SoMAS
School of Marine and Atmospheric Sciences

STONY BROOK UNIVERSITY
School of Marine and Atmospheric Sciences
239 Montauk Hwy, Southampton, NY 11968

20 June 2017

Dear Dr Howarth:

We have completed a revision of our manuscript "Seasonal changes in the biomas, distribution, and patchiness of zooplankton and fish in four lakes in the Sierra Nevada, California" (LO-17-0018). We thank you and the anonymous reviewer for your helpful comments, and have attempted to address the concerns you raised. Specific issues that the reviewer raised (bold) and our response to each of them are detailed on the following pages.

We have revised the introduction to discuss more specifically the types of lakes included in our study. While this paper is primarily descriptive, we have also added text in the introduction which states some of our motivating ideas more explicitly as hypotheses.
The reviewer's main concern, about the limited extent of our net sampling, is reasonable. While it is too late to add additional net tows, we have added text in the discussion section pointing out this source of uncertainty more explicitly. We have also added text emphasizing the snapshot nature of the single surveys in Independence Lake and Lake Tahoe.

Variogram analyses of the horizontal transects were included in the original submission. We read the reviewer's remark on on them as an approving comment, rather than a request for additional analyses. Following the reviewer's suggestion, we have re-run the analysis after excluding rotifers and considering only crustacean zooplankton. Changes to the results were minimal.

The acoustic methods in this paper have not seen much use in fresh water, but can't be considered truly novel. The sound-scattering models and multi-frequency techniques we used are standard practice for larger acoustic surveys. The use of the high-frequency 710 kHz echosounder to observe small lake zooplankton has already been described in *Limnology & Oceanography: Methods* (Warren et al. 2016). While our results are primarily descriptive, we believe they still have value, by quantifying the biomass of multiple trophic-levels of an aquatic ecosystem simultaneously, establishing an ecological baseline in several sensitive and/or little-studied lakes, and by revealing the presence of spatial heterogeneity, which we hope stimulates further research on the causes of patchiness in small lakes. For these reasons, we believe this paper is a better fit for *Limnology & Oceanography*.

Finally, the difficulties in finding reviewers may be partly due to the aforementioned dearth of freshwater acousticians, so we have compiled a list of other potential reviewers (provided at the end of our response). Though they work primarily in marine systems, they are all well qualified to review papers involving acoustical observations of fish or zooplankton.

Thank you again for your time and comments.

Sincerely,
Joseph D. Warren

Joseph D. Warren, Assistant Professor
School of Marine and Atmospheric Sciences
Stony Brook University

ph 631.632.5045 fax 631.632.5070
joe.warren@stonybrook.edu
http://www.msrc.sunysb.edu/~warren

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Page 3, line 41 Sarnelle and Knapp 2005: not a pertinent reference
This reference has been removed.

line 42 Masson et al. 2001 have analysed spatial variation of both zooplankton and YOY perch in Lake Annecy, an alpine lake, using echosounding for fish and continuous sampling recorder for zooplankton.
This sentence has been rewritten to make it clearer that Masson et al.'s study is an exception to our statement, i.e. one of the few to examine fish and zooplankton at similarly high resolution in a high-altitude lake.

Page 4, line 87 Zooplankton TS and fish TS values
Typo corrected, text changed as suggested.

Page 5, line 106 September 2014
Corrected.

Page 6, line 138 October 2013
Inserted the year.
line 142 Refer to Figure 1
Reference to Figure 1 added.

Page 8, line 197 lake.
Extra period deleted.

Page 10, line 259 The unidentified rotifers are not presented in figure neither considered with acoustic sampling.
Rotifers have been removed from the analysis and the results.

Page 10, line 260
Rewritten to emphasize that sampling was repeated in Cherry and Eleanor.

Line 268 June and September 2014
Inserted "2014"
line 270 Lake Eleanor in June 2014
Corrected "April" to "June"
line 275 between -113 and 127 dB.
Corrected "-111" to "-113"

Page 11, line 281 - 40 and -36 dB
These fish TS values have been corrected.

Joseph D. Warren, Assistant Professor
School of Marine and Atmospheric Sciences
Stony Brook University

ph 631.632.5045 fax 631.632.5070
joe.warren@stonybrook.edu
http://www.msrc.sunysb.edu/~warren

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Page 12, lines 322 Not right. Zooplankton biomass in Lake Cherry was 23 000 kg the previous autumn.
"similar to the previous autumn" has been deleted.

Page 13, line 344 0.73
Value has been corrected.

line 347 In October 2013
Changed to "October."
line 358 September 2014 (no sampling in August)
Changed to "September."

Page 14, line 388 variability or variation
Typo corrected.

Page 17, line 488 Urmy et al. 2016).
Inserted period.

Page 19, line 529 De Robertis and Higginbottom 2007 not listed in references
Our bibliography software alphabetized "De Robertis" under "R" instead of "D." It has been moved up.

Page 20, line 545 Daphnia population
Page 21, line 577 Macrohectopus branickii
line 587 Chaoborus
line 605 Mysis relicta
Page 22, line 637 Holopedium gibberum
All species names have been italicized.

Page 23, line 634 tabulation
Tabulation has been corrected.

Page 25, Table 1 Add the sampling dates in Table 1 as in Table 2
Sampling dates have been added to this table.

Page 31, Figure 3 Diaphanosoma, Eurytemora, Pseudosida, Eurycyclops Genera names should be in italic
This figure is now table 2. The names of all genera are now italicized.

Other relevant papers to consult:
We thank the reviewer for these suggestions and have incorporated them appropriately in the manuscript.

Joseph D. Warren, Assistant Professor
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Stony Brook University
ph 631.632.5045 fax 631.632.5070
joe.warren@stonybrook.edu
http://www.msrc.sunysb.edu/~warren

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Additional reviewers with expertise in fish and zooplankton acoustics are listed below. An asterisk indicates those with whom we (JDW and SSU) have collaborated with in the past 5 years.

Alex De Robertis, NOAA Alaska Fisheries Science Center
alex.derobertis@noaa.gov

Patrick Ressler,* NOAA Alaska Fisheries Science Center
patrick.ressler@noaa.gov

Kelly Benoit-Bird,* Monterey Bay Aquarium Research Institute
kbb@mbari.org

Nils Olav Handegard, Institute of Marine Research, Norway
nilsolav@img.no

Elliott Hazen,* NOAA Southwest Fisheries Science Center
elliott.hazen@noaa.gov

Amanda Kaltenberg, Savannah State University
kaltenberga@savannahstate.edu

Kevin Boswell,* Florida International University
kevin.boswell@fiu.edu

Gareth Lawson, Wood Hole Oceanographic Institute
glawson@whoi.edu

Andone Lavery, Wood Hole Oceanographic Institute
alavery@whoi.edu

Lars Rudstam, Cornell University
lgr1@cornell.edu

Anthony Cossio, NOAA Southwest Fisheries Science Center
anthony.cossio@noaa.gov

Malinda Sutor, Louisiana State University
msutor1@lsu.edu

Sandra Parker-Stetter,* NOAA Northwest Fisheries Science Center
sandy.parker-stetter@noaa.gov

Joseph D. Warren, Assistant Professor
School of Marine and Atmospheric Sciences
Stony Brook University

ph 631.632.5045 fax 631.632.5070
joe.warren@stonybrook.edu
http://www.msrc.sunysb.edu/~warren