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TITLE: Potential consequences of climate change for primary production and fish production in large marine ecosystems

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ABSTRACT:

Existing methods to predict the effects of climate change on the biomass and production of marine communities are predicated on modelling the interactions and dynamics of individual species, a very challenging approach when interactions and distributions are changing and little is known about the ecological mechanisms driving the responses of many species. An informative parallel approach is to develop size-based methods. These capture the properties of food webs that describe energy flux and production at a particular size, independent of species' ecology. We couple a physical-biogeochemical model with a dynamic, size-based food web model to predict the future effects of climate change on fish biomass and production in 11 large regional shelf seas, with and without fishing effects. Changes in potential fish production are shown to most strongly mirror changes in phytoplankton production. We project declines of 30-60% in potential fish production across some important areas of tropical shelf and upwelling seas, most notably in the eastern Indo-Pacific, the northern Humboldt and the North Canary Current. Conversely, in some areas of the high latitude shelf seas, the production of pelagic predators was projected to increase by 28-89%.

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