

UW-Extension Wisconsin Geological and Natural History Survey

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USGS

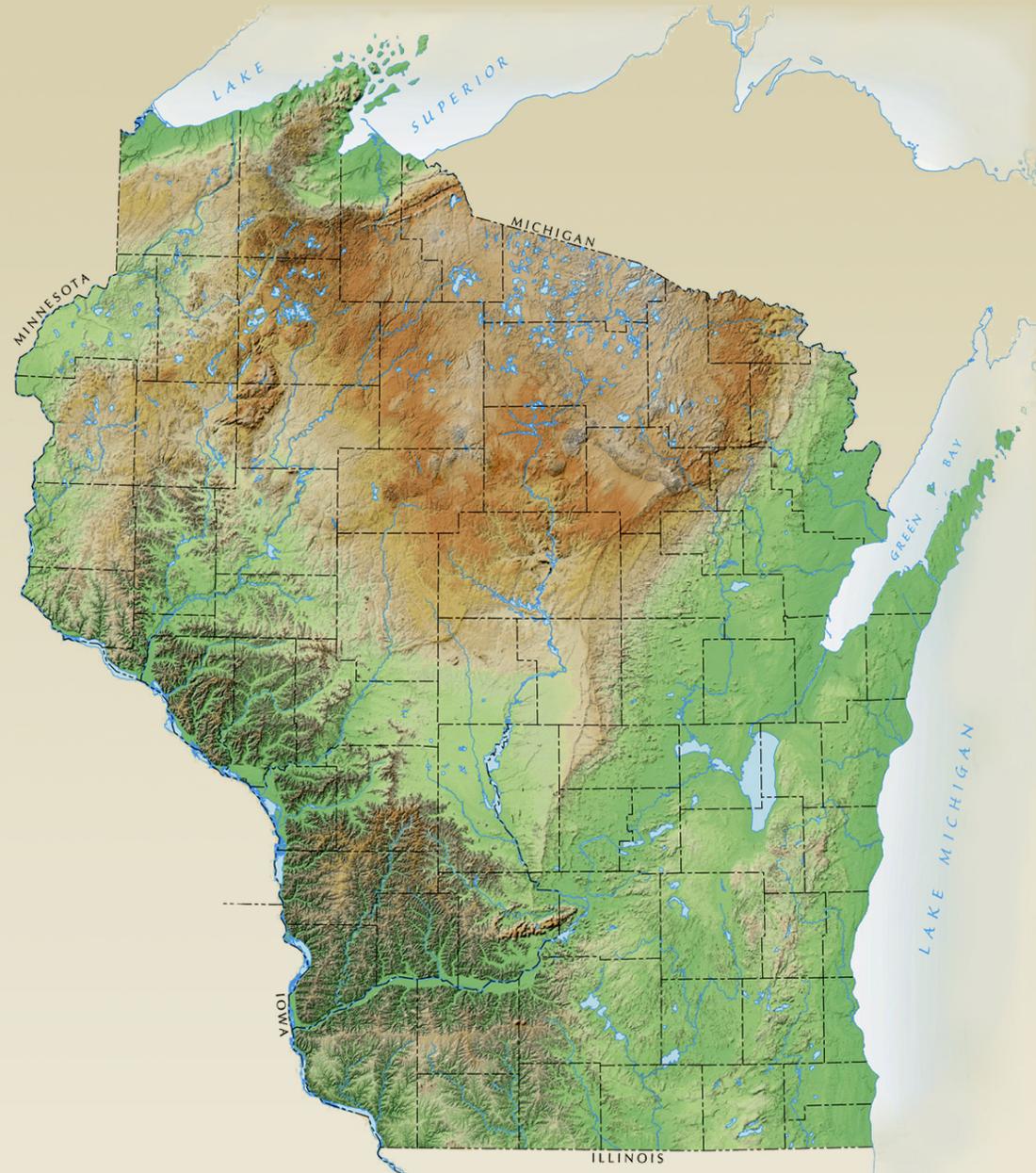
SOGW

Data Providers

Meeting

December 7, 2016

Las Vegas, NV



Wisconsin Monitoring Network

Est. 1944, Championed by Aldo Leopold

The stated goal of the observation network was to:

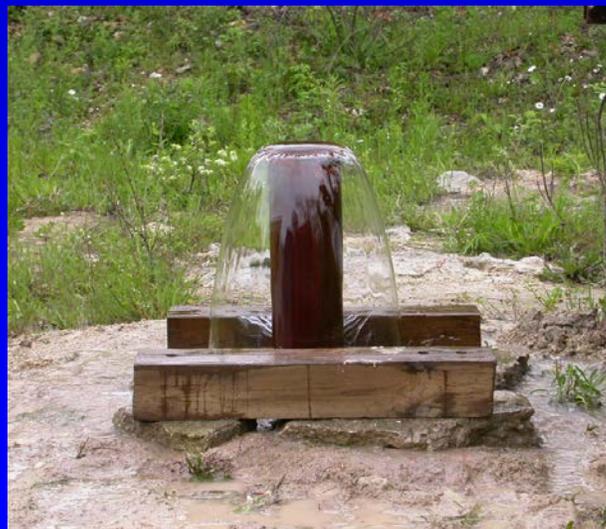
- Determine the relationship between precipitation and groundwater levels*
- Obtain reliable and continuing groundwater level data of confined, unconfined and artesian aquifers*
- Determine to what extent fluctuations in ground water levels can forecast stream flow and lake level*

Photo: WI DNR



Wisconsin Statewide Groundwater Monitoring Network

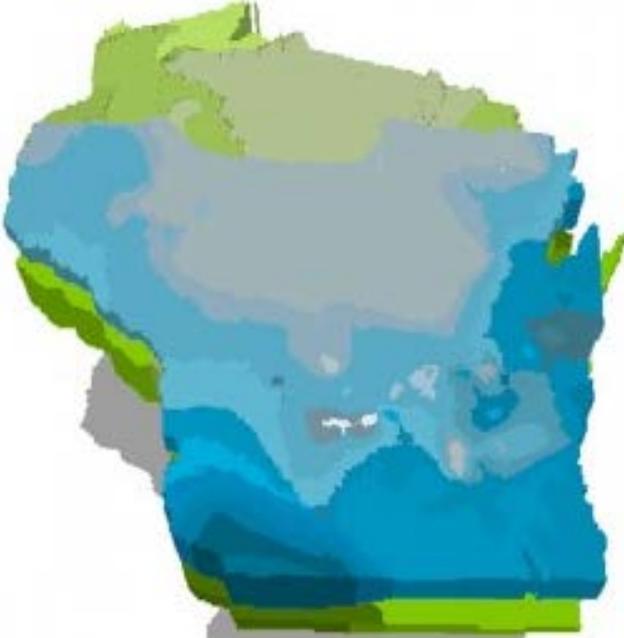
- Funded by WDNR, USGS, UW-Extension
- Water-level data is used for a variety of applications
 - Well siting and water supply system design
 - Contaminant investigations
 - Calibration targets for groundwater flow
 - Documenting impacts of pumping, drought, flooding, climate change
 - Groundwater resource modeling and research



Principal Wisconsin aquifer systems



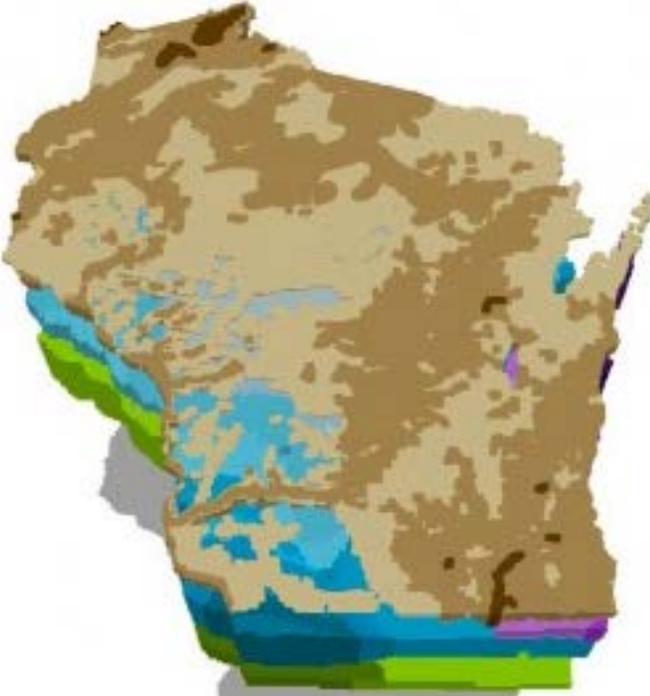
Crystalline bedrock



Sandstone and dolomite

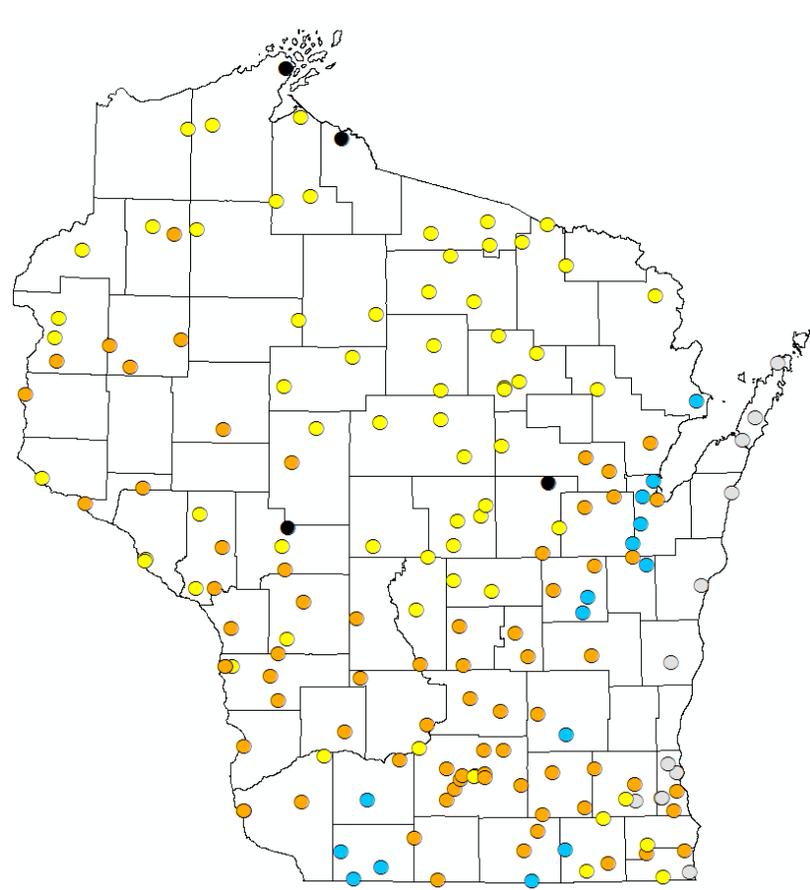


Eastern dolomite

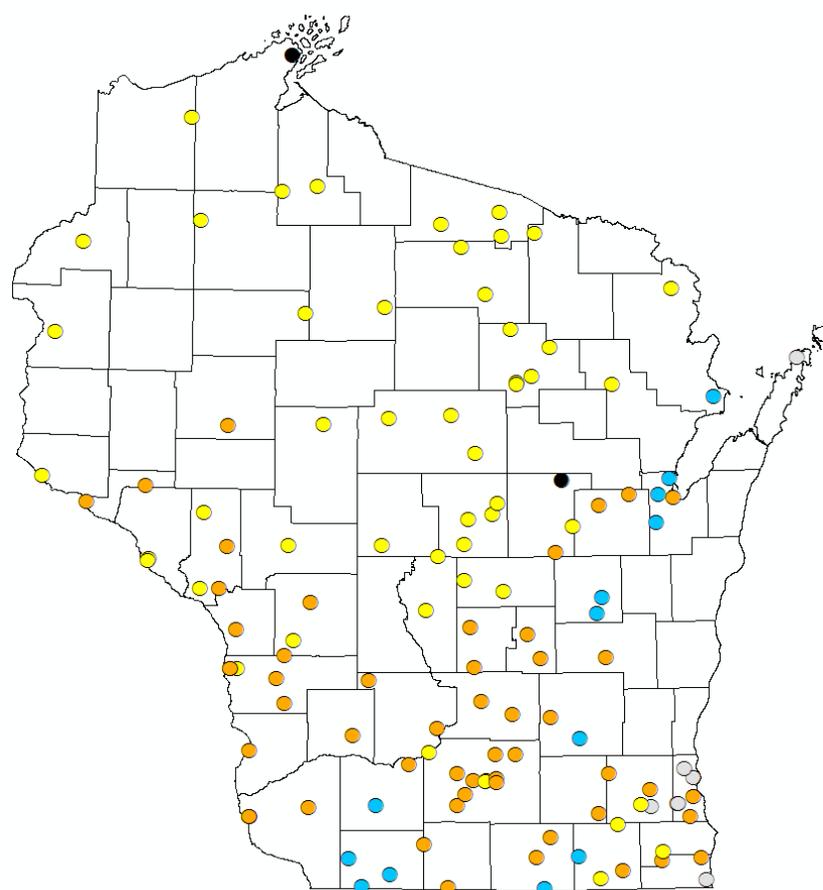


Sand and gravel

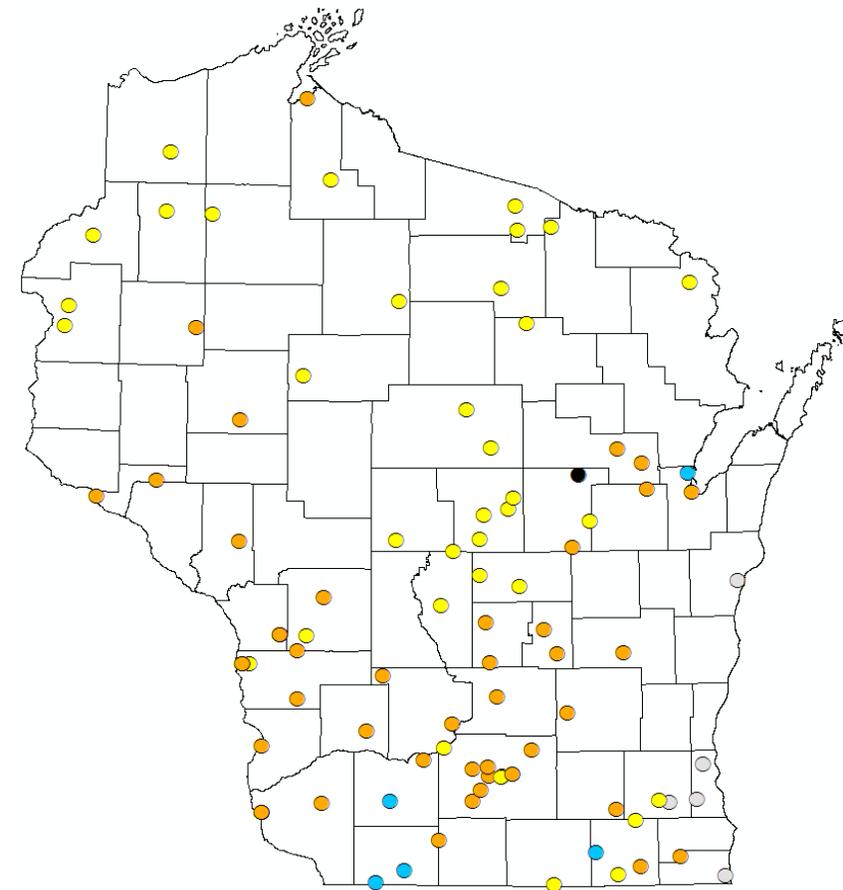
Recent history of the Network



Pre 1996
170 wells



1997 onwards
127 wells



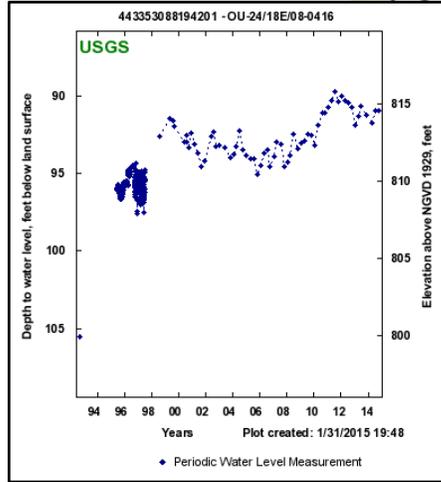
By 2012
97 wells

Aquifer type

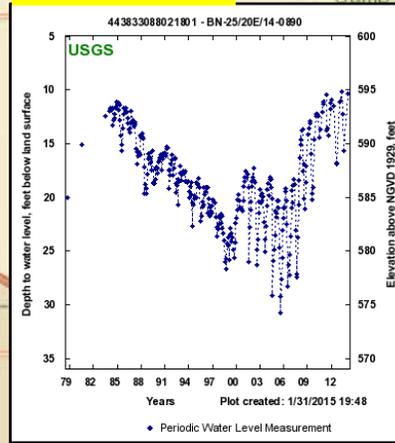
-  Galena-Platteville
-  Precambrian
-  Sand and gravel
-  Sandstone

Key success stories using network data

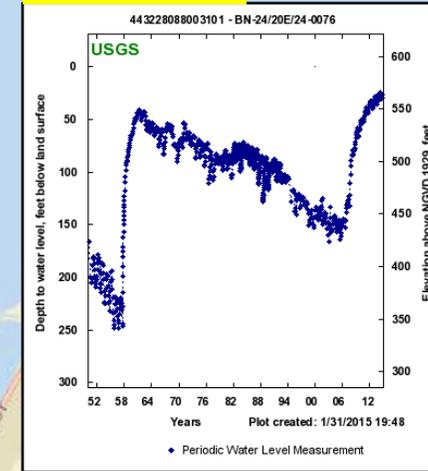
BN-416



BN-890



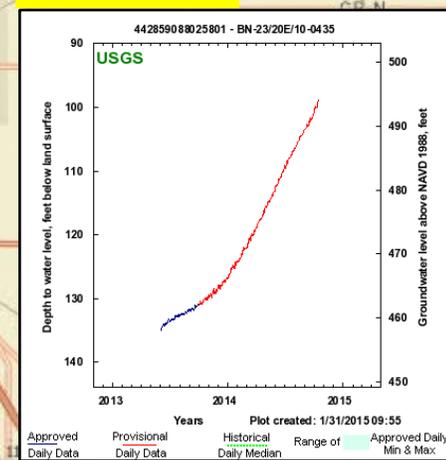
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Monitoring drawdown (and rebound) in Brown Co.

Record back to early 1950s with more recent data in deeper aquifer system

BN-435



Explanation - Percentile classes (symbol color based on most recent measurement)

●	●	●	●	●	●	●	●
Low	<10 Much Below Normal	10-24 Below Normal	25-75 Normal	76-90 Above Normal	>90 Much Above Normal	High	Not Ranked

○	Real-Time	■	Wells
□	Continuous	▣	Wells
△	Periodic Measurements	▣	Wells

Agencies supported: WDNR, WGNHS, USGS, WEMA, FEMA

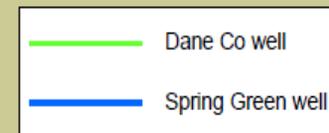
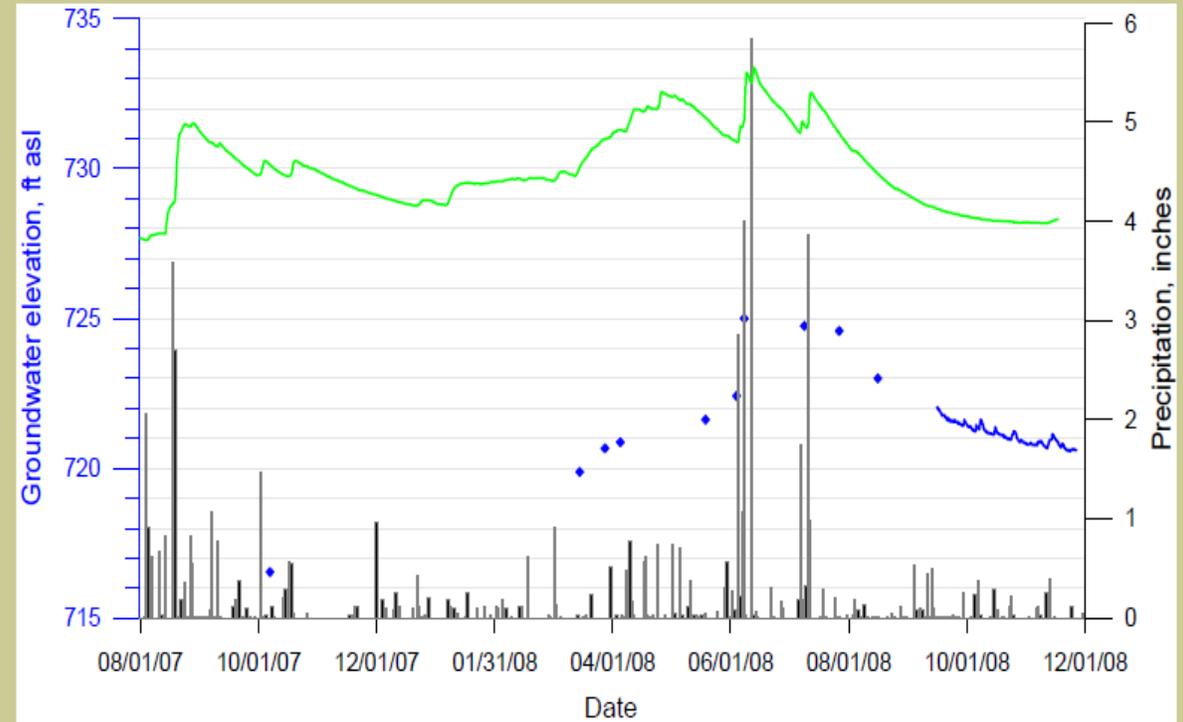
Wells utilized: DN-83 (real-time, water-table well)



WI Emergency Management

Response to 2008 flood at Spring Green

Groundwater elevation, 2008



May 29 to June 12:

15.23 in = 1.27 ft rainfall

$n = 0.25$, 5.1 ft of water table rise

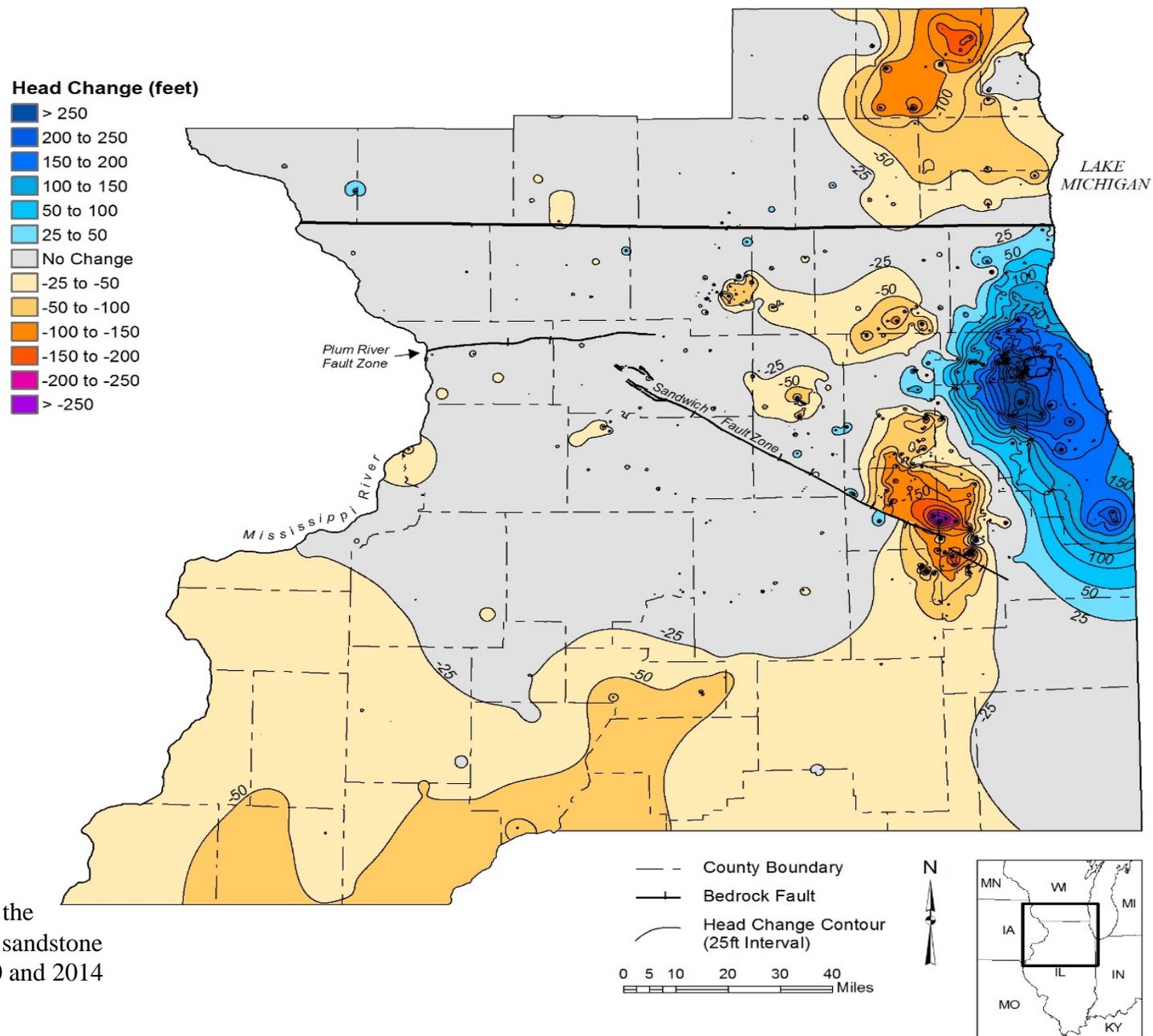
$n = 0.20$, 6.3 ft of water table rise

2.5 ft measured rise
in water table

Transboundary Issue of Note:

Response of Cambrian- Ordovician Aquifers to Changing Stresses in SE Wisconsin/NE Illinois

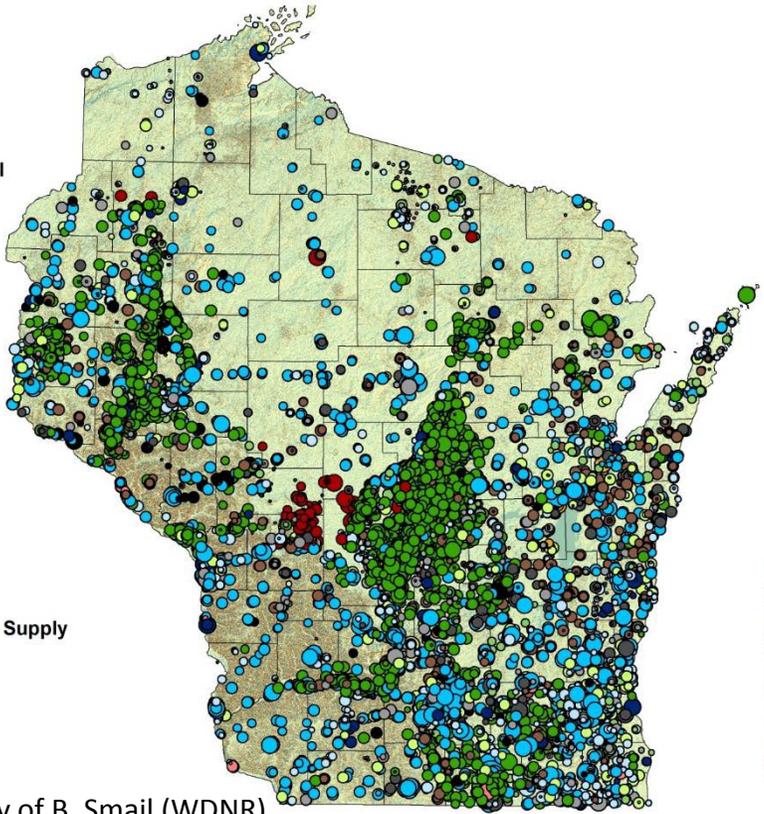
Change in heads from the
Cambrian-Ordovician sandstone
aquifers between 1980 and 2014



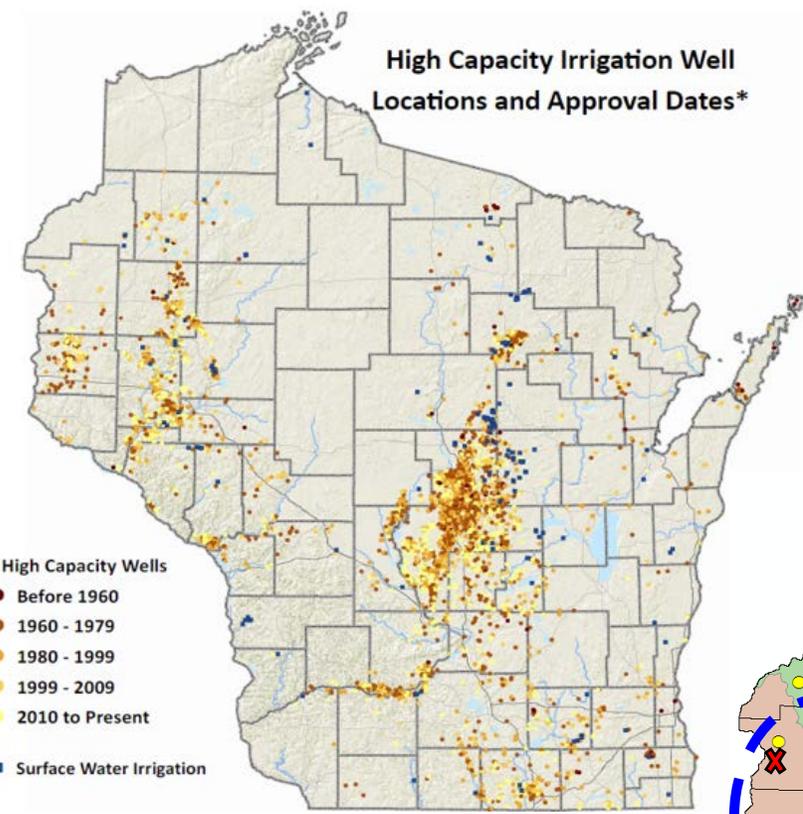
Respond to expansion of high-capacity well permit applications

- <100 kGal
- 100 kGal - 1,000 kGal
- 1,000 kGal - 10,000 kGal
- 10,000 kGal - 100,000 kGal
- 100,000 kGal - 1,000,000 kGal
- > 1 Billion Gallons

- Agricultural Irrigation
- Aquaculture
- Cranberry Production
- Golf Course Irrigation
- Industrial
- Livestock
- Misc Irrigation
- Municipal Water Supply
- Non-Municipal Public Water Supply
- Non-Metallic Mining
- Paper Manufacturing
- Power Generation
- All other uses



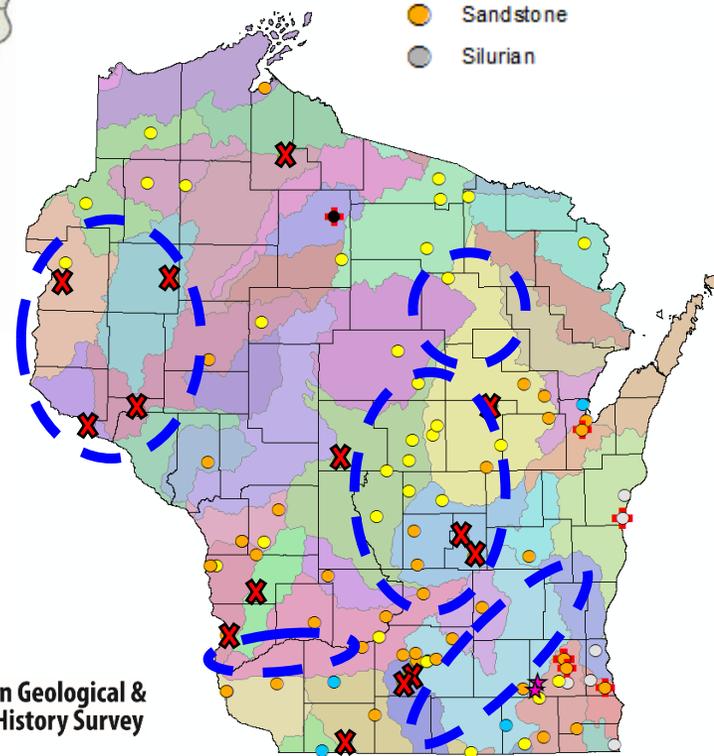
High Capacity Irrigation Well Locations and Approval Dates*



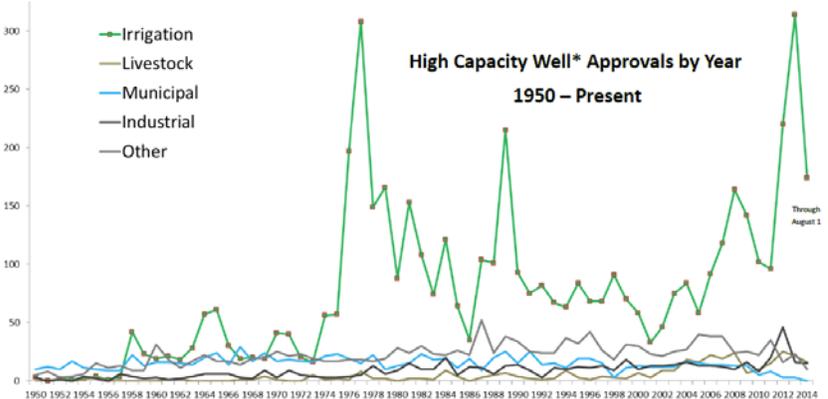
- High Capacity Wells
- Before 1960
- 1960 - 1979
- 1980 - 1999
- 1999 - 2009
- 2010 to Present
- Surface Water Irrigation

Aquifer type

- Galena-Platteville
- Precambrian
- Sand and gravel
- Sandstone
- Silurian

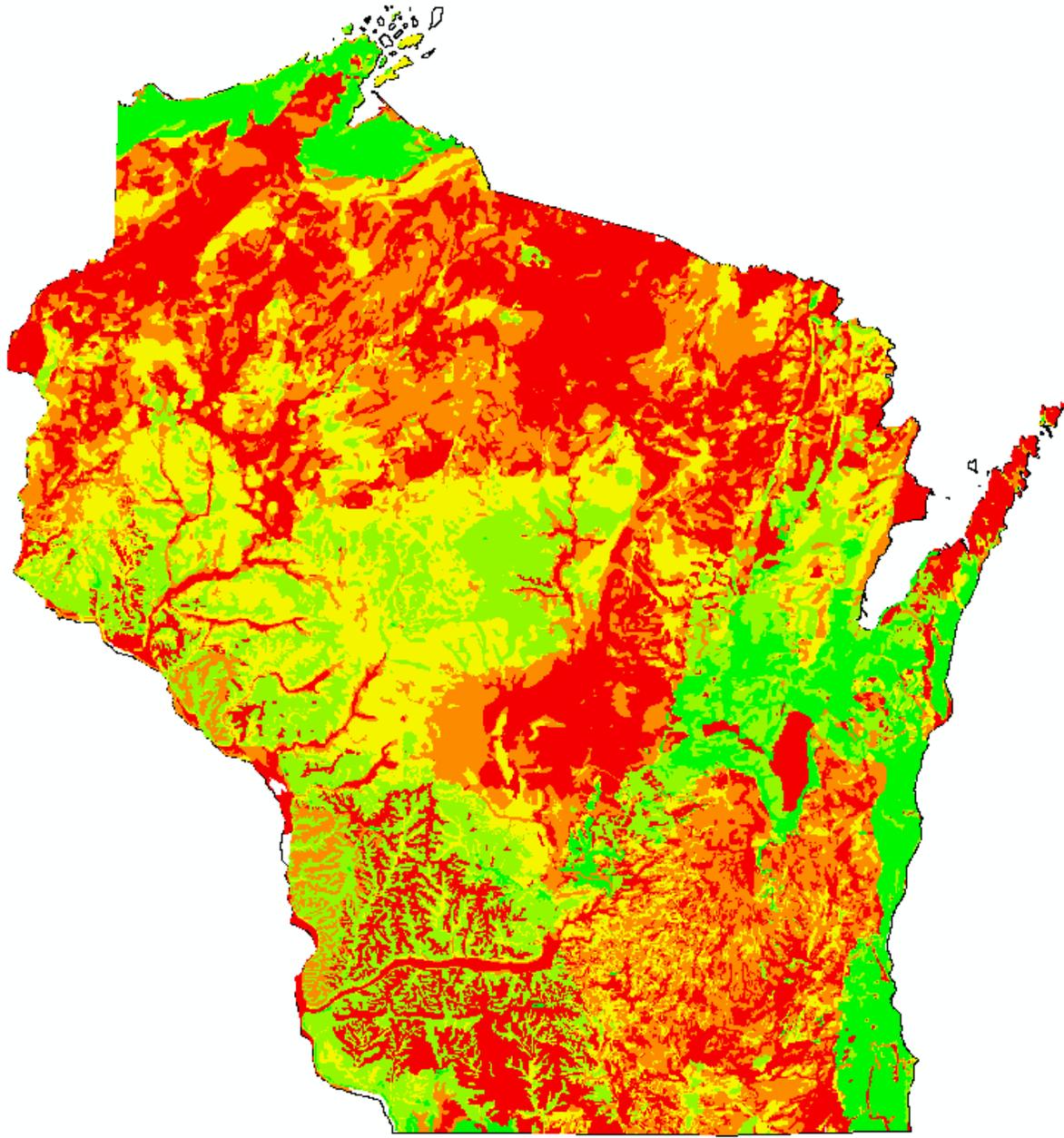


Figures provided courtesy of B. Smal (WDNR)



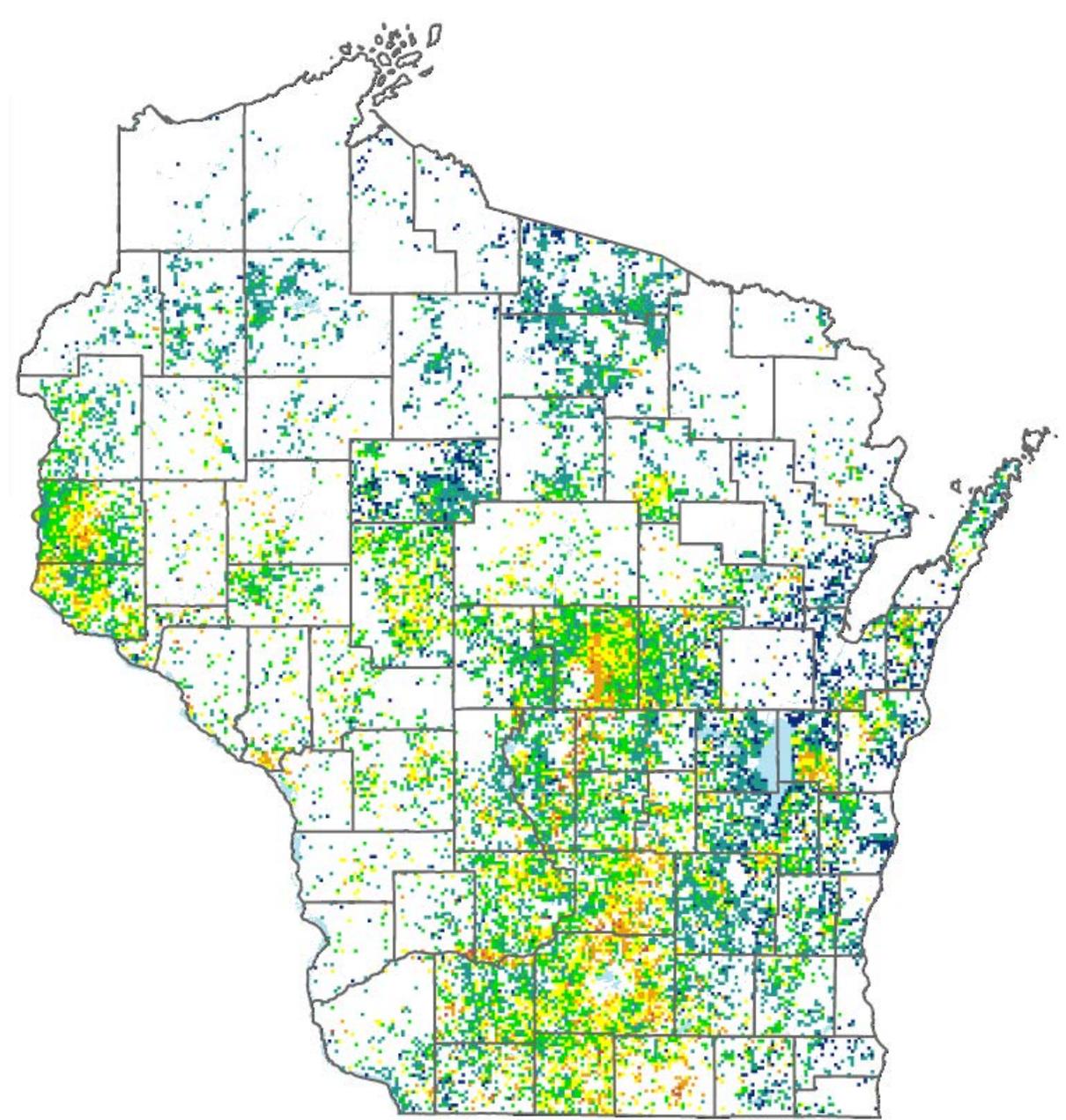
Trends are dominated by Irrigation

Extra images and content on following slides



Groundwater contaminant susceptibility

Wisconsin DNR



Nitrate – Concentration (ppm)

UWSP – Well Water Quality Viewer (Private Well Data)

