**Proposal for a Contribution to the special issue on “Ecological and Evolutionary Insights from Very Long-Term Studies” to be published by Ecology Letters in 2024**

Proposed contribution type: Letter

Corresponding author name: Max Lindmark/Jan Ohlberger

Corresponding author email: max.lindmark@slu.se

Preliminary list of coauthors: Max Lindmark1, Jan Ohlberger2, Anna Gårdmark1

Institutional affiliations of all coauthors: 1Swedish University of Agricultural Sciences, Department of Aquatic Resources, Sweden, 2 School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA 98195, USA; 3 Washington Department of Fish and Wildlife, 1111 Washington St. SE, Olympia, WA 98501, USA

Proposed title: Warming increases body growth in cold but reduces growth in warm populations of a common fish

**Proposal (expected length < 300 words) which should (a) briefly describe the long-term dataset(s) that you are analyzing, including study site location, observations, experimental treatments if relevant, and the years involved, (b) succinctly explain why the proposed manuscript would be novel, important, and of general interest in ecology and (c) explicitly state the importance of very long-term data for this study.**

**a)** We compiled a novel dataset of individuals’ growth history (length at each age) of Eurasian perch (*Perca fluviatilis*) from annuli rings on operculum bones (215,975 measurements across 41,212 individuals). This contains individuals from 12 populations along the Baltic Sea coast (56.1°-65.9° latitude). The longest time series starts in 1953 (average length 32 years). Temperature data were compiled from 3 sources with complementary strengths: ERSST data (long time series, low spatial-temporal resolution), temperatures measured during fishing (long time series, low temporal resolution, co-sampled with the fish), and daily temperatures from data loggers (short time series, high temporal resolution, proximity to samples). Two of the monitoring areas have been artificially warmed by nearby nuclear power plants, resulting in whole-lake warming ‘experiments’, and large temperature gradients in our data, with average growth-season temperatures of 7°C-23°C.

**b)** We analyzed effects of warming on body growth within a fish species during xx-yy years, across a wide range of temperatures experienced in the wild. General rules have been proposed for such relationships, but rarely tested in the wild over time series long enough to cover climate change or across such a large spatial and temperature gradient as herein. We find a non-linear relationship: body growth increases with warming in cold, but instead decreases in warm, populations of a common fish species. This is an important contribution to our understanding of climate change effects on organisms’ growth and size in the wild, which are key for predictions in both applied and fundamental ecologicy, on e.g. food production and food web efficiency.

**c)** Our study and the long-term data used is perfectly suited to address key knowledge gaps regarding the impacts of climate warming on growth. Because the species is stationary, we can link local temperatures to individual growth data. The time series are very long – enough to cover climate warming – and have unusually large temperature and spatial contrasts that aid detection of patterns in trait responses across populations.

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