**ANNEX A: Blue Paper Technical Review Form**

Date: 28 AUG 2019

Title of Blue Paper: Blue Paper 2: The expected impacts of climate change on the ocean economy

Reviewer: 1

**Overarching Questions**

Reviewers are requested to answer the following questions to assess the overall analytical quality of the contributing paper

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| 1. Analysis: Are there any concerns, flaws in logic, or gaps in empirical basis, calculations or theoretical reasoning? |
| This is a well-written and quite comprehensive treatment of the subject, full with relevant facts and new analyses. My main concern is that several of the key analyses are new to this paper and have not been peer reviewed (the method details presented here do not allow for full evaluation). As such the BP deviates from IPCC and other comparable panels that only include peer reviewed published work in their assessment. I thus urge the authors to be more cautious in their conclusions and base them largely on published and less so on their unpublished work presented here, while appropriately caveating the unpublished works.  There are also some gaps in the literature that is included. I note that the new IPCC report on oceans and climate change is coming out next week, this should be considered when revising the paper. Likewise results of the FISHMIP Model intercomparison project seem very relevant but are not treated here, see for example  Bryndum-Buchholz A et al. (2019) Twenty-first-century climate change impacts on marine animal biomass and ecosystem structure across ocean basins. Global Change Biology 25:459-472  And  Lotze HK et al. (2019) Global ensemble projections reveal trophic amplification of ocean biomass declines with climate change. Proceedings of the National Academy of Sciences 116:12907-12912  I am also not convinced by the mariculture analysis. It does not account for increasing temperature variability, storminess, and disease prevalence all of which are already severely limiting the profitability of existing mariculture facilities in a number of countries I am familiar with. If climate change was only characterized by an increase in temperature, this would not pose a problem, but certainly these other dimensions do pose significant barriers to mariculture sustainability and expansion.  Likewise, the coral reef tourism analysis seems too superficial to be all that useful as a guidepost. I note that coral cover loss in major reef tourism areas (e.g. GBR and Caribbean) already far exceeds the projections included in their analysis.  I am also missing a mentioning of protected areas as an insurance strategy to hedge against large uncertainty on the effects of climate change on marine ecosystems and their economic services, e.g.  Roberts CM et al. (2017) Marine reserves can mitigate and promote adaptation to climate change. Proceedings of the National Academy of Sciences 114:6167-6175  Finally, I am strongly suggesting addressing in detail the impacts of sea level rise and increased storminess on marine infrastructure, such as ports, marinas, offshore energy, and aquaculture operations. The IPCC report to come out next week might be a source here, they predict a 100-1000-fold increase in flood risk, for example.  Thinking about the ocean economy more broadly, I feel that these threats to basic infrastructure are probably the costliest, and potentially most disruptive of all the impacts discussed. While this is mentioned in passing in some of the sections, the potentially overriding importance of this factor to the ocean economy as a whole does not come out at all. Please add a dedicated, data-rich section on this. |
| 1. Content: Is the paper clearly written, structured, with a logical presentation, and easy to read? |
| Yes, this is very nice to read and aimed at a general audience. I liked that it is very data rich and the right amount of detail is included. It’s a comprehensive yet highly focused summary of available information. |
| 1. Content: Does the paper provide a fair and comprehensive treatment of the topic? Are the conclusions justified? Are the recommendations based on the content?   Generally yes, but there are some important gaps that I have identified above that need to be addressed. |
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| 1. Eligibility for public distribution: Does the paper require minor/major revisions before it is ready for public distribution?   I think it requires a major revision of content, but not of language, which is already very appropriate for a general audience. |
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The issues below are suggestions for the reviewer to consider.

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| **List of issues to be checked** | **Yes/No** | **Comments** |
| Were assumptions clearly identified? | No | Incomplete assumption in new analyses |
| Is the methodology explained in a transparent way? | Yes | But not enough detail to fully evaluate |
| Are quantitative and qualitative sources referenced appropriately and thoroughly? | Yes | Except some gaps in cited literature identified above |
| Does the research effectively address relevant gender aspects? | No | This does not come up |
| Are there significant and relevant issues that are missing from the paper? | Yes | See comments above (section 1) |
| Are there any faults in empirical basis, calculations or theoretical reasoning? | No |  |
| Is the information contained in the document up-to-date? | Yes | But check IPCC report to be published 25 SEP 2019 |
| Does the manuscript present original material and/or an original viewpoint or if it is a synthesis is the methodology comprehensive and appropriate? | Yes | It’s both |
| Was sensitivity analysis performed where applicable? | No | Analyses are very bare bones, and qualify in my view as back-of-the-envelope, which is fine for here, but needs to be appropriately caveated. |
| Are you aware of any reputable evidence that contradicts the arguments presented in the paper and is not mentioned? | No |  |
| Are the conclusions and recommendations supported by the evidence? | Yes | But incomplete, see comments in section 1 above. |

**3. Memo for specific comments**

The following table is intended to facilitate the work of the reviewers, arbiters and authors and we kindly request you to use this format. This provides space for specific comments, suggestions and responses from the author. The memo will be used to inform the sign-off.

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| Ref. no. | Page/ Para/ Line | Comment | Suggestion | Author Response |
|  | P 18 | I really disagree with this conclusion: “little is known about the impacts of large-scale mariculture on marine ecosystems, regulations on mariculture have tended to be precautionary” | There is an enormous literature on the effects of mariculture on marine ecosystems, yet regulations in countries that I am familiar with have not been precautionary. It’s been largely a trial-and-error expansion, often with boom-bust cycle dynamics. Examples include pennaeid shrimp aquaculture in South Asia, salmon aquaculture in Chile and Canada |  |
|  | P 28 | 31 trillion seems a large overestimate and it is certainly not 2.5% of global GDP, which is around 80-90 trillion | Please check and revise all GDP numbers |  |
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