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Warming oceans may cause the world's fish to shrink, study suggests

UBC study finds fish could be up to 30% smaller in 30 years due to climate change

By [Matt Meuse](#), CBC News | Posted: Aug 29, 2017 12:15 PM PT | Last Updated: Aug 29, 2017 12:15 PM PT



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A new UBC study suggests that increasing ocean temperatures could be causing fish to shrink as they struggle to breathe effectively in the warmer water. (Jean-Pierre Muller/AFP/Getty Images)

As climate change continues to warm the world's oceans, a new study suggests the fish that inhabit them may, in response, shrink in size as much as 30 per cent in the next 30 years.

The study, published in *Global Change Biology*, found that fish size drops about 30 per cent for every degree of ocean temperature increase. Climate modelling used in the study predicts a "moderate" average ocean temperature increase of about one degree within 30 years.

Daniel Pauly, a professor at UBC's Institute for the Oceans and Fisheries and one of the study's co-authors, says the trend is already being noticed in areas like the North Sea.

"It is happening on a grand scale throughout the world now," Pauly said.

Gill size restricts growth

The root of the problem, Pauly says, is that fish are cold-blooded. They can't regulate their own body temperature, which means their body temperature increases along with the water they live in.

As body temperature increases, metabolic processes speed up, which increases oxygen requirements. But warmer water holds less oxygen, making it harder for fish to breathe.

"It's like us breathing through a straw," Pauly said.

To compound the problem, fish breathe through gills, which are essentially two-dimensional oxygen-exchanging surfaces. Two-dimensional surfaces do not scale at the same rate as three-dimensional objects, which puts an upper limit on how large a fish can get before it is not able to breathe effectively — and if oxygen requirements increase and availability decreases, that size limit shrinks.

Effects already being felt

Pauly says the effects of warming oceans can already be seen not just in decreasing fish sizes, but in the gradual displacement of fish from their native habitats as they move north and south from the tropics in search of colder, more oxygen-rich water.

"You have a species replacement on most coastlines," he said. "There are fish that you don't know appearing all of a sudden, but in the tropics, there's no species replacement. They simply lose their fish gradually."

But fish that require specific habitats — such as B.C.'s salmon, who return to their birth streams to spawn — can't just pick up and move. These are the species Pauly says will be most likely to shrink in size as oceans warm.

That could have ramifications for entire ecosystems. Pauly says fish usually need to eat other fish about a third of their own length, as anything smaller tends to not be worth the effort.

"It's like if you were to get a meal out of peanuts or something that would be scattered in the room," he said. "You would spend as much energy collecting the food as it provides you with."

*With files from **Polly Leger** and CBC Radio One's **The Early Edition**.*

Link: <http://www.cbc.ca/news/canada/british-columbia/shrinking-fish-study-1.4266962>