Association for the Sciences of Limnology and Oceanography

K. David Hambright, PhD · Editor-in-Chief, *Limnology & Oceanography*
University of Oklahoma · Department of Biology · 730 Van Vleet Oval, 304 Sutton Hall · Norman, OK, 73019 · 405-325-7435
Vicki Pang ·Associate Managing Editor, *Limnology & Oceanography* · lo-edoffice@wiley.com

RE: LO-20-0466 – "Vertically resolved zooplankton biomass and size-structure across a continental shelf under the influence of a western boundary current"

Dear Dr. Schilling,

Thank you for your submission to *Limnology & Oceanography*. Unfortunately, we have decided not to publish your manuscript based on two thorough reviews, which are appended below.

The two reviewers have significant concerns on technical matters, notably that the OPC does not discriminate zooplankton and lack of ground truthing thereof. In addition, the second reviewer comments that the findings are unsurprising, and that the conclusions are not strong enough to warrant publication in *Limnology & Oceanography*.

The journal receives many more manuscripts than we have space to publish. Competition for our limited space is thus intense, and we are consequently unable to give further consideration to manuscripts that do not receive strong endorsement from our reviewers in the initial round of review, even if they possess obvious qualities. We regret to inform you that your paper is one of these.

Thank you for your submission to *Limnology & Oceanography*. We hope the outcome of this specific submission will not discourage you from the submission of future manuscripts.

Sincerely,

Thomas Anderson
Associate Editor
Limnology & Oceanography

K. David Hambright
Editor-in-Chief
Limnology & Oceanography

COMMENTS TO THE AUTHORS

Reviewer 1:

Overall, I really liked this study because it reported a series of high resolution off-shelf profiles of plankton biomass and size structure, coupled to good quality environmental data sets to provide context. The bigger picture view was very nicely done, via a data compilation of surveys across continental shelves around the world. This provided a simply presented and neat conceptual model of plankton attributes across continental shelves, as a neat schematic cartoon (Fig. 8). My main suggestions are threefold and should be easy to address. First to present much more information on what plankton the opc is actually counting and how it processes the data and what units of biomass are presented. This is critically important to the observations. Second, the interpretations of the slope value and what factors produce steep slopes follows on from this and needs to be caveated. Third the basis of the literature compilations could deserve better explanation, and the selected literature expanded, if necessary. I expand on each of these below.

1. What plankton is the opc counting?

It looks like a couple of paragraphs have been missed out in the area of lines 206 to 210 – maybe they were in an old version. What was the size range of particles enumerated? Was any cropping of the ends of the spectrum needed? Was there any identification of the particles? Was every particle measured and included or was their any kind of recognition of zooplankton only and if so, how was this done? Were results expressed as biovolume or carbon mass (this fact needs adding to the figures). The text repeatedly mention the particles as zooplankton, but how were these separated from everything else in the water?

2. How should steep negative slopes of NBSS be interpreted?

This point follows on from the method one above and reflects some of our recent work on NBSS spectra, coincidentally also compiling literature data and also just published in L and O http://dx.doi.org/10.1002/lno.11613. We, as others (e.g. Quinones et al 2003) found slopes to be highly variable depending on the biomass/biovolume unit chosen and also to depend on the size range of particles. You have suggested three references to support a statement made repeatedly in the text: that steep NBSS slopes signify productive systems or ones with high predation. However, other studies have found no such relation (E.g Garcia-Comas et al. 2014, Kenitz et al. 2018) or they have found alternative and often totally opposite relationships (Noguuira et al. 2004, Sprules and Munawar 1986, Rossberg et al. 2019, our above study). I guess it varies and it still seems a bit controversial, perhaps depending on the portion of the size spectrum chosen and the numbers of orders of magnitude of body mass that is assessed. I think the authors should heavily tone down the assertion that steep NBSS slopes signify productive systems or those with high predation – it might go into plankton folklore and nobody ever bothers to properly test it!

3. What was the basis of the literature compilation?

There are clearly masses of published NBSS spectra data now published, and your study reveals ones that our study did not use, but also vice versa. Can the authors explain better in the text what was the basis for the lit compilation? As an example, Nogueira et al. 2004 and Garcia Comas et al. 2014 were very extensive cross shelf surveys of NBSS slopes similar to your own.

These were not compiled and they yielded opposite patterns to those you report (Nogueira) or no clear patterns (Garcia-Comas). It would be useful to expand this literature compilation section if possible, and also improve the explanation (lines 234-235) of how the inshore and offshore representative values were obtained. A caveat also needs to be explained about the ratios (they don't work if one of the NBSS slopes is positive) and the fact that they are ratios not actual NBSS values made clear in Fig 7 (Change (C) Size Spectra slope to Size spectra slope ratio).

Figures. I thought the figures were really great – extremely clear and well presented, as was SI. A little quibble on Fig 1: The grey isobaths don't show up very well – these important so could be better as black and slightly heavier lines.

Reviewer 2:

General comments

The authors towed an optical plankton counter (OPC) on 4 transects across the continental shelf in eastern Australia. They present high-resolution vertical profiles of zooplankton biomass and size-spectra across these 4 transects. The study concludes that, in three out of the four transects, biomass is higher inshore versus offshore, and this is accompanied by steeper size-spectral slopes indicative of higher production/ higher predation. Comparison with results from other locations in the world put the inshore/offshore differences into a global context.

The high-resolution vertical profiles over the strong gradients present across the continental shelf are valuable data. However, the results of higher biomass inshore versus offshore are not novel, these are expected due to productivity gradients. In addition, a significant problem with optical plankton counters is that they count particles, not zooplankton, and discerning marine snow from animals is not trivial. There were no additional measurements done here to ground truth what these particles really were.

The manuscript is largely descriptive of general oceanography and particle sizes/abundance within the Eastern Australia current and adjacent waters.

Specific comments

Introduction
Line 74 – Replace 'southeast' with 'southwest' as the cited paper includes results off of the coast of Brazil.
Line 79 – I would argue that most continental shelves have enhanced production due to upwelling, not river discharge.

Methods
Table 1 – Two tows were done at night and two during the day, yet this is never mentioned in the data interpretation. Diel vertical migration would likely affect the depth-distribution of zooplankton.

Line 205-on. What is the resolution of the OPC? What size is the smallest pixel? Not much detail given on the sampling of the OPC.
How was biomass calculated from the OPC? What equations were used?
How was the data interpolated from the point measurements to obtain the colormaps?
Line 234 – The authors take the inshore/offshore values from previous studies, but do not include the distance. A difference between two stations located 10km from each other is expected to be much less than if they are located 100km from each other. These should be listed with the Table S1.
Table S1 – Citations listed here are not in any Bibliographic reference list.

Results
Line 361 – Southern Diamond Head peaked in Jan/Feb, or Nov, but not in December
Figure 6 – Note the sampling time within the Figure.
Figure 7 – There is no Bay of Biscay south in the legend within the Figure