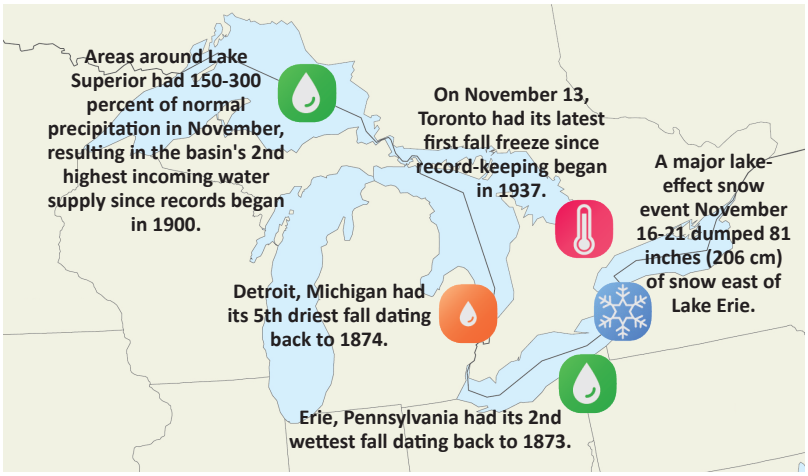
Quarterly Climate Impacts and Outlook

Great Lakes Region

December 2022

Great Lakes Significant Events – *September - November 2022*



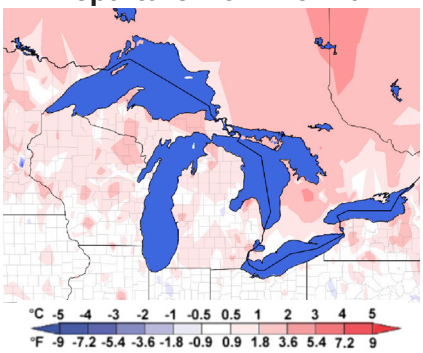
A lack of widespread rainfall exacerbated ongoing dry conditions, particularly in the central basin, and contributed to a relatively uneventful September and October. Some areas of southern Ontario developed pockets of severe drought.

From November 4-6, temperatures were up to 30°F (17°C) above normal in the east. On November 5th, Toronto, Ontario had its warmest November day (records began in 1937) when it reached 77°F (25.1°C). That same day, Buffalo, New York, had its second warmest November day, with 79°F (26.1°C), and Syracuse and Rochester, New York, recorded their warmest low November temperatures at 63°F (17.2°C) and 62°F (16.7°C), respectively.

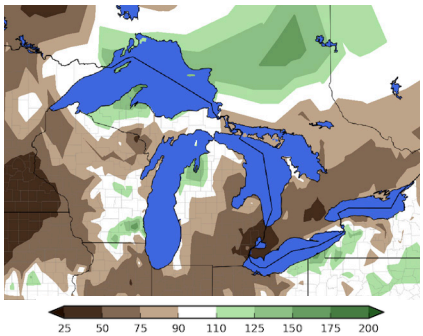
Water temperatures in Lakes Huron, Erie, and Ontario were unusually stable (not decreasing) in October, leading to near-record water warmth by early November. Arctic air moved across the basin mid-month producing massive lake-induced snowfall. Buffalo had 36.6 inches (92.96 cm) of snow from November 17-19, ranking as its second-largest three-day snow for November (records began in 1884). Wiarton, Ontario had a record four-day snow total of 49 inches (124.6 cm) from November 17-20 (records began in 1947).

Regional Climate Overview – *September - November 2022*

Fall Temperature Departure from Normal



Fall Precipitation Percent of Normal



Precipitation normals based on 1991-2020. Temperature normals based on 1991-2020 (U.S) and 1981-2010 (Canada).

Air Temperature and Precipitation

Fall and September were up to 2°C (4°F) warmer than normal. October temperatures ranged from 2°C (4°F) below normal in the southern Erie basin to 2°C (4°F) above normal in the Superior basin. November was up to 3°C (5°F) warmer than normal.

September and October precipitation was 75% of average and 70% of average, respectively, with all basins being dry. November precipitation was 89% of average with only Superior being wet. Fall precipitation was 78% of average with all basins being dry.

Current Water Levels

End of November water levels were above average on all lakes except Lake Ontario, which was below average. When comparing end of November 2022 levels to 2021, water levels were well below last year on all lakes

Lake	End of Nov 2022 Level Compared to:		Change in Level from beg. of Sep. to end of Nov:	
	Average for Nov	Nov 2021	2022 Change in Level	Average Change in Level
Sup.	+17 cm	+30 cm	-2 cm	-10 cm
Mich.-Huron	+12 cm	-21 cm	-26 cm	-17 cm
Erie	+19 cm	-38 cm	-32 cm	-23 cm
Ont.	-10 cm	-42 cm	-22 cm	-29 cm

besides Lake Superior, which was 30 cm above last year's level. Wetter conditions in the Lake Superior basin led to a smaller-than-average decline over the fall months. Dry conditions in the Lake Michigan-Huron and Erie basins led to above-average declines during the fall months. On Lake Ontario, initial dry conditions led to a greater-than-average drop in lake levels during the first half of the season, but later, wet conditions resulted in an overall smaller-than-average decline.

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Regional Impacts – *September - November 2022*

Agriculture: Corn and soybean yields in southern Ontario were reduced by about 5% and 7%, respectively, compared to last year due to dry conditions in 2022. In New York, moderate drought and abnormal dryness during summer and early fall led to reduced pumpkin yields and smaller-sized pumpkins. The Ontario Apple Growers reported a bumper crop, with apple yields up 29% compared to last year and up 19% over the 5-year average. Michigan apples were also abundant and of high quality resulting from favorable weather conditions throughout 2022. Additionally, dry weather and mild temperatures during fall were beneficial for agritourism.

Algal Blooms: The harmful algal bloom in Lake Erie persisted into November, which is about a month longer than usual and the first time on record the bloom lasted into November. In October, there was also an unexpected shift in the dominant algal species in the bloom. While this species produces toxins, the overall toxicity in November was low despite the bloom persistence. The 2022 bloom was rated as "moderately severe" and the sixth worst bloom since 2002, which was more severe than initially projected. NOAA and its partners continue to research bloom dynamics to improve the Lake Erie Harmful Algal Bloom Forecast.

Fall Foliage: Fall colors were reportedly spectacular across Canada and Michigan. Experts attribute the brilliance to a combination of low temperatures, but no frost, and sufficient rainfall.

Fall colors in the Toronto area during Fall 2022 (credit: Edwina Lopes)

Pumpkin on the vine (credit: Purdue COA)

Snow from Buffalo, NY storm in mid-November (credit: John Jarosz/NWS Coop)

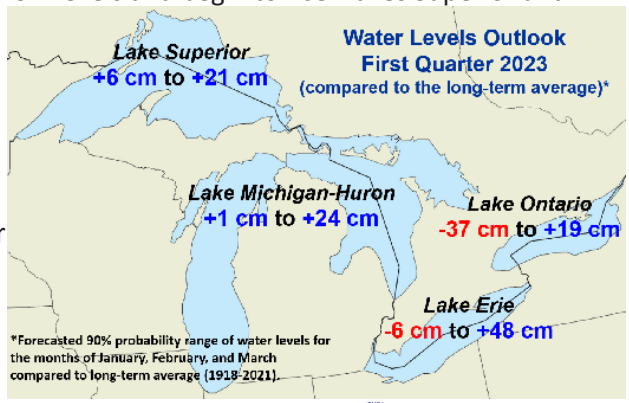
Regional Outlook – *for January - March 202*

Temperature and Precipitation

The outlook from American and Canadian forecasters shows enhanced chances of above-normal precipitation for the Great Lakes. Temperature outlooks are less consistent. American forecasters indicate equal chances for above-, below- and near-normal temperatures for the region, and Canadian forecasters indicate an enhanced chance of above-normal temperatures in northern Michigan.

Great Lakes Water Level Outlook

The December forecast indicates that first quarter (January, February, and March) water levels will continue seasonal declines on Lake Superior, transitioning from seasonal decline to rise on Lakes Michigan-Huron and Erie, and be in seasonal rise on Lake Ontario. By late winter and early spring, water levels on all the lakes typically reach their seasonal low levels and begin to rise. Lakes Superior and Michigan-Huron are forecast to remain above average levels under most water supply conditions in quarter one. Lake Erie is likely to remain above average unless very dry conditions occur. For Lake Ontario, water levels started below average in December and will likely stay below average unless wetter conditions occur.



Ice Cover

The U.S. National Ice Center predicts above-normal ice conditions for Lake Superior and normal conditions for Lake Huron, Green Bay, and northeastern Lake Michigan. Below-normal ice is predicted for the rest of Lake Michigan and Lakes Erie, St. Clair, and Ontario.

Partners

- *Midwestern Regional Climate Center*
- *Environment and Climate Change Canada*
- *Agriculture and Agri-Food Canada*
- *Northeast Regional Climate Center*
- *Great Lakes Region State Climatologists*
- *NOAA*
  - *NCEI*
  - *GLERL*
  - *CoastWatch Great Lakes Node*
  - *Great Lakes and IL-IN Sea Grant Networks*
  - *North Central River Forecast Center*
  - *Ohio River Forecast Center*
  - *Climate Prediction Center*
  - *Office for Coastal Management*
- *GLISA*
- *US Army Corps of Engineers, Detroit District*
- *NIDIS*
- *USDA Midwest Climate Hub*

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