Great Lakes water levels

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Changes in the water levels of the Great Lakes impact humans and environmental systems across a variety of time and space scales. Storm events, for example, can lead to damaging and life-threatening water level surges along the Great Lakes coastline that are not only greater than the tidal fluctuations of marine coastlines, but are also more difficult to predict.

Long-term changes in regional precipitation and evaporation rates, on the other hand, drive seasonal, inter-annual and decadal water level fluctuations, and can lead to periods of extremely high or low water levels. These extreme water levels can persist for months or years, and have important implications for human-ecosystem interactions along the 10,000 miles of state, provincial and tribal lands that constitute the Great Lakes coastline.

When water levels are too low, for example, commercial shipping, recreational boating and hydropower facility capacity (among other uses and infrastructure) are impaired. When water levels are extremely high, coastal erosion and flooding become widespread.

The Great Lakes coastal ecosystem and the regional population have historically adapted to water level fluctuations. These adaptation measures range from technological innovation to internationally-coordinated water resources management protocols to modification of expected ecosystem services. Water levels on the Lake Michigan and Huron system, however, have been below their long-term average for over a decade, and Lake Superior has been below its long-term average for most of that period as well.

Interestingly, water levels on the Lake Michigan and Huron system over this recent period have varied little from year to year relative to historical inter-annual variability. Moving forward, there will be a continued, if not growing importance of adapting to water level dynamics and ensuring management protocols are in place for supporting adaptation and mirroring the system's resilient past.

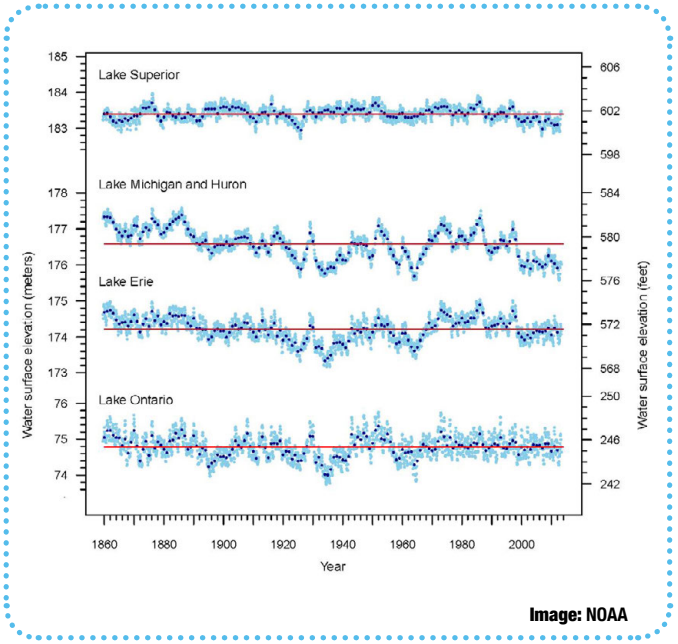

Image: NOAA

The water levels of the Great Lakes, the flows in the channels that connect them and the major components of the Great Lakes water budget are collectively monitored, assessed and forecast by a collaborative international network of federal agencies including the National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, the U.S. Geological Survey, Environment Canada and Canada's Department of Fisheries and Oceans.

This coordinated effort underscores the fact that the Great Lakes are not just the largest network of lakes on Earth, but are also a massive interconnected ecosystem requiring extensive resources to understand and interact with it in a way that ensures both human and environmental well-being.

Civilizations throughout human history have met and overcome challenges stemming from extreme conditions in the hydrologic systems on which they depend. The 40 million people in the Great Lakes region are certainly prepared to meet the challenges currently posed by the low water level conditions on the upper lakes. However, that challenge is intensified because water levels could again rise to extreme highs, or they could drop further.

It is important to recognize, for example, that the results of current annual investments of hundreds of millions of dollars in restoration efforts through the historic Great Lakes Restoration Initiative are highly sensitive to future water level fluctuations. While these current investments are critically important, it is equally important to recognize that investments in water level-related resource management must continue if we hope to realize the full value of the Great Lakes as a unique and essential resource.

The future of Great Lakes water levels is highly uncertain. Changes in regional climate and meteorology could cause water levels on Lakes Superior, Michigan and Huron to drop further – or they could cause water levels to increase abruptly. A combination of continued monitoring, improvements in forecasting, and anticipation of adaptation measures needed to ensure system resilience will collectively define how successfully we, as a region, meet current challenges and those we will undoubtedly face in the future.

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