Associate Editor  
Board Member: 1  
Comments to Author:  
Thank you for your submission to Proceedings B.  
  
The manuscript has been assessed by two expert reviewers and myself.  
  
The reviewers and myself all found the manuscript to be of high quality and of high interest within the field. One reviewer has questioned the breadth of topic appeal across the broader PRSB readership. Concerns were also raised around the strength of the findings based on literature values and community snapshots.  
  
I believe that the topic is of general appeal to a broader ecological audience and this is evidenced through the cross-disciplinary approach of the questions and research approach. Perhaps more could be done to frame and discuss the topic in a wider context of investigating ecological services across productivity and trophic gradients.  
  
I do think that it is import to address concerns about the leap from snap-shot community surveys to calculating fish productivity, turnover, and nutrient content, based on literature values. The authors could better speak to the efficacy of this approach, as well as acknowledge and discuss some of its caveats.

Thank you for your positive review of our manuscript. We have expanded the first two introductory paragraphs to place our study in a broader ecological context, including the importance of large-scale comparative analyses in assessing human and environmental drivers (L39-55). We have also added a new standalone section to the Discussion that considers the limitations of snapshot underwater surveys in estimating dynamic rates, but also notes that this remains a widely used and effective approach in empirical coral reef science (L491-502).

Reviewer(s)' Comments to Author:  
  
Referee: 1  
  
I enjoyed reading this manuscript. It is well written and interesting (to me, given my area of study). The analyses are sophisticated, and the interpretation of the data is generally sound (within the confines of the study design, see below). Therefore, I have little to say about the technical aspects of the manuscript, other than one substantive concern: at its core, the approach to this study was to take count data from in situ visual surveys and use published/grey literature values to extrapolate all the way up to fish productivity, turnover, and nutrient content. That’s a big leap to go from “snapshots” of fish community structure to calculating rate-based processes. As such, I would like to see a section in the Discussion that more clearly acknowledges the limitations of this approach and the associated interpretation. I’d also like to see the authors strive for less self-citation throughout the manuscript.  
  
On a larger note, I question whether this manuscript will be of general interest to the broad readership of PRSB. That is for the editorial team to decide.

##### Thank you for your helpful comments. We agree that scaling fish observations to dynamic processes remains a challenge in ecology, though recent studies have considerably advanced our ability to use – and test – measures of dynamic processes in fish assemblages (Morais & Bellwood 2018, Schiettekatte et al. 2020, Smallhorn-West et al. 2023). We have added a new paragraph that explains difficulties of using snapshot surveys to estimate dynamic processes, and noting that empirical approaches such as ours should be contrasted with mechanistic ecosystem models (L491-502, L514). We also add context on the use of these metrics in the Methods (L138, L153). The new discussion paragraph is a standalone section, clearly drawing attention on these limitations.

##### We have also revised our citations to ensure stronger representation from scientists outside this author team (e.g. new refs 4-8, 40; removed 2 of the first-authors’ papers) Technical comments: -- Please use continuous line numbering when submitting manuscripts to journals – doing so makes it much easier for reviewers to provide pointed and meaningful feedback. Thank you.

Apologies for this oversight. Line numbers have been added.  
  
-- Please more clearly delineate when you are talking about human consumption of fishes and impacts to human health vs. environmental/ecological responses. This is especially important given the broad readership of PRSB.

Thanks for raising this important distinction. We have clarified throughout where our results refer to human consumption of fishes, e.g. “*maximising nutrient yields for people* ***consuming reef seafood***” (L489).  
  
-- Please format all figures and tables per PRSB style, and check to make sure that sufficient information is provided in the figure legend.

Figures and tables are formatted according to PRSB guidelines. We have revised figure captions to ensure sufficient information is provided.  
  
Referee: 2  
  
The authors explore the nutrient productivity of coral reef fish using data from four different countries. They combine biomass, growth and nutrient concentration data to explore how the trophic composition of reef fish communities impacts on the potential nutrient productivity of coral reefs.  
  
In this study the authors provide an important step forward for research in this area. They build on studies linked to the nutrient content of standing biomass in fish communities by exploring how productivity of these communities influences the potential nutrient yield from local fisheries and how different fishing regimes and habitat conditions may modify these nutrient yields. In light of the increasing interest in fisheries to support micronutrient deficiencies the findings of the paper are important and timely.  
  
I found the paper well written and extremely thorough in its analysis. My comments primarily revolve around increased clarity in some areas to support the general readership of this journal. These comments can be found in the attached pdf.  
  
I recommend publication once these minor comments are addressed.

##### Thank you for your positive assessment and recommendation to publish. We have addressed all minor comments in your pdf, noted below.

L48: I do not agree with this statement - in the abstract you imply that you are linking nutritional quality to value and productivity but I dont think this is a standard definition of nutritional quality. I would say a more common definition is: "Nutritional quality is defined as the value of the product for the consumer's physical health, growth, development, reproduction and psychological or emotional well-being." As a result, this statement implies that there have been no analyses of fish biomass linked to nutrient content - which is not true - the authors have written some themselves. I would either be clear about how you are defining nutritional quality here in the intro or change the wording of this sentence.

##### Thank you – this sentence was poorly expressed in the original submission. We have changed the wording of this sentence to emphasise that biomass **alone** cannot be used to assess nutritional quality, and it **can** be used without social aspects of fisheries (L58). As a result, integrating biomass, production and nutrients together can improve understanding of fisheries contributions to people. We have also edited the abstract to clarify that nutrient concentration can represent the nutritional value of reef fish (L21).

L108: Which countries have such low replication? Does it have much impact on your results through high variability?

##### Belize had the highest replication and smallest transects, whereas Madagascar had the lowest replication and largest transects. We have added this detail to the Methods (L119). These sampling differences were also associated with variability in fish abundance, for example, with Belize having higher variance in transect-level counts than Madagascar (Solomon Islands and Fiji in between both). However, to minimize variance influencing model outputs, all analyses were based on site-level mean values. We have added this detail to the Methods (“*thus reducing sampling variability arising from the number and size of transects*”) (L187).

L126: Is this per nutrient? As I see in the results you report results that are above 100%- is this the summed percentage across nutrients?

##### Yes, each nutrient is capped at 100%, if it exceeds recommended intakes. Nutrient density is summed across nutrients, so can exceed 100%. This has been clarified at L146 (Methods).

L151: I would use the original reference for this - the Belton paper is citing this data from an earlier paper by Edwards et al 2019.

##### Thanks. We have updated the reference.

L212: I find this very hard to follow. Do do you mean that if a nutrient concentration is related to growth it is also related to body size? Please clarify.

##### We have clarified this result, now saying “*For example, nutrients that vary strongly with body size [3] (Fig. S1) were more strongly correlated with Kmax, which also varies with size*.” (L238)

L219: Would be helpful to have a greater differentiation of the shading between sessile and mobile invertivores as hard to identify on figure A. For example, in the results text you state: “The fastest growing species (Kmax > 1) were dominated by planktivores and sessile invertivores, most of which had nutrient densities below 200%, and only a few mobile invertivores were both highly nutritious and fast growing (Fig. 1a).” And yet from looking at the shading in the plot it looks like there are more faster growing mobile invertivores than sessile invertivores - but that might just be the difficulty of differentiating the shading.

##### Your interpretation is correct - this was an oversight in our results text. There are 14 species of mobile invertivore with Kmax > 1, and 10 species of sessile invertivore. We have corrected this result to note mobile invertivores as the fastest-growing species, and included details on number of species (L233). We have retained the shading, as this was a text error that was more clearly presented in the figure.

L238: I would clarify that this is a min value for one site in madagascar and similarly a max value for one site in fiji. The way it is written suggests this is the value for the whole of madagascar and fiji respectively.

##### Thanks, added.

L243: It would help if you clarified you naming of this group and kept it consistent throughout as it is currently confusing when you are refering to herbivores more broadly or when just the herbivore/detritivore group. I am presuming from looking at the results in figure 2a that here you are not including herbivores(macroalgae).

##### We have revised our results to only refer to the trophic group names used in figures, e.g. herbivores (detritivore) or herbivores (macroalgae). We also explain in methods (L201) and results (L297) that these groups are combined as ‘herbivores’ in the bottom vs top-heavy analysis.

L247: It would be helpful to have a plot in the supplemental that replicates this plot separately for each country. This would support the discussion in the following paragraph about country level differences.

##### Thanks, good idea. We have added this plot as new figure S3, linked in the main text and figure 2 caption.

L248: mean?

##### Changed to mean.

L276: Would be nice to know what percentage of reefs were bottom- heavy for selenium (and maybe omega-3) as these also look quite concentrated in the bottom heavy zone.

##### Yes, these nutrients are also bottom-heavy. We initially focused on calcium, iron and zinc because these were more clearly concentrated in herbivore (detritivore) group (Fig 2a). We have added selenium and omega-3 to this result, now noting fishery services that were bottom-heavy at >93% of reefs (previously 96% for the three nutrients). (L302)

L284: Are all the error bars on the yaxis smaller than the size of the mean dots? cause it doesnt appear to have any SEM values on the yaxis at the moment.

##### Yes, the error bars are smaller than SEM values for most countries, indicating low variance in herbivore/piscivore contribution to fishery services. We have added Table S1 to show this more clearly, linking to this in Figure 3 caption.

L340: stronger at the base in relation to what? Please clarify.

##### We have clarified that this may relate to the mineral concentration of dominant energy pathways for low-trophic level species, which are more likely to feed on benthic or detrital prey. This contrasts with species feeding on multiple energy bases, such as slow-growing species which had higher selenium concentrations (L367-371).

L341: Why is being from deeper habitats relevant to selenium concentrations - please explain why depth explains greater concentration in slow-growing species

##### We have clarified that depth is correlated with selenium in fish, such that deeper species are predicted to have higher selenium concentrations (L372).

L393: I think you need to be very careful about your wording - I understand there were some restrictions to fishing at sites in the other nations i.e. no sites with zero restrictions as per madagascar, but this could be confusing to the reader - on reading the first impression is Madagascar is the only site with fishing. I would think about your wording/category names for the different fishing regimes.

##### We have clarified that we use ‘openly-fished’ to refer to reefs that did not have formal gear, area, or time restrictions, and these were only in Madagascar (L331, L427, L445).

L408: I wouldn't agree with this statement as it is currently worded - yes all management forms might be effective at protecting the trophic structure of the community that supplies fishery services but the specific species may change across management forms.

##### Excellent point. We have added a caveat that we do not analyse species composition shifts, which are expected under fishing regimes, and can lead to shifts in catch composition and ecosystem functioning. We cite key studies to support these statements.

“*However, analyses of trophic composition may mask shifts in the species that provide most fishery services. Species composition typically responds strongly to fishing, with high fishing pressure associated with shifts in catch composition [46] and diminished functioning, if key species become depleted (e.g. excavating parrotfish) [47].*” (L446)

L426: I think it would be worth pointing out that this is the case despite piscivorous species have high nutrient density (as per figure 1a) and this is why your analysis, which looks beyond nutrient density and deals with nutrient productivity, is so important if we want to understand the potential contribution of fish to nutrient supply.

##### Excellent point, thank you. We have noted that this result is “*despite these species having high nutrient density*” (L467) and that “*Such findings highlight the importance of considering trade-offs and associations between biomass, biomass production, and nutrients.*” (L472)

L458: It would also be nice, in light of your focus on the recommended nutrient intake of females in your analysis, to highlight that in some locations, these invertebrates may be a critical part of food supply for women through reef gleaning.

##### These are important fisheries that our study overlooks. Thank you for the suggestion, we now note this research gap – invertebrate contributions to energy flux, as well as fisheries and food in many reef-dependent regions.

##### *“Our results suggest that invertebrate biomass (or population turnover) was higher on rubble and low-biomass reefs that supported the largest (relative) biomass of mobile invertivores. Indeed, invertebrates can be significant contributors to energy flux in reef food webs [65,66], while many reefs support invertebrate fisheries that may benefit vulnerable people (e.g. reef gleaning by women) [67]. Analysis of invertebrate contributions to coral reef biomass, biomass turnover and nutrient production, and better integration of ecological and fisheries surveys with nutritional values for invertebrates, will help to address these knowledge gaps.”* (L531-538)

L489: Do you mean higher biomass reefs that have the potential to provide yields closer to MSY? Curerntly, I find this sentence doesn't makes 100% sense.

##### Yes, these are findings from several large-scale studies of reef fish community properties along fishing gradients. In addition to MSY, this biomass benchmark also meets conservation targets (e.g. protecting functional group abundance). We have reworded this sentence to clarify, noting the biomass window is a “*biomass-based multispecies MSY”*. (L550)