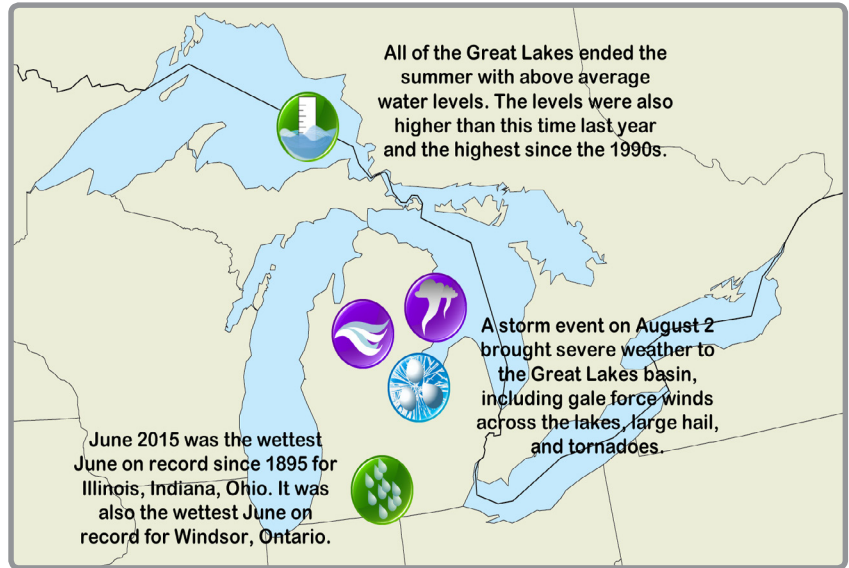




Great Lakes Significant Events - for June–August 2015

Even though the basin-wide summer averages for temperature and precipitation were near normal, the Great Lakes basin experienced a range of weather during summer 2015. A wet and cool June was followed by a drier July and sporadic waves of hot and humid weather in July and August. June 2015 was the wettest June on record since 1895 for Illinois, Indiana, and Ohio, the second wettest for Pennsylvania, and third wettest for New York. In Ontario, Windsor recorded its wettest June on record, while Toronto and Kingston recorded their second wettest June.

Water supplies in June for the Lake Erie basin reached a record high and a near record high for the Lake Ontario basin. As a result, lakes Erie and Ontario experienced record water level rises of 28 cm (11 in) and 33 cm (13 in), respectively, in June. This is significant since it is possible for both lakes to begin their seasonal declines in June. Overall, the generally wetter-than-normal conditions, particularly in June, resulted in the water levels on all Great Lakes ending the summer above average, higher than last year and the highest since the 1990s.



A strong storm system moved over the Great Lakes basin on August 2, causing a barrage of severe weather including hail, high winds, heavy rainfall and tornadoes. High winds blew across the Great Lakes, including numerous gale force wind gusts over 61 kmph (38 mph) and also some storm force wind gusts over 87 kmph (54 mph). Despite the high winds, there were no accompanying high waves or seiches on the lakes. This event also produced the largest outbreak of severe storms in Ontario this summer, including four tornadoes, two of which were EF2 tornadoes in the small southwestern Ontario communities of Teviotdale and Lebanon. On the U.S. side, there were several large hail reports in Wisconsin, Michigan, Minnesota and Illinois, one of which was of softball-sized hail (10.8 cm, 4.25 in) in Clear Lake, Michigan.

Regional Climate Overview - for June–August 2015

Great Lakes Water Levels

Despite a dry July, the Superior and Michigan-Huron basins experienced normal to wet conditions in June and August. As a result, Lake Superior ended the quarter 16 cm (6.3 in) above average and the highest for this time of year since 1996, and Lake Michigan-Huron finished the quarter 18 cm (7.1 in) above average and the highest this time of year since 1998. With the Lake Erie basin wetter than normal in June and July but dry in August, Lake Erie water levels at the end of August were 33 cm (13 in) above average, 23 cm (9.1 in) higher than last year and the highest since 1998. The Lake Ontario basin was wetter than normal this summer, which led to Lake Ontario at the end of the quarter 19 cm (7.5 in) above average and the highest this time of year since 1992.



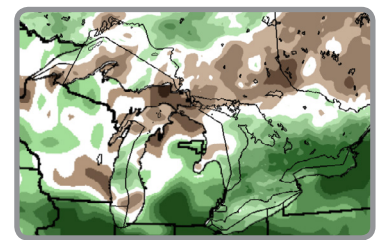
Lake Huron on 6/25/2015 (Photo: Michigan Sea Grant via Flickr)

Water level statistics based on 1918-2014.

Precipitation

The Great Lakes basin received 128% of average June precipitation. The Erie and Ontario basins were very wet at 194% of average and 180%, respectively. All lake basins had near-to below-average precipitation in July, with the overall basin seeing 81% of average. In August, all lake basins except Erie had near-average precipitation, with the entire basin seeing 103% of average. The overall basin received 104% of normal summer precipitation, with near-to above-normal precipitation in the individual lake basins.

June 2015 shown to display greatest anomalies. Precip. normals based on 1981-2010.

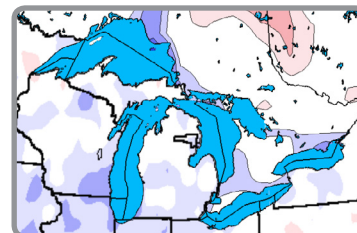


June 2015 Precip: Percent of Normal (%)

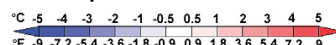
Temperature

Air Temperature

June temperatures ranged from near normal to 3°C (5.4°F) below normal. In July, most of the region experienced temperatures ranging from near normal to 2°C (3.6°F) below normal.



June-Aug 2015 Air Temp: Departure from Normal



Air temperature normals based on 1981-2010.

However, the western Lake Superior basin was warmer. August temperatures ranged from 2°C (3.6°F) below normal on the southern side of the basin to 2°C (3.6°F) above normal on the northern side of the basin. Overall, summer temperatures ranged from near normal to 2°C (3.6°F) below normal. Summer 2015 is the seventh season in a row with below-normal temperatures over the basin.

Water Temperature

Great Lakes water temperatures during summer were 0.5°C to 4.7°C (0.9°F to 8.5°F) below the long-term average (1995-2014), with the exception of a few areas.

Regional Impacts - for June–August 2015

High Water Level Impacts

Above-average water levels on the Great Lakes can bring a mix of negative and positive impacts. The higher water levels reduced the size of beaches around the Great Lakes, increased the risk of shoreline flooding and erosion, and encroached on the property of beachfront owners. On the other hand, the higher water levels may benefit the shipping industry, recreational boating and hydropower generation.



High water on Lake Erie on 7/9/2015 (Photo: Ohio Sea Grant)

Water Quality

As predicted, the Lake Erie harmful algal bloom is large this year, rivaling the size of the largest bloom in 2011. Heavy rains in June increased river flow, and as a result, the Lake Erie bloom developed farther east than it typically does, closer to the Lake Erie islands. By August, the bloom was predominantly in the western Lake Erie basin but extended into the central basin. The algal bloom in Lake Erie was confirmed to be toxic cyanobacteria, resulting in beach advisories this summer. Fortunately, as of September, the toxins from the bloom



Algal bloom on Lake St. Clair on 7/28/2015 (Photo: NASA)

have not impacted drinking water supplies like last year. Lake St. Clair (located between Lake Huron and Lake Erie) also experienced a large harmful algal bloom this summer.

Agriculture

The wet conditions in June resulted in limited ability to do fieldwork in June and early July. The June rain also flooded many fields in the areas surrounding the Great Lakes basin, which led to delayed planting, or in some cases, the inability to plant in some locations this year. In addition, persistent wet conditions led to earlier-than-normal crop disease development. After the wet start to the summer, the Great Lakes basin did experience more favourable conditions for crop growth in July and August.



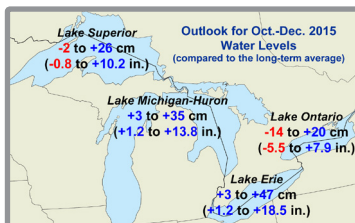
A flooded field in Illinois (Photo: Jim Angel)

Storm Damage

Damage from the August 2 storm included over 50 000 customers without power in southwestern Ontario and a number of damaged trees, homes and downed power lines. On July 13, a microburst associated with a severe thunderstorm caused significant damage to docks and boats at a marina near Morrisburg in eastern Ontario. Heavy rainfall associated with this storm also created flooding issues along the south shore of Lake Ontario and in Ohio.

Regional Outlook - for October–December 2015

Lake Level Outlook



Potential range for water levels for Oct-Dec. 2015 compared with the 1918-2014 average.

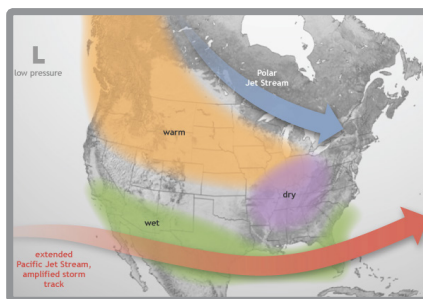
During autumn months, water levels are typically in their seasonal decline as over-lake evaporation increases and water supplies generally decrease. Current projections from October to December show above-average water levels for lakes Superior, Michigan-Huron and Erie unless exceedingly dry conditions are experienced. Lake Ontario is projected to be near average this fall unless exceedingly wet or dry conditions are experienced.

Temperature & Precipitation Outlook

Environment Canada (EC) and the Climate Prediction Center (CPC)** are forecasting a greater chance for above-normal temperatures across the Great Lakes basin for October-December 2015. The CPC is forecasting greater chances for below-normal precipitation across much of the U.S. Great Lakes basin, while EC indicates there is no clear signal at this time whether precipitation will be below, near, or above normal for October-December.

Since spring 2015, the equatorial Pacific Ocean has been experiencing warmer-than-average sea surface temperatures, meaning that **El Niño** is occurring. The seasonal forecast for October-December 2015 is reflecting the fact that **El Niño has a greater than 95% chance of continuing** through winter 2015-2016, according to the CPC. Based on previous years, El Niño winters tend to be warmer than normal in the Great Lakes basin, with drier than normal conditions in the eastern basin, less snow than usual, and reduced ice cover on the lakes.

The current outlooks can be found through the [Climate Prediction Center](#) and [Environment Canada](#).



The typical pattern in the winter during El Niño events. The polar jet stream tends to stay further north, while the Pacific jet stream remains across the southern U.S. (Graphic: NOAA)

Great Lakes Region Partners

Environment Canada
www.ec.gc.ca

Agriculture and Agri-Food Canada
www.agr.gc.ca

Midwestern Regional Climate Center
mrcc.isws.illinois.edu

Northeast Regional Climate Center
www.nrcc.cornell.edu

Great Lakes Region State Climatologists
www.stateclimate.org

National Oceanic and Atmospheric Administration
www.noaa.gov

National Operational Hydrologic Remote Sensing Center
www.nohrsc.noaa.gov

Great Lakes Environmental Research Laboratory
www.glerl.noaa.gov

NOAA Great Lakes Sea Grant Network
www.seagrant.noaa.gov

North Central River Forecast Center
www.crh.noaa.gov/nrcfc

Ohio River Forecast Center
www.weather.gov/ohrfc

Climate Prediction Center
www.cpc.noaa.gov

Office for Coastal Management
<http://coast.noaa.gov/>

Great Lakes Integrated Sciences & Assessments
www.gliisa.umich.edu

US Army Corps of Engineers, Detroit District
www.lre.usace.army.mil

National Integrated Drought Information System
www.drought.gov

Contact Information

Contact for NOAA:
Molly Woloszyn: mollyw@illinois.edu
Samantha Borisoff: samantha.borisoff@cornell.edu

Contact for Environment Canada:
greatlakes-grandslacs@ec.gc.ca
enviroinfo@ec.gc.ca



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www.drought.gov/drought/content/resources/reports
www.ec.gc.ca/eau-water/default.asp?lang=En&n=F5329B03-1



#regionalclimateoutlook