

Status of Deep Sandstone Wells in Northeastern Illinois

Background

In May 1959, the Illinois State Water Survey (ISWS) and the Illinois State Geological Survey (ISGS) published a report that discussed the geology and hydrology of the groundwater resources of the eight-county Chicago region ([Suter et al., 1959](#)). Special emphasis was placed on the deep bedrock aquifers that had been widely used to obtain large groundwater supplies throughout the region.

In 1959, the ISWS expanded its program of collecting and reporting water-level and pumpage data for deep wells in the Chicago region. Since that time, the ISWS has issued 11 reports on deep well water levels and pumpage (for 1959, 1960, 1961, 1962-66, 1966-71, 1971-1980, 1980-85, 1985-1991, 1991-95, 1995-2000, and 2000-2007). In addition, computer models of the deep aquifers have been developed to assess the impact of withdrawals on deep aquifer groundwater levels.

Serving nearly 500,000 people at a rate of over 80 million gallons per day (estimated 84.4 million gallons per day, Mgd, in 2004), the ISWS has prioritized the deep bedrock aquifer system of northeast Illinois as the most important groundwater system in Illinois. While new data collection and analysis on this aquifer system is continually being updated, the scientific evidence suggests that if trends continue, water levels in many deep aquifer wells will continue to drop, potentially causing water supply interruptions and water quality problems (e.g., higher concentrations of radium and total dissolved solids).

Historical Deep Sandstone Withdrawals and Water Levels

Total historical deep aquifer withdrawals from the 8-county northeast Illinois area (Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will Counties) are shown on Figure 1. The graph shows that in the past the deep aquifers provided much more water than is currently being withdrawn, and that the switch to Lake Michigan water in the late 1970's and 1980's greatly reduced withdrawals from the deep aquifers. The allocation of Lake Michigan water to the collar communities surrounding Chicago did much to alleviate water supply concerns in the region. However, industry and population continues to grow at a rapid pace in those communities and rural areas that did not receive lake water and the amount of additional water that might be derived from Lake Michigan is reaching legal limitations.

Figure 1 also shows that deep aquifer withdrawals are back on the rise and exceed the widely-cited 65 million gallon per day (mgd) potential yield estimate made by the ISWS in the mid-1960s. Recent computer modeling of the aquifer system by the ISWS suggests the potential yield may be greater (~80-85 mgd) because, as Lake water became available to communities farther inland, the principal deep aquifer pumping centers shifted westward, closer to the aquifer recharge areas of DeKalb and Boone Counties (see Figure 2).

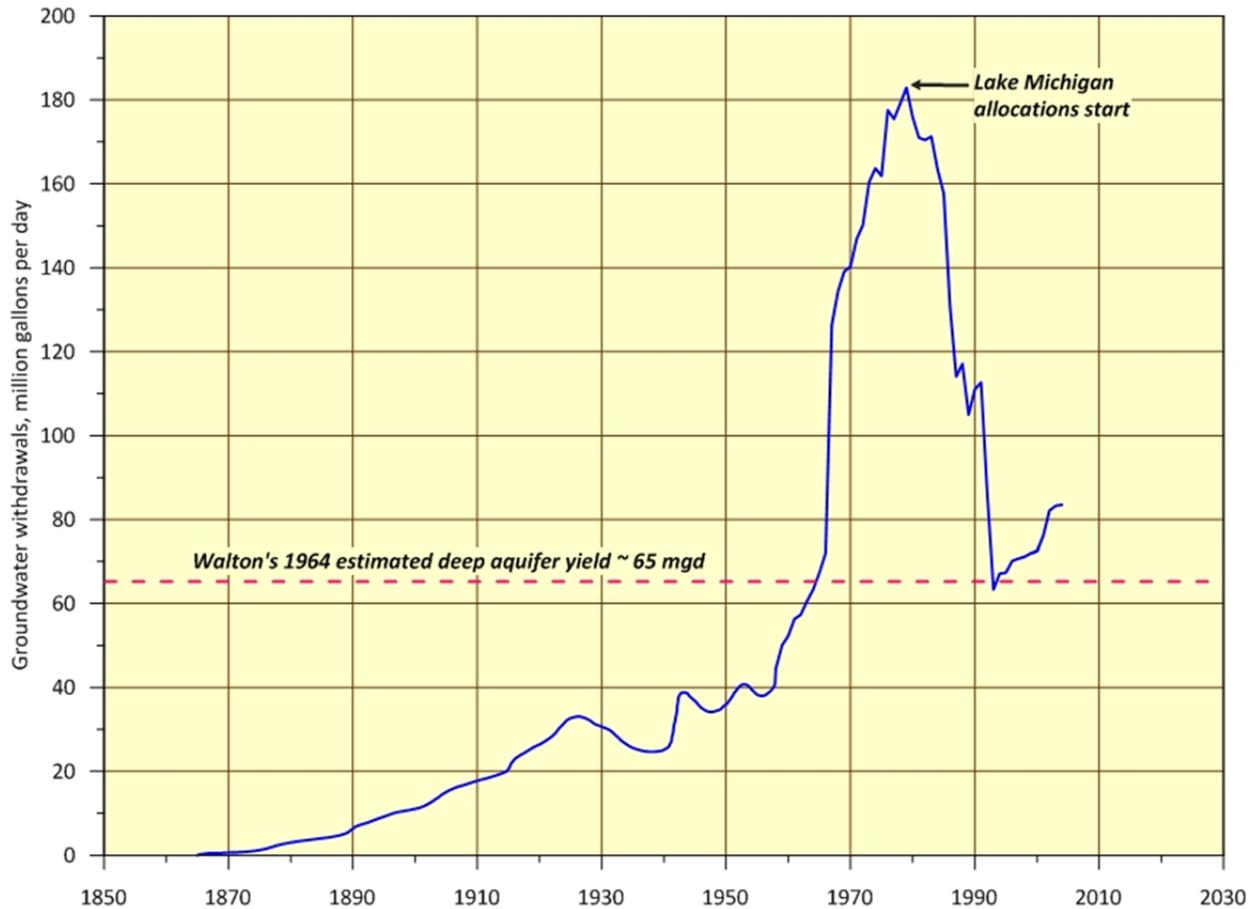


Figure 1. Historical withdrawals from deep aquifers in northeast Illinois and estimated potential yield.

Recent trends in withdrawals appear to exceed even this higher yield estimate. And, as a result, sandstone water levels continue to fall throughout the region (Figure 3). In some areas, heads have declined as much as 800 feet since aquifer development began in the mid-1800's. At that time, deep sandstone heads are estimated to have ranged from 800 feet mean sea level in McHenry and northwestern Kane Counties to 700 feet msl across Kendall and northern Will Counties ([Burch, 2008](#)). [Compare those elevations to recently observed elevations in Figure 3.]

Additional major allocations of Lake Michigan water to outlying areas remains unlikely; therefore, the region does not have a ready back-up water resource to call upon as it did 30+ years ago. This is part of the impetus behind the creation of the Northwest Water Planning Alliance, to bring together county and community leaders from across Kane, Kendall, DeKalb, Lake and McHenry Counties in a voluntary partnership to address water supply planning and conservation in areas relying upon groundwater and inland surface waters (e.g., the Fox River).

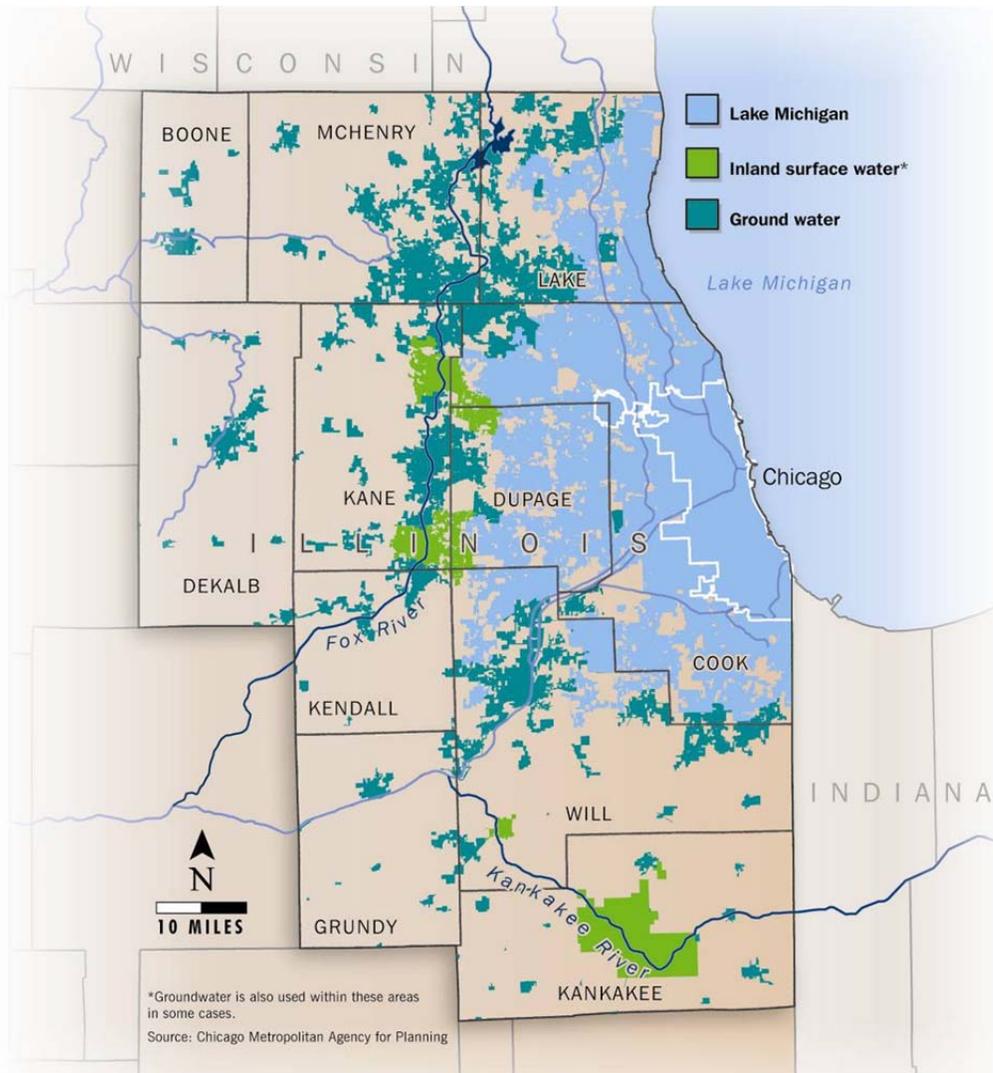


Figure 2. Water sources for public supply in northeast Illinois (from CMAP, 2010).

Although our understanding of the yield of the sandstone aquifers is uncertain, the increasing use of this resource is a concern. Because this aquifer system is present beneath the whole of northern Illinois and southern Wisconsin, provides high well yields, and stores a very large quantity of water, it is often the first choice for developers, communities, and industries seeking to secure additional water.

However, the limited recharge capability of this system also means that community leaders and developers alike must understand that this is a shared resource, and the water used by one affects the amount of water available to others. Continued monitoring of this resource is needed to assess how the sandstone aquifers are responding to growing pumping rates and shifts in pumping locations.

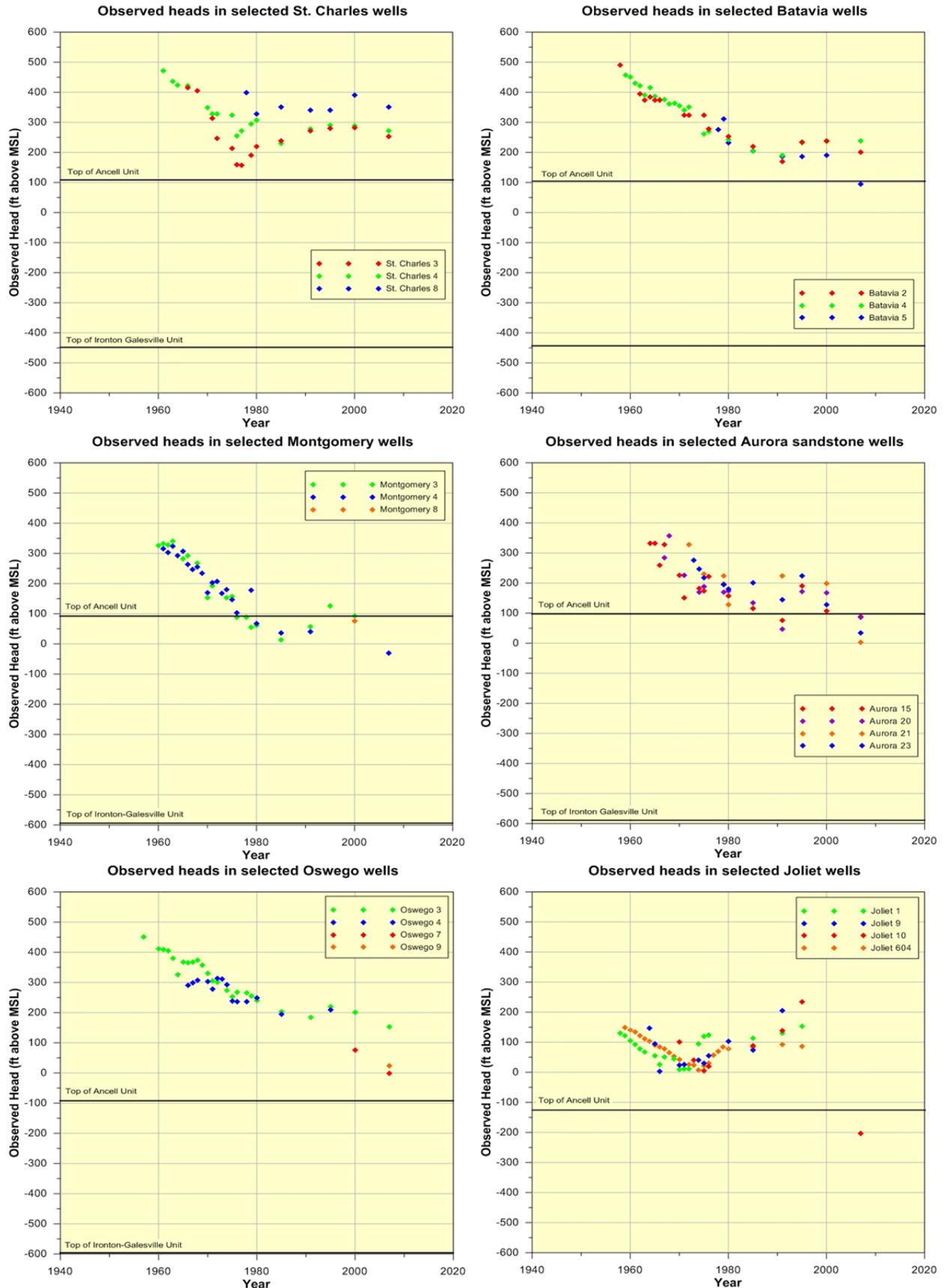


Figure 3. Observed heads in selected sandstone community wells across northeast Illinois.