



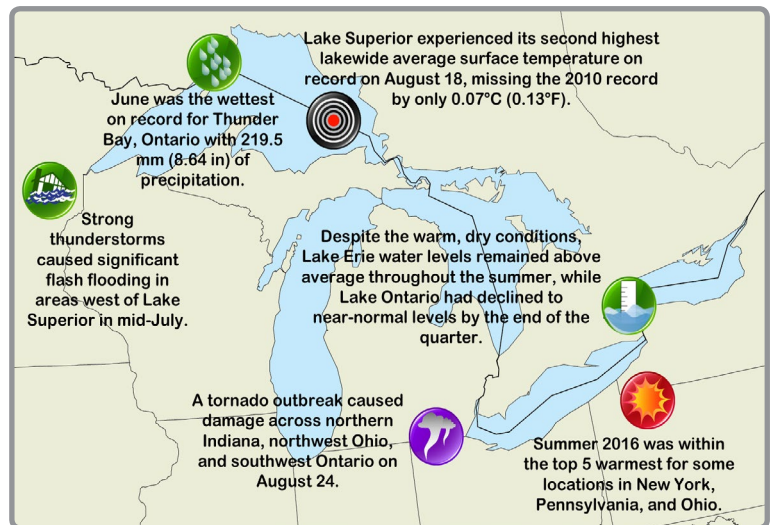
## Great Lakes Significant Events - for June - August 2016

The Great Lakes basin experienced a wide range of extreme weather this summer. Temperatures in the basin this summer were above normal, with the greatest departures from normal occurring in August. Summer 2016 was within the top 5 warmest for Rochester (NY), Buffalo (NY), and Erie (PA) (records began in the 1870s). High minimum temperatures were a large contributor to the warmth this summer. Ohio's summer minimum temperatures were the warmest on record since records began in 1895.

Precipitation varied from drier-than-normal in the eastern Great Lakes to wetter-than-normal in the western Great Lakes. The dry conditions, which were predominant in the early summer, led to drought development in New York, Pennsylvania, Ohio, Michigan, and portions of Ontario. On the other hand, Thunder Bay, Ontario recorded 219.5 mm (8.64 in) in June, making this their wettest June on record since records began in 1877.

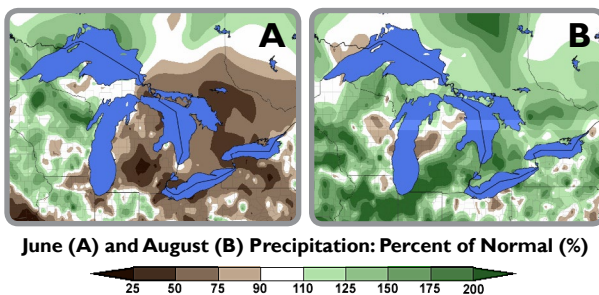
Strong thunderstorms in mid-July caused significant flash flooding in areas west of Lake Superior in Minnesota and Wisconsin. Rainfall amounts totaled 102 to 254 mm (4 to 10 inches) in a 24-hour period, with much actually falling within an 8-hour period. Gurney, Wisconsin recorded 245 mm (9.65 in) on the morning of July 12, making it their highest one-day precipitation total on record since records began in 1952.

A tornado outbreak on August 24 caused substantial damage in portions of Indiana, southwest Ontario, and northwest Ohio, which is unusual for this time of year. The 25-year average for August tornadoes in Indiana and Ohio is only two, but these states had over 21 combined on August 24. In fact, the 21 tornadoes reported in Indiana and Ohio ranks in the top 10 list for the largest number of tornadoes in a single August day across the U.S. (since 1950).



## Regional Climate Overview - for June - August 2016

### Precipitation



June was dry for all lake basins except Superior, with the Great Lakes basin receiving 83% of normal precipitation. The July storm track brought near- to above-normal precipitation to the upper lakes, while the lower lakes had below-normal precipitation. The overall basin received 91% of normal in July. In August, all lakes received above-normal precipitation, with the overall basin receiving 138% of normal. Summer averaged out to be drier than normal for Lake Ontario, wetter than normal for Lake Superior, and near normal for the other lake basins. Overall, the Great Lakes basin received 104% of normal summer precipitation.

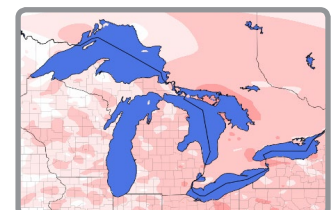
June and August 2016 graphics are shown to display the range in precipitation this summer. Precipitation normals based on 1981-2010.

### Temperature

**Air Temperature:** June temperatures ranged from 1°C (2°F) below normal to 2°C (4°F) above normal, while July temperatures ranged from near normal to 3°C (5°F) above normal. The entire region was warmer than normal in August, with temperatures ranging from 1°C (2°F) to 5°C (9°F) above normal. New York and Pennsylvania were record warm, while Ohio had its 3rd warmest August. The eastern Canadian basin observed August mean temperatures that were extremely above normal (90th-98th percentile). Summer temperatures ranged from near normal to 3°C (5°F) above normal.

**Water Temperature:** All Great Lakes surface water temperatures were above the long-term average for June, July, and August. Some temperatures were as much as 3.5°C (6.3°F) above average for the period.

Air temperature normals based on 1981-2010. Water temperature long-term average is 1995-2015.



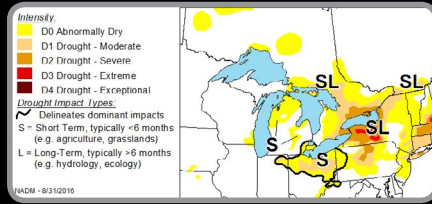
°C -5 -4 -3 -2 -1 -0.5 0.5 1 2 3 4 5  
°F -9 -7.2 -5.4 -3.6 -1.8 -0.9 0.9 1.8 3.6 5.4 7.2 9

## Great Lakes Water Levels

With the exception of Lake Superior, all lakes generally experienced dry conditions during the past three months, yet levels on all but Lake Ontario remained above average throughout the quarter. At the end of August, Lake Superior was 16 cm (6.3 in) above average, Lake Michigan-Huron was 28 cm (11.0 in) above average, and Lake Erie was 24 cm (9.45 in) above normal. The past three months were especially dry on Lake Ontario, and it finished the quarter 2 cm (0.8 in) below average, 20 cm lower than last year.

Water level statistics based on 1918-2015.

## Drought



North American Drought Monitor

## Transportation & Infrastructure



## Agriculture

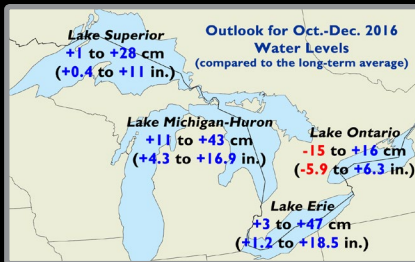
## Water Quality

is smaller

this year

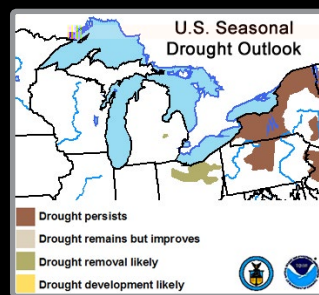
## Water Resources

## Water Levels



## Temperature & Precipitation

## Drought



CPC ECC

neutral

conditions

have a strong influence on North American weather in the coming months.

basin into the October-December 2016 period (not pictured).

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