Planning for Groundwater Sustainability in 21st Century Minnesota

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NATURAL RESOURCES


Metropolitan
Council


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Pollution
Control
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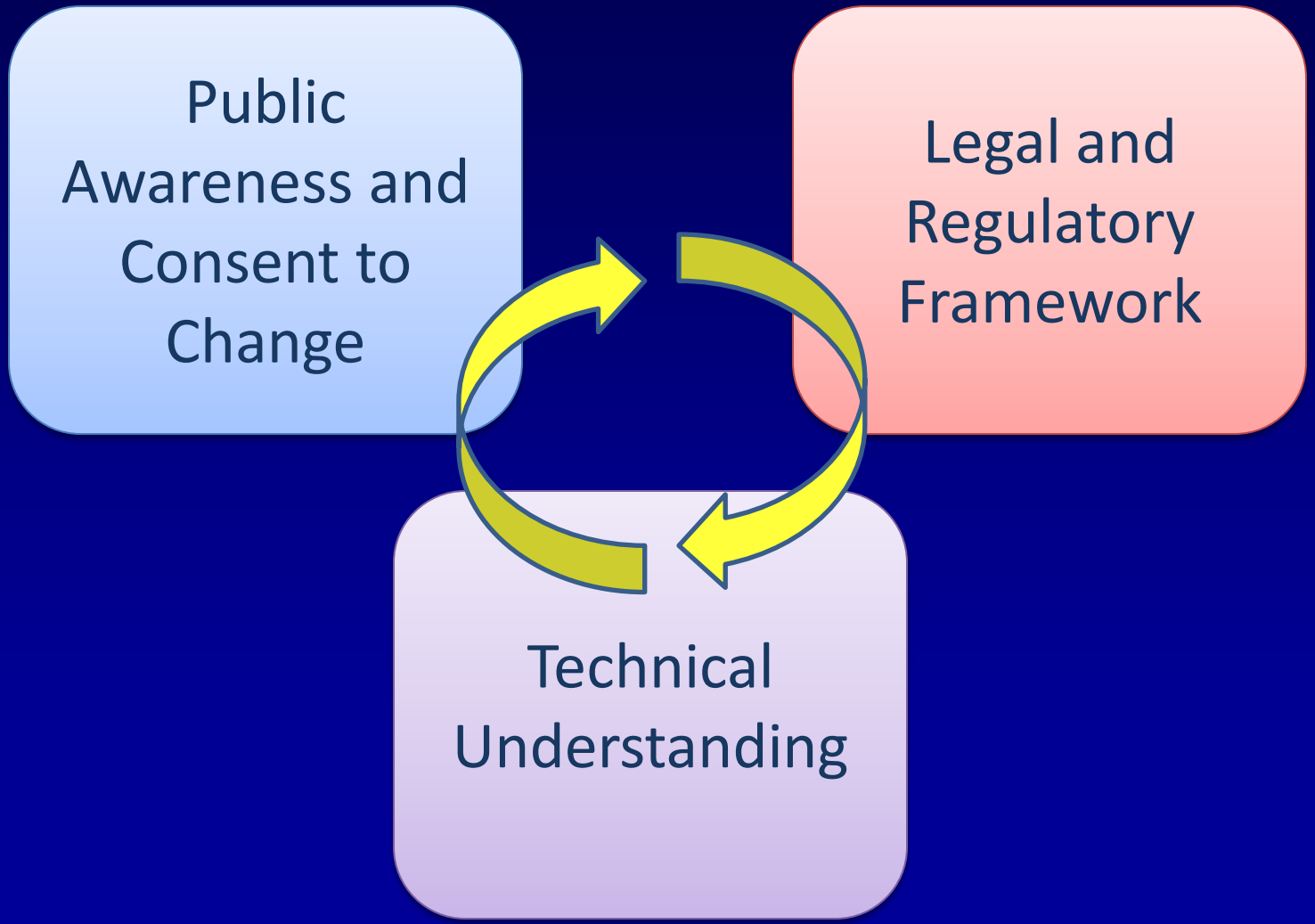
Main Ideas for Today

- Groundwater at risk from overuse and contamination
- Responsibility to act, how we can use planning to systematically address sustainability concerns and inform actions
- Regulation to stimulate and innovate

The Governance Challenge…



The Problem…

- There are places in Minnesota where we are not achieving sustainability in the use of groundwater resources and “we” are currently making decisions with a lack of information
- Key Risks
  - Over use
  - Contamination

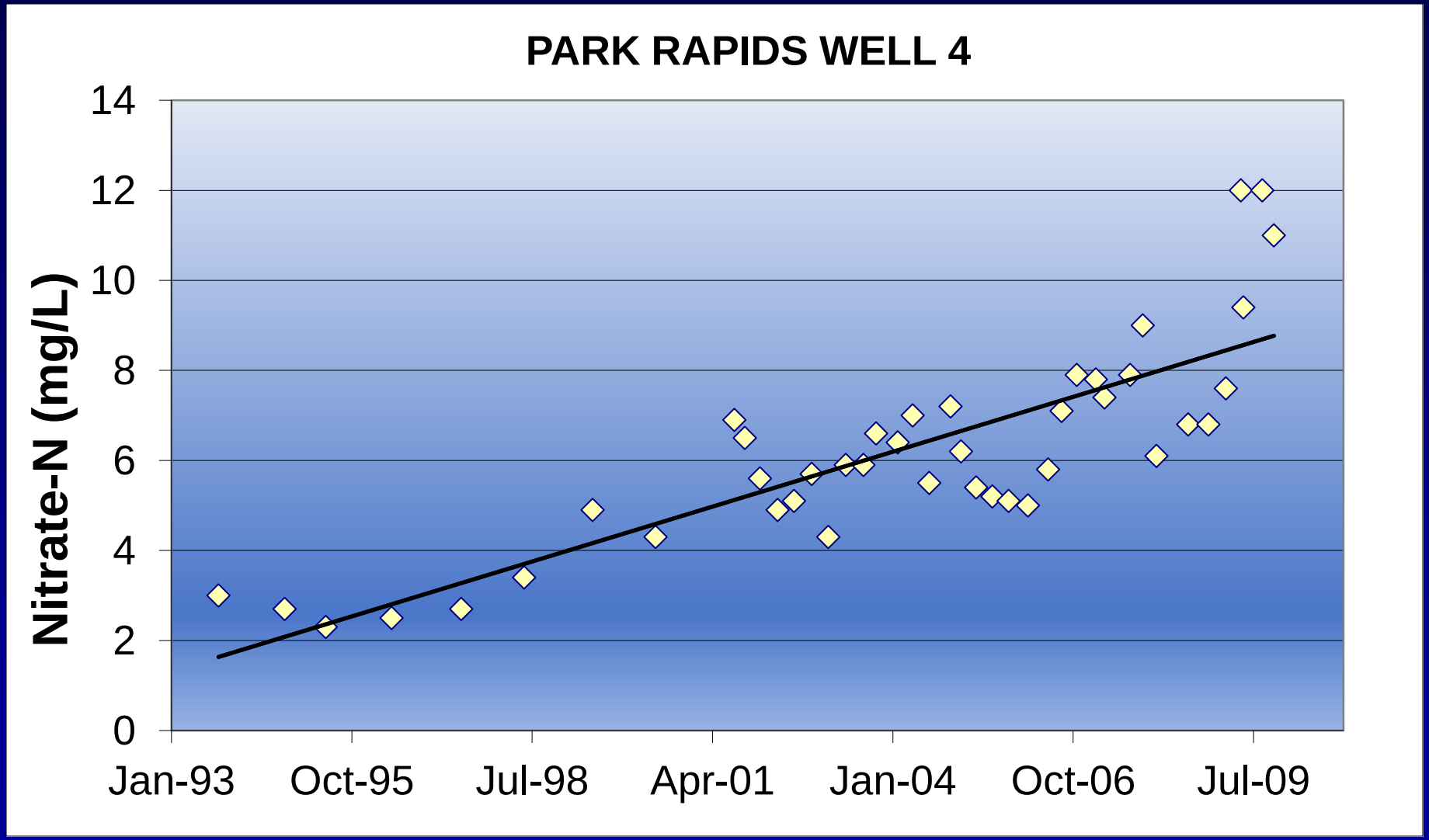
Sustainability... (Statute 103G.287)

- When establishing limits DNR must consider the sustainability of the resource, including:
  - Current and projected water levels
  - Water quality
  - Protect ecosystems
  - Future generations to meet their needs

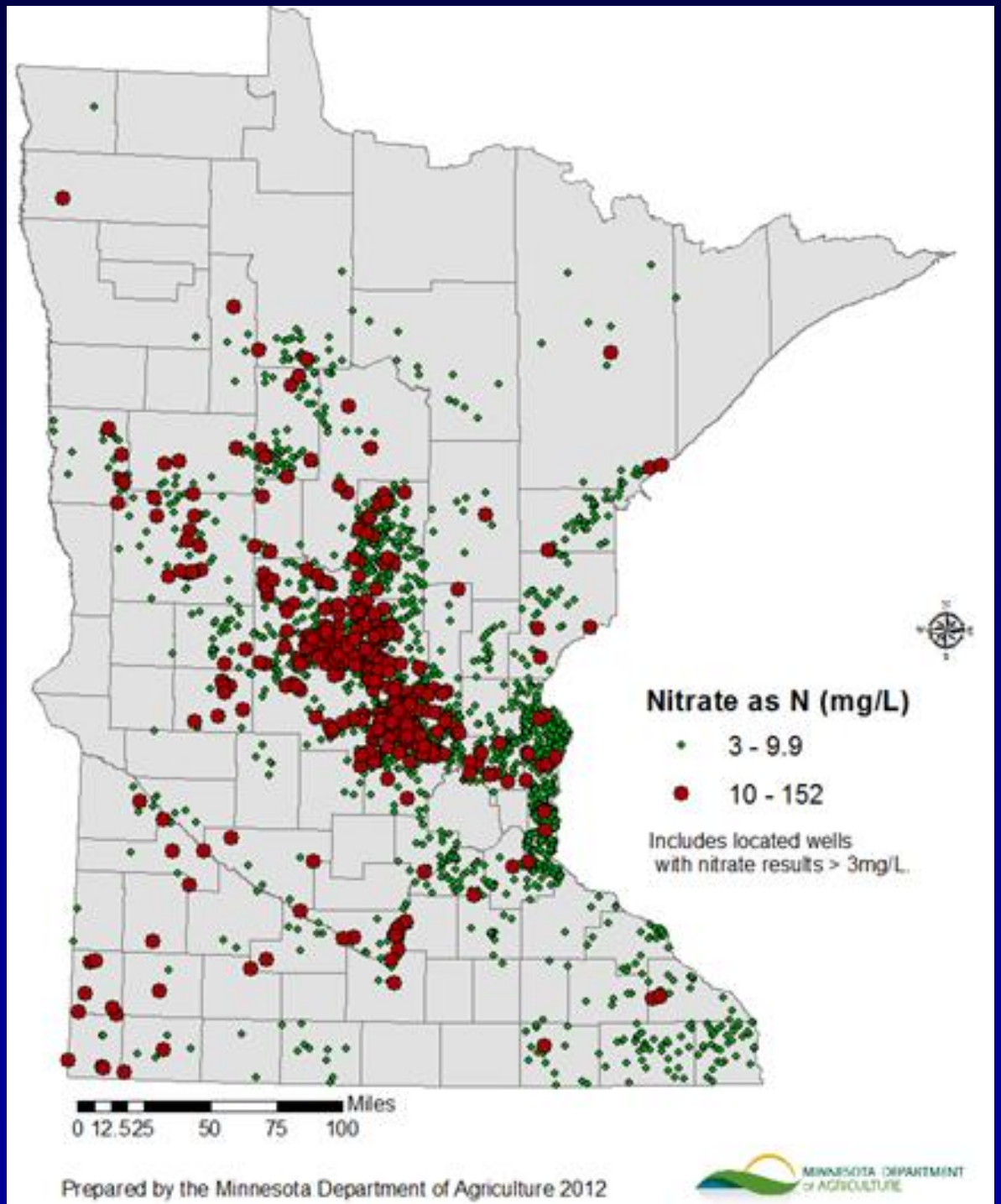
Some Observations

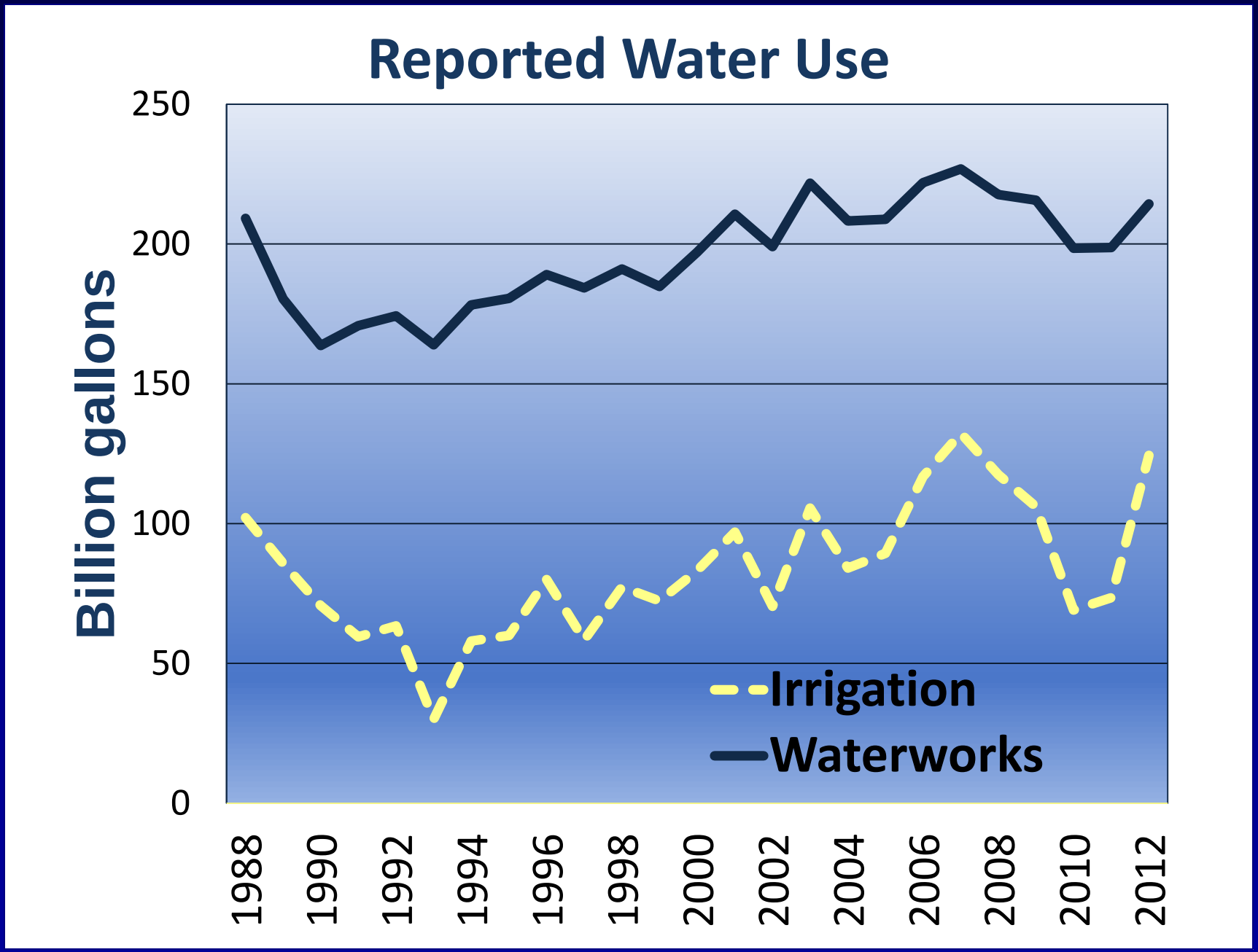
What do we know?

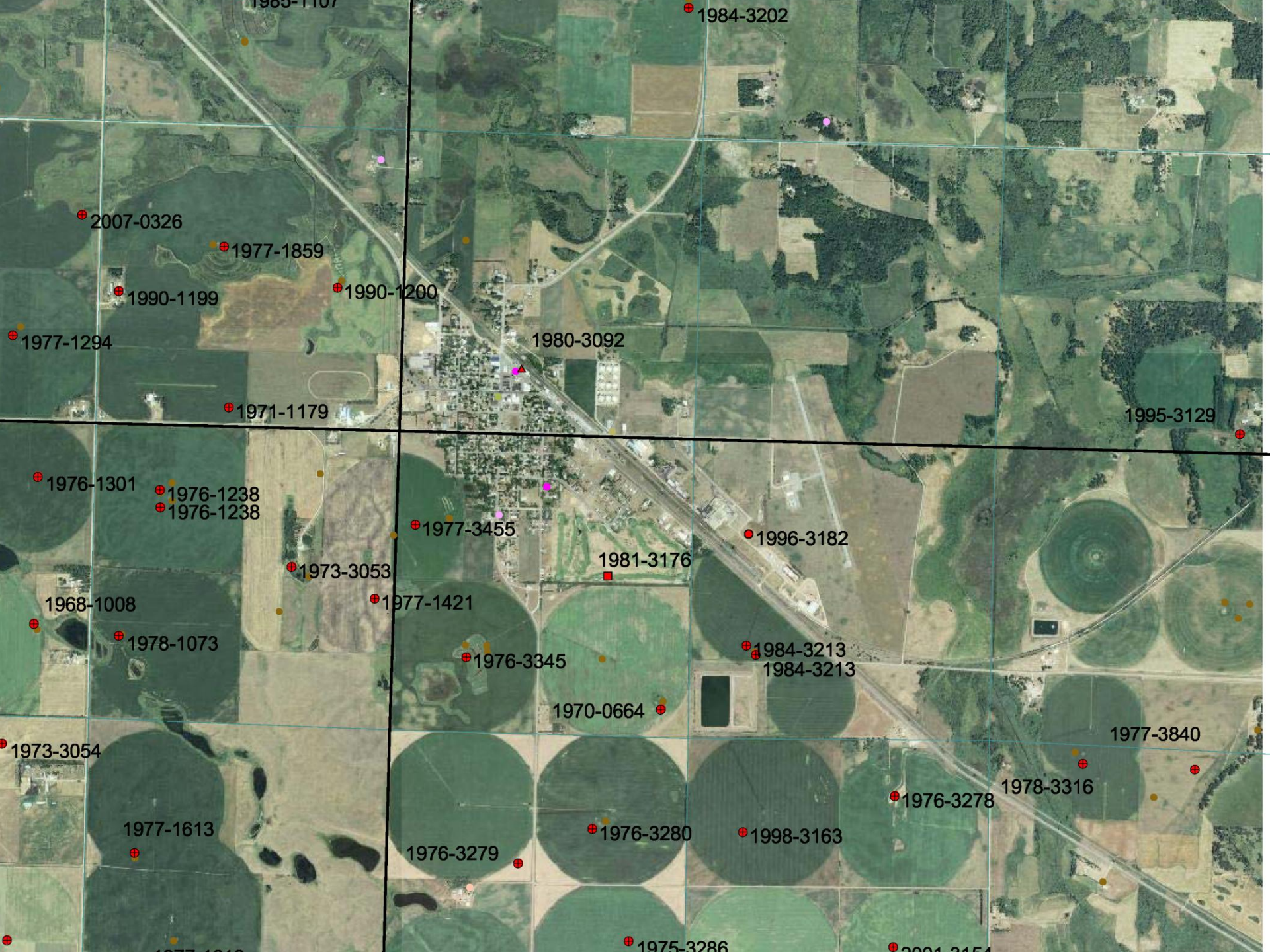
Nitrate Loading to Groundwater Can Be Significant In Sensitive Geologic Areas



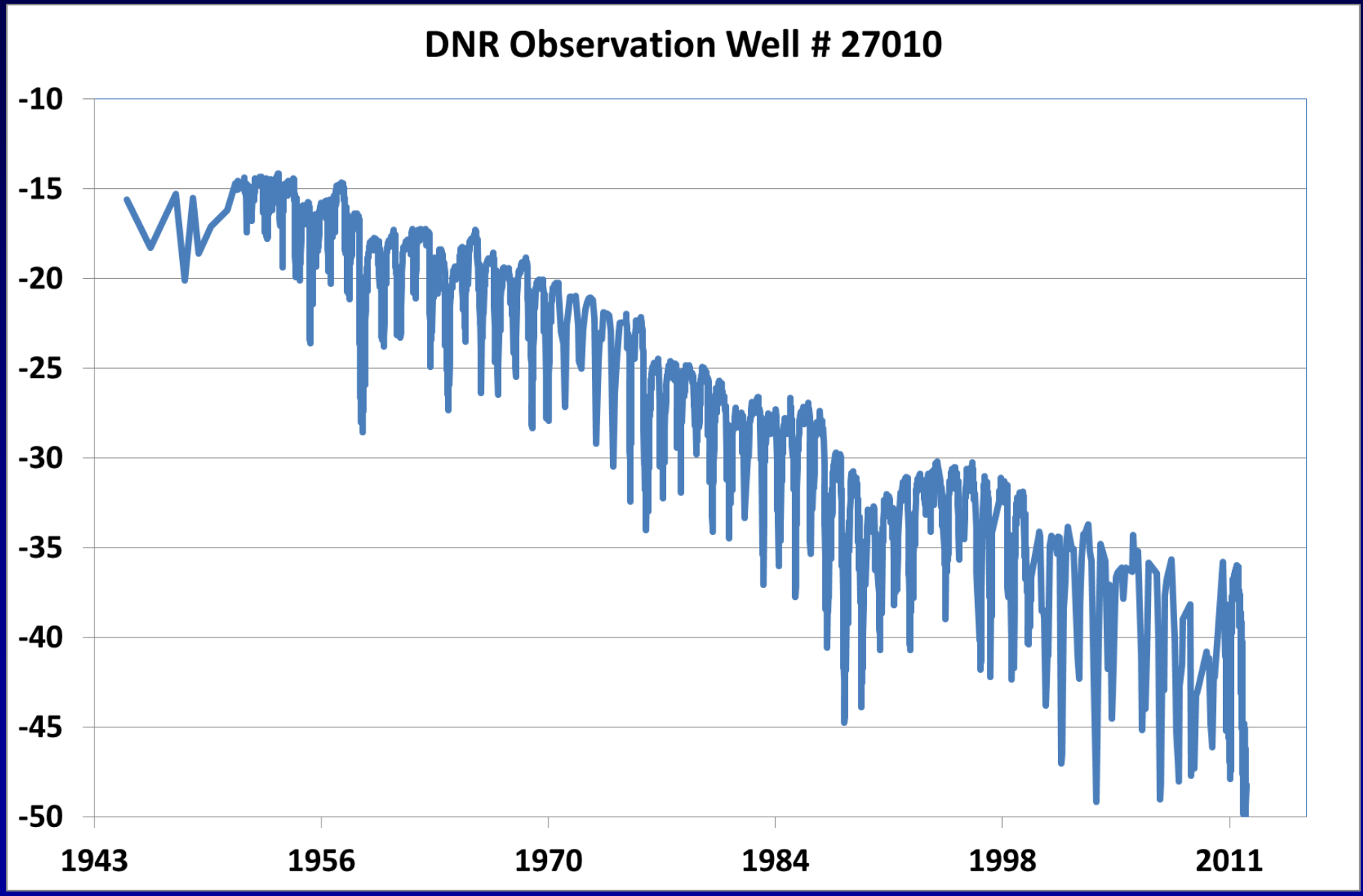
- County Well Index Data Nitrates in Private Drinking Wells

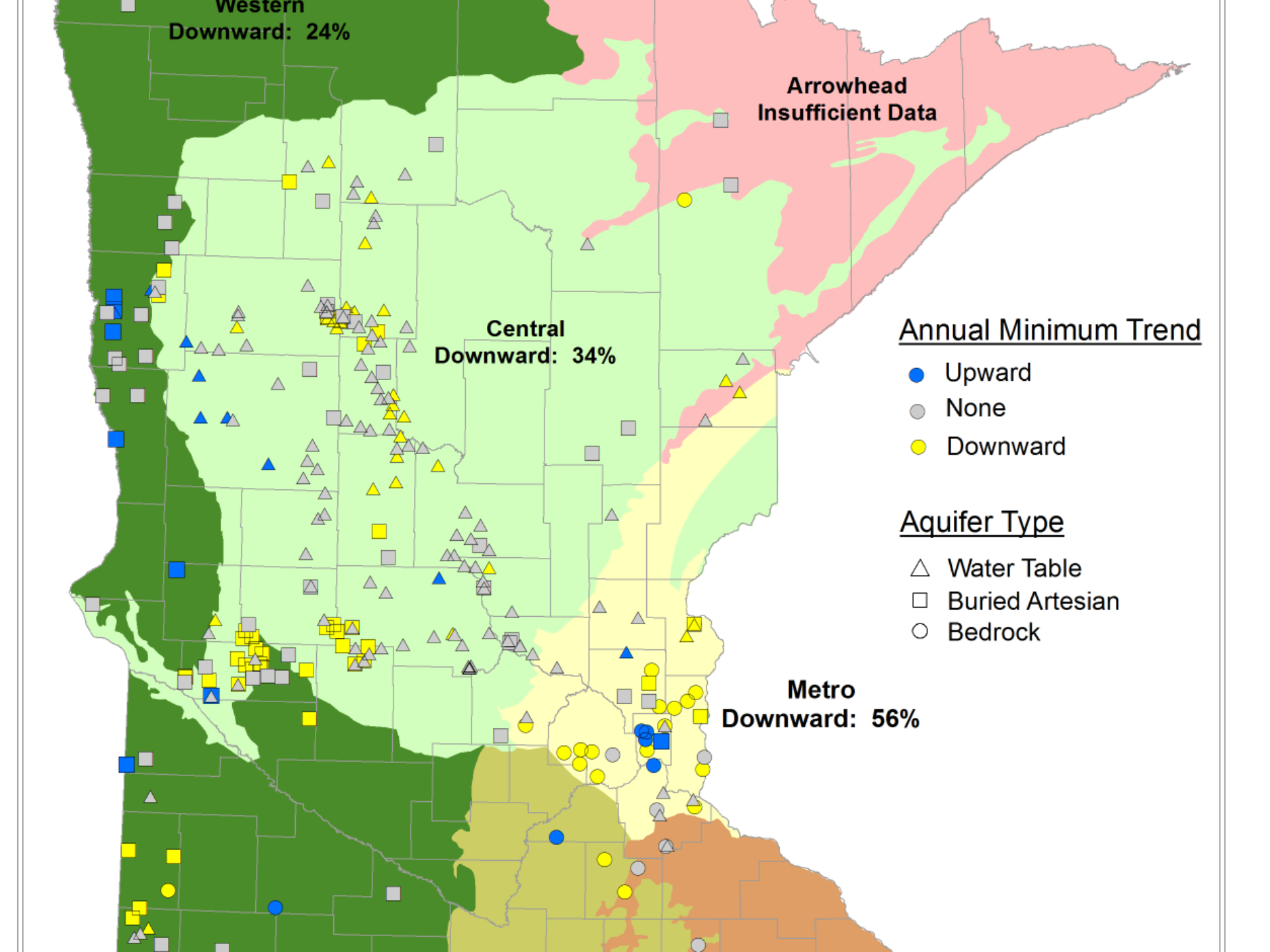



Reported Water Use
Billion gallons
250
200
150
100
50
0
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Irrigation
Waterworks


1984-3202
2007-0326
1977-1859
1990-1199
1990-1200
1977-1294
1980-3092
1971-1179
1995-3129
1976-1301
1976-1238
1976-1238
1977-3455
1996-3182
1981-3176
1973-3053
1968-1008
1977-1421
1978-1073
1984-3213
1976-3345
1984-3213
1970-0664
1977-3840
1973-3054
1978-3316
1976-3278
1977-1613
1976-3280
1998-3163
1976-3279
1975-3286

West TC Metro (‘45 – ‘12)




Western
Downward: 24%
Arrowhead
Insufficient Data
Central
Downward: 34%
Metro
Downward: 56%
Annual Minimum Trend
Upward
None
Downward
Aquifer Type
Water Table
Buried Artesian
Bedrock

Observations – Minnesota Trends

Precipitation

- ✓ **Long-term upward trend in annual precipitation**
- ✓ **Frequency and intensity of heavy rainfall events has increased**

What does this mean for our water supplies and ecosystems?

Observations – Minnesota Trends

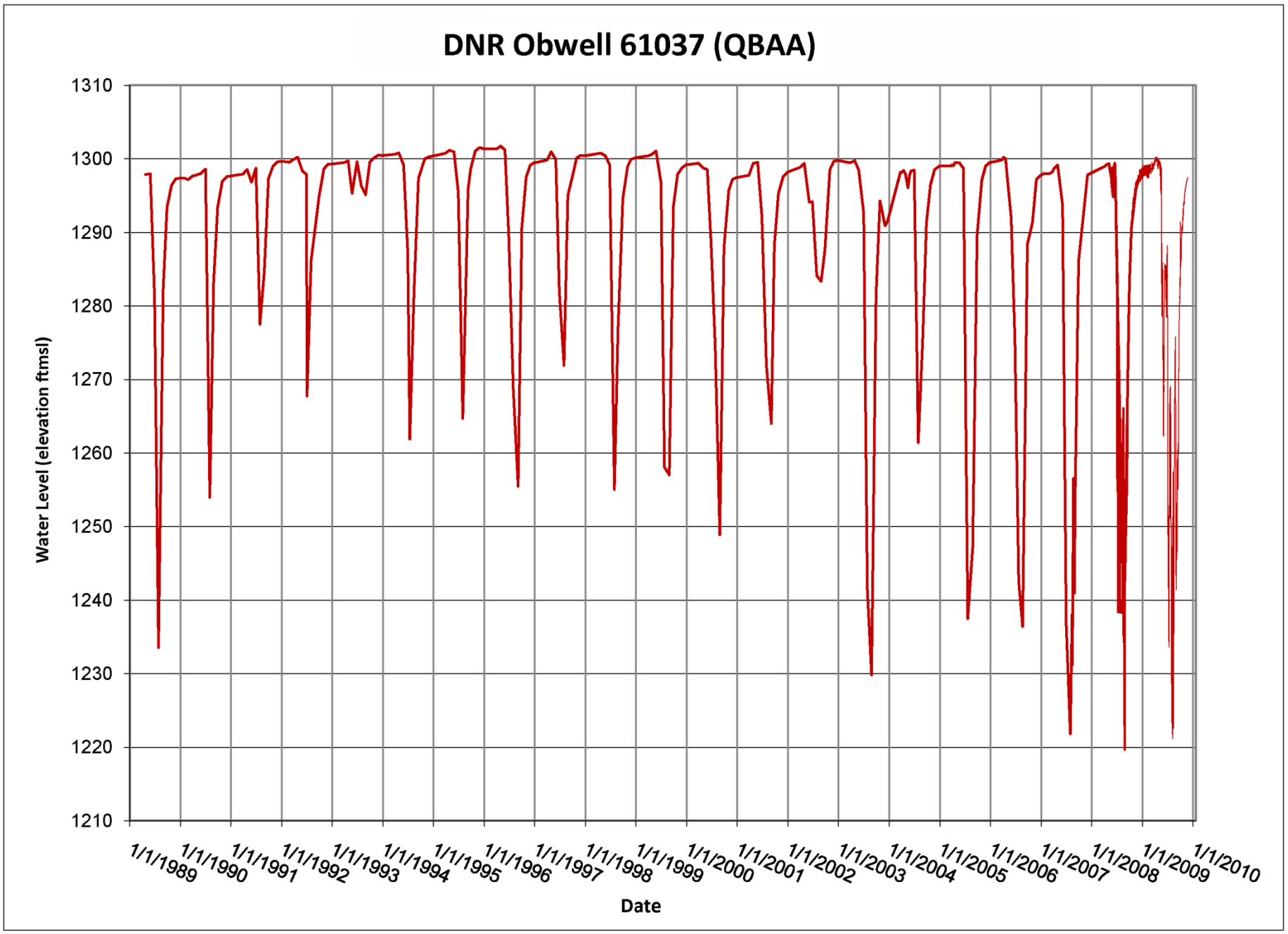
Temperature

- ✓ **Annual average temperature increase**
- ✓ **Increases accelerating after 1970**
- ✓ **2000s warmest decade on record**
- ✓ **Warming signal strongest winter and spring**

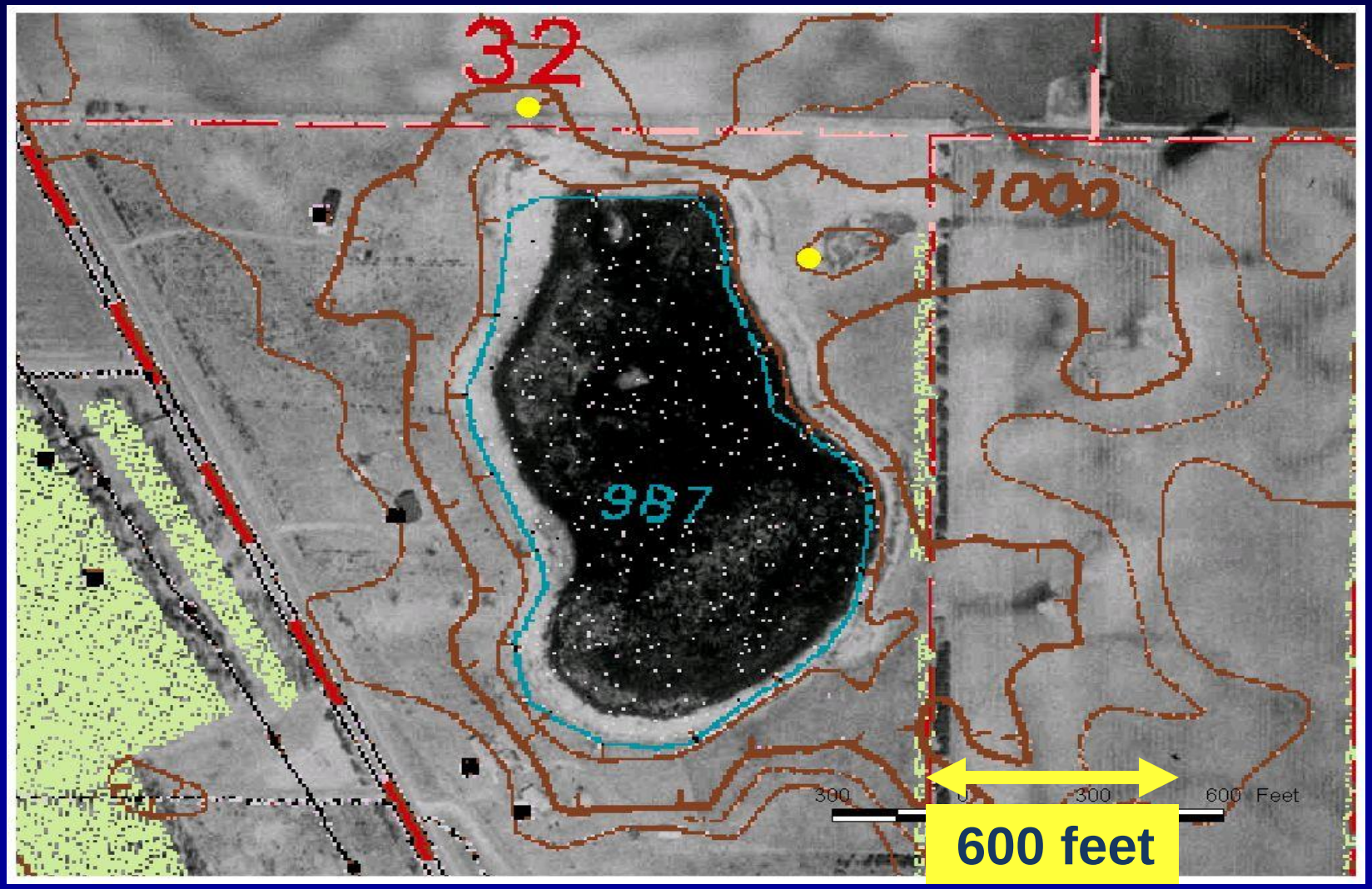
What does this mean for our water supplies and ecosystems?

Sustainability

What don’t we know?


DNR Obwell 61037 (QBAA)
Water Level (elevation ftmsl)
1310
1300
1290
1280
1270
1260
1250
1240
1230
1220
1210
1/1/1989
1/1/1990
1/1/1991
1/1/1992
1/1/1993
1/1/1994
1/1/1995
1/1/1996
1/1/1997
1/1/1998
1/1/1999
1/1/2000
1/1/2001
1/1/2002
1/1/2003
1/1/2004
1/1/2005
1/1/2006
1/1/2007
1/1/2008
1/1/2009
1/1/2010
Date

Lakes and Wetlands



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  - Current and projected water levels
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  - Future generations to meet their needs

Potential to Affect Surface Waters

- 103G.285 - Set protective elevations
  - Important aquatic vegetation characteristics
  - Existing uses of the basin by the public and riparian landowners
  - Total volume within the water basin and the slope of the littoral zone
- Trout Streams
  - Temporary only

Planning is a way to link knowledge to action – John Friedman

DNR's Current Planning Efforts

Planning

- 2013 – Draft Strategic Plan for DNR's groundwater management program
- Groundwater Management Areas – locally relevant planning efforts to develop an allocation and conservation plan

Draft Strategic Plan

Seven Core Strategies

1. Heighten the priority given to groundwater
2. Enhance the information available for decisions
3. Improve management of appropriation permits
4. Improve compliance with permits and regulations
5. Improve communication and education
6. Effectively address challenges in areas of high use
7. Promote water conservation practices

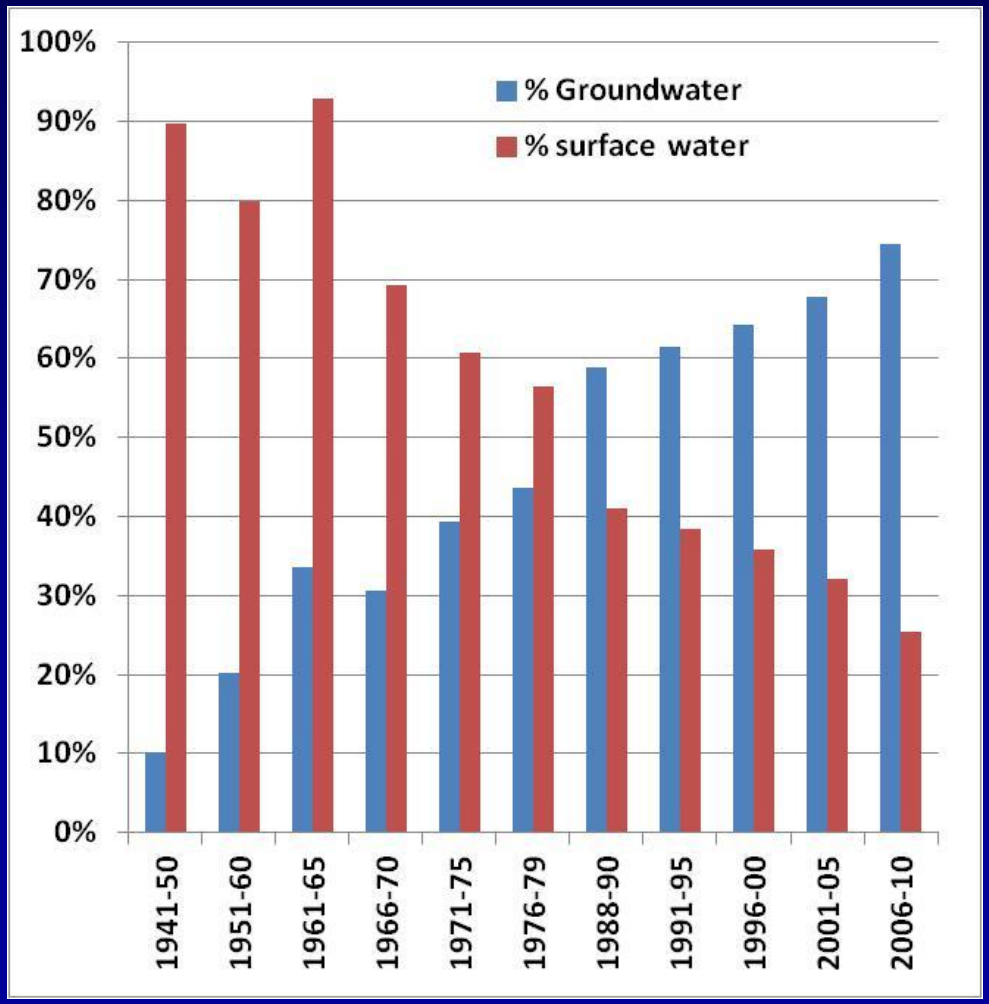
Groundwater Management Areas: 3 Pilot Planning Projects

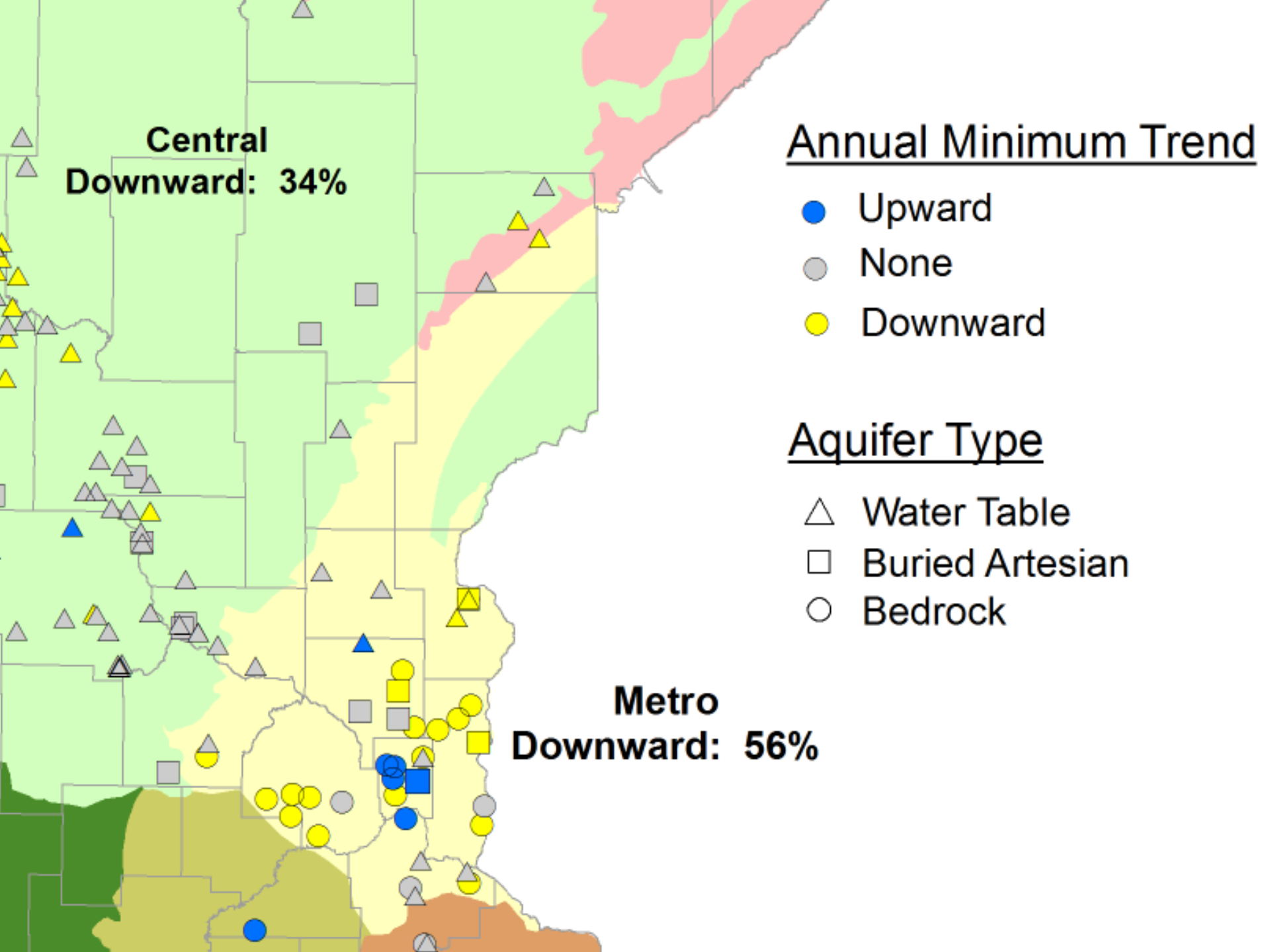
- 12 -14 month process
- Involving local stakeholders
- Transparency of the decision process
  - What information and how it will affect permits
- Implementation will take place over a period of years after the plan is completed
- Adapt over time

Water Supply Trends
Twin Cities, MN

Increased Reliance on Groundwater

- Surface water: major source of Supply until 70's
- Groundwater: source to meet growth needs since 80's

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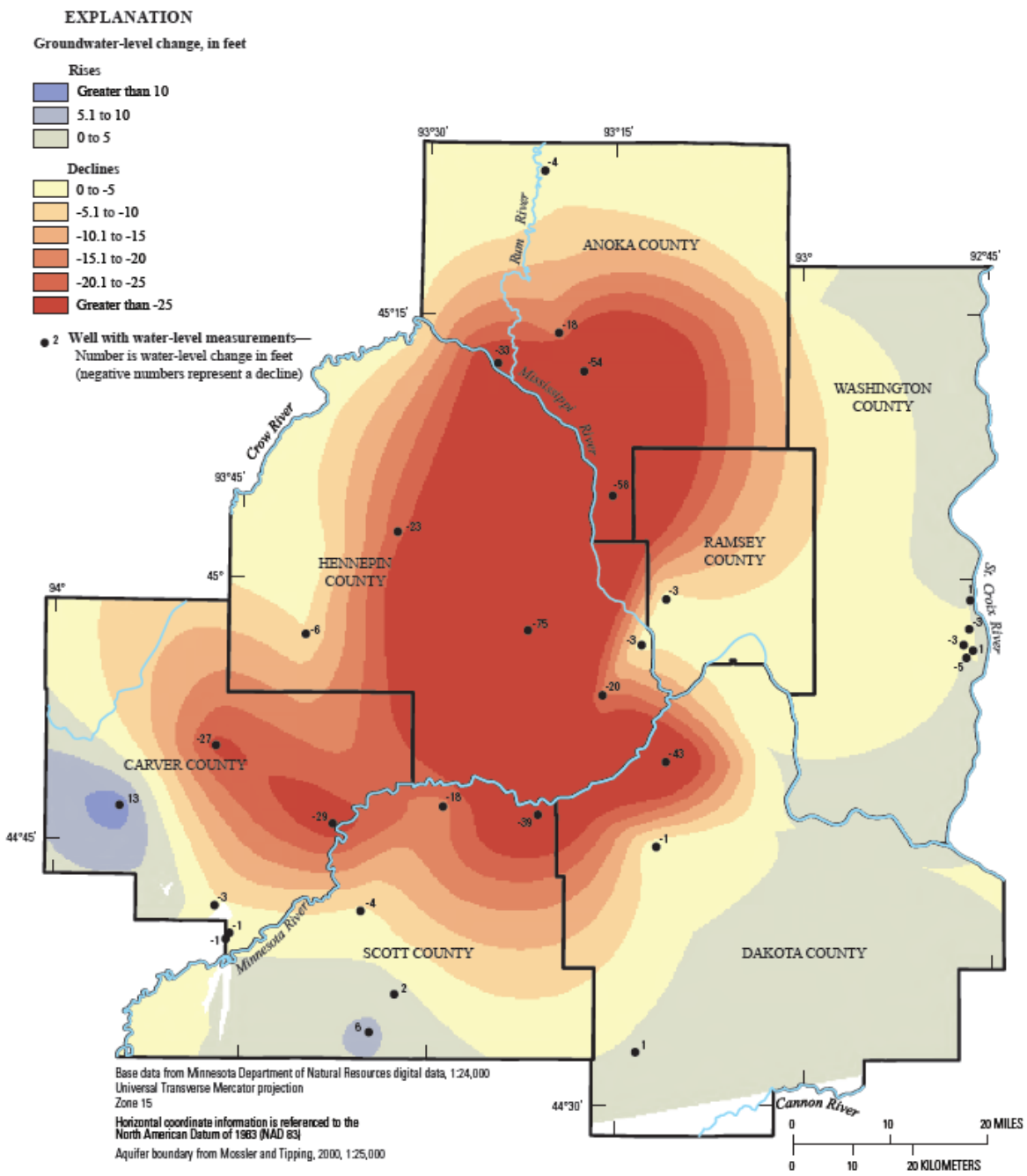
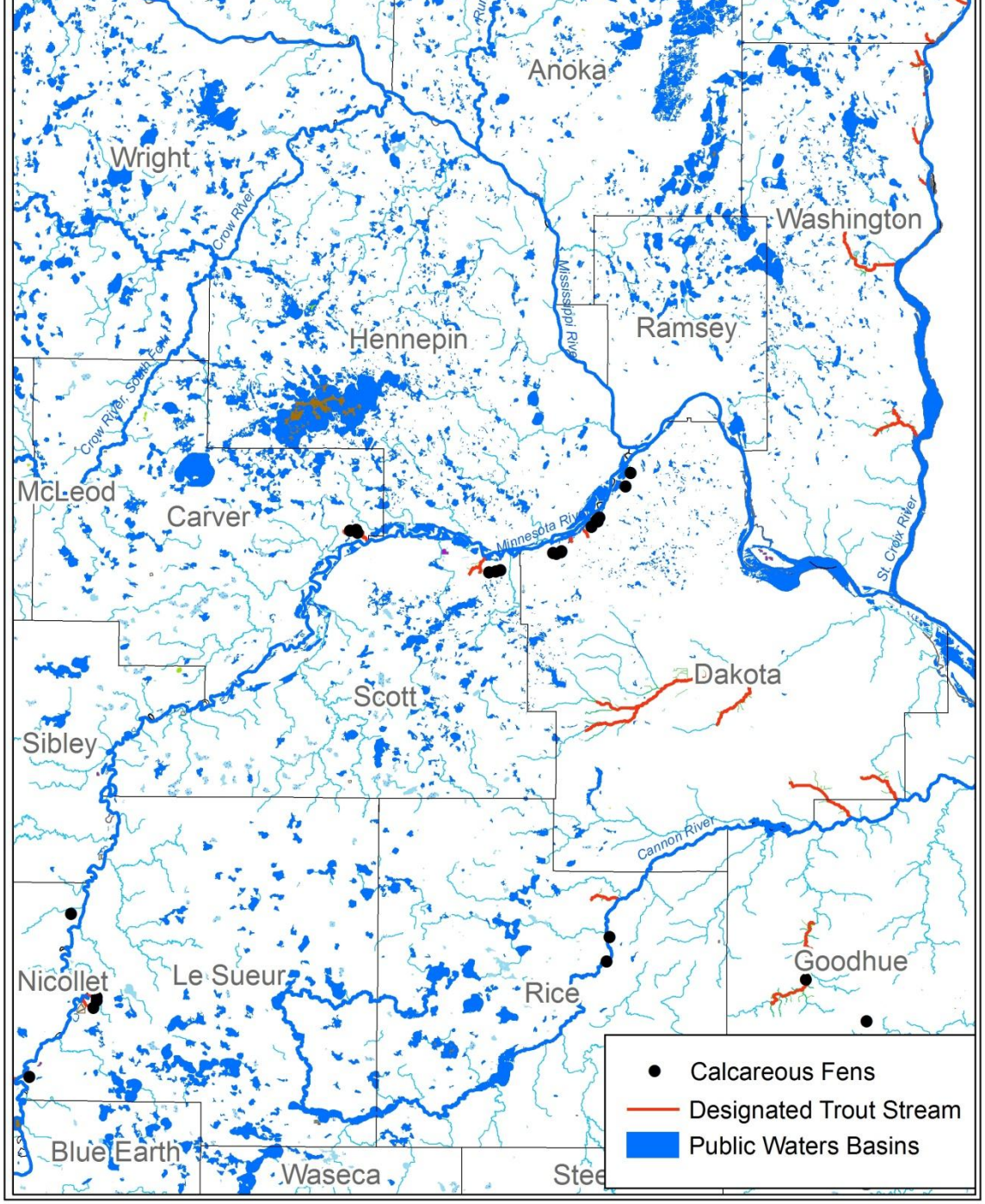


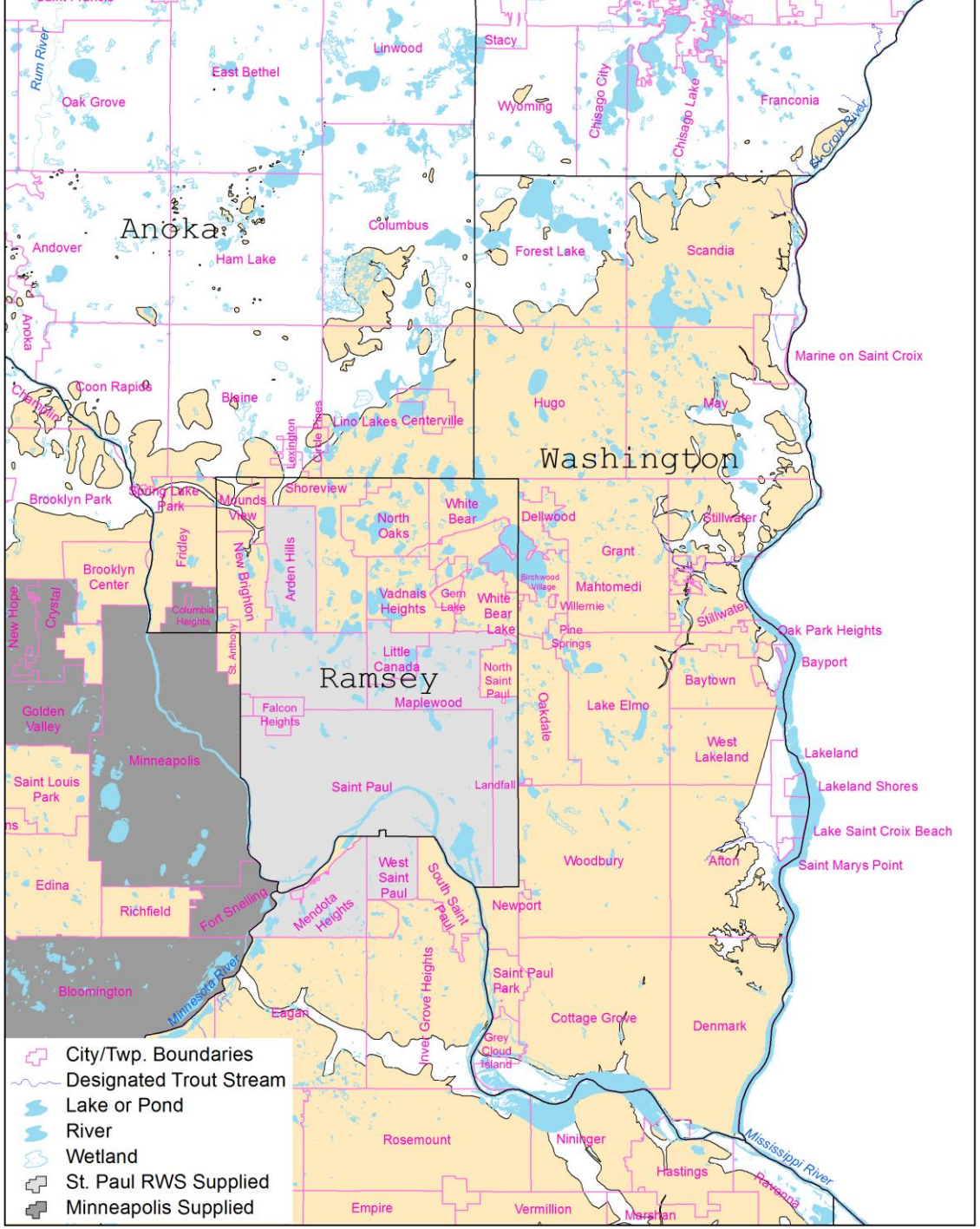
Figure 12. Groundwater-level changes in the Mount Simon-Hinckley aquifer between March 2008 and August 2008.

Seasonal Drawdown in Twin Cities (Mar – Aug)

- 75 feet in the center

Surface Waters





Defining the geographic boundary for a Groundwater Management Area

- Hydrogeology
- Current and projected use
- Natural resources
- Water quality
- Jurisdictional and planning frameworks

Heighten the Priority

- Staffing and monitoring resources
- Evaluate progress
- Communicate with affected interests

Enhance Information for Decisions

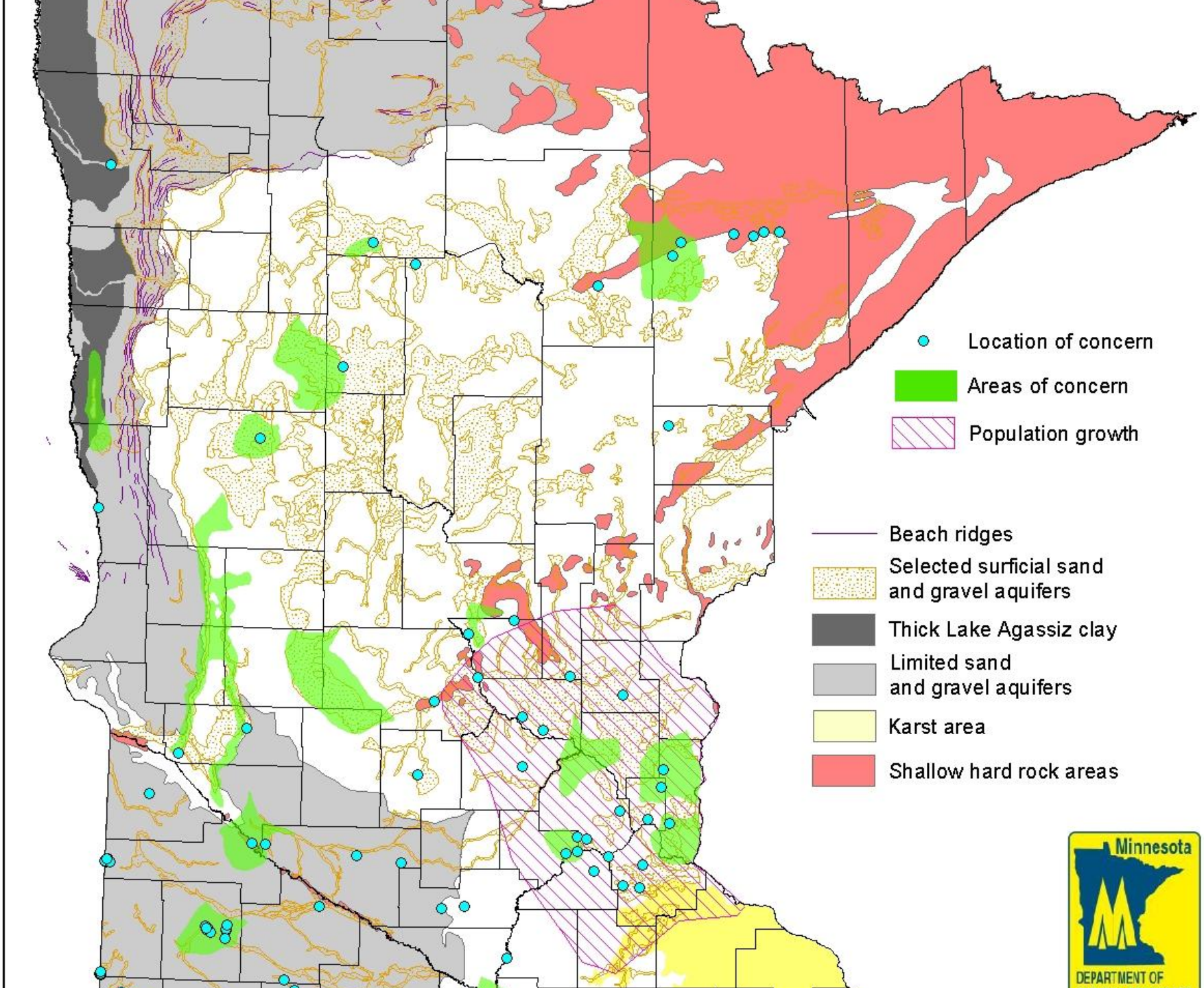
- Improve monitoring networks – surface and groundwater
- Develop thresholds and standards for sustainability
  - Protection elevation
  - Change in hydrograph
- Improve information on water use

Improve Management of Permits

- Minnesota DNR Permitting and Reporting System (MPARS)
- Preliminary Authorization of Well Construction
- Consistent Evaluation and Decision Process
- Increase Water Conservation Practices

Other Strategies for Planning Projects

- Improve compliance
- Enhance communication and education
- Promote wise use and conservation


Location of concern
Areas of concern
Population growth
Beach ridges
Selected surficial sand and gravel aquifers
Thick Lake Agassiz clay
Limited sand and gravel aquifers
Karst area
Shallow hard rock areas
Minnesota
DEPARTMENT OF

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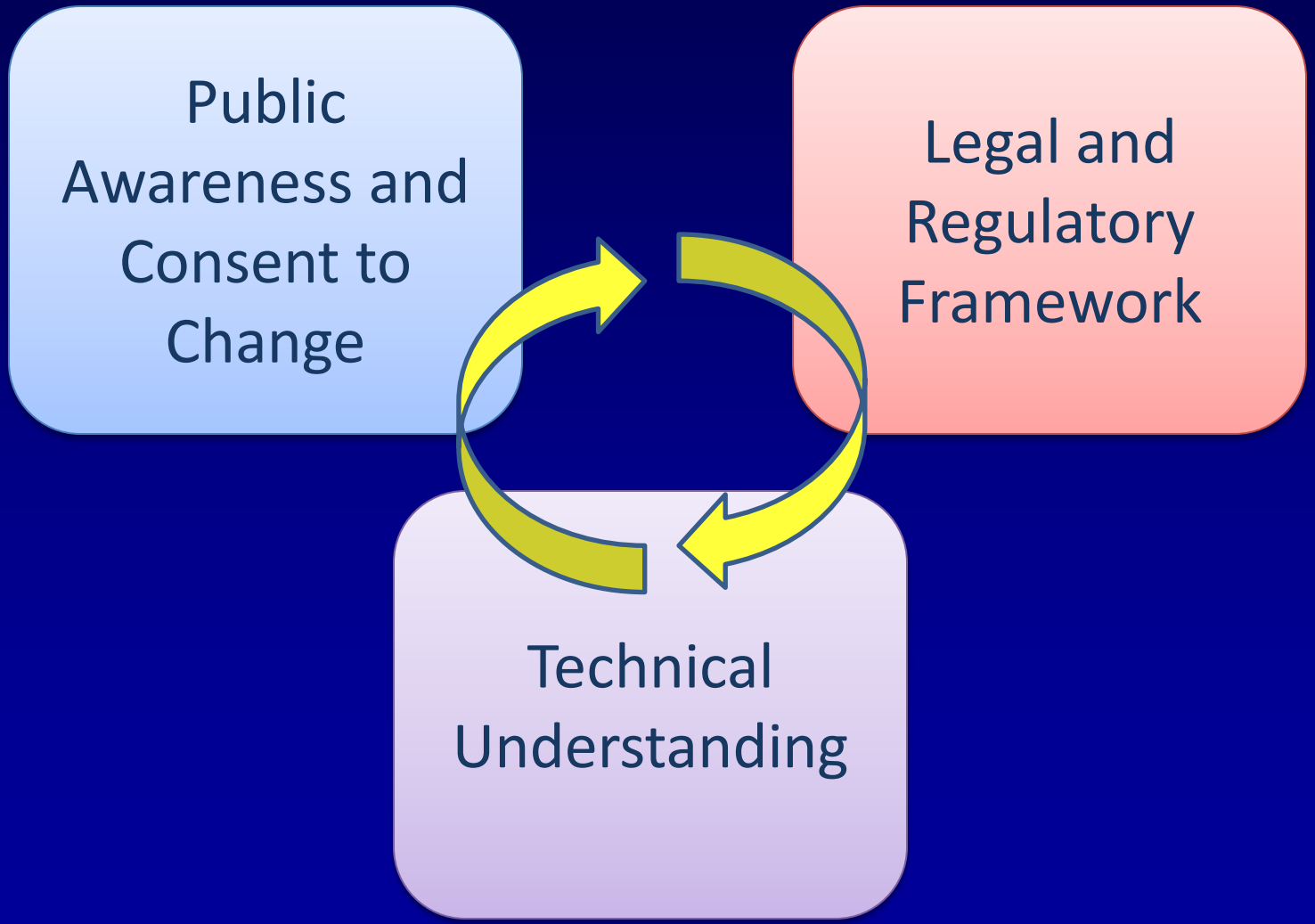

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Innovations and Investments

- Conservation
- Conjunctive use – seasonal patterns
- Shared systems
- Leak detection
- Stormwater management
- Re-use
- “Minimum management practices” for agricultural production


Thank you!