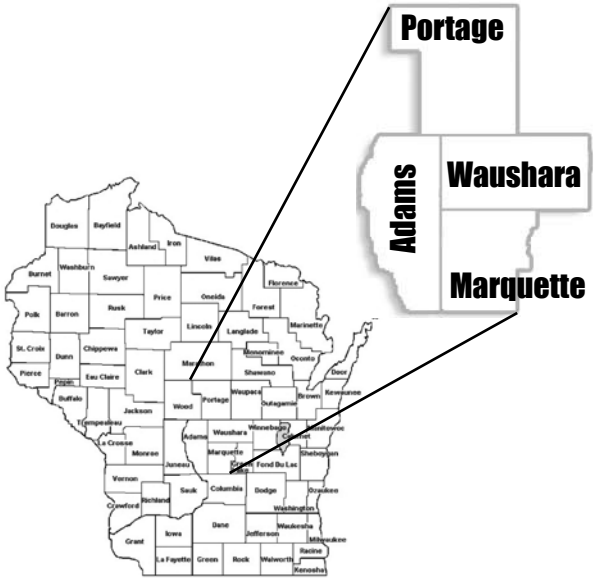
You Don't Know What You've Got 'Til It's Gone

Low Lake Levels in Wisconsin

Lakes in Wisconsin are no strangers to fluctuations in water levels, they respond to changes in climate, weather patterns and to what is happening on the land that drains into them. Snow cover, rainfall, seasonal average temperatures, and human consumption all can play a role. Climate trends can last for many years, affecting lake levels, streamflows, and groundwater. The recent unusually dry weather patterns have made low lake levels particularly noticeable.

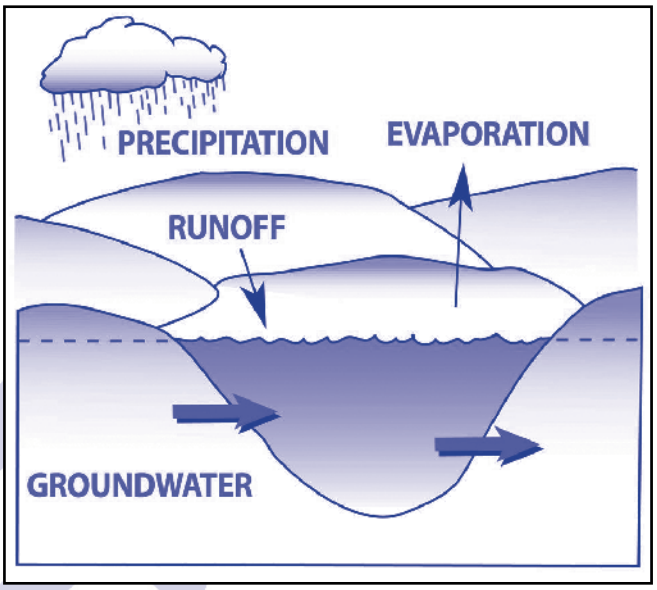
Why Are Water Levels So Low?

One region in the state where the conversation often turns to *"where's the water?"* is Central Wisconsin. This area includes parts of Adams, Marquette, Portage and Waushara Counties. These counties are particularly susceptible to a lack of water because of a combination of **lake type**, **geography**, **weather** and **human use**. This combination of factors has led to particularly low water levels in some of the area lakes.

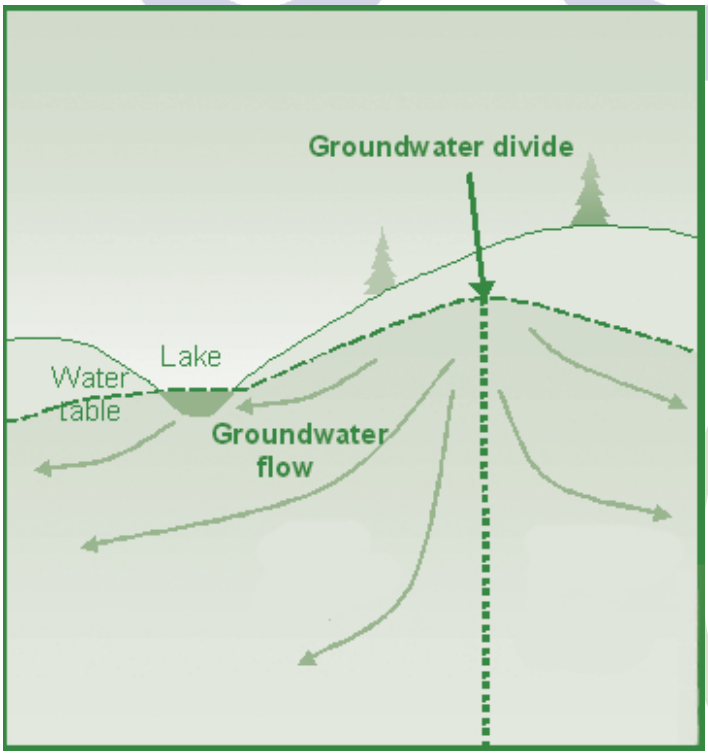


Lake Type

Groundwater is typically out of sight, except where the landscape dips lower than the groundwater – this place is called a lake. A lake whose main source of water is groundwater, with no inlet or outlet streams, is called a **seepage lake**. Water levels on seepage lakes can change substantially from season-to-season, and year-to-year, because their water level is a reflection of the elevation of the water table. If the water table is low because of a lack of rain or snowmelt, lake levels can be low.



A survey of several Wisconsin lakes pointed to a relationship between lake level fluctuations and lake types[1]. Water levels in **seepage lakes** fluctuated between 2½ and 11 feet, where water levels in other lake types only fluctuated between 1½ and 4 feet. The range of fluctuation in seepage lakes is often greater because they have less water to draw from - their main source of water may be a limited groundwater supply. Other lakes may have a larger water source to draw from, including inflow from streams.



Geography

Water always flows from high areas to low areas – this fact plays an important role in lake water levels. From a high point in a landscape, (like a hill top) water flows one way or the other, depending on where it lands. This highest point is called a divide because it is the place where water divides and flows in different directions.

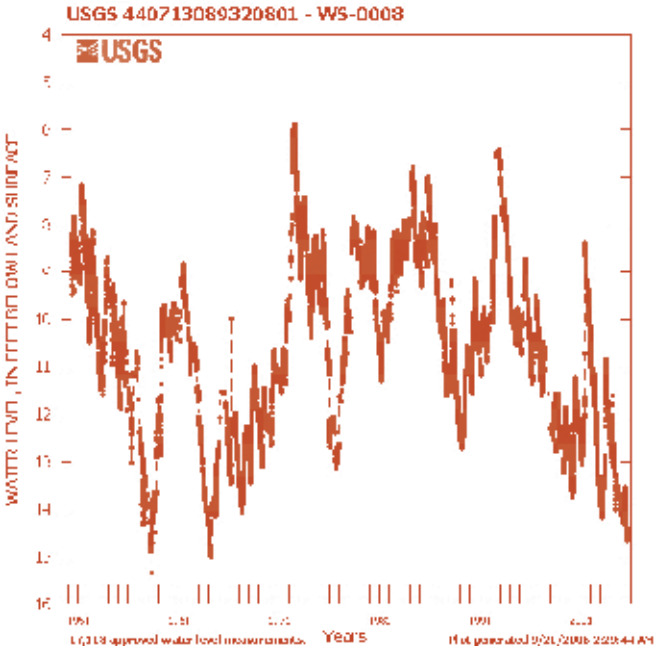
Groundwater operates by these same principles. A groundwater divide can be thought of as an underground hilltop, where the groundwater flows in different directions. Lakes close to this high point in the groundwater have less area to draw water from than lakes farther down (the hill).

Some lakes in Central Wisconsin are located close to a groundwater divide. Because of this they are more susceptible to fluctuations when a lack of water lowers the water table.

[1] ***Wisconsin Lake Levels: Their Ups and Downs***, *Novitizki, R.P. and Devaul, R.W., US Department of Interior Geological Survey. February 1978.*

Weather

Groundwater levels go up and down based on the amount of water that falls on the land. Over the century there have been significant variations in the annual amounts of rain and snow. Some of the driest years recorded were in the 1930's and again in the 1950's. Recent dry summers and a lack of winter precipitation have some people thinking that we may be in another cycle of dry weather. Many scientists believe that global climate change is also playing a role in weather patterns, which can ultimately affect water levels.



Water table fluctuations over time at a well near Hancock, WI (source: US Geological Survey) http://groundwaterwatch.usgs.gov/StateMaps/WI.html

Photo courtesy of Dept. of Geology & Geophysics, University of Wisconsin-Madison

A high capacity well being drilled.

Human Use

The sandy center of Wisconsin is a great place to live and a breadbasket for the Badger State. A sufficient amount of water is an essential part of the quality of life in this region. *But how do we ensure there is enough water for everyone?*

The amount of water in the ground is dependent on the pace at which it is being extracted, compared to the rate at which it is being recharged. Groundwater pumping is one of the factors that affects water levels.

Photo courtesy of Wisconsin Farm Bureau Federation

A study[2] from the 1970s estimated that in some areas of Central Wisconsin groundwater levels were lowered ½ to 1 foot due to groundwater pumping from irrigation. During drought periods, irrigation activities lowered water levels an additional 3 feet. The study predicted future water level declines up to 5 feet if the amount of irrigated land were doubled.

Central Wisconsin currently contains the highest density of high capacity wells[3] in the state, with about 2,100 wells in the four counties, and 580 in Waushara County alone. Irrigation is by far the largest user of groundwater in the region, although industrial and municipal uses may be large water users in pockets. The key question is ***how significant are the effects from groundwater pumping?***

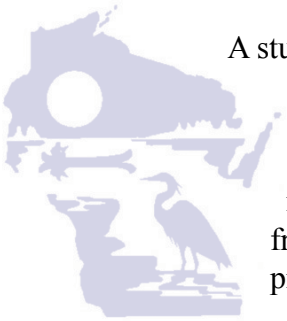
[2]***Effects of Irrigation on Streamflow in the Central Sand Plain of Wisconsin***, *Weeks, E.P. and Stangland, H.G., 110 pages, (1971), US Department of the Interior Geological Survey. http://wi.water.usgs.gov/pubs/OFR-sandplain/OFR-sandplain.pdf*

[3]*A high capacity well is one that singly, or together with other wells on the same property, withdraws more than 100,000 gallons of groundwater a day.*

What Can Our Community Do?

Communities need to work together to solve this complex problem. No one wants lakes and rivers to go dry and no one wants businesses to fail. Looking for someone to blame for low water or spending time and money trying to stop certain water uses will probably yield less positive results and cause more frustration than looking at the situation as a whole and working together as a community to find solutions.

What will Wisconsin Do?



A study group made up of stakeholders and experts will look at information to see if pumping may be exacerbating already low groundwater levels. The group will compile current and historical records on precipitation, streamflow, and groundwater levels in the Central Wisconsin area to better explain the factors affecting lake levels. They will also conduct monitoring to fill data gaps and help identify which lakes are most susceptible to impacts from pumping. The study group will look for possible ways to mediate those impacts to protect drinking and lake water quality, agriculture, fisheries and boating.

People and government are limited in their ability to control some factors affecting lake levels, like persistent drought. The study group will look at possible approaches centering on factors and solutions people can control. The group hopes to have some short-term measures identified within the next two years.

Cumulatively, human extraction of water may be having a long term, regional impact on the water table, and ultimately on lake levels. Are our demands for water outstripping Mother Nature's ability to replenish the supply? Because water is an important and finite resource, we will need to work together to find ways to balance our long term ecological, riparian and agricultural water needs.

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Photos on front and back cover provided by Tim Asplund, Wisconsin Dept. of Natural Resources.