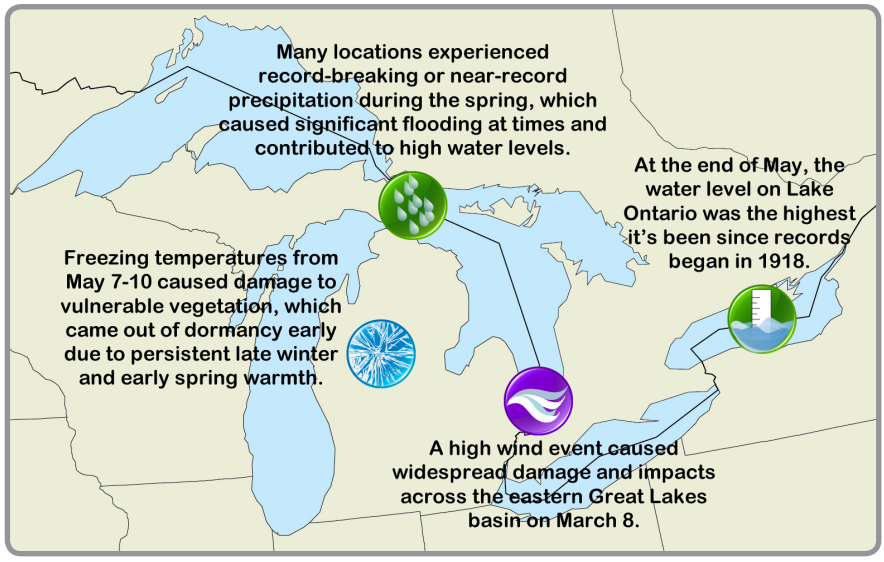
Quarterly Climate Impacts and Outlook

Great Lakes Region

June 2017

Great Lakes Significant Events - *for March - May 2017*

At the end of May, Lake Ontario's water level was 82 cm (32 in) above average, which is the highest it's been since records began in 1918. The high water levels led to widespread flooding and erosion along the Lake Ontario shoreline. Lake Erie was also close to reaching its all-time high water level. All the other lakes were at least 22 cm (8.7 in) above average and all were higher than they have been since at least 1998.



The high water levels this spring were primarily driven by very wet conditions across the basin in April and May. In the Lake Ontario basin, over 4 trillion gallons of rainwater flowed into the lake during this time and the basin had its wettest May since 1900. Rochester and Buffalo (NY) had their second wettest spring on record and many locations across Ontario received record precipitation for April through May.

Following an unseasonably warm February, many locations across the basin continued to experience this warmth through much of March and April, leading to early dormancy break in some vegetation well before average last freeze dates. May brought cooler weather across the basin, including freezing temperatures on May 7-10 that resulted in damage to vulnerable vegetation.

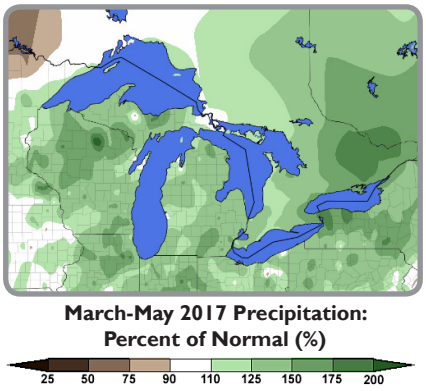
A powerful and destructive wind event blew across the basin in early March. In Rochester (NY), a wind gust of 130 kph (81 mph) was recorded, which was the 2nd strongest wind gust on record at that site. The high winds also affected locations in Ontario and Michigan, and resulted in widespread power outages and other impacts like pushing a plane off the runway in Ypsilanti (MI) and derailing 12 train cars in Batavia (NY).

Regional Climate Overview - *for March - May 2017*

Precipitation

Following a wet winter, the Great Lakes basin received 126% of average precipitation during spring, with all lake basins wetter than average. In fact, all lake basins received near- to above-average precipitation during each month of the spring season, with the Lake Ontario basin having its wettest May since 1900. The overall basin received 103% of average precipitation in March, 152% in April, and 120% of average in May.

Precipitation normals based on 1981-2010.



March-May 2017 Precipitation: Percent of Normal (%)

Great Lakes Water Levels

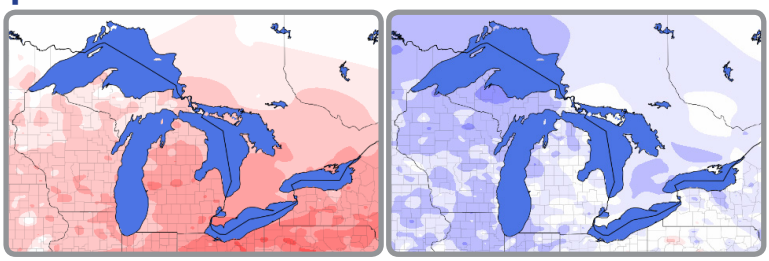
Lake	End of May 2017 Compared to:		Change since March 1st	
	Average	Last Year	2017	Average
Superior	+22 cm (+8.7 in)	+9 cm (+3.5 in)	+21 cm (+8.3 n)	+17 cm (+6.7 in)
Michigan-Huron	+34 cm (+13.4 in)	+2 cm (+0.8 in)	+33 cm (+13 in)	+24 cm (+9.4 in)
Erie	+54 cm (+21.3 in)	+21 cm (+8.3 in)	+44 cm (+17.3 in)	+31 cm (+12.2 in)
Ontario	+82 cm (+32.3 in)	+83 cm (+32.7 in)	+95 cm (+37.4 in)	+43 cm (+16.9 in)

Water level statistics based on 1918-2016.

Temperature

Air Temperature: Spring temperatures ranged from 1°C (2°F) below normal in the Superior basin to 2°C (4°F) above normal in the Erie basin. March temperatures ranged from 3°C (5°F) below normal to 1°C (2°F) above normal, with the coldest areas in the Ontario basin. April temperatures ranged from near normal in the Superior basin to 4°C (7°F) above normal in the Erie basin. May temperatures ranged from 3°C (5°F) below normal to near normal.

Water Temperature: Surface water temperatures on all Great Lakes were around 1°C (1.8°F) above the long-term 1992-2016 average (LTA) in early March. Water temperatures increased as expected in the spring season. However, a noticeable decrease in late May resulted in temperatures that were just slightly above the LTA at the end of the season.



April 2017 (left) and May 2017 (right) Air temperature: Departure from Normal

Air temperature normals based on 1981-2010.

Regional Impacts - *for March - May 2017*

Coastal Flooding & Erosion

High water levels on the Great Lakes and adjacent lakes and streams, combined with the frequent bouts of heavy precipitation, caused significant flooding and erosion damage around the Great Lakes, particularly Lake Ontario. Clean-up costs and infrastructure damages in Hamilton (ON) totaled over $2.5 million. In New York and Ontario, residents were evacuated and over one million sandbags were used to protect shoreline property and infrastructure from rising waters and coastal flooding. A main road to Sodus Point (NY) was inaccessible for several weeks. However, the community's effort to remove water on that and other roads via water pumps, discharge intake sealing, and sandbagging was relatively successful. The inundation of roads became manageable and businesses were able to remain open. In some places, high winds amplified flooding and erosion issues. The high water levels significantly reduced beach access around Lake Ontario and submerged docks and launches at marinas, which will continue to impact tourism and recreation this summer.

Erosion in Lyndonville, NY (Photo: Alicia Bonanza)

Oswego County, NY on 5/15/17 (Photo: Cathy Goodnough)

Agriculture

The excess moisture, cold May temperatures, and flooding delayed seeding and emergence in Ontario, New York, Michigan, and Ohio, forcing some producers to switch from early to late season crops. In addition, many farmers dealt with flooding in fields. As a result of the early May freeze, apple growers in eastern Michigan reported a significant amount of crop loss with some reporting up to 80% loss.

Water Quality

The heavy rainfall events and high water levels forced the release of untreated water into Lake Ontario in order to mitigate flooding. There were reports in early May that the Toronto Harbour had E. Coli levels that were 16 to 30 times the safe amount for human contact or boating.

Navigation

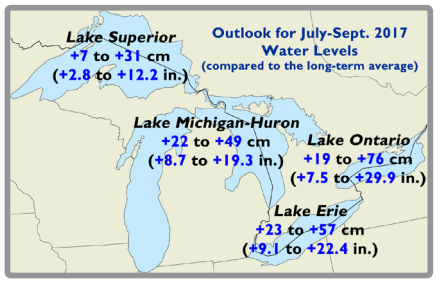
Due to the high water levels, the Lake Ontario St. Lawrence River Board increased outflows from Lake Ontario to help alleviate flooding in this region, which created higher velocities in the shipping channels and increased the need for safety precautions by shipping.

Societal

The powerful wind event in early March produced significant impacts across the basin, including widespread power outages. In southeast Michigan, one million people lost power after 4,000 power lines were pulled down by falling trees. In addition, Monroe County (NY) 911 had its highest call volume since the 1991 ice storm.

Regional Outlook - *for July - September 2017*

Water Levels



Potential range for water levels for July-Sept 2017 compared to the long-term average (1918-2016).

Typically, water levels in all the Great Lakes peak in the summer months before beginning to decline in late summer as water supplies to the lakes tend to decrease. However due to high water levels in lakes Erie and Ontario at the end of May, both of these lakes may have peaked for the year and are expected to decline assuming average water supply conditions for the summer. Lakes Superior and Michigan-Huron are expected to more closely follow the typical seasonal pattern. All lakes are estimated to stay well-above average levels through the summer, even if dry conditions occur.

Harmful Algal Blooms

The harmful algal bloom (HAB) season in the Great Lakes peaks annually in late summer. The severity of HABs are dependent on phosphorus and nitrogen outputs from March 1-July 31 (the "loading season"). Conditions can change quickly, so a Lake Erie HAB bulletin is updated twice a week and the Lake Erie Experimental HAB Tracker is also updated frequently. On July 13, NOAA will officially announce the predicted western Lake Erie HAB season outlook for 2017. Resource and public health managers can use these outlooks to plan for toxic blooms this summer, which could affect human and animal health.

Lake Erie HAB in July 2015 (Ohio Sea Grant)

Temperature & Precipitation

The Climate Prediction Center (CPC) and Environment and Climate Change Canada (ECCC) are predicting greater chances for above-normal temperatures across the entire Great Lakes basin for the July through September period. On the other hand, the CPC and ECCC do not have a clear signal on whether precipitation will be above-, near-, or below-normal for July through September. The current monthly and seasonal outlooks can be found through CPC and ECCC.

Great Lakes Region Partners

Environment and Climate Change Canada (ECCC)
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 Centers for Environmental Information**
  www.ncei.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/ncrfc
- **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.glisa.umich.edu
US Army Corps of Engineers, Detroit District
www.lre.usace.army.mil
National Integrated Drought Information System
www.drought.gov
USDA Midwest Climate Hub
https://www.climatehubs.oce.usda.gov/midwest

Contact Information

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

Contact for ECCC: ec.enviroinfo.ec@canada.ca

Archive: goo.gl/3WA5QZ