Natural selection minimizes genetic effects of human-induced hybridization

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Brook trout from Algonquin Park. Credit: Dylan Fraser

Overfishing, climate change and pollution have reduced fish populations in Canadian lakes and rivers. While hatchery-raised fish could return numbers to normal, they aren't as well adapted to their new environments, and there's been concern that the wild population is "tainted" once it breeds with its domesticated counterparts.

But new research from Concordia, published in the journal *Evolutionary Applications*, shows that after a few generations of breeding and natural selection, these hybrid fish are genetically as robust as their purely wild forefathers.

Fishing for results

Under the leadership of biology professor Dylan Fraser, the research team—which included Concordia graduate student Andrew Harbicht and research scientist Chris Wilson from the Ontario Ministry of Natural Resources and Forestry—headed to Algonquin Provincial Park, a fisherman's paradise of lakes stocked generations ago with hatchery salmon and trout.

The team transplanted combinations of wild, domesticated and hybridized populations of Algonquin Park vbrook trout to new environments. The researchers then compared survival rates and physical characteristics to determine whether hybridization affects a fish's potential to adapt after multiple generations of natural selection in the wild.

It turns out that within five to 11 generations of fish (about 25 to 50 years), the foreign genes introduced into wild populations through hybridization are removed by natural selection. That means fish populations previously bolstered by hatchery stock are, genetically speaking, indistinguishable from purely wild populations.

The implications for conservation

Fraser, himself an avid fisherman, says these results provide hope for wild populations that were initially negatively affected by human-induced hybridization.

"If we can stop the incoming flow of foreign genes while maintaining an environment similar to what was there pre-hybridization, wild populations are likely to recover—possibly in less time than previously thought," he says.

And it looks like that's true for more than just fish. Similar conclusions have recently been made about wolf species previously exposed to hybridization.

Provided by Concordia University