Policy Responses to Climate Change:
Climate Change & Our Regional Water Supply

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Chief, Illinois State Water Survey

Creating a Regional Agenda to Address Climate Change

University of Illinois
Chicago, December 11, 2007

ILLINOIS

ISWS ACKNOWLEDGMENTS

- **Al Wehrmann**
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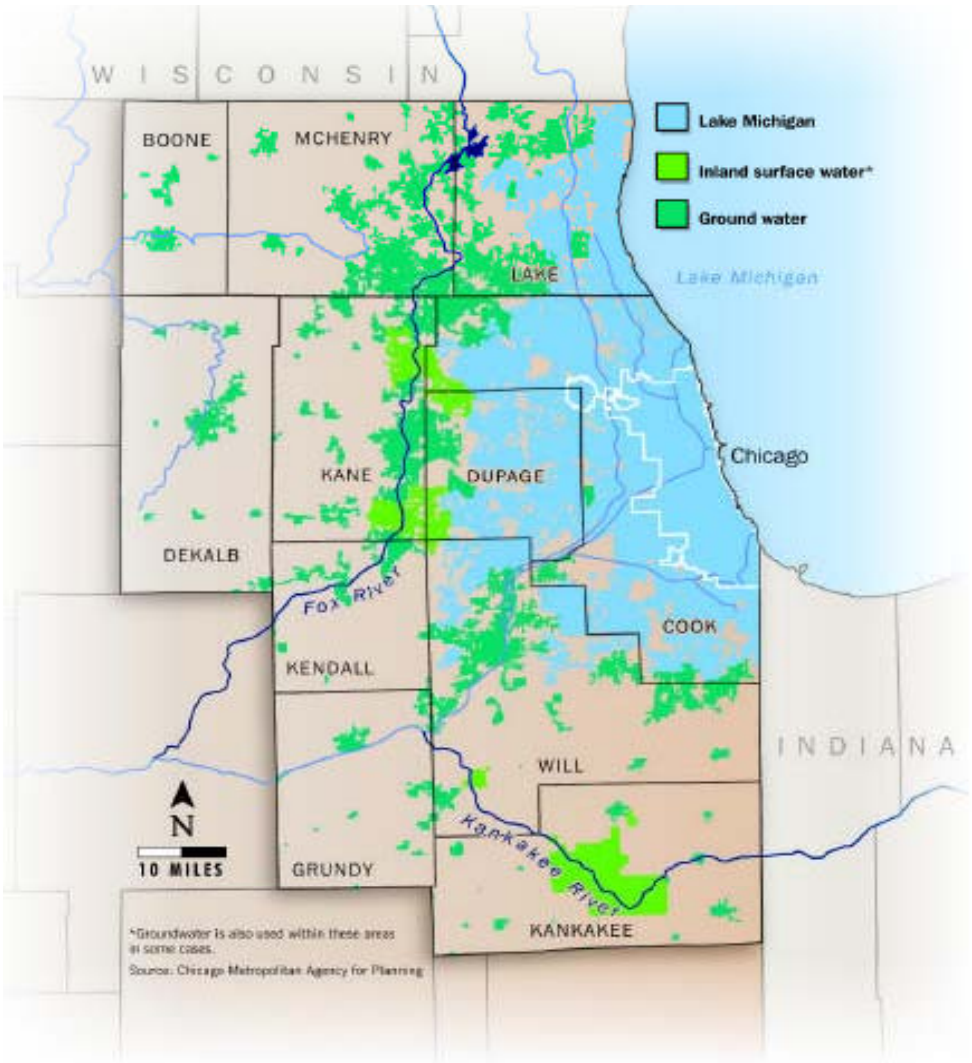
- **Ken Kunkel**
- **Mike Palecki**

Water Sources for Public Supply in Northeast Illinois



REGIONAL WATER SUPPLY

- **Water is a critical natural resource (CMAP)**
- **Governor established an administrative process and structure for regional water supply planning and management (Executive Order 2006-01)**
- **Many pieces to the jigsaw puzzle (supply; demand; impacts of withdrawals; conservation; reuse; surface water; groundwater; climate change; droughts; floods; development; long time horizons)**

REGIONAL WATER SUPPLY PLANNING

GOVERNOR

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

MAHOMET AQUIFER CONSORTIUM

CMAP Chicago Metropolitan Agency for Planning

East Central Illinois Regional Water Supply Planning Committee

Northeastern Illinois Regional Water Supply Planning Group

Northeastern Illinois Priority Planning Area

Aquifers and Watersheds

- Sand-and-gravel aquifers
- Shallow bedrock aquifers
- Deep bedrock aquifers
- Fox River watershed
- Priority planning area

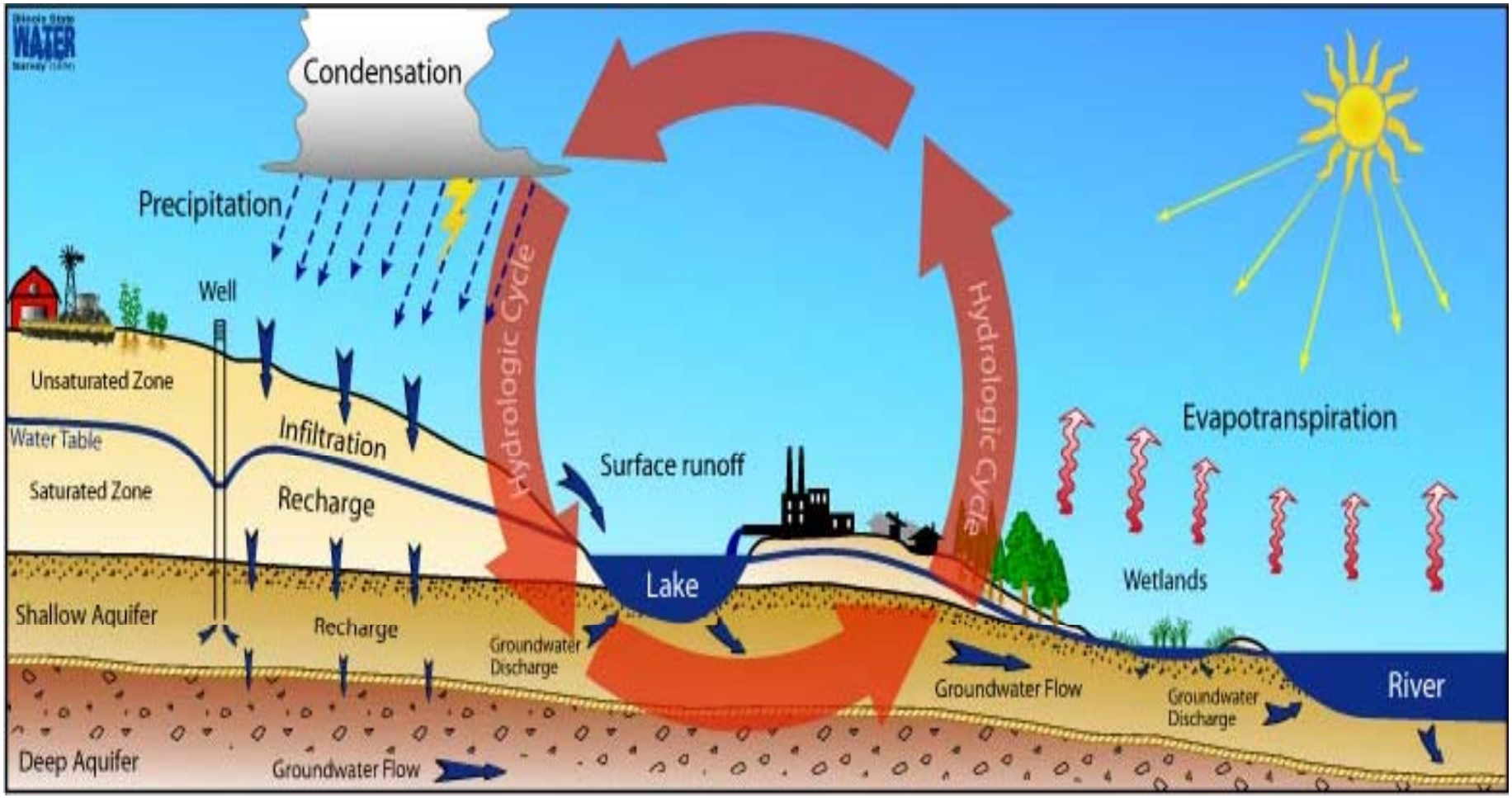
NE Illinois
Regional Water Supply Planning Group

1. Municipalities and Municipal Water Suppliers
2. Counties
3. Agriculture
4. Business, Industry, and Power
5. Conservation and Resource Management
6. Environmental Advocacy
7. Academia and Public Interest in Regional Planning
8. Real Estate and Development
9. Wastewater Treatment and Non-municipal Water Suppliers

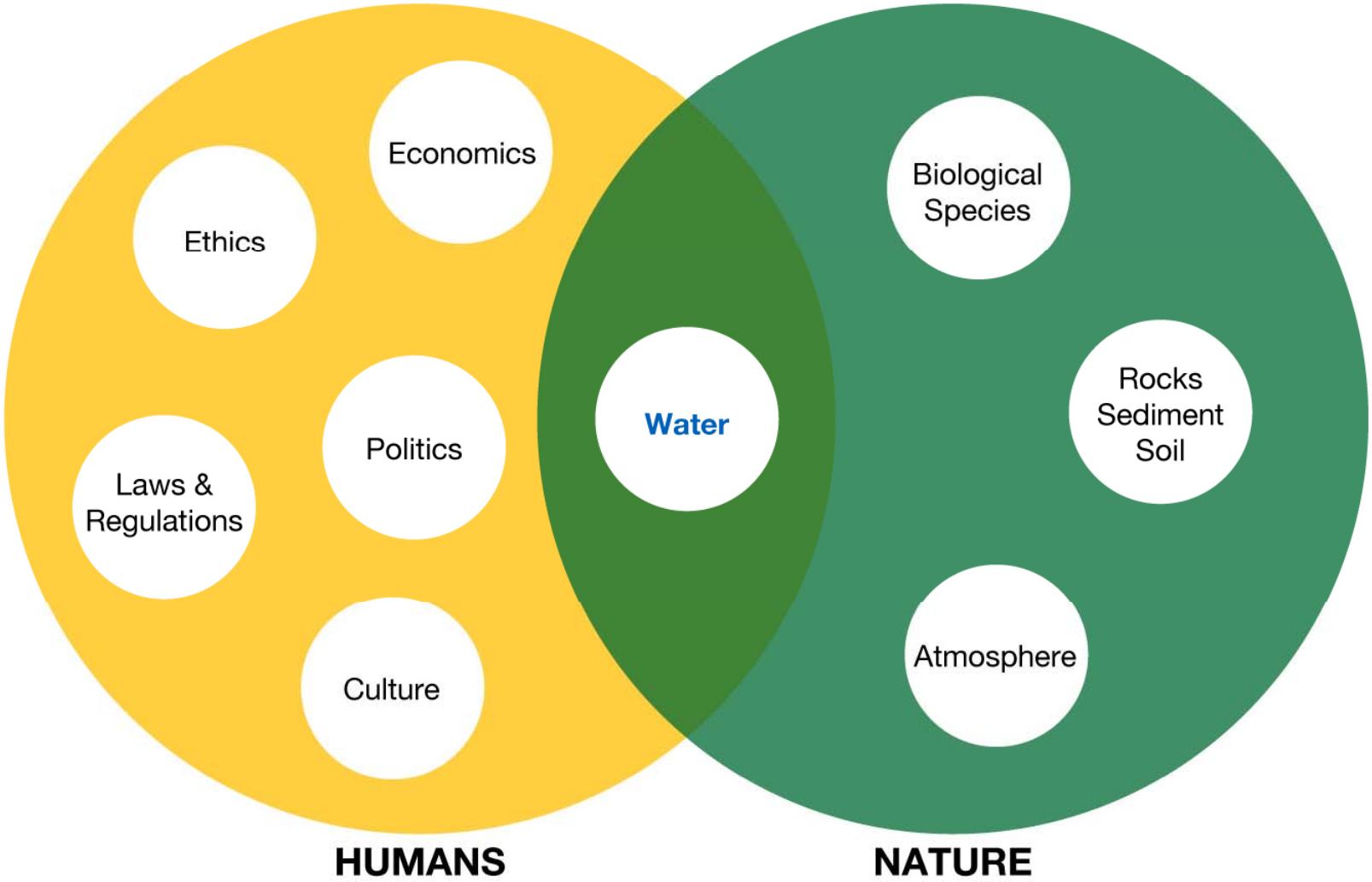
MAJOR ANALYSES

- **WATER DEMAND SCENARIOS TO 2050 (considering climate change)**
- **WATER SUPPLY ANALYSIS TO 2050 (considering climate change)**
- **WATER SUPPLY/DEMAND ANALYSIS TO 2050 (considering climate change)**

THE WATER CYCLE:
A FRAMEWORK FOR REGIONAL WATER SUPPLY PLANNING



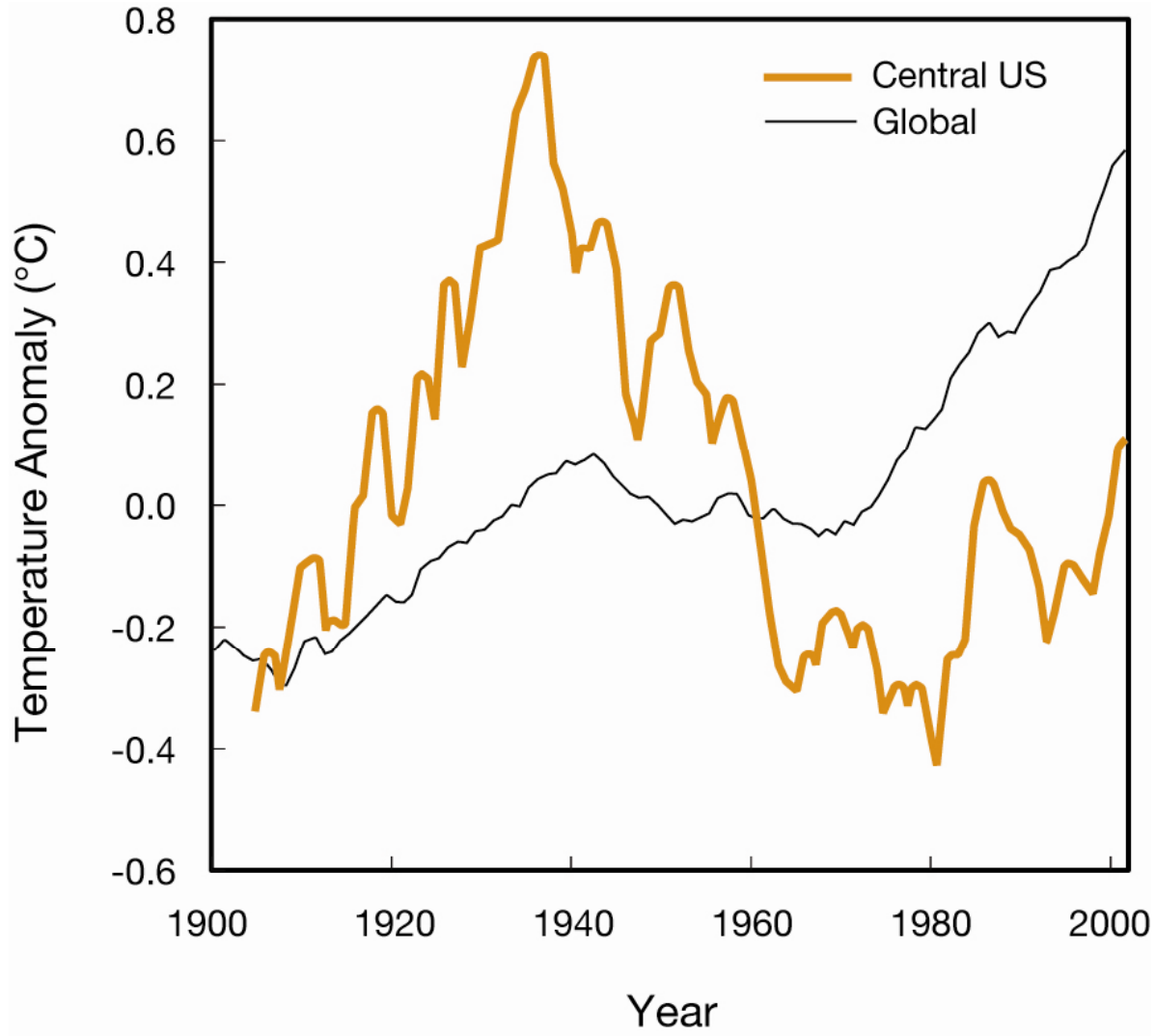
Water Supply Planning and Management



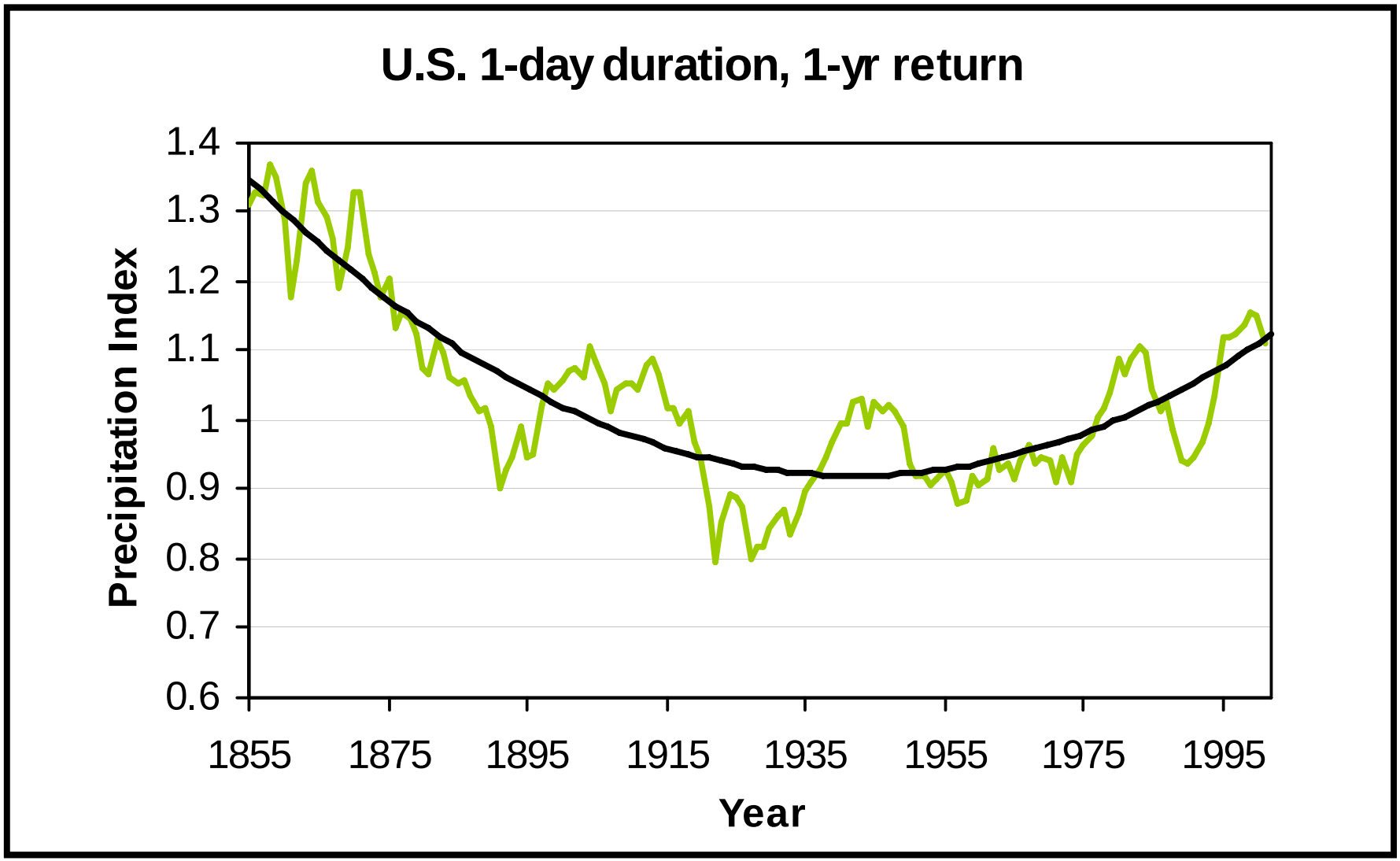
CLIMATE CHANGE

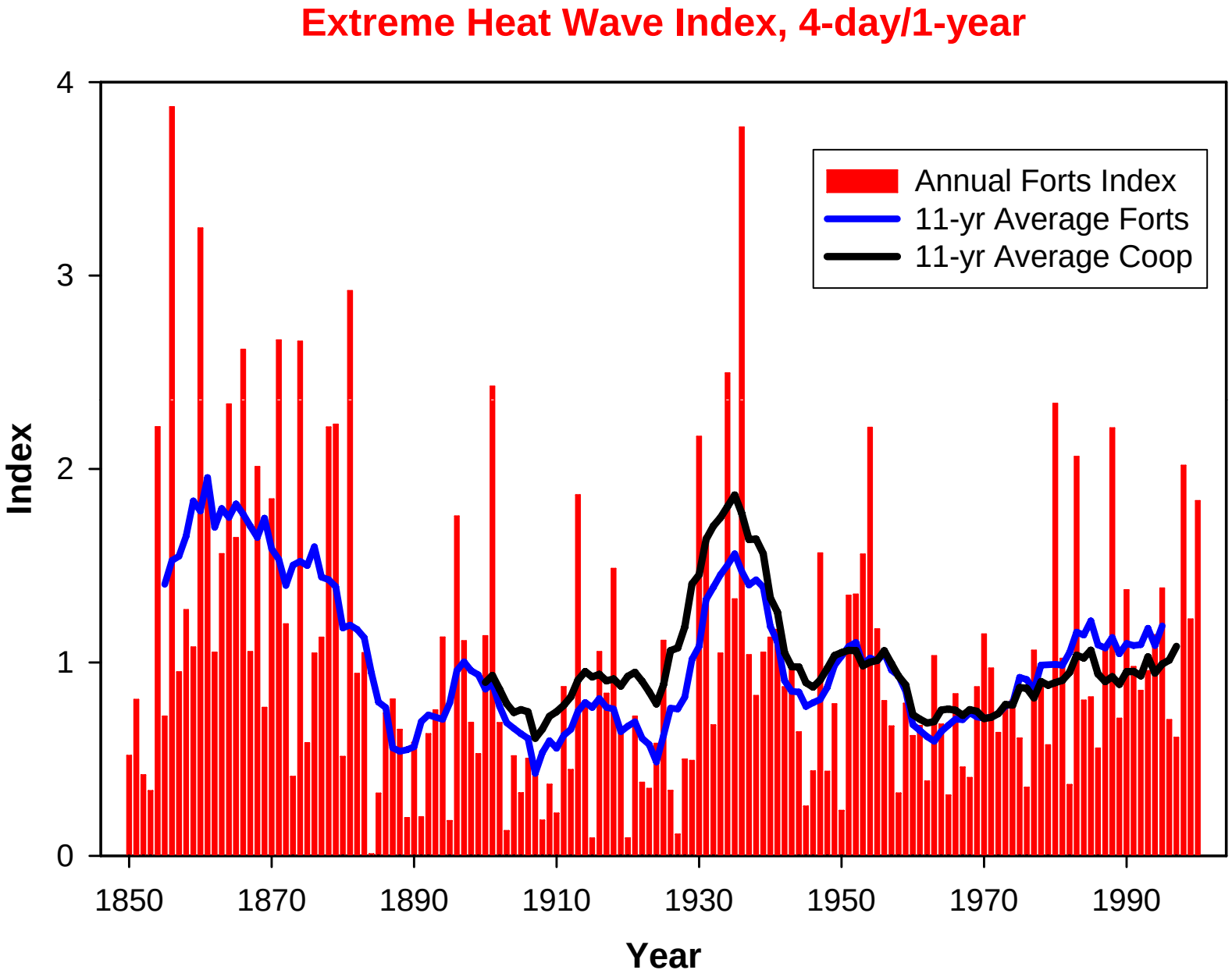
- **Local (urban effect)**
- **Regional**
  - **NE Illinois**
  - **Illinois**
  - **Great Lakes**
  - **USA**
- **Global**
- **Natural**
- **Anthropogenic**

TEMPERATURE CHANGES IN ILLINOIS AND CENTRAL USA ARE NOT THE SAME AS GLOBAL AVERAGE TEMPERATURE TRENDS



Heavy precipitation events have increased over past 80 years, but they were more frequent in the 19th century (Palecki & Kunkel)




Extreme Heat Wave Index, 4-day/1-year
Annual Forts Index
11-yr Average Forts
11-yr Average Coop
Index
Year
0
1
2
3
4
1850
1870
1890
1910
1930
1950
1970
1990

EXTREMES

- **Weather and climate extremes annually cause billions of dollars in damages and often benefits.**

- **Will the intensity and/or frequency of extremes change due to natural and/or anthropogenic climate change?**

POSSIBLE FUTURE CLIMATE SCENARIOS FOR NE ILLINOIS

- **Can't predict future regional climate conditions with confidence:**

  - future greenhouse gas concentrations

  highly uncertain

  - climate model limitations

- **Scenarios based on historical climate record and output from 140 climate model runs.**
- **Large uncertainties and wide ranges of possible future climate conditions to 2050.**

  no change

  +6ºF

  +5 ins precipitation

  -5 ins precipitation

POSSIBLE FUTURE CLIMATE CONDITIONS IN NE ILLINOIS (contd.)

- More heatwaves
- Longer growing season
- Less severe cold spells
- More droughts
- More floods
- Lake Michigan could be higher or lower

IMPACTS OF FUTURE CLIMATE SCENARIOS ON WATER SUPPLY & DEMAND

- **Less precipitation > more droughts; lower lake levels; less water available**
- **More precipitation > more floods; higher lake levels; more water available**
- **How do you manage resources with such uncertainty?**

GROUNDWATER SUSTAINABILITY

“ .. development and use of groundwater in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences.”

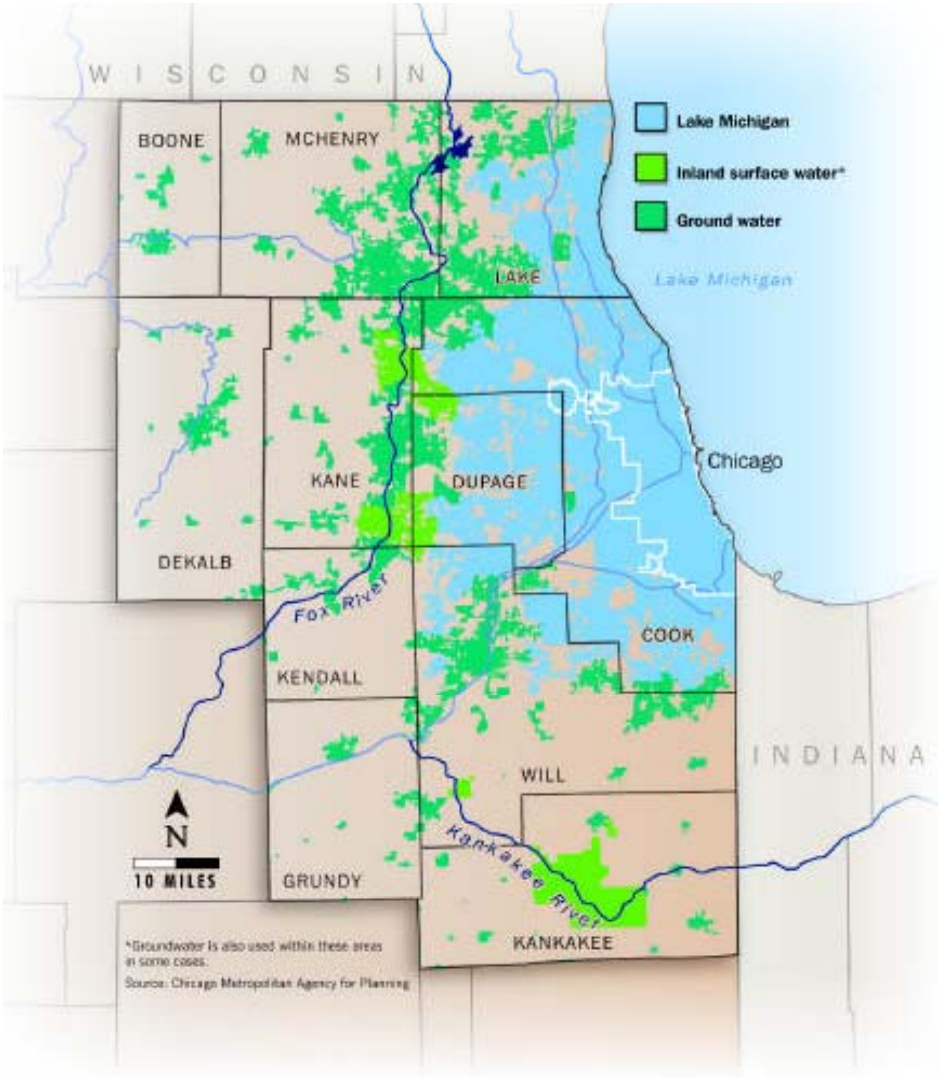
USGS Circular 1186, 1999

REGIONAL WATER SUPPLY ISSUES

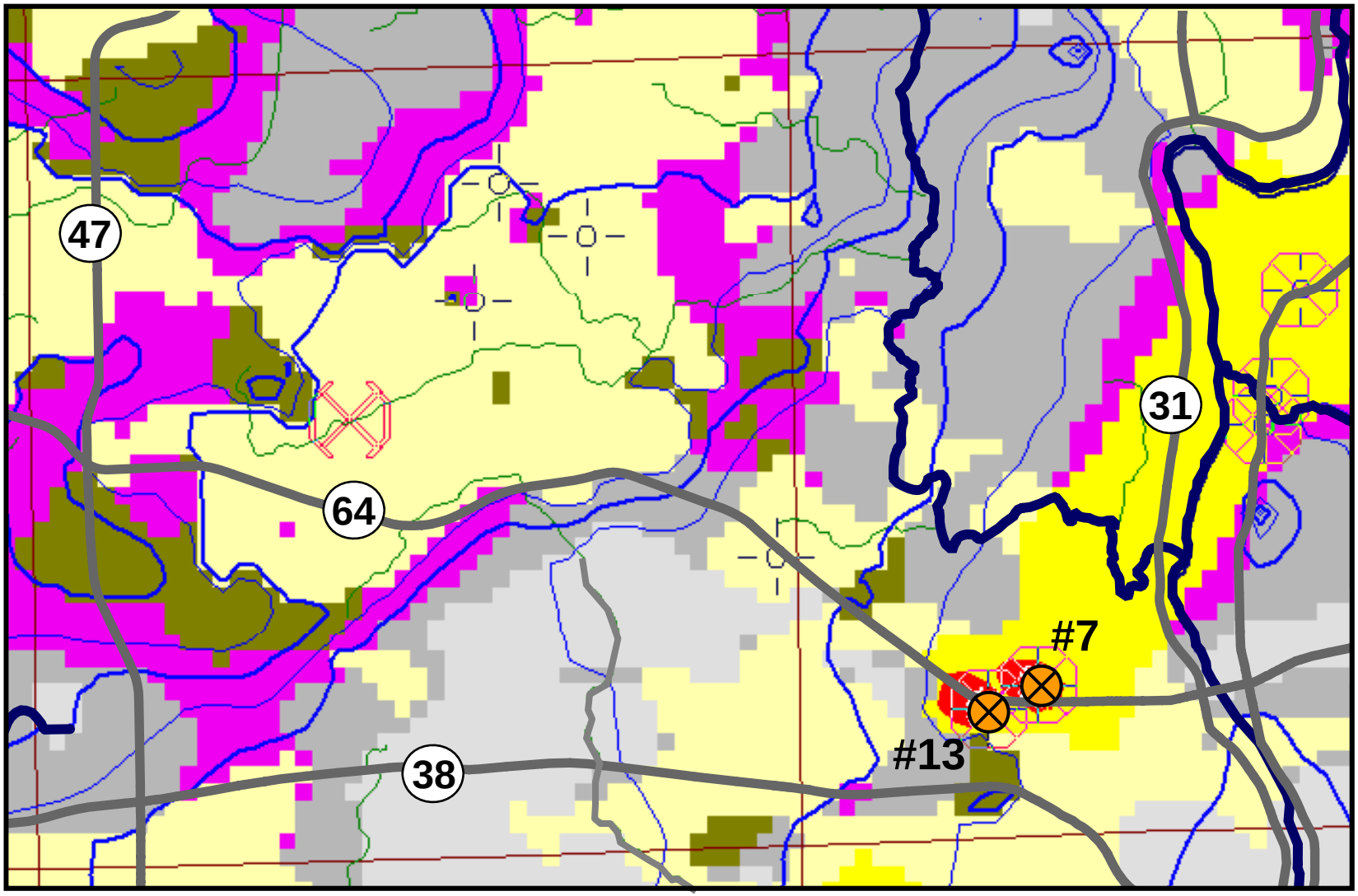
- **Sustainability**

  – how define operationally?
- **How integrate use of Lake Michigan water, groundwater, and surface water under possibly changing climatic conditions?**
- **How much adverse impacts to accept and costs to bear?**

Water Sources for Public Supply in Northeast Illinois



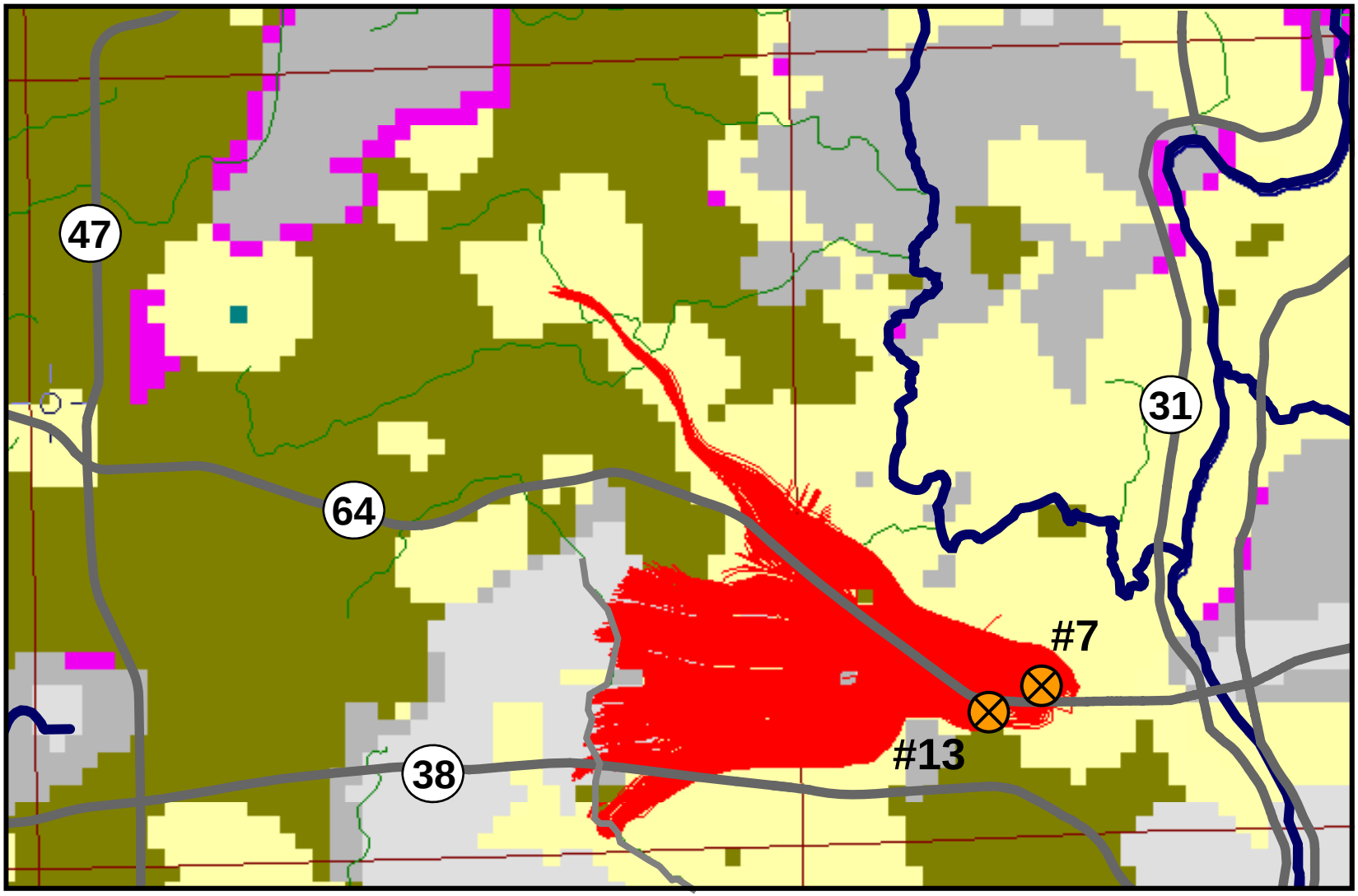
Capture Zone of St Charles #7 and #13



Layer 16

1 Year

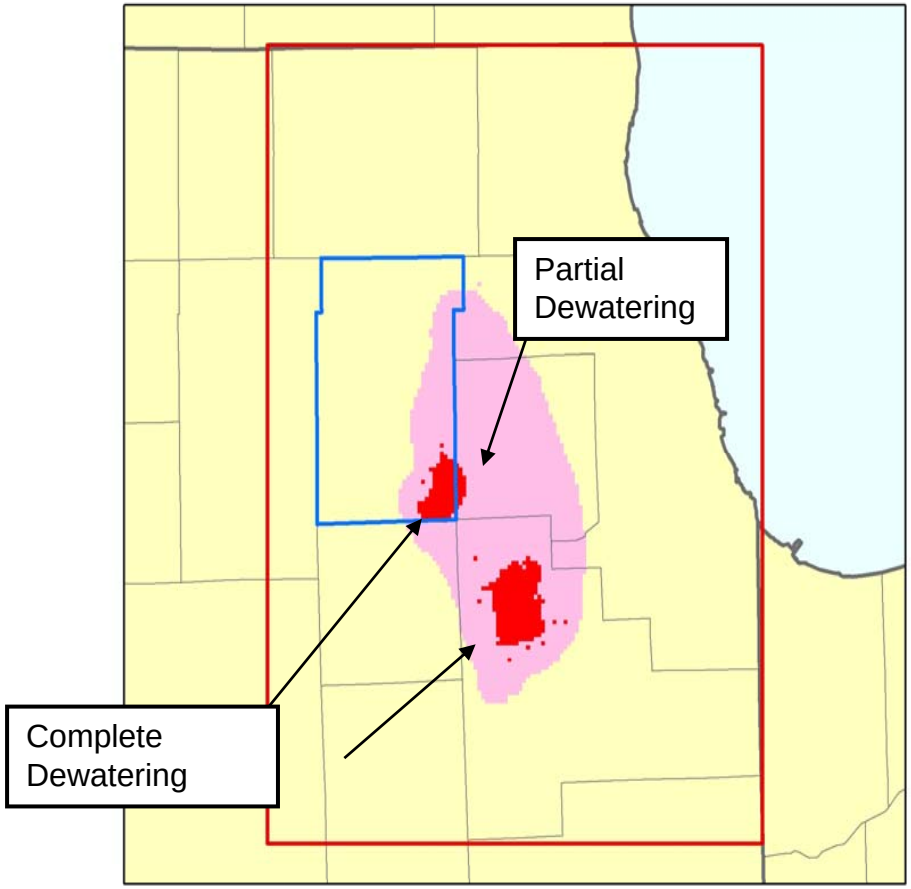
Capture Zone of St Charles #7 and #13



Layer 14

40 Years

Expected Areas of Dewatering of Ancell (Extended Pumping at 2002 Rates) (S. Meyer et al, draft, 2007)



REGIONAL WATER SUPPLY MANAGEMENT RECOMMENDATIONS (6/09)

Northeastern Illinois Regional Water Supply Planning Group

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Chicago Metropolitan Agency for Planning

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ILLINOIS DEPARTMENT OF NATURAL RESOURCES

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GOVERNOR

COMPONENTS OF A POLICY FRAMEWORK

- **Develop consensus among City, CMAP & State on future climate conditions we should plan for.**
- **Develop and integrate City, CMAP& State climate adaptation plans. Include water supply planning.**
- **Integrate Lake Michigan water, groundwater and surface water in regional water supply plan.**
- **Integrate NE Illinois water supply planning with economic, land-use, energy and transportation planning.**
- **Develop policies that are robust and flexible to deal with a wide range of possible future climate conditions.**
- **Determine acceptable costs and risks.**
- **Reduce uncertainty through research.**
- **Revisit policies and strategies as more information becomes available (adaptive management).**
- **Define sustainability in an operational manner.**

Illinois State WATER Survey (1895)

HAPPY HOLIDAYS

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