



Joliet Alternative Water Source Study

Topic #8: History of Northeastern Illinois Water Sources (including City of Joliet) and what other communities are doing to address declining aquifer levels

Northeastern Illinois has relied upon a mix of surface and ground water sources to meet domestic and industrial water needs since widespread development of the area began in the 19th century. The City of Chicago and other lakefront communities began relying upon Lake Michigan as their primary source of drinking water early on. Major improvements in the quality of the lake supplies occurred when the Chicago River was reversed, wastewater discharges diverted away from the lake, and water treatment technologies introduced. Most inland communities relied upon groundwater or river water sources during their early years of development.

During the first half of the twentieth century, the City of Chicago began to expand its service area beyond its municipal limits, with many “inner ring” suburbs becoming wholesale water customers of the City. Inland communities beyond this inner ring continued to rely on groundwater or river water sources. Regional water systems began to be developed in the late 1950s. For example, the Northwest Water Commission was created by the communities of Arlington Heights, Buffalo Grove, Palatine, and Wheeling in 1957.

Following the U.S. Supreme Court’s decision in 1967 to establish a limit on the rate at which Illinois can divert water from Lake Michigan to 3,200 cfs, investigations to develop an understanding of the balance between available water resources and projected water demands in the region intensified.

In 1980, the Illinois Institute of Natural Resources State Water Survey Division published a report analyzing the adequacy and economics of water supply in Northeastern Illinois (<https://www.ideals.illinois.edu/bitstream/handle/2142/59740/ISWSCR-229.pdf?sequence=2&isAllowed=y>)^[1]. This study identified approximately 90 communities that were likely to need to develop alternative sources of water supply based on projections of available aquifer and river capacity and future water needs. Sustainable yields from the deep aquifer system were determined to be well below the water demands to be met in a number of these areas.

Based on the analysis, the State Water Survey defined six potential regional water systems for consideration as options to provide more sustainable water supplies for areas of concern. These included:

- Lake County Regional Water System
- Southern Cook County Regional Water System
- DuPage County Regional Water System
- Northwestern Cook County Regional System

^[1] Singh, Krishan P. and J. Rodger Adams. *Adequacy and Economics of Water Supply in Northeastern Illinois: Proposed Groundwater and Regional Surface Water Systems, 1985-2010*. Illinois Institute of Natural Resources – State Water Survey Division. Urbana, Illinois. May 1980.



- Fox River Supply for Kane County
- Kankakee Regional Supply for Will and DuPage Counties

Five regional systems have developed (Central Lake County JAWA, Oak Lawn Regional System, DuPage Water Commission, Northwest Suburban Municipal JAWA and Northwest Water Commission) to provide service to the areas associated with the first four conceptual systems presented by the State Water Survey. The Illinois American Lake Michigan Water Transmission System was also completed in the early 2000s to provide water to areas in southwest Cook and northwest Will Counties. Regional systems continue to be discussed but have not been developed in the Fox River or Kankakee (Will County) areas.

The evolution of water sources in Northeastern Illinois from 1966 to 2014 is depicted in the attached document prepared by the Illinois State Water Survey. As you can see, the reliance on groundwater has shifted considerably through northeastern Illinois over the past 50 years.

The Illinois State Water Survey (ISWS) has continued to monitor conditions in the aquifers in northeastern Illinois over time. A report issued in 1997 (<https://www.isws.illinois.edu/pubdoc/C/ISWSC-177.pdf>)^[2] indicated that levels in the deep wells in western Cook/eastern DuPage Counties and northern Cook/southern Lake Counties rose sharply between 1991 and 1995 due to the transition of multiple communities from groundwater sources to regional sources supplied from Lake Michigan while levels in areas still served by groundwater continued to decline. A 2008 report by the ISWS (<https://www.ideals.illinois.edu/bitstream/handle/2142/9485/DCS%202008-04.pdf?sequence=2>)^[3] found that even with reductions in deep aquifer pumpage in some areas, groundwater level declines had resumed across much of the eight-county Chicago region, and in 2015 the ISWS published a contract report that includes a comprehensive review of changing groundwater levels across the region (<https://www.ideals.illinois.edu/handle/2142/90999>).^[4] The 2015 report includes color-coded maps that show the pattern of change in groundwater levels across the region for periods between 1959, 1966, 1971, 1975, 1980, 1985, 1991, 1995, 2000, 2007, and 2014.

Planning for the long-term adequacy of water supplies for the northeastern Illinois region remains an ongoing effort. While the number of communities served by Lake Michigan water has increased significantly over the past 30 years, the total amount of Illinois' diversion from the Lake is and is presently projected to remain below the Supreme Court limit of 3,200 cfs. As such, Lake Michigan remains a potential source of water supply for additional communities in the region under the IDNR's Part 3730 rules. Area rivers including the Fox River and the Kankakee River are used as a source of water for multiple communities. Plans for potential development of new withdrawals from these waterways are continuing, though requirements for the maintenance of minimum flows during drought periods will constrain the amount that can reliably be withdrawn during low flow periods without providing adequate back-up sources. Groundwater drawn from both shallow and deep wells remains a primary

^[2] Visocky, Adrian P., *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995*. Illinois State Water Survey Circular 182. Champaign, IL. 1997.

^[3] Burch, Stephen L., *A Comparison of Potentiometric Surfaces for the Cambrian-Ordovician Aquifers of Northeastern Illinois, 2000 and 2007*. Illinois State Water Survey, Data/Case Study 2008-04. Champaign, IL. December 2008.

^[4] Abrams, Daniel B. et al., *Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply*. Illinois State Water Survey/Prairie Research Institute Contract Report 2015-02. University of Illinois at Champaign-Urbana. September 2015.



source of water for multiple communities, self-supplied industries, and individual property owners throughout significant parts of the region.

Several of these groundwater dependent communities, including Joliet, are currently evaluating alternative water sources due to the declining aquifer levels.

Joliet

The City's primary water source is currently the deep aquifer system, specifically the Ironton-Galesville Aquifer. As noted above, declining levels in the deep aquifer system have been observed for over 40 years. Alternative water supplies for the Joliet region have been studied since the 1960s. In 1971, the Public Water Commission of Frankfort, Joliet, Lockport, Mokena, New Lenox, Rockdale and Romeoville was formed. A 1972 report presented three alternatives for supplying water to the member communities from the Kankakee River. Dissent amongst the group regarding financial obligations terminated further development of these plans. In 1975, a report was prepared on Water Supply Resources for the City of Joliet. This report concluded the City should continue development of its shallow and deep wells for the present and look to develop a future Kankakee River water supply source for the City of Joliet. In the late 1980s, the City was faced with another decision regarding water source when new regulations reducing the allowable limits of radium in drinking water were proposed by the USEPA. The City purchased property for an intake from the Kankakee River at Towpath Lane in Wilmington, Illinois and completed design engineering for a surface water treatment plant. Due to the delay of the radium standard, this project was never constructed. In the early 2000s, a study was prepared for an intake at I-55 and the Kankakee River with a treatment plant at Amoco Road. This new location was proposed due to the westward shift of the demand center for the City. In 2003, the radium standard was finalized, the ISWS estimated the aquifer would be sustainable for 40-80 years, the City abandoned the Kankakee River option due to cost, and proceeded with constructing water treatment plants to remove radium and drilling additional deep wells. Fast forward 15 years and a 2015 study completed by the Illinois State Water Survey (ISWS) of the sandstone aquifers in Northeastern Illinois identified decreased groundwater levels with partial desaturation of the Ironton-Galesville aquifer anticipated within 15 to 30 years. This prompted the City to commission this Alternative Water Source Study to select another alternative water source and bring it online by 2030 when the deep wells will be desaturated to the point of not being able to meet the City's maximum day water demands.

Oswego, Montgomery, & Yorkville

In 2015, given the projected water level declines in the deep sandstone aquifer noted in the ISWS Study, the Villages of Oswego and Montgomery and the United City of Yorkville proceeded with individual Water Works System Master Plans and also initiated the analysis of alternate water supply options for the three communities as a sub-region. The three communities evaluated individually withdrawing and treating water from the Fox River as well as withdrawing at one location that would serve all three communities. The Villages of Oswego and Montgomery approached the City of Aurora to evaluate if connection to their Fox River supplied system would be an option. The United City of Yorkville worked with Illinois American Water to evaluate the potential of extending their Lake Michigan supplied transmission line that currently provides water to Bolingbrook, Homer Glen and Plainfield. All three communities also commissioned an analysis to determine the cost of connecting to the DuPage Water Commission (DWC). The three communities are continuing to evaluate alternative sub-regional water supply options. The two leading sub-regional options appear to be withdrawal from the Fox River or connection to the DuPage Water Commission.



Shorewood

In 2014, the Village of Shorewood completed a Water Supply Project Plan (<http://vil.shorewood.il.us/departments/admin/WaterSupplyProjectPlanWebsite.pdf>) which questioned the sustainability of the deep aquifer and evaluated 4 alternatives: 2 alternatives consisting of blending of deep well water and shallow well water and 2 alternatives consisting of connecting to Lake Michigan Water. In 2015, ISWS presented their findings on the declining deep well aquifers to the Village (<http://vil.shorewood.il.us/departments/admin/ShorewoodISWSPresentation.pdf>). In May 2018, the Village took its first step in the process to connect to Lake Michigan water when they conducted an appraisal of 17 miles of ComEd easement for construction of a water transmission main. In June 2018, Village Trustees approved the engineering contract for the design of the approximately 17-mile water transmission main from the site of the proposed Lake Water Receiving Station near Black Road and I-55 to the proposed connection to the Illinois American Water system near I-55 and N. Schmidt Road. Design is currently underway and is anticipated to last until Spring 2020. Construction is anticipated to take 3 to 5 years.

Several other groundwater dependent communities in the Joliet region are waiting to see which alternative water source Joliet selects before deciding how they will proceed in addressing declining aquifer levels. The City will be hosting a regional water meeting in the near future with our surrounding communities.

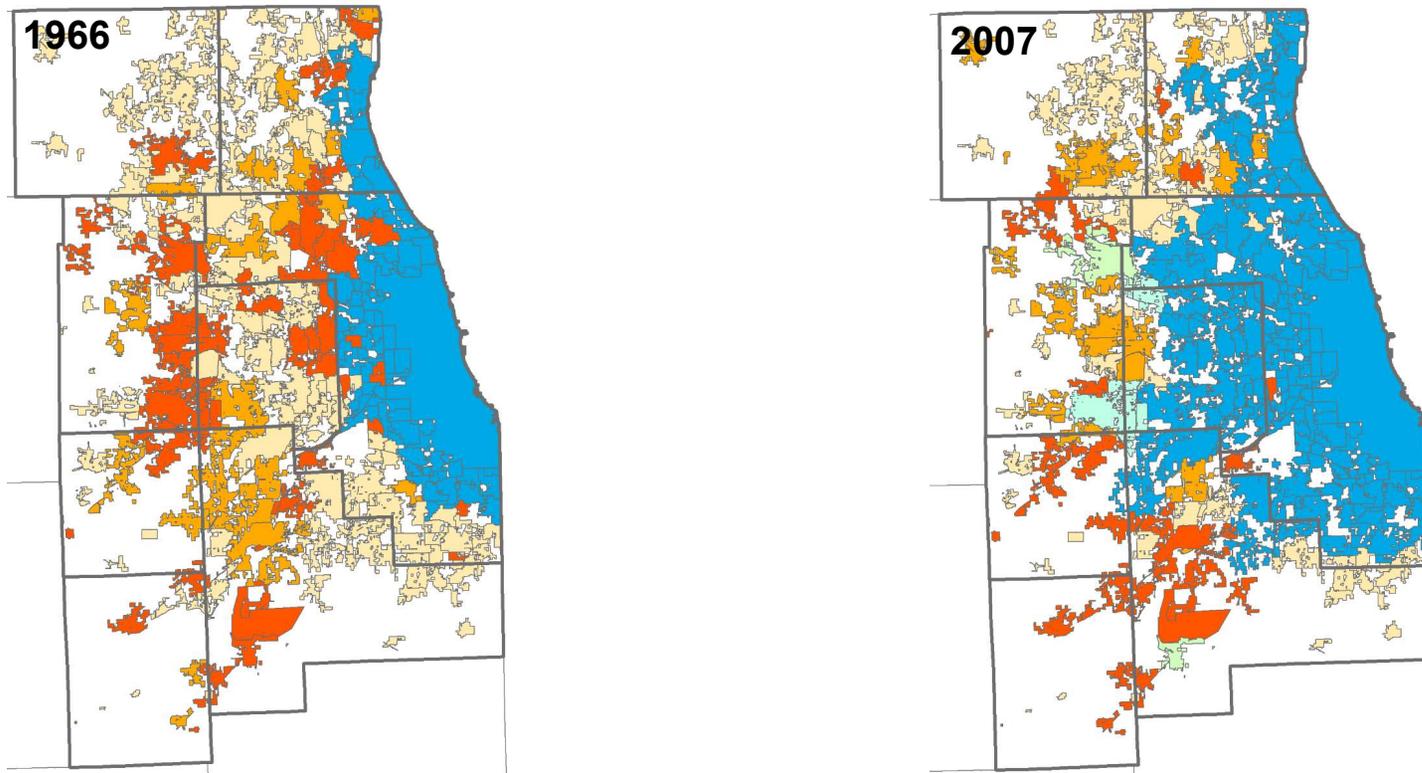
^[1] Singh, Krishan P. and J. Rodger Adams. *Adequacy and Economics of Water Supply in Northeastern Illinois: Proposed Groundwater and Regional Surface Water Systems, 1985-2010*. Illinois Institute of Natural Resources – State Water Survey Division. Urbana, Illinois. May 1980.

² Visocky, Adrian P., *Water-Level Trends and Pumpage in the Deep Bedrock Aquifers in the Chicago Region, 1991-1995*. Illinois State Water Survey Circular 182. Champaign, IL. 1997.

³ Burch, Stephen L., *A Comparison of Potentiometric Surfaces for the Cambrian-Ordovician Aquifers of Northeastern Illinois, 2000 and 2007*. Illinois State Water Survey, Data/Case Study 2008-04. Champaign, IL. December 2008.

⁴ Abrams, Daniel B. et al., *Changing Groundwater Levels in the Sandstone Aquifers of Northern Illinois and Southern Wisconsin: Impacts on Available Water Supply*. Illinois State Water Survey/Prairie Research Institute Contract Report 2015-02. University of Illinois at Champaign-Urbana. September 2015.

Source Water Evolution In NE IL

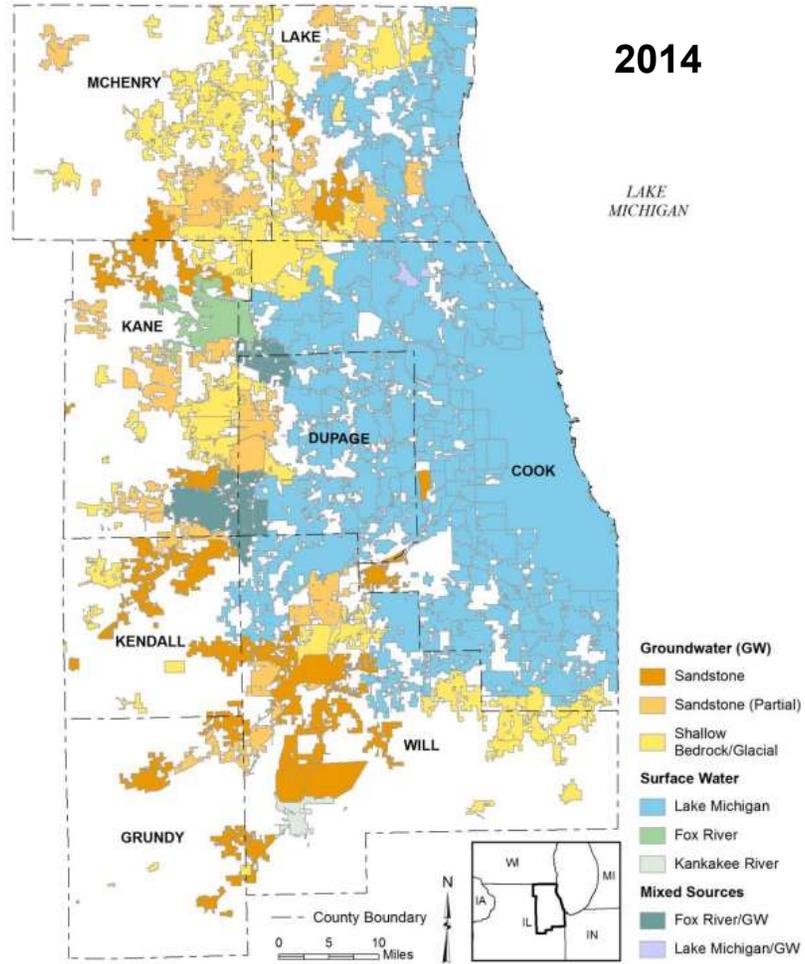


Source of Municipal Water Use

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|---|---|
|  Shallow Groundwater |  Lake Michigan Water |
|  Mixed Groundwater |  Surface Water |
|  Deep Groundwater |  Mixed Surface and Groundwater |

Source: ISWS

Source Water Evolution In NE IL



Source: ISWS