

High cod catches could have been sustained in Eastern Canada for decades, simple stock assessment method shows

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A simple fish stock assessment model applied to over 500 years of catch data demonstrated that if Canadian authorities had allowed for the

rebuilding of northern Atlantic cod stock off Newfoundland and Labrador in the 1980s, annual catches of about 200,000 tons could have been sustained.

A new study by researchers from the *Sea Around Us* initiative at the University of British Columbia, the GEOMAR Helmholtz Centre for Ocean Research and Dalhousie University modeled the cod population trajectory for the entire period from 1508 to 2019.

"Our assessment suggests that the biomass—the weight of the population in the water— of northern cod is currently around 2 per cent of what it was earlier," said Rebecca Schijns, lead author of the study and a researcher with the *Sea Around Us* at UBC's Institute for the Oceans and Fisheries.

"The interesting thing is that we got to these results by applying a computer-intensive but very simple [stock](#) assessment methods—known as CMSY—to catch data for five centuries. Different from previous assessments that required large amounts of information, this method basically requires only a time series of annual catches," Schijns said. "The other information that is required is available from the scientific literature, and from people with knowledge of the fishery."

Working with such a long time series allowed the researchers to reliably estimate maximum sustainable yield—or the highest catch that a fish stock can support in the long-term, given that environmental conditions remain more or less constant— for northern cod at 380,000 tons per year.

But such high catches are now only a dream.

Fisheries used lines and later traps for 400 years and were sustainable, generating catches of 100,000 to 200,000 tons per year. However, in the mid-1950s the introduction of bottom trawlers reduced northern cod

biomass to levels that could not sustain high catches.

Although Canada declared a fishery exclusion zone in 1977, fishing did not actually halt to allow the stock to rebuild. This led to a final collapse of the northern Atlantic cod fishery, which remained open to small-scale fishers even during a moratorium imposed in 1992.

And in recent years, every time northern cod populations appear to increase, the fishing quota is raised.

"As a student, I was on board a German trawler fishing off Newfoundland and Labrador in 1973 and I have vivid memories of this cod rush," said Dr. Daniel Pauly, co-author of the study and the *Sea Around Us* principal investigator.

"If artisanal fishers in the outports had been listened to when they warned about running out of cod to catch, things would be different now," said Dr. Pauly. "The scientists then monitoring the cod stock ignored small-scale fishers and relied only on the data from trawlers which, however, did not reflect the cod stock's decline because the trawlers could follow the cod further out than the small-scale fishers."

Paying attention to what local and/or Indigenous fishers have to say—and integrating centuries-old catch data into stock assessments—can help manage marine populations more effectively for the long term. This approach is also helpful to understand the total impact of fisheries on marine ecosystems, Dr. Pauly noted.

"The CMSY method proved to be useful to assess the data-rich cod stock, but it also works with stocks for which we have only a catch data. This method is able to provide more reliable estimates of stock status by incorporating past data-limited periods," Dr. Pauly said.

The CMSY method offers researchers, fisheries managers and policymakers the possibility of taking a comprehensive look into the status of the world's most important fish stocks.

"Ancient catch data exist for several stocks, such as Bluefin bluefin tuna in the Mediterranean, which started being commercialized around the 8th century, Atlantic herring in the Baltic Sea, whose fishery started in the 13th century, and Atlantic salmon in the Celtic Sea, whose fishery started in the 14th century," said Dr. Jeffrey Hutchings, co-author of the study and a researcher at Dalhousie University. "There is a real opportunity to use these data to design policies that prevent collapses similar to that of the cod stock."

More information: Rebecca Schijns et al, Five centuries of cod catches in Eastern Canada, *ICES Journal of Marine Science* (2021). [DOI: 10.1093/icesjms/fsab153](https://doi.org/10.1093/icesjms/fsab153)

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