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## Climate change will force fish north and south to find cold water: study

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Climate change will cause a major redistribution of fish and other marine species around the world as they leave their native habitats in search of cooler waters, says a new study.

The migration is expected to see certain cod stocks off the eastern United States cut by 50 per cent over several decades, with some moving into Canadian waters.

The paper paints a distressing picture of oceans that are dramatically reshaped as hundreds of commercially harvested fish species migrate toward the cooler polar regions while others are simply wiped out.

Daniel Pauly, a marine biologist at the University of British Columbia, said that could mean exotic species like the Mexican jumbo squid become mainstays in Canadian waters, while other native stocks head north.

"We will be invaded by some species that were before in Mexico and California," Pauly, who co-wrote the report, said from a conference in Bath, England.

"You have this major reorganization and in the polar areas you have a wholesale extinction of the specialized fauna that is linked to the ice."

The findings, slated for publication on Friday in the journal *Fish and Fisheries*, use new computer models to predict the distribution of over 1,000 fish stocks and invertebrates as temperatures rise.

Researchers used predictions endorsed by the Intergovernmental Panel on Climate Change that are related to temperature increase, salinity and ocean current patterns to project where fish will be over the next several decades.

Lead author William Cheung said they discovered that on average, fish will likely travel more than 40 kilometres per decade as they seek better habitats.

That means the U.S. cod population could drop by half by 2050, but it wasn't clear how much of that stock would end up in Canadian waters.

Northern countries like Norway, Iceland and Russia could be the big beneficiaries of the phenomenon as species like cod and herring migrate to their waters.

But Cheung — a former researcher at the University of British Columbia who is now at the University of East Anglia in England — warns that poorer countries in the tropics that rely heavily on the fishery will be hard hit if their primary species head north to escape

warming waters.

"If you're a fisherman in the tropics, you will suffer most because there will be a major reduction in the catch potential," he said from Chicago where he is presenting the paper on Friday.

"The impacts will be particularly strong on those tropical, developing countries."

Fish adapt to changing environments up to a certain point and then will migrate in search of a more hospitable habitat. They are particularly sensitive to temperature.

Cheung said there are already examples of the global redistribution of fish stocks brought on by climate change.

The giant Mexican squid has been found off Oregon and fishermen in the area have reported having to travel north to find catches of certain species of cod and stable fish.

Species in the northern and southern polar regions are facing the greatest threat because they have nowhere to go as water temperatures increase, Pauly said.

For example, krill feeds on algae that grows on ice, but it will see its food source disappear if waters warm to a certain point. Striped rock cod in the Antarctic and a type of lobster in the Southern Ocean are at particular risk of extinction.

"Animals can adapt by going to a different place or by going deeper but if they cannot adapt anymore we go into extinction phase," he said.

"If we don't solve the problem of greenhouse gas emissions then there will be another phase of widespread extinction, but for species that are tied to the ice that phase has already begun."

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