

Water Supply Planning for Illinois
April – June 2007 Progress Report
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Illinois State Water Survey and Illinois State Geological Survey

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The following is a summary of activities of the Scientific Surveys from April 1, 2007 through June 30, 2007 related to the Water Supply Planning Initiative.

Public Education/Outreach

The water supply planning (WSP) web site, accessible at www.sws.uiuc.edu/wsp, continued to evolve. Two Water Survey presentations made to the Northeastern Illinois Regional Water Supply Planning Group (RWSPG) and two made to the East Central Illinois Regional Water Supply Planning Committee (RWSPC) during the reporting period were added to the site. Four other Water Survey presentations and four presentations given by others were also added. Seven Water Survey publications, and links to twelve publications by others, were added to the site along with links to twenty four other organizations with water supply planning related activities.

Derek Winstanley participated in a discussion about the Mahomet Aquifer that was taped by the Champaign County Farm Bureau for distribution on the Insight television channels.

An ISWS staff member continues to assist the Paul Simon Policy Institute at Southern Illinois University (SIU), the Chicago Metropolitan Agency for Planning (CMAP), the Illinois Department of Natural Resources (IDNR) and the Metropolitan Planning Council with planning for a water planning issues conference in Chicago. The conference is intended to increase the awareness of Illinois' elected and appointed officials.

Regional Water Supply Planning Committee Support

Staff assisted both regional planning groups in drafting operational guidelines determining how they would conduct their business. Operational guidelines have been adopted by both regional planning groups. The documents are posted on the planning group web-sites, accessible through the WSP web-site, Home Page, Meetings links.

Staff participated in three monthly meetings each of the Northeastern Illinois RWSPG and the East Central Illinois RWSPC. Al Wehrmann presented *Groundwater Occurrence & Movement: An Introductory Discussion with Application to Northeastern Illinois* to the Northeastern Illinois RWSPG at their April meeting, and Vern Knapp presented *NE IL Streams: Factors Affecting Distribution & Availability of Streamflow for Water Supply &*

Instream Needs at their May meeting. Derek Winstanley made two presentations to the East Central Illinois RWSPC. One was titled *Water Supply Planning and Management: Sustainability* and the other was titled *Climate Variability and Change*. These presentations are on the WSP Web-site, under Home Page, Water Survey Presentations. Ed Mehnert demonstrated a draft web site, prepared by web master Mindy Tidrick, to the East-central Illinois Regional Water Supply Planning Committee.

Water Survey staff provided technical assistance to the East Central Illinois RWSPC and the Mahomet Aquifer Consortium (MAC) in the development of a request for qualifications seeking a consultant to prepare water demand scenarios to the year 2050. Following the designation of Wittman Hydro Planning Associates (WHPA) as the preferred consultant, Water Survey staff worked with MAC Board members, WHPA staff and Dr. Ben Dziegielewski of SIU in developing a methodology statement defining the conduct of the water demand scenario work. That statement is an attachment to the contract between the MAC and WHPA that has been approved by the IDNR.

Water Survey staff worked with CMAP staff and their consultant, Dr. Ben Dziegielewski of SIU, to develop a similar methodology statement to guide the conduct of water demand scenario work for Northeastern Illinois. The mutual development of these methodology statements helps ensure compatibility between the water demand scenarios in the two regions

IWIP

The second mailing of the 2006 ISWS Illinois Water Inventory Program (IWIP) questionnaire was mailed out. And Water Survey staff initiated and participated in a meeting of East Central Illinois Farm Bureau directors in Clinton to improve information regarding the extent of irrigated acreage and water use. Suggestions to seek information about irrigated acres from seed companies and the U.S. Department of Agriculture's Farm Service Agency are being pursued.

Climate

The Water Survey's Center for Atmospheric Science (CAS) reconstructed the historical climate record of Illinois by performing quality control on early 19th century temperature and precipitation records in and near Illinois. The results are being applied to existing quality-controlled climate records from both the Global and U.S. Historical Climate Networks which are widely used in climate studies.

The CAS also constructed future climate scenarios for Illinois and Lake Michigan that involved summarizing annual and seasonal temperature and precipitation projections from global climate models, using three scenarios of future greenhouse gas emissions, in a variety of time series plots and tables. Possible future water levels in Lake Michigan were calculated. This material is on an internal web site, and is being edited for presentation to the public on the WSP web site.

Groundwater Modeling

The regional groundwater flow model for northeastern Illinois is ready for external review. Model calibration under transient pumping conditions is complete. Model output, in the form of model layer heads, has been created for a variety of past, present and future pumping conditions. Future pumping scenarios were based on regional breakdowns of pumpage based on the work of Dziegielewski *et al.*, 2005.

Calibration runs are being conducted on modeling of the shallow aquifers within Kane County to rectify errors created by boundary conditions between the shallow and the regional model.

New Mahomet aquifer field data is currently being collected primarily through funds provided by the Illinois-American Water Company. Modification of the model will be conducted when this new field data has been collect. This includes collection of groundwater levels from existing wells by ISWS and drilling of new wells by ISGS in western Champaign County.

Surface Water Models & Accounting

The calibration of two hydrologic simulation models for the Fox River is near completion, one based on the SWAT watershed model and the other the HSPF model. Each model is being verified using historical drought conditions, and the relative strengths of the models to simulate drought conditions for evaluating water supply availability. The purpose of the model development and comparison is to evaluate the potential impacts of climate change on streamflows and surface water availability in the Fox River watershed.

Similar hydrologic simulation using the SWAT model is continuing for additional regions within the Sangamon River watershed. The Sangamon River SWAT model, when completed, will be used for evaluating potential impacts of climate change scenarios in east-central Illinois.

Database programming for the new version of the Illinois Surface Water Accounting Model (ILSAM) is continuing. Recent improvements include the ability to insert multiple new water withdrawals or wastewater discharges in evaluating a variety of future water use scenarios. The final step before the initial release of ILSAM later this summer is the completion of the scenario building capabilities that will permit reloading, sharing, and building updates on top of previously-developed scenarios. ILSAM differs from the previously-described watershed models in that it is a statistically-based accounting tool that is used to more accurately predict direct impacts of water use development on streamflow quantity.

Hydrologic data and watershed characteristics are being prepared for the Vermilion River basin in east-central Illinois. These data will be used in the hydrologic analysis portion of the ILSAM model development for east-central Illinois.

Geologic Map - Fox River Basin

Work continued on developing a 3-D geologic map of the Fox River Watershed that lies within the 11-county planning region. This work included:

- Database modifications: creation of standard of material descriptions
- Compilation of information on the hydrogeology of the sand and gravel aquifers and the Silurian dolomite
- Progress on development of the 3-D geologic map for large portions of western and central Lake County and portions of Cook and Kane Counties
- Collection of 2 miles of high resolution seismic data to help interpret the distribution and character of shallow sediments and the bedrock surface
- Completed 3 stratigraphic test borings in northwestern Cook County. Groundwater observation wells were installed in each of these boreholes
- Scheduled field time for this summer, including 2 weeks of seismic data collection in Kendall and DeKalb Counties, and 5 weeks of drilling in Lake, McHenry and Cook Counties

Geologic Map – Mahomet Aquifer

Work continued on enhancement of a 3-D geologic map for the Mahomet aquifer and overlying shallow aquifers. This work included:

- Continued research for the 9-township Illinois-American Water Company (IAWC) project in Champaign and Piatt Counties, and initiation of work on the 18-township IAWC project in portions of Champaign, Piatt, Ford, Iroquois, and Vermillion Counties
- Continued development and enhancement of database for the region
- Began digitizing key archival geophysical surveys into database
- Drilled and collected cores from two test holes in the proposed Bondville water supply area
- Installed 5 monitoring wells at these two drill sites, and recorded water levels
- Completed 12 miles of surface seismic surveys over the Mahomet Bedrock valley near Bondville and Pesotum.
- Scheduled 5 miles of seismic surveys for this summer south of Paxton.
- Reached agreement with IAWC to collect data during installation of monitoring and production wells at the proposed Bondville water supply area
- Scheduled drilling test holes along recently acquired geophysical lines to further characterize the aquifers over the Mahomet Bedrock Valley. Observation wells will be installed targeting the Mahomet aquifer and shallower aquifers. Downhole seismic profiles will be collected when the wells are complete.

Supplemental Research Proposal

The ISWS and ISGS submitted a supplemental research proposal to conduct additional geologic and hydrologic studies in northeastern and east central Illinois in FY 08 and 09. The work involves shallow aquifer mapping, improving knowledge of surface water/groundwater interactions in the Fox River basin, preparing surface water accounting tools for the Kankakee and Vermillion/Wabash watersheds, and improving knowledge of recharge. The \$598,300 proposal, an amendment to the contract between

IDNR and the University of Illinois, has been approved by the University and is awaiting approval by IDNR, pending passage of a State budget.

Meetings

- 3 MAC Executive Board meetings, Champaign
- 1 MAC general membership meetings, Champaign
- 2 conference calls, Pontiac Group (Coordination between OWR, MAC, CMAP, ISWS and ISGS)
- 3 Northeastern Illinois RWSPG meetings, Woodstock, Deerfield, Chicago
- 3 East Central Illinois RWSPC meetings, Havana, Bloomington, Decatur
- 1 Village of North Barrington Planning Commission, discussed ISGS mapping in the region and how the geology relates to groundwater issues that they are addressing.

Presentations (In addition to those made at meetings listed above)

- Apr 25, Bayles Lake Board meeting, Loda, *The Mahomet Aquifer, Ethanol Production and Potential for Impact on Bayles Lake Supply*, presenter Allen Wehrmann
- May 14, Mahomet Aquifer Consortium Membership meeting, preliminary results of the IAWC sponsored projects, presenter Bill Dey. Also presented at the East-Central Illinois Water Supply meeting in June 2007.
- May 24, Northeast Illinois Regional Groundwater Protection Planning Committee Field Day, Yorkville, *Update on Groundwater Investigations in Northeast Illinois*, presenter Allen Wehrmann
- May 24, Kane County Water Study Stakeholders Committee, Geneva, *Water-Resources Investigations for Kane County, Illinois: Progress Report*, presenters Scott Meyer and Bill Dey
- May 24, Central Illinois Municipal Official Association, Savoy, *The Mahomet Aquifer and Ethanol: Are We Running Out of Water*, presenter Allen Wehrmann
- June 6, Kendall County Mayors and Managers meeting, Yorkville, *An Update on the Kendall County Groundwater Assessment and Regional Water Supply Planning for Northeast Illinois*, presenter Allen Wehrmann

Staffing

ISGS Geophysicist: Curt Blakley was transferred within the ISGS for WSP work in June 2007. Curt will be responsible for much of the ISGS characterization efforts of the Deep Bedrock Aquifer and its confining units for northeastern Illinois.