Surface Water and Groundwater Supply Planning and Data Resources in Illinois

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Regional Water Supply Planning

- Ensuring there are adequate and reliable supplies of clean water for all users at reasonable cost
- Two foundations required
  - Knowledge of available water supply [PRI: ISWS and ISGS]
  - Forecasts or scenarios of future water demand [PRI and RWSPCs]
- Regional water supply planning committees responsible for developing water demand scenarios (to 2060)
- IDNR-OWR provides oversight and funding

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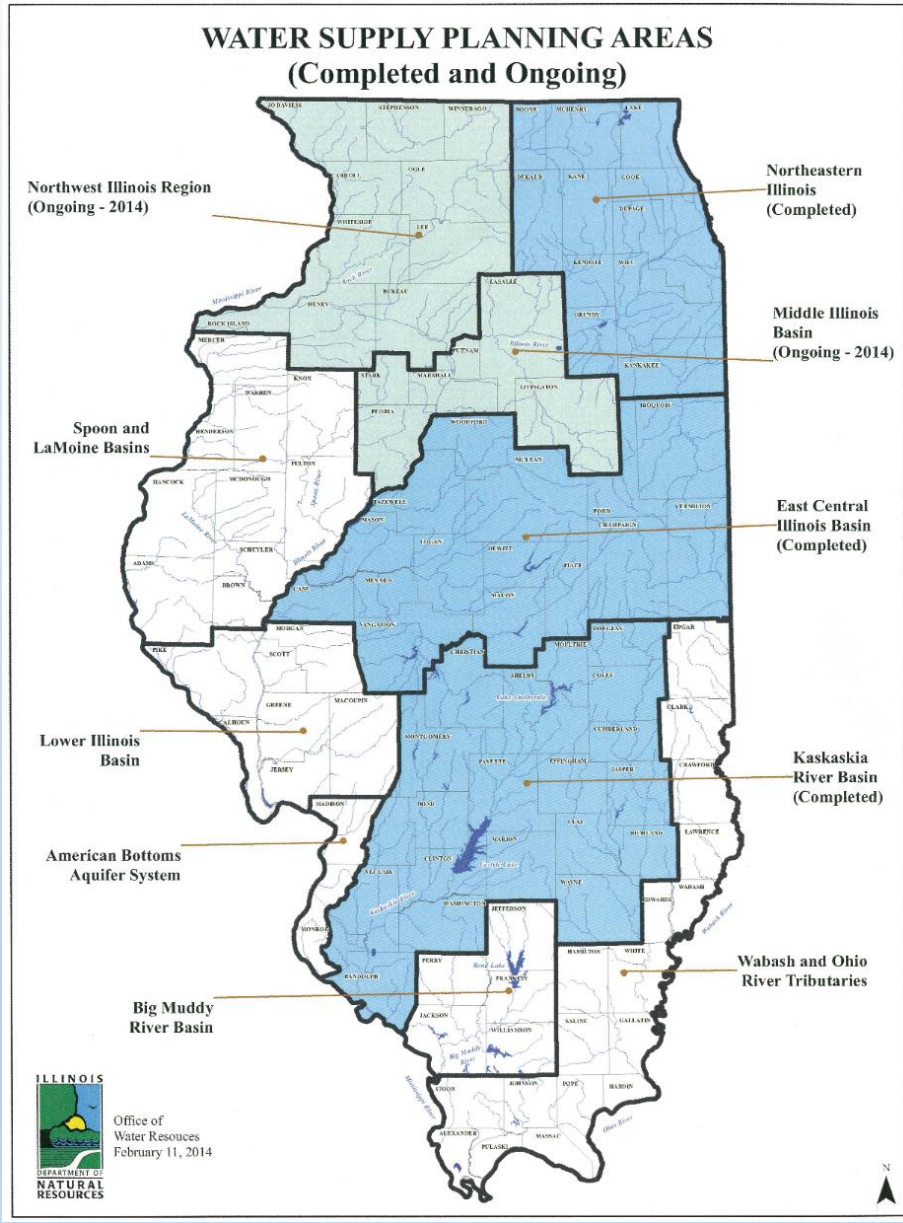
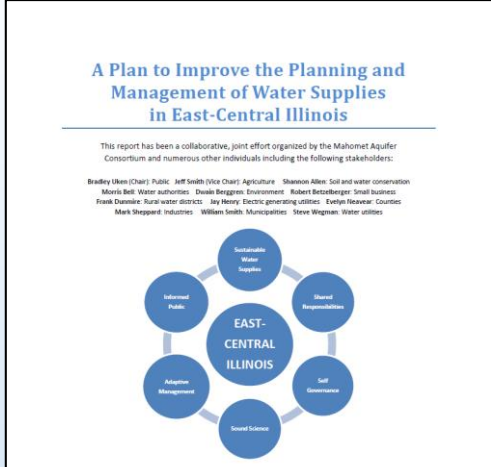
10 Water Supply Planning Regions

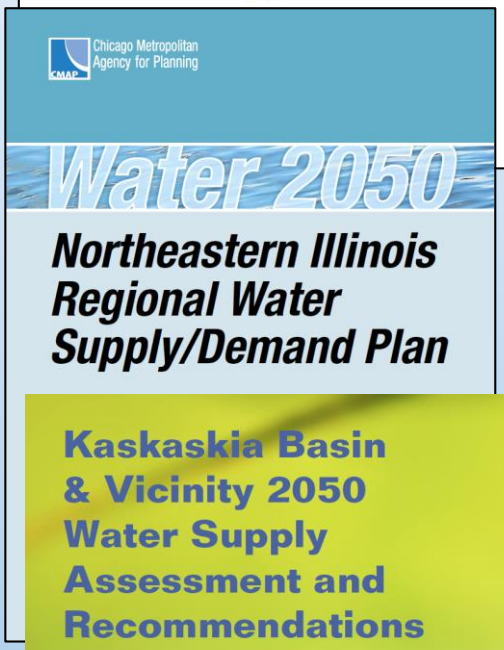
- 3 regions “completed”:
  - Northeastern Illinois
  - East-Central Illinois
  - Kaskaskia River Basin
- Middle Illinois, Kankakee, and Rock River Basins currently under study

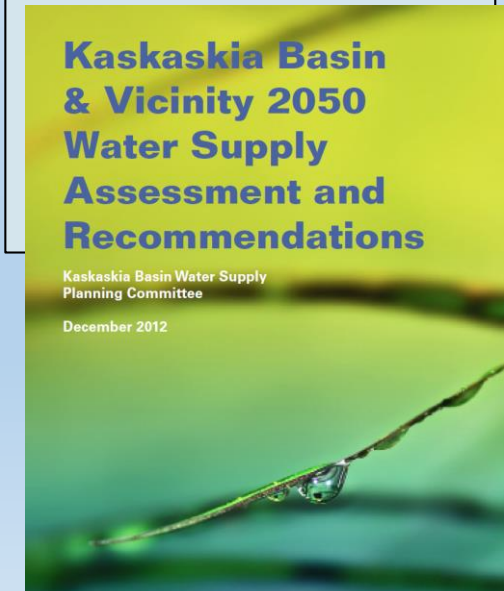


Final Products: Regional Water Supply Plans and Scientific Reports

- Regional plans developed to guide planners and water supply entities and contain:
  - Currently available and possible future water supply
  - Water-demand scenarios
  - Water supply deficits or conflicts
  - Possible options for water supply/demand management to meet future water needs
- PRI produces companion scientific reports
- Water supply planning is never finished; should be updated periodically



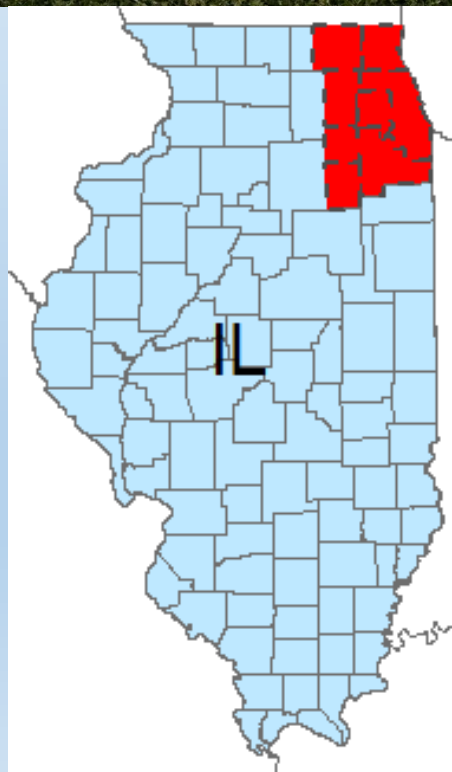




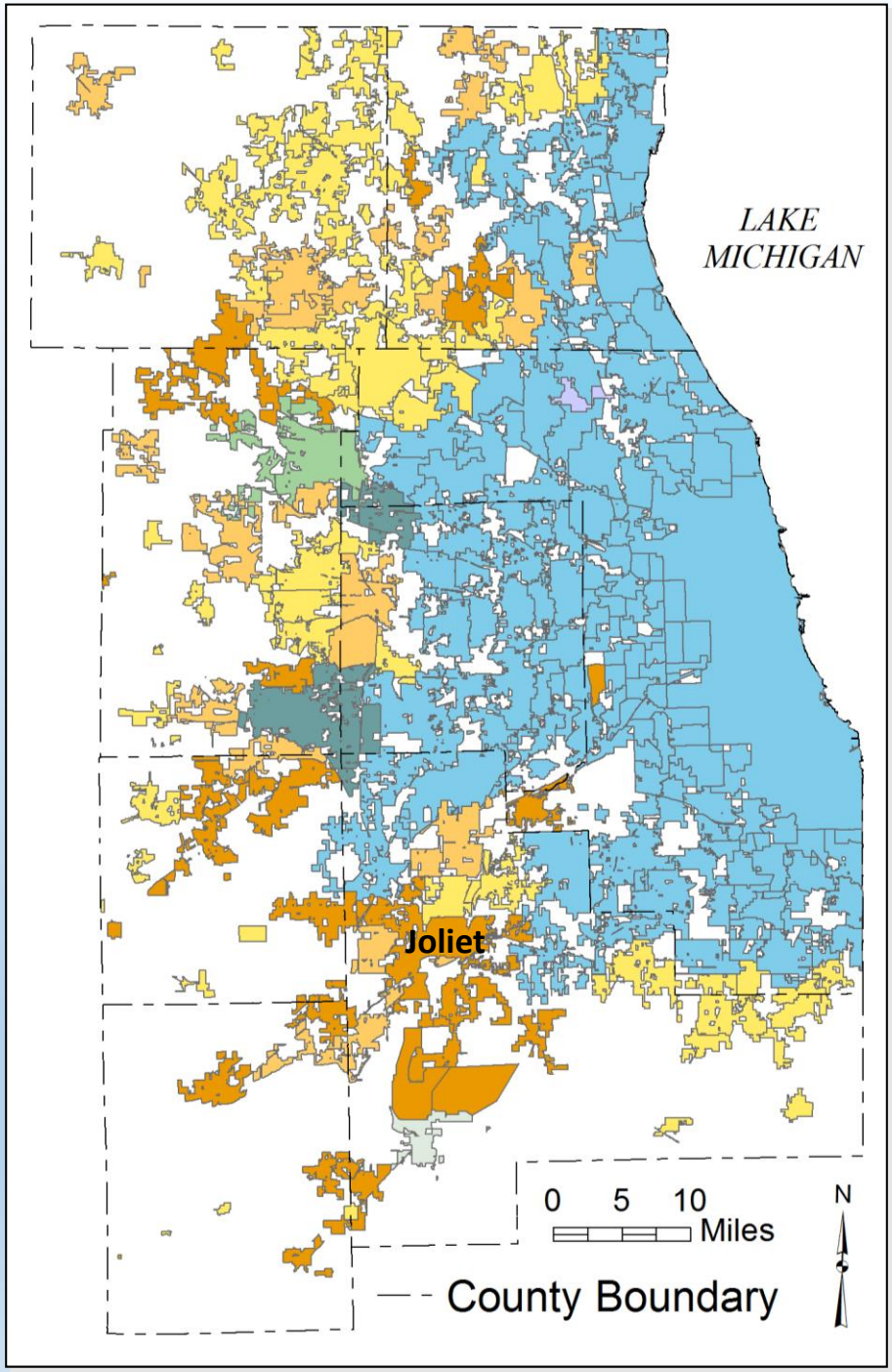
Looming Water Supply Crisis in Southwestern Suburbs of Chicago

- The sandstone aquifer in northern Will and Kendall Counties will not be a viable source of water in the next 15-25 years

- Many communities and industries will be forced to find alternative supplies within that time frame



Sources of Community Water Supplies



Groundwater (GW)

- Sandstone
- Sandstone (Partial)
- Shallow Bedrock/Glacial

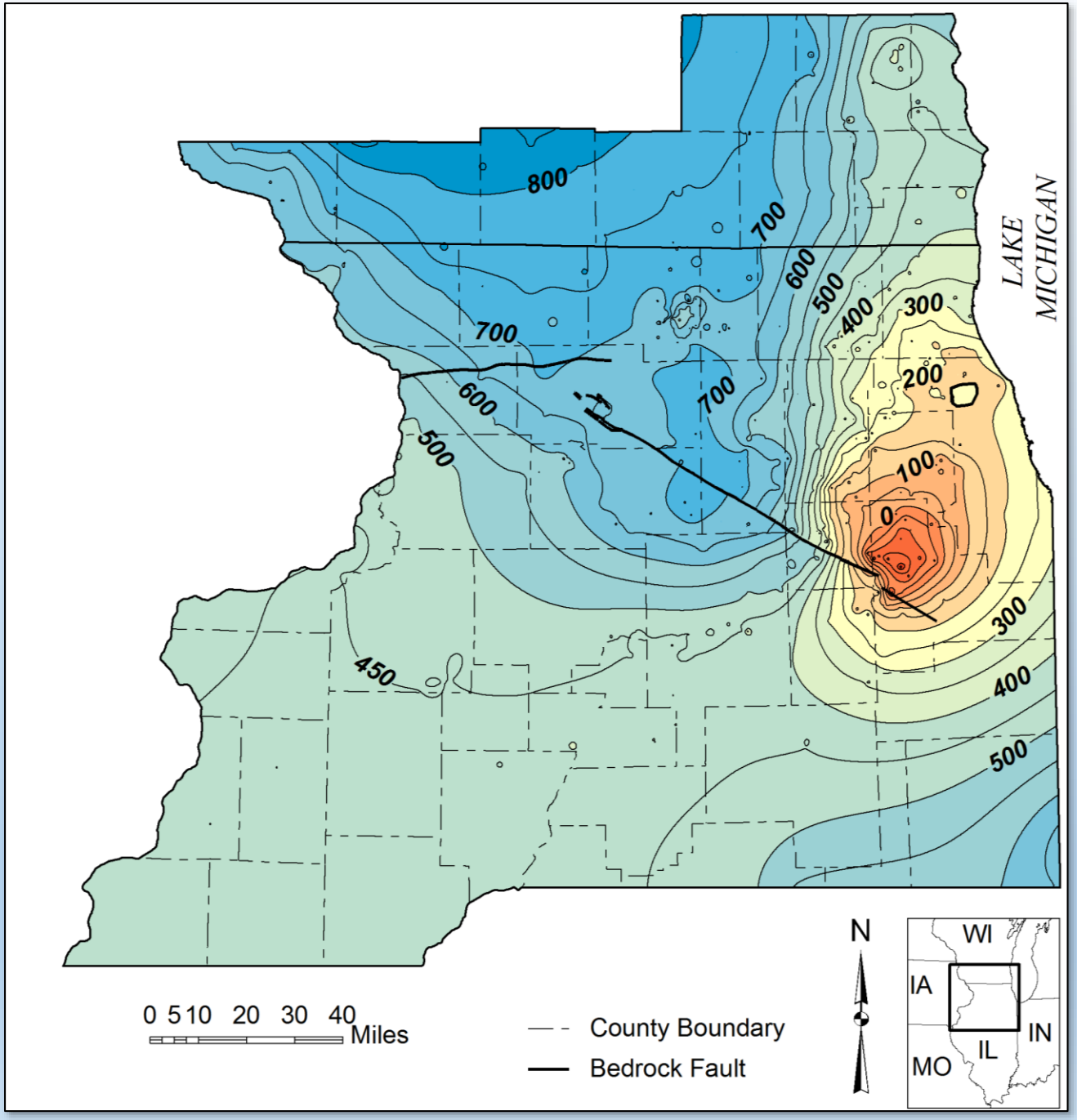
Surface Water

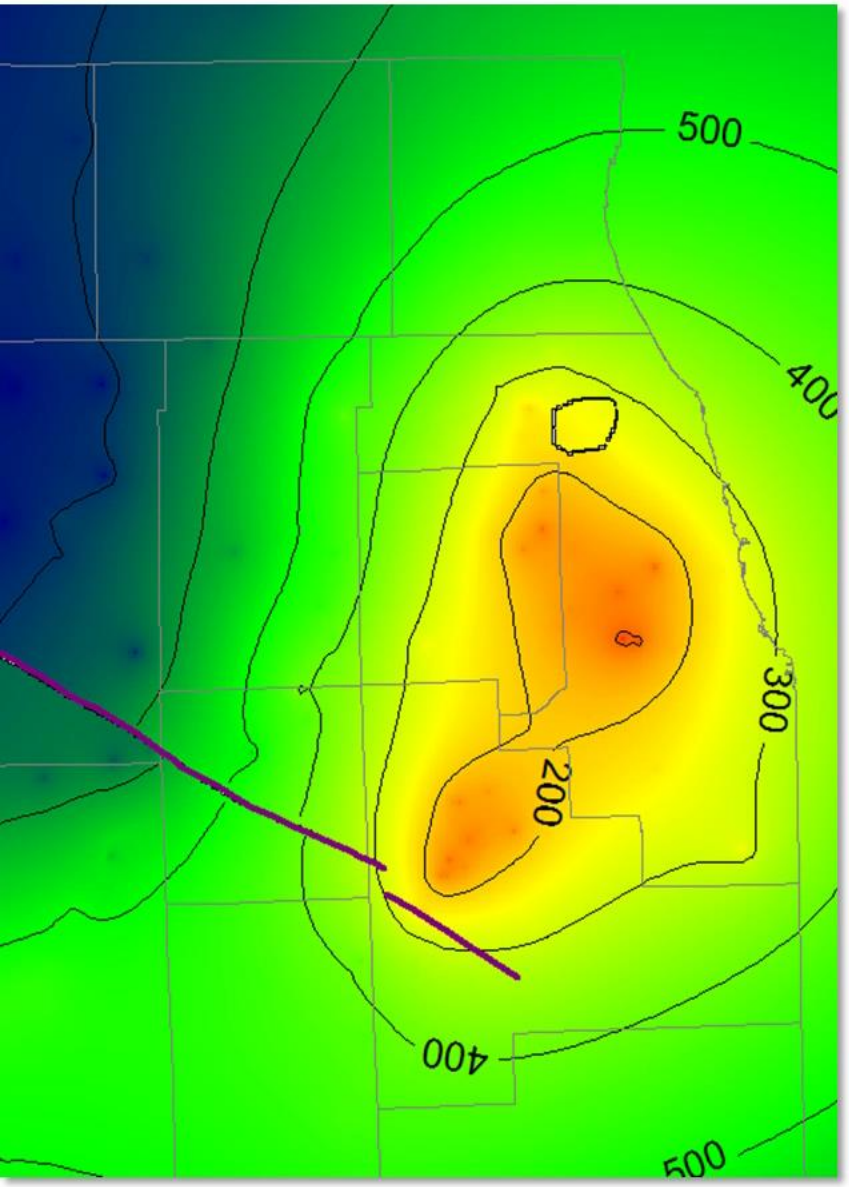
- Lake Michigan
- Fox River
- Kankakee River

Mixed Sources

- Fox River/GW
- Lake Michigan/GW

2014 Potentiometric Surface





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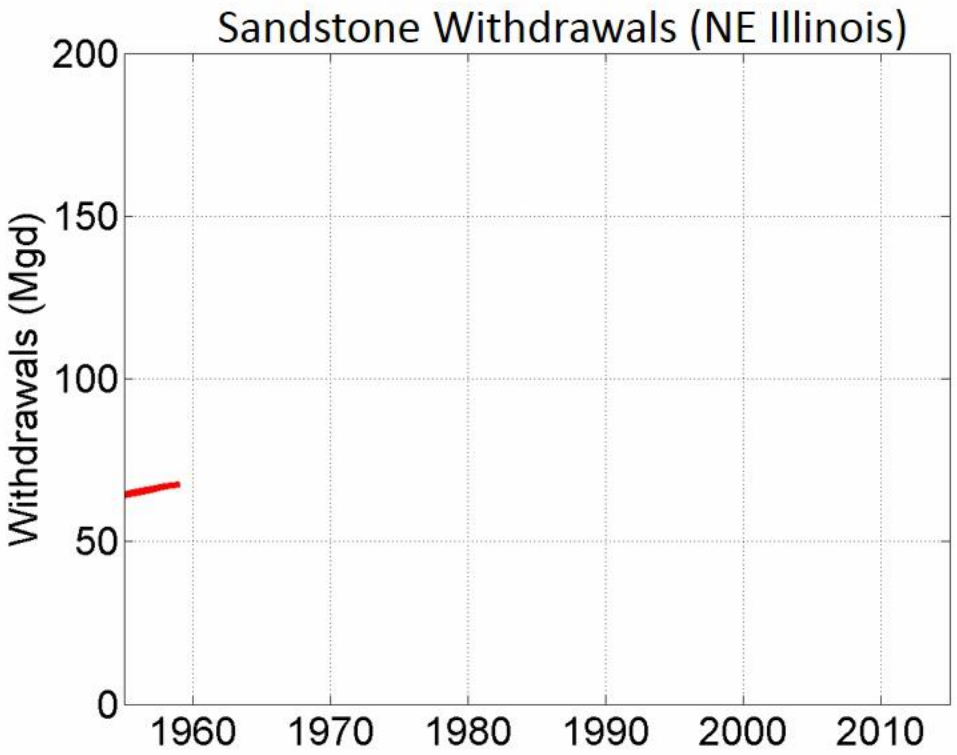

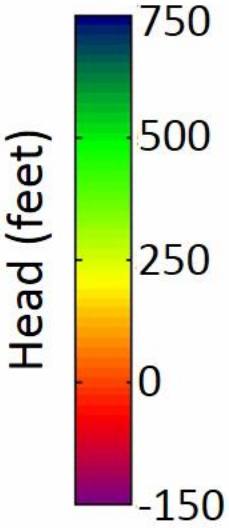

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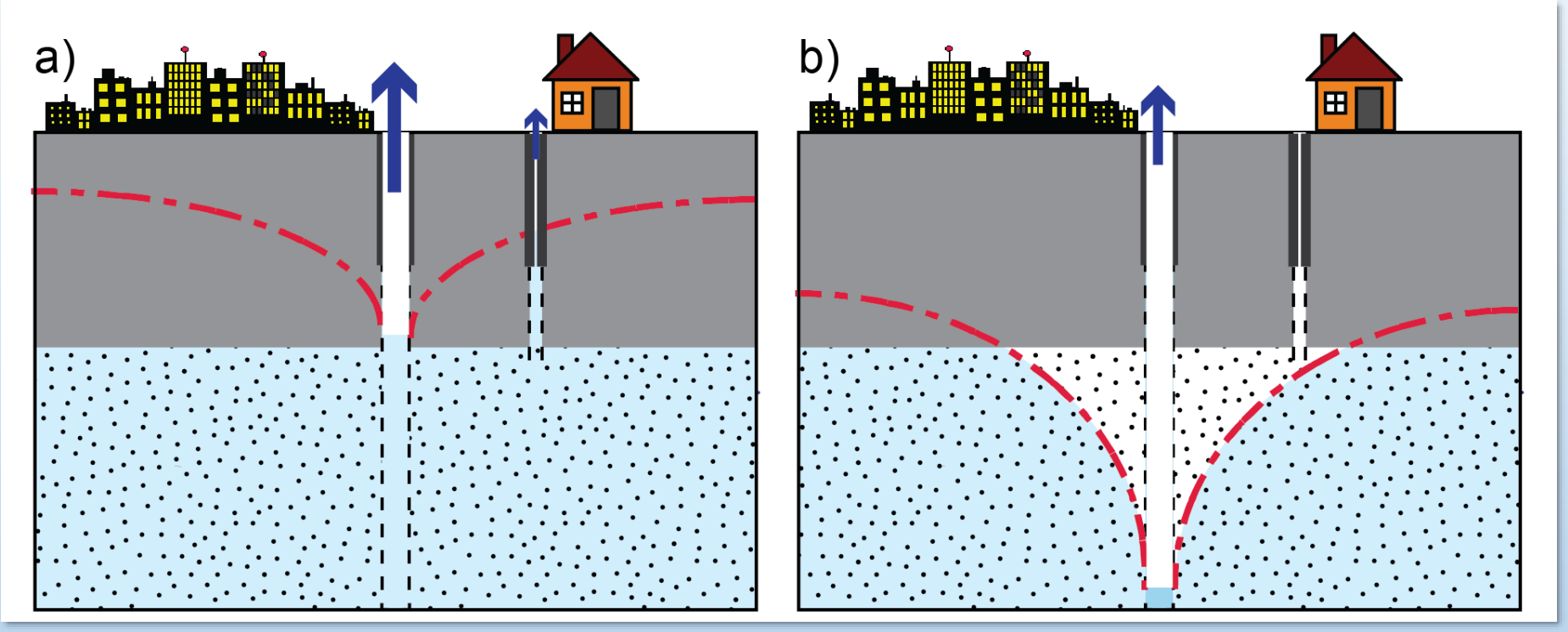
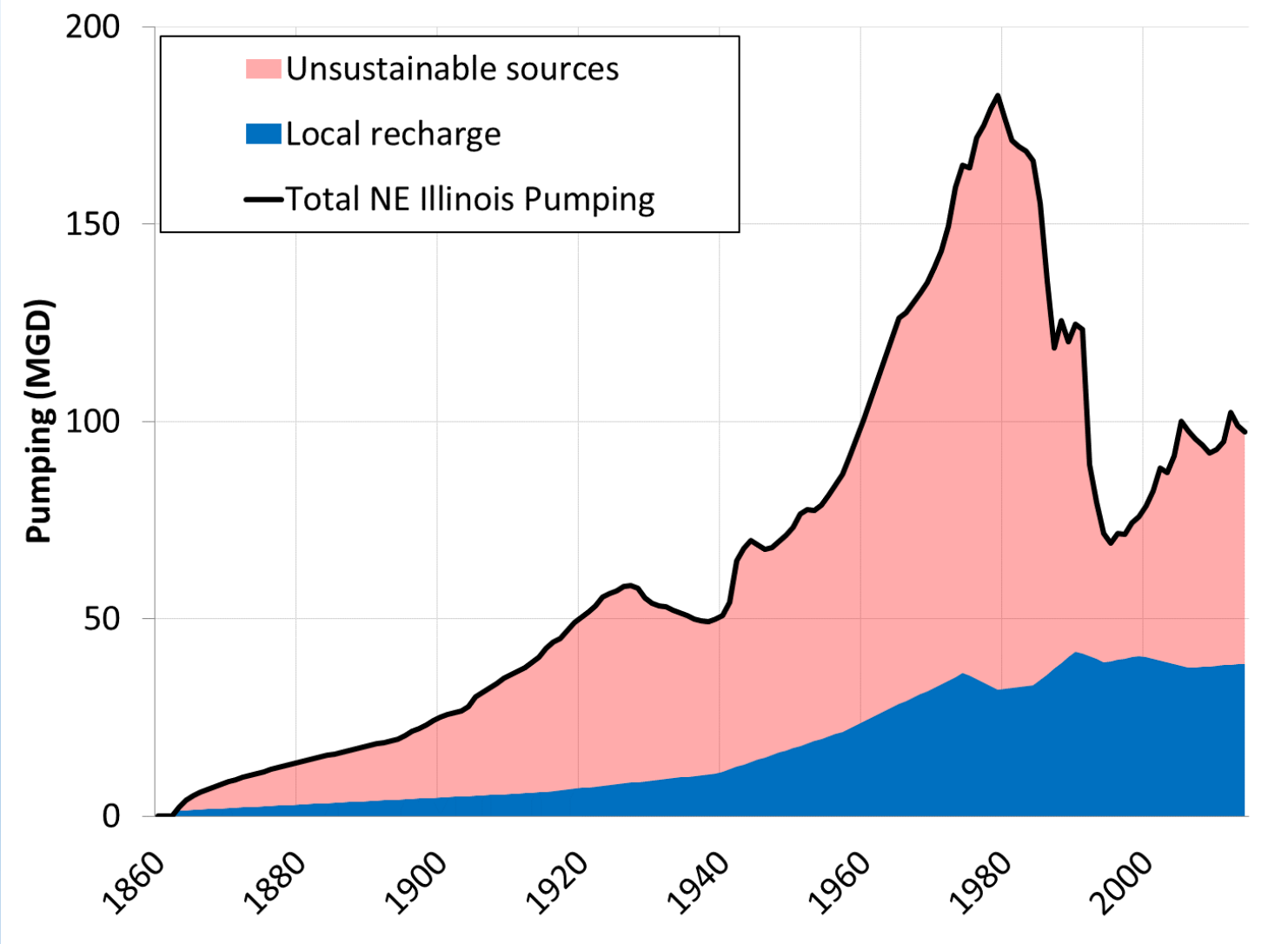
Desaturation of Sandstone

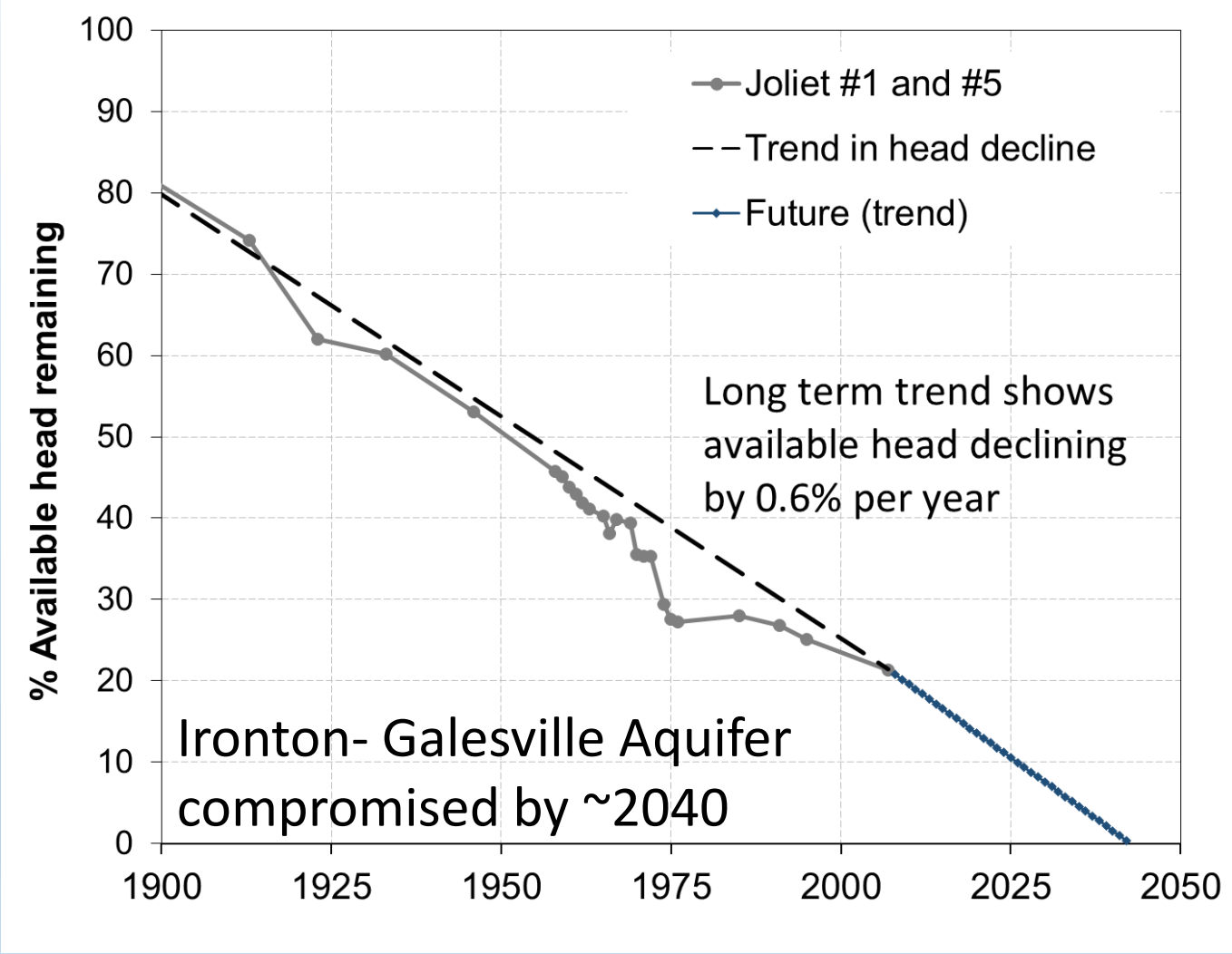


- Lost well capacity (including dry wells)
- Caving potential (well pumps sand)
- Possible water quality impacts

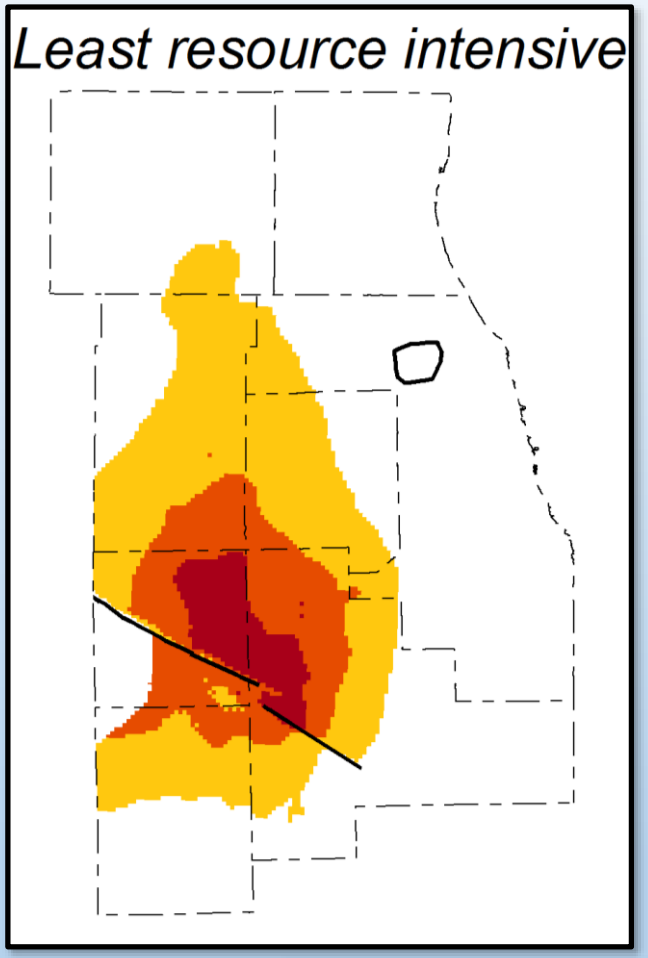
Water from Sandstone Aquifers in NE Illinois: 60% Unsustainable

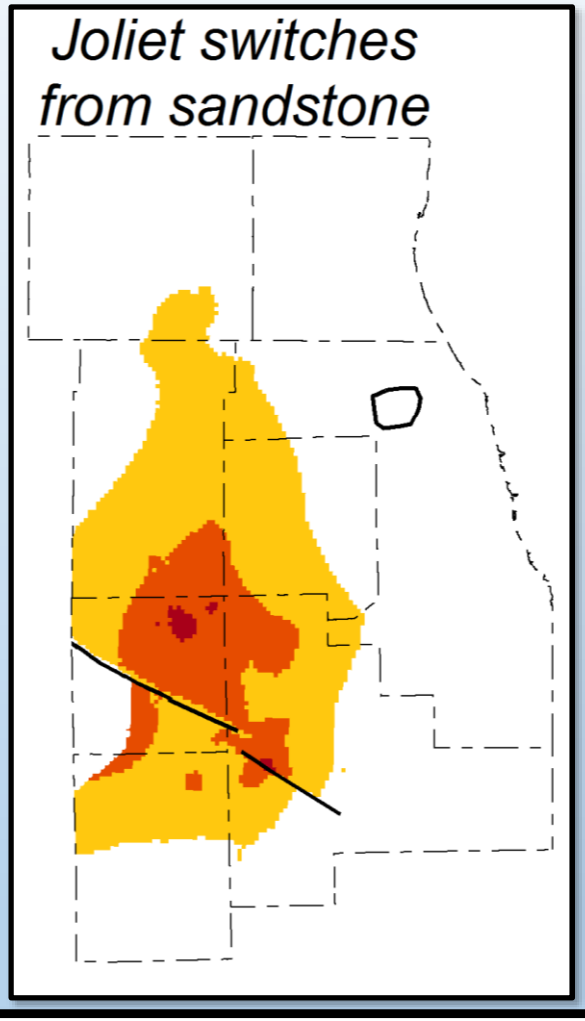


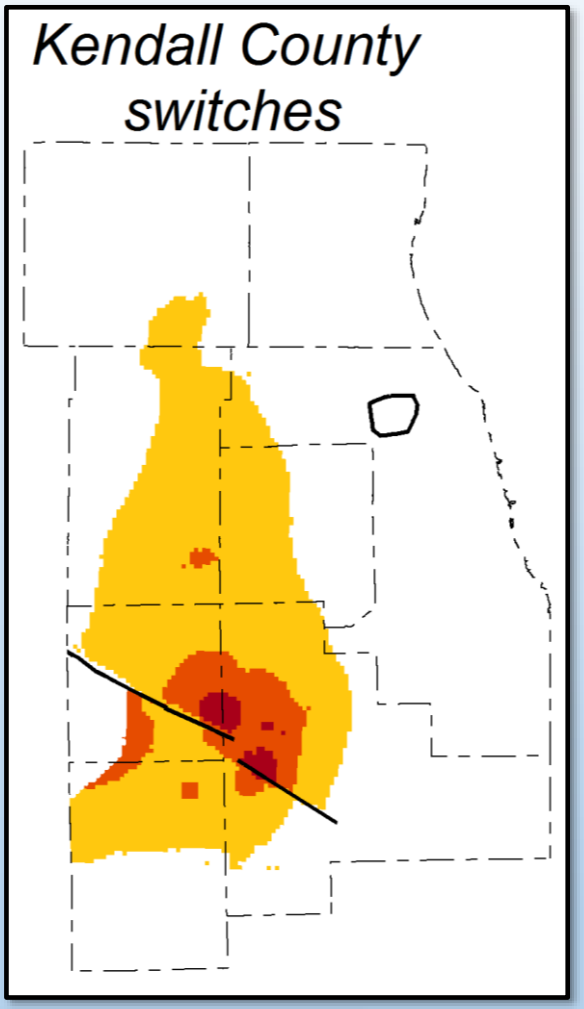
Data Trends in the Joliet Region



Model Simulations







2050 risk zones (St. Peter)

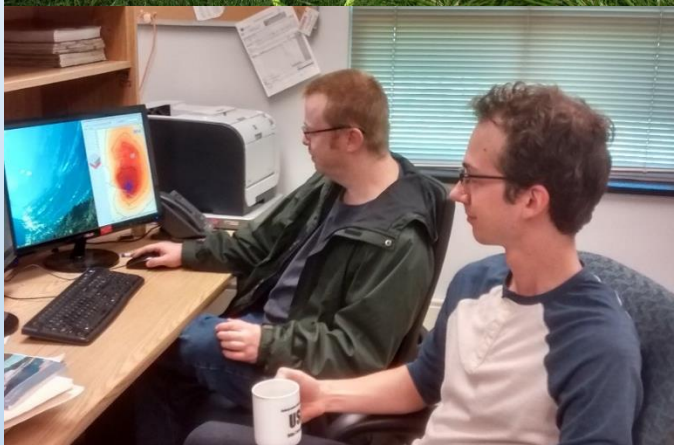
- Partial desaturation (pumping)
- Partial desaturation (non-pumping)
- Complete desaturation
- County Boundary
- Bedrock Fault

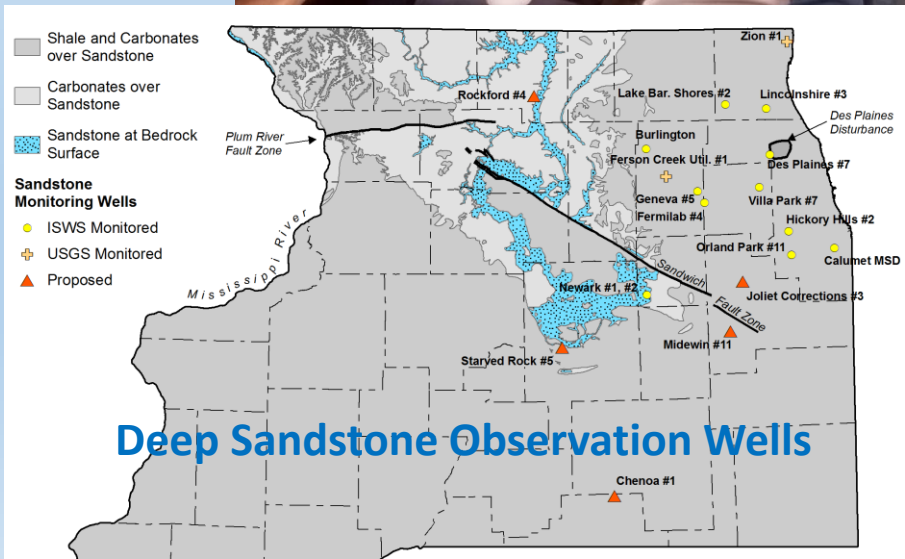
Bottom Line

- The sandstone aquifers will only be a viable source of water for the next 15-25 years at the center of the cone of depression
- Alternative supplies will be necessary
  - Most likely alternatives are rivers (Kankakee and Fox)
  - There is water available from Lake Michigan
  - Unconventional options
    - Water reuse (gray water)
    - Aquifer storage and recovery

Ongoing ISWS Activities in Region

1. Collect water level data
2. Update groundwater flow model
3. Compile well construction and rehabilitation information
4. Water withdrawal data
5. Technical assistance
6. Public outreach





ISWS Proposing Partnerships with Stakeholders

Comprehensive regional planning for future water supply, accounting for both surface water and groundwater

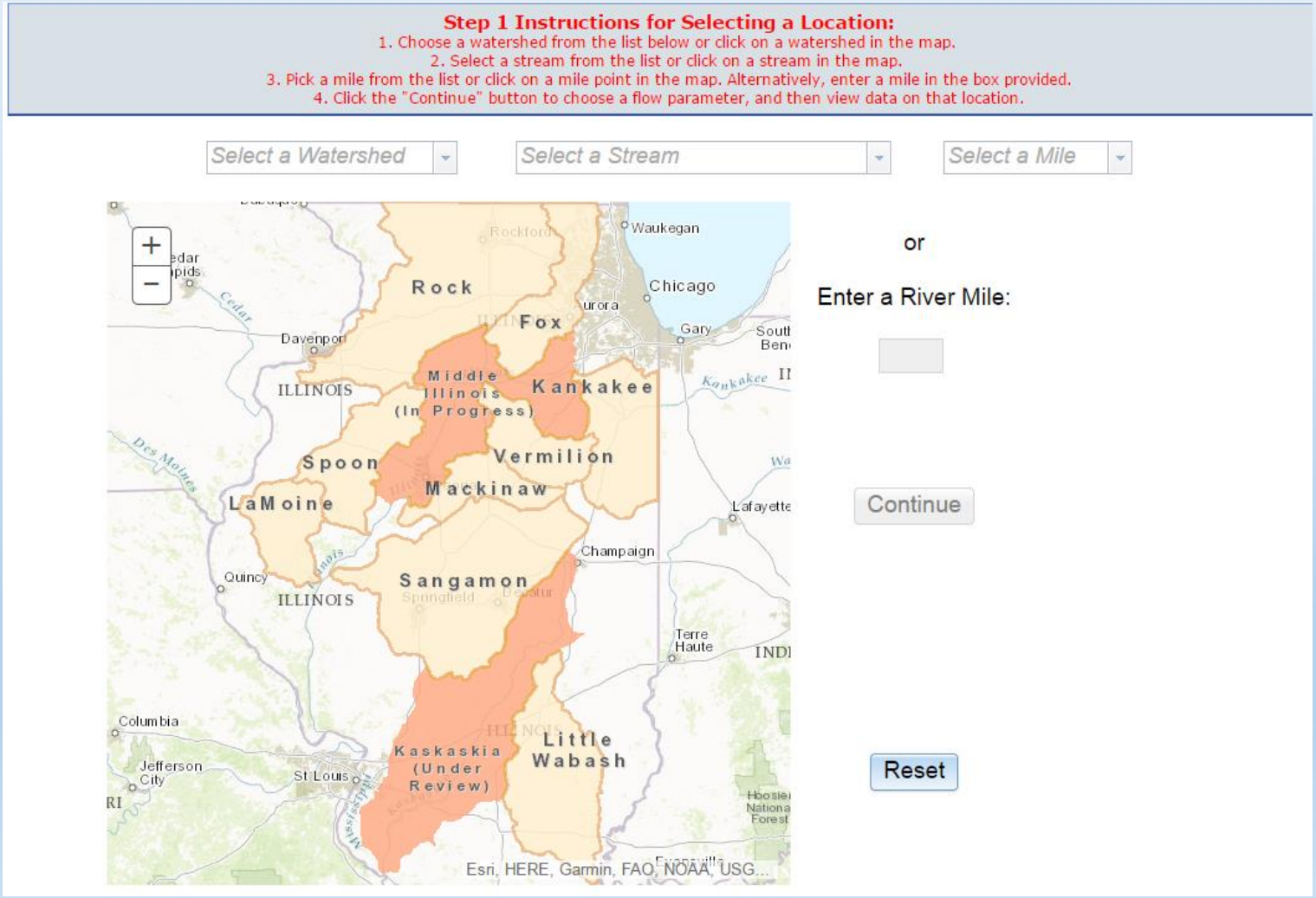
Three phases:

1. Data collection: Withdrawals, water levels, water quality
2. Data analysis: Determine temporal and spatial trends in demands and impacts
3. Groundwater and surface water flow modeling: Evaluation scenarios

Illinois Streamflow Assessment Model (ILSAM)

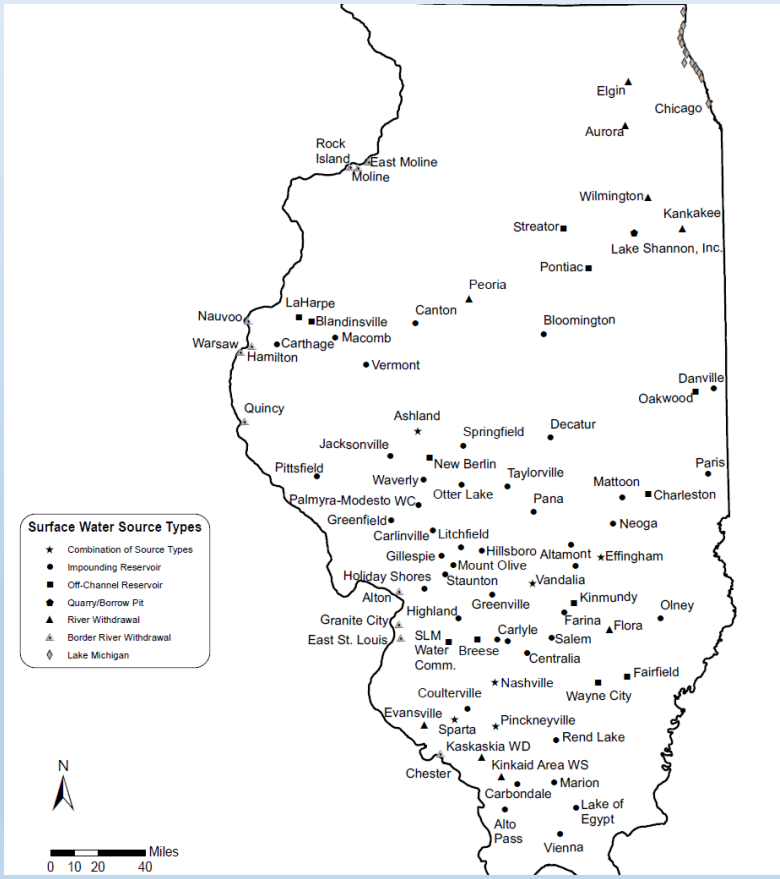
- ILSAM produces streamflow statistics that are
  1. Representative of long-term climatic condition
  2. Accounting for man-made modifications such as reservoirs, water withdrawals, and effluents
- ILSAM has a web application version and desktop version
- ISWS will upgrade ILSAM to GIS-based web application

Illinois Streamflow Assessment Model (ILSAM)



Surface Water System Vulnerability

- Systematically assess surface water PWS vulnerability
- Surface water system are classified as adequate, at risk, and inadequate based on safe yield analysis
- Provide scientific basis for allocating resources of monitoring and managing surface water system

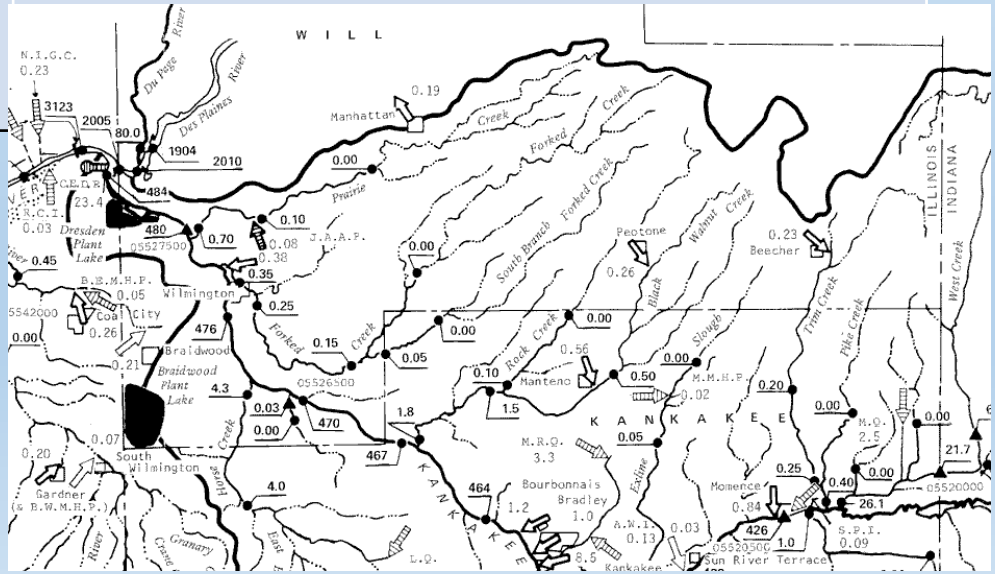


Water Supply Lakes Monitoring

Reservoir	Normal pool (feet)	Difference from normal (feet)	Monthly change (feet)	Years of record	April reported pumpage (mg)
Altamont	582.0	-0.1	-0.4	33	6.2
Bloomington	719.5	0.2	-0.3	30	N/A
Carlyle	445.0	5.7	4.7	39	N/A
Decatur	614.3	0.2	0.0	33	912.9
Evergreen	720.0	-0.1	-0.9	26	N/A

7-day-10-year ($Q_{7,10}$) Maps

Region	Year updated
NE Illinois	2003
Rock River, Sangamon, Kaskaskia, Little Wabash	2002
Kankakee, Spoon River, La Moine, Embarras, Southern Illinois, Illinois and Border Rivers	1988



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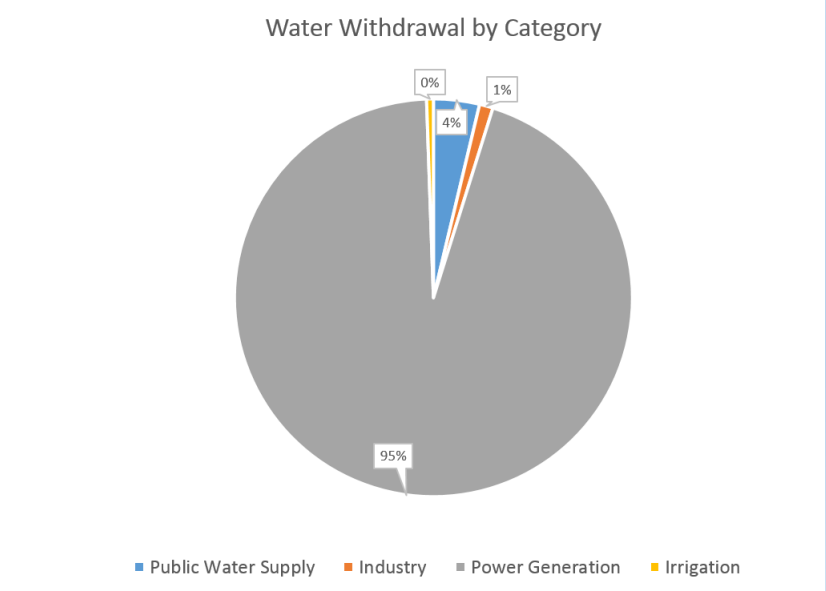
Water-Energy Nexus Resilience

- Power generation is the largest user of water
- Both water and energy demand peak in summer when water availability is low
- Characterize water demand by power plants
- Analyze water-energy nexus resilience for a range of climate scenarios



Groundwater Data Housed at ISWS

- Water well construction reports/driller's logs
- Water well permits/applications (since 1997)
- Well sealing forms (since 1980)
- Field inventory notes
  - 1930s statewide
  - Selected local studies subsequently
- Water level measurements
- Pumping tests
- Water quality analyses (ISWS, IEPA)
- Illinois Water Inventory Program (IWIP) annual water use survey
- Community Water Supply (CWS) inspection reports
- Historic community reports

ISWS Groundwater Databases

- Well records inventory
  - 422,000 well records, mostly private (active and abandoned)
  - IWIP (high-capacity) wells database; > 11,000 at active facilities
  - 275,000 wells info scanned
  - 333,000 pages scanned
  - >2,000 folders of documents
- Illinois Water Inventory Program (IWIP) data-base (both SW and GW)
- > 60,000 samples in groundwater quality database

Thank You