Dr. Anna Kuparinen

Editor, Fish and Fisheries

Dear Dr. Anna Kuparinen,

We are writing to submit a revised version of our paper “*Trait-based analyses reveal global patterns in diverse albacore tuna diets”* for consideration by Fish and Fisheries.

We are grateful to the three reviewers for their helpful feedback and suggested edits. We are also pleased to see that all of the reviewers were supportive of the importance of this topic and the soundness of our approach to the synthesis. We have addressed their suggestions through revisions and additions to the manuscript text, figures, citation list, and supplementary materials. Our key changes include:

* Regarding the Methods. As suggested by Reviewer 1, we have added a figure showing the flow diagram of our data manipulation and analyses (now presented as Figure 2), and cited throughout the Methods section. We believe this addition, along with revisions and additions to the Methods text as suggested by all three reviewers, has helped to make our data synthesis and statistical analysis methodology more clear.
* Regarding the key findings of this paper. We undertook to better describe the core findings displayed in the figures as well as some results that were buried in Supplementary Information, with significant revision of the Results section to address Reviewers 1, 2 and 3’s concerns about interpretation. We have paired this effort to the Discussion, added and reorganised text in the Discussion that better highlights the contributions as well as limitations of this comprehensive meta-analysis of albacore tuna diets by linking traditional stomach content data with a more contemporary trait-based analysis of diet composition. In addition, we have added a key citation to another diet database and tissue collection effort noted by Reviewer 1 in this section.
* We have revised the caption and colouring of Figure 3 (formerly Figure 2), based on the suggestions of Reviewer 1 to address their points regarding its interpretation. We have elected to retain this figure in the paper given the visual way that it illustrates two key points: 1. the sheer diversity of taxa consumed by our focal predator, and 2. that the habitat use traits we examine recur across unrelated taxa groups. This figure also pairs well with the similarly circular design of the trait guild cluster dendrogram (formerly Figure 3) and beautifully juxtaposes the high diversity of species, and their trait diversity with the simplicity of the trait guilds quantitatively identified in this synthesis. We also took on board many
* Reviewer 3’s comments made us realize that we had an opportunity to clarify the contribution this study in the abstract, discussion and conclusions – firstly in systematically reporting the global diversity of albacore tuna diet composition, secondly in significantly advancing our understanding of the patterns and variability in albacore diets using trait information and in simplifying taxonomic information, and thirdly in the broader contributions the identified trait guilds as well as trait-based framework of analyses builds for studies of other highly migratory pelagic predators and commercial valuable tunas and billfishes.
* Ultimately, our analyses show that the extreme taxonomic diversity of albacore diets across the globe can be reduced to a small number of guilds based on shared habitat use traits. Discovering that prey traits cluster in this way is important evidence that trait-based analyses could be used to determine which kinds of prey such predators will target in changing oceans, given that the same trait guilds will be present even when taxonomic composition shifts. We have now clarified this point in our Discussion section.
* Finally, we revised and improved all figures and tables, and devised a strategy for sharing supplementary data in addition to supplementary information in a way that won’t affect the pdf copy of the manuscript and that will be far more legible than when it was submitted all together.

We feel these changes have substantially increased the clarity and completeness of the main points of our synthesis paper. We hope that you will now find it is suitable for publication in Fish and Fisheries. Thank you for your consideration. We look forward to hearing from you.

Sincerely,

Dr. Natasha Hardy (on behalf of the author team)

**Response to reviews of “Trait-based analyses reveal global patterns in diverse albacore tuna diets” for Fish and Fisheries**

**Please find the reviewer’s comments and our responses (*in italics*) below. Lines numbers in this document refer to the location of changes in the manuscript when viewed with tracked changes.**

**Reviewer: 1**

The paper is informative and well written and gathers an impressive amount of data and work.

*Thank you!*

The methods needs to be better organised so the reader is not lost in the amount of information. I suggest to add a figure in the spirit of Fig S1 to help the reader follow the methods.

*A great suggestion. We have created a similar flow chart to help orient the reader to the aims and flow of the methods, Figure 2 in the manuscript.*

The paper demonstrates clearly the interest of using trait-based guilds in diet description, however it is not very clear what are the pros and cons of using individual traits rather than trait guilds and I recommand that the authors elaborate a little on that when commenting Fig 5 and in the discussion.

*A great point and addressed with text added the end of the results (L382–389) and substantial discussion added on this topic as this is a key finding and contribution of the paper (L412–418).*

Also, if traditionnally diet has been described based on taxonomic composition and if this approach still has its merits as well as the trait-based approach, it is not clear what is the phylogenetic approach is and what would be its interest in diet analysis; the authors should elaborate on this point to clarify their view.

*Addressed, we previously referred to phylogenetic information quite sporadically throughout the discussion. We have now grouped these discussion points at the beginning of section 4.2 (L454–463) and highlight that this is a limitation of the present study and recommendation of future work.*

About the illustrations, if Fig 2 is very beautiful, I feel it has limited interest to clearly visualise trait diversity; it could be moved to suppl and a more informative figure included in the main text (see my comment on the pdf).

*Addressed, now Figure 3. We have added class phylogenetic information as requested, and as suggested below we have also added summary statistics of the percentage of species associated with each trait value. This is also now paired with the cluster dendrogram as both images depict the two different ways to approach this trait information, as individual trait values or as quantitatively aggregated functional groupings of traits. We believe this is a significant improvement to the past graphics, and pairs better with the final statistical models.*

Unfortunately, the main figure of interest, Fig 4, was not available in the pdf provided due to conversion issue, this is really a shame and made the reading of the corresponding paragraph very hard to follow with no visual support. The final pdf provided to the reviewers has not been properly checked and this is not acceptable.

*This is simply unfortunate as the figure to our knowledge met all image production guidelines prior to submission, a lower resolution version now appears in the new submittal. The issue was noticed and amended within weeks of submission, this will not be an issue in the resubmission..*

Fig S1 is very helpfull and I suggest that a similar figure is developed to help follow the methods' paragraph which is very long, provides a lot of information in which it is easy to get lost. Supplementary tables S3 to S6 were impossible to read in the pdf provided to the reviewer because of the poor formatting. It is only when I submitted the review that I noticed that xls files were available; it would have been better that the tables are not included in the pdf but that a line of text indicate where to find them on the reviewing system.

*A great suggestion. We have created a similar flow chart to help orient the reader to the aims and flow of the methods, Figure 2 in the manuscript.*

Supplementary tables S3 to S6 were impossible to read in the pdf provided to the reviewer because of the poor formatting. It is only when I submitted the review that I noticed that xls files were available; it would have been better that the tables are not included in the pdf but that a line of text indicate where to find them on the reviewing system.

*Addressed. We have created a data repository in Dataverse and stored an editable copy on Google Drive, which we now include a link for in this submittal and which reviewers can access anonymously, they just need to remember not to sign in and to open the link in a web browser for which they are not signed into with any gmail account, should they wish to remain anonymous. Chrome for example should give them the option to sign in or not when clicking the link. Once the format and content for this supplementary data are finalised we can then publish the Dataverse repository to make all data widely accessible.\**

I included a number of comments in the pdf attached with some suggestions and references:

Abstract

L29 You mention 4 traits but you only cite 3

*L30–31 Additional trait text added.*

Introduction

L75 Bell et al 2021 is a good citation on this topic : <https://www.nature.com/articles/s41893-021-00745-z>

*L80 Citation added.*

L83 however some models do account for trophic interactions such as Lehodey et al 2015 that uses prey guilds caracterised by vertical behaviour: https://www.sciencedirect.com/science/article/pii/S0967064514003051?via%3Dihub

*L89 Added the citation. A really interesting paper which we found within the linked paper's citations, found here: https://www.sciencedirect.com/science/article/abs/pii/S0079661109001414*

L112 Other broad references are :

Olson et al 2016: http://www.sciencedirect.com/science/article/pii/S0065288116300049

*L443 Added the citation in the Discussion!*

Methods

L151 In the document provided to the reviewers Table S3 is impossible to read as the width of the table is spread over several pages and the text in the columns is not entirely visible. The fact that the final document submitted to the reviewers was not properly checked demonstrated poor consideration for the reviewers.

*This appears to be an issue with Fish & Fisheries submission portal options and submittal rendering. We have resolved this as noted with \* above.*

L161 In the document provided to the reviewers Table S4 is impossible to read as the width of the table is spread over several pages and the text in the columns is not entirely visible.

The fact that the final document submitted to the reviewers was not properly checked demonstrated poor consideration for the reviewers.

*We have resolved this as noted with \* above.*

L199 In the document provided to the reviewers Table S5 is impossible to read as the width of the table is spread over several pages and the text in the columns is not entirely visible.

The fact that the final document submitted to the reviewers was not properly checked demonstrated poor consideration for the reviewers.

*We have resolved this as noted with \* above.*

L211 (Figure S1) I suggest that you present a figure similar to Fig S1 mentionning all the different analyses conducted as the reader is completely lost very quickly with the amount of information and it is nearly impossible to follow the different steps and how they connect to each other and why you conduct those various analysis. A simple graph outlining the various steps and in which order would be extremely usefull

*A great suggestion. We have created a similar flow chart to help orient the reader to the aims and flow of the methods, Figure 2 in the manuscript..*

L219 Please clarify if whitin a study where there are variaous locations and years you only consider the locations and compile all years describing them with the final year sampled or if you also consider different time periods if the study presents a wide time range

*L255–256 This has been clarified within this section, and throughout. Replaced text to "ocean basins and year(s) sampled".*

L223 Please specify which trait information?

*L261 Clarified to “habitat use trait information”, and throughout the MS we frequently specify traits now.*

L231 Please justify why you use this Gower dissimilarity matrix and not another one?

*L270–271 Justification provided and text added "This was build on a Gower dissimilarity matrix for mixed variable types (here binomial and categorical; Gower, 1971)..."*

L238 In the document provided to the reviewers Table S6 is impossible to read as the width of the table is spread over several pages and the text in the columns is not entirely visible.

The fact that the final document submitted to the reviewers was not properly checked demonstrated poor consideration for the reviewers.

*As noted above, we have provided a solution to this, please use the open access link to these data created for this revision.*

L253 please be more explicit: observations being locations? years? a combination of year and location?

*L293–294. Addressed and clarified to "* *data from 23 studies that yielded 60 observations (independent years and locations sampled) of diet composition".*

L255 what other 3? You only ever mentionned 26 studies, where are those 3 extra studies coming from. It is unclear if in total there are 26 studies with 69 obervations or 26 studies with 60 observations or 23 studies with 60 observations? Please rephrase and clarify.

*L293–294. Addressed, see previous response above this one. There was an unfortunate typo here that read "26 studies" instead of "23" at this point. We hope that additional clarifications to address comments elsewhere in the manuscript and our new Figure 2 also help address the confusion here in the methods.*

Results

L314 more results should be described for Fig2. The figure looks beautiful but it is difficult to extract any information from it. It would be more informative to have barplots indicating the proportion of prey with a specific trait overhall and per taxonomic groups (fish, crust...).

*L359–363. Addressed. We have added a paragraph of text that better highlights the result sof this figure. And to the figure we have added class phylogenetic information as suggested earlier and summary statistics of the percentage of species associated with each trait value. This is also now paired with the cluster dendrogram as both images depict the two different ways to approach this trait information, as individual trait values or as quantitatively aggregated functional groupings of traits. We believe this is a significant improvement to the past graphics, and pairs better with the final statistical models.*

L333 can you be more explicit on the interest of this MDS plot? At least, a better description is required: If guilds 1, 2, 5 and 6 appear well isolated on the MDS plot, it is not the case for guilds 3, 4 and 7.

*Addressed. Because this plot is extraneous to the study, and represents an additional and non-essential check of the outputs, we have moved the nMDS plot to supplementary information. This was really just a sanity check of the species and trait data and how they clustered and does not add much to the results or discussion. We do not expect all the clusters to be fully differentiated in 2 dimensions either, when there are four traits and multiple combinations of these traits are possible. This figure simply added confusion and does not add much to the results.*

L337 In the document provided to the reviewers Fig 4 is not available ("unable to convert image'). The fact that the final document submitted to the reviewers was not properly checked demonstrated poor consideration for the reviewers. It is very difficult to follow this chapter without the figure and impossible to comment on the text.

*Addressed. Noted above.*

L372 "add" (vertical and horizontal distribution)

*L369 Addressed and added.*

L386 and changing behaviour (vertical migration, horizontal migration)

*We could not find reference to this line in the original submittal at the provided line number. However, we have ensured that we use much clearer language when referring to the set of traits used.*

L390 It should be noted that both taxonomy and traits are linked as trait as determined based on the taxa identification to the species level. Trait allows to simplify data analysis and provides valuable information but there is always a need to identify prey at the species level before being able to group them into trait-based guilds. However it is not clear to me what is the interest of phylogenetic information and how would it be used in diet description, more information is needed here to clarify this point.

*Addressed, we previously referred to phylogenetic information quite sporadically throughout the discussion. We have now grouped these discussion points at the beginning of section 4.2 and highlight that this is limitation of the present study and recommendation of future work.*

L396 Olson et al 2016, already mentionned in the Intro

*L443 Added the citation in the Discussion!*

L452 Some initiatives exits however with for example the Pacific Marine Specimen Bank from the WCPFC with regular collection of samples, including stomachs, from tuna and other large pelagic species:

https://www.spc.int/ofp/PacificSpecimenBank

https://meetings.wcpfc.int/node/16345

https://meetings.wcpfc.int/node/16208

However this type of effort should be extended and generalised

*L512 An amazing working group and product, citation added.*

Figures & Tables

Figure 1 add a reference to Longhurst publication for the code correspondance + is there a color code for the Longhurst provinces

*Addressed, citation and clarification added to the Figure 1 caption.*

Figure 2 Please add in this figure the color code for phylogeny tree to differentiate fish from crustaceans, molluscs etc

*Addressed as per previous recommendations and a great suggestion. Now Figure 3.*

Figure 4 It would have been appropriate that the final document is checked, complete and readable before sending it to the reviewers

*This was an unfortunate rendering issue and has been addressed.*

Figure 5 the brief description of the guilds as indicated in Fig 3 should be added on Fig 5 or in the caption of the Fig to help the reader

*Addressed, great suggestion. We have added legend key for the trait guilds.*

**Reviewer: 2**

Dear Authors,

This is a well-written manuscript that will provide a valuable contribution to the literature base, not only on albacore diets but on the prey-trait guilds that have been assigned to the diversity of prey consumed over time. This approach will facilitate reduction of taxonomically-based diet composition into more digestible groups, which in turn will help ecologists better interpret potential changes in the forage base over time.

The manuscript entitled “Trait-based analyses reveal global patterns in diverse albacore tuna diets” is a well written piece of work that will provide a valuable contribution to the literature base on diet studies of albacore tuna. The authors provide a comprehensive meta-analysis that links traditional stomach contents data (i.e., taxonomic-based methods) to a contemporary traitbased approach whereby species-specific prey are assigned to traits based on a prey species’ vertical and horizontal habitat association and diel and seasonal migration patterns. Although taxonomically based diet data will remain an important part of trophic ecology (e.g., for quantifying energy flow in ecosystems), distilling diverse diet composition data into broad functional groups, or trait guilds, provides trophic ecologists with a novel and complementary tool to traditional diet studies that offers a different perspective. As the authors note in their review, some diet studies have already partially used traits in classifying for example, functional groups (“epipelagic prey”, “mesopelagic prey”) from taxa identified through stomach contents analysis. This approach in conjunction with taxonomic-based diet studies, will help ecologists to test hypotheses on how climate change might affect predator distributions based on the distribution of forage communities, but through a new lens. Knowledge on

prey behavior—as related to the habitat and migration traits identified in this paper—along with prey taxonomy provides an indication of potential spatial and temporal availability of predators that may forage on prey with specific traits and may help contribute to identification of foraging hotspots. While assessing albacore trait-based prey data and the potential influence of environmental conditions, across space and time, on prey traits is beyond the scope of this paper, I wonder if similar studies have addressed this issue. I think the Discussion section could benefit from some text or an example of studies that may have examined linkages between specific environmental conditions and traits to show how trait-based approaches may be implemented.

Another consideration for future studies might be to include fisheries data, where available, to obtain perhaps more frequent time-series data as opposed to diet studies that often lack consistent time series. For example, fisheries data exists for some forage species including Pacific sardine and Northern anchovy. Such datasets may be able to fill some gaps in the time series, though it is acknowledged that information on forage species is often lacking.

*General Response:*

*Thank you for your very supportive and helpful feedback on our study! We have added text to better highlight as you have done what this paper achieves, in the abstract, end of the introduction, and the end of the discussion (as well as an interesting example and citation as suggested on trait-based functional responses to environmental change). There are not many examples for marine or pelagic systems currently, but we hope this study opens a way forward for additional such analyses. We hope you enjoy the significantly improved manuscript resubmitted here.*

Specific comments:

Lines 28-30: Please be clear and list the 4 traits.

*L30–31. Clarified!*

Line 89: Remove the comma, and add an ‘and’ in between “(Muhling et al. 2019)” and “the number…”

*L94. Comma removed.*

Line 93: Please define or provide examples of ‘traits’ here, so the reader understands, early on, what ‘trait-based’ approaches entail.

*L97–99. Added description of traits as “functional ecological and non-taxonomic predictors…”*

Lines 99-102: This is also common in forming diet matrices in ecosystem mass-balance models where prey may be aggregated into functional groups (e.g., “mesopelagic fishes”, “epipelagic squids”). ‘trait-based’ approaches entail.

*L105–107. Reference to this usage added with the sentence “mass balance models or food web modelling (Hui, 2012).”*

Lines 104-105: Please elaborate on ‘there is little evidence for the influence of predator size on prey selection’. Do you mean predators do not select prey based on prey size? There are several papers that discuss ontogenetic shifts in tuna diets, but large-bodied tunas continue to eat small-sized prey even though they have the gape size to eat large-sized prey."

*L110–112. We have clarified what we meant and rewrote this sentence to “Functional trait-based approaches may be particularly useful for tunas because they have taxonomically broad diets (Duffy et al., 2017; Pethybridge et al., 2018) and continue to consume very small prey with increasing predator body size (Ménard et al., 2006; Young et al., 2010; Romanov et al., 2020; Portner et al., 2022).”*

Line 141: Add a comma after ‘i.e.’ for consistency.

*L150 Added.*

Lines 150-151: Suggest changing ‘longlining’ to ‘longline gear fished’ and mention what the specified depths were (e.g., shallow or deep and define each categorization) and change ‘purse seining gear’ to ‘purse-seine gear’."

*L158–161. Addressed and clearer information added.*

Lines 172-175: I think ‘metainformation’ should be changed to ‘meta-information’ throughout the paper, but this may be a comment better suited to the Editor.

*Addressed and corrected for 'meta-analysis' also.*

Lines 172-175: How was adult vs. juvenile life stage determined for these 221 species in albacore diet? What kinds of trait information were similar between juveniles or adults? Please provide an example of similarities in trait information here.

*Addressed, we have significantly edited and simplified the text in section 2.3, as well as reordered the subsections, to better highlight how this was done, from pages 9– 11, and examples of similar traits are included, additional detail sufficient to replicate this study can be found in supplementary materials.*

Line 188: Provide the equation.

*Now provided in Supplementary Information, Appendix C, with sufficient detail to replicate this study and we provide better cross-referencing of the information in this document.*

Lines 189-193: Please elaborate. How did you match gear-specific length data? Length data can vary within a specific gear type. What statistical test was used to determine whether differences were significant? This information was not provided in the Appendix B either (same for Menard’s equation in line 188 or mentioned in Appendix B, these details have not been provided).

*L226–233. Addressed, additional detail and better flow of information provided in the methods "Albacore lengths were reported for 16 out of 26 studies, and for 10 studies wWhere albacore lengths were not reported, we coarsely matched gear-specific length data (range and mean FL) from relevant regional fisheries management organisations (ICCAT, 2020; ISC, 2006) to albacore diet studies by year and gear type used. We then estimated the likely life stage(s) sampled using region-specific age and growth curves, and reported sizes at maturity (described in Supplementary Data, Table S3)." Then in the following paragraph, we clarified that the statistical analysis was a linear regression, and this was non-significant.*

Lines 201-209: I think the section on prey traits should come before prey life stage because there is a fair amount of text on prey traits in the prey life stage section, but without any information on what the prey traits are. The prey traits are the most important part of this paper.

*A great catch, we have moved this section now 2.2 above the estimation of prey life stage section.*

Line 274: Geographic region is not a typical environmental parameter (e.g. SST, chl-a etc.) and can encompass dynamic oceanographic conditions. I suggest changing ‘environmental variable’ to ‘geographic variable’ and remove ‘geographic’ from the parenthesis. Line 275 would then become ‘trait-geographic interaction’ instead of ‘trait-environment interaction’. Subsequent mention of environment would also need to be changed (e.g. Table 2, line 290)"

*L319–323. Agreed and great suggestion, this has been changed in this paragraph and in the caption for Figure 5.*

Line 277: State the 7 trait guilds, particularly because you previously mentioned 4 traits.

*Partially addressed, we opted to simplify the text and not list the number of individual traits or guilds here because these are results.*

Line 282: change ‘include’ to ‘included’

*L326 Addressed.*

Line 302: Please add the total number of taxa consumed by albacore to assist the reader with the various numbers provided in this paragraph.

*L347. Added!*

Line 337: remove the space between ‘(Figure 4)’ and the period.

*L383 Removed as with hopefully all typographic errors of this nature!*

Line 347: Remove the ‘,’ after ‘(Figures 4 &5)

*L388. Removed.*

Lines 370-372: This sentence is confusing because you mention 7 trait guilds and 4 sets of traits but list 3 descriptions (prey habitat association, seasonal and diel vertical migration). I suggest revising this sentence for clarity and remind the reader what the 4 traits are by listing them instead of the 3 descriptors. It would also be helpful to remind the reader what the 7 guilds are.

*L420–424. Addressed, added this information and also listed the 7 guilds identified in this analysis.*

Lines 389-392: This is an important sentence because trait-based approaches should not replace taxonomic approaches but rather be complementary.

*L486. Thank you, we agree! This was noted in the Abstract and we also moved to the beginning of section 4.2 to be better grouped with other references and recommendations for including taxonomic and phylogenetic information in models.*

Lines 458-466. This is a great paragraph for informing future diet studies. Not only would more consistent low-level diet studies create improvements in monitoring communities and predator-prey interactions over time and under variable environmental conditions but including information on both predator and prey size in future diet studies is helpful for determining ontogenetic shifts in diet. It seems the trait-based approach is complementary to traditional diet studies where disaggregated diet data is essential to more accurately reduce complex taxa-specific data into simplistic habitat guilds to infer changes in species distributions and availability.

*Thank you! Very much in agreement. We have expanded on this paragraph to add your note on predator and prey size information needed for future diet studies.*

Line 520: Should this title be capitalized?

*No, this and others that appeared capitalised have been edited.*

Line 534: italicize Thunnus alalunga.

*Italicised all species names.\*\**

Line 567: italicize Thunnus alalunga.

*\*\*As above.*

Lines 680-682: Fix the formatting of this reference.

*This and many others have been fixed.*

Line 686: Please italicize Thunnus alalunga.

*\*\*As above.*

Line 722: Italicize Thunnus orientalis.

*\*\*As above.*

Lines 728-729: italicize Thunnus alalunga.

*\*\*As above.*

Line 758: italicize Thunnus alalunga.

*\*\*As above.*

Fig 4. This is a great figure to show the trait guilds in albacore diet over time. I suggest adding to the caption a link to Table S5 and including an additional column in S5 to connect each prey species to the prey trait guilds listed here. This would allow the reader to filter the data in the table on a specific prey trait guild to see what species were included in this guild.

*Addressed. Thank you for this suggestion! We have linked now Figure 3 to table S5, because it directly relates the trait guilds to trait composition. This looks tidier because Figure 4 already has a long caption, and the reader can quickly link all the core information and achieve the same goal you suggest. We have now also added the trait guilds to Table S5 as recommended here.*

SI: Line 143: Italicize Thunnus alalunga

*\*\*As above.*

List of supplementary information Tables – captions

*Addressed. This is a great suggestion. We have listed all Supplementary Data tables in the Supplementary Information document, in chronological order.*

Table 1 caption. The caption lists 3 traits, but the table lists 4. For clarity, I suggest either adding ‘vertical and horizontal’ before habitat use or deleting the text in parentheses, since the traits are repeated in the table.

*Addressed, the caption now lists four traits and clear text describing where these data came from.*

Table S5 caption: Change ‘prey species information’ to ‘prey taxa information’ since you also include class, order, and family. Please list the 4 traits for clarity (only 3 are currently listed). I think adding a field for ‘prey trait guild’ would be a nice way to link the prey trait guild to each prey species and help the reader to see which prey species were assigned to which trait guilds (see my comment for Figure 4). If researchers wish to conduct further research on prey trait guilds, they could consult this table for which you have already assigned prey species to a specific trait.

*Great suggestion! Addressed, the caption now lists four traits and the trait guilds have been added to this table.*

Table S6 caption. The font is different. Please change to be consistent.

*Addressed, this was probably meant to refer to Table S7 which was in Arial font, while the rest were in Times New Roman.*

Table S7 caption: Change ‘form’ to ‘from’. Also in some instances ‘1900’ is used and others ‘1880’. Please be consistent.

Table S7: Please elaborate on the table caption. For example, taxonomic information is included in Table S5, so how are the taxonomic lists different? Why is this list longer than the list in S5? Could Tables S5 and S7 be combined? If they remain separate, I suggest using the same terminology for the column headers for consistency (e.g. ‘PreyLife’ and ‘PreyLifeNote’ would change to ‘life\_stage’ and ‘life\_note’ or vice versa to be consistent with Table S5).

*Addressed and additional information added to the table heading to clarify the reason for the two date ranges, as well as provide additional meta-information for the data content.*

Table S3: Define the LocatName’s with letters (i.e. A, B, C).

*Cannot address. We cannot further define the location names 'A', 'B', etc, because these are the independent location names provided by Clemens & Iselin (1963), along with the coordinates which we supply and plot. We are simply rendering this information more accessible, but we cannot go back and relabel locations from a paper from 1963 from the middle of the Pacific. Latitude and Longitude are just as informative at this point.*

Table S3: What does field ‘stomachs\_used’ indicate? Is this the number of stomachs in the original study or the number of stomachs used in this meta-analysis?

*Addressed and table heading clarified, this was the number of non-empty stomachs.*

Table S3: For ease of future analysis, consider changing ‘SampleMethod’ to ‘FishingMethod’ or ‘Gear’ since the data in this field consists of fishing gear. Also, where possible, combine different gear spellings (e.g. ‘longline’ & ‘long-line’; ‘troll, pole-line’ & ‘troll/ pole-line’).

*Addressed, changed to 'FishingMethod' and consistency of gear type labels improved.*

Table S5: How were the prey assigned to vertical & horizontal habitat use and diel & seasonal migration traits? Were these ‘traits’ identified in the literature or assigned from online tools (e.g. Fishbase) or from expert opinion? Please define maxFO, maxN, and maxM. This is an important table because the prey are linked to the traits. I realize this is an extensive table, but I wonder if this table might be better suited for the main text instead of supplementary material.

*Addressed. The traits are extracted from our Pelagic Species Trait Database (Gleiber et al. 2022) with full citation and explanation added. We have added trait guild information to this table, and annotate an 'NA' for the species with incomplete trait information, and it is possible to see which trait was missing from this table also. We agree this is an important output of this paper, and we are providing the readership with online public access repository for this information as it simply won’t fit in the main text or any word document as is.*

**Reviewer: 3**

Regrettably, I cannot recommend the manuscript of Hardy et al. to be considered positively for publication in Fish and Fisheries. I really respect the effort of the authors to compile taxonomic and trait data for meta-analyses from a number of published studies. I fully understand that this type of analysis is required for progress in studies on biology of pelagic predators at a global scale. Even the study deals with one species, such a global synthesis potentially deserves publication in Fish and Fisheries. Overall, I admit that the present study is absolutely a great work which is of great interest as an information source of diet studies for tuna scientists. Importantly, the authors provided a framework of trait-based analyses, which can be applied to other pelagic predators. Hence, this work should be appreciated from various viewpoints.

*We appreciate the reviewer’s supportive comments about the quality of our work and its importance for fisheries scientists, and especially concerning pelagic predators.*

Nonetheless, I have to state that the analyses have not led to any novel findings or conclusions. I imagined that the authors suffered from the complexity of information to extract new findings. I feel that this is well reflected in the contents of the Discussion section (particularly, the last half). As one of the main findings, I agree that diversity of diets of albacore tuna was shown as a global pattern by trait-based analyses. However, it is difficult to find any global trends other than diversity. From this viewpoint, the paper is quite descriptive rather than interpretative, even after applying trait-based analyses to the data.

*As the reviewer points out, our analyses show that the extreme taxonomic diversity of albacore diets across the globe can be reduced to a small number of guilds based on shared habitat use traits. Discovering that prey traits cluster in this way is important evidence that trait-based analyses could be used to determine which kinds of prey such predators will target in changing oceans, given that the same trait guilds will be present even when taxonomic composition shifts. The descriptive portions of our global synthesis comes from the very fact that these diverse data sets – both taxonomically and in terms of traits – have not been collated, analysed, and interpreted. Thus, as we discuss, this is an essential foundational analysis upon which future work examining specific environmental drivers can now follow. We have endeavoured to improve how we highlight the key contributions and findings of this meta-analysis throughout the results and discussion.*

For example, I cannot exactly agree to several key sentences as conclusions.

“Our results indicate that both trait information and constructed functional trait guilds serve as useful and rapid classification tools for tracking large-scale shifts in albacore diets in time and space.” “We posit that investigating trait-based diet shifts in albacore will be a powerful framework for tracking foraging responses to environmental variability.”

The framework was provided, and the results were shown. However, I cannot agree to these statements without any novel findings in the results.

*As stated above and at length in section 4.2 of the Discussion, we are not aware of any other global synthesis papers that present these same diet and trait data, nor analyses of both data sets across time and space globally for any tuna species. Thus, it is unclear to us what part of our results are not novel. The first statement highlighted by the reviewer above is from our Discussion and directly follows from our fourth corner analysis showing that both individual habitat use traits, and trait guilds built from clustering multiple habitat traits explain significant amounts of variation in species occurrence across ocean basins and years, which in this analysis are proxies for environmental conditions. The second statement is related to our Discussion section on the need for additional research that models directly the relationships between trait-based diet information (such as presented here) with environmental covariates. We have endeavoured to improve the logical flow of the findings throughout the results and discussion, and we hope this renders the contributions of this paper much clearer than previously.*

“Our review shows clear differences in trait-based diet composition across years and locations sampled.”

Agreed. But this is quite expected from the differences in years and locations of the data source studies. It’s impossible to discuss any spatial and temporal trends as new findings or for new hypotheses (e.g., climate impacts, community structure shifts, or geographical characteristics). I believe that the authors understand this point well.

*Yes, as we discuss in our manuscript Discussion section 4.2, there is a need to explicitly model environmental correlates of trait-based diet variation. Our paper makes an essential step towards this by synthesizing both the diet information and also adding in the traits associated with the huge variety of taxa consumed by albacore over time and space.*

“4.2 Synthesis limitations, knowledge accessibility and gaps to overcome”

“This review also highlights how variable the sampling of albacore tuna diets has been in space and time, with long gaps between studies ranging from a few years to over fifty years apart depending on ocean basin.”

“Syntheses of historic trophic interactions are crucial for establishing baselines in understudied systems and understanding how they may change.”

These are true. Yet, I feel that these conclusions are not exactly based on the results of the present study.

*We are unsure why the results of historical ecological data, showing variability in taxonomic and trait-based resource use by albacore tuna would not then be foundational to establishing baselines from these historic data, with respect to how these patterns in resource use may change in the future. Our global synthesis is exactly what allows us to conclude that diet sampling has been variable over time and space (the first point quoted); this result is not evident from the regionally-specific studies published to date. The second statement is a general Discussion point that highlights the need for further sampling, as well as continued synthesis of sampling, in order to derive trends and patterns.*

I really like this approach and respect the effort for meta-analyses. However, I have to vote to a negative recommendation for the reasons above. Personally, I consider that this work would be surely publishable for any international journals unless novelty of the results is concerned.

*We appreciate the reviewer’s positive comments about our approach. Without more information it is not clear to us what is motivating their comments about the novelty of our results, nor are we able to constructively improve the manuscript. To our knowledge, this is the first global synthesis of albacore diets made publicly available, two other large-scale datasets on albacore diets are cited but the data has never been made publicly available for review, here from both a taxonomic and traits-based perspective.*

But, if so, it is advisable to describe the methods in a comprehensive manner. It was difficult to evaluate the validity of the approach only from the description within the current manuscript.

*Thank you for this point. We have added additional text to the Methods, and synthesized information as much as possible. The Methods however are extensive in order to enable reproduction of this work.*

“Taxonomic and trait diversity in albacore diets” Only R packages are introduced for different analyses. Nothing has been explained about the analyses.

*Addressed. Indeed, the first subsection of the statistical analysis methodology was too brief in describing the aims of each section, and thus appeared dominated by information on R packages. These are of course still cited, but accompanied by more effective explanation of the methods as well as topic sentences that introduce the goal of each paragraph.*

“Albacore prey trait guilds” Similarly, explanations of the analyses are not enough. Readers would understand what analyses were done but would have no ideas why and how those analyses were done.

“Trait-based vs taxonomic diet variation” Better than the above two. But the explanations are still too rough to understand.

*Addressed both concerns. As above, with the addition of appropriate topic sentences and Figure 2, we hope the very detailed methods are now better framed.*

Also, tables and figures need to be improved.

In general, the figures have some complexity. More comprehensive explanations in figure captions and texts would be helpful.

I feel that the tables were submitted as raw materials. Of course, it is not easy to summarize a lot of data and information, but there is still much room for improving presentations.

*Addressed. The contents of all figures and figure captions have been reviewed, and significant edits to all results sections have been made to better synchronise description of depicted results. Notably, the addition of Figure 2, and we also added trait summary statistics and phylogenetic class information for Figure 3 and combined the trait guild figure (formerly number 4) with Figure 3, which now better displays species phylogenetic information alongside trait variation and flows logically into the trait guilds assigned from these traits. The axis and legend legibility have been improved for Figure 4, and an additional key to the legend added for Figure 5.*

*We have created a data repository in Dataverse and stored an editable copy on Google Drive, which we now include a link for in this submittal and which reviewers can access anonymously, they just need to remember not to sign in and to open the link in a web browser for which they are not signed into with any gmail account, should they wish to remain anonymous. Chrome for example should give them the option to sign in or not when clicking the link. Once the format and content for this supplementary data are finalised we can then publish the Dataverse repository to make all data widely accessible.*