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Waukesha groundwater predicted to drop another 200 feet without Great Lakes water supply

Deep aquifer is not a sustainable long-term water supply

Updated groundwater modeling confirms that Waukesha's current groundwater supply is environmentally unsustainable for the future. The conclusion of the updated analysis is consistent with previous modeling by the state, by regional planners and by the city.

The new analysis updates the previous analyses by considering information on regional groundwater use since 2000. It shows that a recent increase in deep aquifer levels from 2000 to 2010 was temporary and has ended.

A regional increase in pumping of water from the deep aquifer began in 2010 and groundwater levels have begun to decline again.

"As a region, Southeastern Wisconsin is continuing to pump out groundwater faster than it is replaced by rain and snow. It is environmentally unsustainable," according to Dan Duchniak, general manager of the Waukesha Water Utility.

"If you care about the groundwater and the surface water environment it is connected to, Waukesha needs to stop using the aquifer," he said. "Our only reasonable alternative is to use Lake Michigan water. We can return the same volume of water back to Lake Michigan, ensuring no harm to water levels. At the same time, we will help the deep aquifer both inside and outside of the Great Lakes Basin, along with the surface waters it is connected to."

With modest increases in regional water use, modeling shows that the deep aquifer will drop 200 feet over the next 50 years in parts of Waukesha, Milwaukee, Ozaukee and Washington Counties. Those declines will reduce the production of some municipal wells and cause water quality to deteriorate further. "Regional lakes, streams and wetlands are also being harmed because they receive less flow from the groundwater as the aquifer decreases," Duchniak said.

The 100-year trend of decreasing aquifer water levels of as much as 500 feet led the City of Waukesha to seek a new water supply from Lake Michigan under the Great Lakes Compact. Recharge of the current water supply from rain and

snowmelt is restricted because of a layer of hard shale rock over the deep aquifer. Waukesha is also under a court order to provide a water supply that complies with federal standards for radium, a human carcinogen.

The Wisconsin Department of Natural Resources recently released its draft conclusion that a Lake Michigan water supply was Waukesha's only reasonable water supply alternative. "Switching to Lake Michigan water and then returning it to the lake after use and treatment is our only sustainable option," Duchniak said.

The new groundwater modeling was conducted by Dr. John Jansen, a hydrogeologist with Leggette, Brashears & Graham.

The new analysis shows that regional pumping from the deep aquifer dropped 49% from 2000 to 2010, due to municipalities switching from the deep aquifer (to shallow aquifer wells or to Lake Michigan water supplies), as well as the economic recession. Nearby New Berlin, Wisconsin, for instance, switched to Lake Michigan water. The regional reduction in pumping allowed the aquifer levels to increase approximately 50 to 100 feet during that time.

The extent of the switch away from the deep aquifer had not been anticipated in the previous modeling by planners at the Southeastern Wisconsin Regional Planning Commission in 2005. Regional planners also could not have predicted the economic recession.

However, as has been previously seen in other areas, the increases in aquifer levels were temporary. Regional pumping in the six counties of southeastern Wisconsin has increased by 9% from 2010 to 2014. Groundwater levels have begun to again decline. "We had a temporary increase, but we are now returning to the long-term trend of declining groundwater levels," Duchniak said. "The same thing has happened at other places that had used this aquifer, including Brown County in Wisconsin and Northeastern Illinois."

A similar example with the aquifer can be found in Green Bay. That City abandoned its deep aquifer supply by 1957 and switched to Lake Michigan water. Aquifer levels increased nearly 200 feet over the next few years, but demand by other area communities caused aquifer levels to drop again. Between 2005 and 2008, six area communities also abandoned their deep aquifer wells and switched to Lake Michigan.

In Northeastern Illinois, water levels had also risen after municipalities switched to Lake Michigan water, but are declining again. In September, the Illinois State Water Survey said current trends in deep aquifer use are not sustainable and will dewater parts of the aquifer.

Unlike Green Bay, Waukesha is 1.5 miles outside of the Lake Michigan surface water divide. However, the Great Lakes Compact allows communities in need to apply for Great Lakes water, but only if they are in counties that straddle the basin divide, like Waukesha. Waukesha would use 1/1,000,000 of 1% of Great Lakes water, but would return the same amount of water. Waukesha would also need the approval of all eight Great Lake Governors under the Compact.

The Chicago metropolitan area is also largely outside the Great Lakes Basin, but is allowed to use Lake Michigan water under a U.S. Supreme Court decree. The decree allows Illinois to use 2.1 billion gallons per day of Lake Michigan water – or 200 times Waukesha's request – without returning it to the lake.

Future pumping from the aquifer was modeled under three scenarios. At a moderate increase in aquifer pumping of 2.4% in Waukesha County (similar to the increase since 2010), the aquifer would drop 200 feet over the next 50 years in parts of Waukesha, Milwaukee, Ozaukee and Washington Counties and more than 100 feet in much of the rest of the region. Parts of the aquifer would be dewatered and environmental impacts on surface waters would increase.

At a higher aquifer pumping rate used by regional planners, groundwater levels would decline more than 300 feet in portions of Washington and Ozaukee Counties and more than 200 feet in much of Milwaukee County, as well as significant portions of Ozaukee, Washington and Waukesha Counties.

At a no-growth pumping rate, aquifer levels would still decrease about 10 to 20 feet. However, this is not realistic and not a reasonable water supply planning approach.

Even under the unlikely no-growth scenario, groundwater would remain drawn down by more than 400 feet. Current Wisconsin law requires that areas with drawdowns of more than 150 feet be in special planning districts called groundwater management areas. Waukesha County is one of only two in the state. Groups like Clean Wisconsin, the Wisconsin Wildlife Federation, and the Wisconsin League of Conservation Voters and the Sierra Club support a bill by Rep. Cory Mason (D-Racine) and 28 other lawmakers that would require the DNR to adopt a plan to reduce Waukesha's drawdown to less than 150 feet. It allows approvals of existing wells to be modified to ensure that the goal is met.

"Reducing the drawdown to less than 150 feet would be virtually impossible without Waukesha getting off the deep aquifer," Duchniak said. The alternatives to the deep aquifer are shallow groundwater aquifers or Lake Michigan water.

Shallow aquifer use would harm 1,939 to 2,326 acres of wetlands, according to the DNR, even if Waukesha would use much less water than what is projected. A switch to using and returning Lake Michigan water, on the other hand, helps correct existing harm to groundwater and connected surface waters, without harming the lake. In fact, the new modeling shows that ending Waukesha's use of the deep aquifer would result in an increase of approximately 200 feet in groundwater levels, aside from increases in pumping by other users.

"Staying on the deep aquifer would only continue the negative effects on the lakes, rivers and streams and make them worse," Duchniak said. "But getting off the aquifer will help end those environmental impacts. Using and then returning Lake Michigan water will benefit the regional environment without harming the lake."