14-Aug-2017  
  
Dear Dr Sobocinski  
  
Your paper EC-17-05-111 "Using a qualitative model to explore impacts of ecosystem and anthropogenic drivers upon declining marine survival in Pacific salmon" has been reviewed. The reviewer comments are included at the bottom of this letter.  
  
The reviewers have recommended publication, but we require some minor revisions to your manuscript. I therefore invite you to (1) respond to the  comments in the space provided and (2) revise your manuscript within 30 days. If you do this satisfactorily I will proceed with editing. Attached is Environmental Conservation's author style guide. Use this document in preparation of your revision. If your paper does not conform to style it is likely to be referred back to you. Please pay particular attention to the quality of figures required for publication. If you have any problems, please contact the Editorial Office at [envcons@btinternet.com](mailto:envcons@btinternet.com).  
  
To revise your manuscript, log into <http://mc.manuscriptcentral.com/envcon> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." You should respond to all the reviewers’ comments and note changes made in the space provided. Please then delete any redundant files before completing the submission.  
  
EndNote: If your manuscript was prepared using EndNote, please disable this and read the attached document to ensure files are in the correct format for publication.  
  
Thank you for submitting your manuscript to Environmental Conservation, I look forward to receiving your revision.  
  
Yours sincerely  
  
Prof. Nicholas Polunin  
  
Editor in Chief, Environmental Conservation  
  
  
Editor in Chief comments:  
  
Your paper is looking good but I would like you to attend to the changes in the attached scan, and note that the dpi resolution of Figure 2 is too low (please refer to Instructions for Contributors).  
  
  
Associate Editor Comments to the Author:  
  
Dear Dr Sobocinski  
  
We have received two reviews of your manuscript that are in agreement about it's quality and interest; however both have a few additional points they would like to see addressed in a revision, specifically relating to wording and context. If you can address each of these points in a revised manuscript I would greatly appreciate it.  
  
Regards  
  
Aaron MacNeil  
  
  
Reviewers' Comments to Author:  
  
  
REVIEWER 1  
  
The authors have prepared a very interesting paper that draws on qualitative network modelling to examine the relative importance of different drivers in contributing to observed declines in Pacific salmon. Their paper is very well done, and I only have a few minor suggestions.  
  
1) On page 12 (line 228), the authors suggest that the strength of response is related to the relative proportion of model runs where a particular outcome is observed for each variable. I think using "strong" and "weak" to describe the outcomes from qualitative network models somewhat misrepresents them. I believe what the authors refer to as a strong (weak) response is actually more of a consistent (inconsistent) response, and I would suggest they change their wording throughout.

We have clarified the language throughout. And yes, consistency in response is more accurate than strength, since the evaluation is of the proportion of models with positive/negative response for a given variable.

2) In the methods section (page 6, starting on line 101), I have a couple questions about how the conceptual model was created. Who were the experts engaged? What groups did they represent? Were any resource users included? Were they intimately involved throughout model construction or only consulted at key stages?

Additional information about the development of the model has been added (lines 100-114). Because the *Salish Sea Marine Survival Project* has an advisory technical team (~20 people), we relied heavily on the members for feedback, and when necessary, we reached out to other resource management agencies (e.g. the Washington State Department of Ecology, Fisheries and Oceans Canada, and others). Small meetings with experts on specific model components (e.g., oceanography) helped refine the relationships in the model further. Versions of the model have been presented at regional scientific meetings and further improvements resulted from those experiences.

3) Page 11 (line 211), I believe the relationship between network stability and connectance has been shown by Dunne et al. for food webs, specifically. Is it also valid for the types of networks in the paper (i.e., food webs mixed with other types of nodes and linkages)?

While the idea of connectance seems primarily applied to food webs, the idea of connectedness and centrality is used in other network literature. I have added some references.

4) I would suggest adding two subsections to the discussion to highlight a few important points. First, I would highlight how the outcomes of research inform future research efforts. The authors note this as an important use of qualitative network models earlier in the paper. Second, I would highlight the implications of the research for management and policy. The relationship between harvest and survival is particularly interesting, and I would challenge the authors to critically engage with what this could mean for management and policy.

A paragraph about continuing research efforts and the utility of the model has been added (lines 363-373). The linkage between harvest and survival mentioned by the reviewer is an interesting finding, but harvest in this region is currently low and this result is more interesting in how feedbacks through the food web were captured in the model than for management purposes. But, we have added a few sentences about using the model as a communication tool with diverse audiences.

REVIEWER 2  
  
This manuscript describes the application of a qualitative network model (QNM) to compare the relative influence of various environmental, ecological and anthropogenic drivers on Pacific salmon survival in the Salish Sea. The authors perturb individual driver nodes and a suite of driver nodes to simulate individual and cumulative effects of the drivers on salmon survival. This QNM approach is useful for working with complex, nonlinear system that have sparse or disjointed data. The approach can be useful for highlighting key variables/indicators to track when attempting to understand a complex set of drivers influencing outcomes of concern. Though the approach is considered qualitative, when applied in the manner and with the rigor that the authors used (as evident in the first supplementary table), considerable quantitative data and information on interrelationship between variables is used, thus ensuring the model is applied in an objective manner.  
  
The text of the manuscript was clear and flowed logically. The figures and tables were informative. The approach described is not entirely novel, but the application for using this approach to consider cumulative effects is novel. The approach has broad applicability to wider array of environmental and ecological issues.  
  
Points for minor revisions:  
  
Line 58 – “ongoing” should not be hyphenated

Changed

Line 216 – “…self-limiting loop to aid in model converge” – There are likely good a priori ecological and environmental reasons for including some (and maybe most) of the self-regulating loops.  IF that is the case, the authors should note that most of these loops have a good justification and only discuss the ones that were necessary for model convergence.

We gave this considerable thought during the model construction phase. In the case of the biotic components, the addition of the loops made good sense. But even when we started thinking about abiotic variables, the addition of these loops was logical (e.g., sunlight is not unlimited, but controlled by diel and seasonal cycles) and we included them on all components, as other researchers have with QNMs. Additional wording has been added.

Table 2 – This was a bit confusing as it is referenced in the Methods (Invoking Perturbations subsection) as well as the results. Perhaps the first 3 columns would be suitable as a Methods Table and the Response variable columns would be in a Results Table.  
In addition for Table 2, the key was part of the table and took a bit of figuring out. Perhaps the response key could be more explicit (as in Table 4).

Due to the Journal’s limits on tables and figures, I am inclined to keep the table as one, rather than splitting it out. However, I did re-design the key to stand out more, as the reviewer suggests.

Figures 1 & 2 – When printed “as is” the text on these figures was very small and difficult to read.

Will work with publications to improve this; font size in Figure 1 has been increased.  
  
Appendix 3 – In the last row of the table – “SSMP Hypothesis” is an unclear reference.

A proper citation for disease impacts to juvenile salmon has now been entered here.

Appendix 4 – Although this is a large figure, it is addressing one of the main point of the analysis – to consider perturbations to individual driver nodes. Consider including in the main body rather than the supplementary materials.

I agree with the reviewer that this is an important figure, but given the Journal’s limits on figures, I do not know if this would be possible to include without excluding something else, and because of its size, we opted to place it in the supplementary material. Additionally, the material presented in these plots is summarized in Table 2.