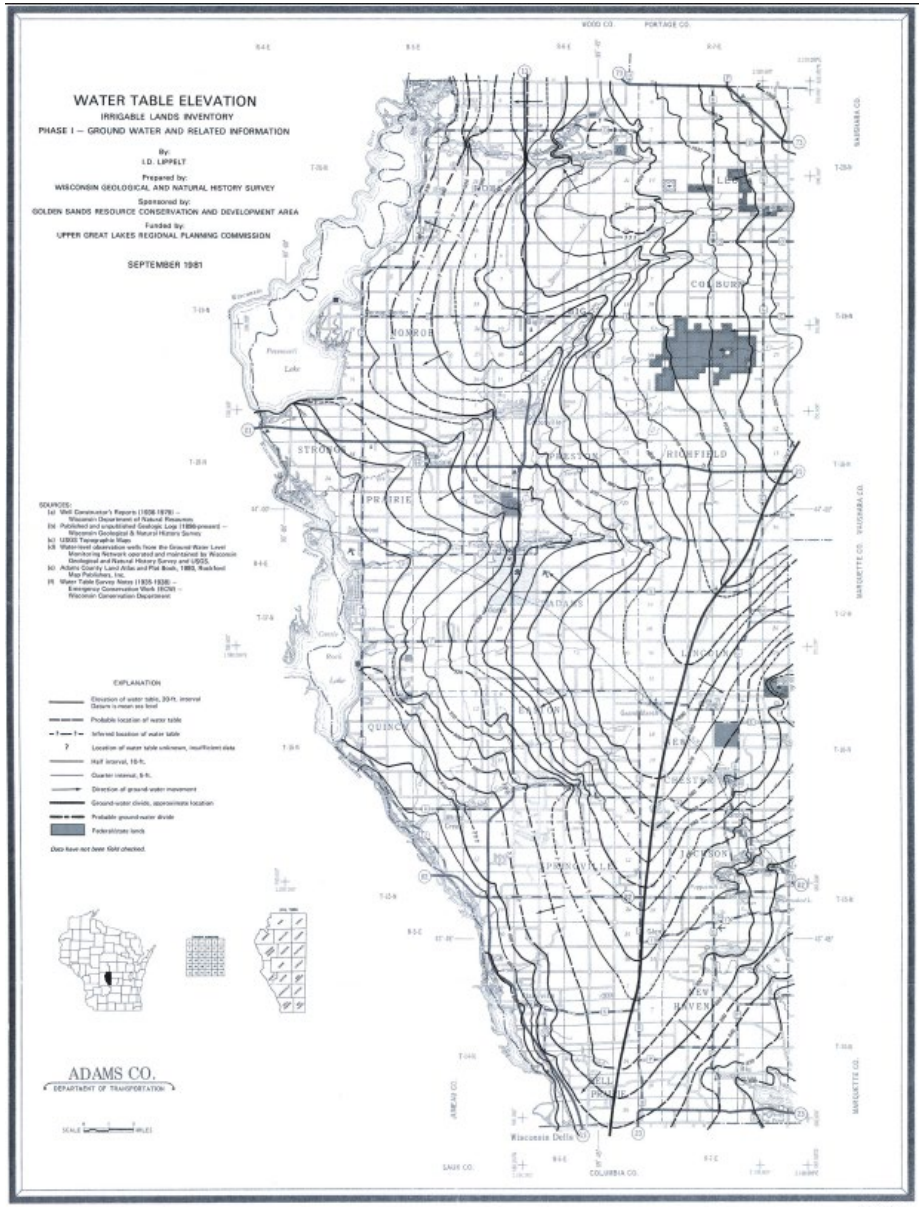
Goals:

- Compile existing water-level information for parts of Adams, Juneau, Portage, Waushara, Wood, and Marquette counties
- Delineate areas where water depths are estimated to be less than 5 ft, 5 to 10 ft, and greater than 10 ft below grade
- Evaluate the observation wells that have been used by governmental units when applying the Hydrograph Procedure
- Make recommendations for additional data and analysis needs to support appropriate use of the Hydrograph Procedure in the future

- Quick turn-around requested by DSPS

Compile existing water-level information

- Existing Water Table Maps
  - Irrigable lands inventory for the Golden Sands Resource Conservation and Development Area in central Wisconsin
    - Adams, Juneau, Marquette, Portage, Waushara, Wood
    - Scale = 1:126,720
    - 10-foot contour interval
    - Published in 1981
    - Used well construction report data from 1936 to 1979
  - Wood County
    - Scale = 1:100,000
    - 20-foot contour interval
    - Published in 1989
  - Central Sands Lakes Study
    - Digital data
    - Evaluated in 2020
    - Excludes Juneau County
    - 25-foot contour interval



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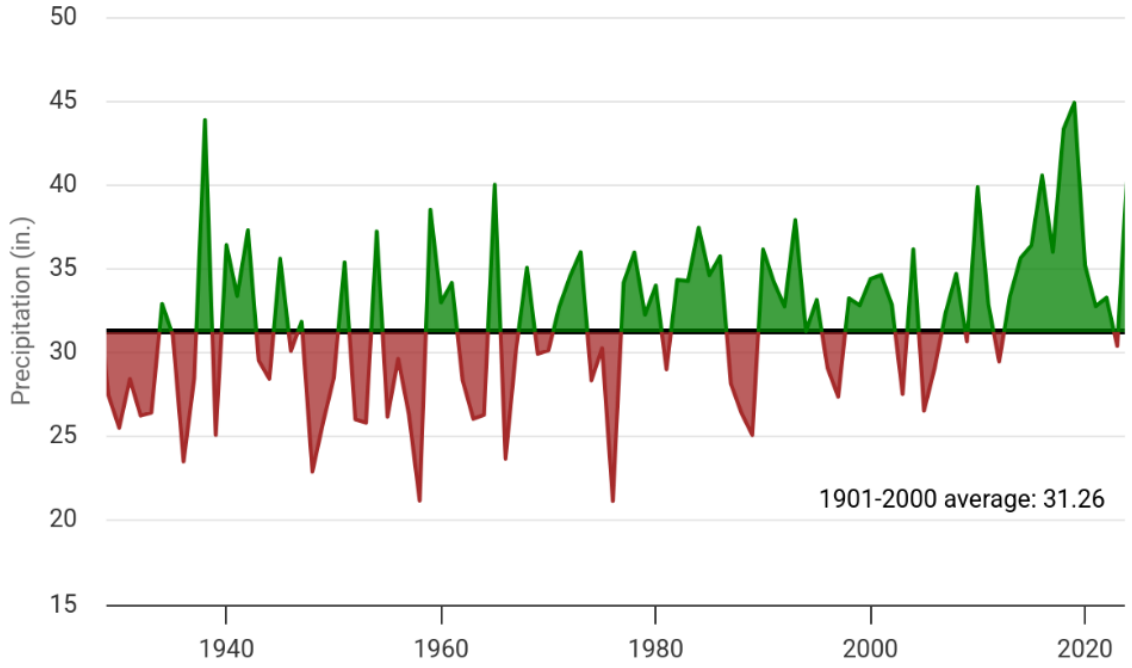
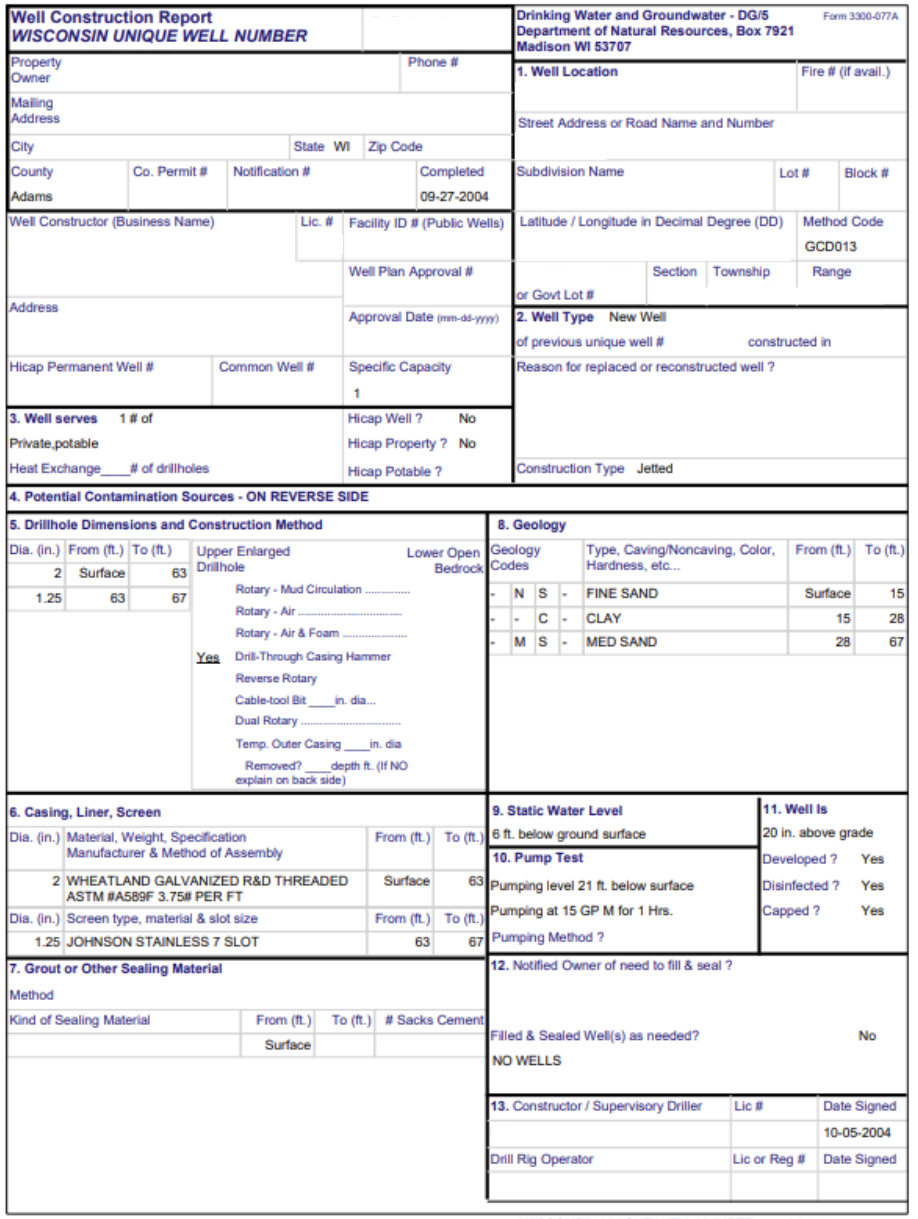


Wisconsin's Central climate division (Division 5) annual average precipitation in inches from 1930 to 2024 (Wisconsin State Climatology Office, unpub. data, 2024).

Compile existing water-level information

- Well Construction Reports (WCRs)
  - Tens of thousands of new wells installed in the study area since the late 1970s
  - Nearly 31,000 available in a digital format for Adams, Juneau, northern Marquette, Portage, Waushara, and Wood counties (post-1988)
  - Wells need to be geolocated
  - Snap-shot in time
  - Used collectively = average conditions



Well Construction Report
WISCONSIN UNIQUE WELL NUMBER

Drinking Water and Groundwater - DG/5 Form 3300-077A
Department of Natural Resources, Box 7921
Madison WI 53707

Property Owner | Phone #
Mailing Address
City | State WI | Zip Code
County: Adams | Co. Permit # | Notification # | Completed: 09-27-2004

1. Well Location | Fire # (if avail.)
Street Address or Road Name and Number
Subdivision Name | Lot # | Block #
Latitude / Longitude in Decimal Degree (DD) | Method Code: GCD013
Section | Township | Range | or Govt Lot #

Well Constructor (Business Name) | Lic. # | Facility ID # (Public Wells)
Well Plan Approval #
Address
Approval Date (mm-dd-yyyy)
Hicap Permanent Well # | Common Well #
Specific Capacity: 1

2. Well Type New Well
of previous unique well # | constructed in
Reason for replaced or reconstructed well ?

3. Well serves 1 # of
Private,potable
Heat Exchange____# of drillholes
Hicap Well ? No
Hicap Property ? No
Hicap Potable ?
Construction Type: Jetted

4. Potential Contamination Sources - ON REVERSE SIDE

5. Drillhole Dimensions and Construction Method

Dia. (in.)	From (ft.)	To (ft.)
2	Surface	63
1.25	63	67

Upper Enlarged Drillhole | Lower Open Bedrock
Rotary - Mud Circulation
Rotary - Air
Rotary - Air & Foam
Yes Drill-Through Casing Hammer
Reverse Rotary
Cable-tool Bit ____in. dia...
Dual Rotary
Temp. Outer Casing ____in. dia
Removed? ____depth ft. (If NO explain on back side)

8. Geology

Geology Codes	Type, Caving/Noncaving, Color, Hardness, etc...	From (ft.)	To (ft.)
- N S -	FINE SAND	Surface	15
- - C -	CLAY	15	28
- M S -	MED SAND	28	67

6. Casing, Liner, Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
2	WHEATLAND GALVANIZED R&D THREADED ASTM #A589F 3.75# PER FT	Surface	63
Dia. (in.)	Screen type, material & slot size	From (ft.)	To (ft.)
1.25	JOHNSON STAINLESS 7 SLOT	63	67

9. Static Water Level
6 ft. below ground surface

10. Pump Test
Pumping level 21 ft. below surface
Pumping at 15 GP M for 1 Hrs.
Pumping Method ?

11. Well Is
20 in. above grade
Developed ? Yes
Disinfected ? Yes
Capped ? Yes

7. Grout or Other Sealing Material
Method

Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
	Surface		

12. Notified Owner of need to fill & seal ?
Filled & Sealed Well(s) as needed? No
NO WELLS

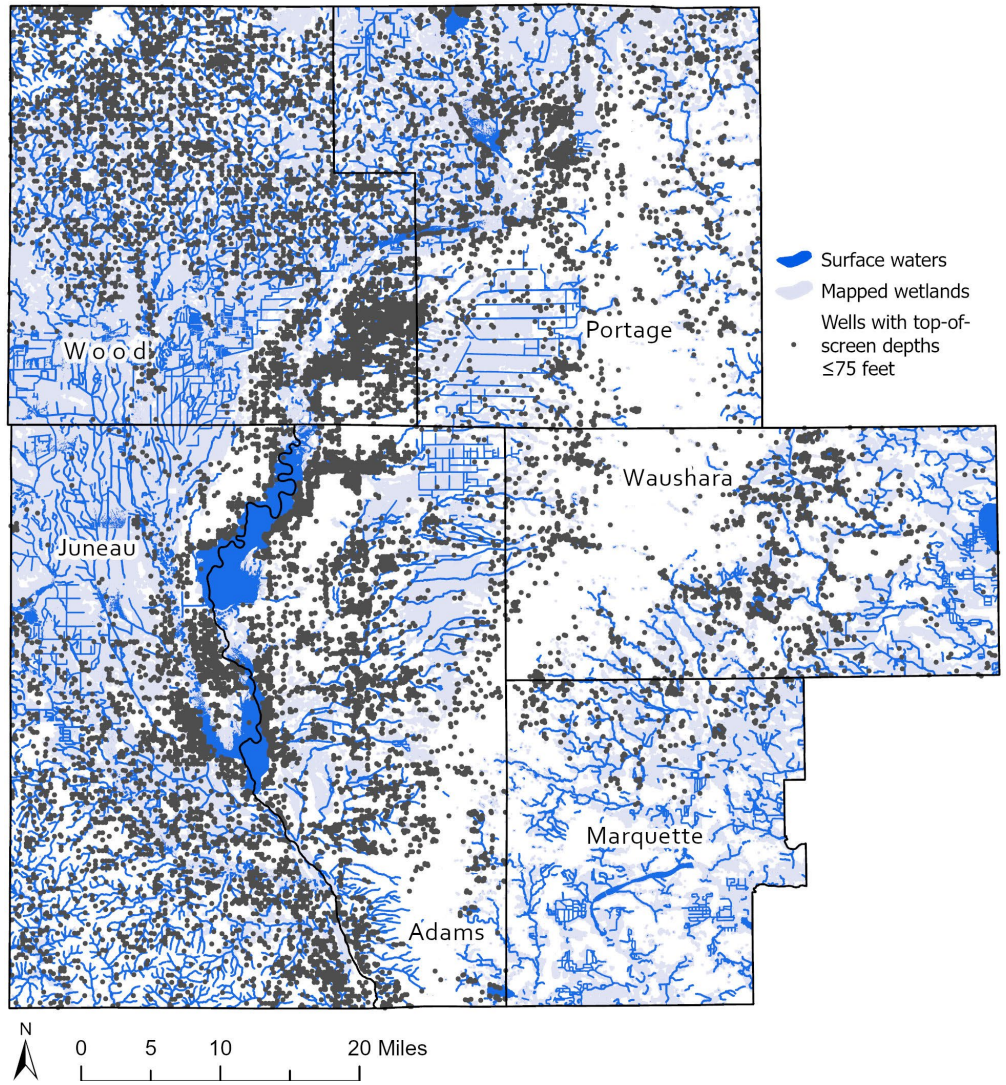
13. Constructor / Supervisory Driller | Lic # | Date Signed: 10-05-2004
Drill Rig Operator | Lic or Reg # | Date Signed

WISCONSIN UNIQUE WELL NUMBER

Compile existing water-level information

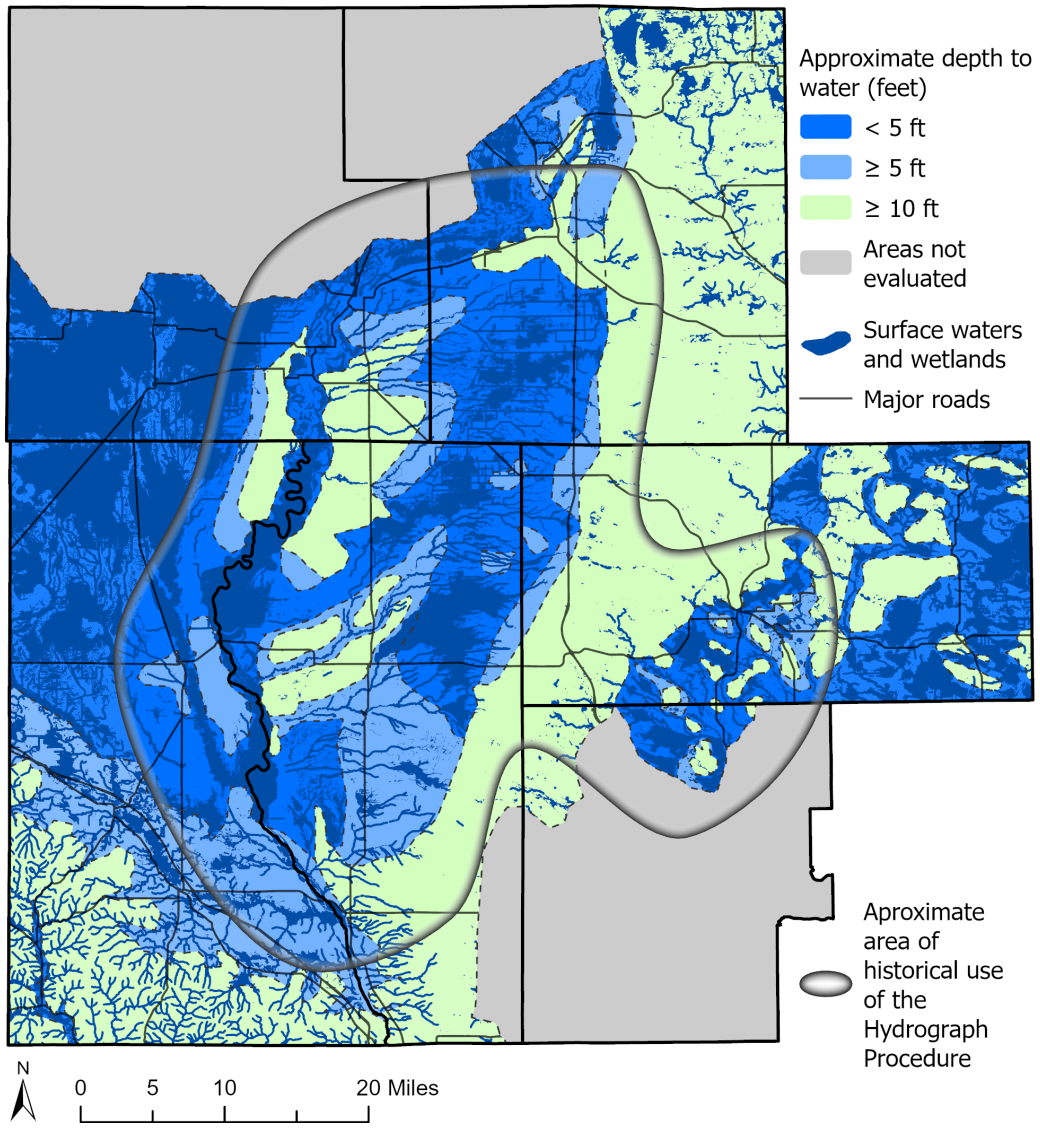
- Wells screened at shallower depths are more likely to represent water table conditions.
- Wells installed during groundwater recharge periods may be more likely to represent high water table conditions.

County	Total number of wells with reported water levels	Depth to the top of well screen (ft)		
		≤ 100, but > 75	≤ 75, but > 50	≤ 50
Adams	6,167	565	2,784	1,913
Portage	5,596	838	1,001	2,097
Waushara	5,579	1,383	1,241	388
Wood	7,131	210	1,063	5,765
Juneau	4,910	335	1,289	2,993
Marquette	1,295	304	260	94
Sum	30,678	3,635	7,638	13,250
% of total number of wells		12%	25%	43%



Distribution of supporting data for shallow groundwater mapping, showing the positions of 20,888 wells with screens shallower than or equal to 75 feet, surface waters from the National Hydrography Dataset, and wetlands from the Wisconsin Wetlands Inventory (accessed May 2025).

Delineate areas where water depths are estimated to be less than 5 ft, 5 to 10 ft, and greater than 10 ft below grade



Sources of information

- Well data
- Surface-water features (streams, lakes) from the National Hydrologic Dataset
- Wetlands from the WDNR Wisconsin Wetland Inventory
- Quaternary Geology of Wisconsin map (Rawling and others, 2025)
- Topography from Lidar

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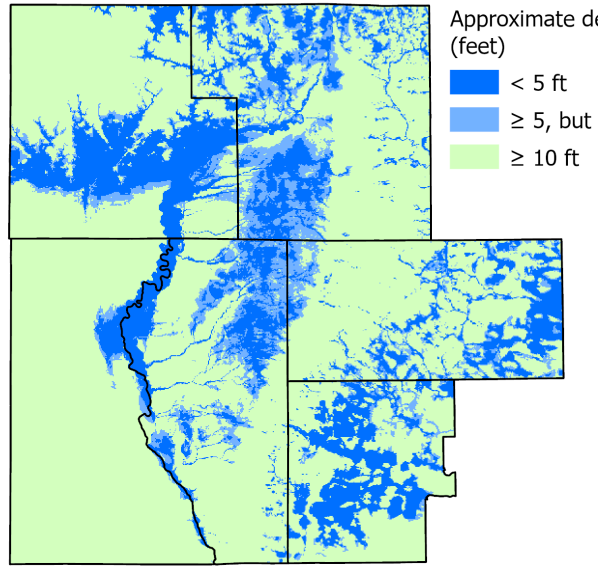
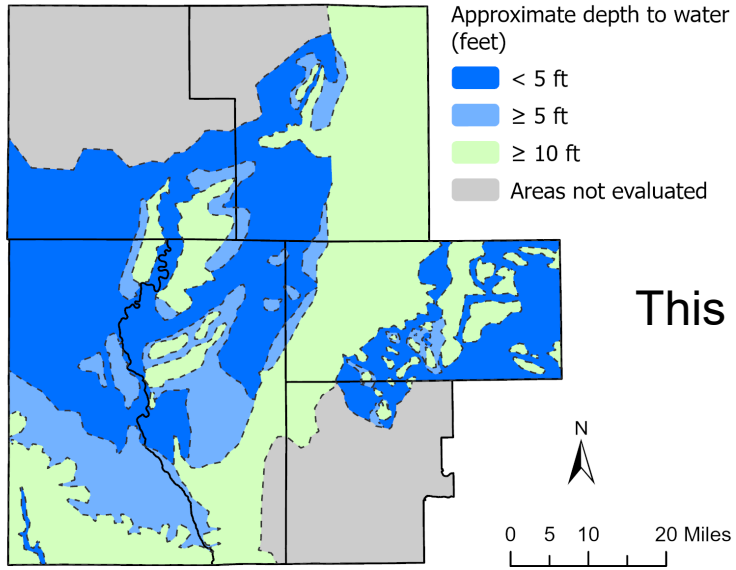


Using data for wells installed between 1936 and 1979



This study

Evaluation of mapped areas

- Limited field checking during a period of seasonally high water-table conditions
- Comparison of mapped areas to existing water-table maps

Observed high water

Evidence of past flooding

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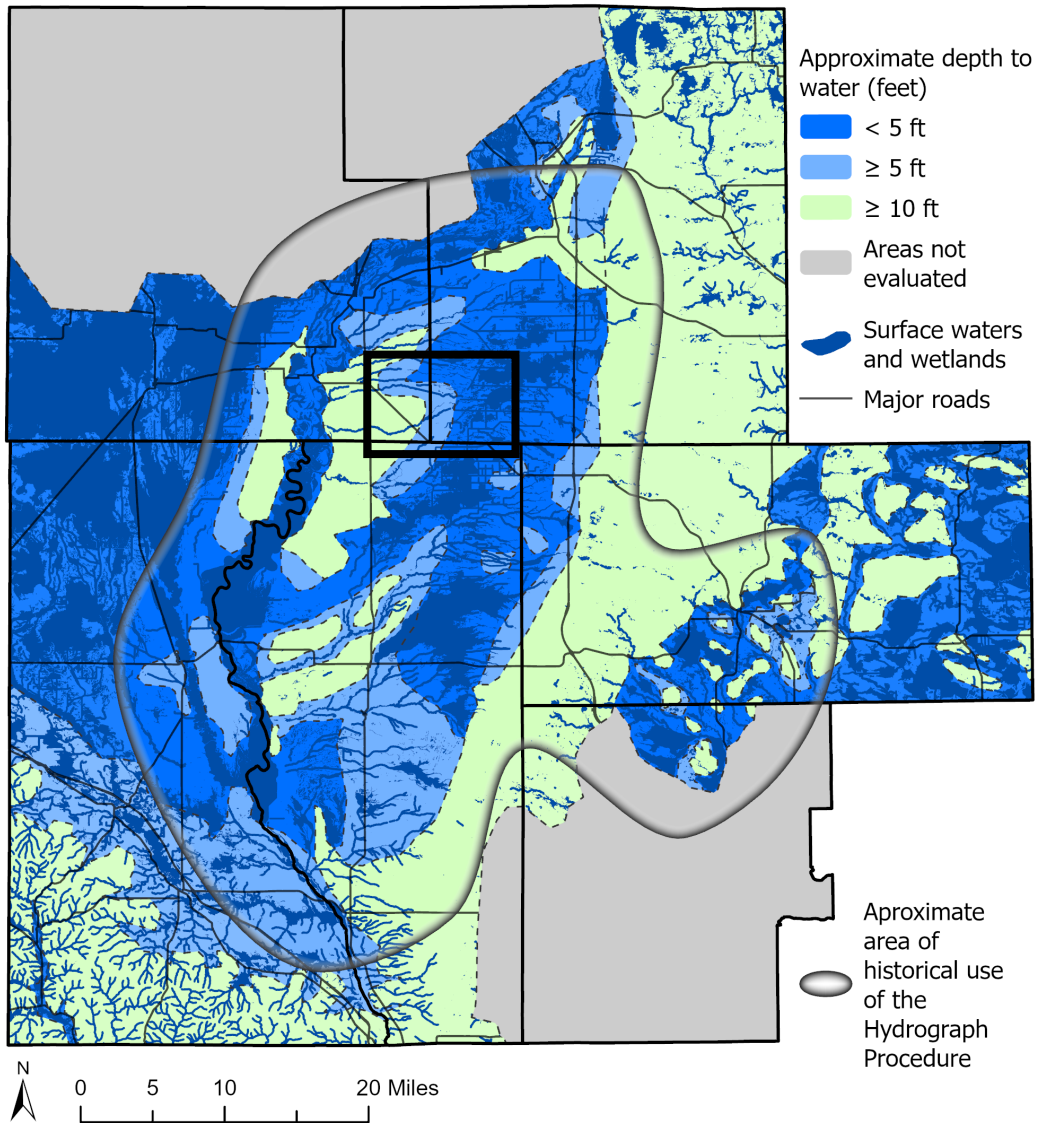
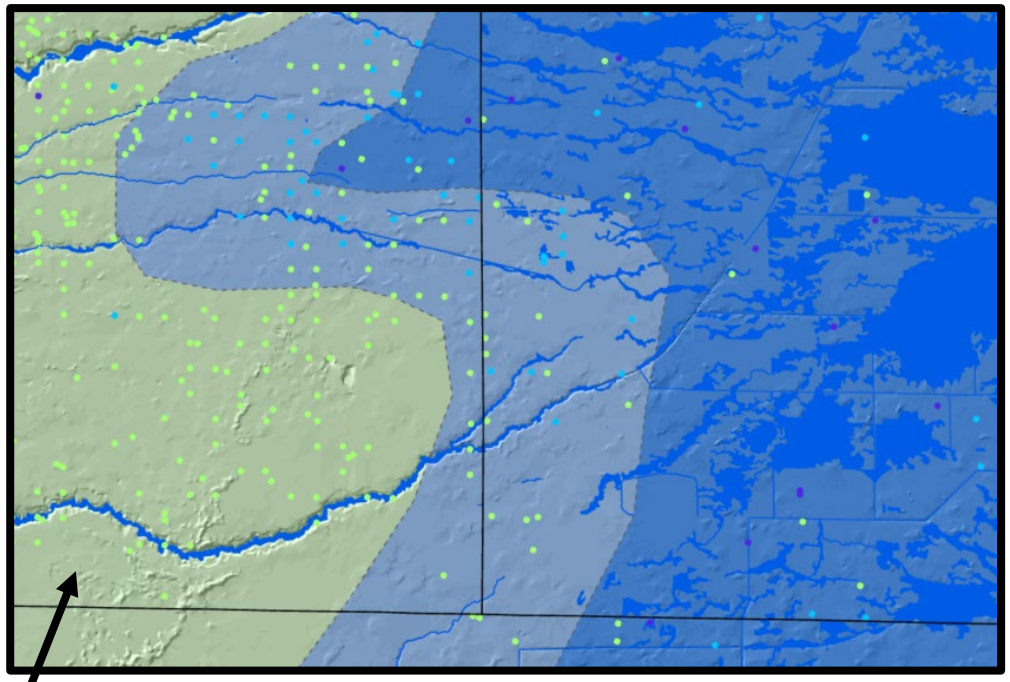


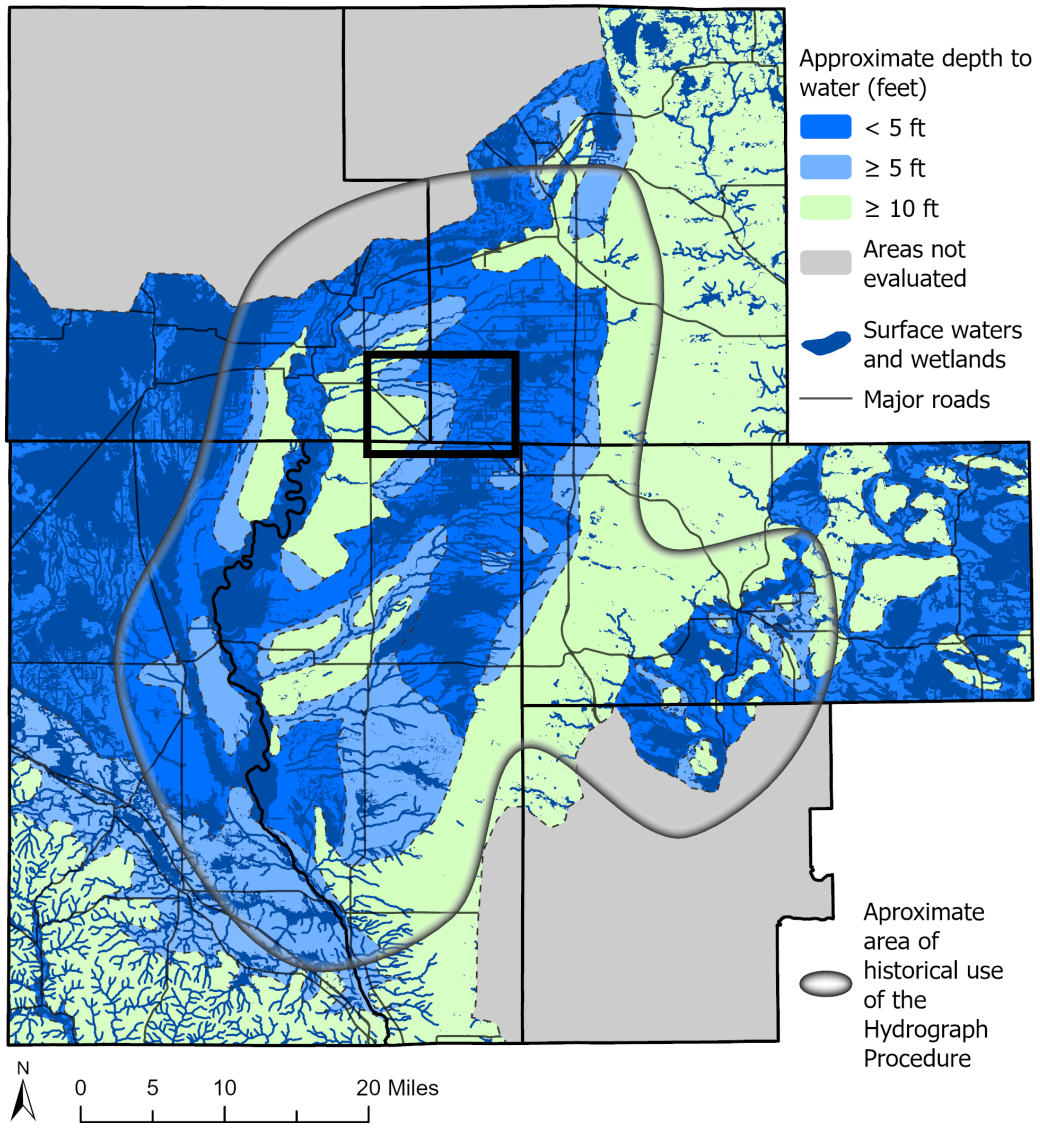
Confidence in mapped areas



Higher confidence:

- Density of wells is higher
- Nearly all wells (98%) have water levels that are ≥ 10 ft below grade.
- Prevalence of surface waters and wetlands is lower
- Exceptions: limited areas within about 300 ft of a surface-water feature or within or near the margin of a floodplain

Delineate areas where water depths are estimated to be less than 5 ft, 5 to 10 ft, and greater than 10 ft below grade



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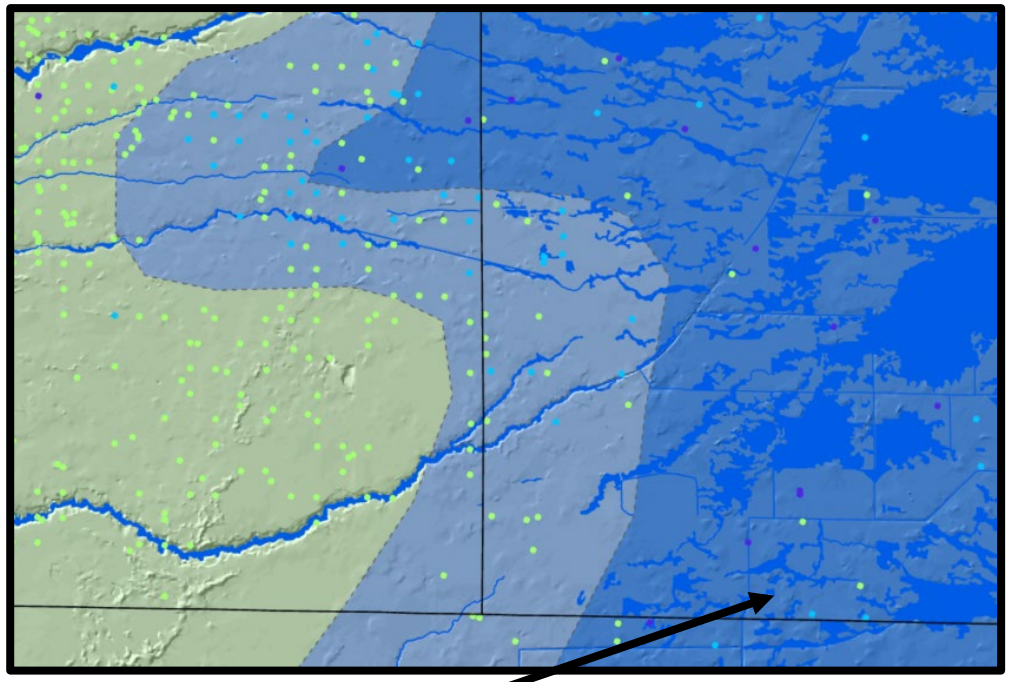
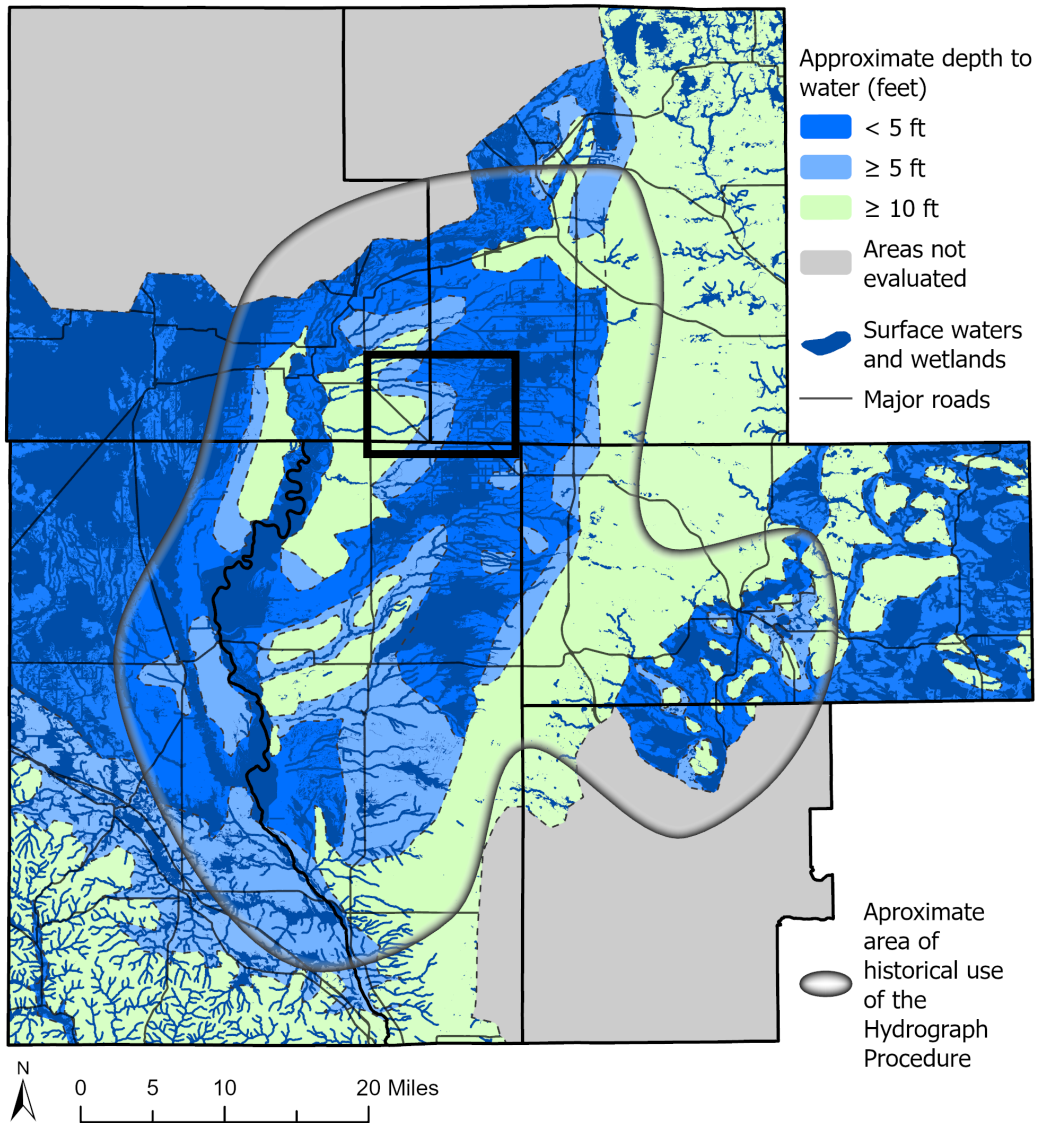


Moderate confidence:

- Density of wells is lower and more variation in the WCR depth-to-water data
- However, the prevalence of surface waters and wetlands is high, which suggests very shallow groundwater

Delineate areas where water depths are estimated to be less than 5 ft, 5 to 10 ft, and greater than 10 ft below grade



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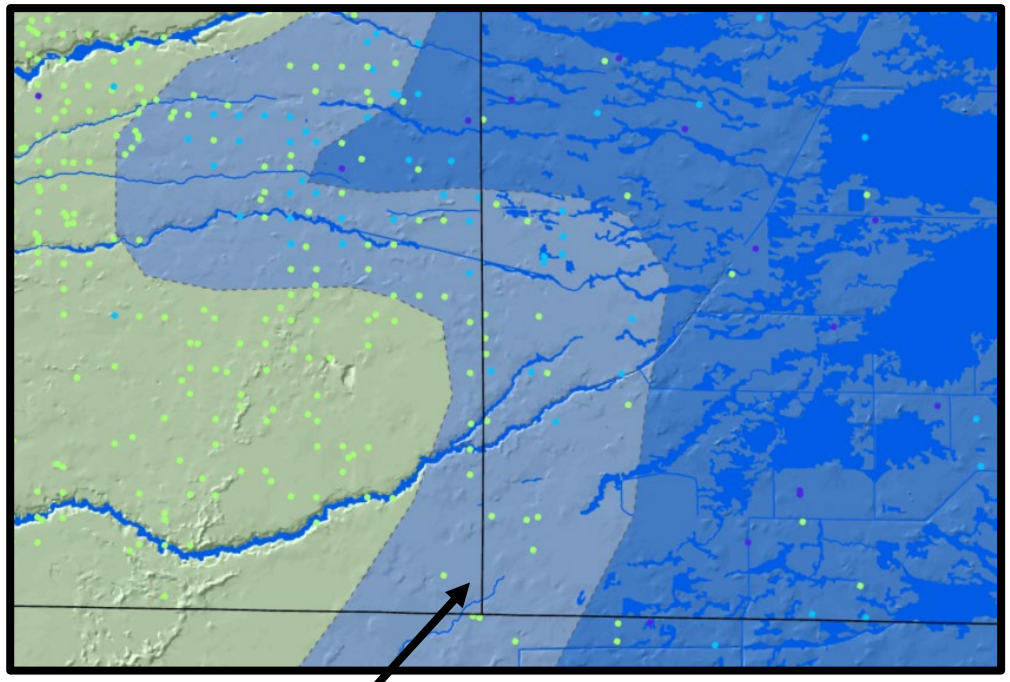
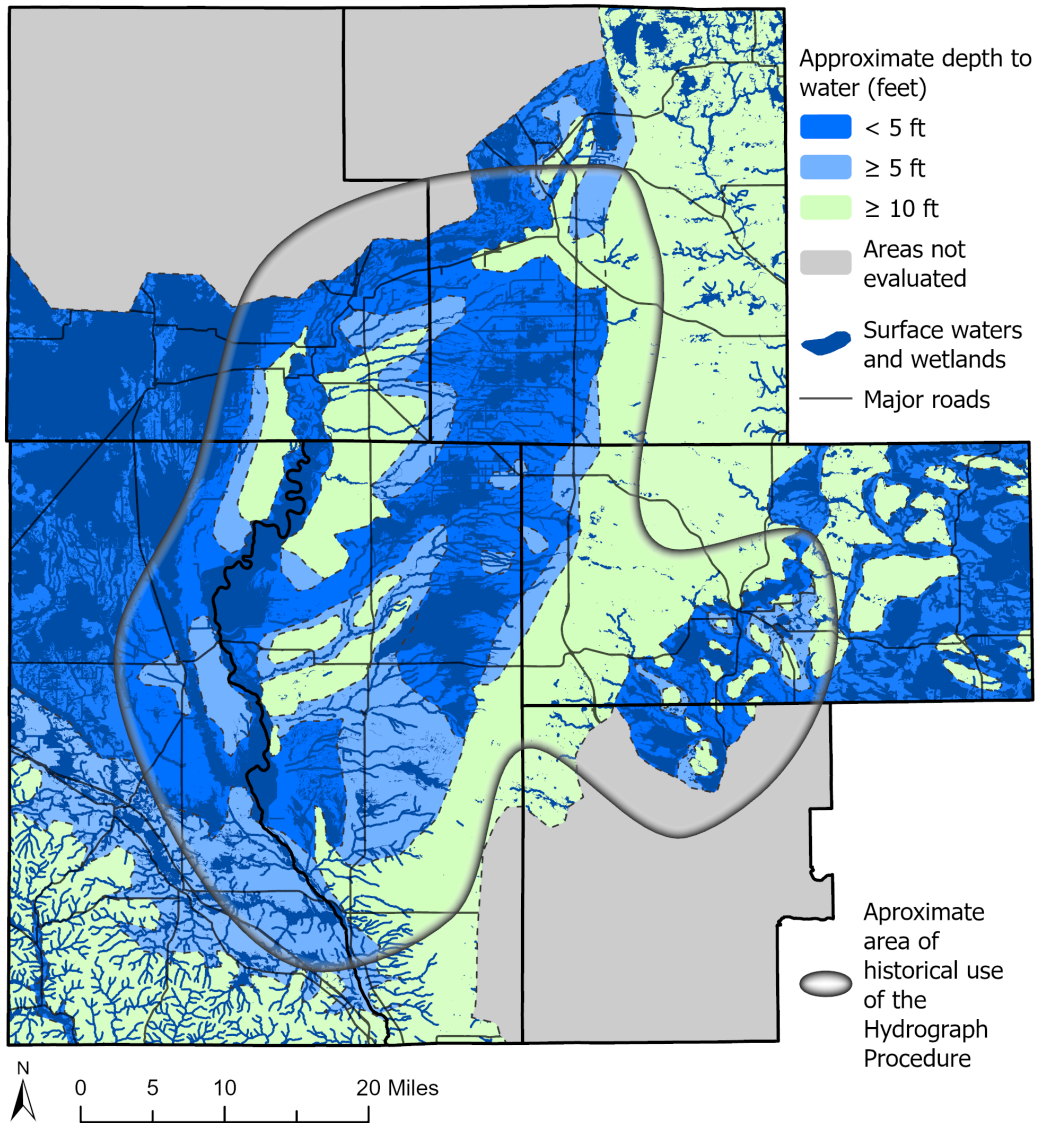


Lower confidence:

- Variation in the WCR depth-to-water data
- More appropriately characterized as areas where the approximate depth to water is ≥ 5 ft

Delineate areas where water depths are estimated to be less than 5 ft, 5 to 10 ft, and greater than 10 ft below grade



Summary

- Greater certainty in areas with higher densities of wells and surface-water features
- Occurrence of wetlands strengthen confidence in shallow-water designations where well records are limited

Recommendations

- Well geolocation in Juneau and Wood counties
- Updated water table mapping using
  - WCRs: Many well construction reports submitted since 1979
  - High-resolution LiDAR
  - Updated National Hydrography Dataset layers and wetlands inventories

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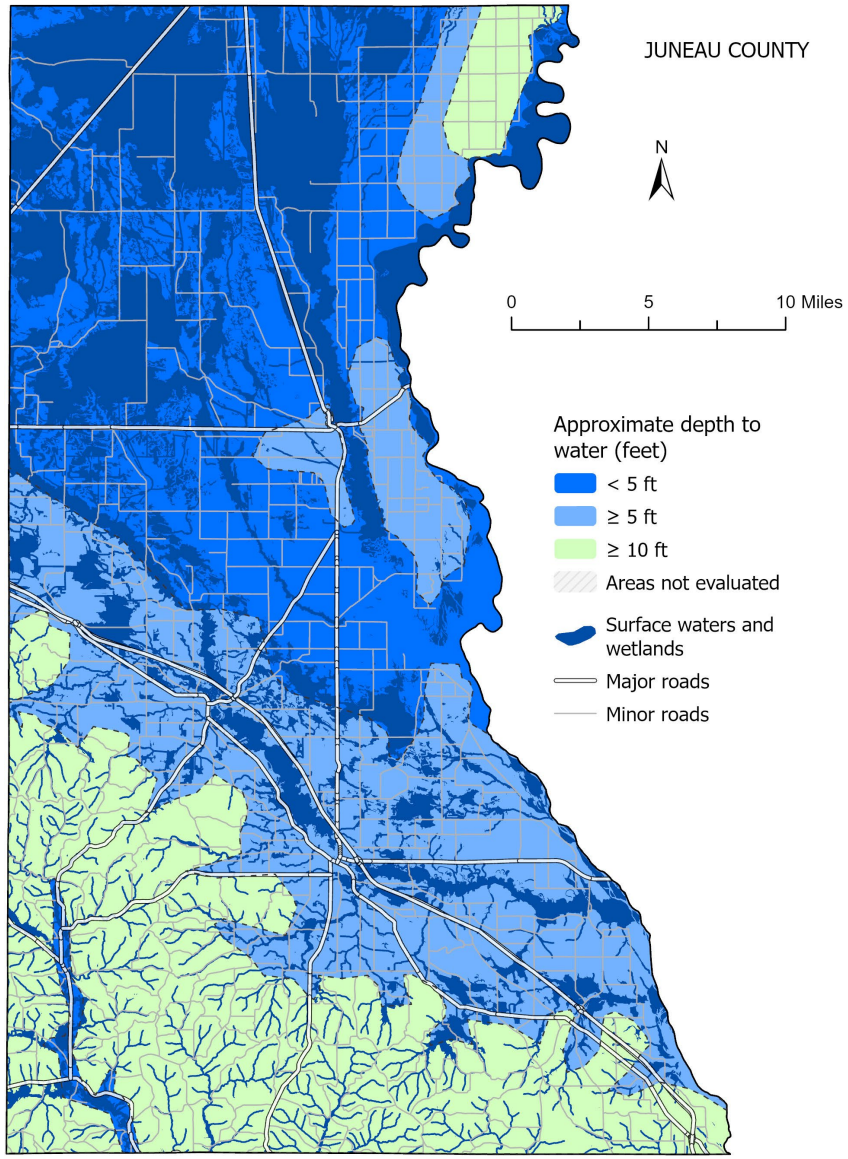
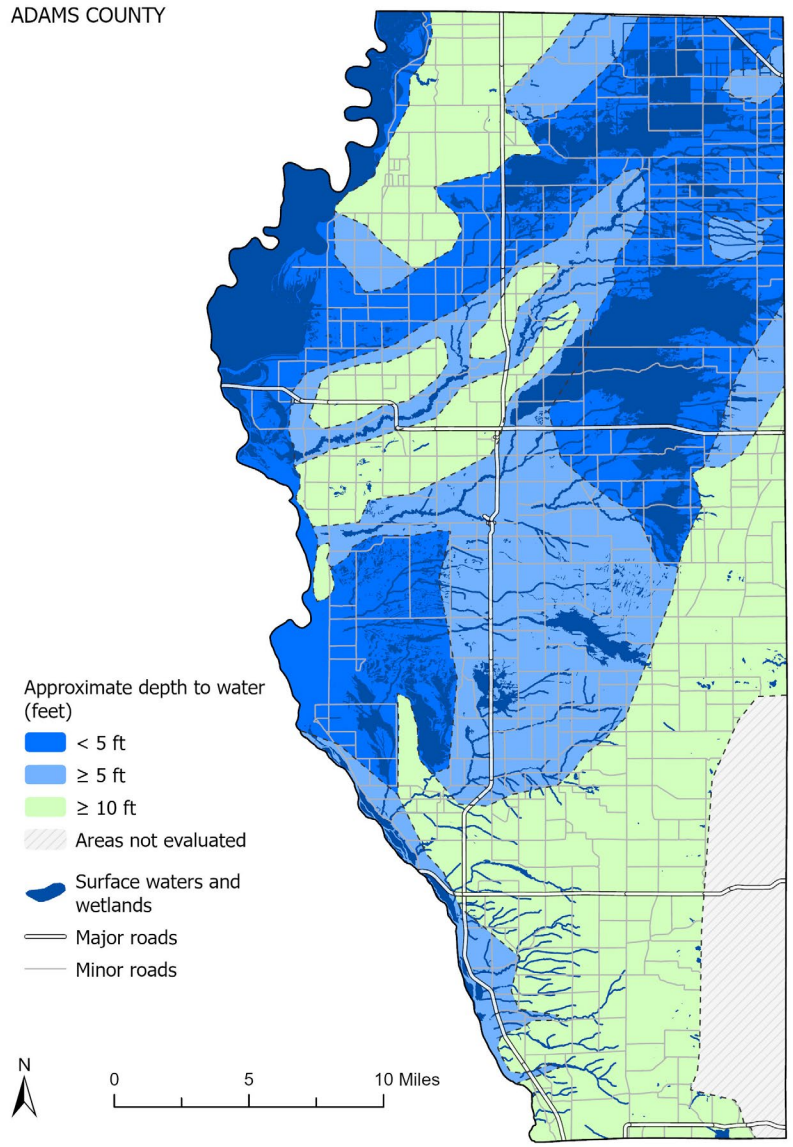
Maps for each county and GIS layer of mapped zones are available



The spatial accuracy of the mapped zones in Juneau County is no less than about 1,320 feet or roughly 1/4 mile.



The spatial accuracy of the mapped zones in Adams County is no less than about 750 feet or roughly 1/8 mile.

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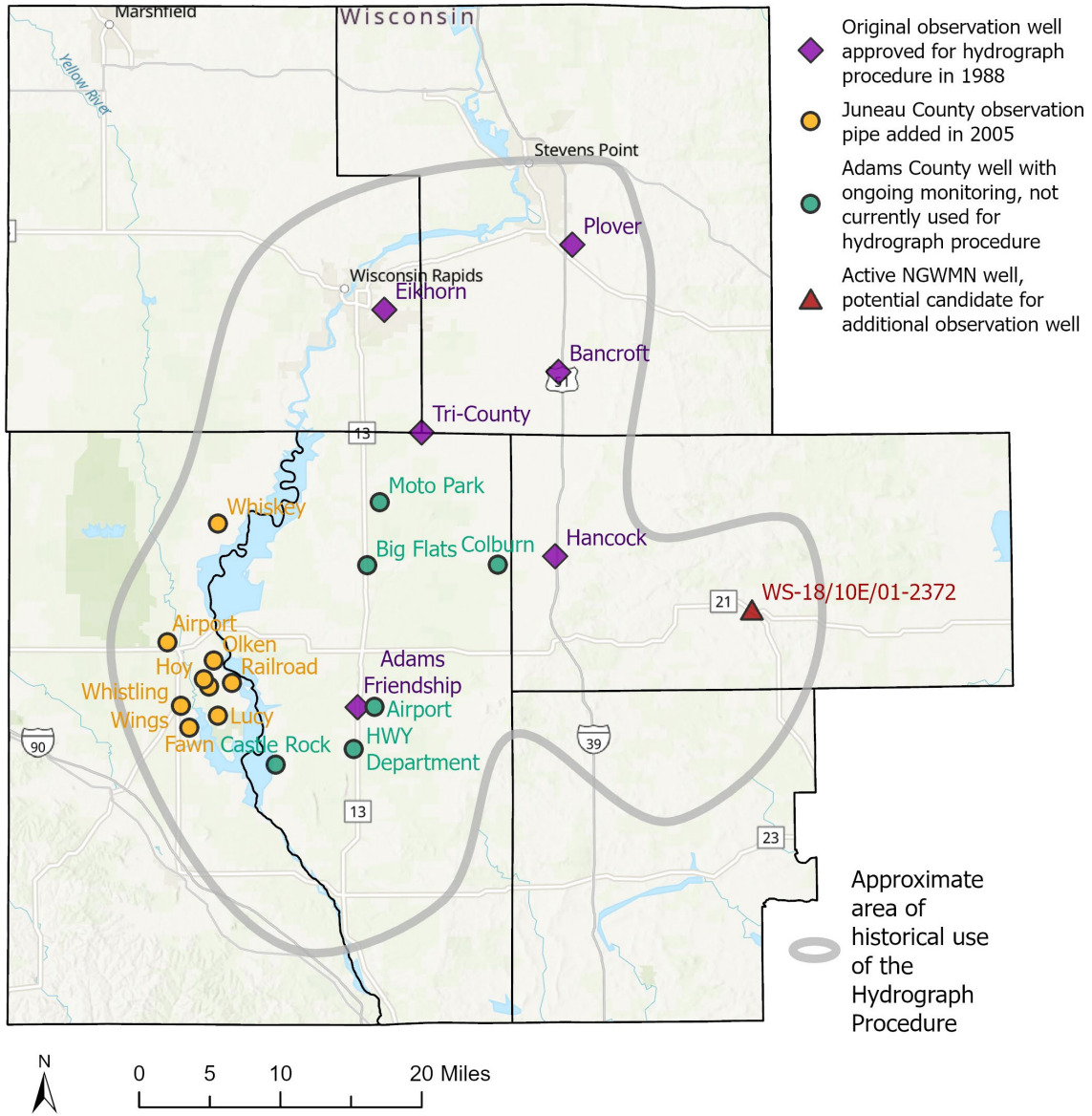
Evaluate observation wells



- DSPS provided documentation for observation wells most recently in use
- WGNHS
  - Supplemented with WCR data, if available
  - Organized all available data in a consistent format

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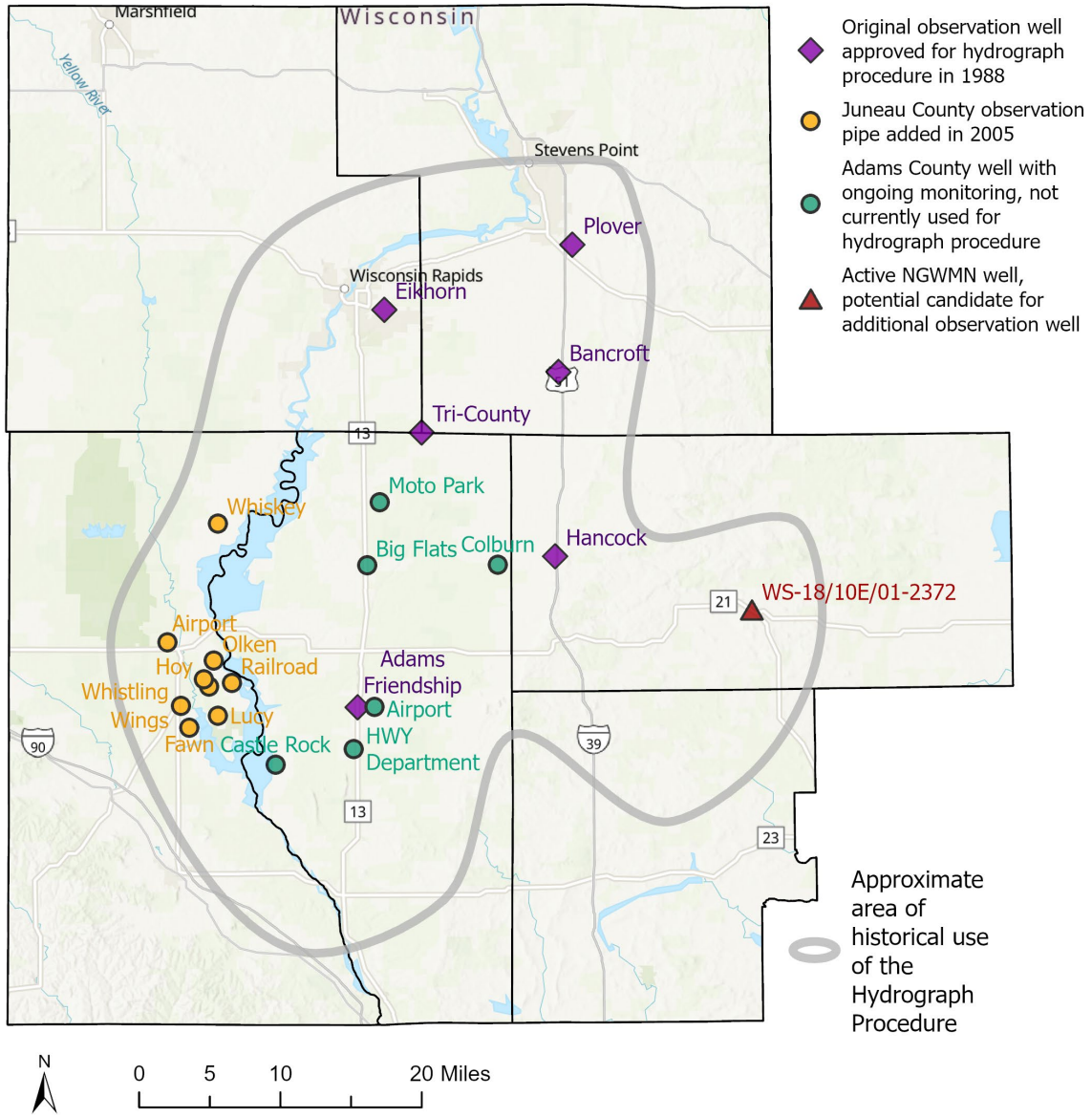

- County
- Well Name
- WID or other external ID
- Owner
- Latitude
- Longitude
- Land surface elevation (ft)
- Locking cap
- Stick-up (ft)
- Casing diameter (in)
- Casing material
- Total well depth (ft)
- Screened interval (ft)
- WCR availability
- Summary of monitoring
- Quality of water-level record
- High assigned and notes on assigned high

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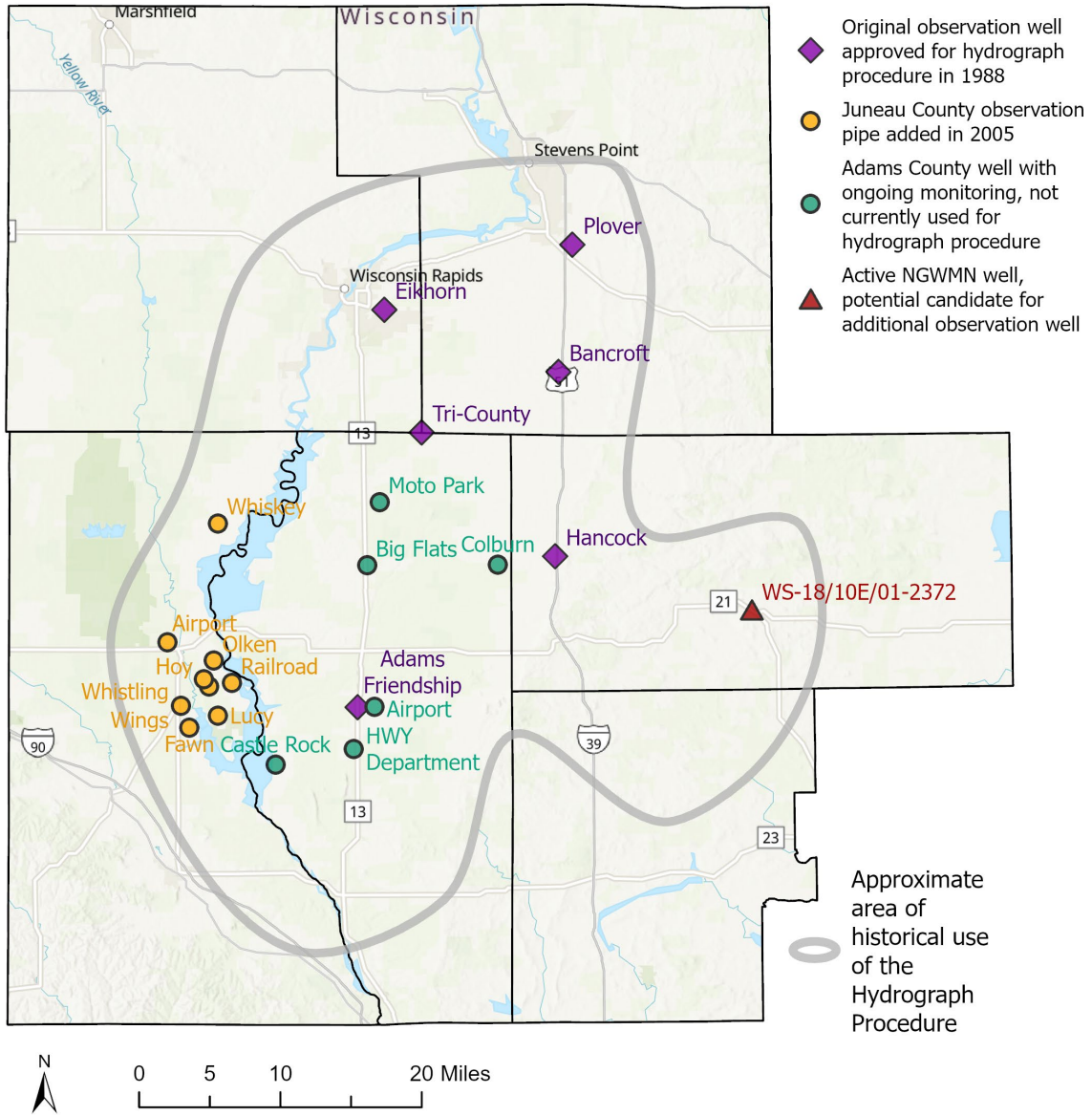

Recommendations

- Observation wells should be constructed in accordance with Wisconsin groundwater monitoring well requirements (Ch. NR 141) and have screen lengths capable of measuring expected seasonal and annual water-table conditions.
- Pressure transducers that are rated to accommodate the expected range of water-level fluctuations and data loggers should be used to monitor and record water levels at observation wells, but periodic manual water-level measurements should still be collected to verify accuracy and detect and correct for instrument drift.
- Water levels at observation wells should be measured relative to a fixed, and clearly defined, reference point on each well casing to ensure comparability between technicians and over time.
- A minimum of two years of water-level monitoring (or longer during drought conditions) is recommended before assigning a high-water level to a new observation well or for an existing observation well lacking a long-term record.

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Licenses in WI That Can Sign Off on Septic Maintinance

	Pumper Master Operator	Master Plumber/ MP Restricted	Journeyman/ Restricted	POWTS Inspector	Powts Maintainer
Hours Required	1600	1000	0	0	0
Exam Required	YES	YES	YES	YES	NO
Continuing Ed	18 Hours/ 3 Years	24 Hours/ 4 Years	24 Hours/ 4 Years	24 Hours/ 4 years	12 Hours/ 4 years