

Planning for Sustainable Water Supplies in Illinois

*Environmental Horizons Sustainability Summit
April 24, 2008*

Allen Wehrmann, P.E., Director
Center for Groundwater Science
Illinois State Water Survey, IL Dept. Natural Resources



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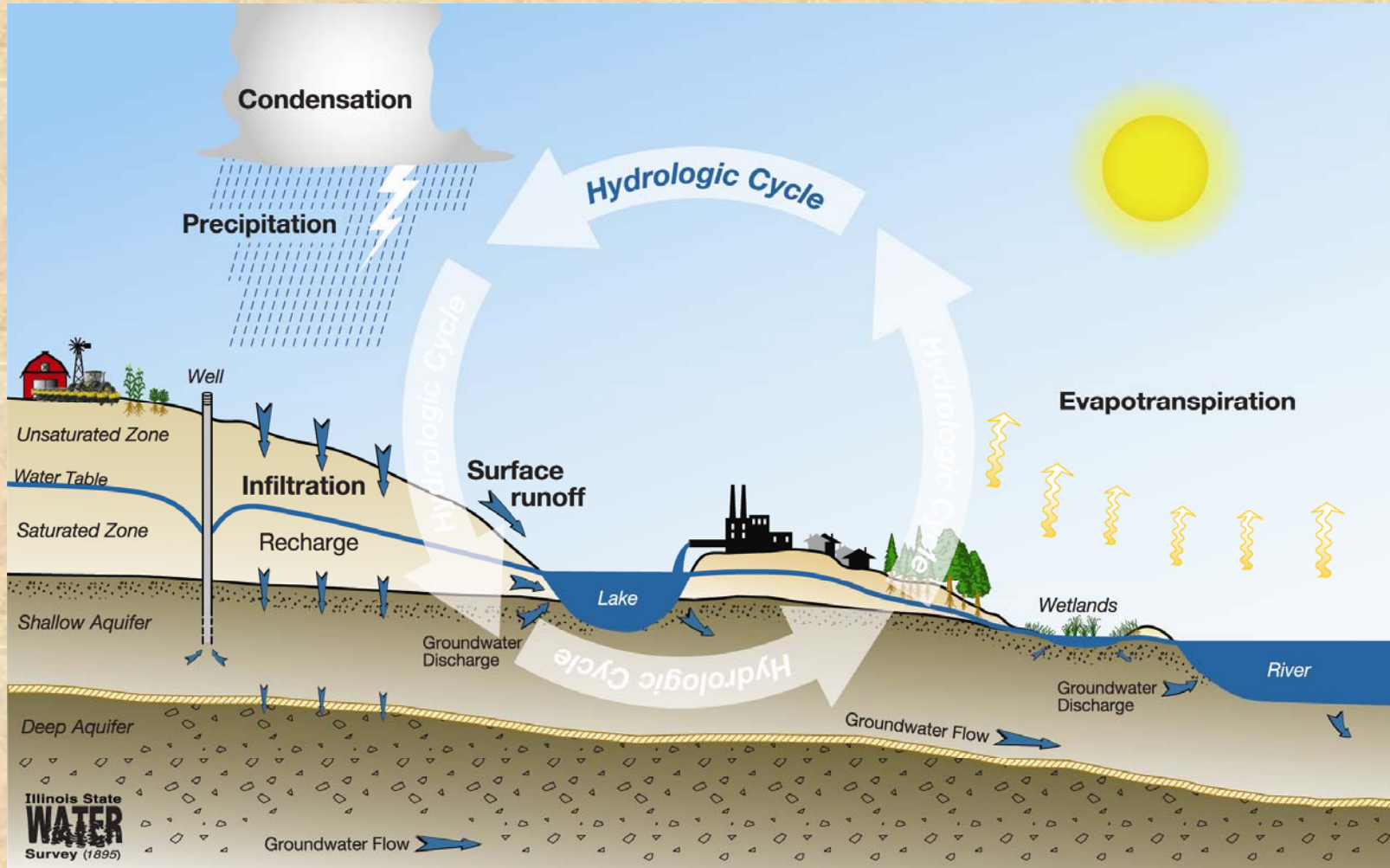
Acknowledgment

**My Colleagues & Partners
at the
Illinois State Water Survey &
Illinois State Geological Survey**



The Water Cycle

Climate, surface water, and groundwater are linked



Illinois Water Use – Quick Facts

- Total water withdrawals ~2.8 bgd
- Surface water withdrawals ~1.9 bgd
- Total groundwater withdrawals ~0.9 bgd
 - Roughly split between sand/gravel & bedrock sources
 - ~ 500 mgd for public and domestic supply
 - ~ 200+ mgd for irrigation (mostly sand/gravel)
- ~ 1800 community water supply facilities
 - ~ 1200 of those use groundwater
 - Lake Michigan provides 900 mgd to Chicago & 140 other systems in Cook, DuPage and Lake Counties

Water Withdrawals in Illinois (million gallons/day)

	Surface Water	Ground Water	Total
Domestic & Public Water Supply	1,450	500	1,950
Self-Supplied Industry	420	180	600
Livestock & Irrigation	2	234	236
Thermoelectric	<u>17,100</u>	<u>10</u>	<u>17,110</u>
TOTAL	19,000	925	19,900

New potential ethanol demands will require 30 – 70 MGD



Executive Order 2006-01

- Three year planning initiative ending June 2009
- \$5 million over three years
- Includes \$1.5 million for local planning grants



OFFICE OF THE GOVERNOR
ROD R. BLAGOJEVICH - GOVERNOR

NEWS

FOR IMMEDIATE RELEASE
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Governor Blagojevich orders statewide water supply study

Governor issues executive order to study state's water needs to protect against shortages and develop regional plans

SPRINGFIELD – Following last summer's long and costly drought, Governor Rod R. Blagojevich today issued an Executive Order to develop a comprehensive, statewide water supply planning and management strategy. The Department of Natural Resources Office of Water Resources will oversee the process in conjunction with the State Water Survey (SWS).

"It is critical for Illinois to get ahead of the curve when it comes to water supply planning," said Gov. Blagojevich. "Last summer's drought demonstrated to us that careful management of our water must be a priority so we always have enough supply for people to drink and use, for our industries like agriculture, and for our fish and wildlife habitats."

While Illinois is on the shores of Lake Michigan, one of the largest freshwater sources in the world, and has significant sources of both groundwater and surface water, portions of the state face legal and physical restraints to increasing water supplies. Shortages like last year's drought, and the restrictions it triggered, have so far been rare, but the growing population of the state and increasing demand for water will strain current sources.

Previously, the SWS, the Illinois Interagency Coordinating Committee on Groundwater, and the Illinois State Water Plan Task Force have identified the Priority Water Quantity Planning Areas that are most at risk for water shortages and conflicts. By December 31, 2006, at least two of those areas will have Regional Water Quantity Plans in process.

Executive Order 2006-01

Governor's Executive Order calls on IDNR-Office of Water Resources, in conjunction with State Geological and Water Surveys, to:

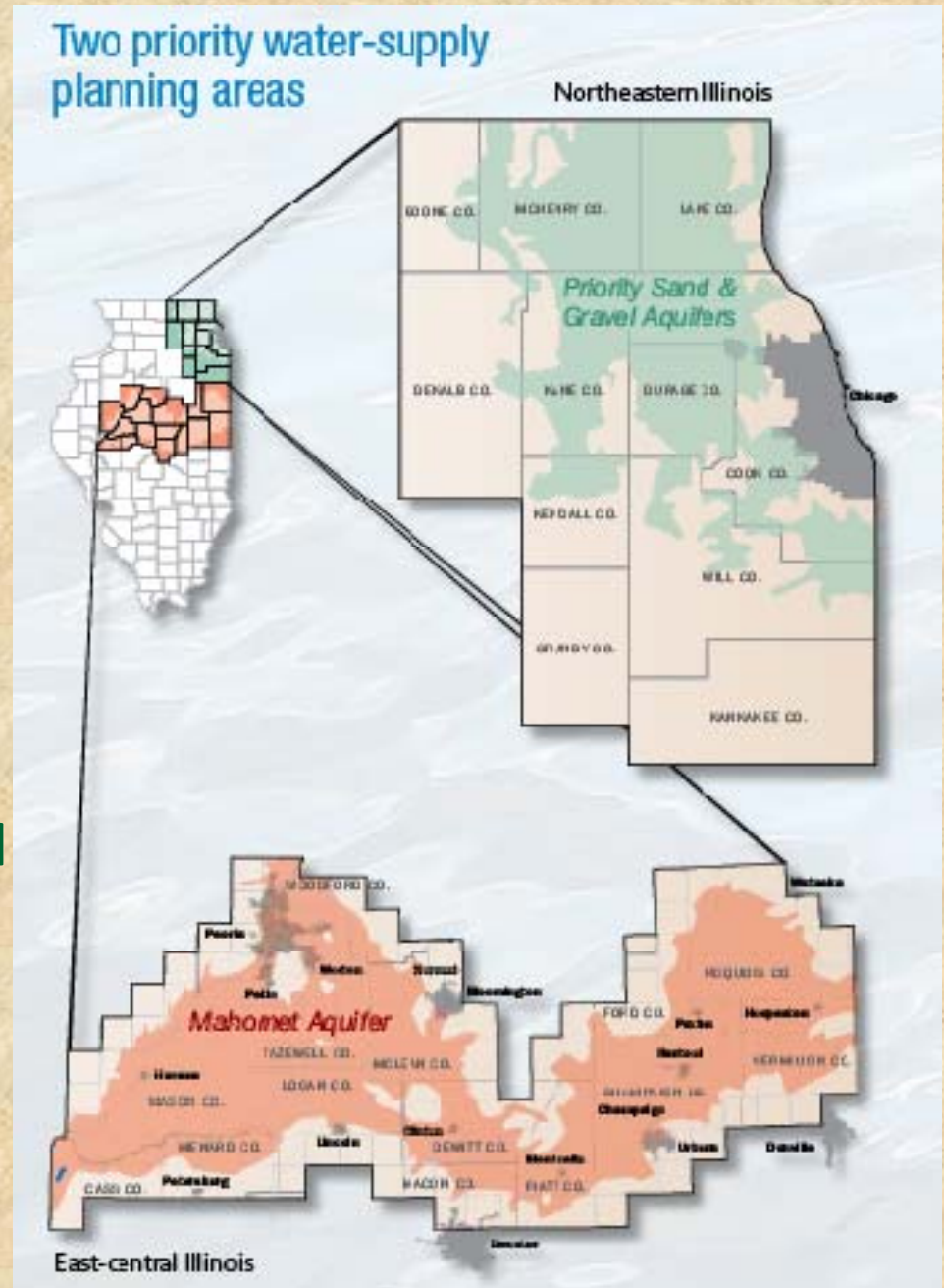
- 1) Create a comprehensive program for state and regional water supply planning & implementation**
- 2) Initiate public review of a strategic plan for a water supply planning and management program**
- 3) Establish a scientific basis & an administrative framework for implementation of state and regional water supply planning and management**
- 4) Encourage creation of locally-based regional water supply planning committees**
- 5) By June 30, 2009 have regional water quantity plans for 2 priority planning areas**



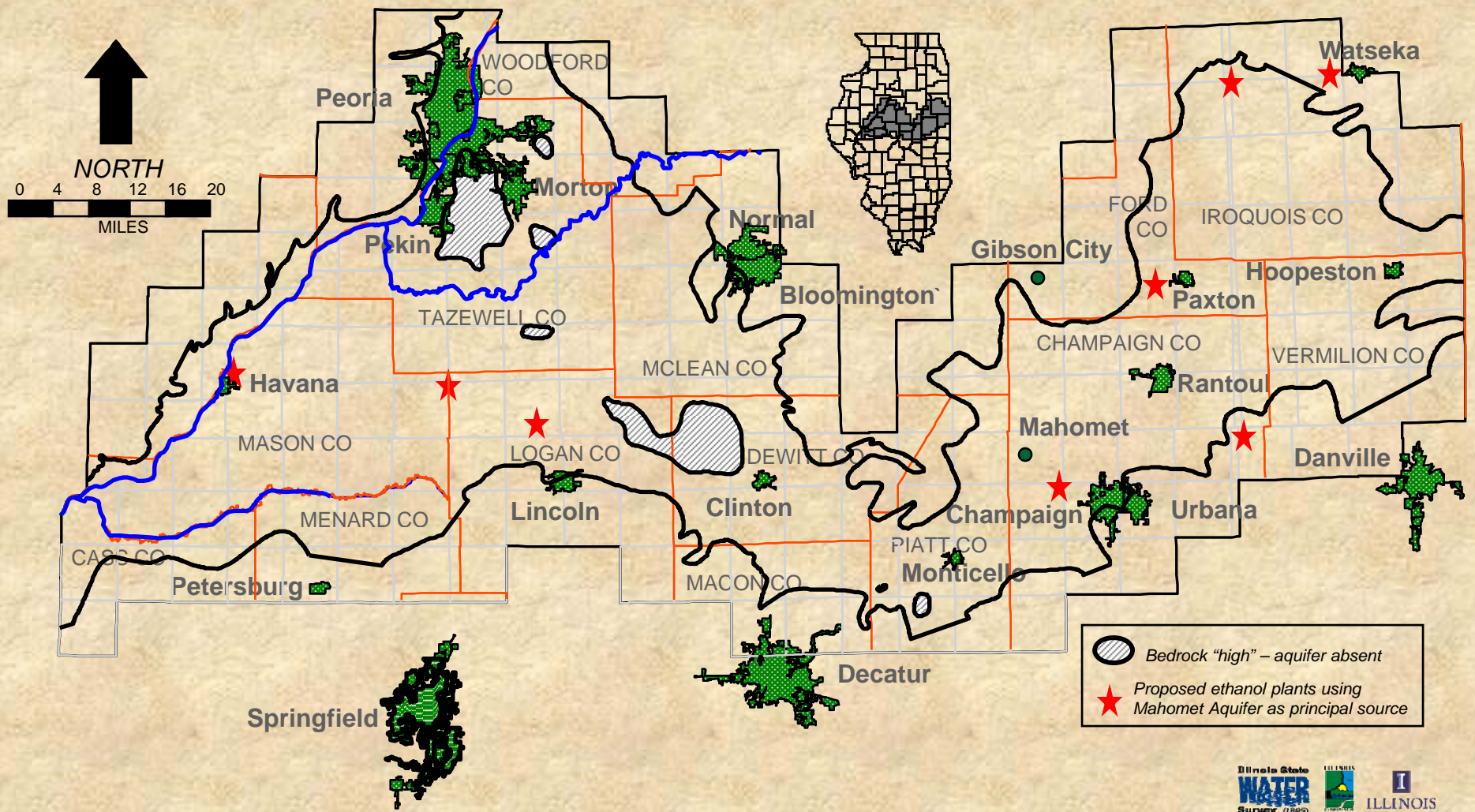
Two priority planning areas
have been established:
Northeast Illinois
East-Central Illinois



Two locally based water
planning committees
have been established

Each committee is nearing
completion of water demand
scenarios to 2050

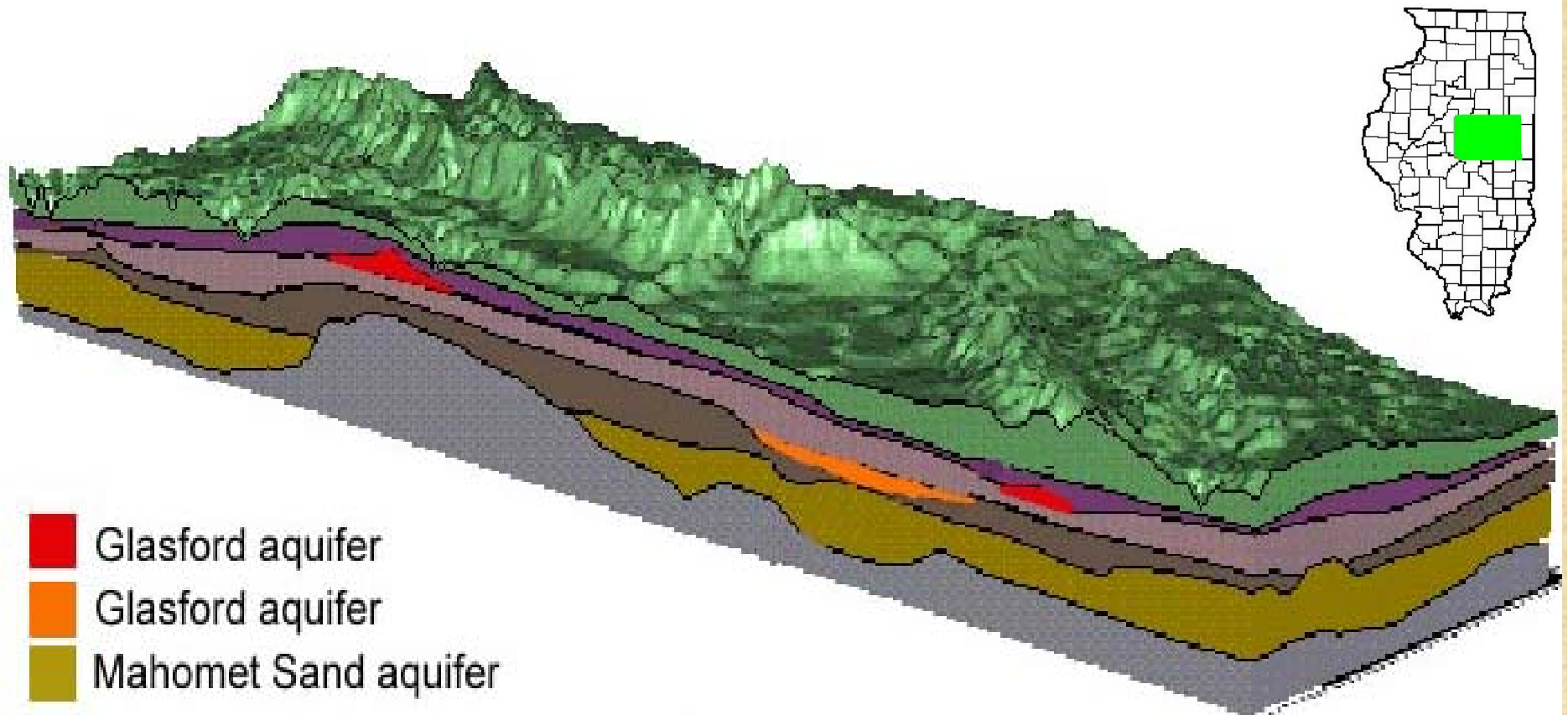


The Mahomet Aquifer Region

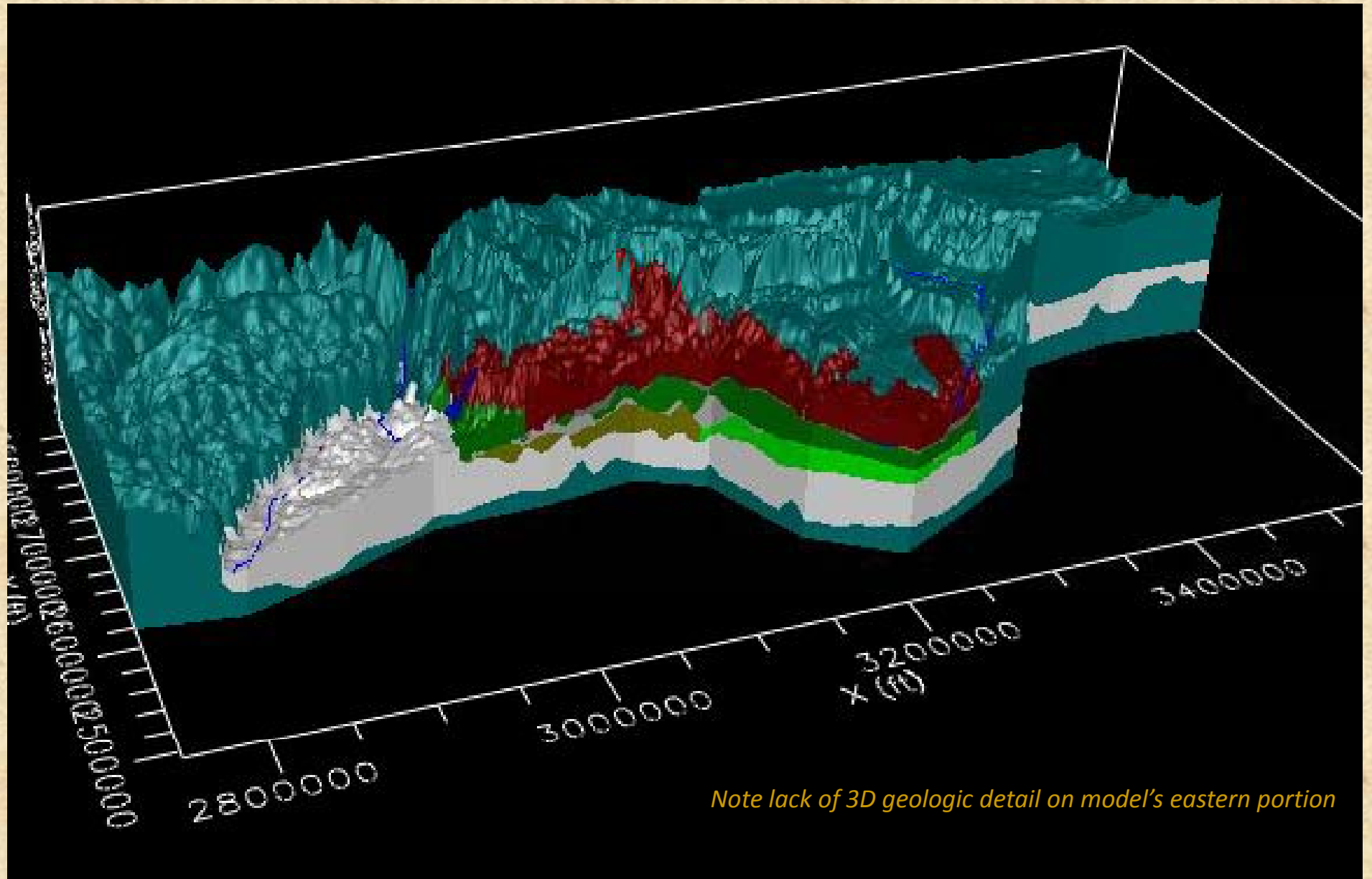


 Bedrock "high" – aquifer absent
 Proposed ethanol plants using Mahomet Aquifer as principal source

Geology of the Mahomet Aquifer



Vertical Slice along the Mahomet Valley Thalweg

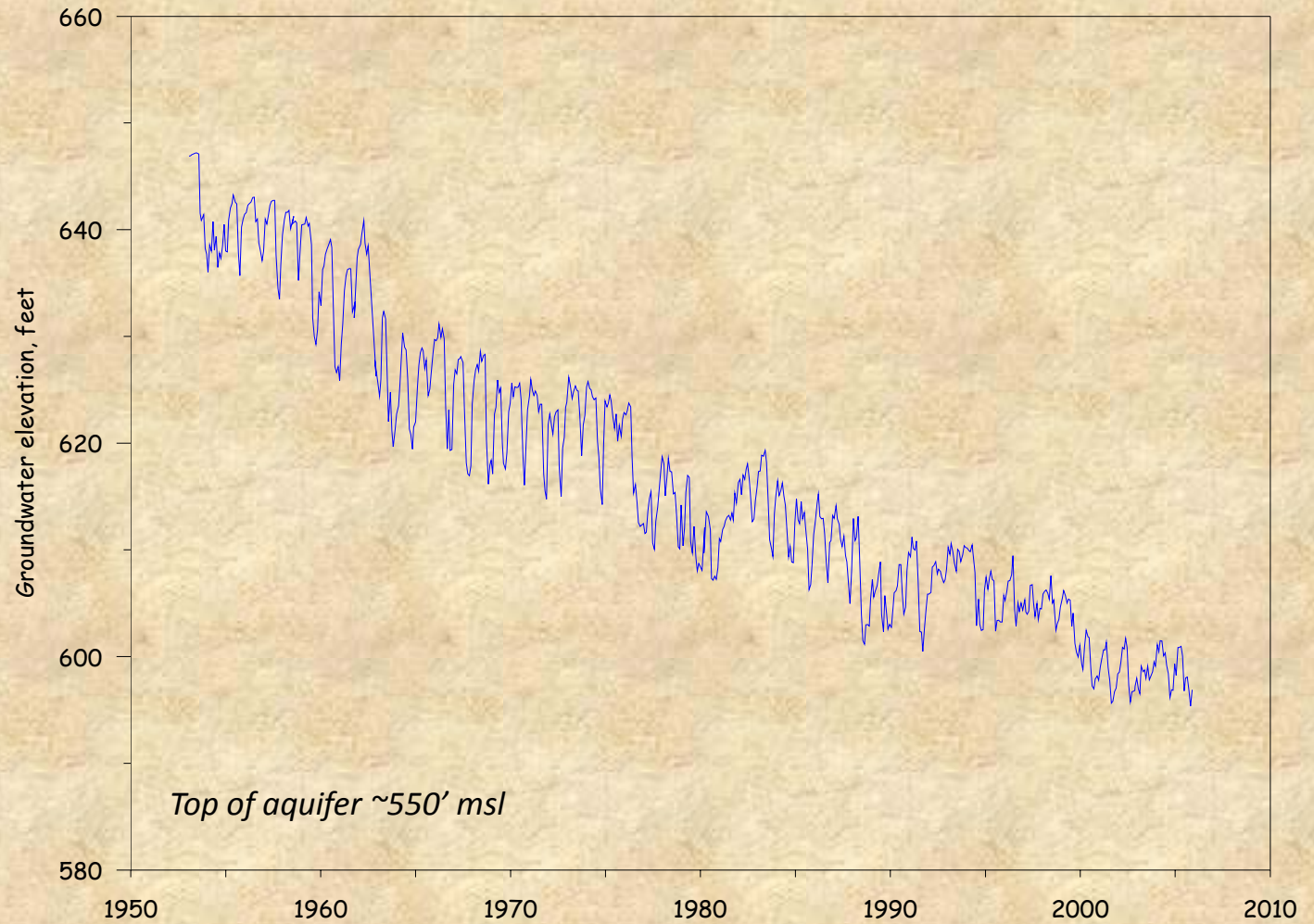


Note lack of 3D geologic detail on model's eastern portion

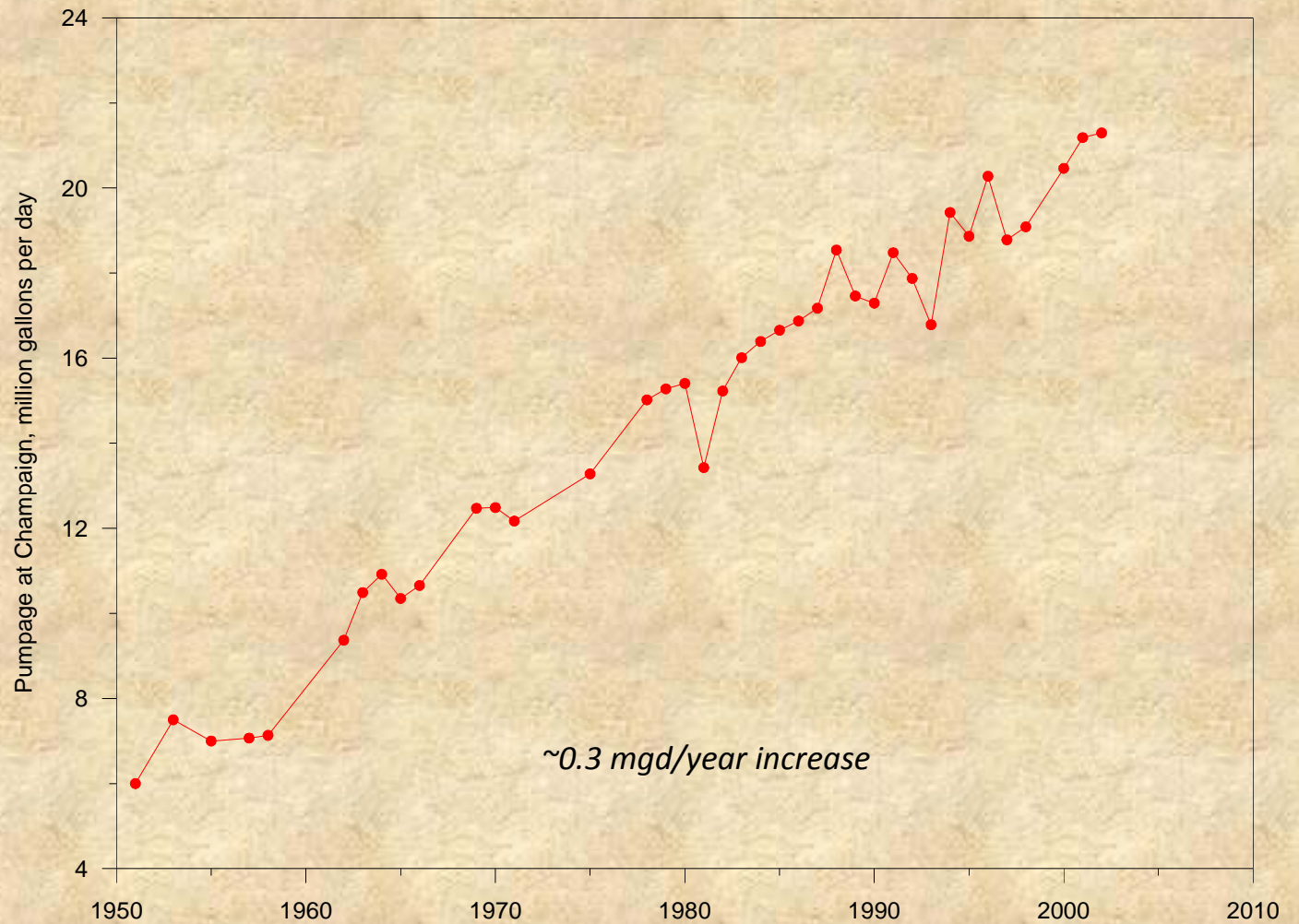
2005 Regional Community Groundwater Use

	Water Use (gpd)
Argenta	60,000
Forsyth	410,000
Illinois-American Water Co.	23,200,000
Mahomet	540,000
Monticello	720,000
Normal	4,290,000
Rantoul	1,670,000
White Heath	60,000
<i>15-County Total Community Groundwater Use</i>	<i>70,210,000</i>

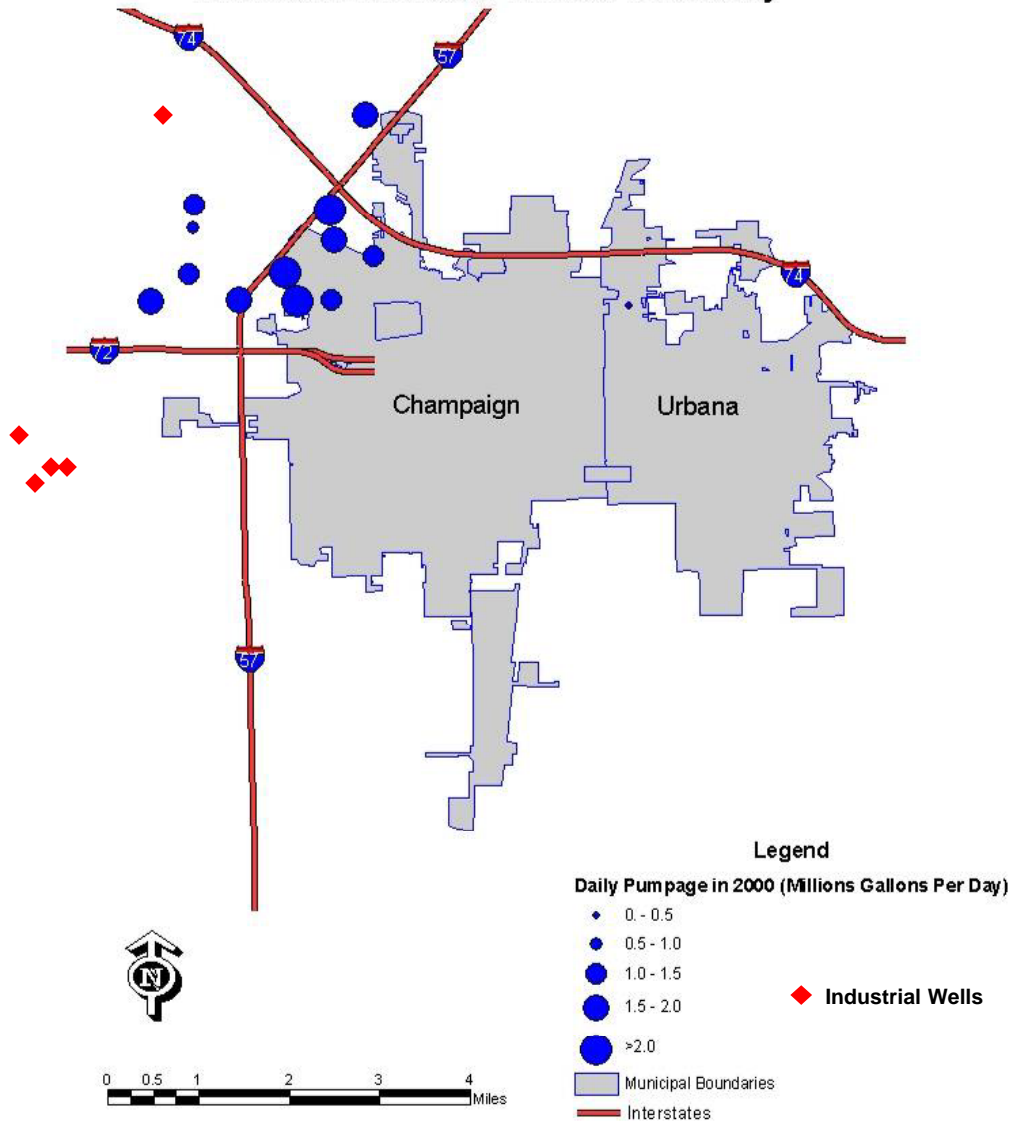
Mahomet Aquifer Water Levels (Head) near Champaign



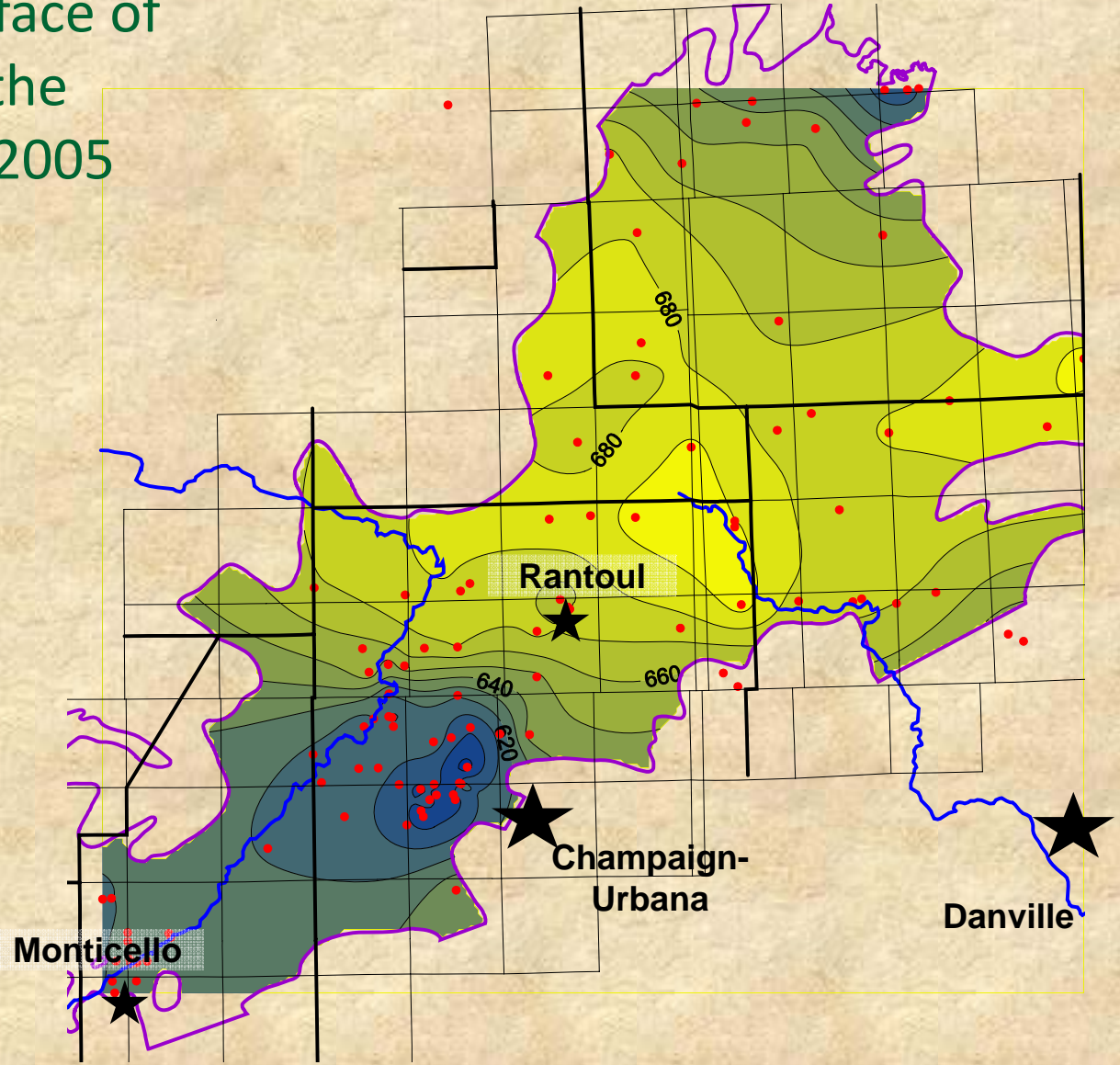
Head Decline a Response to Groundwater Pumpage



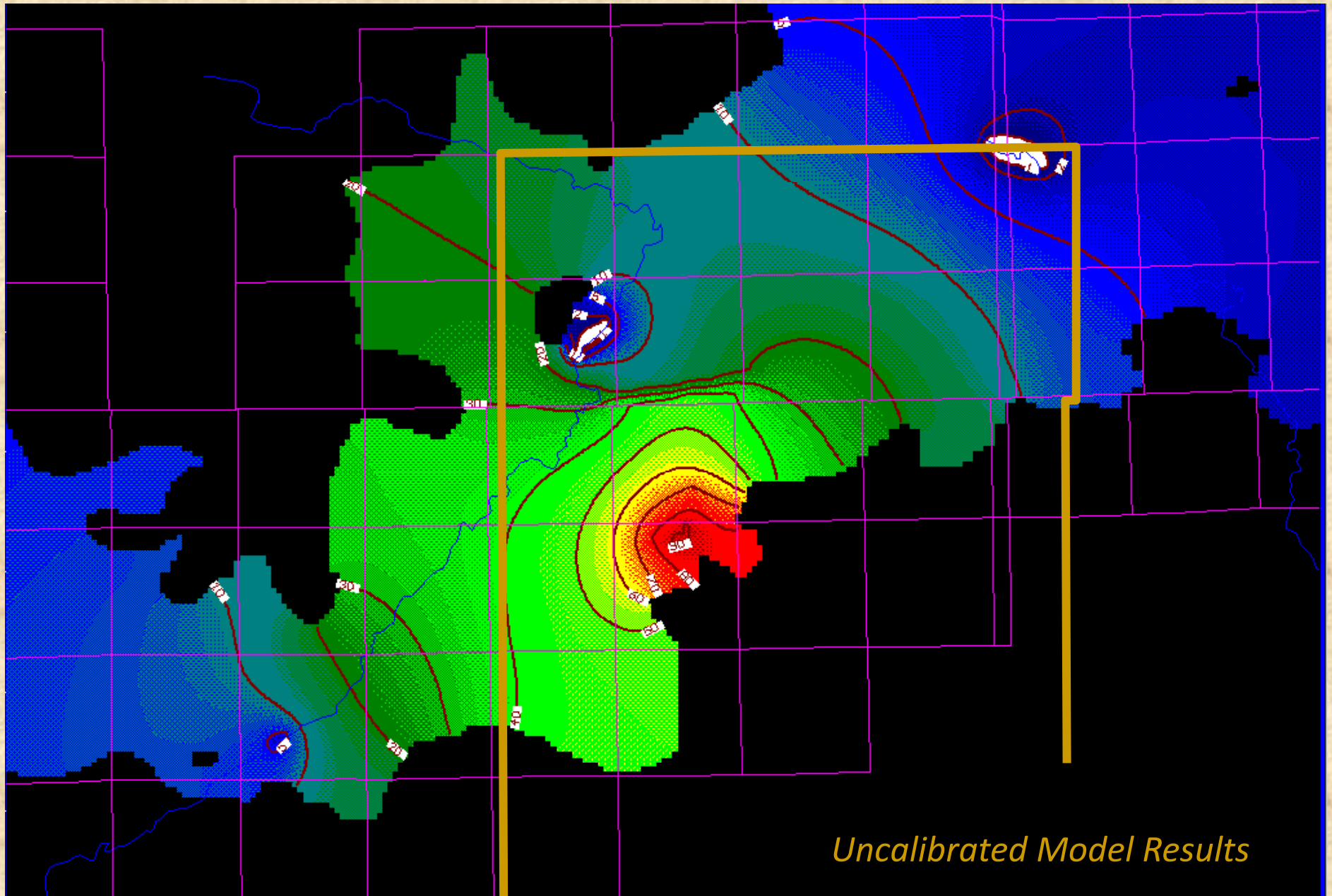
Top Producing Wells Owned by Illinois American Water Comany



Potentiometric Surface of Eastern Portion of the Mahomet Aquifer, 2005

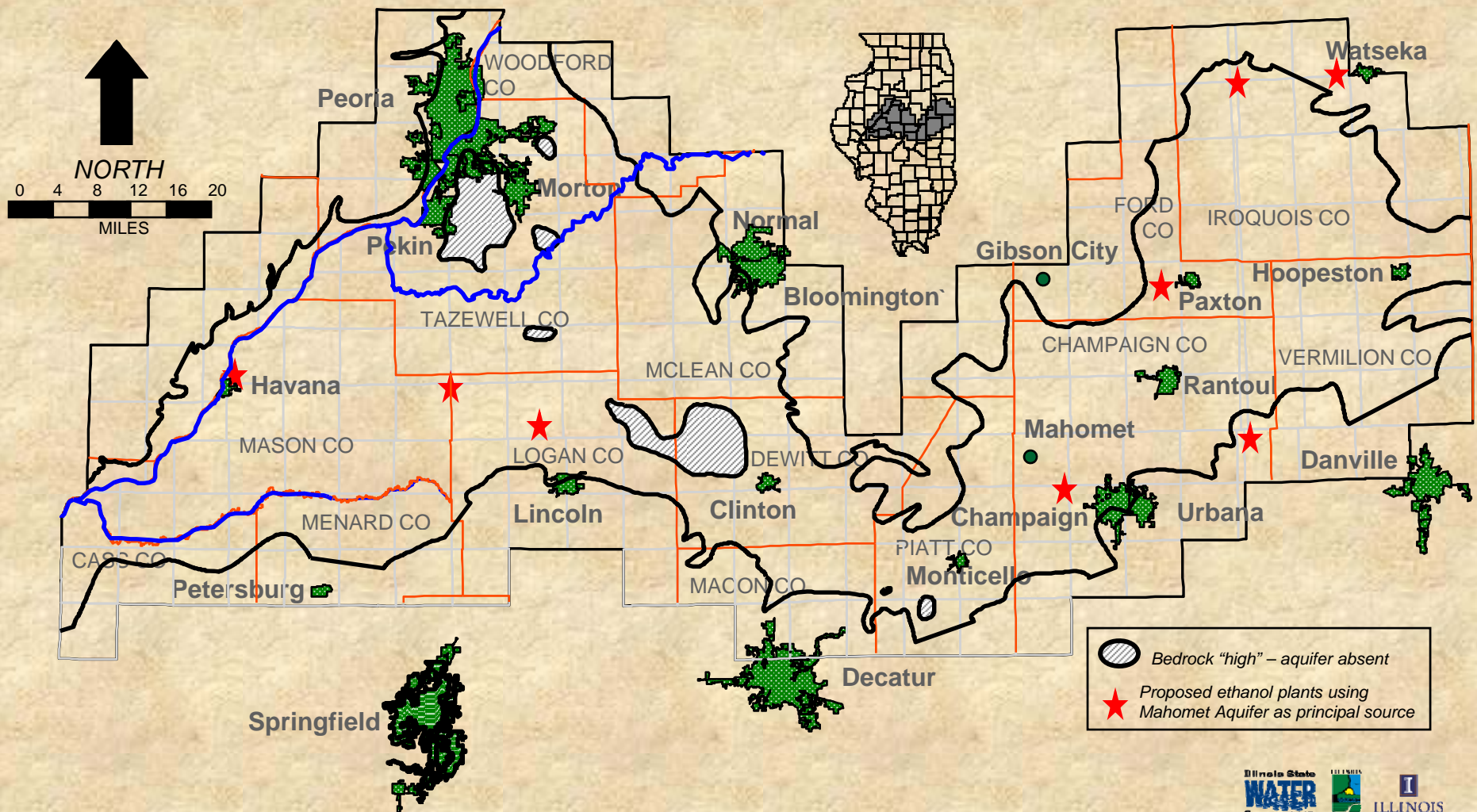


Predicted Drawdown from IL-Am Wellfield, 2005



Uncalibrated Model Results

Ethanol Plants Proposing to Use the Mahomet Aquifer

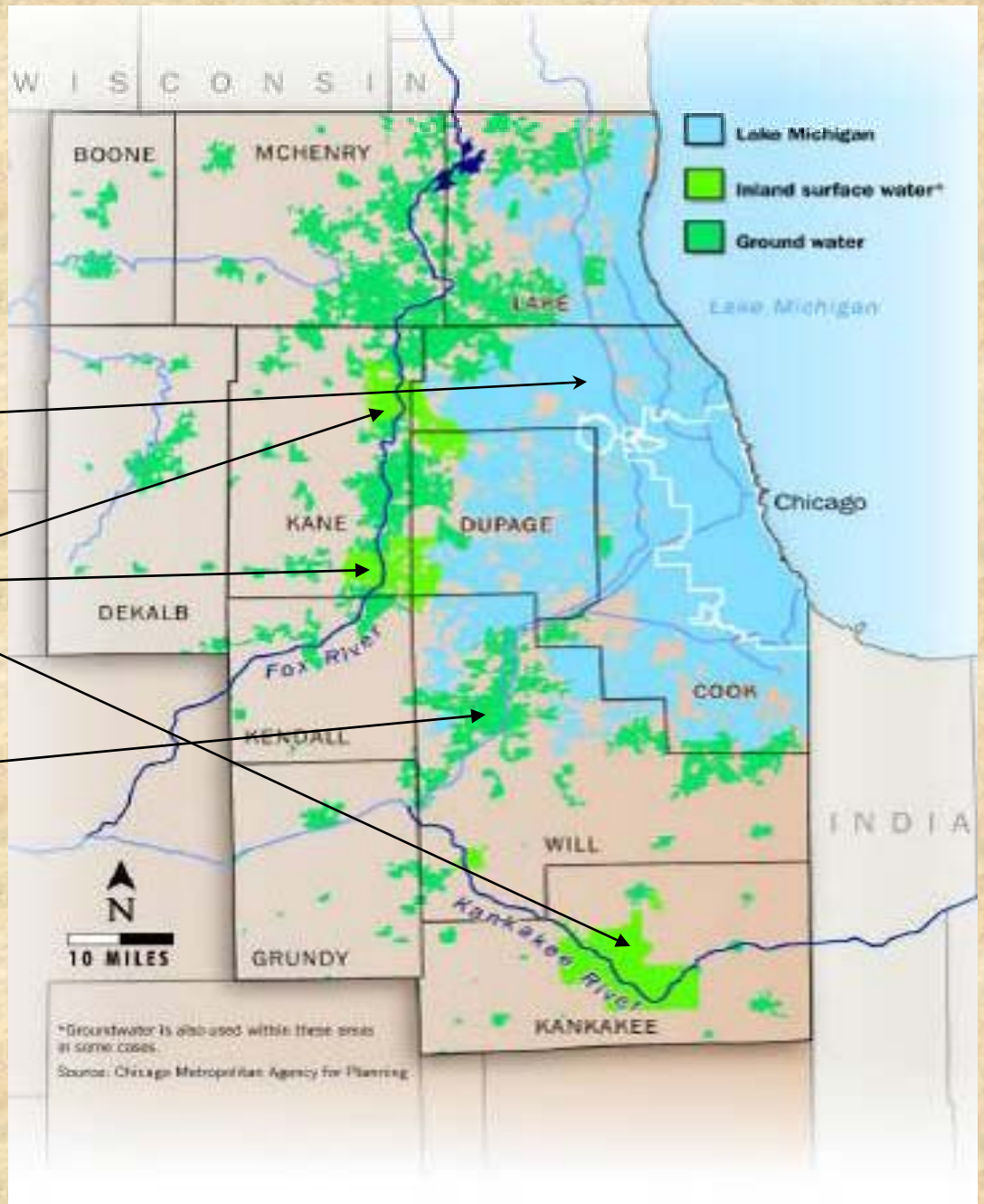


Water Sources for Public Supply in Northeast Illinois

Lake Michigan
900 mgd

Inland surface waters
60 mgd

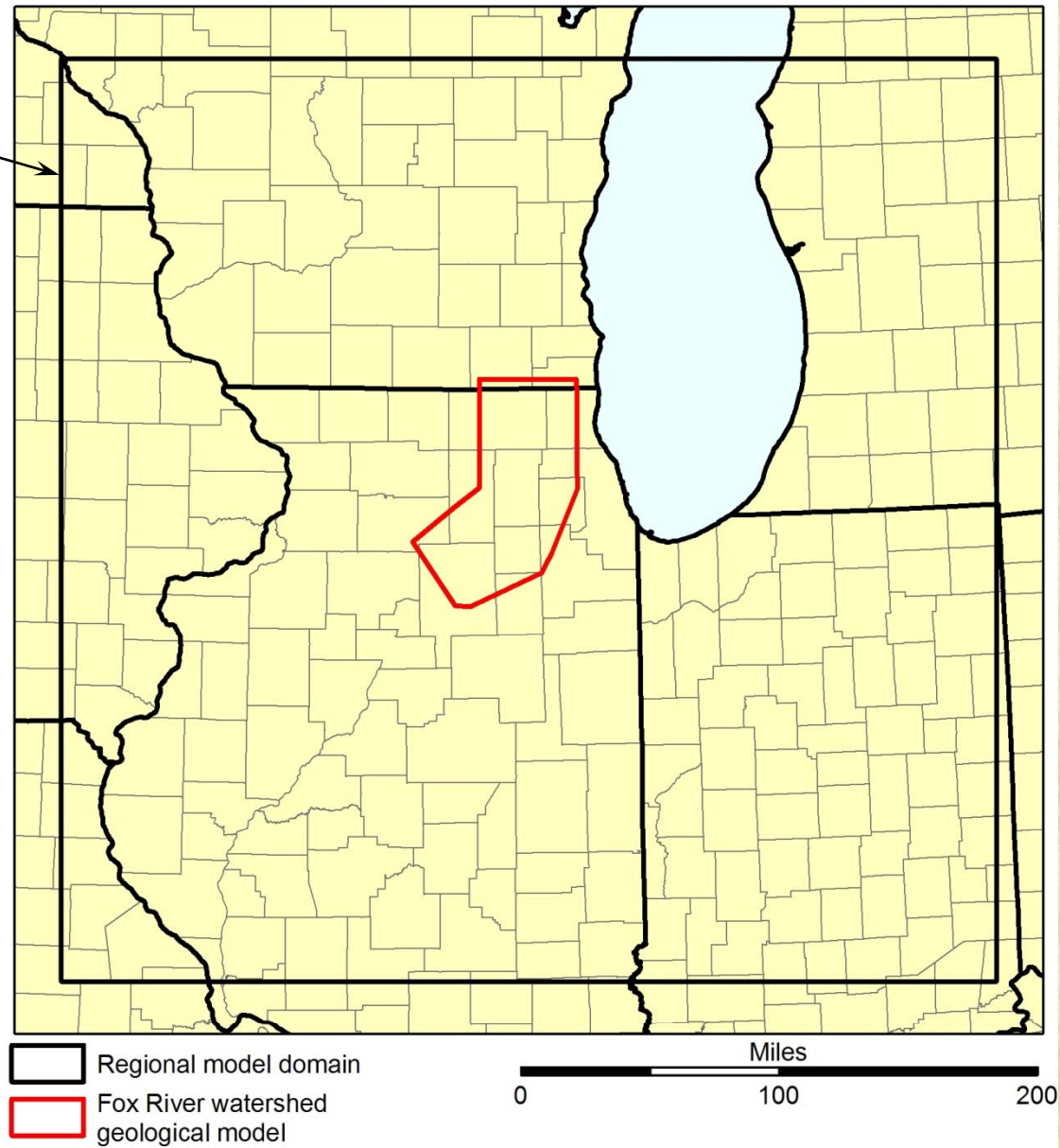
Shallow & Deep
Groundwater
160 mgd



Graphic courtesy of Kane County

A Regional Flow Model Being Developed for NE Illinois

Regional Model Domain
Approx. 800,000 nodes
Max grid spacing 16 mi.
Min grid spacing 2,500 ft.
All aquifers from land surface to basement granite



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

Water Sustainability

“the condition of beneficially using water supply resources in such a way that the uses support current and probable future needs, while simultaneously insuring that the resources are not unacceptably damaged.”

Unacceptable damage is defined as a change in an important physical property of the ground or surface water system (e.g., level, quality, temperature, recharge rate) that approaches a significant % of the normal range of variability.

Southeastern Wisconsin Regional Planning Commission

Sustainability Recognizes:

- Present & future generations
- The value of water supply
- Shared responsibilities
- Limits of water
- Stewardship
- Maintaining the integrity of societal & ecological systems
- Adaptability to deal with uncertainties & risk
- Critical examination of terms like “reasonable use” and “no adverse impacts”

Challenges for Illinois Water Resource Sustainability

- Estimating availability: need for more & better data (e.g., geologic maps, water levels, hydraulic properties, flows) and analytical tools (e.g., models)
- Demand forecasting (population, economic, etc.)
- Influence of climate variability and change on recharge & demand
- Water quality and contamination, treatment options
- Water law
- Water resource management, including conservation and reuse

Visit us on the web!

Illinois State Water Survey Home Page is:

<http://www.sws.uiuc.edu>

Or Google: Illinois State Water Survey

