Thank you for submitting your manuscript to PLOS ONE. After careful consideration, we feel that it has merit but does not fully meet PLOS ONE’s publication criteria as it currently stands. Therefore, we invite you to submit a revised version of the manuscript that addresses the points raised during the review process.

Although I was only able to procure one review, it is a very thorough one and I am willing, based on the quality of that review, to render a decision.  I agree wholeheartedly with the concerns raised by the reviewer and ask the authors to provide a point by point rebuttal to those comments.  I also appreciate this useful contribution and look forward to a revision.

We would appreciate receiving your revised manuscript by Jan 30 2017 11:59PM. When you are ready to submit your revision, log on to [http://pone.edmgr.com/](http://pone.edmgr.com/" \t "_blank) and select the 'Submissions Needing Revision' folder to locate your manuscript file.

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Kind regards,

Robert Guralnick

Academic Editor

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**Reviewers' comments:**

Reviewer's Responses to Questions

**Comments to the Author**

1. Is the manuscript technically sound, and do the data support the conclusions?

The manuscript must describe a technically sound piece of scientific research with data that supports the conclusions. Experiments must have been conducted rigorously, with appropriate controls, replication, and sample sizes. The conclusions must be drawn appropriately based on the data presented.

Reviewer #1: Partly

2. Has the statistical analysis been performed appropriately and rigorously?

Reviewer #1: Yes

3. Have the authors made all data underlying the findings in their manuscript fully available?

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Reviewer #1: Yes

4. Is the manuscript presented in an intelligible fashion and written in standard English?

PLOS ONE does not copyedit accepted manuscripts, so the language in submitted articles must be clear, correct, and unambiguous. Any typographical or grammatical errors should be corrected at revision, so please note any specific errors here.

Reviewer #1: Yes

5. Review Comments to the Author

Please use the space provided to explain your answers to the questions above. You may also include additional comments for the author, including concerns about dual publication, research ethics, or publication ethics. (Please upload your review as an attachment if it exceeds 20,000 characters)

Reviewer #1: This study represents a really interesting and thorough comparison of marine species distributions from two different source, AquaMaps and IUCN range maps and – as part of the AquaMaps team of developers – I consider the developed analytical assessments are very useful for providing diagnostic metrics and indices and the obtained results are very useful from our perspective. However, I have some concerns about the definition or underlying assumptions that the authors have made with respect to AquaMaps predictions, that I think would be important to clarify throughout the paper.

First of all, AquaMaps predictions do not actually necessarily represent the area of occupancy of a given species. Instead, if used in a manner as done in this study (namely simply converting each cell with a predicted probability > 0 into a presence cell) the AquaMaps approach also delineates extent of occurrence from occurrence record with boundaries based environmental borders rather than a polygon drawn by an expert (that may or may not also take environmental factors into account). Based on validation analyses to date (Kaschner et al, 2006, Ready et al, 2010, Kaschner et al, 2011), area of occupancy is probably better represented for most species using a probability threshold >0.6. As a consequence of this, I think, one of the assumptions made by the authors, namely that they would expect Aquamaps ranges to be smaller than IUCN ranges leads to somewhat misleading conclusions to be drawn from the findings of this study.

Secondly, I think it would be very important to distinguish between limitation of the AquaMaps approach/methodology itself (of which there are, of course, also plenty) and a limitation of input parameter settings. Like other models, AquaMaps is only as good as its input data – and this is in many cases more than suboptimal. Some general assumptions made for the default maps, like the FAO boundary settings, lead to artefacts as shown in this paper and it’s very useful for this to be highlighted and definitely represents a short-coming of our current data set. However, the analyses conducted in this study do not actually allow an assessment of the overall methodology – which strongly emphasizes the importance of expert-review of input parameter settings to deal with the short-comings of all input data (including the external lists of FAO area occurrences for different species that are used in part to define the so-called bounding boxes for each species). So, to truly assess the match between expert-derived IUCN range maps and AquaMaps, it would have been informative e.g. to also compare the subset of AquaMaps expert-reviewed maps with IUCN ranges. The coral example shown in this study is a very good demonstration how the incorporation of known environmental preferences (here with respect to depth) in IUCN range maps actually results in a much closer alignment of both data sets. One of the conclusions drawn from this comparison by the authors is that IUCN range maps could be further improved by incorporating information about temperature and salinity boundaries – which is essentially what AquaMaps already attempts to do.

AquaMaps and IUCN range maps are essentially aiming to achieve the same thing, namely to somehow delineate species ranges (and in the case of AquaMaps - also gradients of relative occurrence) derived from similar sources of information – occurrence records combined with expert knowledge. While the focus of IUCN maps lies on the incorporation of expert knowledge in geographic space (with some – but not clearly defined – consideration of habitat usage), AquaMaps invites the incorporation of expert knowledge in environmental space. Obviously, as stated by the authors, neither approach represents the true distribution of a species, however, I think that this analysis would be a great opportunity to actually encourage closer collaboration between AquaMaps and IUCN species experts to a.) increase the number of expert-reviewed maps and b.) to move towards a more transparent and reproducible approach for describing species maximum ranges based on expert input.

While the latter point is not something that the authors necessarily need to address (this would be more a wish list from our perspective), I think the first point about the confusion of Area of Occupancy and Extent of Occurrence may lead to some misleading conclusions to be drawn from this analysis that I think should be addressed before publication.

More specific comments are included below

28 ‘demonstrate that AquaMaps methodology can produce odd discontinuities at the extremes of a’

Perhaps replace by ‘show’ and ‘default settings’ rather than ‘methodology’

53 – add ‘supplemented by expert knowledge’

67- hundreds of studies might be an exaggeration?

114 – as indicated above actually AQ maximum range extent, by definition, would generally correspond to Extent of occurrence. Based on validation analysis, area of occupancy would be better described using a probability threshold of 0.6

260 – actually based on my knowledge, IUCN specifically extends species ranges of coastal species outwards (based on a distance to land metric) to allow visual representation of these ranges on global maps. What’s perhaps missing there is a disclaimer to make people using these maps aware of this.

285 – this is what AquaMaps already does!!!!

310 – interesting metric, however, extrapolation in environmental space maybe better metric

Case study MPA gap analysis – this is not really surprising, if you’re looking at the proportion of distribution protectedthe larger the base area (i.e. IUCN range extent or AQ = 0%) the smaller the proportional are protected.

Fig 1 A – am not sure where you would be getting the number of 166 marine mammals. AQ does not yet cover all recognised marine mammals, partially because many of the new species are actually newly split subspecies that were formerly defined as one species (e.g. Sousa chinensis and S. plumbea). However, even the most up-to-date source of marine mammal taxonomy – The Society for Marine Mammalogy’s ad hoc Committee on Taxonomy, only lists 126 marine mammal species and 5 to 6 of those (depending on your definition) are considered to be freshwater only species

Fig 2 B – which terrestrial mammals are you including here – to my knowledge AQ doesn’t include any terrestrial mammals (unless you’re counting the sea otters as terrestrial?)

6. If you would like your identity to be revealed to the authors, please include your name here (optional).

Your name and review will not be published with the manuscript.

Reviewer #1: Kristin Kaschner

[NOTE: If reviewer comments were submitted as an attachment file, they will be attached to this email and accessible via the submission site. Please log into your account, locate the manuscript record, and check for the action link "View Attachments". If this link does not appear, there are no attachment files to be viewed.]

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