



US Army Corps  
of Engineers  
Detroit District

# Great Lakes Update

## Lake Superior Water Levels – Then and Now

Lake Superior is currently at its lowest water level since the mid 1920s. Based on provisional data, the monthly mean water levels for the months of August and September set new record lows by one half inch and four inches respectively. The old record lows for August and September occurred in 1926. A new record low is also expected in October. This article will investigate the meteorology and hydrology in the Lake Superior basin during the 1920s. Included are newspaper clippings from various sources, highlighting the low water levels and weather conditions of the time.

### Record Low Water Levels for Lake Superior\*

January 1926	599.8 feet
February 1926	599.6 feet
March 1926	599.5 feet
April 1926	599.5 feet
May 1926	599.6 feet
June 1926	599.9 feet
July 1926	600.3 feet
August 1926	600.5 feet
September 1926	600.8 feet
October 1925	600.7 feet
November 1925	600.4 feet
December 1925	600.1 feet

\* Refers to the monthly mean water level.

### Forecasted Water Levels on Lake Superior\*

October 2007	600.6 feet
November 2007	600.5 feet
December 2007	600.2 feet
January 2008	600.0 feet
February 2008	599.9 feet
March 2008	599.8 feet

\*Refers to the monthly mean water level

All water levels shown are referenced to International Great Lakes Datum of 1985 (IGLD 85).

### What caused the low levels in the 20s?

Lake Superior's water level was consistently below average from 1918 through 1927. A major contributing factor then was very dry conditions. Two precipitation stations in the Lake Superior drainage basin with reliable data from the 1920s are Ishpeming, Michigan and Duluth, Minnesota. Annual precipitation from 1923 through 1926 at these stations was well below average (Figures 1 and 2). Note the significant difference from average in 1925. Ishpeming had a 10.5 inch precipitation deficit, while Duluth had a 10.4 inch deficit. Marquette, MI experienced its driest year on record in 1925.

The winter of 1925-1926 was quite calm by Upper Peninsula standards, with only 2 major

storms affecting the region. The first occurred in October and the second in March. Snowfall in 1925 was also limited; the town of Calumet on Michigan’s Keweenaw Peninsula recorded only 84.5 inches of snow in 1925. In an average year this region receives in excess of 200 inches of snow.

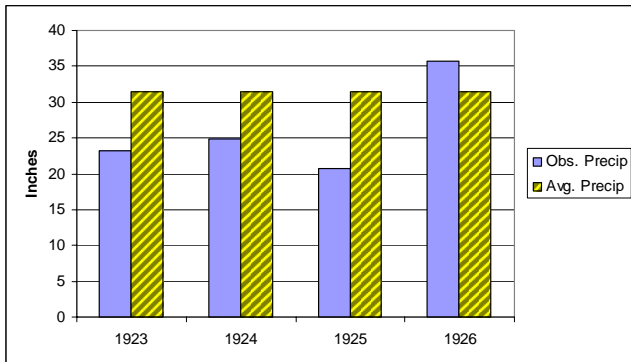


Figure 1: Precipitation at Ishpeming, MI

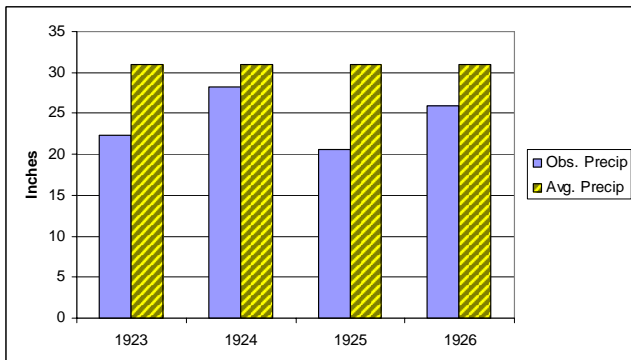


Figure 2: Precipitation at Duluth, MN

**How do these conditions relate to water levels?**

Lake Superior receives 96% of its water supply from precipitation and runoff. When several years of below average precipitation occur like the early and mid 1920s, water levels are bound to decline (Figure 3). Note the steady decline from 1923 to 1926, when conditions were very dry. The water contained in the snow pack in the Lake Superior basin largely contributes to the lake’s annual seasonal rise. All of the Great Lakes have an annual cycle of rise and fall. The lakes rise during the spring to their peaks in late summer, and then fall to their winter low. The average seasonal fluctuation between summer

peak and winter low on Lake Superior is about twelve inches. From late 1925 through early 1926, the lake fell seventeen inches, noted by the circle on Figure 3.

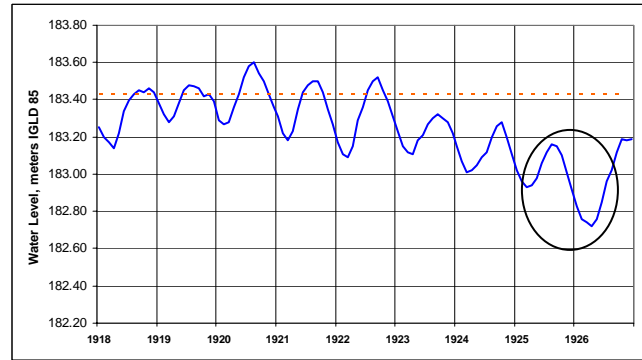


Figure 3: Lake Superior water levels 1918-1926

**What were people saying then?**

All direct quotes from newspapers and journals are displayed in italics. Direct quotes were used for historical context only and may not be representative of the views of the Corps of Engineers.

Navigation on Lake Superior was greatly affected by the low water levels of that time period. An article in the April 3, 1926 *Daily Mining Journal* is quoted below.

*“Warnings that cargoes be limited to 17 feet nine inches depth on Lake Superior has been issue by...[the]...secretary of the Lake Carriers’ association. This is about nine inches less than last year’s maximum.”*

The official from the Lake Carriers’ Association theorized, *“Chicago’s diversion of water is responsible for at least 6 inches less water than normal.”*

**Diversions**

The diversion of water from Lake Michigan at Chicago was a hot topic during the low water period of the 1920s. An editorial from the *Duluth*

*Herald* reprinted in the June 2, 1926 *Daily Mining Journal* addressed the issue.

*“The weather bureau has issued a report on low lake levels...in which it ascribes the present conditions very largely to the fact that the Great Lakes watershed is in a cycle of light precipitation and declares that the levels will come back when, may be expected as the usual course of natural events, the dry cycle is succeeded by a wet one.*

*There have been dry cycles before in the recorded history of the Great Lakes watershed, and for every dry cycle there has been a wet one to follow. In the long run these cycles flatten out into an average rainfall that keeps us through the ages about on a dead level.*

*During the decade from 1875 to 1884, according to the bureau’s records there were heavy rains and the lakes were high.*

*From 1885 to 1916 there was a period of moderate but on the whole diminished precipitation. And from 1917 to this time there has been a period of rainfall very much lighter than the average; hence the present low lake levels.*

*Not, as Chicago might like to have us think, wholly because of the light rainfall. For 10,000 cubic feet a second cannot be taken out of even so great a water system as this through a stream that used to empty into it without having a marked effect on lake levels. We can’t control rainfall—yet—but we can, it is to be hoped, control Chicago.”*

In 1926, the Lake Michigan Diversion at Chicago diverted much more water out of the Great Lakes basin than today. Since the 1930s, The Supreme Court of the United States has issued decrees limiting the amount of water that could be diverted. A 1967 decree limits the flow through

the diversion to approximately 3,000 cubic feet per second (cfs) or roughly one-third the amount diverted in the 1920s.

In the 1940s two diversions into the Lake Superior basin were completed at Long Lac and Ogoki in Ontario, Canada. These diversions enabled Canada to increase its electricity supply during World War II. The volume of water diverted at Long Lac and Ogoki is governed by the exchange of notes between the United States and Canada.

Since the completion of the Long Lac and Ogoki diversions, the amount of water diverted into Lake Superior averages approximately 5,000 cfs, or 2,000 cfs greater than the amount of water diverted out of Lake Michigan at Chicago.

### **More Historical Accounts**

A quote from the April 16, 1926 edition of the *Daily Mining Journal* mentions how low water levels were affecting navigation on all of the Great Lakes.

*“The March water levels of those lakes on which Great Lakes shipping is most dependent were lower than at any time in March during the recorded history of the lakes, according to the Canadian Hydrographic office bulletin.”*

Due to a cold spring, navigation in Marquette Harbor was delayed until early May. A May 10, 1926 article in the *Daily Mining Journal* chronicles a mishap in the harbor.

*“The steamer Cadillac...ran aground while entering the dock channel Saturday (May 8). Before she could proceed to the dock it was necessary to unload 100 tons of her cargo onto a scow. Water in the harbor is about six inches lower than it was last year, which accounts, in part, for the lack of sufficient depth in the channel to float the Cadillac.”*

The May 24, 1926 edition of the *Daily Mining Journal* mentions the lack of precipitation as a cause of the low water levels.

*“Superior Level below 1925 - Mark Has Dropped Three-Quarters of a Foot; Recedes More Than 2 Feet in 10 Years”*

*“The records also show that the level of Lake Superior is 2.37 feet lower than it was 10 years ago. An accumulated deficiency in precipitation over a long period of years is the reason advanced...for a gradual recession of the waters of the lake.”*

Scientists of the time used mathematics to make long term water level predictions. A rather humorous prediction from the May 27, 1926 edition of the *Daily Mining Journal* is below.

*“Ultimate extinction of the American side of the falls at Niagara is mathematically certain unless water levels in the Great Lakes are raised.”*

**Comparisons to Today**

Some similarities and differences are seen when comparing conditions in the 1920s to today.

Precipitation totals at Duluth, MN and Marquette, MI have been below average in three out of the last four years. The water made available to the Lake Superior basin from snow melt was significantly below average in the winter of 2006/2007.

Looking at temperatures from the winter months (Dec, Jan, Feb) of 1925/1926, Houghton, MI only recorded four days with a high temperature of above freezing. This would have lead to normal or faster than normal ice growth. During the same months in 2006/2007, Houghton, MI recorded thirty days with a high temperature above freezing, eighteen days in December alone. Warmer than average temperatures in December 2006 lead to slow ice growth on Lake Superior.

When arctic air arrived in mid-January 2007, the lake was largely ice free (Figure 4). This set up an ideal situation for large scale evaporation. Nine inches of water evaporated during January and February of 2007.



Figure 4: Ice Cover on 15 JAN 07, NATICE

**Will the Water Return?**

Following the record lows in 1925 and 1926, the water level on Lake Superior rose quickly to above average in 1928 and 1929. Water levels then remained near average for several years. Whether the current water level on Lake Superior returns to average or not remains to be seen.

Lake level fluctuations are largely dependant on Mother Nature. Based on what has happened in the past, it is safe to say that higher water levels on Lake Superior will return, but forecasting how high and a timetable as to when is not realistic.

**Acknowledgements**

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