

# Great Lakes' record warmth likely to fuel lake effect snow, may disrupt fish

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The Great Lakes are experiencing record warmth this fall as water temperatures spike well above normal seasonal levels, fueling lake effect snow and potentially disrupting fish spawning.

The surging temperatures are most stark in Lake Superior, the northerly

Great Lake notorious for its frigidity. It has never been so balmy this late into the fall and has consistently set records for its warmth, according to federal data dating back to 1995.

Lake Superior was nearly 60 degrees on Oct. 8, when the water is typically around 52. On Thursday, it was 51.5 degrees—nearly 6 degrees higher than its normal average [temperature](#), 45.7 degrees Fahrenheit.

All of the five Great Lakes have been 1 to 2 degrees Fahrenheit above normal temperatures since early October, according to National Oceanic and Atmospheric Administration data. All of them have clocked at least a few days of record warmth.

It might sound like a mild fluctuation, but "a 1- to 2-degree change in temperature for the lakes is highly significant," said Andrea Vander Woude, manager of NOAA's Great Lakes Environmental Research Laboratory's CoastWatch program, which has collected data on Great Lakes temperatures, wave heights, ice cover and more since 1995.

"It could have a negative impact on ecosystems, on fish, on zooplankton and phytoplankton and the whole dynamics of small animals within the lakes," she added.

Warm lakes also fuel rain and snow, said Lauren Fry, a physical scientist for the Great Lakes Environmental Research Laboratory. Much like a hot cup of coffee produces more steam on a cold day, warmer lakes lose more water through evaporation into cold air.

That phenomenon contributed to record-breaking lake effect snowfall in northern Michigan on Wednesday after a blast of cold air swept through the region, National Weather Service Meteorologist Kevin Farina said. Parts of northern Michigan, especially around Gaylord, got almost 12 inches of snow that day, more than any single-day snowfall in November

on record.

"It's cold air over [warm water](#) that generates lake-effect snow," Farina said. "The colder the air is and the warmer the lakes are, the more intense it will be."

The Great Lakes were indeed warm that day.

On Monday, when meteorologists sent the alert that lake-effect rain would turn into snow, Lake Michigan was about 57 degrees—more than 5 degrees above normal, a record-warm day that followed a month of record-warm days for the storied western lake.

The rest of the lakes followed suit, all reaching temperatures well above normal:

- Lake Superior was almost 53 degrees, the warmest Nov. 1 on record, about 6 degrees above average.
- Lake Huron was 55 degrees, the warmest on record, about 5 degrees above average.
- Lake Erie was almost 59 degrees, the warmest on record, more than 4 degrees above average.
- Lake Ontario was almost 57 degrees, the warmest on record, more than 5 degrees above average.
- Lake St. Clair was almost 54 degrees, more than 3 degrees above average but it did not set a record for that day.

This comes as summer and fall temperatures were "well above normal" throughout Michigan, Farina said.

Outdoor temperatures, and thus lake temperatures, don't look like they will be dropping soon. Farina said northern Michigan weather could be up to 15 degrees warmer than usual in the coming week.

Vander Woude said it is "extremely rare" for the lakes to clock temperatures so much warmer than average, but it isn't unheard of. The Great Lakes experienced a similar warm spell last summer—average surface temperatures reached more than 5 degrees Fahrenheit warmer than normal on lakes Erie and Ontario in July.

Last year's hot streak was caused by a few factors, Vander Woude said, including warm summer temperatures and little winter ice cover.

Warm spells, while rare, fit into a decades-long trend toward warmer water fueled by a changing climate.

Jay Austin, a physics and astronomy professor at the University of Minnesota Duluth, studies Great Lakes [water temperatures](#). He has used National Oceanic and Atmospheric Administration data to track how the lakes have warmed since 1980, when the administration started collecting data using buoys.

While water temperatures vary from year to year, all of the Great Lakes are getting warmer, he said. There tend to be fewer cold years to cool the average temperatures.

"We have more and more years like 2012, which was basically ice-free, a very warm winter that led to a relatively warm summer," Austin said. There have been "fewer and fewer years like 2014 or 2009, when we had heavy ice cover in winter, which results in a relatively cold summer condition."

The 40-plus-year data set shows average summer water temperatures on Lakes Superior, Michigan and Huron have warmed by about 3 degrees Fahrenheit. Lake Erie has warmed by about 1 degree.

Austin calculated the change by comparing average summer

temperatures from 1980-89 with 2012-21. He does not have long-term data for Lake Ontario.

It's unclear exactly how Great Lakes fish will respond to the current warm spell, but even slight temperature changes could be significant for certain species, said Todd Wills, Lake Huron-Lake Erie area fisheries research manager for the Michigan Department of Natural Resources.

Take lake trout, for example. They spawn in the fall when water temperatures are in the low 50s Fahrenheit. Unseasonably warm temperatures could delay their spawning, which could delay egg laying and egg hatching and reduce the number of fish that make it into adulthood.

"All fish have some sort of optimum temperature that they survive at," Wills said. "When you get past that optimal temperature, even by a few degrees, things like their ability to grow, to spawn and to survive can change. Even small changes in temperature for some species can really have a pretty substantial effect."

The jury is no longer out on what is causing the Great Lakes' slow warming, Austin said.

"It's climate change," he said. "We are seeing warmer and warmer air temperatures, which is causally linked to carbon dioxide in the atmosphere. The [lake](#) temperature reflects that."

That means warm spells, like the one ongoing through the Great Lakes, likely will become more common, said Ed Rutherford, Great Lakes Environmental Research Laboratory fishery biologist.

"The predictions about climate warming are really coming to pass, probably sooner than everybody thought," Rutherford said. "It's

becoming more variable, but it is getting warmer, there's no doubt. I think the expectation is we're going to see more warm falls like this."

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