

Climate change 'double whammy' could kill off fish species

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Many commonly-eaten fish could face extinction as warming oceans due to climate change increases pressure on their survival while also hampering their ability to adapt.

New research suggests that [fish](#) like sardines, pilchards and herring will

struggle to keep pace with accelerating [climate change](#) as warmer waters reduce their size, and therefore their ability to relocate to more suitable environments.

The study, published in *Nature Climate Change*, also provides the first evidence to counter the scientific theory that decreased movement will result in more species, by suggesting the opposite is true. This means many species will also be less able to evolve to cope with [warmer temperatures](#), increasing their risk of dying out.

Serious implications

Professor Chris Venditti, an [evolutionary biologist](#) at the University of Reading, and co-author of the study, said: "Warming waters are a double whammy for fish, as they not only cause them to evolve to a smaller size, but also reduce their ability to move to more suitable environments.

"Our research supports the theory that fish will get smaller as oceans warm under climate change, but reveals the worrying news that they will also not be able to evolve to cope as efficiently as first thought. With sea temperatures rising faster than ever, fish will very quickly get left behind in evolutionary terms and struggle to survive.

"This has serious implications for all fish and our food security, as many of the species we eat could become increasingly scarce or even non-existent in decades to come."

The study, led by the Center for Advanced Studies in Arid Zones (CEAZA) in Chile and the University of Reading in the UK, used statistical analyses of a large dataset of globally distributed [fish species](#) to study their evolution over the past 150 million years. The study provides first solid evidence of how historical global temperature fluctuations have affected the evolution of these species.

It focused on Clupeiforms—a highly diverse group of fish found all over the world, which includes important species for fisheries, such as anchovies, Atlantic herring, Japanese pilchard, Pacific herring, and South American pilchard. However, the findings have implications for all fish.

Fish have thus far only had to deal with a maximum average ocean temperature rise of around 0.8°C per millennium. This is far lower than current warming rates reported by the National Oceanic and Atmospheric Administration of 0.18°C per decade since 1981.

An unexpected finding

The findings support the long-held expectation among scientists that fish will generally get smaller and move less as world warms, due to having to increase their metabolism and therefore needing more oxygen to sustain their body functions. This will impact fish species because larger fish are able to travel longer distances owing to their greater energy reserves, whereas smaller fish are less able to seek out new environments with favourable conditions as the climate changes.

However, the research contradicts the assumption that an increase in smaller fish will mean more new species emerging because of concentrating genetic variations within local areas.

Instead, the scientists found warmer waters would lead to fewer new [species](#) developing, robbing fish of another of their key weapons to cope with [climate](#) change.

Overfishing has also been found to make fish smaller in size, so the new study adds to the list of pressures they face as a consequence of human actions.

More information: Jorge Avaria-Llautureo et al, Historical warming consistently decreased size, dispersal and speciation rate of fish, *Nature Climate Change* (2021). [DOI: 10.1038/s41558-021-01123-5](https://doi.org/10.1038/s41558-021-01123-5)

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