

Some marine species more vulnerable to climate change than others

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Five fish most at risk due to climate change



Toli shad



Spotted grouper



Yellowbar angelfish



Eastern Australian salmon



Sohal surgeonfish

Source: Jones, Miranda C., and William W. L. Cheung.
"Using fuzzy logic to determine the vulnerability of marine species to climate change."
Global Change Biology, 2017. doi:10.1111/gcb.13869

Researchers analyzed the biological characteristics of 1,074 and found that the species most at-risk include the Eastern Australian salmon, yellowbar angelfish, toli shad, sohal surgeonfish and spotted grouper. Credit: UBC

Certain marine species will fare much worse than others as they become more vulnerable to the effects of climate change, a new UBC study has found.

After analyzing the biological characteristics of 1,074 [marine fish](#) and shellfish, the study identified 294 [species](#) that are most at-risk due to [climate](#) change by 2050. Species most at-risk include the Eastern Australian salmon, yellowbar angelfish, toli shad, sohal surgeonfish and spotted grouper.

"We hope that this study will highlight the marine species that are most in need of management and conservation actions under climate change," said William Cheung, associate professor in the Institute for the Oceans and Fisheries and director of science for the Nippon Foundation - UBC Nereus Program.

As part of the study, UBC researchers created a [database](#) that examines the long-term vulnerability of marine species that are important to fisheries around the world. The database was developed with an approach that uses "[fuzzy logic](#)" to combine information about the biological sensitivity of these species to environmental changes as well as their projected exposure to changes in the ocean including temperature and oxygen and acidity levels.

"How susceptible are Atlantic cod to climate change compared to skipjack tuna? How about smaller fishes such as anchovy and pilchard?" asked Cheung. "We know that some characteristics of the species make them more sensitive and less resilient to climate change."

The factors that restrict whether fish or shellfish can adapt to climate change include their preferred temperature range, restrictions on their geographic range, how long it takes to reproduce, and specific habitat requirements such as needing kelp or coral reef to survive.

"Eastern Australian salmon is highly vulnerable because their distribution is limited to shallow coastal and estuarine waters in southern Australia and New Zealand," said Miranda Jones, the study's lead author,

who was a postdoctoral fellow in the Institute for the Oceans and Fisheries when the study was underway. "The species lives in habitats that are exposed to large changes in ocean conditions and have limited scope to avoid these changes."

In Canada, sockeye salmon, along with the alewife, Pacific bonito, and sharks such as the porbeagle and thresher, are identified as at risk to climate change impacts. In contrast, some species such as the Pacific sanddab, blue crab and Pacific sandlance have less vulnerable biological characteristics and live in areas that are relatively less affected by climate change.

The study "Using fuzzy logic to determine the vulnerability of [marine species](#) to [climate change](#)" was published today in *Global Change Biology*.

More information: Miranda C. Jones et al, Using fuzzy logic to determine the vulnerability of marine species to climate change, *Global Change Biology* (2017). [DOI: 10.1111/gcb.13869](https://doi.org/10.1111/gcb.13869)

Provided by University of British Columbia

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