

Contemporary warming of a mountain lake inhabited by a glacial relict, the Irish Arctic char.

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Abstract

The fate of lacustrine fish under future climate change is concerning, given the sensitivity of these ectothermic species to ambient temperatures. The Arctic char (*Salvelinus alpinus* L.) is a salmonid with a Holarctic distribution yet is considered a relict species at temperate latitudes, found only in sufficiently cold, deep lakes at higher altitudes. Here we combine *in-situ* lake temperature observations, a 1-D hydrodynamic model and a multi-decadal climate reanalysis to show evidence of changing contemporary thermal dynamics in Lough Bunaveela, a mountain lake with a char population near the southernmost limit of the species' distribution. Since 1979, minimum annual lake temperatures have increased at a rate of ~ 0.4 °C per decade and mean winter temperatures have increasingly exceeded the documented upper thermal threshold for high egg survival of char (> 5 °C). These findings, taken in conjunction with sustained warming trends, do not augur well for the fate of coldwater lake fish in a changing climate.