

Final Peer Review Report for the Endangered Species Act Status Review of the Leatherback Turtle

The following scientists provided external (non-NMFS) peer review of the Endangered Species Act Status Review (i.e., the Status Review Report) of the Leatherback Turtle:

- Ana Barragán, La Comisión Nacional de Áreas Naturales Protegidas
- Kara Dodge, New England Aquarium
- Angela Formia, Wildlife Conservation Society
- Matthew Godfrey, North Carolina Wildlife Resources Commission
- Milagros Lopez Mendilaharsu, Fundação Pró-TAMAR (Tartarugas Marinhas)
- Muralidharan Manoharakrishnan, Dakshin Foundation
- Ronel Nel, Nelson Mandela University
- Andrea Phillott, FLAME University
- Nicholas Pilcher, Marine Research Foundation
- Pilar Santidrián Tomillo, The Leatherback Trust
- Kelly Stewart, The Ocean Foundation
- Joca Thomé, Centro TAMAR-ICMBio (Chico Mendes Biodiversity Conservation Institute)
- Bryan Wallace, Ecolibrium, Inc.
- Lindsey West, Sea Sense

The peer-reviewers provided the following answers to the questions asked in the Terms of Reference. Some provided edits in the Status Review Report. We responded as necessary and within the Status Review Report.

**Terms of Reference
for the Peer Review of the
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Evaluate the adequacy, appropriateness, and application of data used in the Endangered Species Act Status Review of the Leatherback Turtle (i.e., the Status Review Report).

1. In general, does the Status Review Report include and cite the best scientific and commercial information available on the species, its biology, stock structure, habitats, threats, and risks of extinction?

Yes.

2. Are the scientific conclusions factually supported, sound, and logical?

Yes.

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

Yes. However, there is a paragraph in Section 8.1.1 that compares nester estimates from different studies but it is a bit confusing. I suggest res-structuring this paragraph.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

Yes.

5. Are uncertainties assessed and clearly stated?

Yes.

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Yes, this report include the most relevant papers published to the date. I have added just a few references which can complement the information available for this DPS (see attached document).

2. Are the scientific conclusions factually supported, sound, and logical?

Yes, conclusions were based on sound and logical arguments and were supported by the best available information and scientific published data.

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

Yes, all opposing studies and possible scenarios were acknowledged and discussed thoroughly in this report.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

Yes, results and conclusions were presented in a clear manner and supported by the best information available.

5. Are uncertainties assessed and clearly stated?

Yes, all uncertainties were clearly explained and discussed when necessary.

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Yes

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

Yes

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

Yes

5. Are uncertainties assessed and clearly stated?

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Yes. However, I have added a couple of references that could also be included in some parts.

2. Are the scientific conclusions factually supported, sound, and logical?

Yes, and they are in agreement with other assessments.

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

I do not think there were any opposing scientific studies or theories. I find that all available scientific studies have been discussed appropriately.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

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5. Are uncertainties assessed and clearly stated?

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The literature cited was very broad across peer reviewed and grey literature, many of the references I had to look up. However, where I had difficulty reconciling the conclusions because the same weight was given to an obscure student conference abstract ten years ago vs current published peer-reviewed literature. So information was not scaled based on the source.

Response: added many references to cite most recent and best available data; we weighed peer-reviewed studies greater than unreviewed abstracts.

2. Are the scientific conclusions factually supported, sound, and logical?

I was not convinced. Three examples -

- a) Leatherbacks in Mozambique (one population with the same individuals nesting on either side of the border: number of nests over the last three years = 31, 34, and 36 nests. Because of very poor sampling effort (not taken into account) a clutch frequency of 2.5 is used which totals to 45 individuals. So per year 31, 34 and 36 nests are laid by 45 individuals. Does not make sense.

Response: used South Africa data on clutch frequency in index of abundance but reflected both in the text.

- b) "We conclude that coastal erosion, foot and vehicle traffic, and artificial lighting are threats to this DPS." (Section 8.2.1). I think there is reasonable evidence that erosion affect turtle nests (it is the nature of a dynamic habitat). Out of the 400 km beach driving is extremely limited and take place (mostly) on the low shore. There are no developments but two sets of lights that shine onto the beach. IT is not a reasonable conclusion to state that all three these factors pose a threat. I was not able to work when there is GOOD conservation and some mortality, even incidental, then the conclusion was that a factor posed a threat. What was the threshold to make this conclusion? It was thus overtly negative.

Response: Coastal erosion and beach driving are problems in Mozambique; we added language to reflect uncertainty, where applicable, and the lesser extent of threats on South African beaches

- c) A modelling study indicated (S Tomillo et al 2015) indicated that even a 5oC temperature change will have no adverse effects on emergence success, because there is redundancy. However, if they do not change phenology it may be a problem... The conclusion, in spite of the literature, is that increased temperatures is a threat to the DPS.

Response: changed wording to reflect uncertainty. We also indicate the uncertainty that is communicated by the authors of the paper: Instead, nesters may shift their nesting season to months (e.g., July through October) when temperature and precipitation would be similar to current conditions of the current nesting season (i.e., October through January); however, the authors cautioned that because nesters do not change their nesting habits in response to oceanographic conditions, they may not change their nesting habits in response to climate change either (Santidrian Tomillo *et al.* 2015).

It appears that the conclusion was made before the evidence was provided and that it was not critically applied.

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

Nope. See the documents for specifics, but Thorson et al 2012 (ref included in comment section) contradicts about half of the current conclusions and were not mentioned.

Response: Added Thorson et al 2012 to reflect opposing scientific study; we added citations and information to weigh all evidence.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

I agreed with the conclusions but not for the reasons provided. For example – the SWIO population has ~ 900km of coastline it is currently nesting on with higher density on about 400km of this. There is an additional nearly 2000km of coastline the species can extend into south (if it does not change phenology). It also has three ocean basins it can forage in. However, the conclusion is that there is little resilience as the population nest along a “single coast” with no subpopulation. It is not clear to me how this can be better?

Response: We expect some diversity based on the long stretch of coastline, so there is some resilience; however, environmental changes (e.g., sea level rise) may affect the entire population. We revised the text to reflect the uncertainty, but listed the potential threats as required under the ESA.

5. Are uncertainties assessed and clearly stated?

Only where no data were available. Too much emphasis on grey literature that were treated with the same confidence as peer-reviewed literature.

Response: added more citations and placed greater emphasis on peer-reviewed literature

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Yes, the Status Review Report is well documented and to my knowledge includes the best available information.

2. Are the scientific conclusions factually supported, sound, and logical?

Yes, the analyses are careful and conclusions are within the scope of the data presented.

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

In general yes, for some topics there are very new information that probably needs to be included (comments in the document). I'm not aware of many opposing theories regarding the Eastern Pacific leatherback, but various views are considered.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

Completely.

5. Are uncertainties assessed and clearly stated?

Yes; as with all sea turtle species, there are a lot of uncertainties and voids in the knowledge of leatherback biology and they are clearly stated in the document.

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Yes, the Team gathered the best available information for the assessment, including unpublished nesting data, to do updated abundance and productivity analyses. The only relatively large (>1000 nests) aggregation not represented in the abundance and productivity analyses is Colombia, and that data was not made available to either this Team or the Northwest Atlantic Leatherback Working Group (2018). However, the data gathered here is representative of the DPS. Re: threats, one minor comment is the relatively recent observations of potentially high levels sublethal injuries to leatherbacks that correspond with shark predation in St. Croix, USVI. Shark predation (or attempted predation) off nesting beaches may be a greater threat than previously recognized, though data to date is a short-time series and specific to one nesting region (STX), and does not affect the overall conclusions of this status review. I added a few notes in Track Changes.

2. Are the scientific conclusions factually supported, sound, and logical?

Yes. One comment on the buffering effect of nesting distribution – while overall nesting is geographically wide-spread, nesting is concentrated in a relatively small number of key areas (e.g., as noted in the review, ~29% of nesting takes places in one nesting site in Trinidad). In my mind, this reduces, to some extent, the buffering effect of nesting distribution as threats or catastrophic events at these high-density nesting sites will have a disproportionate effect on the resiliency of the DPS. Leatherbacks' ability to colonize new nesting sites would reduce this risk, but there are examples where this doesn't seem to be the case. For example, the precipitous decrease in nesting in Suriname, largely due to reduction of available nesting habitat, should lead to increased nesting in nearby areas with appropriate/available habitat. This has not been the case in that region (M. Hiwat/WWF, pers comm).

3. Where available, are opposing scientific studies or theories acknowledged and discussed?

Yes, where available. Unfortunately, there is a dearth of information on many of the threats described so it is difficult to evaluate/weigh these threats in a quantitative way. In many cases, we know a threat exists based on a small number of examples of presence,

but we can't quantify the absence. This inherently biases some of the discussion towards impact (or potential impact) of a threat vs. lack of population-level impact. However, in the absence of sufficient data, it is better to follow the precautionary principle, which appears to be the approach here where data was deficient.

4. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?

Yes, these were well-explained.

5. Are uncertainties assessed and clearly stated?

For the most part, yes. I would have liked to have seen uncertainty incorporated into the abundance estimate, but as I noted in Track Changes, the productivity analysis is more compelling than the absolute abundance in terms of imminent extinction risk.

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