

Shape up quickly—applies to fish, too

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Erik Sandblom with a couple of shorthorn sculpins caught off Disko Island in Greenland. Credit: Photographer: Fredrik Jutfelt

Fish can live in almost any aquatic environment on Earth, but when the climate changes and temperatures go up many species are pushed to the limit. The amount of time needed to adjust to new conditions could prove critical for how different species cope in the future, reveals a new study from researchers at the University of Gothenburg, published in the scientific journal *Proceedings of the Royal Society B*.

Climate change continues apace thanks to increasing levels of greenhouse gases in the atmosphere. The greenhouse effect has led not only to an increase in [average temperatures](#) but also to more [extreme weather conditions](#), such as major heatwaves.

More than just survival

In contrast to birds and mammals, fish are ectothermic, which means that their body temperature fluctuates in line with the temperature of their surroundings. Fish that live at different temperatures can generally do so because they are able to optimise their bodily functions to that particular temperature. Changes in the [ambient temperature](#) can therefore disrupt this balance.

"Previous research has focused almost exclusively on whether different species will be able to survive an increase in temperature or not," says Erik Sandblom, researcher at the University of Gothenburg's Department of Biological and Environmental Sciences. "We were interested in finding out how species that survive actually manage to do so, how long it takes and the limitations they have to contend with during the acclimation period."

Most vulnerable during the first few weeks

In the published trial the researchers simulated a temporary [heatwave](#) and then monitored how the physiology of the shorthorn sculpin, a common marine bottom-dwelling [fish species](#), was affected. The results show that during the first week of the heatwave the fish were severely restricted and were forced to forego high-energy processes such as eating or swimming in order to survive.

"During the first few weeks of a sudden heatwave the fish do survive but

are vulnerable to events that would otherwise pass without problem. Dealing with extra challenges such as escaping from predators or coping with disease can be fatal."

Amount of time decisive

The trial took eight weeks and the results show that the physiological load reduces with each passing week as the fish gradually manage to reset their bodily functions and acclimate to the new environment. The results also show that the "cost" to the fish correlates closely with how long it takes to adjust. In a future that is both warmer and more variable, it is therefore likely to be important not only to adjust to new conditions, but to do so quickly.

More information: *Proceedings of the Royal Society B*, [rspb.royalsocietypublishing.org ... 94/20141490.abstract](https://royalsocietypublishing.org/doi/10.1098/rspb.2014.1490)

Provided by University of Gothenburg

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