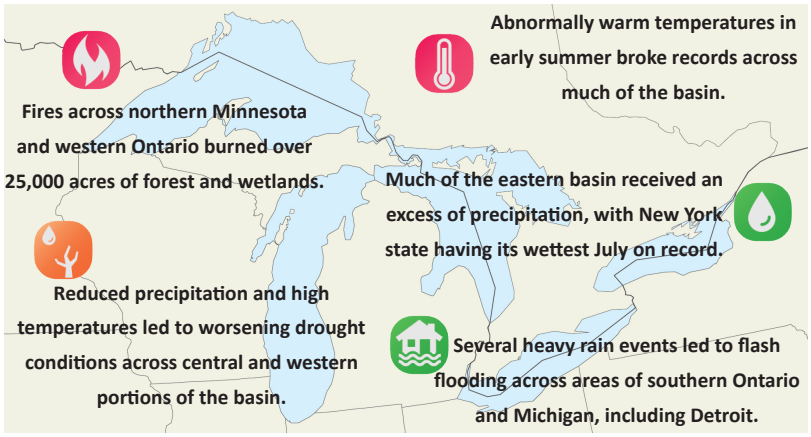
Quarterly Climate Impacts and Outlook

Great Lakes Region

September 2021

Great Lakes Significant Events – *for June - August 2021*



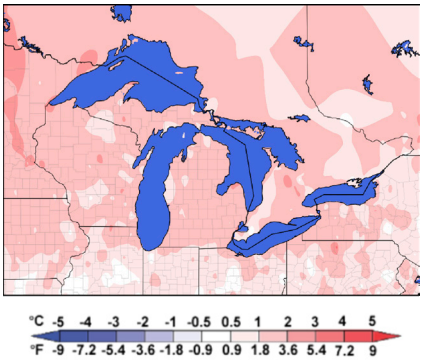
Much of the basin was impacted by above-normal temperatures for the summer of 2021. June was the 3rd hottest on record for Minnesota and Wisconsin, while Buffalo and Syracuse, NY broke the record for the hottest August. Lake temperatures were also very warm during the summer, with Lake Huron reaching a record-breaking 23.2°C (73.8°F) on August 26th.

Precipitation was more variable across the basin. Much of the central and eastern basin were impacted by heavy precipitation events. Several 24-hour precipitation records were broken, leading to flash flooding in many areas. Conversely, areas near western Lake Superior continued to experience dryness which only worsened drought conditions. Officials in both the United States and Canada upgraded the drought classification to the category of "extreme drought" for parts of northern Minnesota and western Ontario.

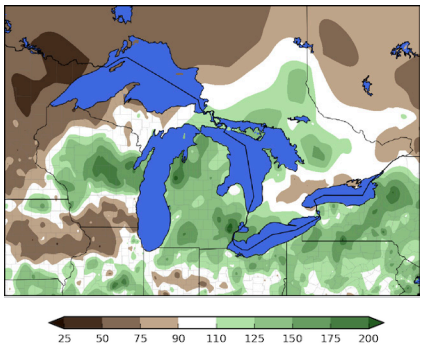
The elevated temperatures and drought conditions led to an increased risk of wildfires, with several fires emerging across the western basin. The Greenwood Fire in Minnesota burned more than 40 square miles (104 km^2) of land. The resultant smoke from these and other fires led NOAA and Environment Canada to issue multiple air quality alerts.

Regional Climate Overview – *for June - August 2021*

Summer 2021 Temperature Departure from Normal



Summer 2021 Precipitation Percent of Normal



U.S. normals based on 1991-2020.
Canadian normals based on 1981-2010.

Temperature and Precipitation

Temperatures across the basin were as much as 2°C (4°F) above normal for the summer. The early summer began with warm conditions, with June temperatures getting as much as 3°C (5°F) above normal. Temperatures varied in July, ranging from 2°C (4°F) below normal in the Ontario basin to 2°C (4°F) above normal in the Superior basin. August was up to 3°C (5°F) above normal. Minimum temperatures were also high this summer for many areas, with Ohio and New York experiencing their 2nd warmest on record.

For summer and each month of the season, all lake basins except Superior saw near- or above-average precipitation. The overall Great Lakes basin received 106% of average June precipitation, 126% of average July precipitation, 98% of average August precipitation, and 110% of average summer precipitation. The notable exception was the far western basin, which remained below 50% of average in some places.

Lake	End of August 2021 Level Compared to:		Change in Level from beg. of June. to end of August:	
	Average for Aug.	Aug. 2020	2021 Change in Level	Average Change in Level
Sup.	-1 cm	-26 cm	+2 cm	+13 cm
Mich.-Huron	+45 cm	-40 cm	+6 cm	+2 cm
Erie	+54 cm	-12 cm	+9 cm	-12 cm
Ont.	0 cm	-15 cm	+13 cm	-24 cm

Current Water Levels

End of August water levels are below last year's levels for all the lakes, but are well above average for Lakes Michigan-Huron and Erie and at or below average on Lakes Superior and Ontario. This is the first time since April 2014 that an end-of-month level was below average for Lake Superior. Water levels have risen on all the lakes this summer. With the exception of Lake Superior, lake basins have seen larger than average increases since the beginning of June. The rise of 13 cm on Lake Ontario this year ties 2015 for the highest rise over summer months.

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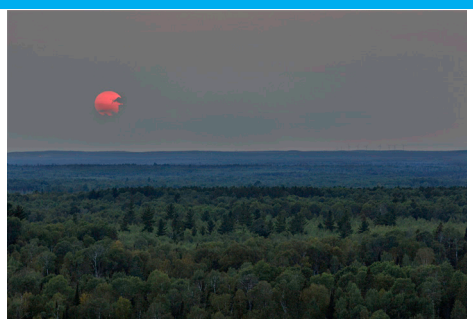
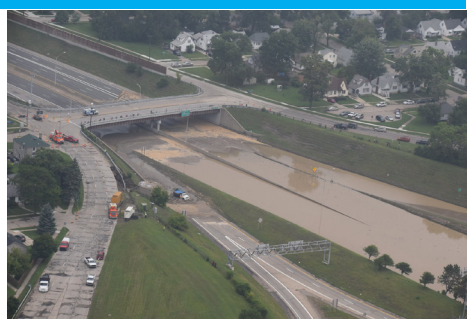
Regional Impacts – *for June - August 2021*

Smoke from the Greenwood Fire in northern Minnesota (credit: Lorie Shaull)



Hazy sunset over Superior National Forest (credit: Lorie Shaull)



Flooded highway in Detroit, MI (credit: Michigan Emergency Management & Homeland Security)

Smoke from the fires in western Ontario and northern Minnesota, as well as the more than 100 fires burning out in the Mountain West, resulted in dangerous air quality for many of the inhabitants of the Great Lakes basin. NOAA officials issued air quality alerts as the smoke and haze led to potentially dangerous air quality for those with respiratory conditions. NOAA had to issue 49 such air quality reports for northeastern Minnesota over the course of the summer, while Ontario had 21 days that were spent under air quality warnings.

Agriculture across the region was also affected by a variety of factors this summer. The drought conditions in the western basin strained crops during the peak of the growing season, while some officials predict that the greatest long-term impact could be to livestock producers. Specialty crop producers in Michigan, having already faced a late freeze this spring, confronted dry conditions in early summer, resulting in reduced growth and yields heading into the harvest.

Infrastructure and recreation have also been heavily impacted by the drought and fires. The Greenwood Fire forced the Boundary Waters Canoe Area Wilderness to close for the first time in nearly half a century. In western Ontario, officials were forced to evacuate local communities and close campgrounds due to the encroaching flames. An excess of precipitation was the primary issue in the central and eastern basin. Several heavy rain events led to Detroit experiencing widespread flooding which damaged property and closed vital roadways.

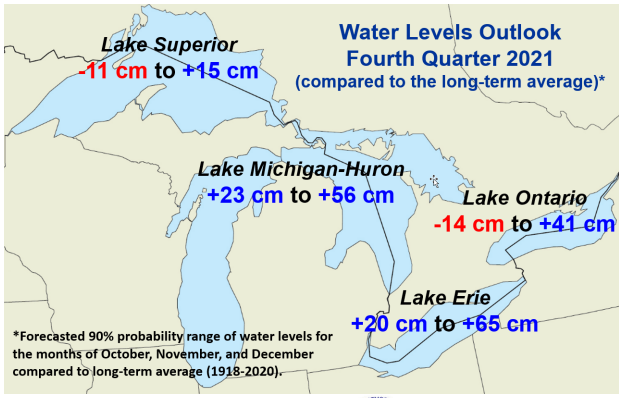
Regional Outlook – *for October - December 2021*

Temperature and Precipitation

Both Canadian and American forecasters are predicting an increased likelihood of above-normal temperatures and an equal chance of above-, below-, or near-normal precipitation for the basin. The various possible precipitation outcomes could have large repercussions for drought conditions in the western basin. An excess of precipitation could help mitigate the drought while a deficit could worsen conditions and negatively impact the start of the next growing season.

Great Lakes Water Levels

Water levels are forecasted to decline through the remainder of the year. Colder air during the fall and winter moves over the relatively warm lake water surfaces and increases evaporation. The recent drier conditions in the Lake Superior basin have brought the level back down to near average and it is forecast to remain that way over the next 6 months. Lake Ontario is forecast to be slightly above average throughout the forecast horizon, but could drop below average with drier water supply scenarios. On Lakes Michigan-Huron and Erie water levels are forecast to remain above average even under dry water supply scenarios.



Potential La Niña Impacts

NOAA has predicted an increased chance for the onset of La Niña conditions over the next few months. Such conditions, while likely weak at first, could 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 Sea Grant Network
  - Illinois-Indiana Sea Grant
  - 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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