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LEVELnews

Great Lakes — St. Lawrence River Water Levels

All Great Lakes water levels remain high, but no record highs in October

Water levels of all the Great Lakes remain well above average, however, October was the first month since April when none of the Great Lakes had a record high level. Lake Superior remains very close to record highs for this time of year and all the other Great Lakes began November 18-20 cm below record-highs. With all the lakes still well above average and a greater probability of large storms and winds during the fall months there is heightened risk for accelerated coastline erosion and flooding to low lying areas. For local sources of information on this, see the following section of this edition of LEVELnews.

Since their record high water levels in the summer, both Lake Erie and Ontario have seen greater than average declines, while both Lakes Superior and Michigan-Huron water levels have not seen their typical season decline. In fact, the water level of Lake Superior has only varied by a few centimetres since the beginning of June while Lake Michigan-Huron's level has been relatively constant for the past 2 months.

At the beginning of November, Lake Superior, Lakes Michigan-Huron and Lake Erie were all at the second highest water level seen in the period-of-record (from 1918 to 2018).

Great Lakes Water Level Information

Lake	October 2019 Monthly Mean Level		Beginning-of-November 2019 Level	
	Compared to Monthly Average (1918–2018)	Compared to One Year Ago	Compared to Beginning-of-Month Average (1918–2018)	Compared to One Year Ago
Superior	37 cm above	11 cm above	36 cm above	8 cm above
Michigan–Huron	85 cm above	39 cm above	88 cm above	40 cm above
St. Clair	77 cm above	25 cm above	83 cm above	27 cm above
Erie	66 cm above	17 cm above	67 cm above	16 cm above
Ontario	43 cm above	42 cm above	47 cm above	46 cm above

Canada

With average meteorological conditions, some of the lakes water level would be expected to continue their seasonal decline while others may hold steady or even rise slightly in the next month. All of the Great Lakes water levels are expected to be below record monthly mean levels in November. The weather will influence how quickly the levels will follow their typical season decline. It would take much wetter than average conditions to once again approach record levels on all the lakes.

Information on flooding

Great Lakes water levels are hard 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 web site at https://www.ontario.ca/flooding.

Local flood watches and flood warning information are issued in Ontario by Conservation Authorities at https://conservationontario.ca/conservation-authorities/find-a-conservation-authority/ or Ministry of Natural Resources and Forestry district office at https://www.ontario.ca/page/ministry-natural-resources-and-forestry-regional-and-district-offices.

Additional information can also be found at the International Lake Superior Board of Control web site, https://www.ijc.org/en/lsbc, and the International Lake Ontario–St. Lawrence River Board web site, https://ijc.org/en/loslrb.

More information is also provided in the "Water levels forecast" section at the end of this newsletter.

Information on current water levels and marine forecasts

With lake levels changing day-to-day the Government of Canada Great Lakes water levels and related data website at: https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data.html provides a source for web sites on up-to-date Great Lakes water levels.

October Precipitation over the Great Lakes[1,2]

Great Lakes Basin	**146%**	**Lake Erie (including Lake St. Clair)**	**143%**
Lake Superior	**108%**		
Lake Michigan–Huron	**156%**	**Lake Ontario**	**186%**

October Outflows from the Great Lakes[1]

Lake Superior	**127%**	**Lake Erie**	**125%**
Lake Michigan–Huron	**131%**	**Lake Ontario**	**128%**

[1] As a percentage of the long-term average.
[2] US Army Corps of Engineers
NOTE: These figures are preliminary.

Daily levels: Current daily lake wide average levels of all the Great Lakes are available on the Government of Canada Great Lakes Water Level Gauging Stations website 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 change when it is changing relatively rapidly due to the high precipitation recently experienced.

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 provides hourly water levels. 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 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

“Wave height forecasts for the Great Lakes and St. Lawrence River” link.

October monthly levels

Although no records were set during the month of October, water levels were still very high with 3 of the 4 lakes recording their second highest level in the period-of-record (1918-2018).

Lake Superior was 37 cm above its October monthly-mean water level and 11 cm above its level in October of last year. This value is the second highest October level on record, 3 cm below the highest level seen in 1985.

Lake Michigan–Huron’s monthly-mean level in October was 85 cm above average, 39 cm above last October’s level. This puts it at the second highest October level, 21 cm below the monthly record value of 1986.

Lake Erie’s monthly-mean level was 66 cm above average, 17 cm above its level during October 2018. This was 20 cm below the record high October value from 1986.

Lake Ontario’s October monthly-mean level was 43 cm above average and 42 cm higher than a year ago. This was the seventh highest on record with the most recent higher year also 1986.

Lake level changes

Lake Superior’s levels went down by 2 cm in October, while the lake typically goes down by 3 cm between the beginning of October and November.

Lake Michigan–Huron also went down by 2 cm during the month of October. This is a lot less than its average decline of 7 cm.

Lake Erie’s level declined by 12 cm, which is a little more than its average decline of 10 cm from October to November.

Lake Ontario went down by 8 cm, a little less than its typical decline of 11 cm.

Beginning-of-November lake levels

At the beginning of November, Lake Superior, Lakes Michigan-Huron and Lake Erie were at their second highest level seen in the period of record.

Lake Superior’s beginning-of-November level was 36 cm above average (1918–2018) and 8 cm higher than November 2018. This beginning-of-November level is just 1 cm less than the highest beginning-of-month recorded in 1985.

Lake Michigan–Huron’s beginning-of-November level was 88 cm above average and 40 cm higher than its level at the same time last year. This is the second highest in the period of record, with a value coming in at 19 cm lower than the record year of 1986.

Lake Erie was 67 cm above average at the beginning of November and 16 cm higher than the same time last year. This puts the level at the second highest on record 20 cm lower than the beginning-of-November record set in 1986.

Lake Ontario’s level at the start of November was 47 cm above average; 46 cm higher than the water levels last year. We have not seen this since 1986 when it was 9 cm higher (56 cm) and 18 cm below the record beginning-of-November level set in 1945.

At the beginning of November, all of the Great Lakes were at least 67 cm above their chart datum level.

Water levels forecast

Relative to their beginning-of-November levels and with average water supplies for this time of the year, some of the lakes would be expected to continue their seasonal decline while others may hold steady or even rise slightly in the next month.

Given Lake Superior’s near record high start of the month level, if there were wet conditions seen in the basin, the lake level could again be at record values in the next few months. While average conditions would still see water levels well above average and close to record values.

If we experience average water supplies, Lake Michigan-Huron would stay relatively steady in November, while wet conditions could result in record values returning by December and into the coming year. However, even if very dry conditions are experienced, the levels will

continue to be well above average throughout the fall and early winter.

Lake Erie has fallen enough below record levels that even if the lake experiences extremely wet conditions, it would take till the start of the new year to get back into record territory. Nevertheless, the lake will stay well above average throughout the rest of the year even with average or dry conditions.

Similar to Lake Erie, Lake Ontario has continued to decline, so that extremely wet conditions would result in record levels being approached again only after a few months. With average conditions, the levels would continue to be above average, while only extreme dry conditions would allow the lake to approach average levels during the new year.

For more information on the probable range of water levels consult the November 2018 edition of LEVELnews at https://www.canada.ca/en/environment-climate-change/services/water-overview/quantity/great-lakes-levels-related-data/levelnews-great-lakes-st-lawrence/november-2018.html

FOR MORE INFORMATION:

For a graphical representation of recent and forecasted water levels on the Great Lakes, refer to the Canadian Hydrographic Service's Monthly Water Llevels Bulletin at: https://waterlevels.gc.ca/C&A/bulletin-eng.html

Flooding and damage experienced during October storm events

Although the peak of wind and wave events don't typically happen until November (as shown in the September 2019 edition of Level News - hyperlink), there were a few notable wind events that occurred during the month of October that caused significant flooding and damage.

The first one occurred on October 21-22 when a low pressure system went across the Great Lakes after coming up the Mississippi River Valley. The progression of the storm resulted in wind gusts of up to 80 km/h that switched directions as the storm passed over the area.

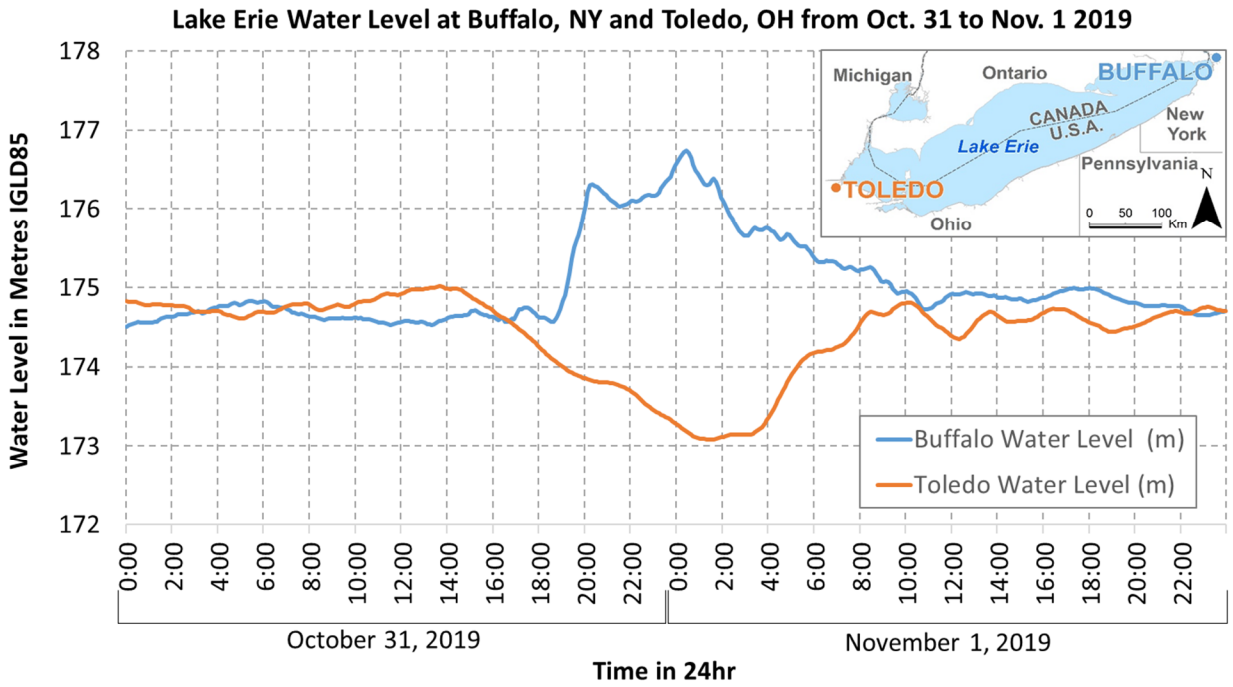
A good summary of this storm along with pictures of the damage can be seen here from the US National Weather Service: https://www.weather.gov/apx/Oct212019StrongWindWavesLakeshoreImpacts

There were various reports of damage caused by flooding, closing of roads and parks along the shore, rapid erosion along the shores of Lakes Michigan and Huron, while waves up to two stories high were reported on Lake Superior. Flooding was also reported along the Lake Erie shoreline that closed roads and entered homes.

Then from October 26-27, the remnants of Tropical Storm Olga brought up to 50 mm of precipitation and wind gusts of up to 90 km/h to Lakes Erie and Ontario. This caused flooding in the Toronto area as well as along the north shore of Lake Erie.

Another storm passed through the basin just as the month ended causing another round of flooding and damage as result of very high winds and waves. The result were more road closures, flooding of property and shoreline erosion. A wind gust of 130 km/h was reported in the Port Colborne, Ontario area along the north shore of Lake Erie. As well, the passing of this system over Lake Erie resulted in winds that caused a difference of water level between the east and west ends of the lake to be almost 4 m at its peak. See the diagram below that shows the water level at stations at both the east end (Toledo, OH) and the west end (Buffalo, NY) of Lake Erie (Data source: https://tidesandcurrents.noaa.gov).

These examples once again highlight the need to be cautious around the shores of the Great Lakes at this time of year, especially when the water levels are elevated as they are now. Also, it is important to keep informed of the most recent forecasts of the weather and lake conditions when your activities take you close to the water around the Great Lakes.



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