



# Monitoring Water Quality at Voyageurs

## Importance

- Water is an important and sensitive ecosystem component, and its quality is an integral part of healthy resource conditions in Voyageurs National Park (VOYA).
- 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 eight inland lakes at VOYA in 2006. 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

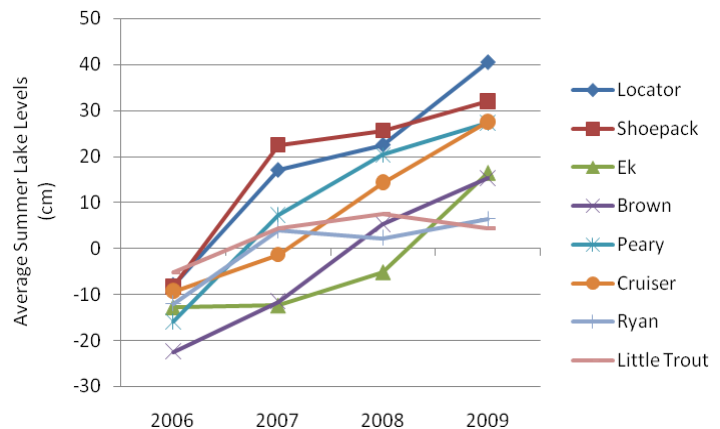
All waterbodies in VOYA are designated Outstanding Resource Waters, so it is not surprising the water quality of the eight index lakes is generally good. The buffering capacity, as measured by alkalinity, is extremely low in most lakes, which means the lakes are susceptible to impacts of acid precipitation. However, lake acidification, as evidenced by decreasing pH values, has not been observed to date. The pH of most of the index lakes is slightly alkaline, with the exception of Shoepack Lake, which is slightly acidic. Most of the index lakes are naturally tannin-stained, and all have very low nutrient concentrations.

The Trophic State Index provides information on a lake's productivity, which is based on the availability of nutrients. 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. Among the index lakes monitored by GLKN, Ek Lake is slightly eutrophic, Cruiser and Little Trout Lakes are oligotrophic, and the remaining lakes (Locator, Ryan, Brown, Peary, and Shoepack) are mesotrophic.

Average lake water levels have risen each year since 2006. These water level increases may be part of natural, cyclical fluctuations (caused by annual changes in precipitation), 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 Applications

We will continue to watch for changes in trophic status and water level in the lakes, and if such changes are observed we will attempt to determine the cause. Because VOYA's interior lakes are protected from most human-related disturbances, management opportunities to improve water quality are limited. However, there is value in understanding changes that occur in one lake and relating them to conditions in other lakes in the park and across the larger region. The index lakes at VOYA provide an opportunity to understand the processes at work in all lakes absent of direct human disturbance. We will continue to help the park interpret the water quality of its inland lakes within an ecosystem context.



Average summer lake levels at Voyageurs National Park, relativized to the first measurement taken in June 2006.