The Cryosphere

Open Access

EGU

Discussions

Interactive comment on "Sea-Ice Indicators of Polar Bear Habitat" *by* H. L. Stern and K. L. Laidre

Anonymous Referee #1

Received and published: 2 June 2016

I find the work to be both interesting and useful. The methods applied are robust and for the most part, clearly presented.

The introduction would benefit from some additional context and referencing. Use of the literature was acceptable but weak for many issues. Many will not be familiar with the issues being raised nor with polar bear ecology and thus, a fuller use of the literature and key points would be useful (e.g., what do polar bears hunt, do they migrate, mating season etc.). There is merit to a fuller examination of existing analyses and acknowledgment of scientific priority of the approach undertaken. Excess use of self-citation does not put the work, which is solid and useful, in context. Further, how this approach may (or may not) be useful to other taxa would be helpful. Further context for what the ice metrics may mean for polar bears would be useful. What are the possible consequences on reproduction, survival, or population trend. A couple of sentences would aid most readers understand the significance of the study, which is very polar

bear centric.

The manuscript would benefit from a clearer statement of the objectives.

13 – I would remove the term "distinct" – this cannot be meaningfully interpreted – further, the term distinct is not used on line 38-39

15 – it is somewhat simplistic to say that polar bear phenology is tied to sea ice. Their phenology is also linked to day length (circannual rhythms), physiological processes, etc. Tied sounds like cause-effect to me but perhaps just soften the wording and replace "tied".

58 – some further clarification would be useful here on the "need to develop" – the logic isn't particularly well developed and it may be worth referencing Vongraven, D. et al. 2012. A circumpolar monitoring framework for polar bears. Ursus Monograph 5:1-66.

Further, it would be useful to put this study in the context of other marine species. Do the proposed metrics work for seals, seabirds, whales etc.? As written, the work is narrowly focused on polar bears yet the applicability is broader and there would be great uptake and use of the work if it could be generalized a bit.

67 – use the primary literature Wiig et al. 2015 is a secondary citation.

72 – "behaviorally tied" – given that the journal's audience may not be familiar with the species, some details would be useful.

75-6 – provide citations – this is a well documented area and not an original or new idea

89-92 – SSM/I is well documented to perform poorly during break-up and freeze-up – this issue should be discussed more fully: in particular, bias in the data. I agree, however, that the bias is likely consistent across space and time so the trends are likely valid and thus, this is not a central concern for the manuscript's validity.

100-106 – the reasons for the bathymetry data are not clearly articulated. Why is

bathymetry data useful? It is only clear further down (line 115) but for flow, please introduce this in the objectives.

102 – sea ice is defined using 15% ice cover but many studies show that polar bears don't use ice cover < 30% or even 50%. Some justification from the literature is warranted. Further, ice cover during freeze-up is different that ice use during break up (Cherry, S.G. et al. 2013. Migration phenology and seasonal fidelity of an Arctic marine predator in relation to sea ice dynamics. Journal of Animal Ecology 82:912-921.)

121 – what the outlier discovery was interesting, it's not central to the study and the last sentences of this paragraph could be removed.

141 – The manuscript presents data for Baffin Bay yet no reason for this was given. The other populations are available in the appendix but the focus on Baffin Bay might warrant a bit more information about this population for background. This is not essential but for those unfamiliar with the polar bears there, it may be useful context (e.g., is this an area that is ice-free is summer or not).

183 – "Most of the trend are statistically significant." – could you give a % (x /76) (i.e., 4 metrics for 19 populations =76) OR for each of the metrics individually (preferred).

183-87 – some clarification of + and – mean might be useful. The – for retreat means earlier and advance means later but "advance" being a positive number made be stop and puzzle the result. You could simply put "(i.e., earlier)" and "(i.e., later)" to aid clarity.

223-229 – this is not a result but discussion. There are many sources that can be cited for this paragraph. This is not a new finding and presenting it as such ignores the literature.

285 – the present study is very similar in form and analysis to Parkinson, C.L. 2014. Spatially mapped reductions in the length of the Arctic sea ice season. Geophys Res Lett 41:4316-4322. doi:10.1002/2014GL060434. I suggest a more thorough comparison of the present manuscript and the published work is undertaken at the start of the

discussion. This sort of analysis has been conducted for many polar bear population and greatly predates The Laidre et al. and Heide-Jorgensen et al. works given priority in the discussion. A fuller coverage of the issue would be useful (i.e., move the cursory treatment of similar studies forward in the discussion for proper context). This field of study has been considered for many Arctic species well before 2012 and it is appropriate to acknowledge scientific priority at the start of the discussion (i.e., not half way through in passing).

289 – narwhal is missing its binomial name.

344-46 – What is mean by "low variability" or "high year-to-year variability" – was this measured (could CV be used or other method (SE, SD)).

397 – "relevance to marine mammals" – non-mammalogists may not have much insight to what species you are referring to. A brief list or examples might be useful (perhaps highlighting the most sensitive species and referencing other studies for this sensitivity).

406-420 – I found this repetitive and could be removed without loss.

430 Obbard et al. 2010 is gray literature – please use core peer-reviewed works to support this statement (of which there are many).

_____