Food webs supporting larvae of Southern Bluefin Tuna in their eastern Indian Ocean spawning region

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Abstract

Southern bluefin tuna (Thunnus maccoyii, SBT) range broadly in high latitudes of the southern hemisphere but spawn only in a small area of tropical waters in the eastern Indian Ocean, directly downstream of the Indonesian Throughflow (ITF). In January-March 2022 (peak spawning season), the BLOOFINZ (Bluefin Larvae in Oligotrophic Foodwebs, Investigations of Nutrients to Zooplankton) program conducted sampling and experimental studies in this poorly studied region to better understand biogeochemical and food web characteristics of the larval tuna habit and their potential vulnerabilities to climate change. This presentation will highlight key findings of the investigation relating to lower-level food web function: 1) a picophytoplankton-dominated nitrogen-recycling ecosystem of intermediate productivity; 2) balanced growth and grazing losses of phytoplankton; 3) nitrogen-fixation support for an unusually high ratio of export:productivity; and 4) enhanced food-web transfer efficiencies from mixotrophy and larval feeding selection of appendicularian prey. Despite warming and stronger water-column stratification, we found significantly improved conditions for larval SBT feeding and growth relative to a prior study more than 3 decades earlier. Our results illustrate that predictions of climate change impacts on higher level consumers in the Indian Ocean need to consider the complexities of pelagic food web interactions which do not necessarily maintain fixed relationships to the physical environment.

Keywords: larval tuna, productivity, nitrogen cycling, food webs, grazing, export, feeding selectivity, climate change

Endorsed Project Number: IIOE2-EP46