Tuna species productivity and size may decrease due to climate change

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Understanding how climate change and fishing pressure affect major commercial species productivity and body size is key to being able to adapt and ensure the future sustainability of the fisheries.

In this context, a team from Spain's Ciencia y tecnología marina y alimentaria (AZTI) has coordinated a study, published in *Global and Planetary Change*, in which the projections in tuna species and swordfish productivity and body size in the future under different climatic and fishing scenarios have been analyzed. A model that includes many mechanisms that represent the population dynamics of different species and the competition between them has been used for this purpose.

"We wanted to know how the climate change and fishing pressure is going to impact some of the most commercially important species in order to make decisions to ensure the future of the resources," says Maite Erauskin-Extramiana, the AZTI researcher who led the study.

Alteration in productivity and body sizes

The study concludes that climate change and fishing pressure will affect main commercial tuna species and swordfish productivity in the future. On average, analyzed stocks are projected to decrease their global potential productivity by 36% by 2050. The results suggest that high trophic level species will be more impacted by climate change than by fishing pressure under the assumption that they remain close to their maximum sustainable yield levels, or current fishing pressure.

"Only the Pacific bluefin shows a slight increase in the future. Five species, Atlantic and Southern bluefins, swordfish, bigeye, and albacore are estimated to decrease in biomass and size at different rates" says Erauskin-Extramiana.

In addition, an overall body size decrease of 15% has been projected by the model by 2050 due to climate change. However, there are also stocks such as yellowfin tuna and Pacific skipjack tuna where, on the contrary, increases in size are projected. Fish price and demand are partially driven by body size, and therefore, climate change and fishing may

potentially reduce revenues for the fishing industry even for the catch of stocks that are estimated to increase productivity.

"The fishing industry should adopt adaptation measures to the changing climate by increasing the value of fish through sustainability certifications and reducing fuel consumption and time at sea with higher digitalization. Reducing fuel consumption can be also considered a mitigation measure for climate change since it comprises 5% of the total globally fishing used fuel amount and would reduce CO_2 emissions," notes Erauskin-Extramiana.

"The results of any model must be taken with caution due to the limitations and uncertainties attached. However, the direction and magnitude of the projected changes highlight the possible upcoming future in absence of decision-making," she concludes.

More information: Maite Erauskin-Extramiana et al, Implications for the global tuna fishing industry of climate change-driven alterations in productivity and body sizes, *Global and Planetary Change* (2023). DOI: 10.1016/j.gloplacha.2023.104055

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