WATER SUPPLIES
in
EAST CENTRAL ILLINOIS

November 6, 2007
Champaign YMCA

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Chief
Illinois State Water Survey

IDNR **UIUC**

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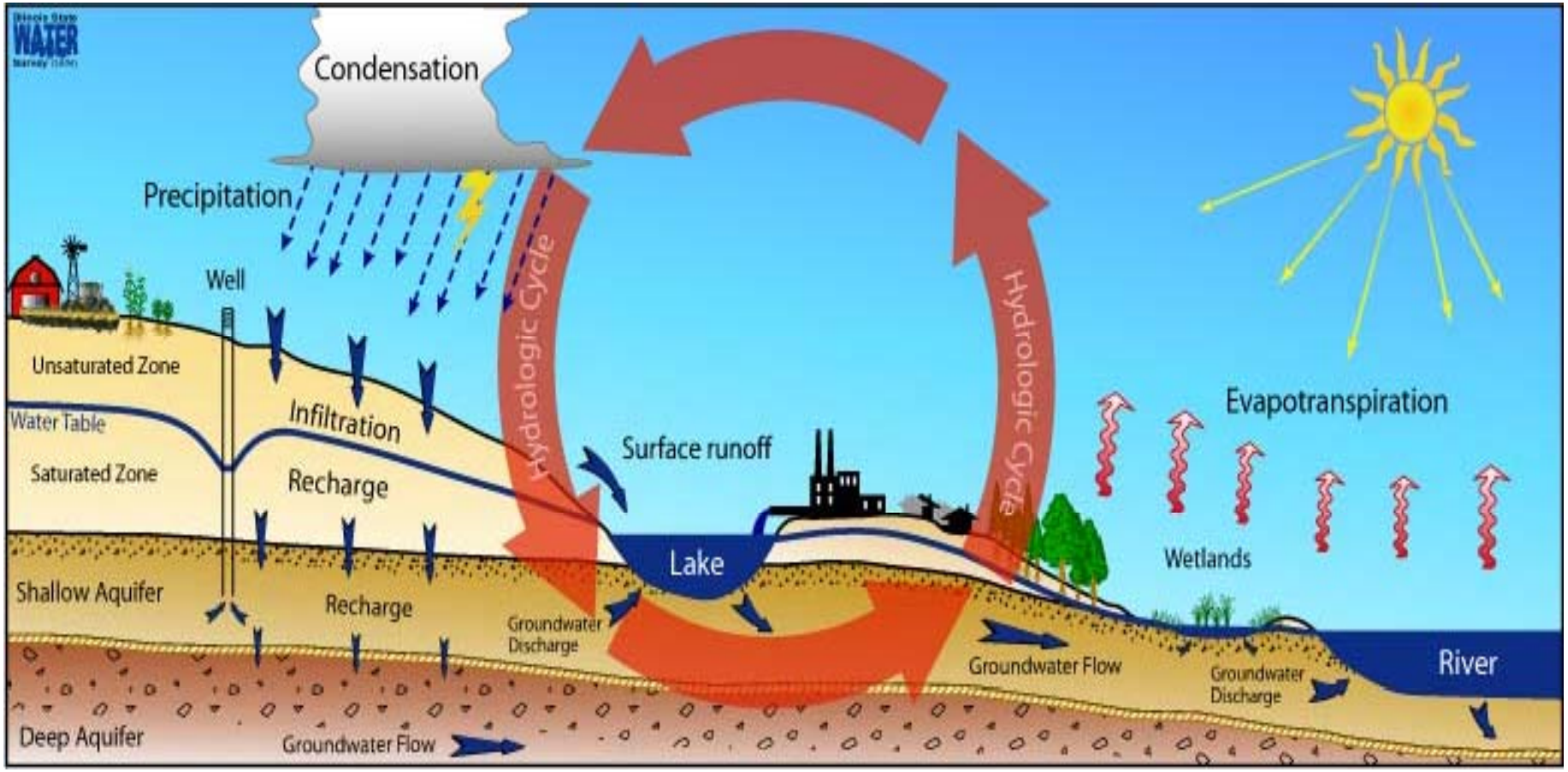
Fresh Water Use, Illinois, 2000 and 2025 (mgd)

	2000	2025
Public Supply	1,678	2,205
Self-Supplied Industries	493	547
Livestock and Irrigation	38	42
Thermoelectric	13,272	16,889
TOTAL	15,793	20,197

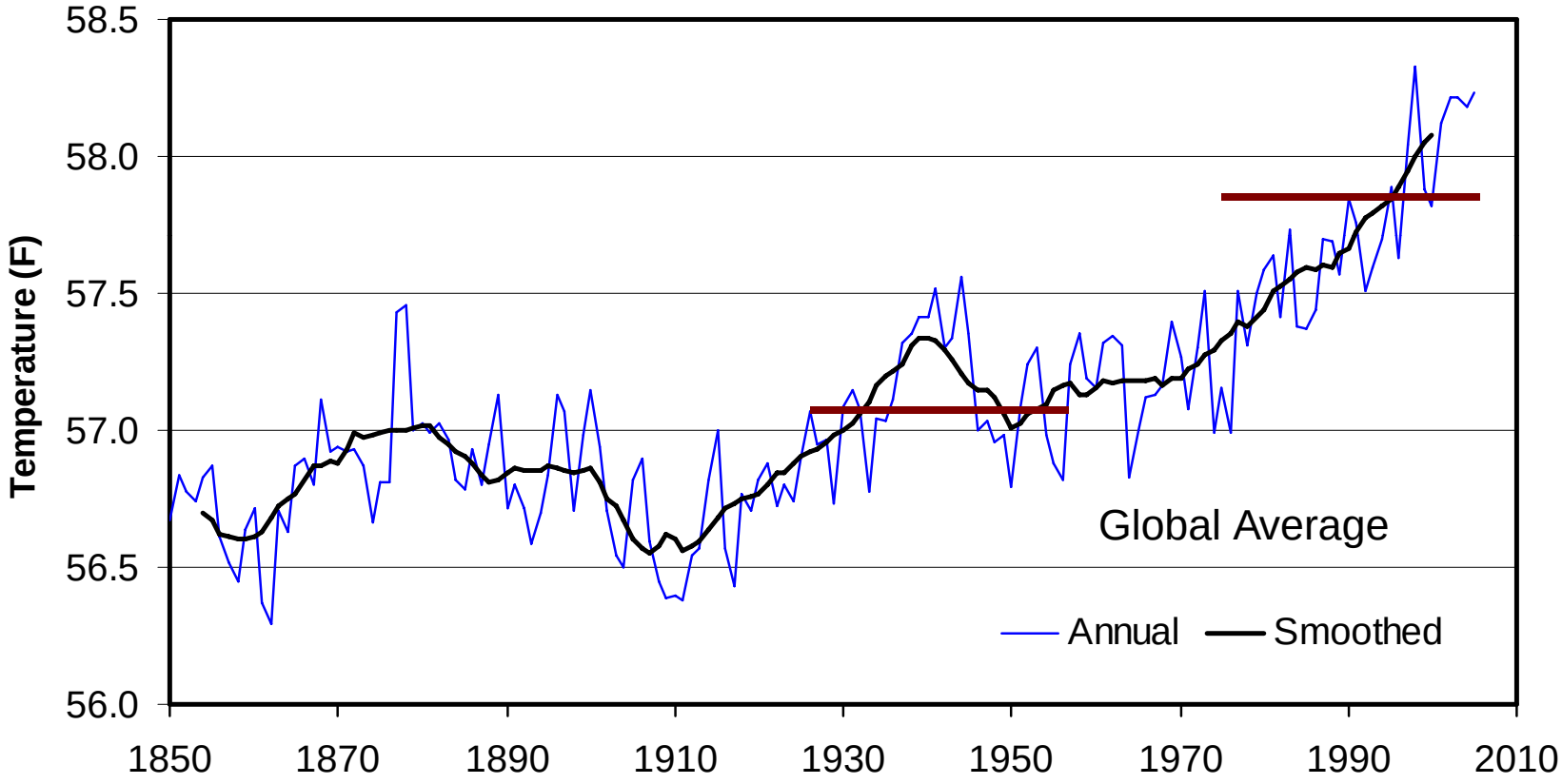
Source:SIU

THE WATER CYCLE: PRECIPITATION; SURFACE WATER; GROUNDWATER



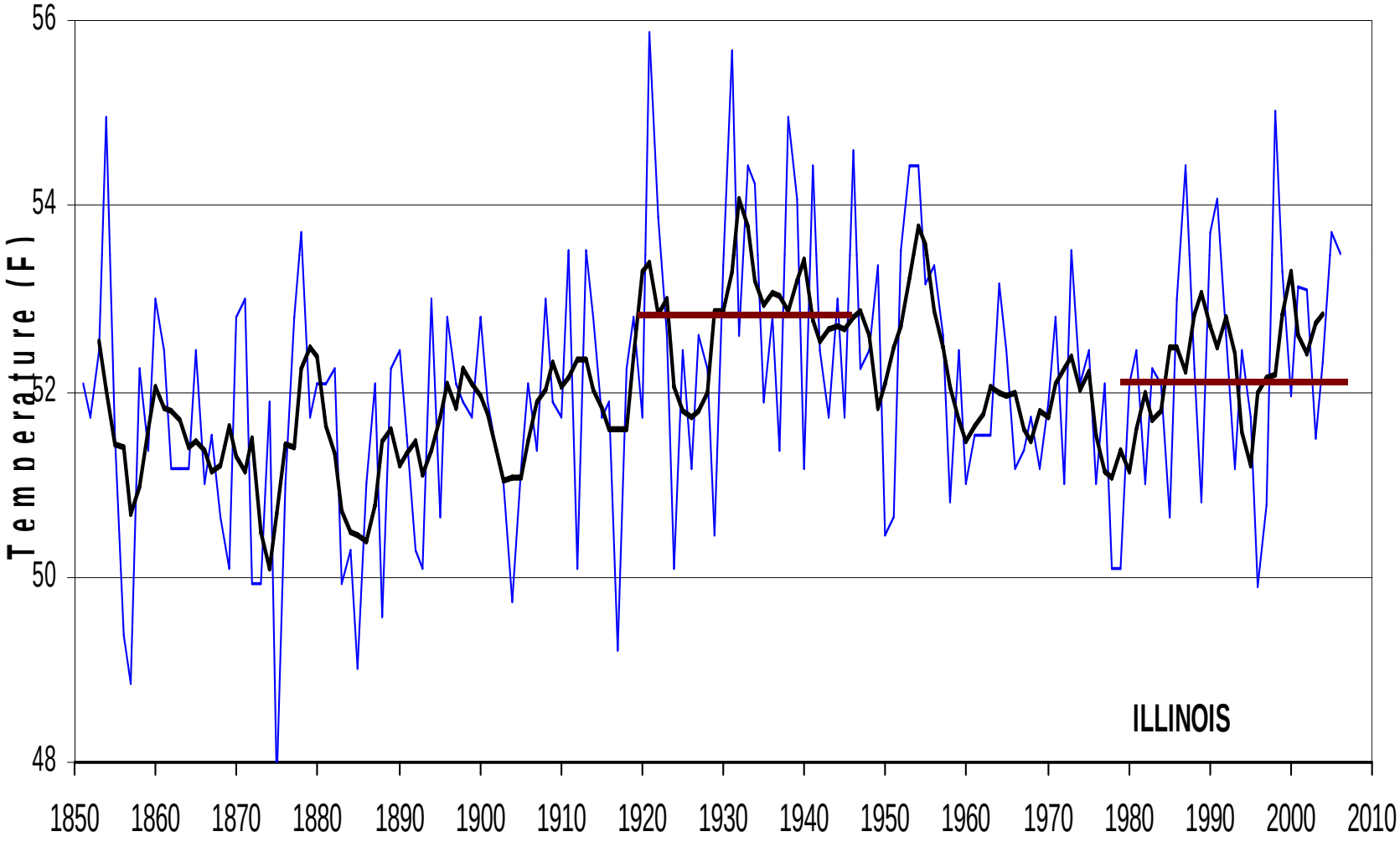
Global Warming

Source: Hadley Centre, UK



Temperature Annual Smoothed

Source: Jim Angel, Illinois State Water Survey



ANNUAL TEMPERATURE TRENDS

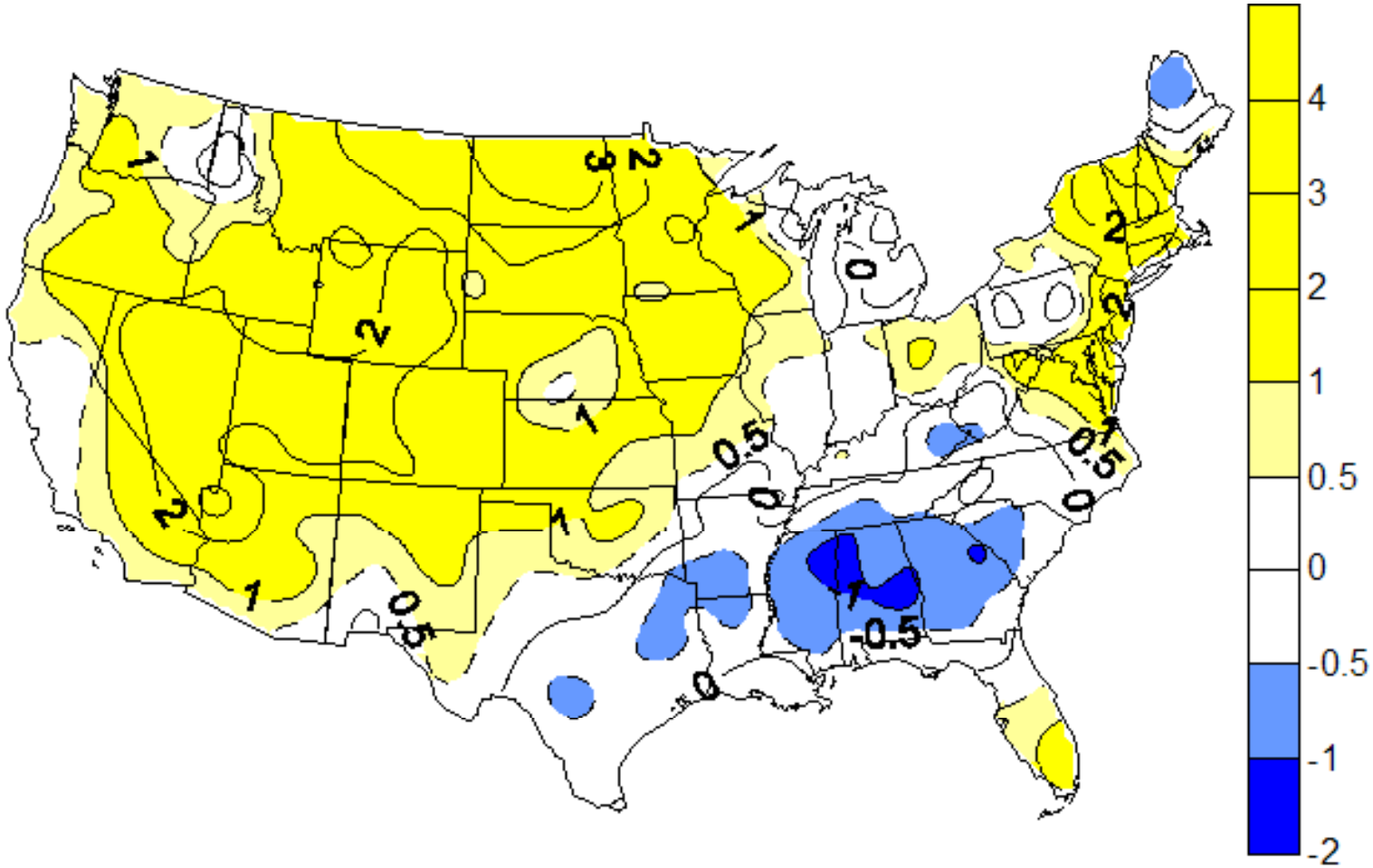
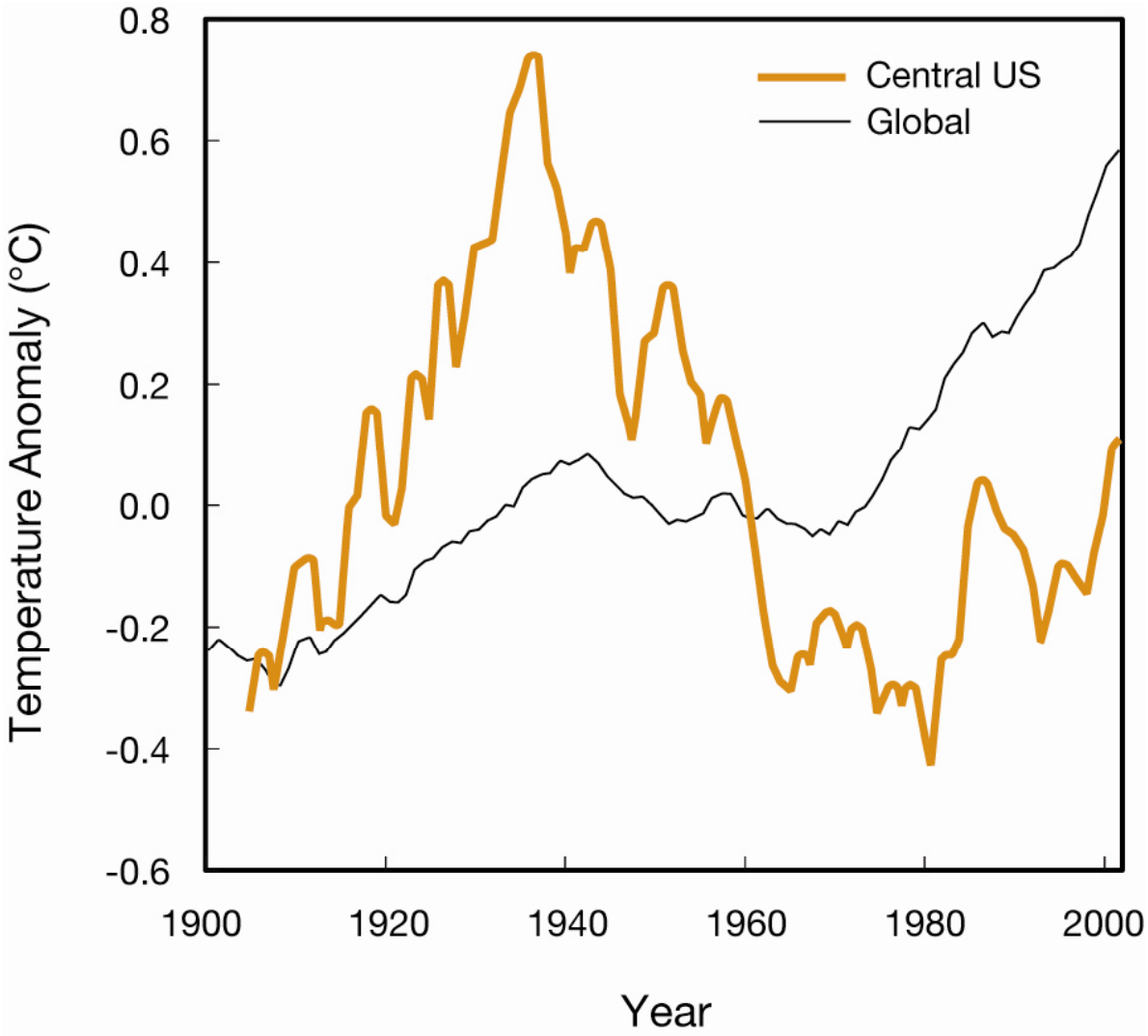
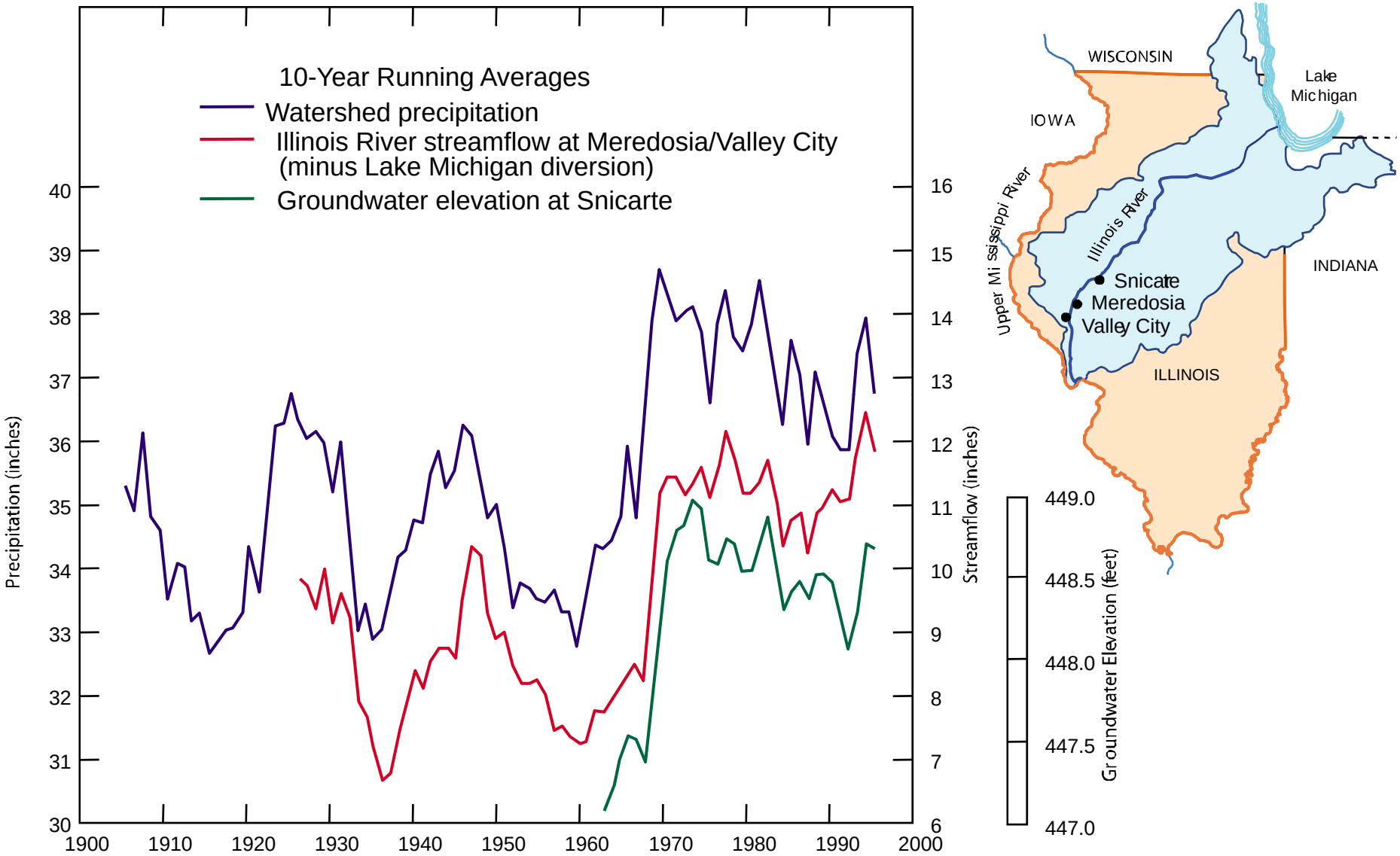


Figure 1. ANNUAL temperature trends in the U.S. expressed as the total change over the period 1895-2006 in degrees F and derived from climate division data. Copyright 2007. Illinois State Water Survey.

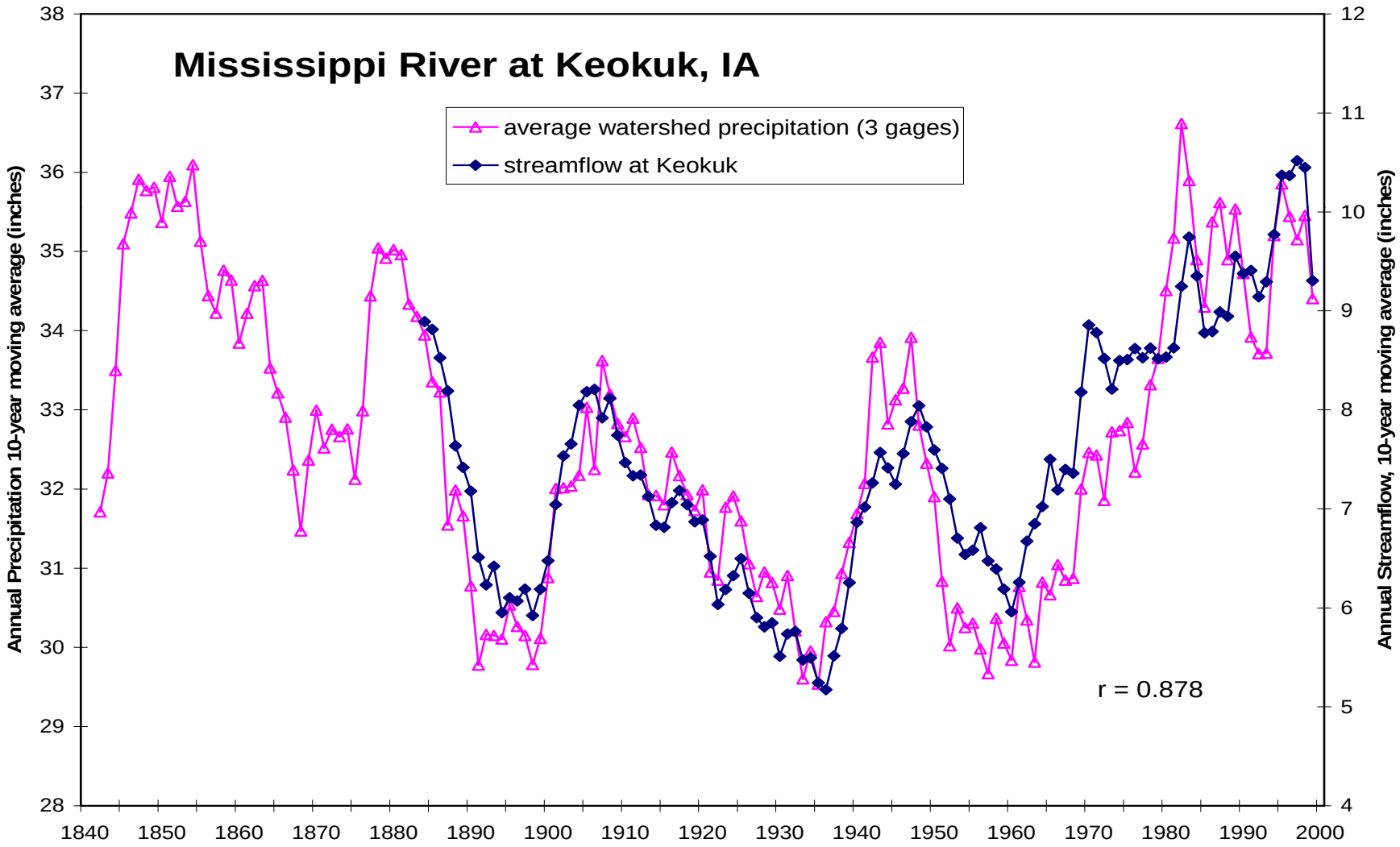
TEMPERATURE CHANGES IN ILLINOIS AND CENTRAL USA ARE NOT THE SAME AS GLOBAL AVERAGE TEMPERATURE TRENDS

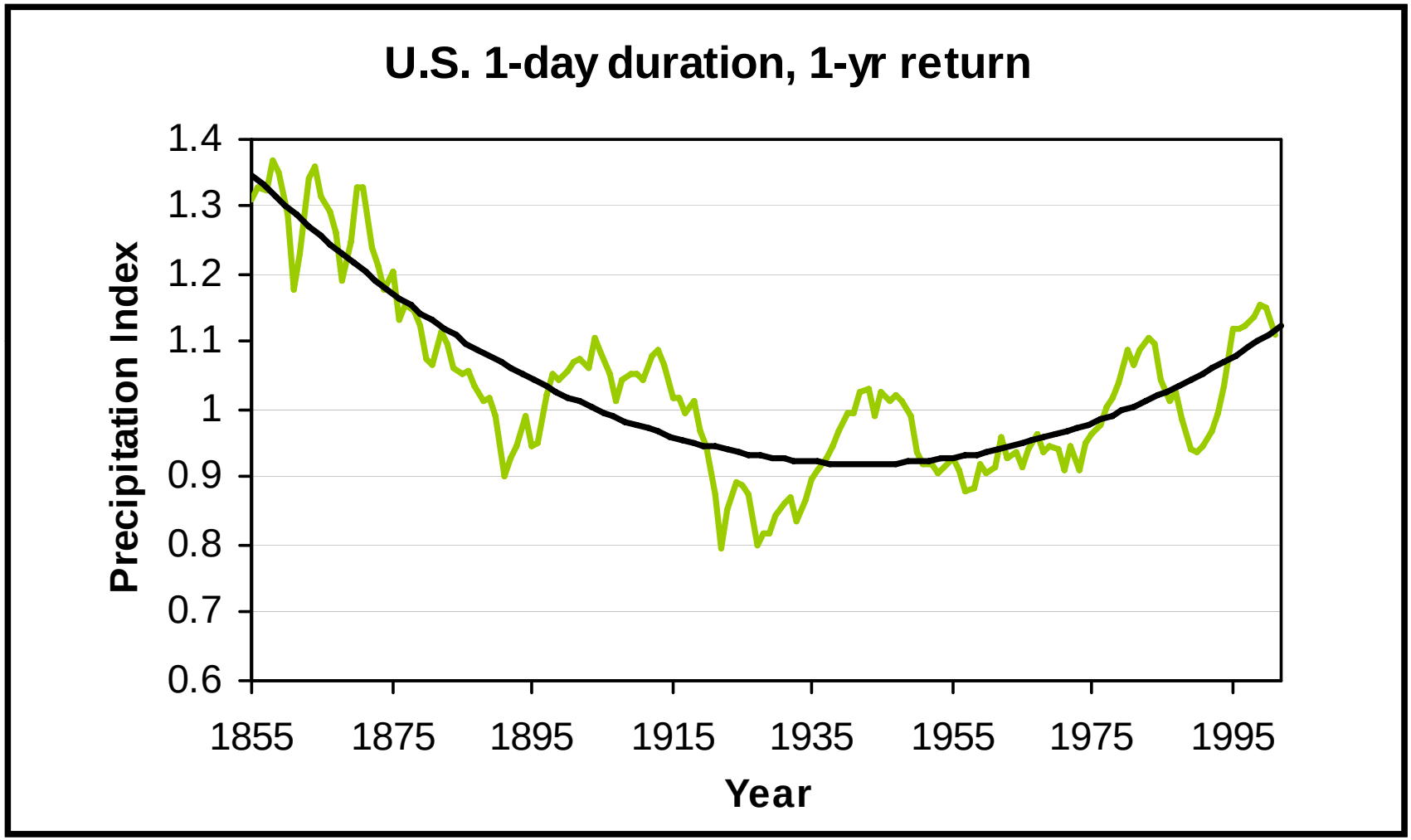


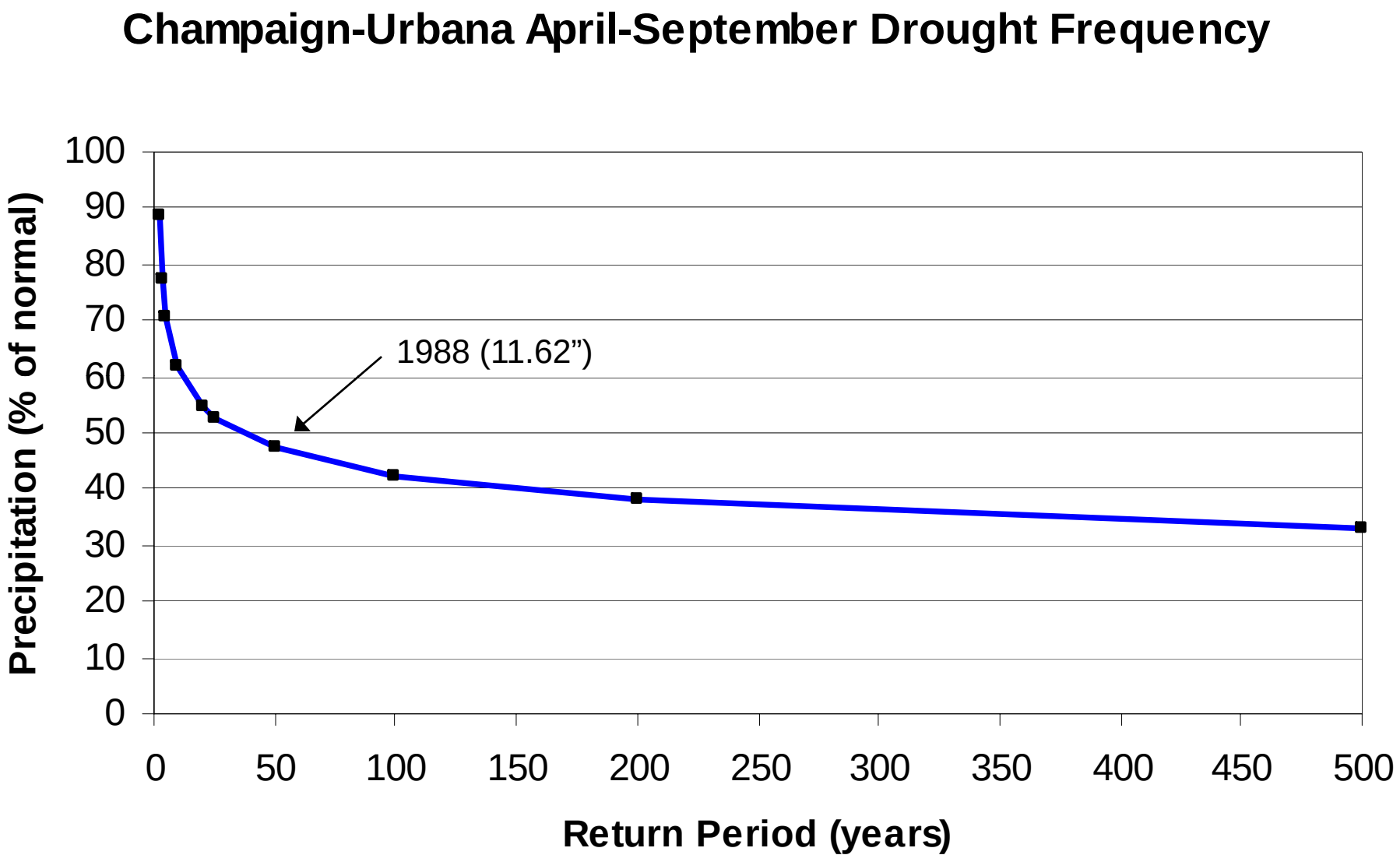


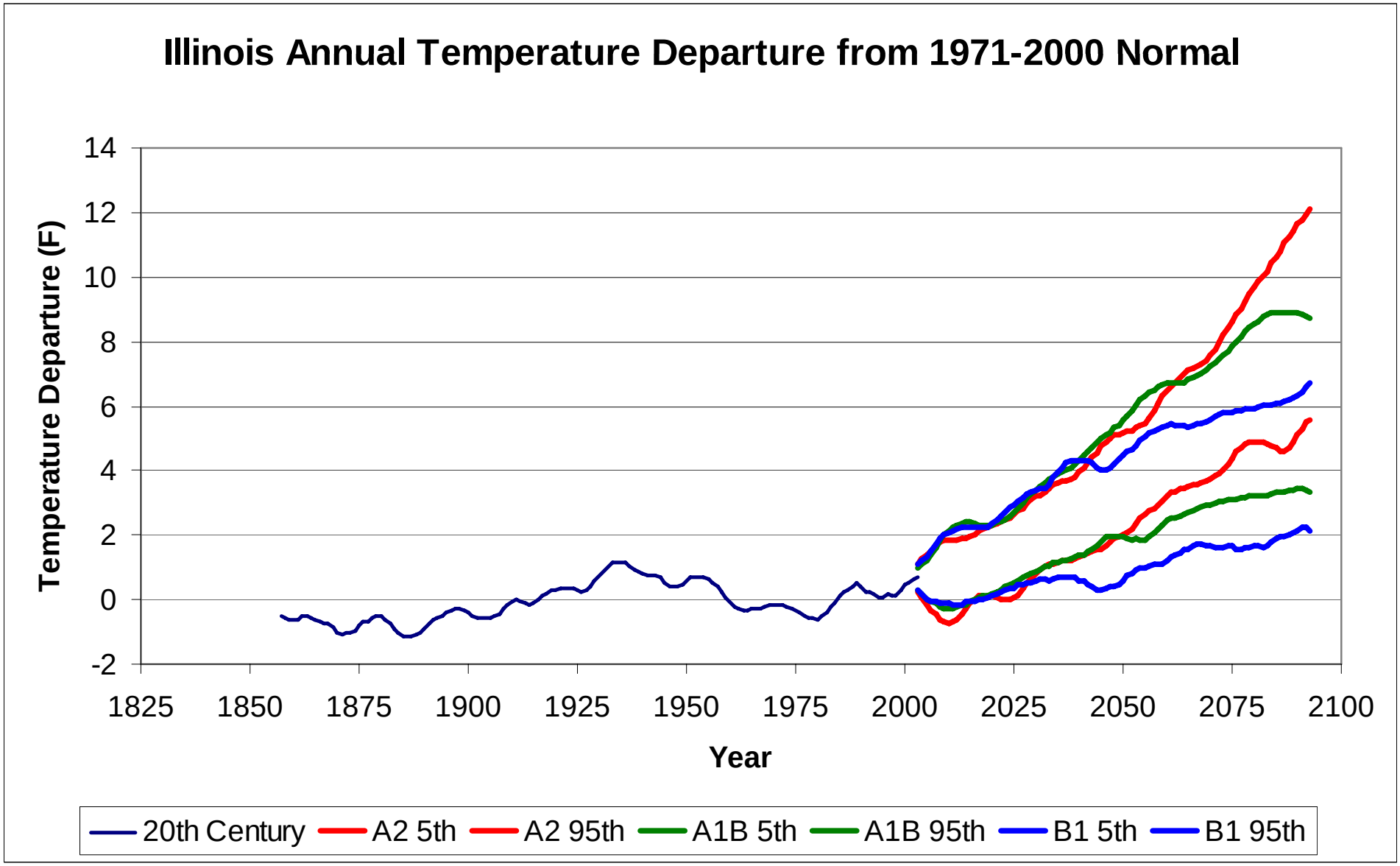
10-year running averages of Illinois River watershed precipitation, streamflow (minus Lake Michigan diversion), and groundwater elevation.

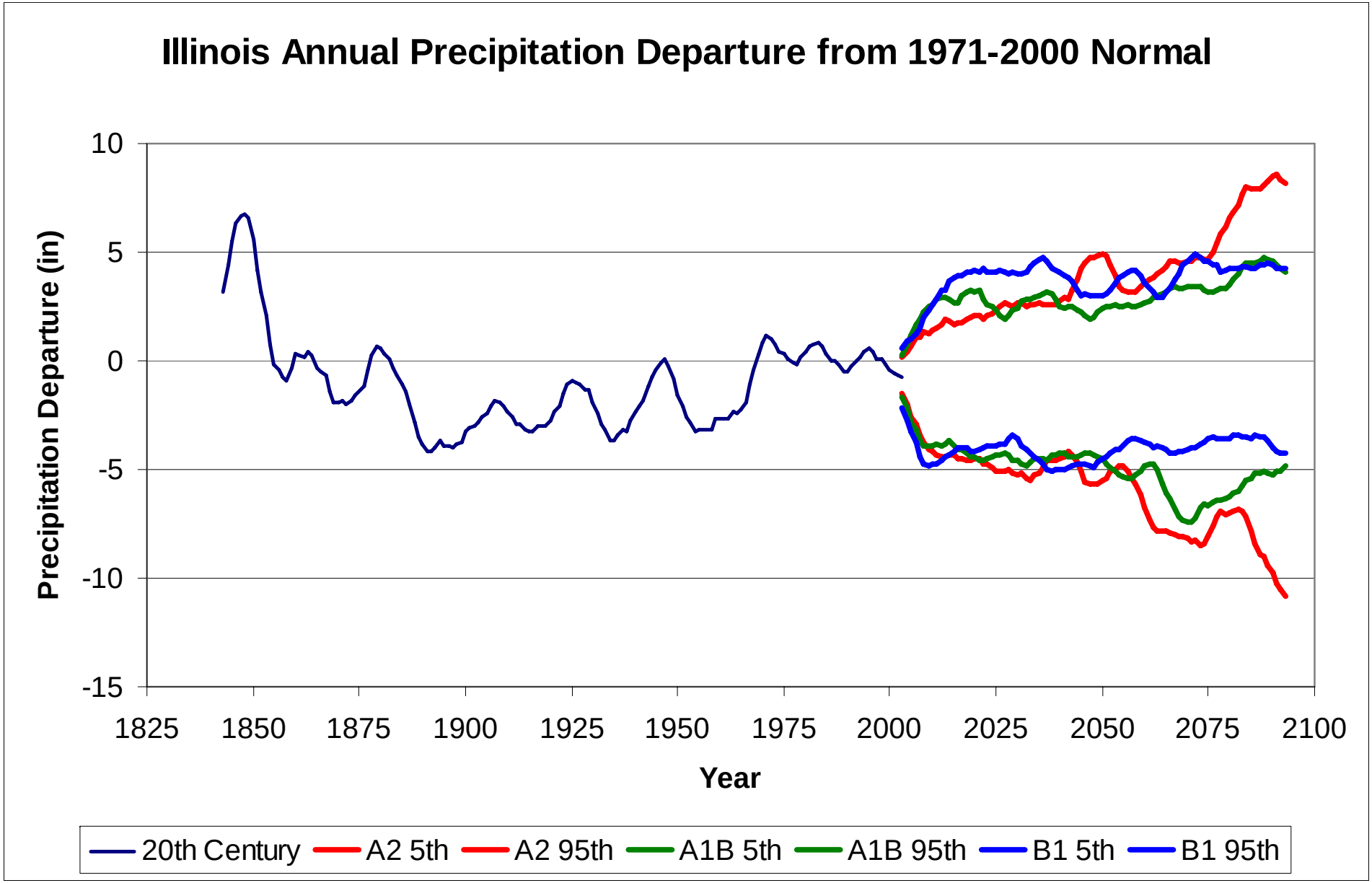
Vern Knapp in Winstanley et al. (2006), ISWS IEM 2006-02



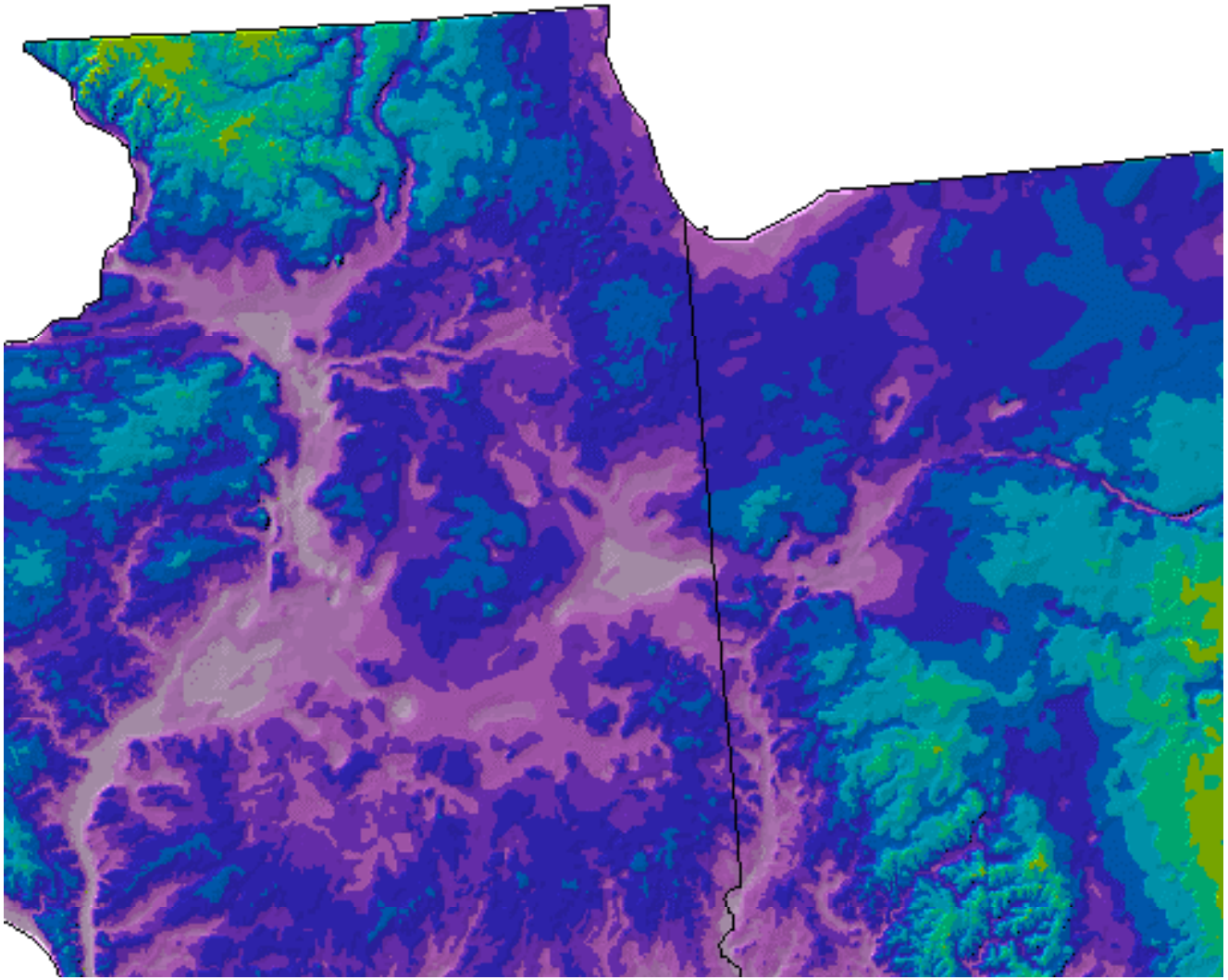

U.S. 1-day duration, 1-yr return
Precipitation Index
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1855
1875
1895
1915
1935
1955
1975
1995
Year


Champaign-Urbana April-September Drought Frequency
Precipitation (% of normal)
100
90
80
70
60
50
40
30
20
10
0
1988 (11.62”)
0
50
100
150
200
250
300
350
400
450
500
Return Period (years)


Illinois Annual Temperature Departure from 1971-2000 Normal
Temperature Departure (F)
14
12
10
8
6
4
2
0
-2
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
20th Century
A2 5th
A2 95th
A1B 5th
A1B 95th
B1 5th
B1 95th

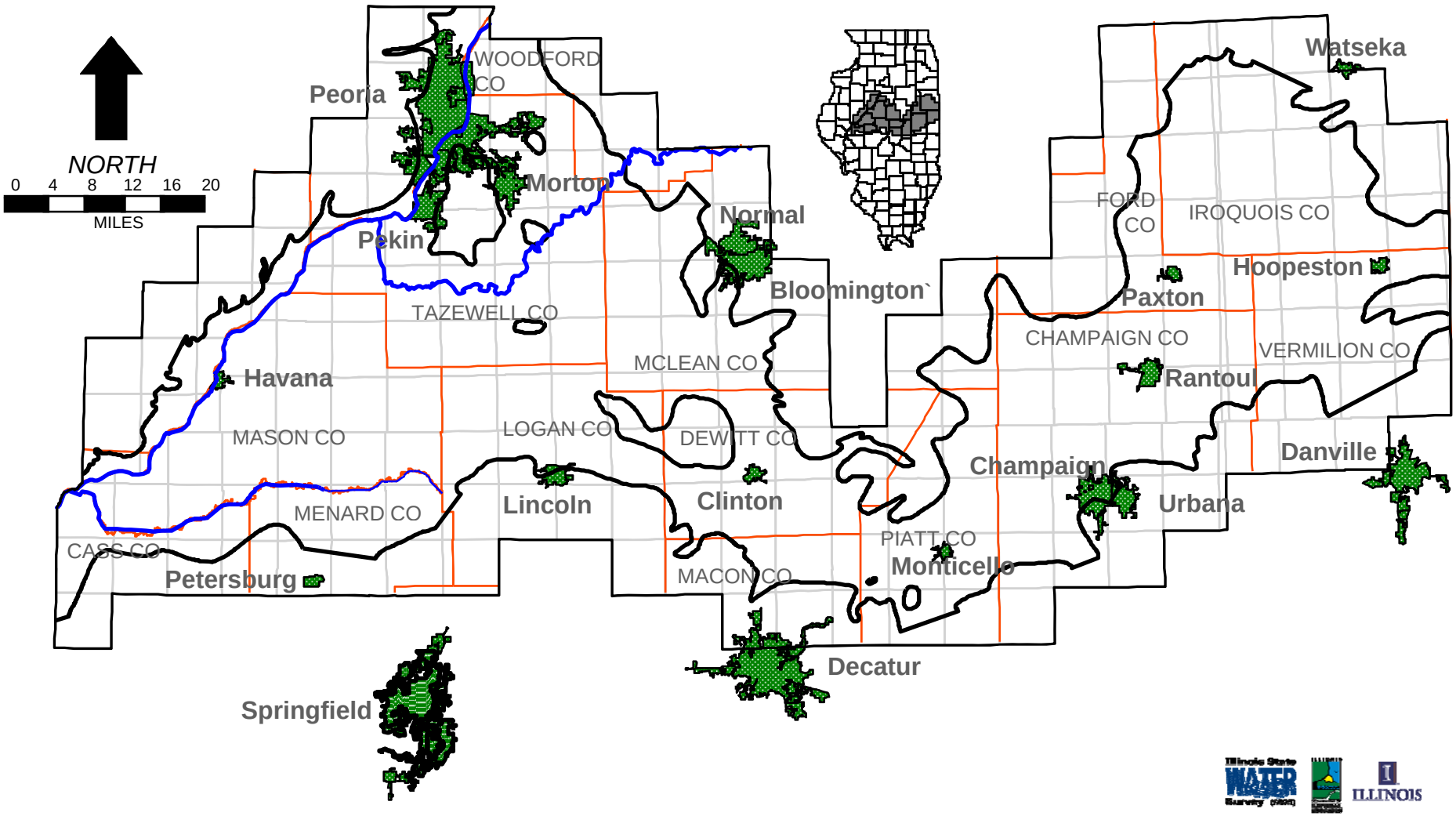

Illinois Annual Precipitation Departure from 1971-2000 Normal
Precipitation Departure (in)
10
5
0
-5
-10
-15
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
20th Century
A2 5th
A2 95th
A1B 5th
A1B 95th
B1 5th
B1 95th

Regional Bedrock Topography

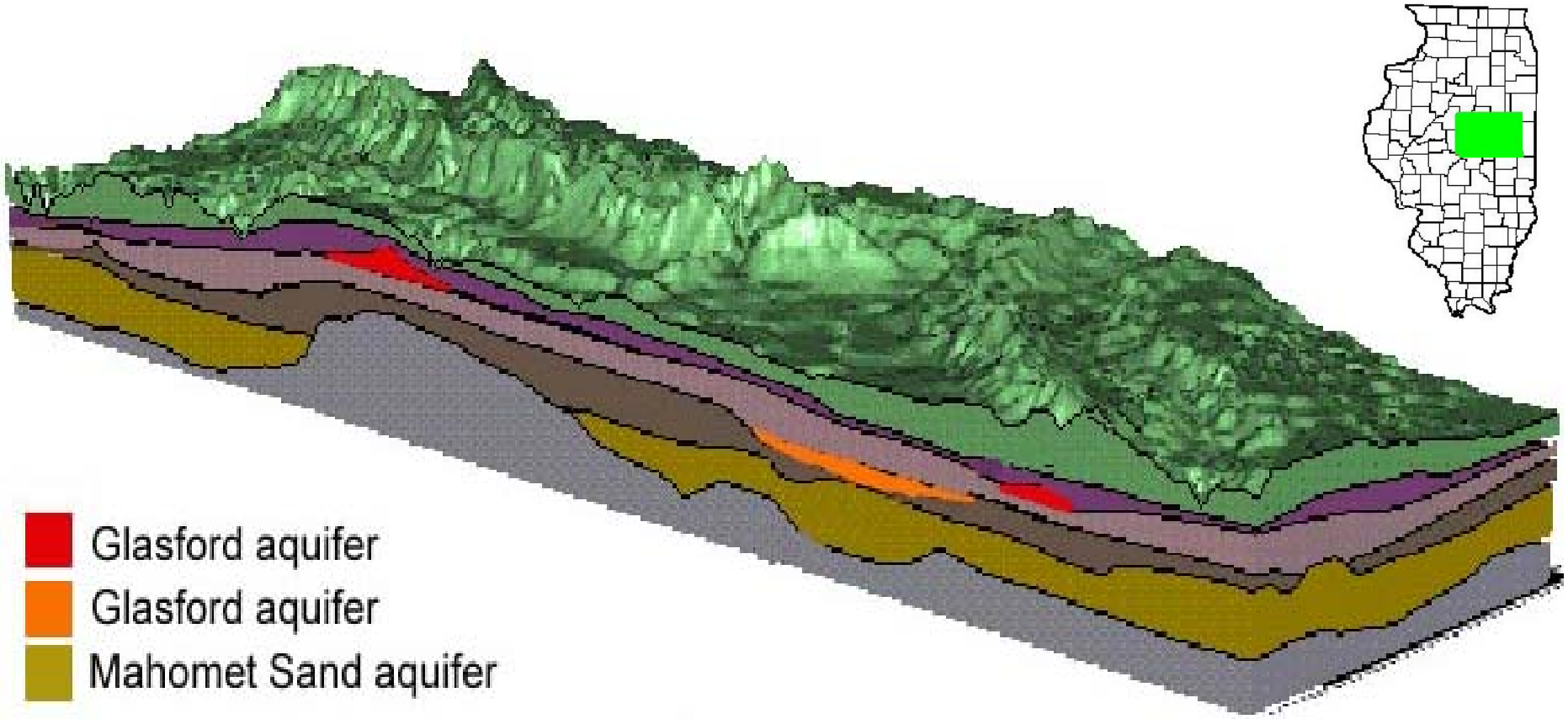


Glacial and wind-borne material filled the old river valley to form the Mahomet Aquifer

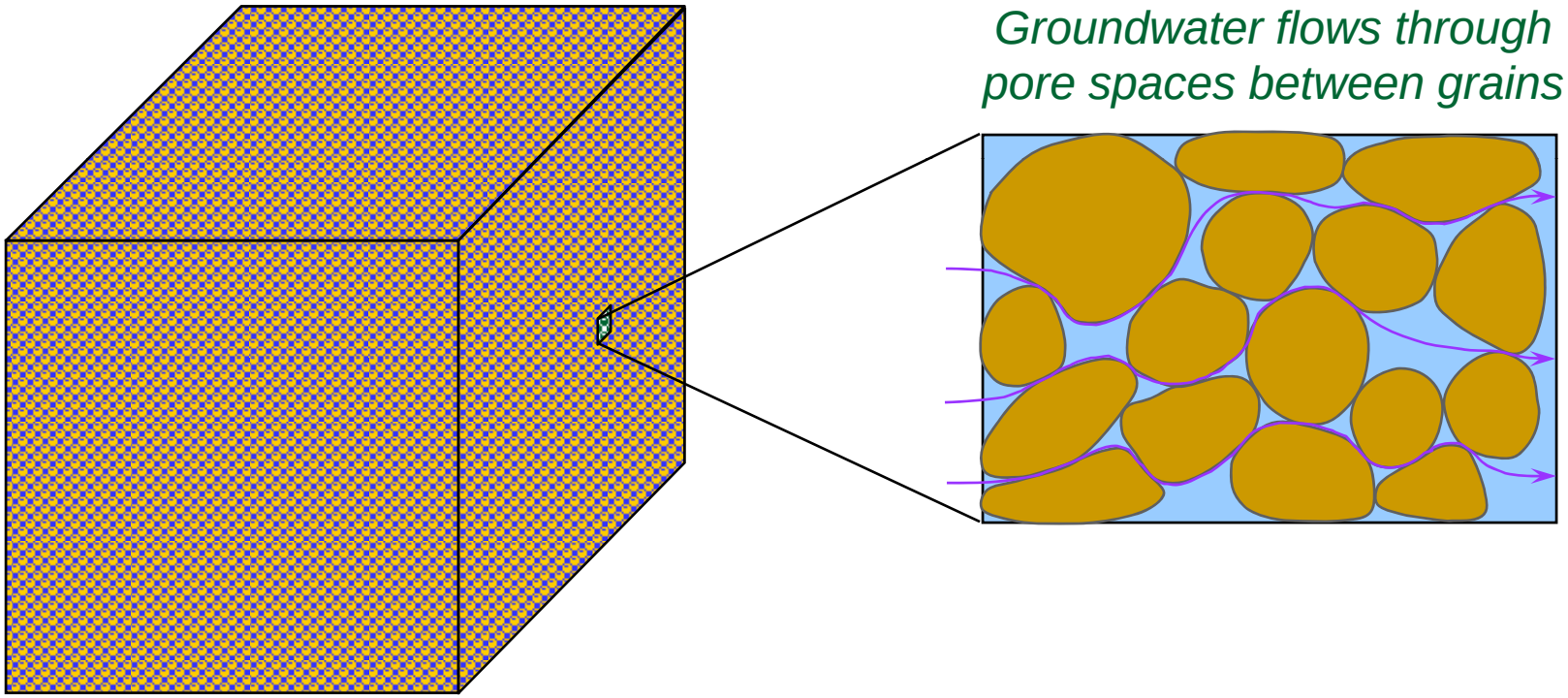
The Mahomet Aquifer Region



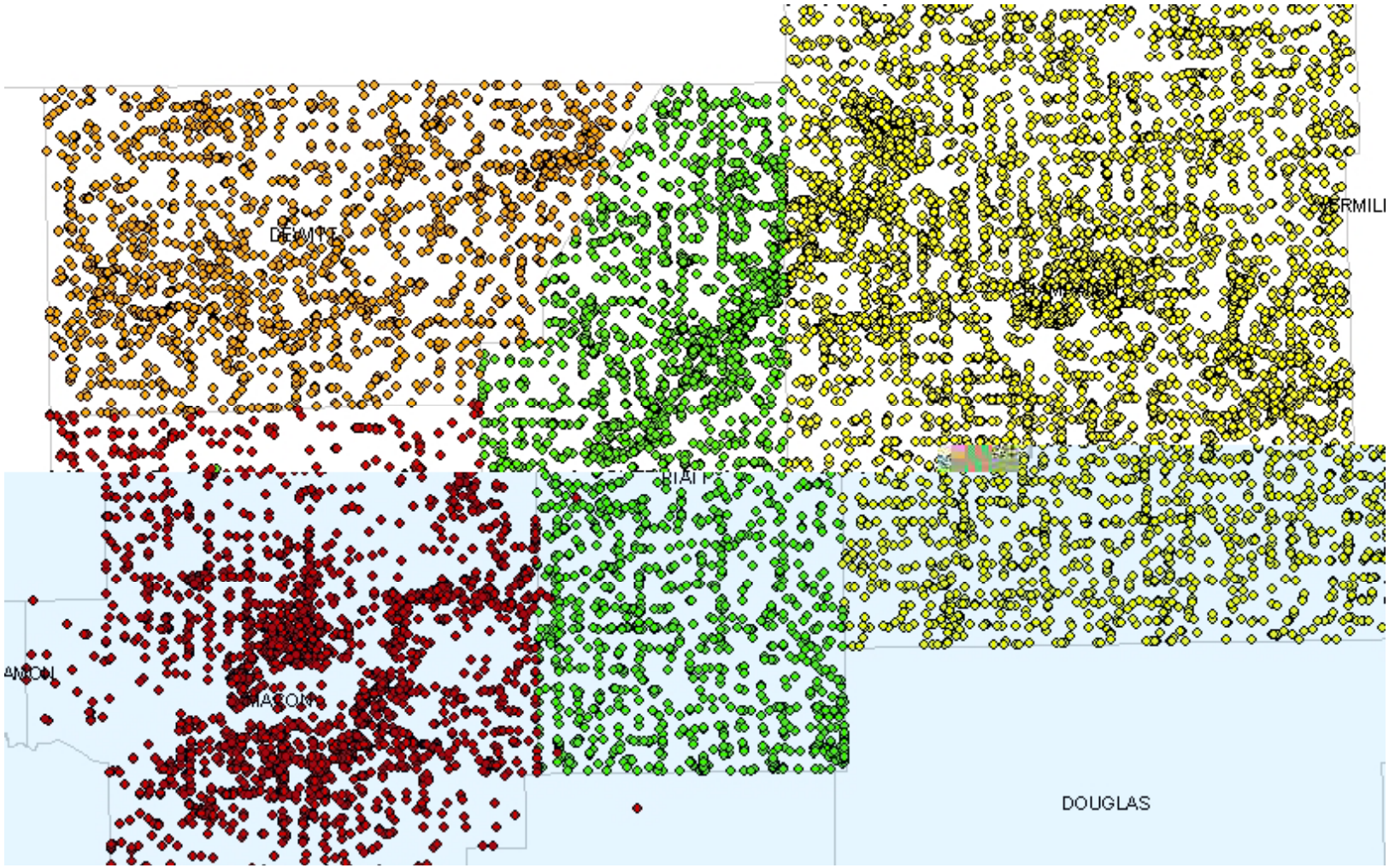
Geology of the Mahomet Aquifer



Porous Systems

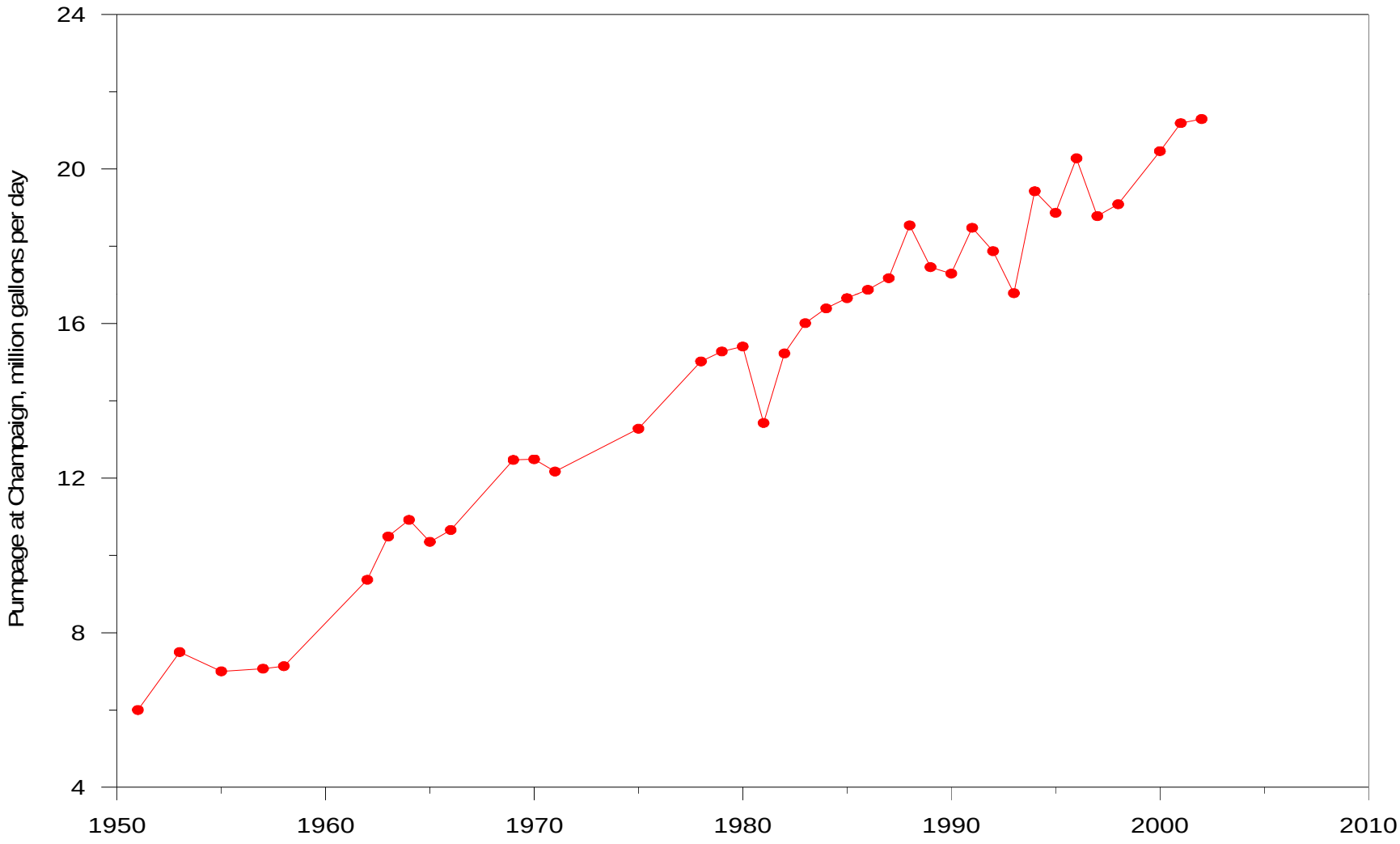


Domestic Wells in Champaign, Piatt, Dewitt, and Macon Counties



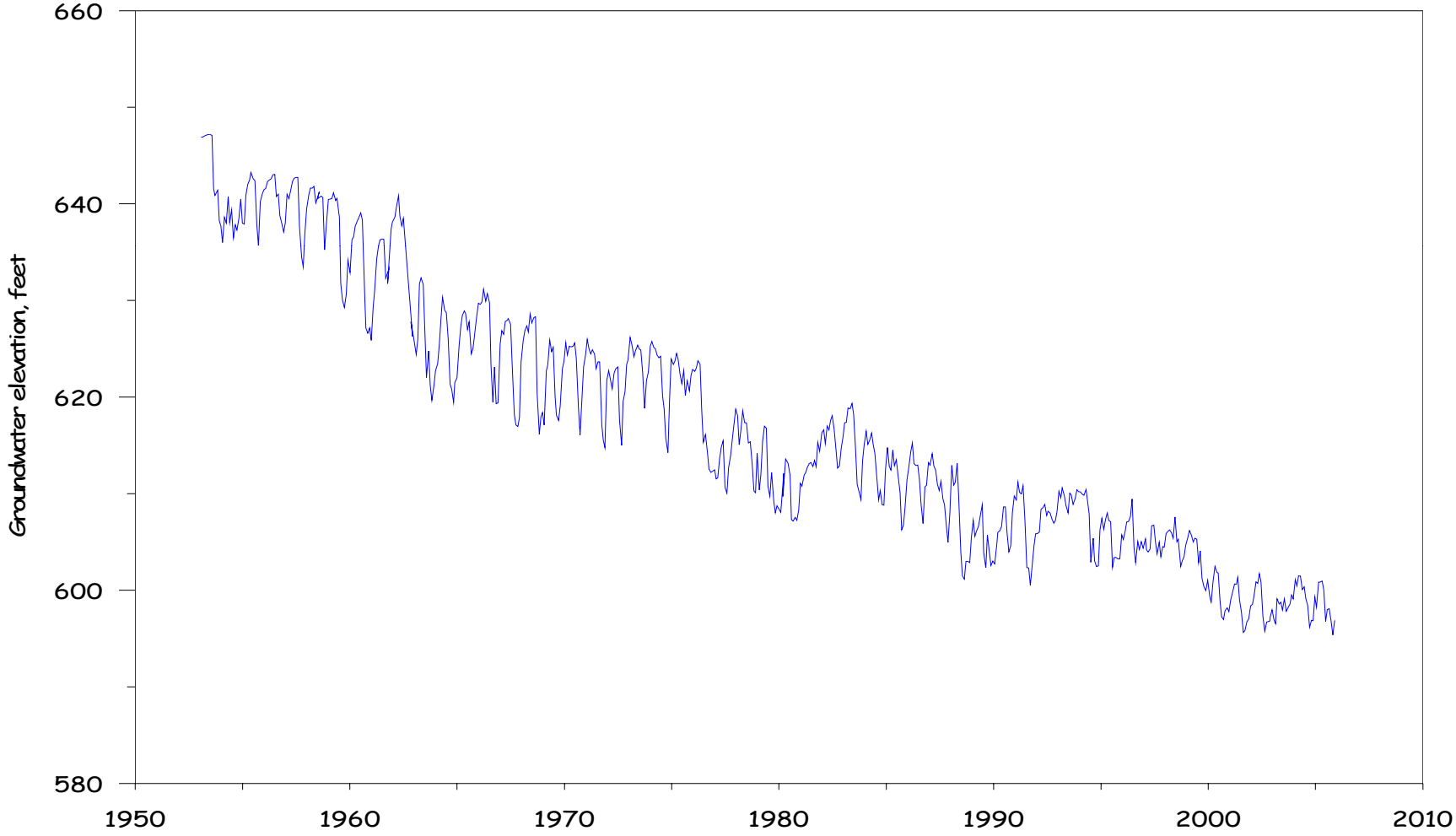
$10 MILLION MODEL OF THE MAHOMET AQUIFER

Water Use - *Long-term trend at Champaign*

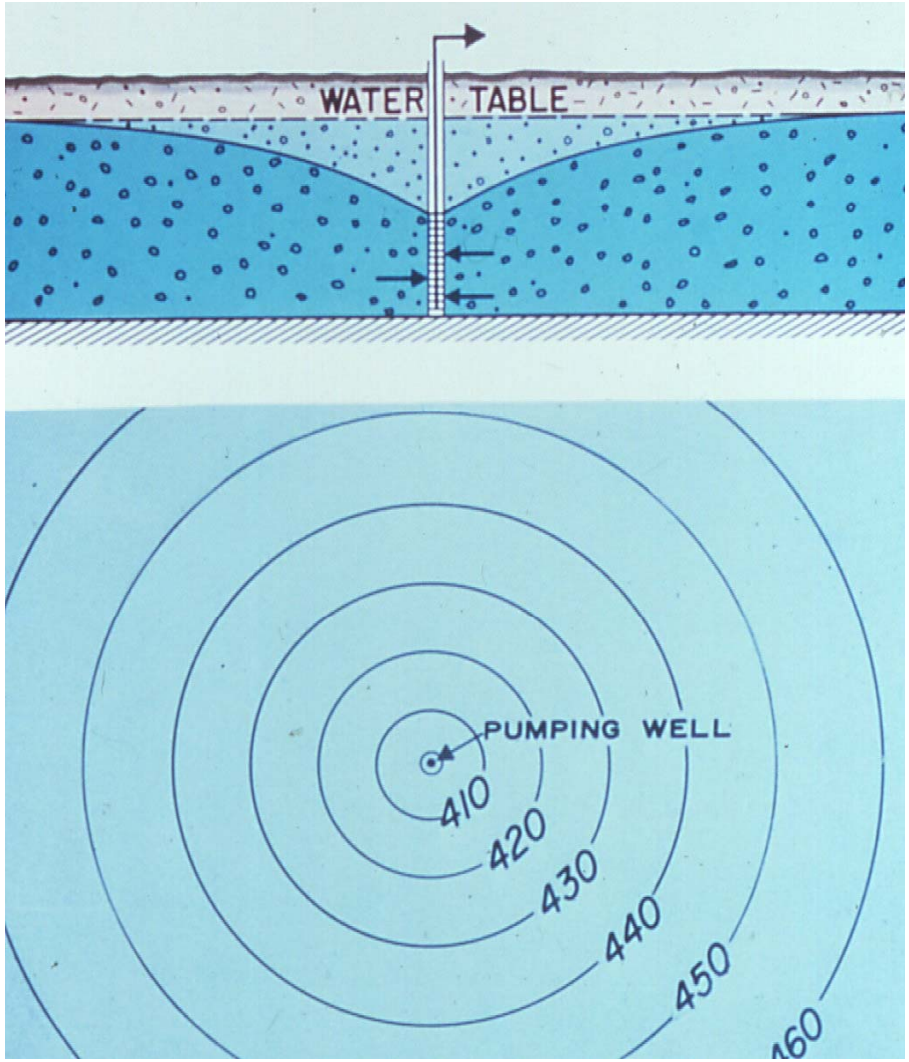


Mahomet Aquifer Water Level [Head]

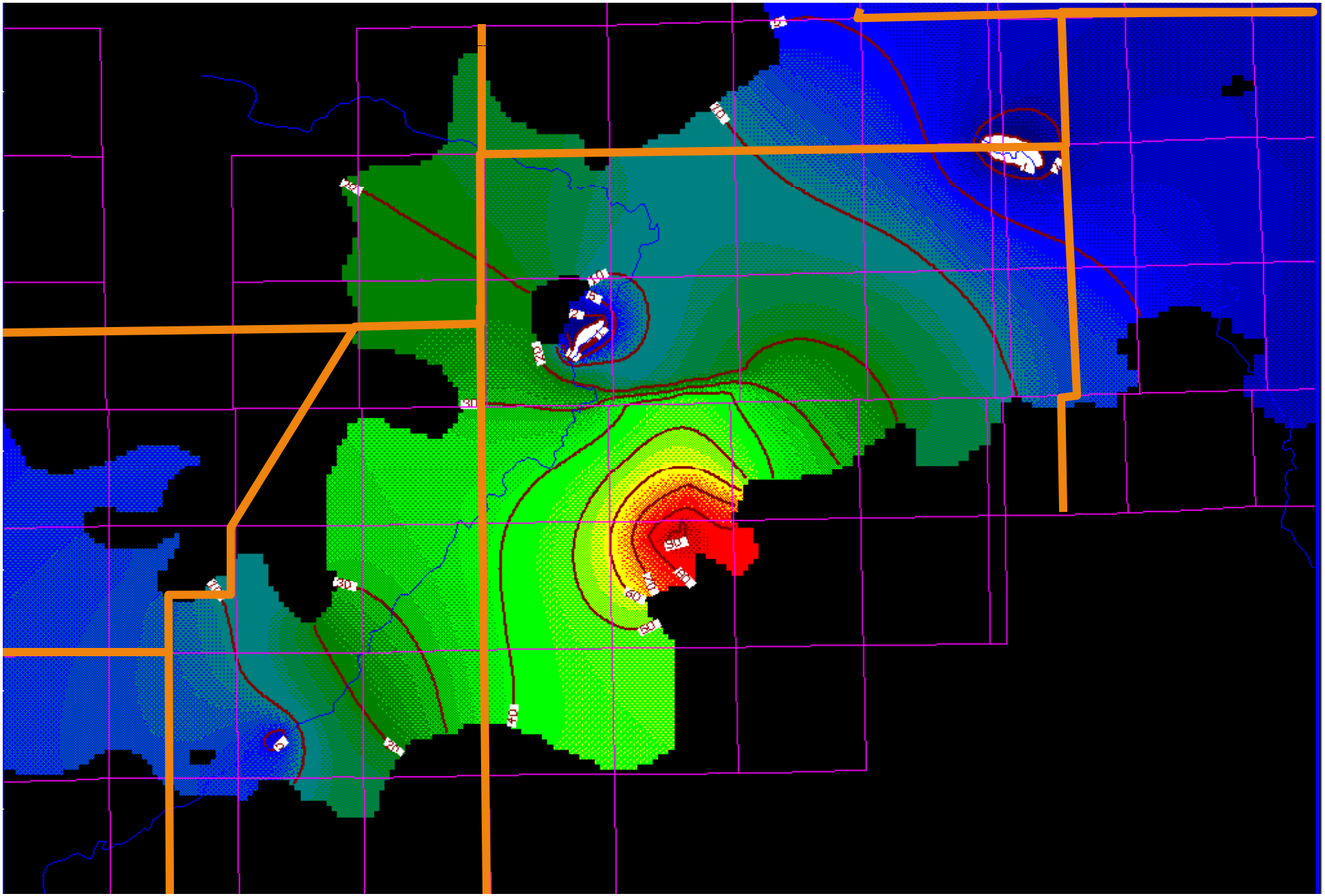
at Rising, near Champaign

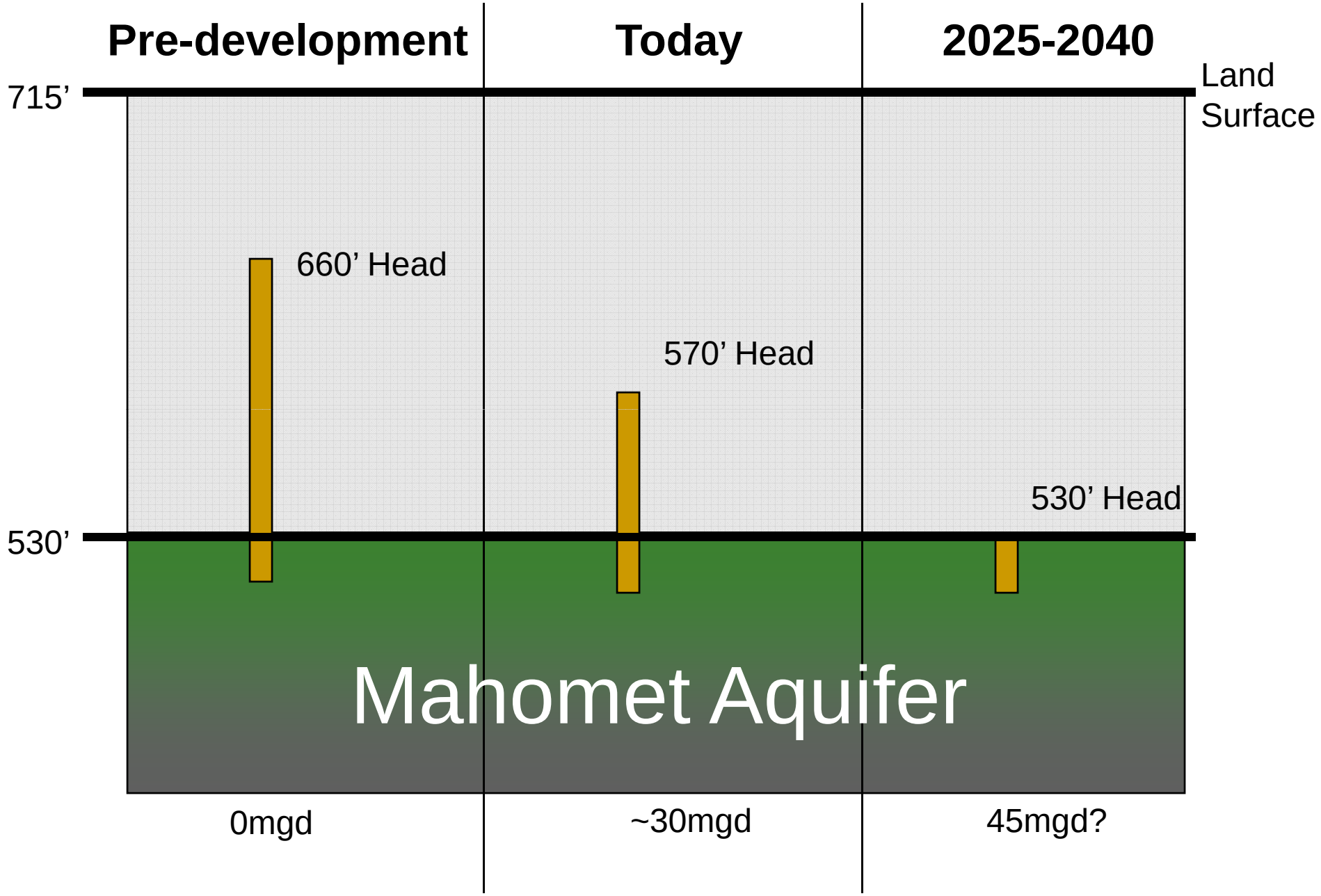


Cone of Depression



Simulated Drawdown from IAWC Wellfield, 2005





Decline in “head” west of Champaign

ETHANOL PLANTS

- Over 50 ethanol plants **proposed** in Illinois including Danville (2), Gilman (2), Watseka, Gibson City, Royal, Champaign.
- Assuming 1.5 million gallons of water per day (mgd) per plant gives total water demand of over 75 mgd – enough for a city of 500,000 people.
- The 8 plants in east-central Illinois would use a total of about 12 mgd, **if built**.
- Separate analysis of water supply needed for each plant.

CUMULATIVE IMPACTS WITH +10 MGD THRESHOLD

- +2 mgd
- +4 mgd
- +6 mgd
- TOTAL +12 mgd

WATER AVAILABILITY AND USE

- In 19th Century, about 130 feet of “head” in the C/U area.
- About 30 mgd currently pumped in Champaign County has drawn “head” down by about 90 feet.
- About 40 feet of “head” remains.
- The bucket of water in the C/U area is about 70% empty, or 30% full (as measured by “head” above the top of the Mahomet Aquifer).
- 2 ethanol plants would use a total of ~3mgd which is about 15-25% of water still available in C/U area before the Mahomet Aquifer is dewatered locally.
- Withdrawals of water for any purpose will lower “head”:
  - Illinois American plans to pump additional 15 mgd.
  - Equistar pumping about 6 mgd near Bondville.
- **How do you want to use the 30% of water still available in the bucket locally?**

KEY QUESTIONS:

- How much water can be withdrawn safely from the aquifers?
- What is the sustainable yield of the aquifers?
- How much growth can be sustained?
- What will be the impacts of additional withdrawals on i) existing wells, ii) rivers and streams, and iii) the aquifers themselves?
- How drought resistant are water supplies in Champaign County?

REGIONAL WATER SUPPLY PLANNING

GOVERNOR

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

MAHOMET AQUIFER CONSORTIUM

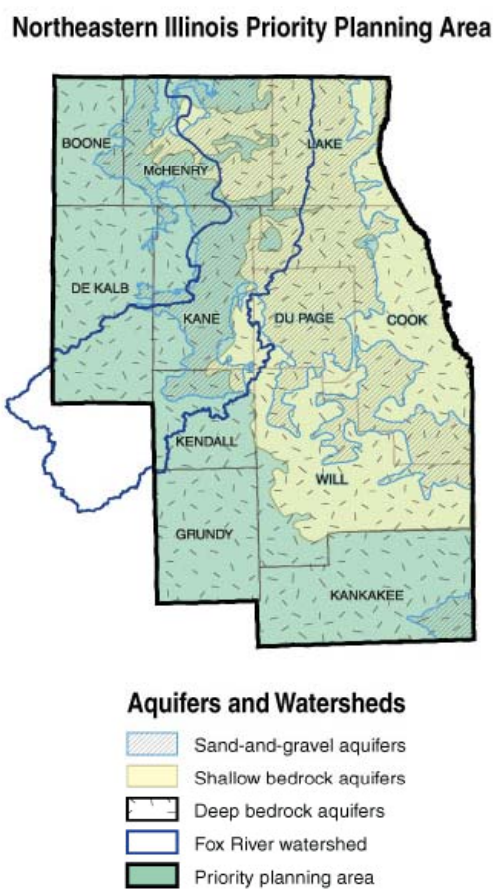
East Central Illinois Regional Water Supply Planning Committee

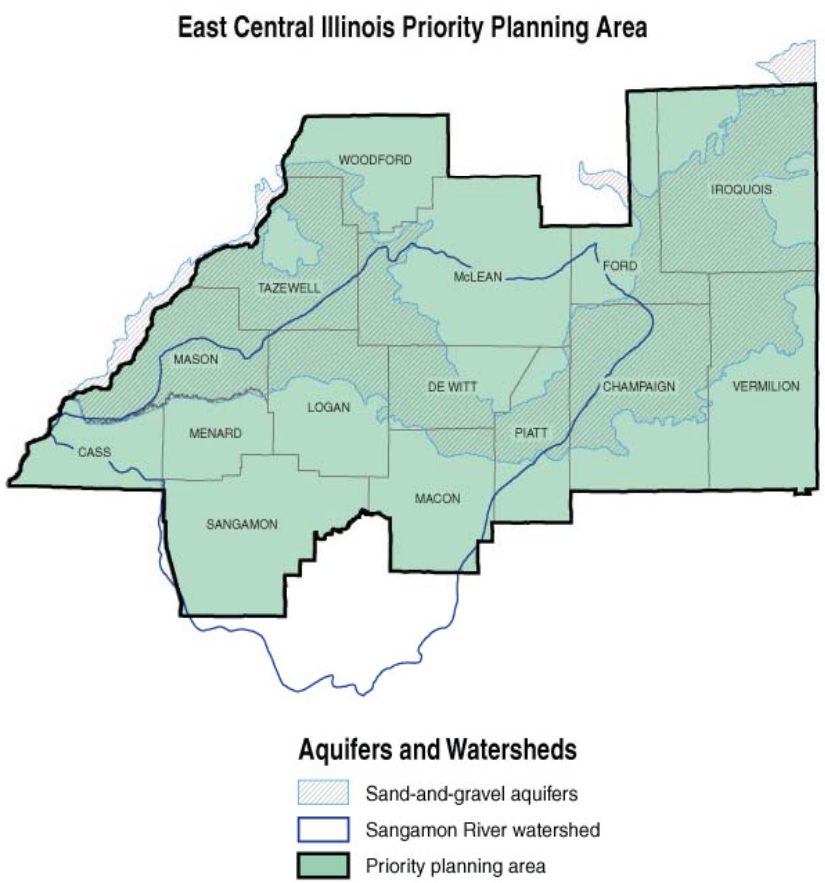
CMAP

Chicago Metropolitan Agency for Planning

Northeastern Illinois Regional Water Supply Planning Group

TWO PILOT PRIORITY REGIONS FOR WATER SUPPLY PLANNING





WATER DEMAND SCENARIOS TO 2050

WATER SUPPLY ANALYSIS TO 2050

WATER SUPPLY/DEMAND ANALYSIS

REGIONAL WATER SUPPLY MANAGEMENT RECOMMENDATIONS (6/09)

East Central Illinois Regional Water Supply Planning Committee

Northeastern Illinois Regional Water Supply Planning Group

MAHOMET AQUIFER CONSORTIUM

CMAP

Chicago Metropolitan Agency for Planning

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

GOVERNOR

Illinois State WATER Survey (1895)

HAVE A NICE DAY!

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