



US Army Corps
of Engineers
Detroit District

Great Lakes Update

Are Great Lakes Water Levels Recovering?

Summer has arrived in the Great Lakes basin and the attention of many tourists and residents alike has turned to water levels. Levels are currently approaching their seasonal peaks on all the lakes, coinciding with the peak recreation season. The Great Lake community including recreational boaters, commercial shippers, shoreline property owners, and the general public have noticed that water levels this year are considerably improved over the levels of last year. There are two questions that are asked of those who forecast water levels in the Great Lakes: why have water levels improved and will this improvement continue into the future?

Current Water Levels

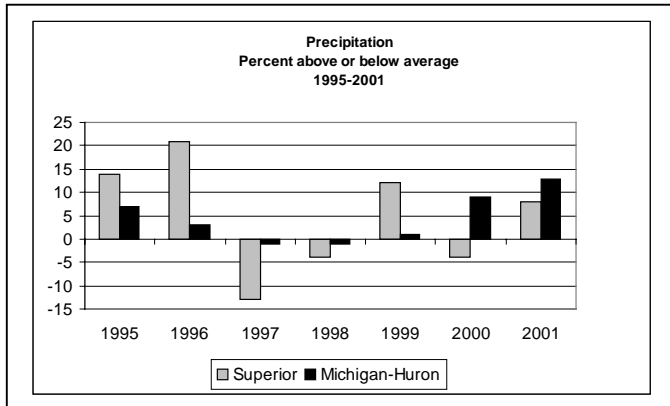
Water levels on all of the Great Lakes except Lake Superior are significantly higher than they were a year ago. Lake Erie is near its long term average and Lake Ontario is well above average. Lakes Michigan, Huron, and St. Clair are eight to ten inches above the levels of last year, but remain ten and three inches, respectively, below their long-term averages. Lake Superior is currently near the same level as last year.

Precipitation

One of the primary components of the hydrologic cycle is precipitation. Scientists are learning that it is not only quantity but also the timing of the rain or snow that affects water levels. Water levels rise in the spring when rain combines with melting snow. In an average year, each of the Great Lake receives their peak water supply between March and May. On average, Lake Superior peaks in September and the lower lakes peak earlier in June and July.

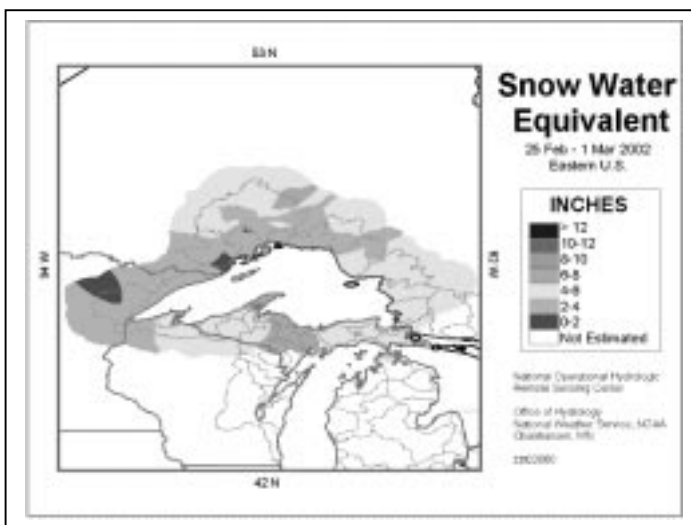
The past seven years have been anything but average as far as precipitation is concerned. The heavy snowfalls of 1995 and 1996 led to near record water levels on most lakes in 1997. In 1998, drought conditions took hold in the Great Lakes basin. By 2000, water levels had tumbled from near record highs on each of the upper lakes to their lowest levels in 35 years.

The following graph illustrates the variability in precipitation that has occurred over the past seven years on the upper lakes. Precipitation on Lakes Superior and Michigan-Huron provide long-term supplies throughout the system.



Airborne snow surveys conducted by the U.S. National Weather Service on behalf of the U.S. Army Corps of Engineers give clues to the fluctuation in recent water levels.

These surveys measure the amount of water contained in the snow pack. The water equivalent for the winter of 2001-02 was ten percent below average. The Great Lakes basin received near record rainfall in October and November of 2001. Rainfall was well above average through the spring of 2002. It is this rain that has been key to the higher water level of 2002.



Above average rainfall in October and November of 2001 reduced normal seasonal declines on each of the lakes. This allowed the

lakes to start the new year at a higher elevation than they would have been if these rain events not taken place.

Evaporation

During peak evaporation months, usually September through December, the Great Lakes can lose one to two inches of water per week. Evaporation occurs when cold dry air masses pass over the warm lake bodies. The rate at which a lake evaporates is set up by summer temperatures that warm the lake water. When the cool autumn temperatures arrive over the warmer lake surfaces, evaporation begins in earnest.

With the unusually warm air temperatures over the past four years, water temperatures on all of the Great Lakes have also been above average. This caused higher evaporation rates, which combined with the below average precipitation to cause water levels to fall. The heavy rains last fall were followed by above average winter air and water temperatures. These temperatures were responsible for the lack of ice development throughout the basin. Because the air temperature was not significantly colder than the water temperature, evaporation remained near average this winter despite the fact the lakes were ice-free.

The Effect of Regulation

How much effect does regulation have on water levels? Outflows from two of the five Great Lakes are controlled by regulation structures. Lake Superior outflows are established by the International Lake Superior Board of Control following a regulation plan that attempts to maintain an balance between levels in Lakes Michigan, Huron, and Superior relative to their supplies.

Lake Ontario outflows are established by the International St. Lawrence Board of Control, which controls releases from Lake Ontario into the St. Lawrence River, following a regulation plan as guidance. Both Boards of Control are binational organizations comprised of Canadian and U.S. representatives under the direction of the International Joint Commission (IJC). It is important to note that although the outflows from these two lakes are controlled, the levels on the lakes are not controlled. The lakes respond to many natural factors including precipitation and evaporation.

During prolonged dry periods, many people wonder if the controls on Lake Superior outflows could be modified to increase lake levels on the lower lakes. An analysis of this question using the Corps' regulation and routing computer model was conducted. It found that the levels of the lower lakes (lakes Michigan, Huron, St. Clair, and Erie) could be increased but only by a limited amount.

For example, during a very dry period such as what we had going into the summer of 2000, the outflows from Lake Superior could be increased by 70% for three months and the water levels on Lakes Michigan and Huron would increase less than three inches. The level on Lake St. Clair would increase less than two inches while Lake Erie would increase less than a half-inch. Lake Superior, on the other hand, would decrease by five inches.

In contrast, in the three-month period between September and November 2000, Lake Michigan lost nearly 12 inches of water due to evaporation alone. This illustrates that the effect that regulation can have on lake levels is insignificant when compared to the role that nature plays.

Throughout the Great Lakes basin, many people are keeping a close eye on the water levels wondering if this trend will continue. It

took nearly three years for the near record highs of 1997 on the upper lakes to develop, and it took two years for the lows of 2000 to materialize. In order for all the lakes to sustain the momentum they have gained in 2002, above average precipitation would need to be sustained throughout the Great Lakes Basin this summer and into next winter.

Meetings

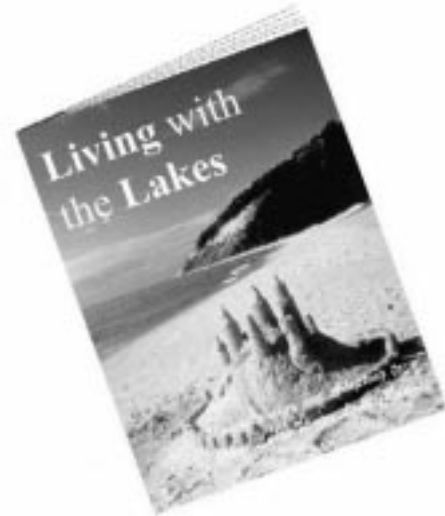
The International Lake Superior Board of Control hosted its annual meeting in Paradise, Michigan on Tuesday evening June 25, 2002 to discuss conditions of Lake Superior. Twenty-five people attended in addition to members of the Board and the IJC. Newly appointed IJC Commissioner David Schornack (U.S.) and Commissioner Robert Gourd (Canada) attended with their staff. Brigadier General Steven R. Hawkins discussed the Board's and IJC's activities, current and expected water level conditions on Lakes Superior and Michigan-Huron, and answered questions from the audience.

Topics covered included current dredging in the Vidal Shoals area and proposed future dredging in the Little Rapids Cut in the St. Marys River, an update on the status of the proposed new lock at the Soo, the "Upper Great Lakes Plan of Study" and the "Peaking and Ponding Operations in the St. Marys River" reports.

The International Niagara Board of Control will hold a open house to inform the public of the current activities and to hear public comments and suggestions regarding the Board's work: huron.lre.usace.army.mil/ijc/niagara.html. or call Mr. Len Falkiner at (905) 336-4947.

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