*4th May 2023*

Dear *Proceedings B* Editorial Board,

We wish to submit our manuscript “**Trophic distribution of nutrient production in coral reef fisheries**”to be considered for publication as an article in *Proceedings B*. Tropical coral reefs sustain important fisheries, with diverse species and trophic groups providing nutritious catch for hundreds of millions of people. However, our understanding of fisheries ecology is based on static snapshots of fish biomass, overlooking effects of biomass production rates and nutrient content on the quality and quantity of reef seafood.

To address this gap, we evaluated associations between fish growth rates (i.e. biomass production) and nutrient content of 541 reef fish species, and use these two metrics to quantify nutrient productivity. We find that size-linked nutrients such as calcium and zinc correlated with species growth rates, such that **fast-growing mobile invertivores had the highest rates of nutrient production**. Using underwater surveys from 333 reefs in four countries, we then examined variation in the trophic structure of three fishery services - standing biomass, biomass production, nutrient production - along fishing and benthic gradients. We show that **low-trophic-level herbivores dominated fishery services**, particularly calcium, iron, and zinc production (>96% of reefs). Such bottom-heavy fishery services reflect the importance of lower trophic level species in transferring energy and nutrients through reef food webs. Posterior effects in Bayesian Dirichlet models indicated that bottom-heavy trophic patterns were likely in both coral- and algal-dominated habitats, and only disrupted at openly fished reefs that had extreme biomass depletion (<100 kg ha-1).

We believe that the findings are well-suited to *Proceeding B’s* focus on ecology, conservation, and global change. Our new metric – **nutrient productivity** – is a major interdisciplinary advance, combining ecological and fisheries theory with aspects of food systems and human health. Our analysis includes reefs with distinct habitat regimes (hard coral, algae, rubble) and fisheries management rules (no-take, gear and area restrictions), thus providing insights into how diverse coral fisheries can be managed to sustain tropical food and nutrition security.

Our manuscript main text is ~7,000 words (including references) and 3 figures, and is not under consideration elsewhere. We can recommend four experts in coral reef ecology and tropical fisheries as reviewers: Drs Adel Heenan, Nicolas Loiseau, and Rene Abesamis.

Yours sincerely,

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