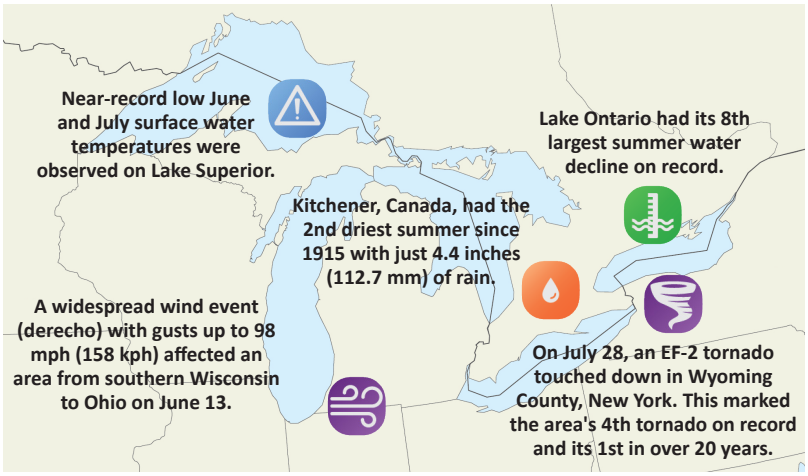
Quarterly Climate Impacts and Outlook

Great Lakes Region

September 2022

Great Lakes Significant Events – *June - August 2022*



Hot temperatures settled across the southern Great Lakes basin June 13-16 and June 20-22, with daytime highs reaching over 90°F (32°C). High humidity pushed heat index values over 100°F (38°C) from Chicago eastward. For only the second time on record in June, Toronto exceeded 95°F (35°C) on two consecutive days (June 21-22).

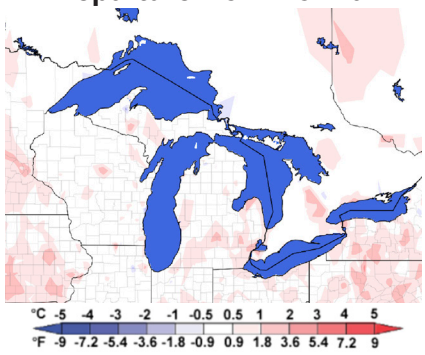
A long-duration, intense wind event on June 13 blanketed an area from southern Wisconsin to Ohio with 50-75 mph (80-121 kph), and higher, winds. A 98-mph (158 kph) wind gust was recorded at the Fort Wayne (Indiana) Airport. On June 16, straight-line winds up to 100 mph (161 kph) and tennis ball-sized hail was reported in western New York.

As summer progressed, drought and abnormally dry conditions settled across the basin from Duluth (Minnesota) eastward through Detroit (Michigan) to Buffalo (New York), and including areas near southern Lake Michigan. Conditions west of Toronto were extremely dry. It was also dry north of Lake Superior, although conditions were better than in 2021.

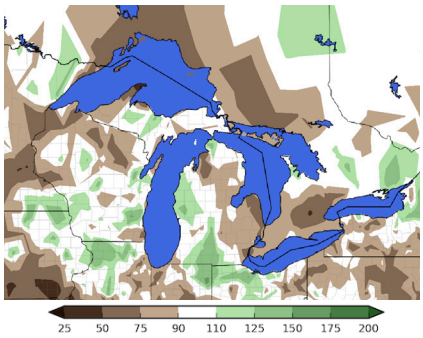
Heavy thunderstorms August 20-21 dropped over 7.9 inches (200 mm) of rain on Brampton (northwest of Toronto) resulting in localized flooding.

Regional Climate Overview – *June - August 2022*

Summer Temperature Departure from Normal



Summer 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

June, July, and summer were within 2°F (1°C) of normal for most of the basins, with a few U.S. locations being warmer. August ranged from within 2°F (1°C) of normal in the Superior and Michigan-Huron basins to 4°F (2°C) above normal in the Erie and Ontario basins. Syracuse, New York had the 4th warmest August since 1903.

June and July were drier than average for all lake basins with the overall basin seeing 81% of average in June and 89% of average in July. In August, all basins were wetter except Superior with the overall basin seeing 101% of average. For summer, the overall basin saw 90% of average, with all basins being drier.

Current Water Levels

End of August water levels were above average on all lakes except Lake Ontario, which was 17 cm below average.

Lake	End of Aug 2022 Level Compared to:		Change in Level from beg. of Jun. to end of Aug:	
	Average for Aug	Aug 2021	2022 Change in Level	Average Change in Level
Sup.	+9 cm	+10 cm	+10 cm	+13 cm
Mich.-Huron	+21 cm	-24 cm	-4 cm	+2 cm
Erie	+28 cm	-25 cm	-15 cm	-11 cm
Ont.	-17 cm	-17 cm	-49 cm	-24 cm

End of August levels were below 2021 levels on all lakes except Lake Superior, which was 10 cm above the 2021 level. The change in water levels from the beginning of June to the end of August was less than average for all the lakes due to drier summer weather and hydrologic conditions. This was most noticeable for Lake Ontario, which had its 8th largest drop on record when water levels declined more than double the average during the period.

Contact: Melissa Widhalm (mwidhalm@purdue.edu)

Regional Impacts – *June - August 2022*

Agriculture: Dryness had positive and negative impacts. Winter wheat yields were less-than-expected in Michigan due drought and high evaporation rates during June grain fill. Newly planted fruit trees that lacked a full rooting system were water stressed. Quality and yields of vegetable and fruit crops were generally good, and irrigation (where available) made a significant positive difference. Although corn and soybeans were late planted, crop progress in Michigan and Ohio were ahead of schedule by summer's end. Corn tip-back was reported region wide. In western New York, drought caused reduced hay yields, stunted corn, and increased operational costs. Across the region, dry weather led to a relatively low frequency of plant foliar disease. Tar spot in corn was very limited. While early dryness reduced apple size, flavor was enhanced from Minnesota to New York. Michigan's apple crop was of very high quality and abundance.

Harmful Algal Blooms: Above-average July rainfall led to increased nutrient runoff and a greater-than-expected Lake Erie algal bloom. The bloom was rated a 4.5-5.5 severity index, ranking it among the smaller blooms since 2011 and less severe than the 2021 bloom. The highest cyanobacteria concentrations were in Maumee Bay and extended north to Monroe, Michigan and east to Reno Beach, Ohio. In July and August, 11 water samples collected near Monroe, Toledo, and Reno Beach exceeded toxin levels considered safe for recreation.

Wildfires: Despite the dryness, wildfires in Ontario were well below the 10-year average both in quantity and size, which contributed to good air quality across the region.

Corn tip-back (missing kernels at end of cob) due to drought. (credit: Purdue COA)

Vegetables at a farmers market (credit: Purdue COA)

2022 cyanobacteria bloom in western Lake Erie (credit: Holly Kelchner/CIGLR)

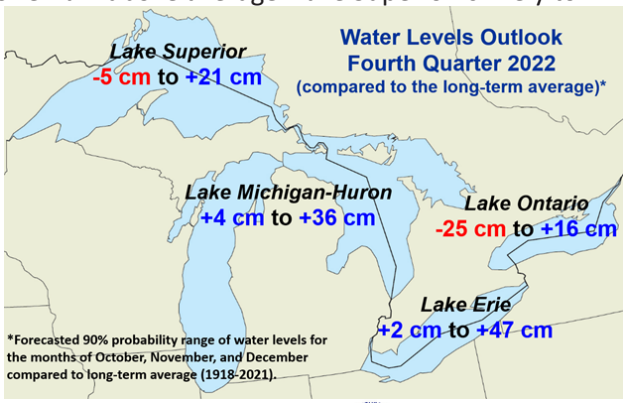
Regional Outlook – *for October - December 2022*

Temperature and Precipitation

The outlook from American and Canadian forecasters shows an enhanced chance for above-normal temperatures in the east and equal chances for above-, below- and near-normal temperatures in the west. The precipitation outlook shows equal chances for above-, below- and near-normal precipitation for most of the Great Lakes region.

Great Lakes Water Levels

The September forecast indicates that fourth quarter (October, November, and December) water levels will be in their period of seasonal decline. During the fall and early winter, water levels typically decline due to increased evaporation from cold arctic air moving over the relatively warm lake surfaces. Lakes Michigan-Huron and Erie are forecast to remain above average. Lake Superior is likely to remain above average, however, if drier conditions ensue, water levels could approach average or slightly below average. Lake Ontario is forecast to remain below average unless wetter conditions occur, which would push the water level closer to average or slightly above average.



Potential La Niña Impacts

NOAA has predicted that La Niña conditions, which are currently present in the equatorial Pacific Ocean, are favored to continue for a third consecutive winter. Such conditions could slightly increase the chance for above-normal precipitation.

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

Contact: Melissa Widhalm (mwidhalm@purdue.edu)