Oceanic Whitetip Shark Status Review Report: ID343

Peer Review Comments

We solicited review of the Draft Status Review Report of the Oceanic Whitetip Shark from ten potential reviewers. Five people agreed to be reviewers and provided reviews. Reviewer comments are compiled below from comments on drafts of the manuscript and are not in the order of the reviewer identification list below.

Reviewers (listed alphabetically):

Ms. Debra Abercrombie
Research Consultant
Abercrombie & Fish, Marine Research Consulting

Dr. Elizabeth Babcock
Associate Professor
University of Miami Rosenstiel School of Marine & Atmospheric Science

Dr. Shelley Clarke
Technical Coordinator-Sharks and Bycatch
ABNJ Tuna Project (Common Oceans)
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Dr. Rui Coelho
Research Scientist
Portuguese Sea and Atmospheric Research Institute

Dr. Mariana Tolotti
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L'Institut de recherche pour le développement
MARine Biodiversity, Exploitation and Conservation

<u>Specific Responses to Terms of Reference Questions</u>

Reviewer #1

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

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

   Yes. In my opinion, the report provides a very comprehensive revision of the available information on the species, including in aspects related with biology, stock structure,

habitats, threats, population trends and risk of extinction. This revision was done at various levels, including global, regional and more local scales. The information was gathered from the peer-review literature, from the tuna-RFMOs that compile both scientific and commercial fisheries data and analysis, and occasionally from grey literature, including technical reports.

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

   Yes. The report provides a good revision of the available data and information. The report then presents scientific summaries and conclusions that are factually supported, sound and logical, based on that available information that was described.

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

   Yes. I believe that a comprehensive revision of the available information was done, in the way it was originally reported by the original authors, including the inclusion of multiple figures, plots and values taken directly from the original papers and reports. In cases where there are multiple studies, sometimes with opposing finding, this report describes and discusses in detail those opposing views, and tries to summarize the situation based on the best and more recent information.

4. *Are uncertainties assessed and clearly stated?*

   Yes. In general, the uncertainties associated with many of the biological studies, and particularly associated with most of the population trends analysis, including CPUEs trends, catch data, size distributions, etc, are stated and discussed. As a bycatch species, the available fisheries data is often poor, and the issues are stated several times along the report and discussed.

Evaluate the findings made in the Assessment of Extinction Risk.

1. *Are the results of the Distinct Population Segment Analysis supported by the information presented?*

   Yes. As a highly migratory species, with some evidence that distinct stocks occupy large oceanic regional areas and can even cross/mix between different oceans, it seems justifiable to conduct the extinction risk analysis on the global population level, as was done.

2. *Are the methods used for the Extinction Risk Analysis valid and appropriate?*

   Yes, the methods used have been applied and validated before, and seem adequate for this type of analysis

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

   Yes. I believe that the conclusions of the ERA team are valid and supported by the information that was presented and reviewed.

Reviewer #2

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

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

   This status review is based on the available literature regarding the oceanic whitetip shark, including peer-reviewed research, reports, working papers and etc. The review can be divided into three main topics. The first one consists of a review of all available information regarding both biological and ecological aspects of the species, as well as population and abundance trends. The second part evaluates the vulnerability of the oceanic whitetip in relation to the five factors listed on the Endangered Species Act. Lastly, an Extinction Risk analysis is presented. The authors concluded that the available information is insufficient to provide a global quantitative abundance estimate. Nevertheless, the results of several regional studies indicate that the populations of the oceanic whitetip shark have suffered substantial declines in all oceans. Due to these substantial declines and to the inadequacy of management mechanism in several regions, the authors also concluded that the oceanic whitetip shark currently has a moderate risk of extinction.

   Overall, this status report fulfills its role as a fair compilation of what is currently known about the oceanic whitetip shark. The risk assessment was also conducted with scientific rigor, taking into account the fragility of the available information. However, I believe that some adjustments could be made to improve the quality of the document, especially regarding the reading flow. The link between different cited studies is often weak; results just seem to be randomly pasted in the paragraphs, making the text hard to follow. These studies could be better summarized using less literal wording from the original texts. There is an excessive use of the word “however” to emphasize opposing results or weakness of data but no conclusion is actually drawn. A lot of the information is also exhaustively repeated throughout the text. The content of the overutilization topic, for example, is very similar to the content of the abundance trends topic. More details about my suggestions are given below. I have also included some additional comments on the status review itself in order facilitate the reviewing process, but I’ve kept modifications in the text to a minimal.

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

Yes. The authors did an excellent job on literature mining. I believe that this status review contains all the currently available information regarding the oceanic whitetip shark. My only concern is that a lot of what is available lacks robustness and, although this is acknowledged in the status review, authors fail to make their conclusions clear in many circumstances (see item 3 below).

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

   Yes. During most of the time conclusions are factually supported and logical, but I think the topic addressing current regulatory mechanisms deserves a bit more attention. Existing management measures are mostly listed without a discussion of their possible impacts, rendering some conclusions weak. The authors concluded that the oceanic whitetip population in the Northwestern Atlantic has stabilized due to current fishery regulations. However, it is not clear how they assessed the effectiveness of these regulations. When drawing this conclusion, they seem to forget the bycatch nature of the species in the regulated fisheries, which has to be taken into account since these regulations won't prevent capture. Authors also fail to discuss post-capture and post-release mortality issues in this particular case.

4. *Are uncertainties assessed and clearly stated?*

   Opposing studies are indeed always acknowledged. The problem is that the authors merely list the studies, often using "however" between them, and no discussion is presented. This can be quite confusing because no choice is made and on many circumstances the authors alternate the results to accommodate what is being discussed in a particular section. Throughout the text oceanic whitetips can have low productivity, moderate or high productivity, suffer from at vessel mortality or not at all...

Evaluate the findings made in the Assessment of Extinction Risk.

1. *Are the results of the Distinct Population Segment Analysis supported by the information presented?*

   A distinct population segment analysis was not conducted for the oceanic whitetip shark. The document states that the petition to list the species on the ESA was warranted for the "global population", which justified the absence of this analysis.

2. *Are the methods used for the Extinction Risk Analysis valid and appropriate?*

   Yes. The methods section is very well explained and seems valid. As it was mentioned many times in the status report, quantitative abundance estimates are lacking for the oceanic whitetip shark. A ranking matrix provides a good solution to assess vulnerability and risks based on available knowledge. The choice of a foreseeable future of 30 years also seems very plausible. Maybe, it would be interesting to include some information about the ERA team, like number of people and their background.

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

   Yes, I can say that conclusions are entirely supported by the information presented. There are many pieces of evidence supporting substantial population declines throughout oceanic whitetip shark range. Most of these declines are likely to continue because the current legislation and monitoring is inadequate in many areas. These two points already show that a risk of extinction exists. The authors conclude this risk is moderate and not high because the species is widely distributed and doesn't appear to have been extirpated from any location. Additionally, there is evidence of stabilizing abundance trends after declines. I believe this facts support the authors' conclusion.

Reviewer #3

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

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

   Yes. However, in addition to the qualitative information included in this review for the threat of overexploitation due to demand for oceanic whitetip fins in international trade, information can be requested directly from the Agriculture Fisheries and Conservation Department (AFCD), Hong Kong, on the fin shipments seized since the CITES App II shark listings went into effect there in November, 2014. Since that time, 2.5 tons of shark fins have been confiscated (meaning the shipment contained CITES listed shark species, but was without the required CITES permits), mostly oceanic whitetip and scalloped hammerhead fins. The amount and exporting country is documented (primarily, the Seychelles and Colombia, for the case of oceanic whitetip fins), and can be added to the information currently in this review.

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

   Yes.

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

   Yes.

4. *Are uncertainties assessed and clearly stated?*

   Yes, particularly with respect to how the shark fin trade will continue to threaten the species, and with regards to implementation and enforcement of regulations (prohibitions

in RFMOs and CITES App II listing) may be partially effective or inadequate in some regions, and don't prevent capture/post-release mortality in many fisheries the species interacts with.

Evaluate the findings made in the Assessment of Extinction Risk.

1. *If applicable, are the results of the Distinct Population Segment Analysis supported by the information presented?*

   NA, as the extinction risk analysis conducted in this status review was on the global oceanic whitetip shark population.

2. *Are the methods used for the Extinction Risk Analysis valid and appropriate?*

   Yes. Not only has the Risk Matrix method been used been used in the status reviews pointed out by the authors, it has also been used in status reviews for other shark species (i.e., Scalloped hammerhead status review).

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

   Yes

Reviewer #4

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

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

   The document provides an extremely thorough review of all the information available on the global status of the oceanic whitetip shark. It is generally well-written, extremely so in some parts but slightly rambling and repetitive in others. It is clear, well-referenced and carefully proofread and thus easily conveyed its messages. I am attaching one paper on life history which was very recently published that was not cited. I am also attaching a translation of Taiwanese regulations and note that some of the regulatory information for other countries is patchy because this kind of information is notoriously difficult to access.

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

   In general the report is fair, objective and balanced and the conclusions are very well supported. I have just three specific comments to highlight here (see text for other comments):

- There are a few places in the document were a catch rate per FAD set before and after is presented showing a decline, and then a separate reference is made to the number of FADs having increased as a basis for further concern. This is actually double counting as the number of FADs is already included as the denominator in the catch rate comparison. I suggest that trends in catch rates be cited as one line of evidence. Trends in catches (not rates) and effort (e.g. number of FADs) may be cited separately as another line of evidence if necessary, or if catch rates cannot be calculated.
- In some cases the findings from references which were published several years ago, and which used data from several years before that, are described as if they are current. Care should be taken to add phrases such as "at the time of the study" or similar when references are more than 8-10 years old.
- Perhaps it is because genetics is not my strong point, but I feel that too much text space and weight is given to genetic studies, some of which are not yet published, and all of which seem to present only preliminary information useful for conservation and management.

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

   Yes, the report does an excellent job of acknowledging conflicts between findings. I have added a few suggestions regarding where this might be enhanced.

4. *Are uncertainties assessed and clearly stated?*

   The report does a good job of highlighting when the authors of studies have raised such uncertainties in their discussion. However, this is actually quite difficult to do in cases where the authors fail to identify important uncertainties in their analyses. The latter occurs in a few places in the document and I have either provided some specific points which could be included, or suggested that the report state (more clearly) that the ideas and findings it presents are those of the authors rather than something that has been validated by the authors of this report.

Evaluate the findings made in the Assessment of Extinction Risk.

1. *If applicable, are the results of the Distinct Population Segment Analysis supported by the information presented?*

   The assessment was undertaken on the global population.

2. *Are the methods used for the Extinction Risk Analysis valid and appropriate?*

   Yes.

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

I agree that abundance is the factor of greatest concern under demographic risk and under the threats assessment that overutilization and inadequate regulatory mechanisms are the major issues. I have noted some minor problems with connecting the presence of shark fins in markets with the existence of finning (i.e. shark fins may originate from fully-utilized sharks) and with the relative weight given to demand for fins and demand for meat (i.e. one may currently eclipse the other but if removed the other might present an equal threat), but these passages can be easily adjusted. I agree with the risk ranking and the conclusions.

Reviewer #5

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

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

   The Status Review is extremely thorough and comprehensive. It includes all the information I am aware of and many new data sources. The evaluation of trends in each region, in particular, is very detailed and uses all available data. The discussion of the available data on biology, stock structure and habitat was also well done. The discussion of the threats to the population from overutilization, especially for the fin trade was mostly good. However, the report overemphasized the importance of a "recent decline" in the shark fin trade in Hong Kong, particularly in the discussion around Figure 56. The figure looks more like a stabilization than a sustained decline, given the fairly large fluctuations between years.

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

   The scientific conclusions are sound and supported by the data. The conclusion that oceanic whitetip sharks have declined throughout their global range (with some recent stabilization in the NW Atlantic) is well supported by fishery-dependent CPUE data, one stock assessment, and historical records showing that the species was once much more commonly caught in tropical surface fisheries. The conclusion that oceanic whitetips have an intermediate productivity relative to other sharks seems reasonable, based on several demographic analyses from several regions.

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

   There has been some controversy on the degree of decline in the North Atlantic, in that the Baum and Myers (2004) and Baum et al. (2003) found larger declines than other

studies using the same datasets. This issue was adequately discussed, and the more recent studies of these data sets seem to have resolved the issue.

4. *Are uncertainties assessed and clearly stated?*

   The status review clearly explained the uncertainties in the individual data sets. In particular, the historical catch data are highly uncertain because oceanic whitetip sharks have only recently begun to be reported at the species level, and many countries still don't report all their catches. The lack of data in some regions, especially the Indian Ocean, was also discussed. Uncertainty about the survival rates of life releases in regions with no-retention policies was also discussed.

Evaluate the findings made in the Assessment of Extinction Risk.

1. *If applicable, are the results of the Distinct Population Segment Analysis supported by the information presented?*

   The DPS analysis only says that, because listing is warranted on the global level, the team conducted the extinction risk analysis on the global level. This does not seem to be consistent with the definition of a distinct population segment as being both discrete and ecologically significant. According to the genetic and population structure data presented in the Status Review, there are probably at least two populations (Western Atlantic and Indo-Pacific), which would seem to imply more than one DPS..

2. *Are the methods used for the Extinction Risk Analysis valid and appropriate?*

   The methods were appropriate and adequately described. I would have liked to see some summaries of the scores the review team gave to each threat The report states that summary statistics such as mean, variance, etc. are not presented because the team felt that this would "add artificial precision or accuracy to the results." That makes sense, but there is no reason not to present the range of answers for each threat.

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

   Yes, given the information presented, the conclusion that the population is at moderate risk is well supported by the data and analyses presented.

<u>Editorial Comments</u>

Reviewer #1

Overall, most editorial comments focused on providing minor clarifications and corrections to certain pieces of information throughout the document, including potential typos, corrections to figure captions, etc. For example, the reviewer noted the importance of clarifying whether

longevity and maximum size estimates were from observed ages and sizes or the result of a growth model.

> *Section 2.4 Growth and Reproduction*: It might be important to note if those maximum ages are "maximum observed/read ages" or "estimated longevity" from the fitted growth models. The reason is that the "maximum observer age" will depend directly on the sample characteristics (size/age distribution), while the "estimated longevity" will depend on the adequacy of the growth model (that also depends on the sample, among other things).

The reviewer also provided most substantive comments and suggestions of where caveats should be more clearly addressed in certain cases. For example, the reviewer noted in a few places the importance of addressing that in addition to discussing at-vessel mortality rates, post-release mortality should also be taken into consideration. The most substantial comments provided by this reviewer focused on the ERA team's model for updating results of a published paper regarding the standardized CPUE trend from the Hawaii-based pelagic longline fishery. The reviewer pointed out that the methodologies used by the ERA team were not "nearly identical" to the original study. The reviewer also suggested some clarifying language regarding the description of the model:

> *Page 59, first paragraph and Figure 39*: If I understood this correctly, the original study used a ZINB, which would means that the response variable was categorical (catches likely in numbers-N and effort likely used as an offset variable), while the new study used a delta-lognormal, which meant the response variable for the positive sets was continuous (i.e., likely CPUEs, that could either be N-based or biomass (kg)-based.) It is important to clarify this, as if the new study used biomass-based CPUEs (and the previous N-based CPUEs) those are not directly comparable, as they are influenced by the size distribution of the data. If the new study also used N-based CPUEs, then they can be compared directly, and I would simply suggest to make that clear in the text.
>
> Might be more accurate to say proportion of zeros, as the binomial component is for all data (zeros vs non-zeros., to calculate the proportion of zeros), while the lognormal component is for the positives only (to calculate CPUE, conditional to having occurred catches, i.e., non-zeros).

The reviewer also provided some criticism of one particular study cited in the status review document.

> *Page 78, Figure 51*: Using year as a continuous variable is highly problematic (conceptually wrong, in my opinion). When using year as a categorical, the CIs are extremely high and overlapped in most cases, meaning that they would not be significant in a hypothesis test for testing differences between years. Those issues could be added in the discussion of those indices.

The reviewer also provided some clarifications on regulations discussed in the status review document, particularly related to reporting requirements in the Indian Ocean.

> *Page 80, first paragraph*: I am not sure that this is correct. There is the original IOTC Resolution 05/05 that already said that CPCs "shall annually report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data". Since 2013 it was added the Resolution 13/06, that emphasized this data reporting need, and also added that the incidental catches and discards of oceanic whitetip should be recorded and reported (as they should no longer be retained and landed, due to the prohibition).

The reviewer also provided several comments on the discussion of caveats and limitations related to the 5 percent fin-to-carcass weight ratio as a means to curb shark finning.

> *Page 99 under International Shark Fishing and Finning Regulations:* The fins:body ratios have been studied and the results presented in multiple peer-review papers and technical documents. The main issue is that the ratios are species-specific (e.g., the ratio for blue sharks is higher than 5%, while for shortfin mako would be less than 5%; not sure on oceanic whitetip, but could also be more than 5% due to the very large fins). Other issue is that the ratio will depend on the fleet-specific fishing practices, i.e., depending on the method of cutting deeper or less deep into the muscle. There is also the issue of using the ratios for dried or fresh fins that changes the ratio substantially. All those issues have been shown and discussed in the literature, and the main problem is that an overall 5% number cannot account for all those specificities. On the other hand, having species and fleet specific ratios would be complicated, and almost impossible to monitor and enforce. So using ratios is complicated, but if they were reselected, in my opinion they would also constitute a clear conservation measure for sharks, as they would also reduce or eliminate finning.
>
> It should be noted, however, that in more recent years the price for shark meat has been increasing, parallel with a decrease for the fin prices (for example the prices of shortfin mako can reach quite high values similar to some of the tropical tunas, while blue shark prices are lower but have also increased in recent years). So in more recent year, the retention of the full carcass for commercial purposes is also an advantage for the fishers, as that is now a product worth keeping for being landed.

Reviewer #2

Editorial comments from this reviewer were largely focused on providing examples of the general points made by the reviewer in their answers to the terms of reference questions. Throughout the document, the reviewer highlighted areas of perceived inconsistencies in terms of the conclusions being made by the authors of the document. For example, the reviewer highlighted several instances throughout the document in which the productivity of the species is characterized differently (e.g., relatively low, low-moderate, relatively high). The same comment was made regarding inconsistent at-vessel mortality rates discussed throughout the report. The reviewer pointed out several times where repetitive text appears, and also noted in a couple of places where the results of studies could be more succinctly and clearly summarized. Finally, in a few instances, the reviewer deemed some particular language confusing and requested the authors to re-write the sentences in question for clarity.

Substantial editorial comments by this reviewer repeated comments by Reviewer #1 regarding the consideration of post-release mortality in addition to at-vessel mortality. The reviewer also emphasized that mortality rates are highly variable and noted that the benefit of no-retention measures is uncertain.

> *Page 94, second paragraph:* It seems the mortality rate is highly fleet dependent, as it's been said before it was high for longline (Indian Ocean). But in the purse seine fishery there is no doubt that mortality is extremely high. This is to just to say that this statement carries uncertainty and this should be acknowledged.
>
> *Page 127, first paragraph*: The retention ban wouldn't have made a difference in the significant capture declines observed for this fishery. The ban doesn't preclude sharks from being caught and sharks caught on purse seine nets have an extremely high rate of mortality. If your point was actually to say that the decline was not a result of underreporting induced by the ban, please make it clearer.

Additionally, this reviewer had some concerns regarding the analysis of regulatory mechanisms in the United States.

> *Page 128, first paragraph*: How did you assess the effectiveness of this measure? The conclusion that overutilization is not an issue in this area is quite important and requires a more detailed explanation than stabilization coincided with implementation. If the management plan is effective it could be used as example in other locations.

Reviewer #4

In addition to minor corrections throughout the text, this reviewer provided several substantive comments throughout the document. These comments largely focused on improving and streamlining the information with clarifications and updates because either the information was unavailable at the time the status review was initially drafted, or the information had changed. For example, the reviewer provided a new published journal article on the life history parameters of the oceanic whitetip shark, and highlighted areas in the status review report where this information should be updated. The reviewer also alerted us to the public release of all observer data from the Inter-American Tropical Tuna Commission, as well as numerous updates regarding the reporting and observer coverage rates in the Western and Central Pacific Ocean. The reviewer provided several suggestions where repetitive or overly long explanations of information could be streamlined and/or pared down. The reviewer also highlighted instances throughout the document where a clarification was necessary regarding older studies that may not necessarily reflect the current situation. The reviewer also had more substantive comments as laid out below. For example, the reviewer pointed out where explanations were not clear/robust enough to convey the conclusions drawn.

> *Pages 24 and 25, Figures 14 and 15*: I don't see that from the figures above but maybe I'm reading them wrong. The dots are just floating object sets and there's no reason (is there?) why we would expect OWT to just be found in those sets, so I'm looking more at

the gray-to-black shading and that hasn't disappeared. Maybe I'm confused about the difference between the green dots and the grayish grid (and between Figs 14 &15)? It seems like they're plotting two things at once and the green dots are clearly dramatically less, but the gray grids less so. If this text is taken from their report then I'll believe it because they know the fishery very well. But just presenting the findings with this short blurb and the figures is not convincing.

The reviewer also provided some explanations and suggestions for streamlining and clarifying discussions regarding the abundance trend information from the Hawaii-based pelagic longline fishery in comparison to abundance trends for the entire Western and Central Pacific Ocean.

Page 31, under Figure 21: Up until 2014 papers by Clarke, Rice and Lawson didn't have any data from Hawaii after 2004, so yes up to 2004 the Hawaii data are used by everyone. But after 2004 only Walsh and Brodziak analyzed the Hawaii data and the trend they found was the same. (Interestingly in 2015 Rice had the full set of Hawaii data (up to date) but didn't use it because it wasn't formatted for loading…so still, only Walsh and Brodziak have analyzed the Hawaii data). I suggest you streamline this and clarify. There are just two key points: Walsh and Clarke (2011) and Brodziak et al. (2013) used data sets that partially overlapped the WCPFC data for years prior to 2005; therefore, we could not consider the trends estimated from these studies completely independent. However, even after 2005 they show similar results suggesting that the patterns are representative of regional trends in OWT stock status.

The reviewer also raised some questions, caveats, and disagreements with regard to the results and conclusions drawn for some particular studies and datasets.

Page 40, last sentence: It's hard to know whether the before and after studies are directly comparable. They seem to be in different areas, one is "research" and one is presumably commercial. The vessels were similarly sized but were the fishing methods the same?

Figure 27: I don't agree this is decreasing. The value in 2003 is almost the same as in 2011. These IOTC working papers are often hastily prepared, not peer-reviewed and not revised after discussion/review at IOTC meetings. It's fine to show the data but if the author's description of the trends seems off I think you should say so.

Page 41, last sentence: But if the comparison is between before and after proportions, the increase in number of FADs has already been accounted for. Seems to be double-counting or double-emphasis here.

Page 41, first paragraph: I'm not sure this is valid—there are a lot of assumptions involved including whether the FADs are placed in preferred OWT habitat and whether there is any limit to the number of OWT that will associate with a FAD. I don't think PS CPUE analyses make this kind of assumption (I might be wrong). It might be better to just give their results without necessarily buying in to their interpretation of them. (I guess you say this in the last paragraph but I think the IO conclusion itself is speculative as well as the comparison to other oceans).

Page 77, last paragraph: I have some serious concerns about the validity of the trends in this paper and I think NOAA should too. First, I am concerned about the stripping out of all the zero catches from the analysis. I have never heard of such an approach before and at a minimum it deserves more explanation. Second, and perhaps more importantly, i) the huge shifts between period suggest that the data are not tracking abundance and ii) "significant" results are driven by changes in extremely low values with huge confidence intervals (which are too large to illustrate) thus raising the possibility that the "trends" are just noise. I know from our southern hemisphere porbeagle work that there were some major shifts in the location/seasonality of the South Atlantic fleets during the timeframe modelled which demand a much more detailed and sophisticated standardization approach than the apparently ad hoc one adopted in this paper.

Page 127, last paragraph: I'm just worried that a lot of these data are estimated (by the IOTC Secretariat) and thus highly uncertain.

Like Reviewer #1, this reviewer also had some questions and comments regarding the ERA team's model of the standardized CPUE trend for the Hawaii-based pelagic longline fishery.

Page 59, first paragraph: These variables [set type (i.e., shallow set or deep-set), hooks per float] seem redundant – why use both?

Page 59, first paragraph: Why is this [vessel length] an explanatory variable? Seems strange. Why not vessel ID? That is often a very useful predictor of catch rates.

The reviewer also emphasized that the species' vulnerability to fisheries, as discussed in various ecological risk assessments, is more a result of the species' encounter rate in fisheries more so than its life history characteristics.

Page 68, Vulnerability to Atlantic Pelagic Longline Fisheries: I think the key to the difference might be susceptibility (or catchability by the fishery). OWT's life history is not so vulnerable but they seem to be caught a lot. Cortes considered this but maybe Gallagher did not? This could be why Gallagher thinks they are "least vulnerable"?

Finally, this reviewer emphasized that the shark meat trade should not be underestimated as a threat and source of mortality for oceanic whitetip sharks.

Page 128, second paragraph: Yes, shark meat is low value compared to other fish but OWT [oceanic whitetip] is not particular low value compared to other shark meat and there are markets for low-value shark meat (e.g. blue) in Spain, Brazil, Taiwan and Japan at a minimum. (also India, Indonesia, Middle East, etc.)

Page 131, last paragraph: I would say that you can't rule out the role of the meat trade. It is most likely secondary to fins, but if the fin trade disappeared the meat trade could still be a threat.

Reviewer #5

All editorial comments from this reviewer were corrections for minor typos and spelling errors.