

Using Groundwater in 21st Century Minnesota



Jason Moeckel
Minnesota DNR
Division of Ecological and Water Resources





- Groundwater is critical for people, agriculture, business and nature
- We are using more groundwater than ever before
- Sustainability will require working together in new ways





Concepts to Explore

- Downside risk analysis
 - “Devastation”
 - Fire insurance
- Discounting the future
 - *the costs are felt today, but the benefits are felt in the future....because they're in the future they're given less economic value than the costs¹*

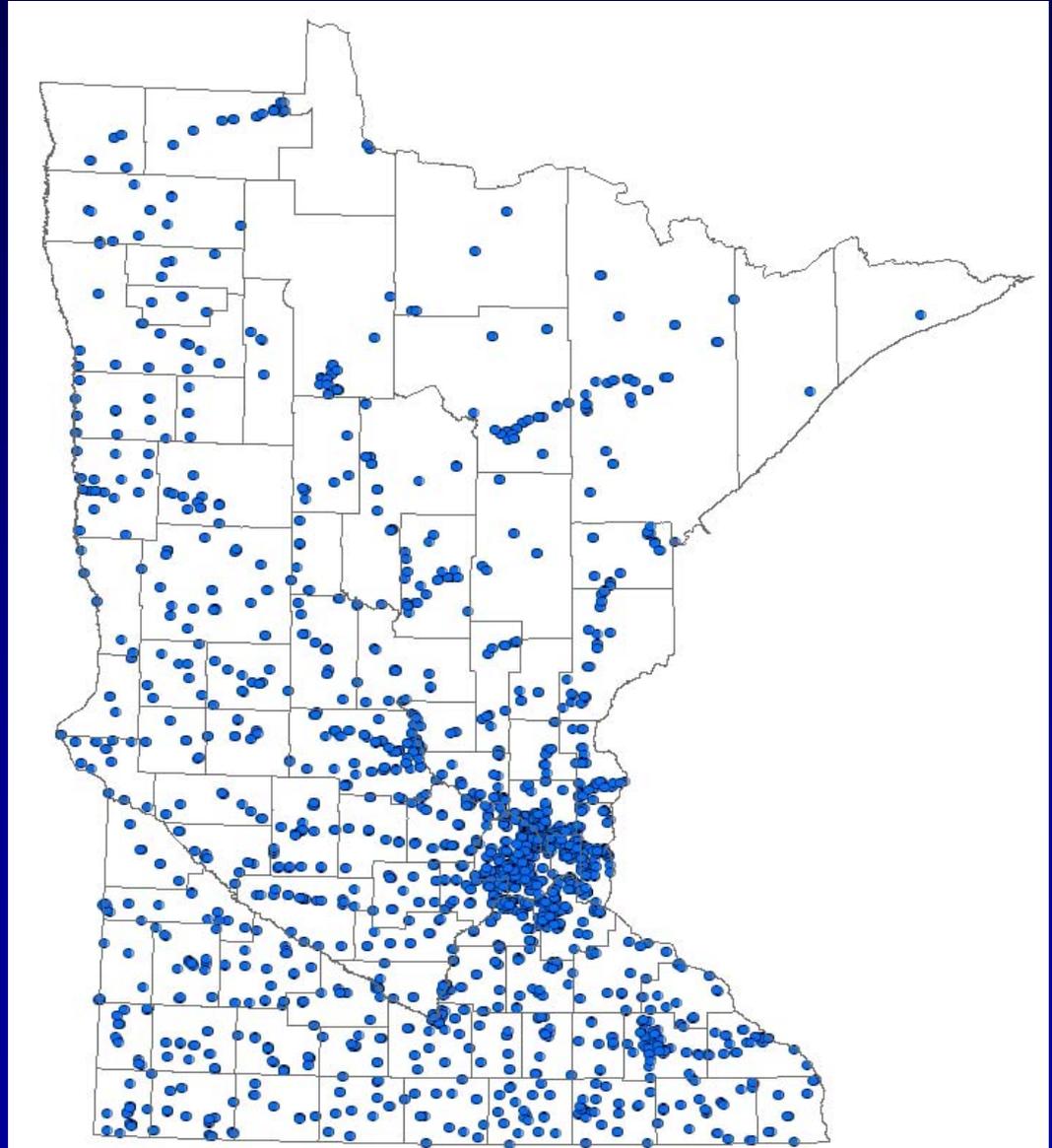
¹Discounting the future: an economic mantra, an ethical dilemma
<http://globaltransition2012.org>

DNR Statutory Mission

- The Commissioner shall develop and manage water resources to assure an adequate supply to meet long-range seasonal requirements for domestic, municipal, industrial, agricultural, fish and wildlife, recreational, power navigation, and quality control purposes from waters of the state.

Where Minnesotans Obtain Drinking Water

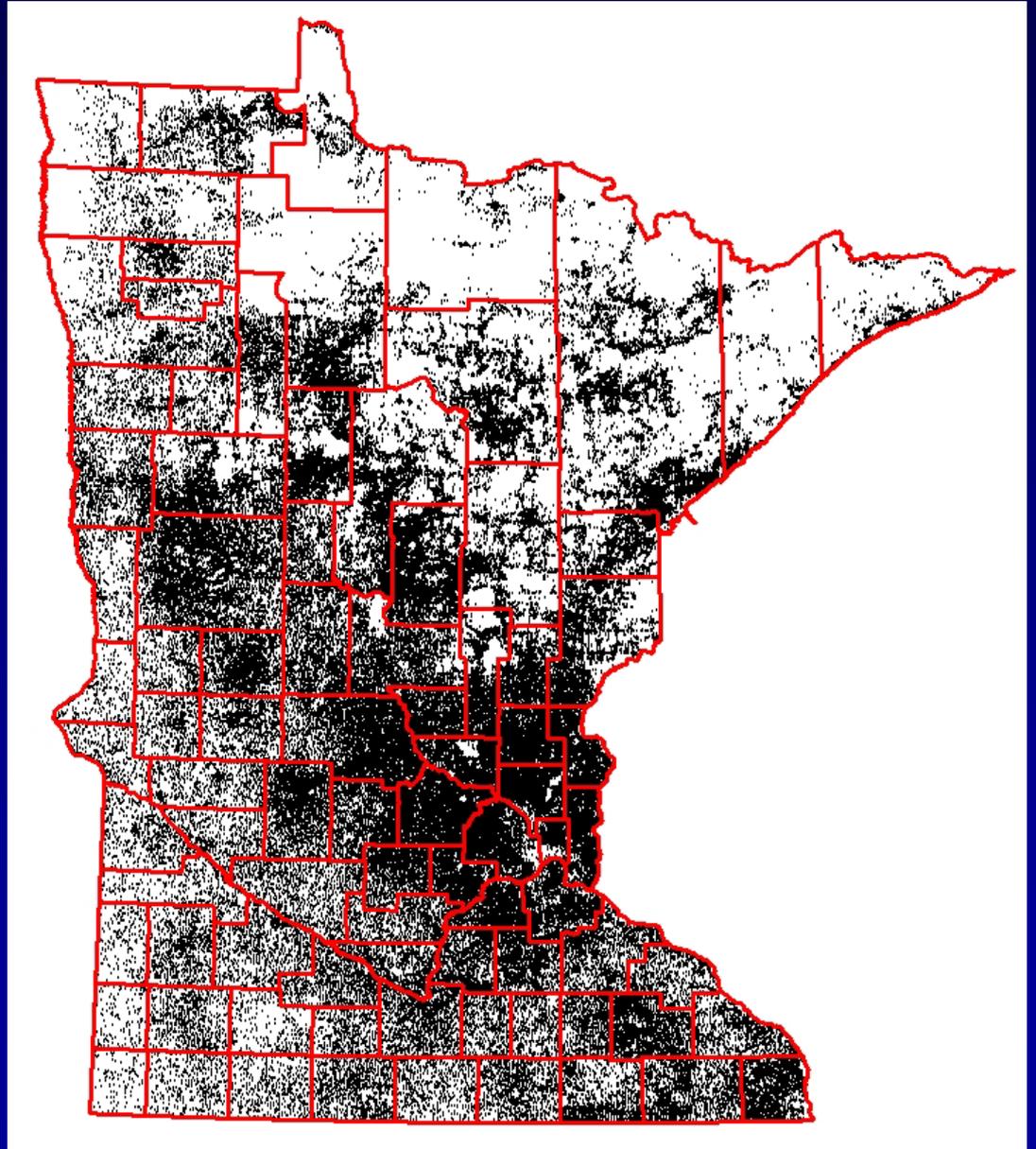
- Community Ground Water Supplies





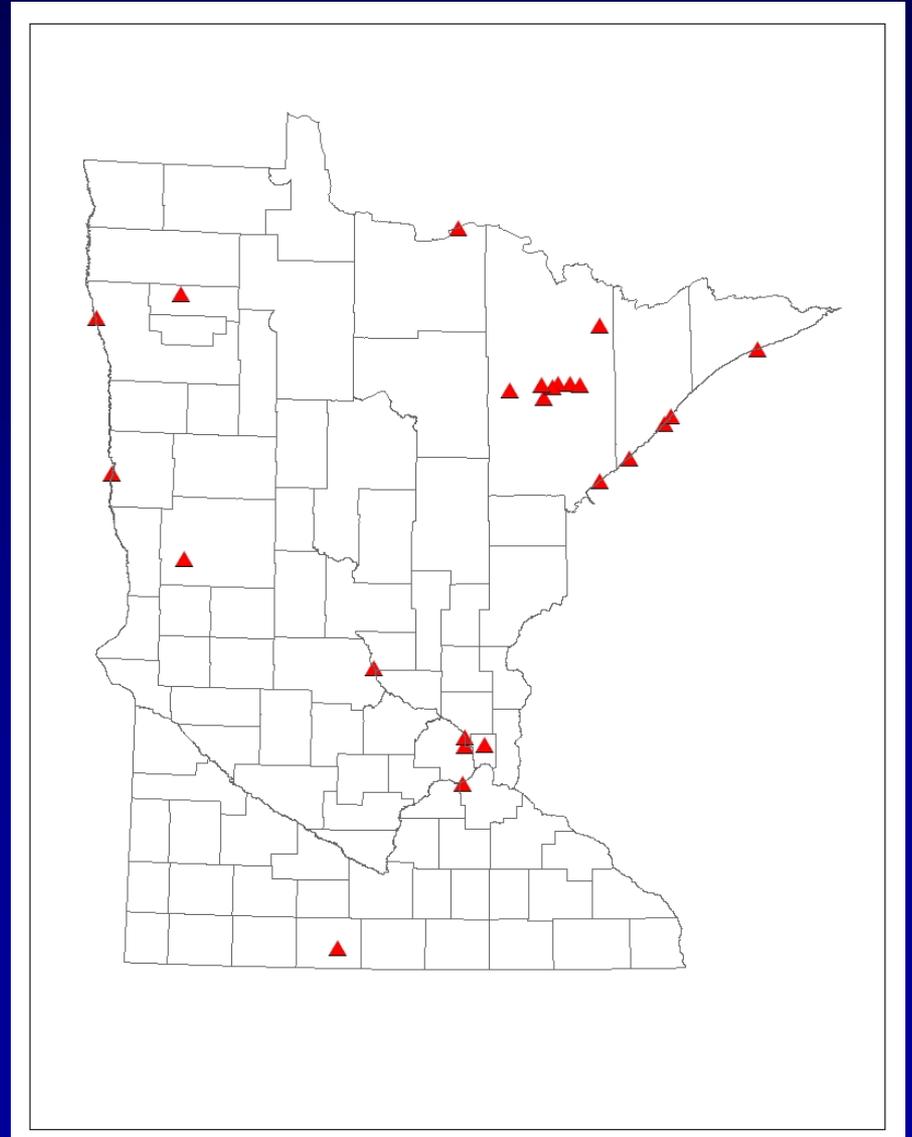
Where Minnesotans Obtain Drinking Water

- Private Wells



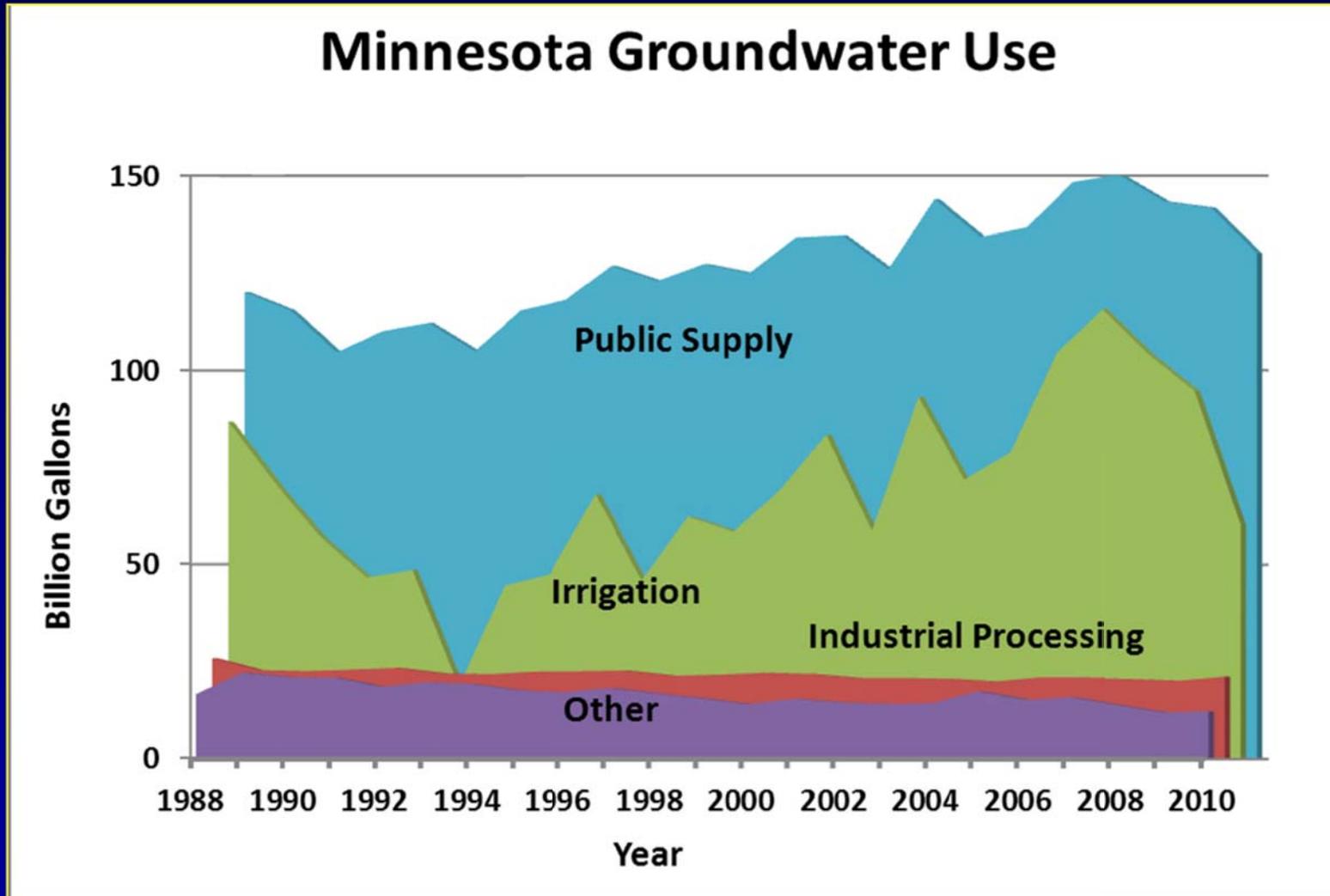
Where Minnesotans Obtain Drinking Water

- Community Surface Water Supplies





Groundwater Use in the State

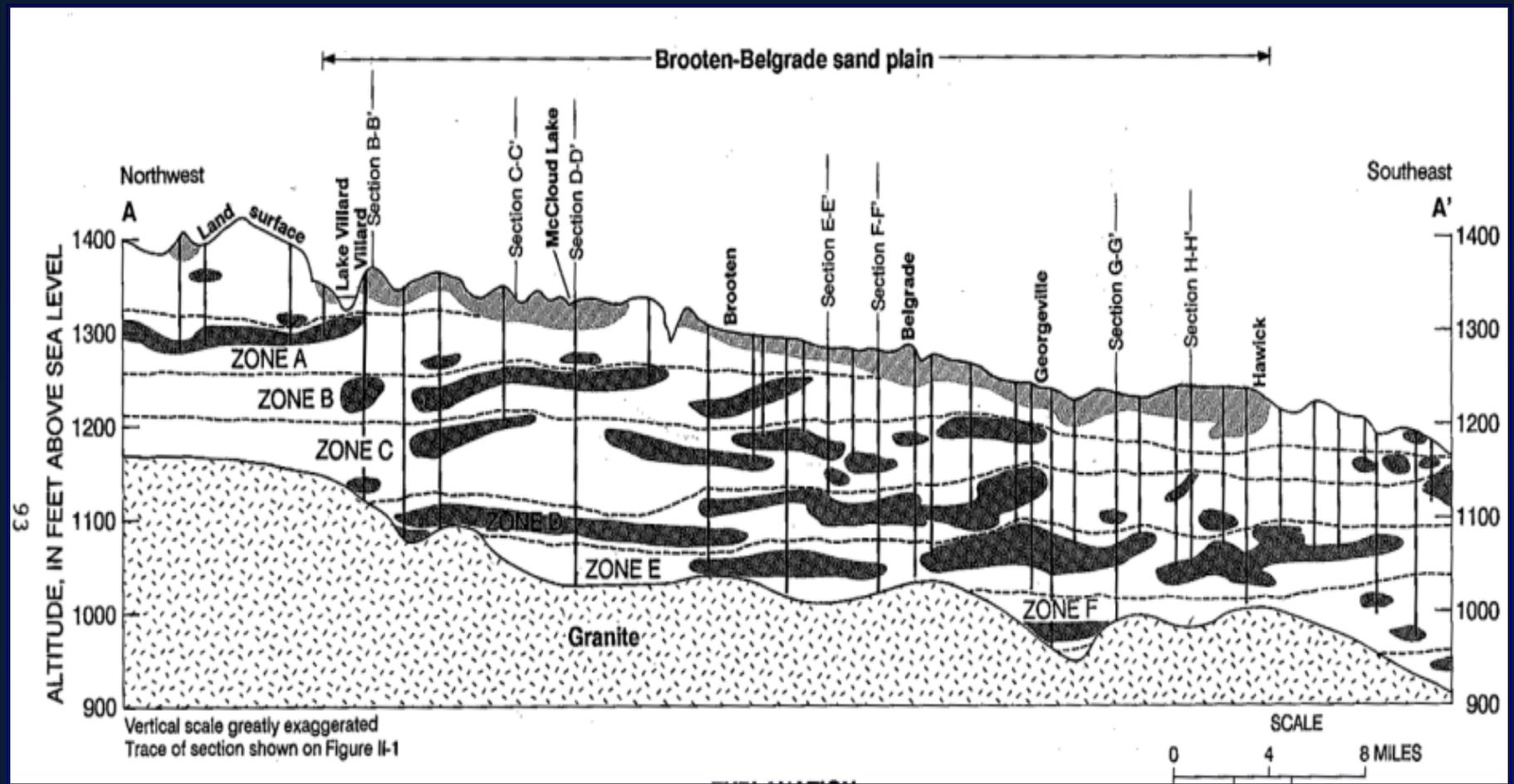


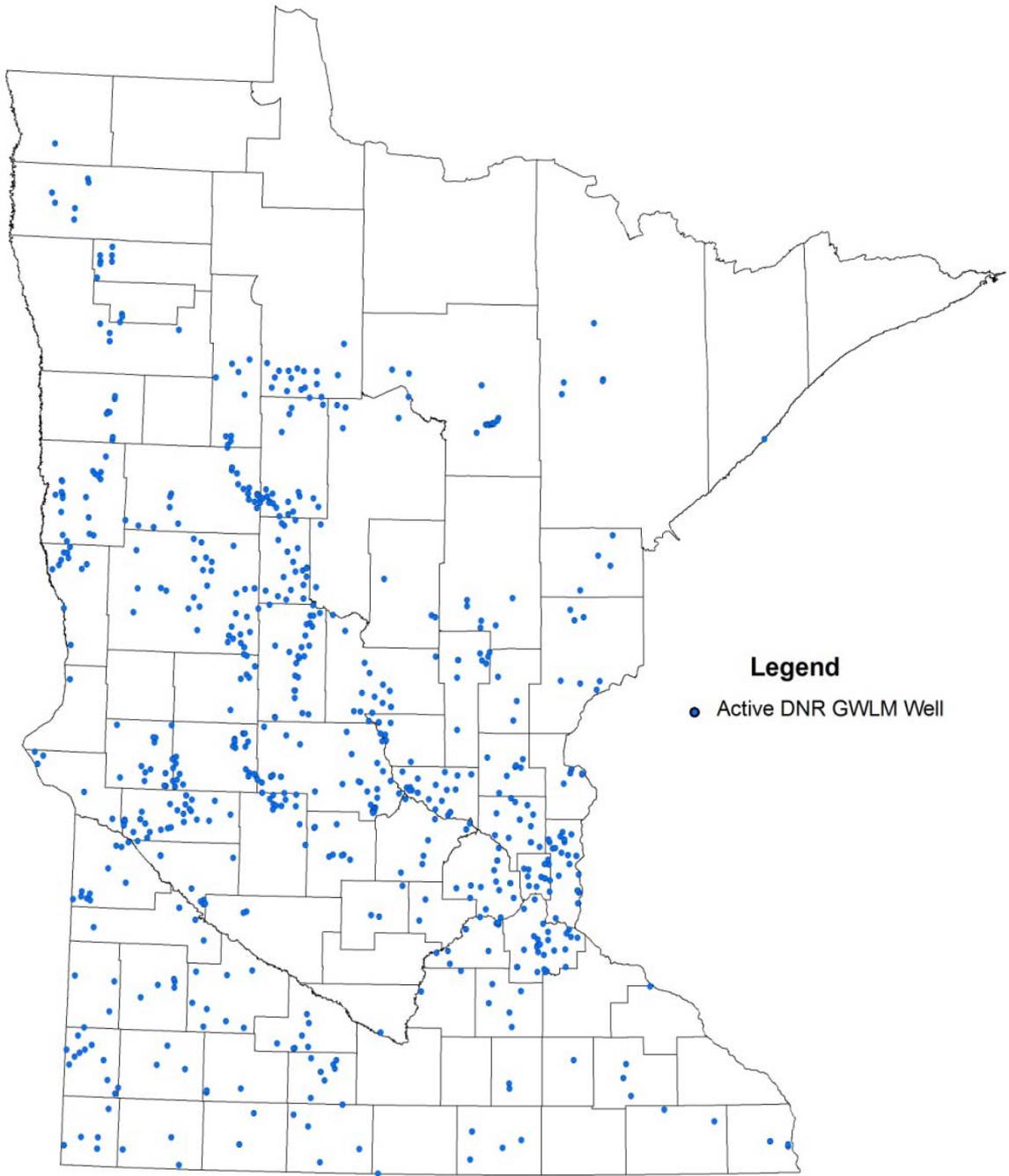
General Ground Water Availability in Minnesota



Groundwater Provinces

It Gets Complicated...

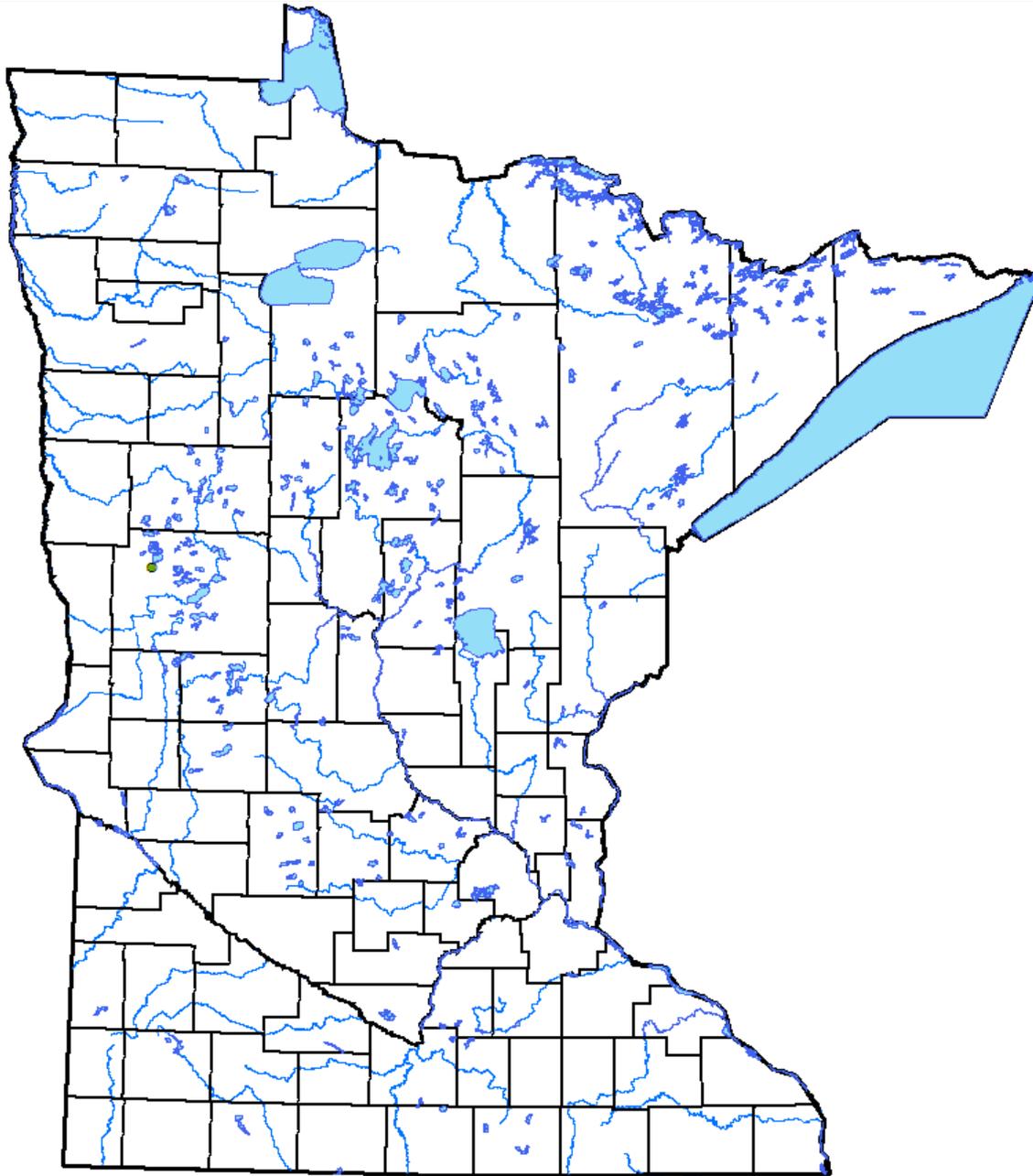




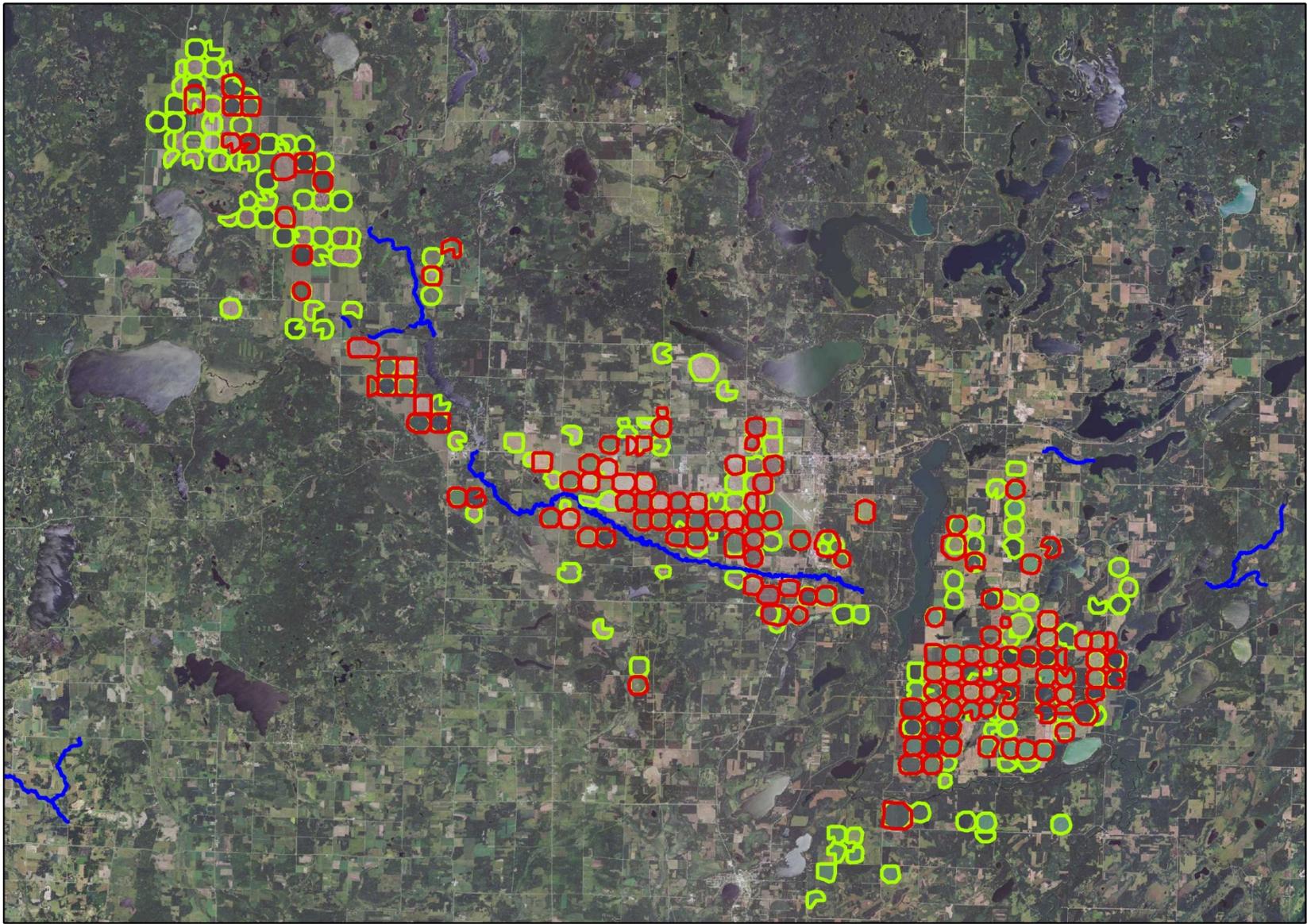
Legend

- Active DNR GWLM Well

Change in Irrigation Permits 1948 – 2012



- = Crop
- = Non-Crop



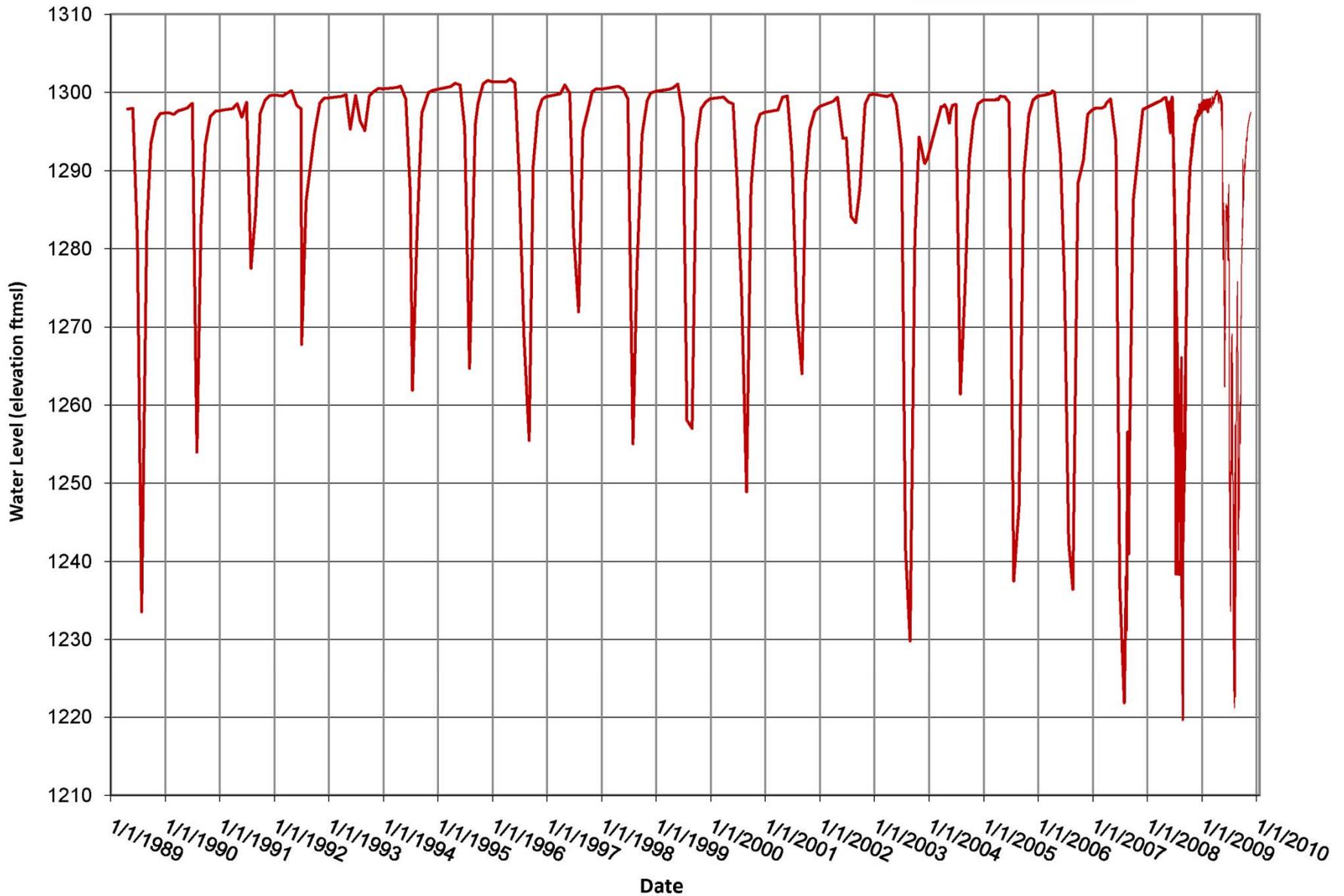
○ 1991 Land Irrigated ○ 2010 Land Irrigated

✓ Designated Trout Stream with Protected Tributaries

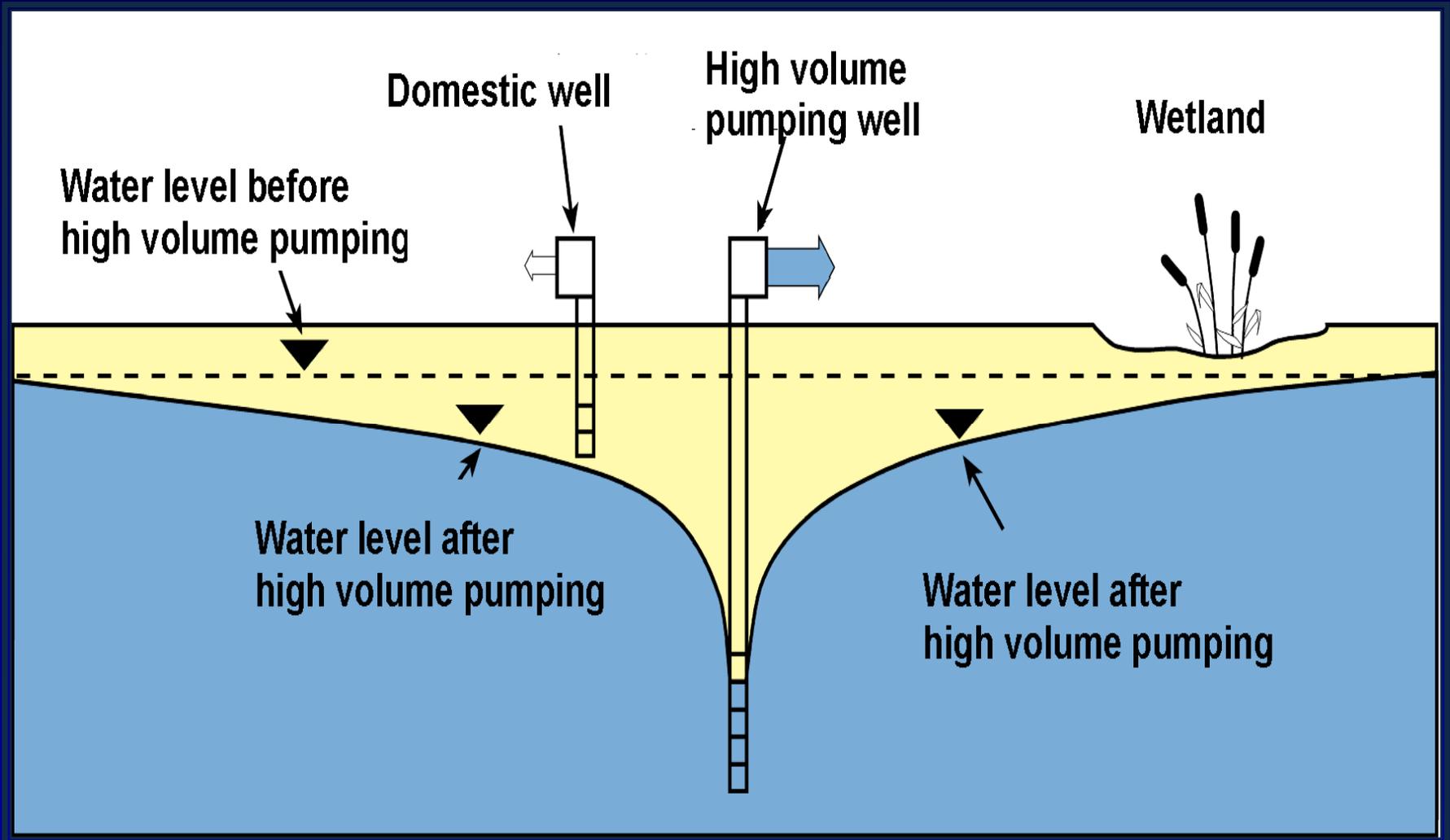
0 1 2 4 6 8 Miles



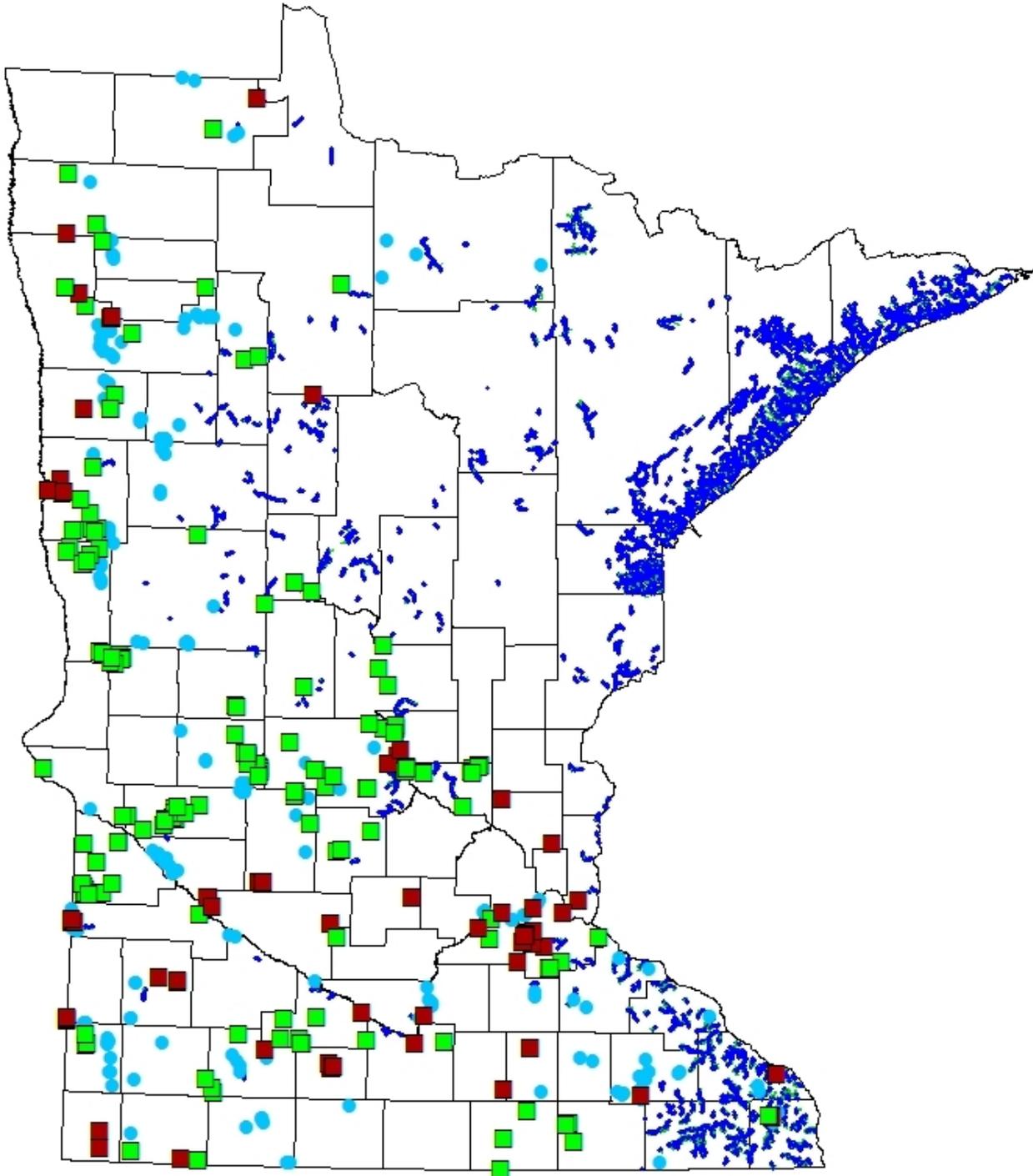
DNR Obwell 61037 (QBAA) (21 years of record)



Ground water withdrawal affects surface water and ground water users



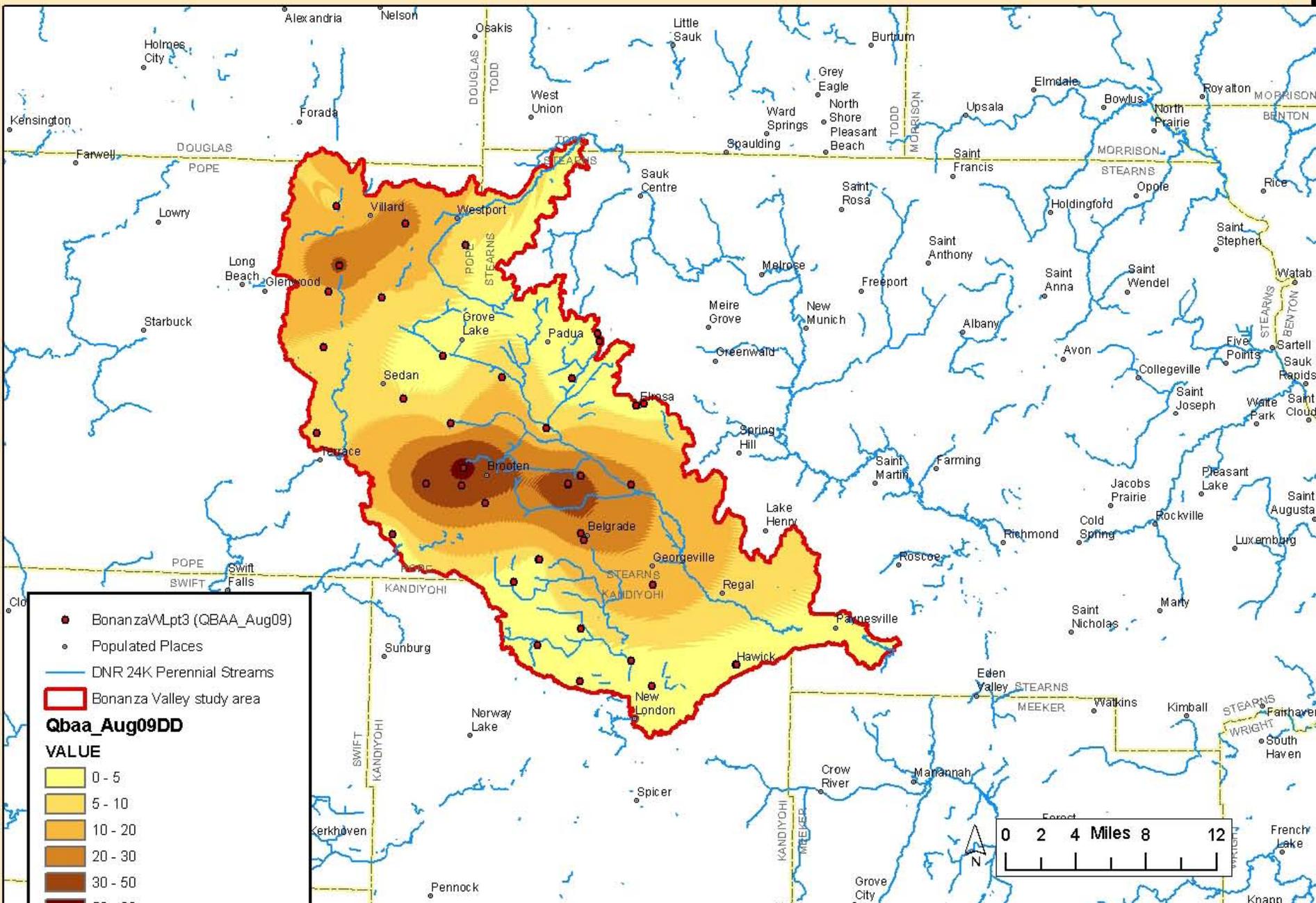
water supply interference



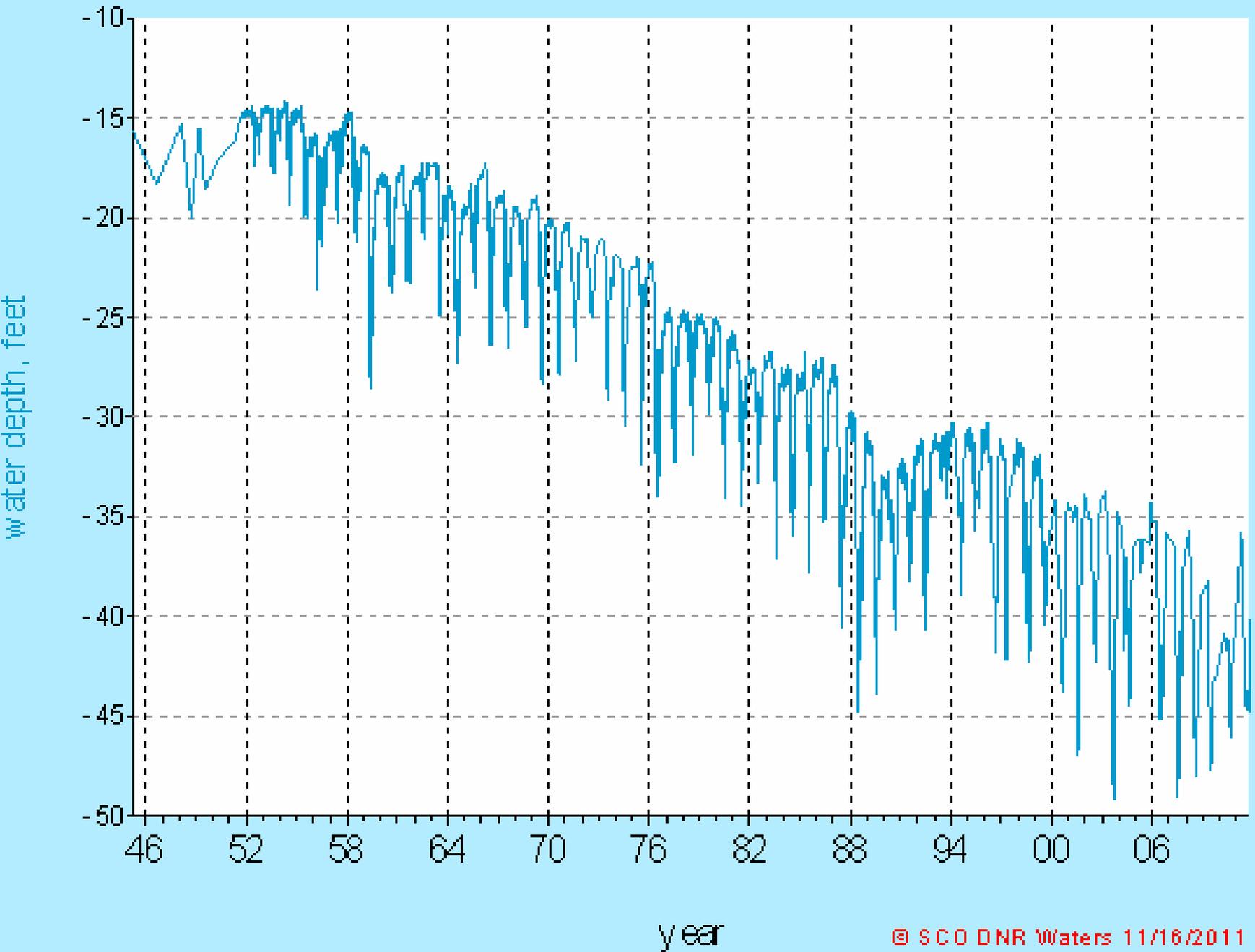
Map of Well Interference Issues



Bonanza Valley Study Area (Summer Drawdown in the Buried Aquifer, 2009)



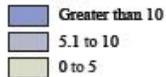
Well 27010



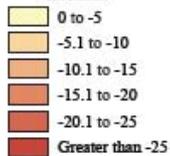
EXPLANATION

Groundwater-level change, in feet

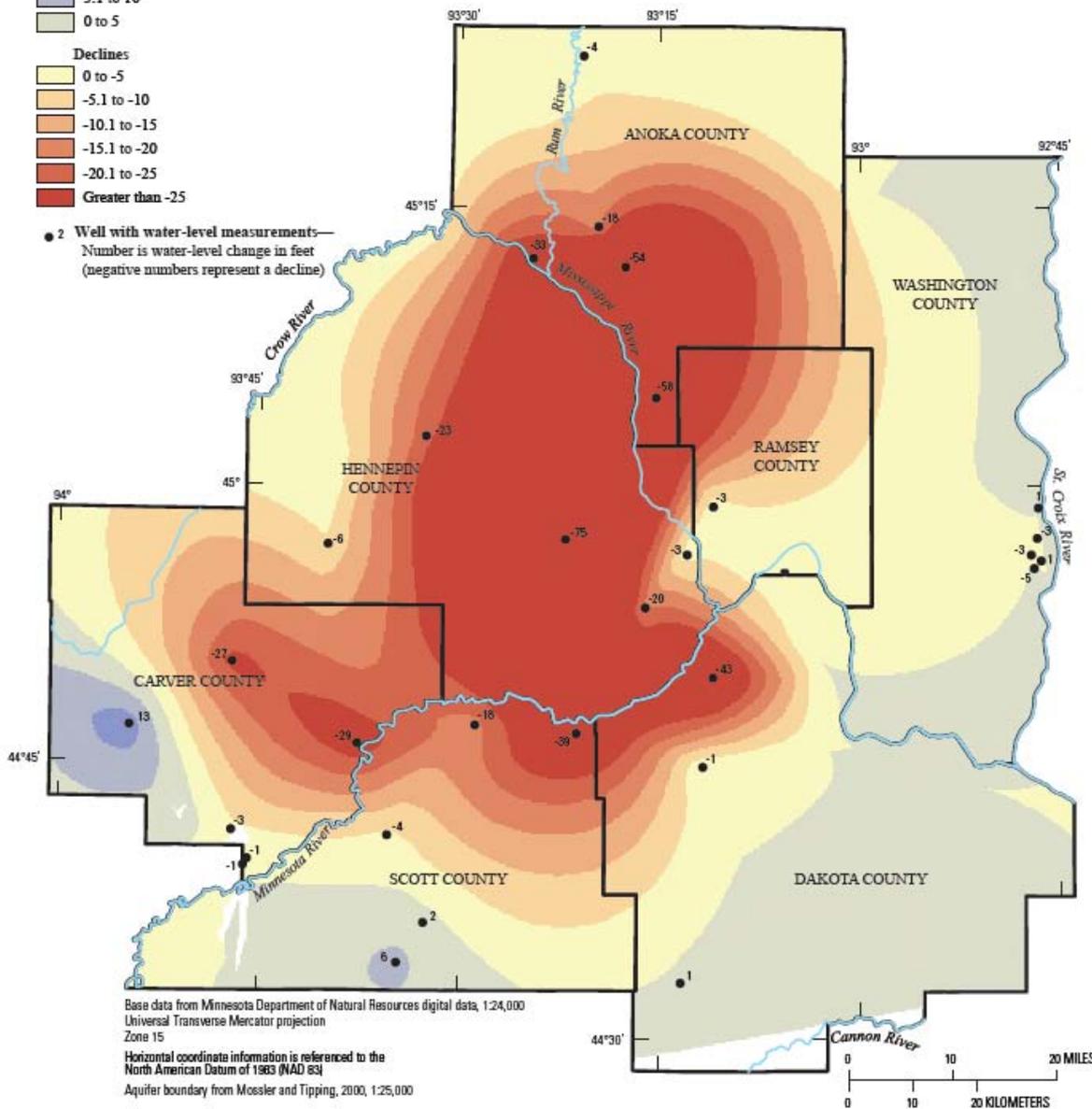
Rises



Declines



- Well with water-level measurements—
Number is water-level change in feet
(negative numbers represent a decline)



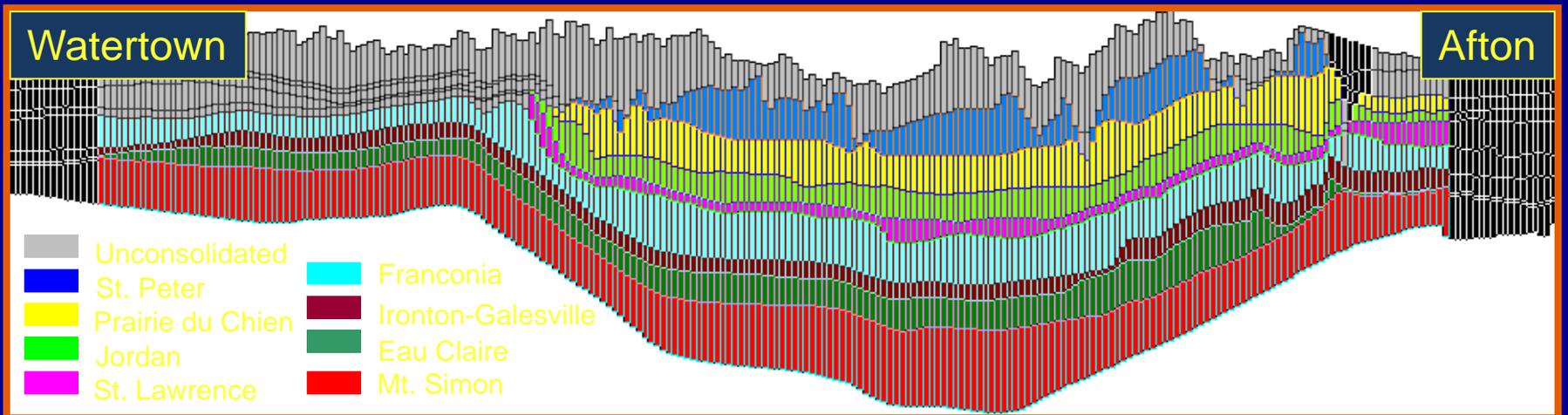
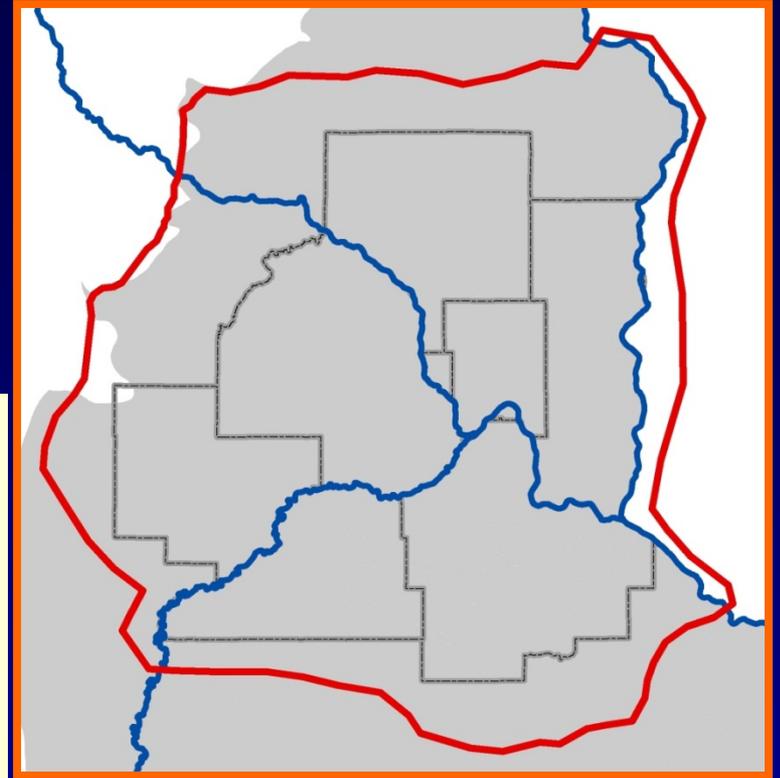
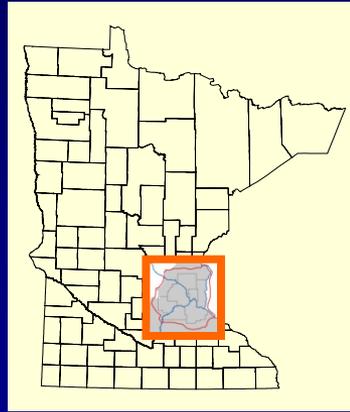
Seasonal
Drawdown
in Twin
Cities (Mar
– Aug)

- 75 feet in
the center

Figure 12. Groundwater-level changes in the Mount Simon-Hinckley aquifer between March 2008 and August 2008.

Metro Model

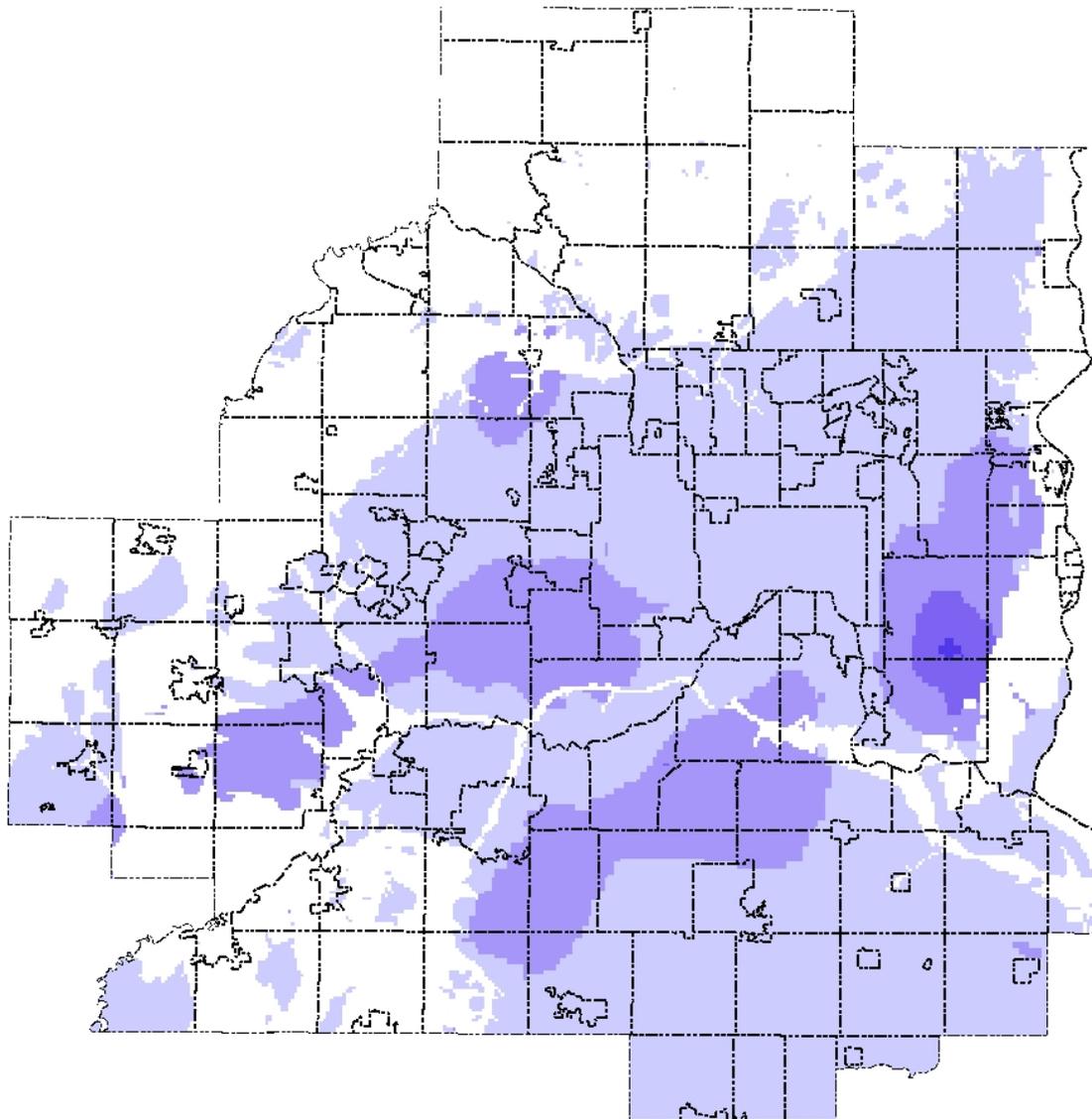
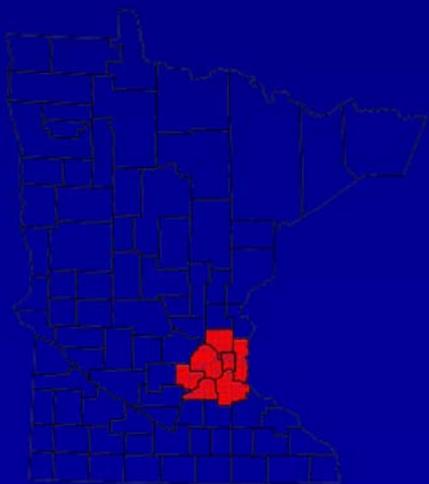
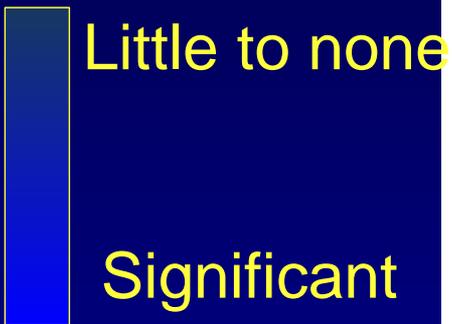
- 5,000 miles²
- Entire metro
- 9 layers





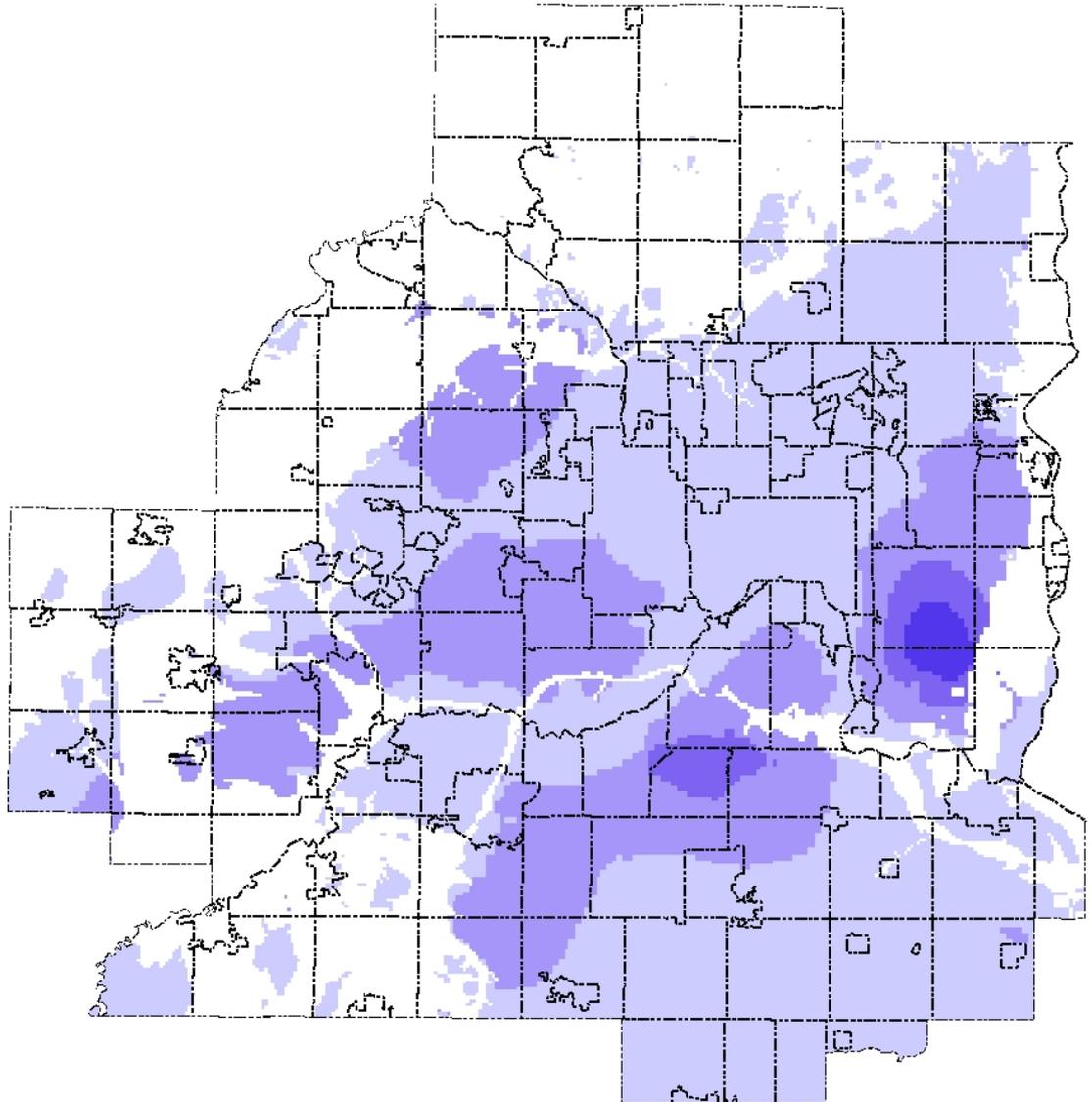
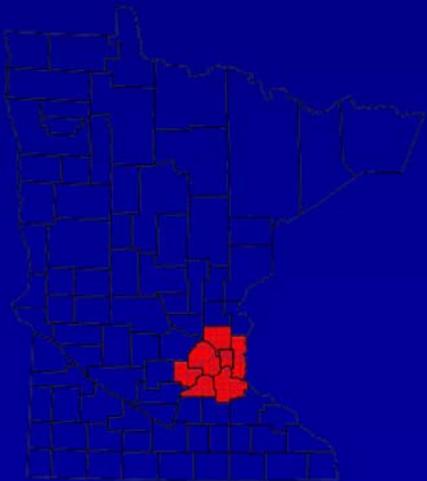
Prairie du Chien-Jordan Aquifer Drawdown

2020 Drawdown



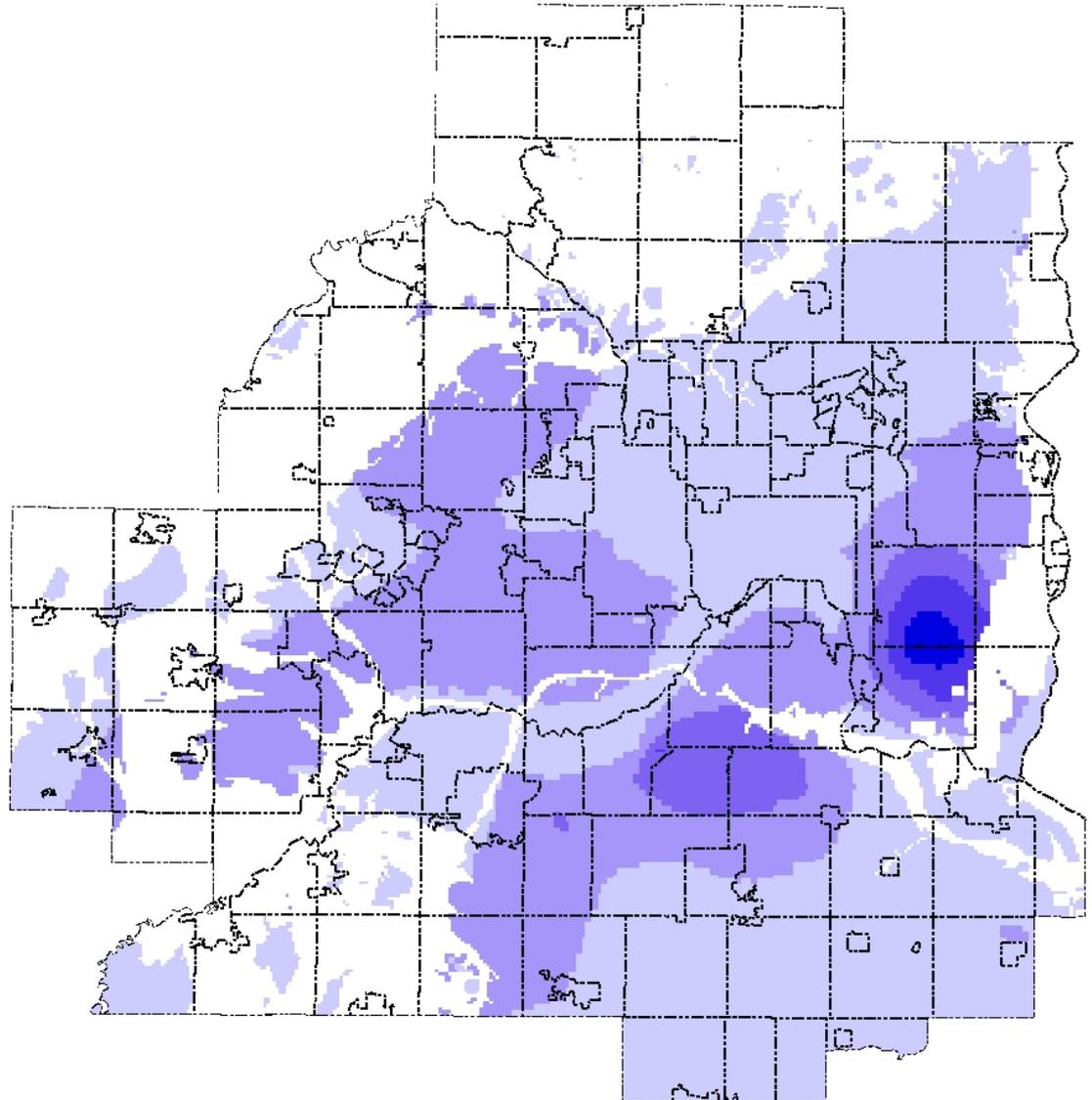
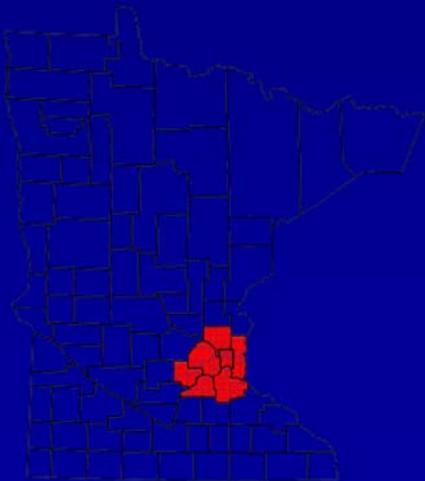
Prairie du Chien-Jordan Aquifer Drawdown

2030 Drawdown



Prairie du Chien-Jordan Aquifer Drawdown

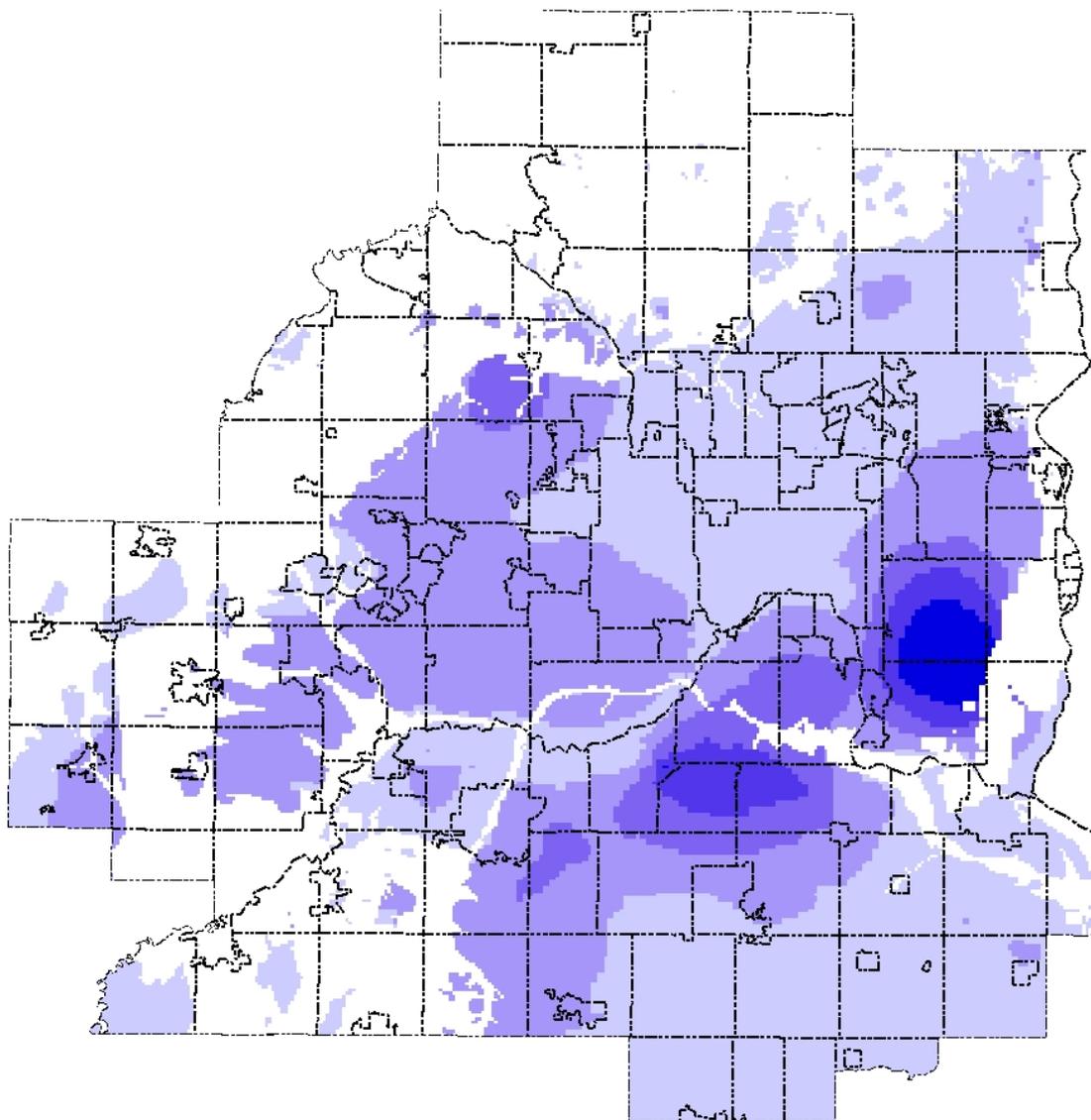
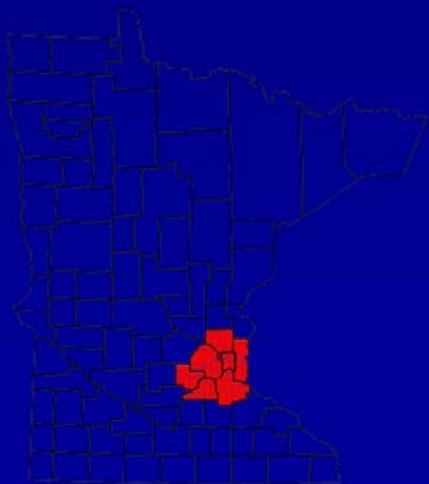
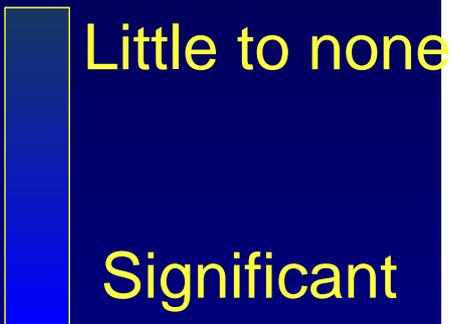
2040 Drawdown





Prairie du Chien-Jordan Aquifer Drawdown

2050 Drawdown



Prairie du Chien-Jordan Aquifer Drawdown

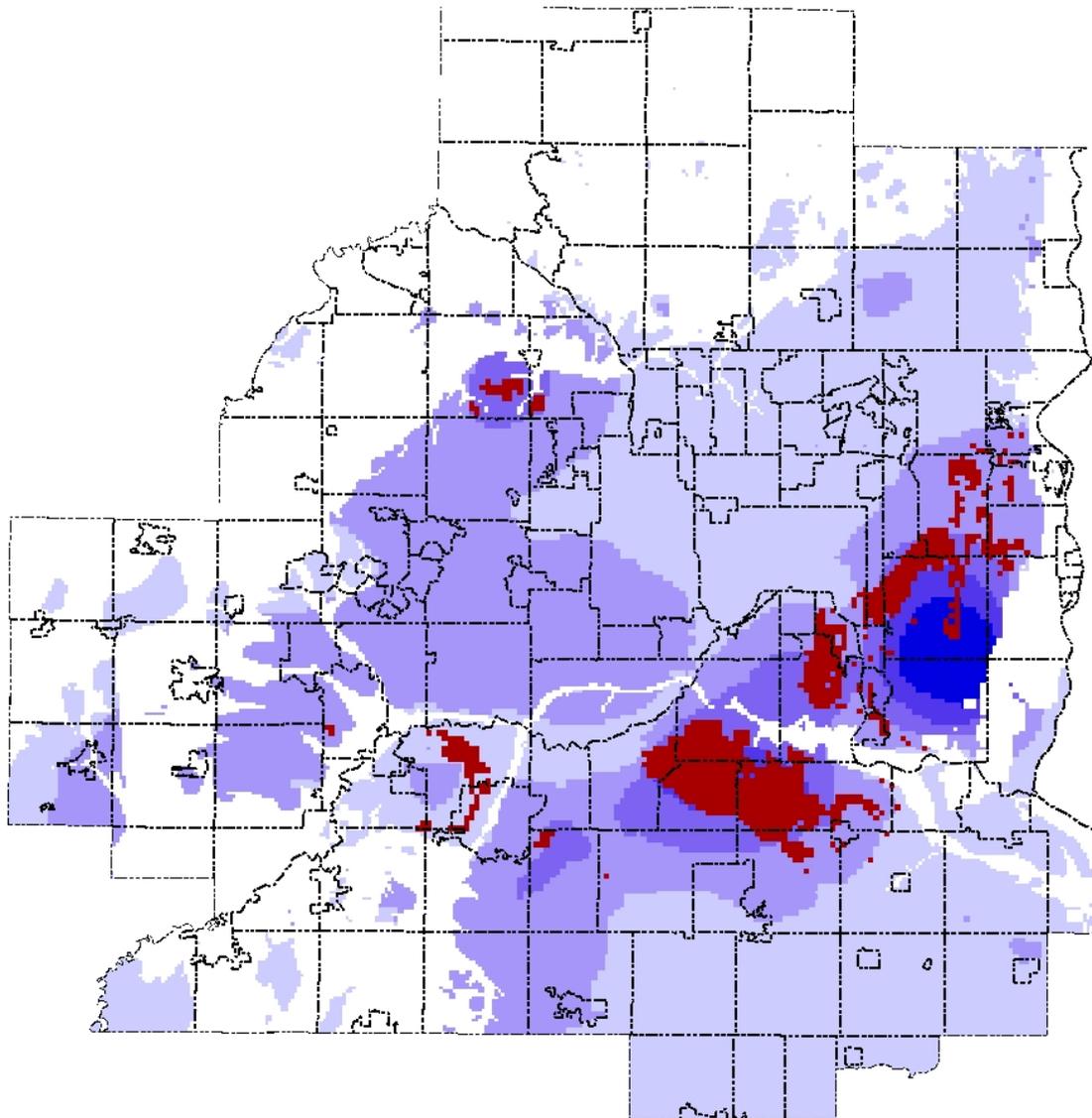
2050 Drawdown



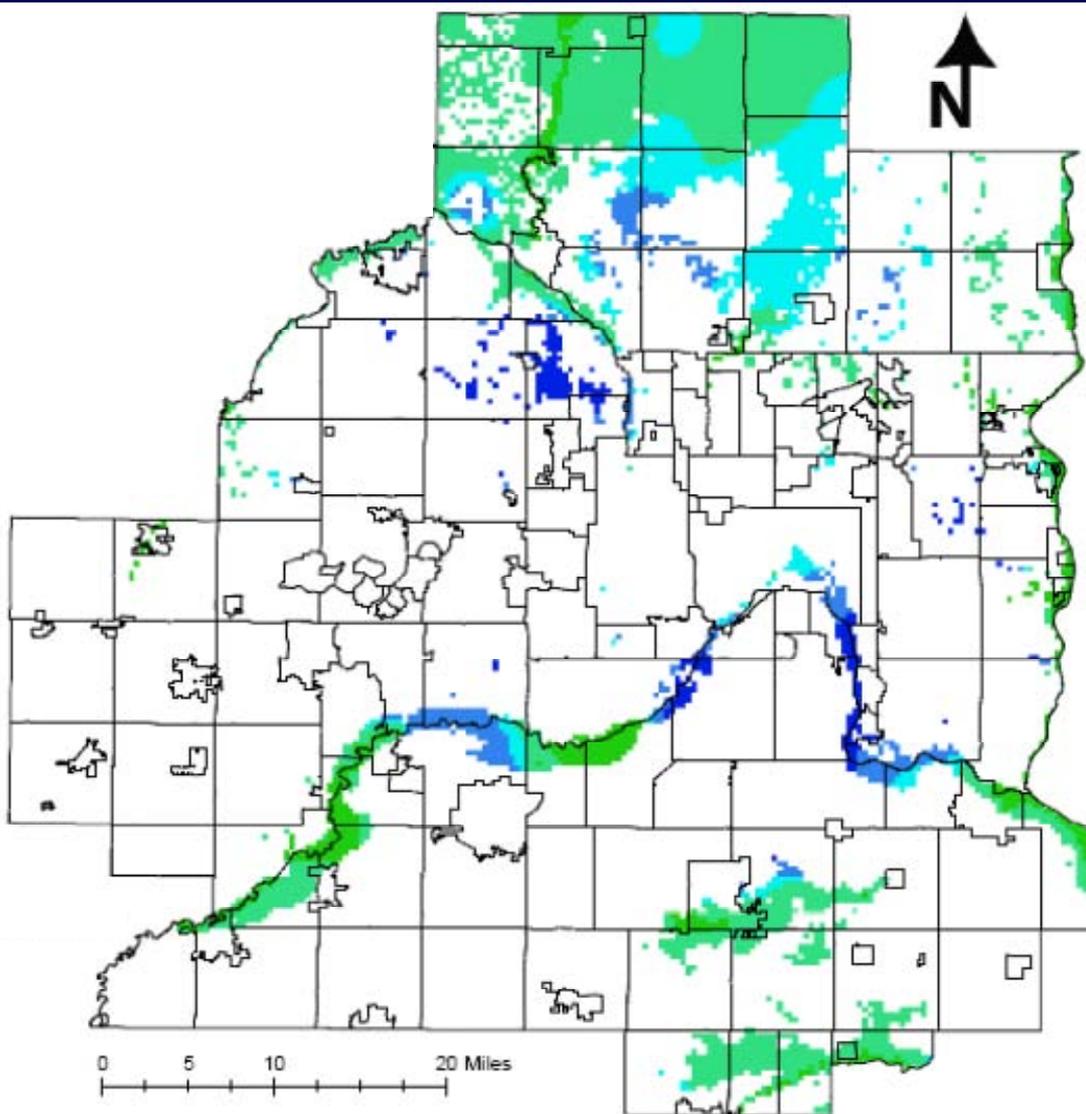
Little to none



Drawdown
exceeds 50%
available
head



Model-projected Drawdown in Water Table Aquifers where Pumping is Likely to Impact Surface Waters



2050 Drawdown
Little to none



Significant

Working together in new ways...



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Farmers take lead in Whitewater conservation efforts

By Janet Kubat Willette
jkubat@agrnews.com

Date Modified: 03/01/2012 8:49 AM

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LEWISTON, Minn. – Farmers in the Whitewater Watershed are taking the lead in water quality improvement through the Farmer-Led Council of the Whitewater River Watershed.

The council is the first of its kind in Minnesota. It's modeled on similar efforts in Iowa where farmers gather to determine what they need to do to clean up impaired streams in their watershed.

Jim Frederick of Lewiston chairs the council. He's involved because he wants to leave an environmental legacy and wants the land to be in better shape when he's done farming than when he began.



Dan Brandt, Natalie Siderius, Jim Frederick and Jerry Hildebrandt are involved with the Farmer Led Council of the Whitewater River Watershed.





103G.287 Subd. 4.

Groundwater management areas.

- The [DNR] commissioner may designate groundwater management areas and limit total annual water appropriations and uses within a designated area to ensure sustainable use of groundwater that protects ecosystems, water quality, and the ability of future generations to meet their own needs.... consistent with a plan approved by the commissioner ...



Groundwater Management Strategy

- 💧 Encourage local engagement in management efforts
- 💧 Use the best available information to inform management decisions.
- 💧 Adopt long-term approach to monitoring and management
- 💧 Share information and make it accessible
- 💧 Recognize that groundwater and surface-water management are complex and interconnected systems



In Summary...

- **Groundwater is critical for people, agriculture, business and nature**
- **We are using more groundwater than ever before**
- **Using groundwater well will require working together in new ways**

U.S. Drought Monitor

March 13, 2012

Valid 7 a.m. EST

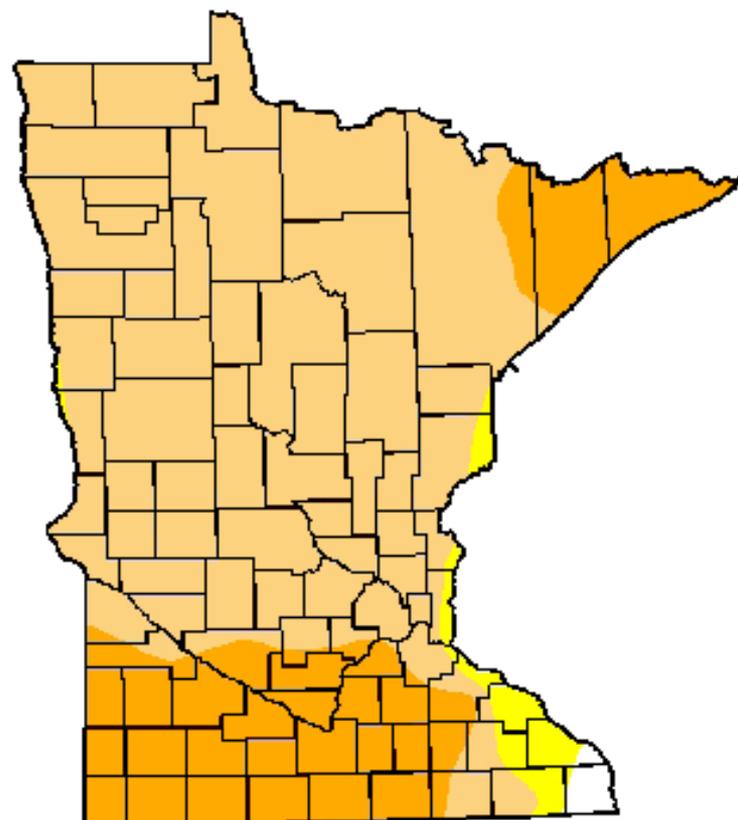
Minnesota

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.79	99.21	95.99	24.10	0.00	0.00
Last Week (03/06/2012 map)	0.79	99.21	95.99	24.10	0.00	0.00
3 Months Ago (12/13/2011 map)	0.81	99.19	56.68	24.08	0.00	0.00
Start of Calendar Year (12/27/2011 map)	0.79	99.21	57.45	24.08	0.00	0.00
Start of Water Year (09/27/2011 map)	48.42	51.58	19.26	4.58	0.00	0.00
One Year Ago (03/08/2011 map)	95.24	4.76	1.76	0.00	0.00	0.00

Intensity:

 D0 Abnormally Dry	 D3 Drought - Extreme
 D1 Drought - Moderate	 D4 Drought - Exceptional
 D2 Drought - Severe	



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



Released Thursday, March 15, 2012

Michael Brewer, National Climatic Data Center, NOAA

<http://droughtmonitor.unl.edu>



Thank you!



Water Use Priorities

- 1st Domestic uses
- 2nd Consumptive use < 10,000 GPD
- 3rd Ag. Irrigation & Processing
- 4th Power Production
- 5th Commercial & Industrial
- 6th Non-essential uses

Downside Risk Analysis

Hypothetical Retirement Account

