



Monitoring Water Quality at Pictured Rocks

Importance

- Water is an important and sensitive ecosystem component, and its quality is an integral part of healthy resource conditions in Pictured Rocks National Lakeshore (PIRO).
- Resource managers need information on the status of and trends in water quality to comply with the Clean Water Act and to address past, current, and future impacts to park water resources.
- The Great Lakes Inventory and Monitoring Network (GLKN) began conducting annual water quality monitoring on five inland lakes at PIRO in 2007. These ‘index lakes’ are distributed throughout the park and were selected to span gradients of size and depth, visitor use, and lake type.



Status and Trends

All waterbodies in PIRO are designated Outstanding Resource Waters, so it is not surprising the water quality of the five index lakes is generally good. However, the lakes differ markedly from one another. Beaver Lake is relatively large and shallow, and has water levels that remain fairly stable throughout the summer. Legion Lake is a small seepage lake, with extremely low pH and alkalinity (in other words, acidic and with poor buffering capacity). These conditions are natural for the lake. Chapel Lake is extraordinarily deep (45 m), with surface and bottom water never (or hardly ever) mixing. Miners Lake is shallow, with surface and bottom water mixing frequently throughout the summer. Impoundments downstream of the lake created by beaver activity can trigger a substantial increase in the lake’s water level. Grand Sable Lake stratifies early and remains stratified throughout the summer, with deeper portions of the lake becoming anoxic and inhospitable for fish.

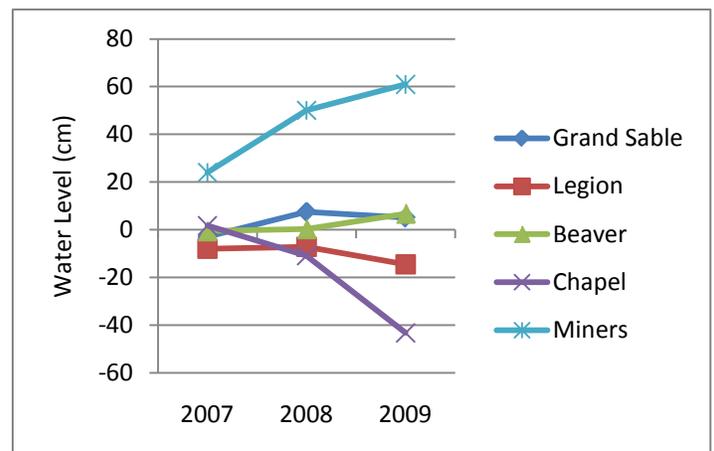
A lake’s productivity can be described through the use of the Trophic State Index, which is calculated using the amount of nutrients or algae in the water, or water clarity. Eutrophic lakes typically are productive, shallow, and nutrient-rich, and may experience heavy algal blooms. Oligotrophic lakes are generally unproductive, deep, clear, and have low nutrient levels. Mesotrophic lakes are in between. All of the index lakes monitored at PIRO are currently mesotrophic, though Miners Lake tends towards eutrophic and Grand Sable Lake approaches oligotrophic.

Average annual water levels have changed differently among lakes since 2007, with Miners Lake increasing, Grand Sable Lake decreasing, and the remaining three lakes staying about the same. The changes may be part of natural, cyclical fluctuations, like those caused by annual changes in precipitation or beaver activity, or they may be part of a long-term trend, like those we might expect to see from climate change. Additional years of monitoring will help us separate trends from natural fluctuations.

Management Implications

We will continue to watch for changes in trophic status, water level, and other water quality indicators in the lakes, and will attempt to determine the cause if changes are observed. PIRO’s lakes are largely protected from most human-caused disturbances, thus management opportunities to improve water quality are limited. The park can play an active role in informing visitors of the dangers posed by the spread of exotic species, and can ensure that campground latrines are not contributing nutrients to nearby lakes.

The Great Lakes Network will continue to help the park interpret the water quality of its inland lakes within an ecosystem context.



Average water levels, relative to June 2007.