Lake fish in New York are losing habitat due to two threats associated with climate change, study shows

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A team of biologists and natural resource specialists from Cornell University and Rensselaer Polytechnic Institute, both in New York, has

found evidence suggesting that lake fish in some of New York's lakes are losing habitat due to dual threats related to climate change.

In their paper published in *Proceedings of the National Academy of Sciences*, the group describes their analysis of data from water collected from browning lake water samples over a 20-year period from 28 lakes in the Adirondacks region in upstate New York.

Browning is a term that has been developed to describe changes in lake water as material builds up in it, reducing its clarity. Prior research has shown that browning can also lead to heat entrapment at the surface, which can cause reductions in oxygen levels in the water. If enough reductions occur, a lake, or part of it, can become uninhabitable to fish and/or other marine creatures. Prior research has also shown that lake surface temperatures are increasing worldwide, along with associated reductions in oxygen levels, putting the creatures that live in them at risk, particularly those that need cold water to survive.

In this new effort, the research team wondered if New York's lakes may be experiencing an increase in browning due to rising temperatures associated with climate change. To find out, they obtained and analyzed Adirondack lake water data (involving 28 lakes) over the years 1994 to 2012 created by other researchers who have been studying the lakes in that region. They also looked at another set of data created by other researchers who conducted fieldwork involved in assessing water conditions at 15 lakes in the Adirondacks in 2021.

In analyzing all the data, the team found a trend—lake surface temperatures in the Adirondacks have been slowly increasing, as has the degree of browning, particularly during the late summer—a finding that suggests reductions in habitat capable of supporting marine life as oxygen levels fall. More specifically, the researchers found that lacustrine brook trout (a cold-water fish) were facing reductions in

viable habitats due to increases in water temperature and reductions in lake oxygen levels, putting their survival at risk.

More information: Stephen F. Jane et al, Concurrent warming and browning eliminate cold-water fish habitat in many temperate lakes, *Proceedings of the National Academy of Sciences* (2024). DOI: 10.1073/pnas.2306906120