Journal: Fish and Fisheries

Author: Hardy et al. 2023

General comments: The manuscript entitled “Trait-based analyses reveal global patterns in diverse albacore tuna diets” is a well written manuscript that will facilitate interpretation of diverse diets, not only in albacore, as stated by the authors, but also for other tunas and pelagic species that consume similar prey types. The authors conducted a meta-analysis by using data on prey taxa from available diet studies on albacore tuna and used a ‘traits’ database to assist with assigning habitat-based traits to the taxonomic prey composition data provided in the albacore diet studies. This process simplifies the extensive taxonomic diversity observed in albacore diets to functional groups, which are more easily interpretable. These functional groups or ‘traits’ can serve as a basis for exploring hypotheses of potential climate change impacts on prey distributions and availability in future studies, an emerging concern among scientists and fisheries managers. Such a linkage between traditional, taxonomically-based stomach contents data and a simplified habitat trait-based approach can be useful for informing ecosystem, mass-balance models for which diet matrices, that form the foundation of these models, include species-specific diet data that have been assigned to functional groups, based on habitat and/or foraging preferences. Therefore, this trait-based approach can be considered a complementary tool to traditional stomach contents, which will facilitate improved interpretation of changes in diet over space and time and under varying oceanographic conditions. Trophic ecologists are often challenged by interpreting long lists of diverse prey taxa from stomach contents analysis of opportunistic pelagic predators. I think the author’s trait database will be useful for other tunas and pelagic species that consume the same prey types as albacore, since traits have already been assigned to an extensive list of prey in the database the authors cite. Additionally, and importantly, I think this manuscript serves as another example for the need to implement ecosystem monitoring programs to reduce data gaps in time series data, which will allow scientists to better address scenarios under a changing climate. I appreciate the improvements the author’s made to this revised manuscript, including improvements to the figures, which nicely summarize the method’s process and results, as well as the table captions.

I include some minor comments below, which should be addressed prior to publication.

Specific comments:

Line 24: This sentence is incomplete. …to ecological what?

Line 27: “coarser” may be a better descriptive term than “lower”, especially since in line 352 you refer to the opposite and mention “higher” taxonomic resolution, but I don’t think you’re referring to species here. Same with line 419.

Lines 34-38: I think an idea is missing in these 2 sentences. It is expected that diets may change over space and time due to many reasons. Stomach contents data provides only a snapshot in time and space and many oceanographic factors can influence predator-prey dynamics. Additionally, it’s not surprising that diet composition was variable and diverse. I think what may be missing from this sentence is that it is challenging to interpret a diverse, taxonomically-based diet composition and this is where the trait-based approach is beneficial.

If I’m understanding your points correctly, a suggested revision might be something like, “Taxonomic information remains important for trophic ecology, for defining biomass flows [and whatever other

reasons you want to include]. Not surprisingly, species-based diet composition in albacore tuna was highly variable across geographies and years sampled, making interpretation of these differences in prey across space and time difficult. By simplifying taxonomic-based diets into habitat trait-based diets, we were able to highlight changes in prey resources. For example, trait-based models of albacore diets highlight…"

What's important in my opinion is that the trait-based analysis allows for prey categorization (i.e., the taxonomic prey composition is used to categorize or condense a long, diverse list of prey into simpler, groups, therefore the complexity of diverse diet compositions is easily interpretable compared to a long list of prey with no indication of prey functionality). This is nicely explained in the beginning of the abstract. You have already assigned traits to several prey taxa and these taxa are likely eaten by other pelagic predators. Therefore, these prey taxa may be assigned to functional groups for other predators for defining biomass flow. By already having these categories assigned, you greatly decrease the workload of other ecologists working on ecosystem models where researchers have to define functional groups as a basis for the diet matrices in these models.

Lines 173 and 175: Change 'used' to 'was created by using' and change 'searched' to 'by searching'. The database did not 'use' or 'search' but a person created the database by using these tools.

Line 180: Add a reference for albacore vertical distribution (i.e., not occurring beyond mesopelagic depths).

Line 257: This sentence is confusing because it sounds like the n=69 represents the "cumulative total number of species identified." Lines 150-151 and the Figure 1a caption provide clearer text on what "observations" represent. I suggest revising this sentence for clarification or maybe changing observations to locations.

Line 276: remove the "and" between "using" and "dendextend"

Lines 303-304: This is an incomplete sentence. What happened to these 'rare species'? Please revise.

Lines 308-310: This is also an incomplete sentence (i.e., as well as what). Please revise accordingly.

Line 351: add "and" before "one hydrozoan"

Lines 376-377: the rarest prey guild is the non-diel migrating mesopelagics (n=12), correct? The coast & shelf demersals (n=14). Figure 3 is a great figure. I like the combination of the phylogeny and the cluster diagram.

Line 383: Figure 4 is a nice summary figure.

Line 389: Change "earlier" to "the"

Lines 437-440: Can you provide an example and reference for "…projects that have needed to simplify diversity in diet analyses through quantitatively or qualitatively clustering prey species into guilds."

Line 542: "temporally variability" sounds awkward, please rephrase.

Table 2: Since the manuscript uses "geographic" instead of "environmental", please change the (R) column heading. Also please define SPP.