Dr. Steve Long,

Editor-in-Chief

Global Change Biology

Dear Dr. Long,

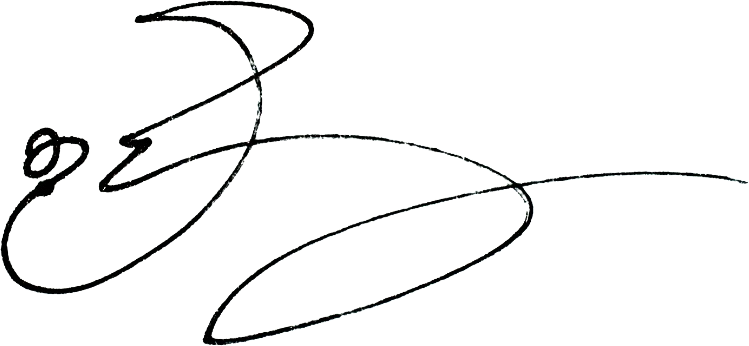
Please find attached our article entitled “**Biological sensitivities to downscaled climate change projections in the California Current Marine Ecosystem**,” for submission as a ***Primary Research Article* in Global Change Biology.** In this work, we combine experimental information along 3 axes of anticipated environmental change (temperature, CO2, and oxygen) with downscaled climate projections along the Pacific coast of North America, for 12 taxa of key concern. We find a range of positive to negative sensitivities in physiological responses within and among species, and find that cumulative impacts will be greatest in the inner shelf and the northern part of the model domain (the Pacific Northwest). We show that sensitivities are generally more negative in *survival* responses compared to other physiological rates not directly related to population demography. We further apply a physiological model that combines oxygen and temperature sensitivities (the Metabolic Index) to two coastal species, and find that combined sensitivities lead to substantial loss of aerobic habitat in both species by year 2100. Our work projects substantial and specific ecological change in this region in the next 80 years, including regional loss of canopy-forming kelp, changes in nearshore food webs caused by declining rates of survival among red urchins, Dungeness crab, and razor clams, and loss of aerobic habitat for anchovy and pink shrimp.

We believe this work will be of interest to a broad readership, spanning experimental biology, ecological physiology, biogeography, marine ecology, ocean climatology, and climate change biology. Our work provides species-specific sensitivities to all three leading axes of ocean change and makes use of recent downscaling efforts in modelling, bringing the scale of projection (as low as 1.5 km) closer to the scale of organismal experience. Our work demonstrates several novel approaches towards combining disparate experimental results towards estimating climate sensitivity, and strengthens the case for filling specific information gaps with experiments focused on fitness-related responses and those that can parameterize the metabolic index model.

The main text is 6375 contains 5 Figures and 1 Table. No version of this work is submitted elsewhere.

Thank you for your consideration,

Jennifer Sunday



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