

Along one Minnesota river, ice and walleyes signal a changing climate

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Looking downstream on the Rainy River, it's hard at first to see how spring is changing along the northern border.

Snowbanks still lined the American shore on a recent morning here, 45 miles west of International Falls, as fishing guide Justin Wiese raced to get his boat in the water under the morning sun.

Just a few miles up, the Little Fork and the Big Fork rivers had busted open overnight, sending a winter's worth of debris into the Rainy, along with thousands of ice chunks the size of sofas, rafts and rugby balls. It was the last of the ice-out, the final phase of one of the most active fishing seasons in Minnesota.

"Ready to dodge some icebergs?" Wiese shouted to a handful of other fishermen waiting to get after walleye.

But this year, the Rainy River anglers would not be keeping their fish. This year, for the first time, the Department of Natural Resources imposed catch-and-release rules on the border river. One major reason: Ice-out is happening earlier and earlier each spring, leaving more time for open-water fishing and, the agency fears, placing increased pressure on the river's famous walleyes.

Which means that on one of the nation's finest walleye rivers, during the best time of year to catch the prized game fish, nobody was allowed to take one home.

It's a telling symptom of climate change, and just one of countless ways that rising temperatures are altering the lives of Minnesotans and the landscape of their state.

Around the world, climate change is forcing people to revamp the way they fight wildfires, prepare for typhoons, nurture their crops through drought and manage coastal flooding. In Minnesota, the same forces are changing the state's response to spring floods, the way foresters choose trees for timber and which lakefronts can have summer cabins or resorts.

Ice is just one indicator. Across Minnesota, lakes are losing up to four days of ice every 10 years, according to the state climatology office. And it's not just Minnesota: Rivers and lakes across the continent are tending to freeze later and thaw earlier.

"You think of all the ways people interact with [lake ice](#)—skating, fishing derbies, iceboats," said John Magnuson, an ecologist and limnologist at the University of Wisconsin, Madison. "And already, in some of these lakes you have about a month less to do it."

As a Northern Minnesota fishing guide, Wiese has been as busy as ever this spring. The type of people who hire guides and brave frigid sunrises are not necessarily doing it for fish that they can eat, he said. They're typically in it to see the northern edge of the country, to get back on a boat for the first time in months, to chase trophy fish that they would photograph and release even in normal times.

But he nonetheless worries what a catch-and-release season will do to the local economy. Aside from the enthusiasts, he said, there's been a clear drop-off in the number of boats on the water. At some well-known hot spots on the Rainy River, hundreds of boats would normally line up during the ice-out season, so close together that a person could walk across the river without getting wet, he said.

Those days were few and far between this year.

"It makes you wonder if people are staying away," Wiese said.

10 fewer days

Like any other climate indicator, ice-out dates on an individual river are highly erratic, often swinging by weeks from year to year. In 2018, the Rainy River stayed frozen deep into April, later than normal. In 2016,

the ice melted in mid-March, one of the earliest thaws ever recorded.

Phil Talmage, the DNR's fisheries supervisor in Baudette, cautioned that ice-out dates are "highly, highly variable." But when the data is plotted out for several decades, the trend is clear, he said.

And during early thaws, he added, there is a clear uptick in fishing pressure.

The DNR went to catch-and-release because it wants to increase the number of male walleye that make it to the spawning grounds of the Rainy River. The spring season is typically designed to protect larger spawning females—anglers can normally keep walleye under 19.5 inches long. But because more walleye are being taken during ice fishing season these days, and the ice is thawing earlier, the DNR wanted to ensure it would have a healthy male population during spawning season no matter what happens with the ice, Talmage said.

Tracking open water as an omen of climate change is still a crude science. Minnesota has been monitoring when the ice melts on the Rainy River since the 1930s. Factoring in the highs and lows, the river is trending to about 10 fewer days of ice now than it had 90 years ago. And that's just in the spring.

While the state has up to 100 years of ice-out data in some lakes and rivers, it has almost no reliable data on when they freeze each year, said Peter Boulay, a DNR climatologist.

"Ice-in is much harder to track," he said. "It'll freeze and thaw and refreeze multiple times. And if it's a huge lake, like Lake Mille Lacs, it's not so simple to see when it's frozen in the middle."

But at the University of Wisconsin, the first school in the country to

study the chemistry and makeup of inland lakes, scientists have been keeping that data for decades.

The university has tracked ice coverage on Wisconsin lakes since the 1850s. In those days, ice harvesters needed to know when they could venture out on a lake to cut large frozen blocks to sell during summer; parents and school superintendents waited for ice roads that would connect Lake Superior's Apostle Islands to the mainland.

The longer the data go back, the clearer the pattern becomes: Lakes have less ice now, said Magnuson, who is semiretired after decades with the school's limnology office.

Lake Mendota in Madison gets 30 days less ice coverage—a full month—than it did during the Civil War, the data show.

And the thaws have been accelerating, Magnuson said.

Six of Lake Mendota's 10 earliest ice-outs have happened since the late 1990s.

Ice coverage is not just a function of temperatures in the spring and fall. It reflects two larger factors: the area's average annual temperature and the depth of the lake. Every body of water is continually heating up through the summer. The deeper the lake, the more volume it has to collect and store that heat. The more warmth a lake stores, the longer it takes to freeze, Magnuson said.

For the first time, some of the deepest lakes in southern Wisconsin are starting to have years when they don't freeze at all. As temperatures continue to climb, that will happen to more and more lakes in Minnesota as well, Magnuson said.

The magic number seems to be about 47 degrees Fahrenheit. Once the average temperature for an entire year reaches that point, lakes that have historically frozen over every year start to see some years where they remain open.

"That doesn't mean they'll always be open, because it's still so variable," Magnuson said. "But you start to see it where you'll have ice, ice, ice, no ice."

Algae blooms

The Wisconsin researchers helped publish a study earlier this year showing that if temperatures climb 2 degrees Celsius—a goal set by the United Nations to limit the damage of [climate change](#)—more than 20,000 lakes across the Northern Hemisphere will stop freezing over every year.

And that will trigger an ecological chain reaction that scientists are just beginning to understand. Without ice cover on a lake, aquatic life will begin to change—often for the worse, said Lesley Knoll, station biologist at the University of Minnesota's Itasca Biological Station and Laboratories.

More light and more oxygen penetrate the water when a lake lacks ice cover, which leads to greater algae blooms in the summer and shrinks the livable area for certain cold-water-loving fish, such as the tullibee.

And tullibee, which are highly sensitive to oxygen levels, are often the best indicators of a lake's health. They're an important food source for most game fish in Minnesota, including [walleye](#) and northern pike. As they die off, the entire food chain is disrupted.

Recognizing these looming challenges, the DNR has begun monitoring

25 "sentinel lakes" throughout the state to better understand how rising temperatures are changing the life and chemistry within them.

Ultimately, regulators hope the data will help them mitigate the smaller, incremental changes that subtly alter the character of a [lake](#) before the more obvious and detrimental effects occur, such as the loss of fish populations and the rise of invasive species.

Knoll is researching a paper on the cultural costs of losing ice, from Swedish skating competitions and indigenous religious ceremonies to canceled fishing derbies.

"Ice is a part of the culture," she said. "When it's not there—when you used to be able to ice fish by Thanksgiving, but now you can't—you feel it."

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