***Manuscript***

**Larger but younger fish when growth compensates for higher mortality in heated ecosystem**

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Dear Editor,

I am submitting the manuscript ‘*Higher mortality rates leave heated ecosystem with similar size-structure despite larger and younger fish*’ for consideration to be published as an article in *PNAS*.

These predictions generally stem from experiments, and to a lesser degree, observational analysis. Semi-controlled ecosystem-scale warming experiments, are, however, extremely rare. Yet, they provide unique insight into potential impacts of climate change.

In this study, we use a lake heated by cooling water from a nuclear power plant for more than two decades (~+8 warmer than the reference area) as a large-scale experimental study system. We analyse time series of growth-increment biochronologies and catch data of a common freshwater fish (12658 length-at-age measurements from 2426 individuals in 256 net deployments), to quantify .

Contrary to common predictions on the effects of warming on size-at-age and growth, we found that body size was larger for all ages and growth faster for all sizes in the heated area, compared to the reference area. However, despite these changes in growth and size, the size-spectrum was only slightly larger in the heated area due to the elevated mortality rates.

Our findings reveal that universal predictions about the shrinking of ectotherm organisms may be too simplistic since they typically focus on individual-level changes (body growth rates) and not population-level processes (mortality and demography). It also suggests that mortality may be similarly important as a driver size structure-changes with warming as body growth rates. Hence, in order to understand warming-induced changes in the size-structure of species, it is critical to account for how climate change alters *both* mortality and growth rate, and these changes may depend on each other. This knowledge is critical for mechanistic climate assessments of aquatic ecosystems.

We are grateful for your consideration of our manuscript, and we look forward to hearing from you.

Sincerely,

Max Lindmark, on behalf of all co-authors

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