

## Both Lake Superior and Lake Ontario enter the fall months at average water levels

During August, the Great Lakes basin experienced relatively average water supply conditions, however, drier than average conditions persisted in the Lake Superior basin. The dry conditions experienced by Lake Superior have resulted in the lake returning to average levels, something that has not occurred since March 2014.

The average level of Lake Superior in August was the same as the long-term average and 27 cm below the level last August. The August water level of Lake Michigan-Huron was 44 cm above average and 40 cm lower than last year's record high. Lake Erie's water level was 51 cm above average but 14 cm lower than the same time last year, which is its sixth highest August level on record. The average August water level for Lake Ontario was 5 cm below the long-term August average and 20 cm lower than last year. Lake Ontario experienced its fourth smallest water decline on record for the month of August.

At this time of year, all the lakes have typically reached their annual peaks and started their seasonal declines. The water levels of Lake Superior are expected to stay at average levels under typical water supply conditions, although wetter than average or drier than average conditions would see lake levels increase or decrease, respectively. The water levels of Lakes Michigan-Huron and Erie are expected to remain above average under any water supply scenario. Lake Ontario levels are near average and expected to remain so under average conditions. Wetter than average conditions could result in Lake Ontario levels increasing above average and drier than average conditions may result in below average levels.

Great Lakes Water Level Information				
Lake	August 2021 Monthly Mean Level		Beginning-of-September 2021 Level	
	Compared to Monthly Average (1918–2020)	Compared to August 2020	Compared to Beginning-of-Month Average (1918–2020)	Compared to September 2020
Superior	Same	27 cm below	1 cm below	26 cm below
Michigan–Huron	44 cm above	40 cm below	45 cm above	40 cm below
St. Clair	53 cm above	26 cm below	59 cm above	24 cm below
Erie	51 cm above	14 cm below	54 cm above	12 cm below
Ontario	5 cm below	20 cm below	Same	15 cm below

With water levels remaining above average on some lakes, low-lying areas are at risk for accelerated coastline erosion and flooding. For current information and forecasts, please refer to the sources listed below.

### August monthly levels

Lake Superior's monthly mean level was 183.54 m (IGLD85<sup>1</sup>), which is its average August level and 27 cm lower than this time last year. Lake Superior water levels have not been average since March 2014.

Lake Michigan-Huron's monthly mean level in August was 177.02 m (IGLD85). This was 44 cm above its August monthly mean water level and 40 cm lower than its record high August level last year.

Lake Erie had an average monthly water level of 174.79 m (IGLD85), 51 cm above average and 14 cm below last year's level. This is Lake Erie's sixth highest August water level on record.

Lake Ontario's August monthly mean level was 74.85 m (IGLD85), 5 cm below average and 20 cm lower than the level from a year ago.

### Lake level changes

Lake Superior declined by 3 cm in August, when it typically rises by 1 cm.

Lake Michigan-Huron declined by 2 cm, half of its typical decline of 4 cm.

Lake Erie declined by 7 cm, close to its average decline of 9 cm.

<sup>1</sup>Lake Ontario's level decreased by only 3 cm in August, less than a quarter of its typical decline of 14 cm. This is the fourth smallest August water level decline in the period of record (1918-2020).

(Note that lake level changes are based on the levels at the beginning of the month and not the monthly average levels.)

### August Precipitation over the Great Lakes<sup>1,2</sup>

Great Lakes Basin	98%	Erie	107%
Superior	73%	(including Lake St. Clair)	
Michigan-Huron	108%	Ontario	112%

### August Outflows from the Great Lakes<sup>1</sup>

Superior	95%	Erie	119%
Michigan-Huron	113%	Ontario	110%

<sup>1</sup> As a percentage of the long-term average.

<sup>2</sup> US Army Corps of Engineers (<https://lre-wm.usace.army.mil/reports/GreatLakes/GLP-LastMonth.pdf>).

**NOTE: The figures contained in this report are provisional and are subject to change. Data are calculated from the best available observations at the time of posting.**

### Beginning-of-September lake levels

Lake Superior's beginning-of-September level was 1 cm below average, which is 26 cm lower than last year.

Lake Michigan-Huron's level was 45 cm above average at the beginning of September and 40 cm lower than its record beginning-of-September level this time last year.

Lake Erie was 54 cm above average at the beginning of September and 12 cm lower than last year at this time.

Lake Ontario's level at the start of September was at its period of record average and 15 cm lower than last year.

At the beginning of September, all of the Great Lakes were at least 34 cm above their chart datum level. Chart datum is a reference elevation for each lake that provides more information on the depth of water for safe boat navigation on the lakes. For more information, please visit

<http://www.greatlakescc.org/wp36/home/international-great-lakes-datum-update/low-water-datum/>

### Water levels forecast

At this time of year, all the lakes have typically reached their annual peaks and started their seasonal declines. Even under wetter than average conditions,

<sup>1</sup>Water levels are referenced to International Great Lakes (Vertical) Datum 1985 (IGLD85). For more information, please visit [International Great Lakes Datum Update – Great Lakes Coordinating Committee \(greatlakescc.org\)](http://www.greatlakescc.org).

none of the Great Lakes are expected to reach record high levels.

Lake Superior is currently at its average level and is expected to remain so under average conditions. Drier than average conditions could result in lake levels dipping below average in the coming months, while wetter than average conditions may result in Lake levels moving above average.

The level of Lake Michigan-Huron is expected to decline throughout the fall under all water supply conditions, however, it is expected to remain well above average.

Lake Erie levels are currently well above average and are expected to remain high under all water supply conditions.

Lake Ontario levels are close to average and are expected to remain so under typical water supply conditions. Drier than average conditions could result in Lake Ontario levels falling below average, while wetter than average conditions may result in lake levels rising above average, as we move into the fall.

For more information on the probable range of water levels, consult

<https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data/levelnews-great-lakes-st-lawrence.html#projection>.

For a graphical representation of recent and forecasted water levels on the Great Lakes, refer to the Canadian Hydrographic Service's Monthly Water Levels Bulletin at:

<https://waterlevels.gc.ca/C&A/bulletin-eng.html>

## Overview of the Great Lakes Evaporation Network

Did you know that the hot summer months are when lake evaporation is at a minimum? This may seem counterintuitive but peak lake evaporation occurs in the late fall/early winter, although the timing is different for each lake. Evaporation over the Great Lakes is driven by the difference between the water temperatures and the air temperatures, and it peaks when lake temperatures are high, air temperatures are cool, and relative humidity is low. Evaporation over the Great Lakes can be hard to measure, and no direct measurements were obtained before 2008. Instead, a water balance equation was used where everything except evaporation was measured and then used to solve for evaporation.

When peak evaporation is occurring, ice is generally starting to form over the Great Lakes and temporary buoys cannot be used to measure evaporation. Instead, permanent sites are required, thus the first continuous measurement effort occurred on Stannard Rock Lighthouse on Lake Superior in June 2008 (shown below). This measurement location was established through the International Great Lake Study (IUGLS, <http://www.iugls.org>), which was coordinated by the International Joint Commission.

A second effort to directly measure Lake Superior evaporation occurred on Granite Island in July 2009, which was led by a network of scientists known as the Great Lakes Evaporation Network (GLEN). GLEN has continued to grow with six permanent stations on the five Great Lakes and two additional mobile sites on ships.

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You can unsubscribe at any time.

The measurements from these monitoring stations have allowed scientists to properly calibrate Great Lakes atmospheric and weather models, reducing the uncertainty in the models and improving weather forecasts. GLEN is currently supported by various agencies including the National Science Foundation, the Great Lakes Integrated Sciences and Assessments Center, the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory, and Environment and Climate Change Canada.



### Information on flooding

With water levels remaining high on some of the lakes, the risk of flooding is also high. Great Lakes water levels are difficult to predict weeks in advance due to natural variations in weather. To stay informed on Great Lakes water levels and flooding, visit the Ontario flood forecasting and warning program website at <https://www.ontario.ca/flooding>.

Additional information can also be found at the International Lake Superior Board of Control web site,

<https://www.ijc.org/en/lslbc>, and the International Lake Ontario–St. Lawrence River Board web site, <https://ijc.org/en/loslrb>.

### Information on current water levels and marine forecasts

**Daily levels:** Current daily lake wide average levels of all the Great Lakes are available on the Great Lakes water levels and related data at

<https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data.html> and by clicking on

“Daily water levels for the current month”. The daily average water level is an average taken from a number of gauges across each lake and is a good indicator of the overall lake level when it is changing relatively rapidly due to recent high precipitation.

**Hourly levels:** Hourly lake levels from individual gauge sites can be found at the Government of Canada Great Lakes Water Level Gauging Stations website at: <http://tides.gc.ca/eng/find/region/6>.

These levels are useful for determining real-time water levels at a given site, however, it should be noted that they are subject to local, temporary effects on water levels such as wind and waves.

**Marine forecasts:** A link to current Government of Canada marine forecasts for wave heights for each of the Great Lakes can be found on the Great Lakes water level and related data web page at <https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data.html> under the “Wave and wind data heading”. Current marine forecasts for lakes Superior, Huron, Erie and Ontario are available by clicking on the link of the lake in which you are interested. To view a text bulletin of recent wave height forecasts for all of the Great Lakes, click on the “Text bulletin wave height forecasts for the Great Lakes and St. Lawrence River” link.

**FOR MORE INFORMATION:**

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**ISSN 1925-5713**

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