Scientific Activities in Support of Water Supply Planning: 2014-2016

Walt Kelly, Vern Knapp, Daniel Abrams, Gary Clark, Ben Dziegielewski, Dan Hadley, Ken Hlinka, Dave Kristovich, Devin Mannix, Scott Meyer, Kevin Rennels, Greg Rogers, George Roadcap, Steve Wilson, Jason Zheng
Illinois State Water Survey

Bill Dey, Don Keefer, Dave Larson, Yu-Feng Lin
Illinois State Geological Survey

What is Water Supply Planning?

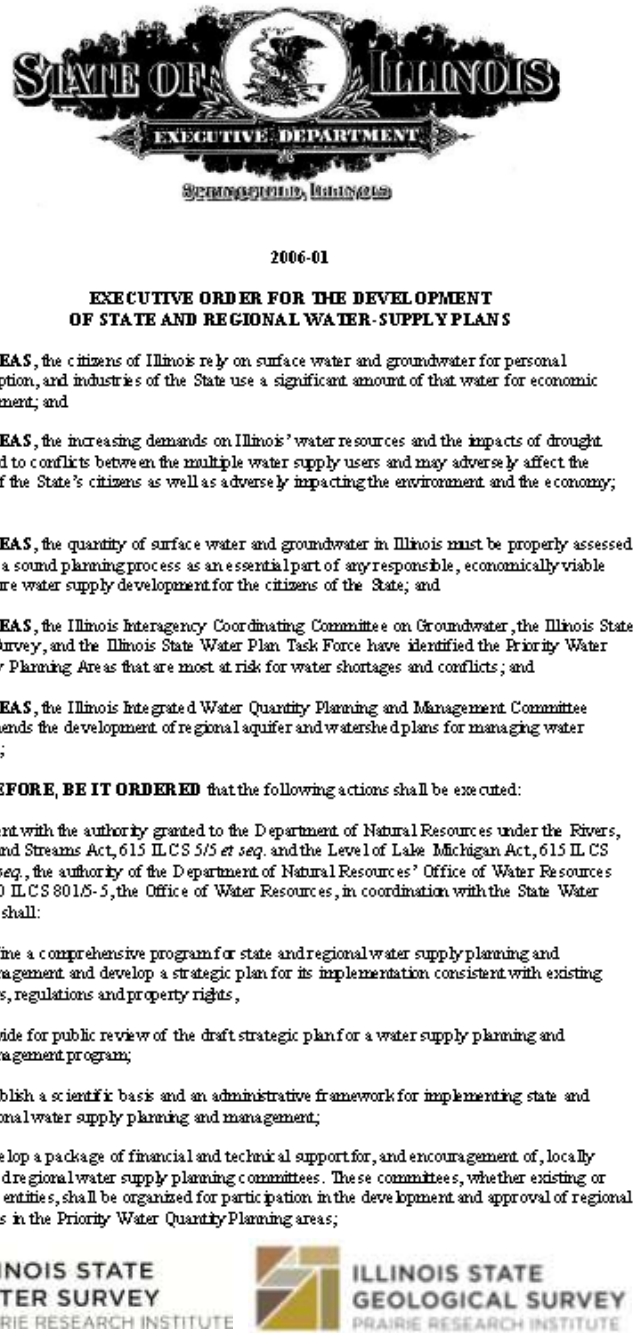
* Is there enough water of sufficient quality for future use?
* What are the existing water resources?
* What are the current and future needs for water?
  * Drinking water
  * Agricultural, industrial, energy needs
  * Environmental requirements
* Information needed: hydrology, geology, and current and future water demands

Taking a Regional Approach

Regional Supply Planning done for 3 highest priority regions:

- Northeastern Illinois
- East-Central Illinois
- Kaskaskia R. Basin

Funding pulled in the middle of the planning process



STATE OF ILLINOIS
EXECUTIVE DEPARTMENT
Springfield, Illinois

2006-01

EXECUTIVE ORDER FOR THE DEVELOPMENT OF STATE AND REGIONAL WATER-SUPPLY PLANS

WHEREAS, the citizens of Illinois rely on surface water and groundwater for personal consumption, and industries of the State use a significant amount of that water for economic development; and

WHEREAS, the increasing demands on Illinois' water resources and the impacts of drought may lead to conflicts between the multiple water supply users and may adversely affect the health of the State's citizens as well as adversely impacting the environment and the economy; and

WHEREAS, the quantity of surface water and groundwater in Illinois must be properly assessed through a sound planning process as an essential part of any responsible, economically viable and secure water supply development for the citizens of the State; and

WHEREAS, the Illinois Interagency Coordinating Committee on Groundwater, the Illinois State Water Survey, 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; and

WHEREAS, the Illinois Integrated Water Quantity Planning and Management Committee recommends the development of regional aquifer and watershed plans for managing water supplies;

THEREFORE, BE IT ORDERED that the following actions shall be executed:

Consistent with the authority granted to the Department of Natural Resources under the Rivers, Lakes, and Streams Act, 615 ILCS 5/5 *et seq.* and the Level of Lake Michigan Act, 615 ILCS 50/1 *et seq.*, the authority of the Department of Natural Resources' Office of Water Resources under 20 ILCS 801/5-5, the Office of Water Resources, in coordination with the State Water Survey, shall:

1. Define a comprehensive program for state and regional water supply planning and management and develop a strategic plan for its implementation consistent with existing laws, regulations and property rights;
2. Provide for public review of the draft strategic plan for a water supply planning and management program;
3. Establish a scientific basis and an administrative framework for implementing state and regional water supply planning and management;
4. Develop a package of financial and technical support for, and encouragement of, locally based regional water supply planning committees. These committees, whether existing or new entities, shall be organized for participation in the development and approval of regional plans in the Priority Water Quantity Planning areas;

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

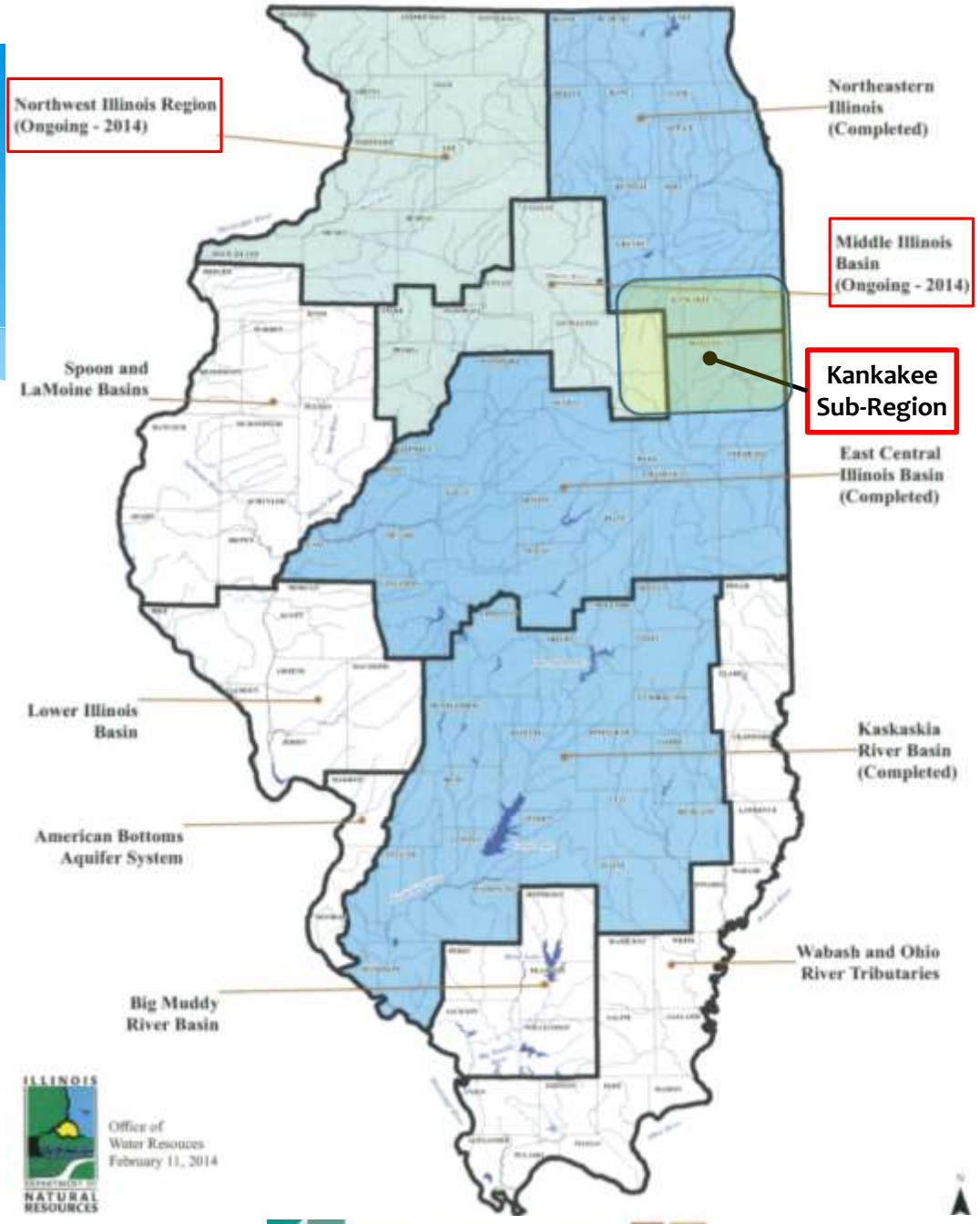
Taking a Regional Approach (Part 2)

* Starting summer 2014, IDNR funding the State Water and Geological Surveys to begin working on several new areas of the state
* Regions based on natural breaks in hydrology or geology, or specific water needs and/or water availability
* Local stakeholder input critical to the process (Regional Water Supply Planning Committees)

Water Supply Planning Regions

Three New Regions

1. Middle Illinois R. (6 counties)
2. Northwest Illinois (10 counties)
3. Kankakee R. (sub-region)



ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

Regional Tasks: Groundwater (ISWS)

1. Compile and evaluate existing maps and data, including water level, water use, water chemistry, and aquifer properties data
2. Identify and instrument observation wells
3. Perform mass measurements of water levels
4. Collect samples for groundwater chemistry
5. Construct groundwater flow models

Regional Tasks: Groundwater (ISGS)

1. Updating of maps for input into Flow Models
   * Major Sand and Gravel Aquifer distributions and thicknesses
   * Elevation and thickness of major bedrock units and bedrock surface topography
2. Updated Hydrogeologic Characterization
   * Analysis of water well data base
   * Summaries of aquifer distribution and character
   * Updated maps

Regional Tasks: Surface Water

1. Characterize stream flow during periods of low flow and drought, including quantifiable human impacts (existing effluent discharges, withdrawals, reservoirs)
2. Project future (2060) changes in low flow and availability as impacted by changes in water demands and potential climate change
3. Model individual surface water supply systems to determine drought vulnerability and yield
4. Model regulated rivers (Illinois, Kaskaskia) to see how management impacts availability

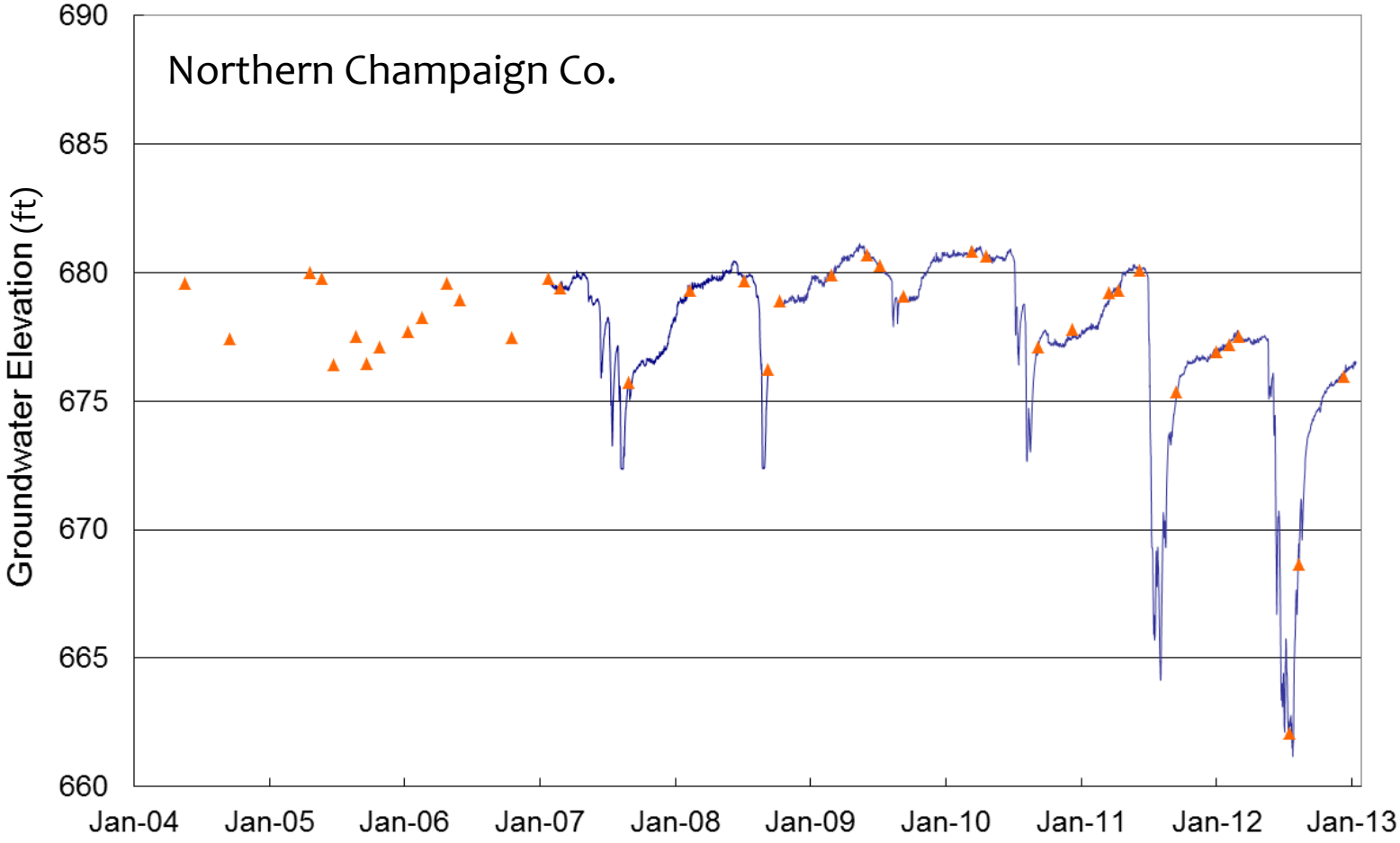
Other Activities for Statewide Water Supply Program

* Illinois Water Inventory Program (IWIP)
* Water demand forecasting
* Development of Illinois Cooperative Groundwater Monitoring Well Network
* Mass measurement of Cambrian-Ordovician aquifers in northern Illinois
* Development/updating of region-based web sites
* Education and outreach on groundwater recharge

Groundwater Monitoring Well Network

1. Identify and assess existing groundwater monitoring wells (multi-agency)
2. Develop monitoring strategies for this network
3. Develop database for managing network data
4. Outfit selected network wells with telemetry
   * 8 bedrock wells in NE Illinois
   * 5 monitoring wells outfitted in Lee/Whiteside Counties
5. Install two new bedrock monitoring wells in Kendall County near the Sandwich Fault Zone

Groundwater Monitoring Well Water Level Data

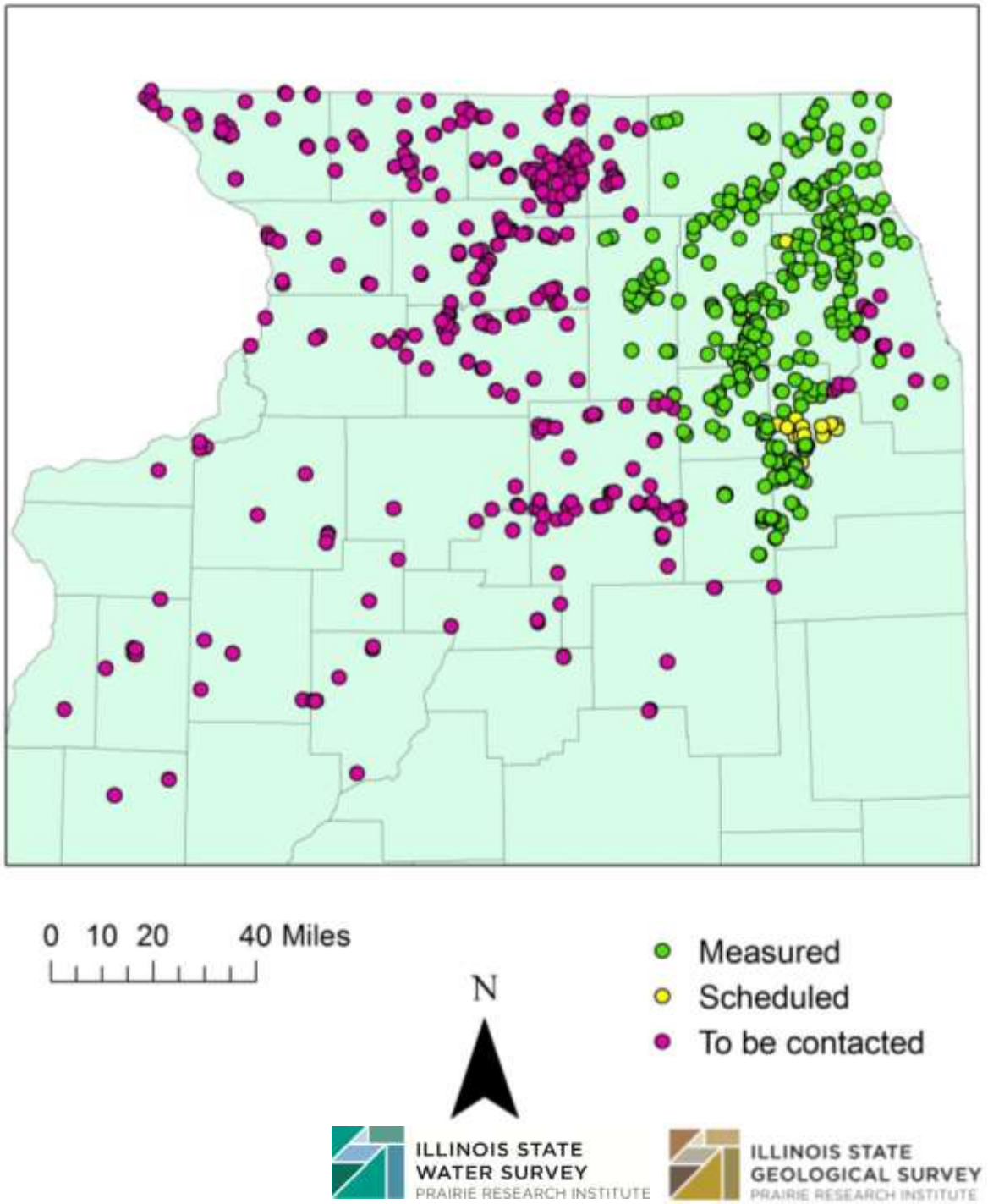


Mass Measurement of Cambrian-Ordovician Aquifers

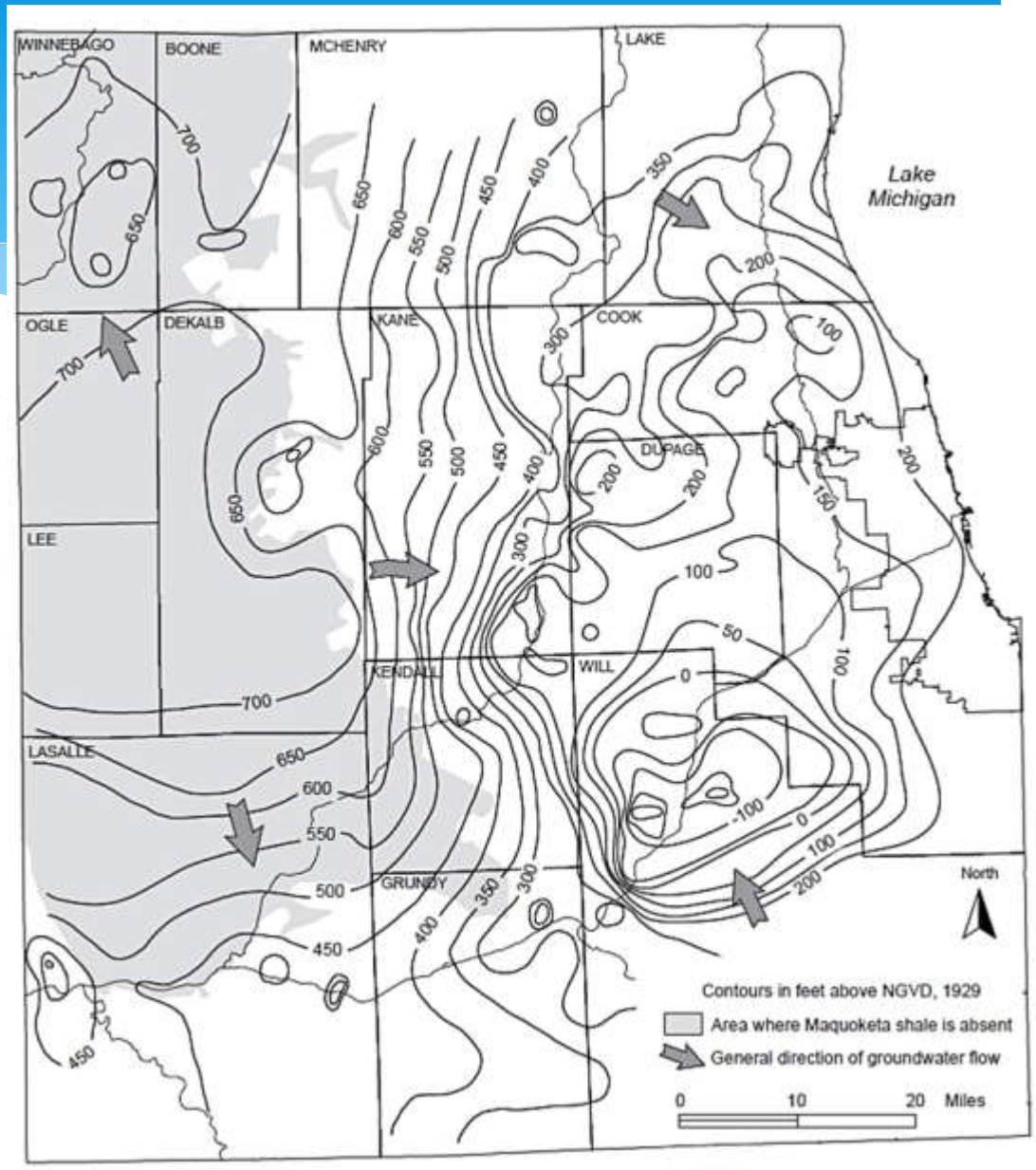
* Synoptic measurements made every 5 – 8 years
* Using as many wells as possible that were sampled in previous mass measurements
* Wisconsin participating this time

2014 Mass Measurement

50-100 wells in SE Wisconsin



Potentiometric Surfaces



From Burch (2002)

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE

Regional Water Demand Forecasting

* Dr. Ben Dziegielewski (SIU-retired) working with and training ISWS staff
* Preparing/analyzing water use data in each of the regions for input in water demand models
* Develop scenarios with input from Regional Water Supply Planning Committees
* Going out to 2060

Water Demand Projections