

Climate change impacting Minnesota lakes

Warmer water, shorter ice seasons may lead to more algal blooms, shifting fish populations, changes in recreation

The pollution we put in our air is impacting our waters. Climate change is bringing major changes to Minnesota lakes, with warmer lake water and shorter ice seasons. With warmer lake water and longer open water periods, Minnesotans can expect more algal blooms in more lakes, even those up north, along with a greater potential for invasive species. Fish populations may shift, with warm-water species migrating north while cold-water species decline.

View the data on climate impacts to Minnesota waters:
<https://www.pca.state.mn.us/climate-lakes>

“It’s mostly about a shift in what we consider natural conditions. It’s a big impact to our culture and recreation. We want to have lake trout and walleye in northern Minnesota. Who are we if we don’t have those species?” says Scott Niemela, MPCA supervisor of biomonitoring for the north region. “These fish won’t disappear in our lifetime, but their populations may shift.”

All these changes will affect Minnesota’s environment and economy. The magnitude of climate change will require bold policies from all levels of government to protect Minnesotans by limiting our greenhouse gas emissions and preparing our communities for the changes to come.

Higher temperatures chipping away at lake ice

On Minnesota lakes, ice coverage has declined an average of 10-14 days over the last 50 years, according to data collected by state agencies and volunteers. Since 1967, ice-in dates have moved about nine days later on average, while ice-out dates have moved about four to five days earlier.

That means two less weeks of ice coverage each winter for ice fishing, snowshoeing, cross-country skiing and snowmobiling across our state’s lakes. Each year, Minnesotans and visitors spend millions of dollars on winter recreation. A shortened lake ice season is also a big hit for businesses that support these winter traditions.



As an avid ice angler, Nick Sacco, a recreation program specialist with the Three Rivers Park District, has noticed the impact of later ice-in dates. “Early season ice is often the best time to fish for game fish in the state like walleye and northern pike. Their season usually closes the last weekend in February. That makes it really challenging when there’s not safe ice in mid-to-late December,” says Sacco. “By the time you can actually fish on the ice safely, these fish have slowed down their feeding cycles. There’s now a lack of consistency for ice anglers that want to get a good late fall, early winter bite.”

Winter temperatures and overnight lows continue to warm at a rapid pace, which will likely lead to even shorter ice seasons in the future.

Impacts of shorter ice seasons on recreation and lake ecosystems:

- A shortened season for safely recreating on ice-covered lakes. The quality of ice is also impacted. Even when lakes are ice-covered, the thickness and quality of the ice may decrease and there may be more episodes of slush. Be sure to check the DNR's website for [ice safety tips](#).
- Loss of cold-water habitat for fish species such as trout, cisco, and whitefish. These species may decline in some lakes and increase in others.
- Altered lake evaporation rates that impact lake levels and humidity, which result in changes to fish and invertebrate populations.
- A longer growing season for algal blooms.
- Potential for increased densities of aquatic invasive plants, such as curly leaf pondweed and Eurasian watermilfoil.

The table below shows the number of lost ice coverage days on some of Minnesota's popular lakes between the years 1967 and 2020. Ice coverage for individual lakes will vary year-to-year, but the collective data shows an average loss of 10-14 days of ice on lakes across the state over the last 50 years.

Lake	County	Days of ice coverage between 1967 and 2020
Bemidji	Beltrami	-18.9
Detroit	Becker	- 9.5
Itasca	Clearwater	-14.0
Lower Hay	Crow Wing	-15.1
Medicine	Hennepin	-11.7
Siseebakwet (Sugar)	Itasca	-12.6
Waconia	Carver	-14.8
Washington	Blue Earth and Le Sueur	-13.7

Warmer lake water: A few degrees make a big difference

As air temperatures have risen over recent decades, lake water temperatures have also increased, according to data collected by state agencies. Compared to 50 years ago, the average July-August surface water temperatures in Minnesota lakes are 3.0 – 3.9 °F higher.

A few degrees may sound insignificant, but the ramifications to natural conditions can be monumental. For example, toxic blue-green algae thrive in water that is 75°F and higher. Warming water is likely part of the reason for algae blooming earlier in the season in some southern Minnesota lakes and even occurring in some northern lakes.

Fish populations may also shift. Warm-water species like large-mouth bass and carp may migrate north, while cold-water species like brook trout and cisco may decline in Minnesota. Walleye prefer water temps at 65 to 70°F during the summer, and smaller, warmer lakes may become too warm for them, meaning their populations will likely shift to cooler, northern lakes.

Increasing air temperatures have the biggest impact on shallow lakes, with less volume of water to absorb solar radiation. However, deeper lakes will also suffer impacts, including:

- Potential for more fish kills. Fish will squeeze into smaller zones for access to oxygen, with lakes too warm at the surface and too little oxygen at the bottom. This competition for limited oxygen leads to fish kills.

- Potential disruptions to [lake turnover](#), when the top layer of water sinks and the bottom layer rises, resulting in a mixing of lake water. This turnover delivers oxygen and nutrients essential to fish and bugs throughout the lake. Without it, lakes suffer dead zones or areas without dissolved oxygen.
- Disruptions to stratification can also lead to more phosphorus being available from the bottom sediment to grow algae.

Impacts of warmer lakes to fish populations and fishing:

- Fish populations may shift. Expect declines of cold-water species as northern lakes warm up, and more warm-water species like sunfish, northern pike, fathead minnows, and central mud minnows.
- Minnesota may lose warm-water species too. “The Topeka shiner, on the federal endangered list, is one of the rarest species in Minnesota, occurring in the southwest corner of the state, the very northern edge of its range, and it loves warm water. But will the water get too warm for it?” Niemela asked.

What you can do to help Minnesota address climate change

- Learn how Minnesota is mitigating and adapting to climate change: <https://www.pca.state.mn.us/air/climate-change-minnesota> and https://www.dnr.state.mn.us/climate/climate_change_info/index.html
- Make the science stronger by volunteering to report ice-in and ice-out dates on your lake: <https://www.pca.state.mn.us/water/lake-ice-reporting-program>
- Reduce your carbon footprint through smart choices around energy use, transportation, diet, and purchasing. Check out this [EPA calculator](#) on reducing your carbon footprint.

