Dear Dr. Gerringer,

Thank you for your detailed, constructive and helpful reviews!

Thank you for agreeing to let us publish the Response to Reviewers and peer review comments in the public repository for our manuscript. We have included a cover page for the supplementary materials and add the Response to Reviewers as the final Appendix K.

Please feel free to email me ([helena.mcmonagle@wellesley.edu](mailto:helena.mcmonagle@wellesley.edu)) if you’d like a version of our revised manuscript and supplementary file that has all tracked changes from the peer review process shown.

Sincerely,

Helena McMonagle

On behalf of co-authors Joel Llopiz, Amy Maas, Deborah Steinberg, Annette Govindarajan, and Timothy Essington

**Response to Editor comments:**

Dear Ms McMonagle,  
  
Manuscript ID ICESJMS-2024-155.R1 entitled "Quantifying uncertainty in the contribution of mesopelagic fishes to the biological carbon pump in the Northeast Atlantic Ocean" which you submitted to the ICES Journal of Marine Science, has been reviewed.  The comments of the reviewer(s) are included at the bottom of this letter.  
  
Thank you for your thoughtful revisions to the article. The reviewers and I are supportive of publication, but have a few additional revisions to your manuscript.  Therefore, I invite you to respond to the reviewer(s)' comments and revise your manuscript. In particular, please add to the bioenergetics section of the discussion to strengthen the presentation of these data. Detailed suggestions on this are provided below.  
  
Thank you for your request to share the response to reviewers document as a teaching resource in the supplementary material of the manuscript. The reviewers and I agree that this would be a great resource and are supportive of including this supplementary file. If you do decide to include the track changes version of the manuscript in this document, please remove any stray comments left from the editing process. Please also add the same cover page to the supplemental material document as you use for the manuscript itself.  
  
Please submit your revision by 19-Oct-2024.  
  
To revise your manuscript, log into https://mc.manuscriptcentral.com/icesjms and enter your Author Centre, where you will find your manuscript title listed under "Manuscripts with Decisions."  Under "Actions," click on "Create a Revision."  Your manuscript number has been appended to denote a revision.  
  
You will be unable to make your revisions on the originally submitted version of the manuscript.  Instead, revise your manuscript using a word processing program and save it on your computer.  Please also highlight the changes to your manuscript within the document by using the track changes mode in MS Word or by using bold or colored text.  
  
Once the revised manuscript is prepared, you can upload it and submit it through your Author Centre.  
  
When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided.  You can use this space to document any changes you make to the original manuscript.  In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).  
  
IMPORTANT:  Your original files are available to you when you upload your revised manuscript.  Please delete any redundant files before completing the submission.  
  
Please ensure that the manuscript conforms to the ICES JMS formatting requirements, particularly the resolution and sizing of the Figures (which should be designed to fit the page format of the Journal).  
  
Because we are trying to facilitate timely publication of manuscripts submitted to the ICES Journal of Marine Science, your revised manuscript should be uploaded as soon as possible.  If it is not possible for you to submit your revision in a reasonable amount of time, you may request a short extension of time by emailing the  editorial office.  
  
Once again, thank you for submitting your manuscript to the ICES Journal of Marine Science and I look forward to receiving your revision.  
  
Kind regards,  
Dr Mackenzie Gerringer  
Editor, ICES Journal of Marine Science  
gerringer@geneseo.edu, gerringer@geneseo.edu  
  
  
Reviewer(s)' Comments to Author:  
  
**Reviewer: 1**  
  
Comments to the Author are italicized. Responses are provided in regular text.

*I thank the authors for their careful consideration of the previous review, and I think the manuscript is now substantially improved and much clearer as a standalone piece of work (including clear indications where other studies provide needed detail).  
  
My only minor comment remains that the x-axis for Figure 8 is still unexplained. Is this simply showing the number of simulations that led to each output? If so, I think that could be stated and then we don't have to worry about it any more.*

Thank you for this feedback. That’s correct and great to include. We have added a sentence to the caption to explain what the violin plot shape widths indicate.  *In the discussion (lines 646-658), I think you could also consider that your net-based estimates of biomass must be conservative and represent a minimum value (i.e., you cannot catch more than what is really there, unlike errors that may arise from e.g., acoustic sampling), and so represent conservatism in your model outputs.*

If we’re understanding this point correctly, we actually do consider uncertainty in catchability and thus quite a wide range for that parameter (*q*, explained in line 236), so our mean estimates are not conservative or a minimum values, *per se*. Rather, they are calculated to incorporate and reflect that uncertainty. It is also possible that, by chance, some net tows may have disproportionately oversampled high density patches of fishes, which could potentially result in overestimation upon extrapolation to the region in general. (Though it is equally possible that we undersampled functionally important dense patches, and could therefore be underestimating). We adjust some of our wording in lines 656 to 658 to clarify what we mean by overestimate, which your comments helped us see.

*Line 763: I would drop "use" from "use caution". I think your point is excellent here, and the warning should be generalized to everyone.*

Good idea. We have dropped “use” there, line 718.  *Otherwise, the only other edits needed are trivial and should be caught in proofing (e.g., italicizing species names in Fig. 3 legend).*

Thanks! We have italicized species names in the Fig. 3 legend.   
  
**Reviewer: 2**  
  
Comments to the Author are italicized. Responses are provided in regular text.

*General comments to the authors: I think your abstract better reflects the overall contents of your paper now, and with the Title as well. Great job on the Introduction; edits added to the first paragraph succinctly and efficiently contextualize the research need/problem and reads very nicely. The additional information in Methods greatly improves understanding of the analysis of cruise data. I think Figure 5’s readability has improved with the added gray area and description in the figure caption.*

Thank you for your suggestions that led to these improvements! *Line 23: If character limit permits, commas after “zooplankton” and “particles”*

Done, thank you!

*Lines 49-50: Thanks for adding carbonates here! Small note, describe as “excretion of carbonates” since it is a metabolic waste product and not undigested food (egestion); you describe it as excretion later in your Introduction and Methods also.*

Good idea, done!  *Line 84-86: Re-reading this, could you clarify what you mean by “including how fish carbon transport compares with other carbon transport mechanisms” in relation to the sentence previous (Lines 81-84)? Do you mean by how studies choose to quantify and compare fish carbon transport in relation to other carbon transport mechanisms? Is this related to the next half of the sentence, where you describe how the number of pathways considered creates variation in our estimates? If so, this sentence might benefit by being consolidated.*

Those sentences could certainly benefit from clarification—we have clarified (now in two separate sentences) that we mean that studies differ in two ways: 1) in how they compare fish to non-fish carbon transport mechanisms and, 2) in which fish carbon pathways they consider.  *Line 658: Stray letter ‘e’*

Fixed. *Line 719-720: I think this sentence is a valuable summary of clarifying mortality pathways, which ties well with what you introduce in Lines 81-86, and a very good addition.*

Thank you! *General Discussion section comment: Re-reading the revised Discussion I think it could be worth expanding on bioenergetics slightly more, if the Authors and Editor see it worthwhile. To me this was a major highlight in your results with the violin plot in Figure 8 (again: wow!) and contextualizes the biomass uncertainty in a major way, because it is well-established in the literature that obtaining directly measured rates is extremely difficult for mesopelagic fishes. I understand the focus of the Discussion is largely carbon sequestration and biomass, which is completely understandable given the focus of the cruise effort (and what the results revealed)… I am curious what the Authors’ suggestions are for uncertainty as a whole. i.e., if we find ways to reduce biomass uncertainty (great suggestions/directions for this given by the Authors!), what suggestions/focus should the scientific community consider moving forward in terms of bioenergetics uncertainty, if the sum of uncertainty in these parameters nearly equals biomass uncertainty? Given both are mentioned several times in the Abstract, I think something as simple as pointing readers in the direction of papers such as McMonagle et al. (2023), where this is more extensively analyzed/discussed, could be worthwhile here to tie it all together while keeping the discussion focused on the cruise’s main efforts.*

Thanks for your thoughts on this. It is difficult to know what the solution to bioenergetic uncertainty is until various empirical attempts to constrain uncertainty have been tried and we can then see the result of those efforts on the bottom-line estimates. However, it is true that there is much more detailed discussion as to which bioenergetics parameters contribute most in these calculations of fish carbon flux in our 2023 paper. We have edited the header of the first paragraph of the discussion to also include bioenergetics (line 565), and have added a sentence pointing readers to a more detailed sensitivity analysis of specific bioenergetics parameters before coming back to the discussion of which parameters contribute most overall, including biomass-related parameters.  *Supplemental Material comments below:  
  
Line 103: Stray ‘d’ at the end of this table caption… those letters can be slippery!*

Thanks for taking a look at our supplemental materials too. Fixed!  *Line 228, Fig. S3: You could change the color code or legend order to match the order in the revised version of the manuscript here.*

Thanks for catching that! We’ve edited that in our code and figure S3.