05 December, 2022

To: The Editors of Fish & Fisheries,

Dear Editors,

We are pleased to submit our manuscript ‘Trait-based analyses reveal global patterns in diverse albacore tuna diets’ for publication as an article in Fish & Fisheries. Pelagic ecosystems are among the last frontiers on Earth, both politically and ecologically, and these ecosystems face significant stressors under climate change. Many are projected to shift to novel ecosystem states by 2100. Within pelagic systems, highly migratory predators such as tunas and billfishes contribute to high-value and extensive international fisheries. The success of these species is tied to their seasonal, basin-scale migrations to exploit food resources for growth, and warmer waters for reproduction. Climate change and novel ecosystem states could lead to mismatches between predator distributions and resources, which likely impacts fisheries production.

Our ability to forecast these changes hinges upon a better understanding of past shifts in predator resource use. Using albacore (*Thunnus alalunga*) as a case study, our paper seeks to move beyond descriptive diet analyses to identifying non-taxonomic predictors for trophic relationships in highly-migratory pelagic predators and commercially valuable species. To do this, we uniquely reconstruct historical resource use for albacore tuna globally from gut content datasets from recent published papers up to 2020 and long-archived grey literature dating back to the 1880’s. We digitised and centralised this historical information and data on the resource use of a commercially valuable pelagic predator, and through this paper we hope to render this information accessible to a broad audience. Performing a meta-analysis of albacore diet composition through time and across ocean basins reveals greater biodiversity in albacore diets than previously reported. Crucially, we use information on four habitat use traits to synthesise over 308 prey species into just 7 functional trait guilds of prey consumed, providing important geographic baselines to track changes in resource use under climate change.

Finally, we combine traditional taxonomic information and new trait information on prey species in a reproducible,model-based framework that highlights the utility of using non-taxonomic generalisable parameters (traits) to model predator resource use. Our results indicate that trait-based tools offer powerful frameworks for tracking foraging responses to changing environmental and ecological states, and may help solve key knowledge gaps in food web and species distribution modelling efforts. We present original work carried out by the authors and acknowledge the requirements for publication in Fish & Fisheries.

Sincerely,

On behalf of all co-authors,

Natasha Hardy