LEVEL news

Volume 30 | Number 4 | April 2022

Great Lakes – St. Lawrence River Water Levels

Lakes Michigan-Huron, Erie, and Ontario have started their seasonal rise

During March, the Great Lakes Basin experienced the following:

- Lake Superior's mean monthly level was below average, while Lakes Michigan-Huron, Erie, and Ontario were all above or well above average.
- Lakes Superior and Michigan/Huron received above average precipitation, while below average precipitation was seen in Lakes Erie and Ontario. It was the same for the local water supplies, with the exception of Lake Ontario, where despite the lack of precipitation, it still had above average water supplies.

This is the time of year when all lakes typically would be beginning their seasonal rise under average water supplies. Lake Superior water levels are expected to remain below average under typical water supply conditions. Wetter than average conditions could result in Lake Superior levels increasing above average, and drier than typical conditions may result in levels moving further below average. The water levels of Lakes Michigan-Huron and Erie are expected to remain above or close to average under any water supply scenario. Lake Ontario levels are above average and are expected to remain so under wetter than average conditions. In the event of average conditions, Lake Ontario could fall below average by early summer, whereas drier than average conditions could result in lower than average levels within the next few months.

Great Lakes Water Level Information

Lake	March 2022 Monthly Mean Level		Beginning-of-April 2022 Level	
	Compared to Monthly Average (1918–2020)	Compared to March 2021	Compared to Beginning-of-Month Average (1918–2020)	Compared to April 2021
Superior	8 cm below	26 cm below	6 cm below	26 cm below
Michigan–Huron	21 cm above	42 cm below	25 cm above	35 cm below
St. Clair	39 cm above	22 cm below	33 cm above	24 cm below
Erie	43 cm above	5 cm below	39 cm above	5 cm below
Ontario	30 cm above	50 cm above	31 cm above	52 cm above

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

Later in this issue, we conclude our two-part overview of the Great Lakes system. Please refer to the December 2021 edition for Part 1.

March monthly levels

Lake Superior's monthly mean level was 183.16 m (IGLD85[1]), 8 cm below long-term average (1918-2020) and 26 cm lower than this time last year.

Lake Michigan-Huron's monthly mean level 176.53 m (IGLD85). This was 21 cm above its March monthly mean water level and 42 cm lower than last year.

Lake Erie had an average monthly water level of 174.53 m (IGLD85), 43 cm above average and 5 cm below last year's level.

Lake Ontario's March monthly mean level was 74.99 m (IGLD85), 30 cm above average and 50 cm higher than the level a year ago.

Lake level changes

Lake Superior rose by 2cm in March at a time when it typically declines by 1 cm.

Lake Michigan-Huron rose by 6 cm, close to its monthly average increase of 4 cm.

Lake Erie rose by 7 cm, close to half its typical rise of 13 cm.

Lake Ontario rose by 14 cm, also close to its average rise of 13 cm.

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

March Basin Statistics

Lake	Precipitation (percentage of LTA) [a,b]	Net Basin Supply (Probability of Exceedance) [c]	Outflows (Percentage of LTA)[a]
Great Lakes Basin	118%	-	-
Superior	108%	>52% (average)	83%
Michigan-Huron	146%	27% (wet)	118%
Erie (including Lake St. Clair)	82%	66% (dry)	119%
Ontario	82%	18% (very wet)	124%

[a] As a percentage of the long-term average (LTA) period of record (1918-2020) for the month of January.
[b] United States Army Corps of Engineers (https://lre-wm.usace.army.mil/reports/greatLakes/greatLakesPrecipitationLastMonth/greatLakesPrecipitationLastMonth.html)
[c] <5% extremely wet; <25% very wet; <45% wet; 45-55% average; >55% dry; >75% very dry; >95% extremely dry.
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. Please refer to the February 2022 edition of LEVELnews (https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data/levelnews-great-lakes-st-lawrence/february-2022.html) for a description of net basin supply.

[1]Water levels are referenced to International Great Lakes (Vertical) Datum 1985 (IGLD85). For more information, please visit http://www.greatlakescc.org/wp36/home-2/international-great-lakes-datum-update/.

LEVELnews User Survey

We're conducting a LEVELnews user survey available at

https://eccc.sondage-survey.ca/f/s.aspx?s=17a3b6e7-b9f4-4853-b154-97ec89ce7060&ds=jLJFWXVAYa

Completing this short survey will help us tailor future editions to our reader's preferences. We appreciate all input!

Beginning-of-April lake levels

Lake Superior's beginning-of-April level was 6 cm below average, which is 26 cm lower than last year.

Lake Michigan–Huron's level was 25 cm above average at the beginning of April and 35 cm lower than this time last year.

Lake Erie was 39 cm above average at the beginning of April and 5 cm lower than last year at this time.

Lake Ontario's level at the start of April was 31 cm above average and 52 cm higher than this time last year.

At the beginning of April, all of the Great Lakes except for Lake Superior were at least 58 cm above their chart datum level, while Lake Superior was 5 cm below its chart datum. 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-2/international-great-lakes-datum-update/low-water-datum/.

Water levels forecast

This is the time of year when all lakes typically would be beginning their seasonal rise under average water supplies.

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

The level of Lake Michigan-Huron is currently above average and expected to remain so under all water supply conditions. In the event of drier than average conditions, lake levels could approach average in the next six months.

Lake Erie levels are currently well above average and are expected to remain high under average and wetter than average water supply conditions. In the event of dry conditions, lake levels could approach average in the next six months.

Lake Ontario levels are above average and are expected to remain so under above average water supply conditions. Typical water supply conditions could result in lake levels falling below average during the summer. Drier than average conditions could result in Lake Ontario levels falling below average in the coming months.

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 https://www.tides.gc.ca/en/monthly-water-level-bulletin-great-lakes-and-montreal-harbour.

Get notified when a new edition of LEVELNews is available!

Did you know that you can opt in to be notified whenever a new edition of LEVELNews is available?

Visit the LEVELnews subscription page to sign up for email notifications (https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data/levelnews-great-lakes-st-lawrence/subscribe.html)

You can unsubscribe at any time.

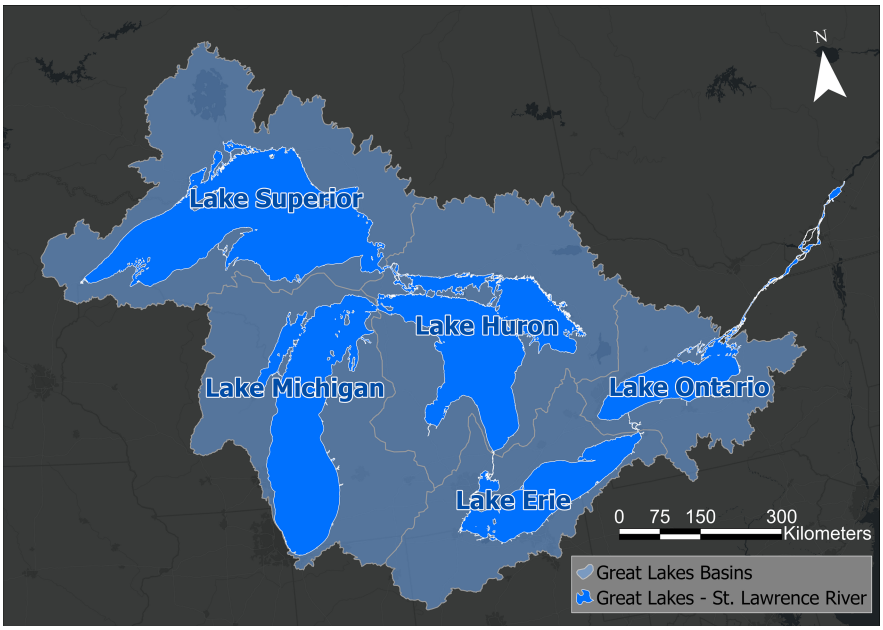
Great Lakes system (part 2)

In December's edition of LEVELnews, we highlighted the Great Lakes system from its headwaters to the ultimate outlet in the Atlantic Ocean. We will continue this discussion in this issue by outlining some additional interesting facts about the Great Lakes system.

When comparing the surface area of the lakes, Lake Superior is by far the largest of not only the Great Lakes, but is also the largest freshwater lake in the world. However, as explained in the June 2020 edition of LEVELnews (LEVELnews: Great Lakes and St. Lawrence River water levels, June 2020 - Canada.ca), Lake Michigan and Lake Huron together can be argued to be a single water body, which would then make them the largest lake by surface area. When it comes to volume, there is no argument that Lake Superior is the largest of the Great Lakes. In fact, Lake Superior contains half of the water in the entire Great Lakes system.

A drop of water that entered Lake Superior in approximately 1820 is only now arriving in the Atlantic Ocean. Each of the Great Lakes has a different residence time for its waters with Lake Superior being the longest, where residence time is the amount of time a drop of water stays in each lake before moving downstream. Water flowing into or falling on Lake Superior takes approximately 173 years to reach the outlet at the St. Marys River. This long residence time is due to the large volume and depth of the lake compared to the width and depth of the outlet. For example, Lake Superior's deepest point is 403 m, while the outlet to the St. Marys River is just 7.3 m deep. The residence time of all the lakes is as follows:

- Lake Superior – 173 years
- Lake Michigan – 62 years
- Lake Huron – 22 years
- Lake Erie – 2 years
- Lake Ontario – 6 years



The comparative difference in residence time between Lake Superior and Lake Erie is a function of the volume of the lakes. Although the surface area of Lake Superior is only 3 times more than Lake Erie, it contains 24 times more water. With a maximum depth of 64 m Lake Erie is the only lake who's bottom does not fall below sea level.

Holding more than 20% of the world's freshwater supply, the Great Lakes are an essential source of potable water to the region, support diverse and thriving ecosystems, provide recreational activities, and socio-economic and cultural benefits to the basin's 34 million residents. We hope you have learned a few things you did not know in this look at the lakes that make up the Great Lakes system.

Information on flooding

With water levels remaining high on some lakes, there is a high risk of flooding. Great Lakes water levels are difficult to predict weeks in advance due to natural variations in weather. To stay informed about 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 https://www.ijc.org/en/lsbc, and 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 at https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data.html 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 https://canada-preview.adobecqms.net/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data.html. 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 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:

Frank Seglenieks and Nicole O'Brien
Boundary Water Issues
Meteorological Service Canada
Environment and Climate Change Canada
Burlington ON L7S 1A1

Email: LEVELnews-infoNIVEAU@ec.gc.ca

ISSN 1925-5713
Aussi disponible en français