

# University Team's Responses to STAC comments

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Prepared for the Scientific and Technical Advisory Committee (STAC) of the Oregon Ocean Policy Advisory Council (OPAC).

We thank the STAC for their comments on our Draft Report: Assessment of Oregon's Marine Reserves, July 2022.

In this document, we outline our Responses and where we have modified the Assessment Report. [Original comments from STAC are in blue](#), and responses from the University Team are in black.

## **General Comments:**

The STAC has identified four areas where the assessment report was lacking or could be more effective and provides the following recommendations for improvement:

1. The primary audience for the executive summary is the Legislative Assembly, other stakeholders, and the public. They will want to know what's working, what's not and what is actionable. STAC recommends developing a more concise executive summary (2 pages) focused on the answers to overarching questions of interest and the university team's recommendations for Administrative Actions and Legislative Proposals. These should be framed in the context of what is needed to achieve the policies and goals established for Oregon's Marine Reserves. Overarching questions include those posed by the Legislative Assembly and the STAC, AND a) Are there any noticeable effects from the marine reserves? and b) What should Oregon do differently, if anything, with the marine reserve system into the next 10 years? The current executive summary is a very useful technical summary of the full report. We recommend retaining and revising it as a separate "technical summary".

Thank you for this suggestion. We have renamed the original Executive Summary to Technical Summary and added a succinct 2-page Executive Summary that aligns with the questions asked.

2. The STAC recommends that the university team clarify whether the methods to assess biodiversity are sufficient to address the OPAC recommended goal for the marine reserves to conserve biodiversity. We note in our detailed comments below that while measurements of particular taxa and assemblages have been made, biodiversity as defined by OPAC and others (including the scientific community) have not been adequately measured.

While we agree that 'true' biodiversity has not been measured by ODFW, their approach is aligned with that of most long-term marine reserve monitoring programs. Critically, they have focused on the diversity of communities that are most likely to be affected by reserve establishment. Their approach, legitimately, trades off a fully complete picture of biodiversity against realistic monitoring (limited dive times, personnel, funding, weather windows, etc.).

We have amended the report to capture this nuance, but overall, we follow our original assessment that ODFW's approach is adequate to address the OPAC recommended biodiversity goal, although there are areas for improvement if certain biodiversity research goals are of interest to Oregon.

Please also see comments throughout the rest of this response.

3. The STAC agrees it is not possible to assess the “significance of socioeconomic impacts,” adverse or otherwise, because this was not defined by OPAC in their 2008 policy recommendations and it was not clarified through legislation either. We suggest the university team should recommend development of an environmental policy framework to define “significance” in the context of “socioeconomic impacts.”

Thank you, we agree that developing such a framework would significantly help resolve the issue around significance. We have included a legislative recommendation in our (new) Executive Summary and have updated the text through relevant sections of the main report to reflect this. See also our comments regarding significance below.

4. The STAC recommends that the university team indicate their confidence level in the robustness of the ODFW findings. For example, it did not appear that the university team actually reviewed the research conducted by ODFW, in particular the Human Dimensions (HD) team and their partners, to determine whether the findings were credible and reasonable. They often just listed the ODFW findings and used phrases such as “ODFW findings indicate...” This recommendation applies to the full report (e.g., biodiversity findings noted in (2) above).

The university team reviewed all supplemental material associated with the Synthesis Report, including the extensive Human Dimensions work. However, a full peer-review of each paper/study was not within the scope of the review nor feasible.

For the HD Program, almost all studies have been peer reviewed and published in relevant journals or passed through a graduate student committee. All studies used standard sampling and methods for questionnaires, choice experiments, participatory mapping, and in-depth interviewing. Data analysis used appropriate statistical and qualitative analysis techniques. Our primary caution is that no single study should be used to answer the question of significance, as every study will have some error. Thus, our recommendation for continuing triangulated studies focused on heterogeneity. We have modified the report to reflect this. For specific examples, see also our response in the Chapter 4 section, below.

Regarding the Ecological Monitoring program, our confidence in ODFWs methods is discussed in Question 3.6, and summarised in Table 3.6.1. With respect to biodiversity, see our response to Comment #2 above.

Lastly, we note that ODFW has provided a response to the university team's report plus an addendum submitted after the STAC meeting on August 9, 2022. These include valuable information such as ODFW's engagement with Tribes. ***We recommend that the university team consider the points raised and evidence provided by ODFW in addition to the comments provided here by the STAC.***

We appreciate these clarifications. Our responses to ODFW's comments, relevant to our evaluation, are:

### 1. Tribal Engagement.

The Tribal engagement comments in the ODFW letters reinforce our original comment about needing to engage tribes in the MR process (as opposed to studying them as research subjects). This will require going beyond a single tribal liaison on OPAC. We have clarified our statements in the main reports as to what tribal engagement does and does not mean in our view.

See also our responses to comments on Chapter 5, below.

### 2. Clarifications to prevent misunderstandings.

A) *The challenge of the aggregate and unit of analysis.* We recognize the challenge of synthesizing the extensive body of work that is the HD Program, and ODFW's approach is understandable, given the socio-political focus. We do not point out the aggregate as a critique, rather to call the legislature's attention to the point that while aggregation can provide a population-level overview and aid synthesis of information, there are still people (fishermen) who self-identify as impacted and are not visible in the quantitative data. See also our responses to comments on chapter 4, below.

B) *Governance.* ODFW state in their response that they include how knowledge and data from their HD Program has been included in nearshore management decisions outside of the Marine Reserves Program, referring to pages 126-7 of the Synthesis report. However, the report discusses not how these data *have been included*, rather how they *can be relevant to* management plans. We have updated the text for Question 6.2 to reflect the high relevance of the knowledge, data, and methods generated by the Human Dimensions Program to management decisions.

### 3. Clarification on critiques vs. Recommendations.

We have clarified throughout the text, especially with respect to the Human Dimensions Program, what are critiques of the ODFW program and what are recommendations for the future.

### 4. Resource Needs to Support University Team Recommendations.

Our report does call out specific areas where additional staffing or resources appear to be necessary to carry out the proposed ODFW mission (e.g., new FTE for the communications and outreach program). In other cases, we felt it was better to simply

recommend 'capacity' to achieve particular goals or outcomes, as we are not experts in ODFW's budgeting and organizational structure, and felt it would be better for that communication to come in ODFW's dialogue with the legislature.

#### 5. Exploration of Genetic and Functional Biodiversity.

We thank ODFW for clarifying that they are exploring genetic and functional biodiversity, and that ARMS are being explored as monitoring tools. As this was not in the Synthesis Report, we were unaware of it. We have made a note in our Report (Questions 3.1 and 3.5) to reflect this work.

#### 6. Human Dimensions Baseline Monitoring Table.

ODFW pointed out four studies that they believe were overlooked in Table 2.6.1 (p. 39-41), which summarises the baseline human dimension studies undertaken by ODFW. We do not believe the Lindberg studies (Lindberg & Williams 2019, Lindberg and Swearingen 2020, Lindberg & Swearingen 2020) classify as baseline as the survey underlying these studies was done in 2017, one year after the last reserve was implemented and five years after the first reserves. However, we did overlook the Freeman et al. 2011 study, and have added this work to Table 2.6.1.

## ***Specific Comments:***

### Regarding questions posed in the General Comments (2)

Regarding the noticeable effect question (a) posed above under general comments, the university team agrees with ODFW that any noticeable effects may not come until 10-15 years after marine reserve creation. The university team rephrases the question as “whether the expected effects of reserve protection in Oregon are large enough to detect using appropriate comparisons.” They recommend “collaborations with researchers to evaluate the detectability of reserve effects in Oregon’s marine reserves.” We note that some members of the university team are authors on such studies and it would be very helpful if they could apply their methodology to the Oregon marine reserves situation to determine the answer to that question as part of their review. This would be preferable to just calling for more research to be conducted in the future.

Undertaking such an analysis requires funding, time, and resources exceeding that available for this scholarly review. For example, the work done by Nickols et al. (2019) and Kaplan et al. (2019) both resulted from multi-year projects with larger budgets than this award. Furthermore, such analysis for Oregon requires more data/longer time-series than are currently available. As such, we maintain our recommendation that, if this was of interest to Oregon, then future collaborations may be beneficial.

Regarding the ‘should Oregon do anything differently’ question (b) that paraphrases SB1510 (2)(b)B “Include Recommendations for administrative actions and legislative proposals related to the reserves and protected areas,” the report makes no recommendations other than potential administrative actions for how ODFW might run the marine reserves program differently. STAC encourages the university team to include some recommendations regarding legislative proposals, for example those related to size and spacing (see next paragraph).

In our (new) Executive Summary we have explicitly outlined the key legislative recommendations that we make. Furthermore, all our recommendations related to capacity and staffing at ODFW would require legislative appropriations.

Regarding the “Size and spacing considerations” (pg 54), the university team should make some recommendations instead of just stating the facts about whether the five marine reserves meet or fail to meet the size and spacing requirements. What are the implications for resilience - OPAC recommended an objective for the marine reserves to “Protect key types of marine habitats in multiple locations along the coast to enhance resilience of nearshore ecosystems to natural and human-caused effects.” For example, should Otter Rock and Redfish Rocks Marine Reserves be extended farther in the along-shore dimension? Should all the marine reserves be extended westward to the state waters boundary? Should estuaries and other marine habitats be represented in the

system? How are Oregon's reserves impacted by the marine reserve system in California? Regarding the criteria "Sites distributed along the full Oregon coast and in each biogeographical region," four out of the five marine reserves are in one biogeographic region north of Cape Blanco. If Redfish Rocks is adversely affected by some event and/or stressor, say a catastrophic heat wave or hypoxic event, there would be no marine reserve in the southern biogeographic region south of Cape Blanco. The university team should point this out and make a recommendation for what new policy changes Oregon might develop to address these risks.

A scholarly review, as undertaken here, is distinct from a policy review; policy recommendations require taking into consideration political context in addition to the scientific evidence. The decision to modify size or spacing requires weighing both ecological and social implications, and the extent to which the Oregon legislature is willing to affect the social groups that studies to date have identified as impacted. Ecologically, as expected, we do not yet have the evidence to say for sure whether the reserves are achieving ecological goals. Socially, some of the reserves are well supported by the community whereas others are not. Redfish Rocks, in particular, is the result of a community-led process to identify fishing ground that could be set aside that would avoid large impact to the fishing fleet but also provide ecological benefit. Recommending changes without substantial community input would dismiss the substantial time and effort various stakeholders put into establishing and supporting that reserve. Evidence from elsewhere in the world has shown that reserve outcomes are better and social costs lower when reserve planning is a community-engaged process rather than dictated solely by expert recommendations.

As such, a primary recommendation (see Executive Summary) is to develop an adaptive management plan that includes clear objectives, defined decision-making points and timelines, and stakeholder engagement processes. We recommend this plan:

- 1) Include an evaluation of the need to alter existing reserve boundaries or add or remove marine reserves or marine protected areas in order to meet the legislative objectives of the reserve program, and a process for planning and implementing those changes in a community-engaging manner.
- 2) Assess the capacity for the marine reserves to enhance ecological resilience to environmental disturbances.
- 3) Continue monitoring and evaluation until reasonable time has passed in which we expect to see ecological impacts that can be used to inform these decisions.

## **Executive Summary**

The STAC regards the clarity of the executive summary as especially important. This is what most people will read. The primary audience for the executive summary is the Legislative Assembly and the public, not the STAC. The current version of the executive summary is more of a technical summary. We recommend adding a new executive

summary that is much shorter (2 pages) and focuses on addressing the overarching questions of interest from the Legislative Assembly and the STAC, and the university team's recommendations for Administrative Actions and Legislative Proposals. We also recommend that the university team revise the current version of the executive summary as a technical summary.

This is well received. We added a new executive summary and converted our existing summary into a technical summary.

Some of the summaries to the questions seem poorly worded and don't really say anything that is a take home message. The questions about adaptive management are good examples of this but there are others. In most cases it is because they have copied the exact summaries from the full report. There they make sense as they are connected to the information that supports the summary, but when they are moved out of context, they lose that support and don't stand well on their own. There are some statements that have no sensible content and thus will not be useful for those making decisions on next steps. One example of this, but not the only one is, "However, there are equity and accessibility issues." Page 23.

We have tidied up the language and content of the technical report.

The MPAs are mentioned (page 8), "Following ODFW's Synthesis Report, this report focuses primarily on the marine reserve portion of the five sites, although Marine Protected Areas are implicitly included in the Marine Reserve Design, Level of Community Engagement, Governance, and Enforcement sections." We note that there is no mention of the seabird protection area at Cape Perpetua. It needs to be recognized that nothing has been done there by ODFW as far as we are aware. There is nothing in the ODFW report about it. It is a weird anomaly in the MR designation, resulting from a community process of designation. This is a Marbled Murrelet hotspot and Audubon has a forest sanctuary adjacent to this area, and a sanctuary manager who is vocal about seabirds.

We agree with the comment that there was limited mention of a seabird protection area associated with Cape Perpetua beyond its existence and acknowledgment in the site descriptions (pg. 38 [Synthesis Report](#); [Cape Perpetua Management Plan](#)). There is also mention of community science seabird monitoring on page 144 of the [Synthesis Report](#).

We have included mention of the seabird protection area on pg. 7 of our assessment (in the introduction), pointing out that it falls in the same category as the MPAs.

It would be helpful to have subtitles for the sections of the executive summary in the table of contents. When tables in the main report are referenced in the executive summary, page numbers would be useful.

Thank you for the recommendation. We have added the technical summary to the TOC and updated the tables to be hyperlinks for easy navigation of the report.

Page 10, top: is compliance and enforcement within the MR program or outside in the State Police instead? I think it is outside the MR program so should not be included in the list of ODFW MR program responsibilities.

Oregon State Police carry out the enforcement of the MRs, with patrol assistance from Oregon State Police and the U.S. Coast Guard. ODFW provides support for compliance and enforcement through 1) providing funding to OSP for staff overtime and patrol equipment and 2) outreach and education, including acting as a point of contact for people to report non-compliance. Consequently, we have left compliance and enforcement support as a responsibility of the MR Program.

Page 10, 2.c: "This will likely require..." strike 'likely'

Done.

Page 11 (top) C.2.c: Wherever the word resilience is used it should be clarified with examples, e.g. to ecological and social economic resilience, or something to that effect.

Where there is ambiguity in the report, we have clarified whether resilience refers to ecological or socio-economic.

Explain/define what "ecologically significant as a whole" means. The 2008 OPAC policy recommendations provide guiding definitions ecological terms, but punts on defining social and economic impacts:

- **Ecologically Significant:** contributing to biodiversity, resilience of the system and its populations and ecological communities.
- **System:** a collection of individual sites that are representative of marine habitats and that are ecologically significant when taken as a whole.
- **Resilience:** the amount of natural or manmade disturbance an ecosystem can absorb while retaining the same function, structure, and feedbacks (Walker and Salt, 2006).
- **Social and Economic Impacts:** Scope and content to be defined.

"Ecologically significant as a whole" is the term used in the reserve Goals. Where we refer to it in the text, we have clarified our understand of this term as at the network

scale (i.e., ecological resilience of the system of five reserves and the portion of a metapopulation that they contain).

We feel that the overarching recommendations is not the appropriate place to discuss the definition of 'ecologically significant'. However, we have added reference to OPACs definition where 'ecologically significant' is first mentioned (pg.8).

Page 11, top, C.3: Definite "SMART" (or reference, defined above).

It was defined previously in 2.a. We have added '(defined above)' to the text.

Page 11, top, C.4: Does fully support mean 1 full time position? (1 FTE)? Then say so.

We have clarified by adding "(at least one full-time equivalent position)" to the text.

Page 11: It would be helpful to have some bridging text, a paragraph, before moving into the section responding to the STAC questions.

We have added this to the report, thank you for the suggestion.

Page 11, 1.1, Recommendation: Not applicable seems contrary to the finding that proxies were used in the planning process and we still don't know the answer to this question. What about a recommendation to do a biodiversity survey and assess as part of the adaptive management plan?

We have removed the recommendations for all of Sections 1 & 2 as these sections relate to outcomes from the initial design and planning of the reserves and to the baseline data, so any 'recommendations' would be moot. We added a statement explaining this. Recommendations regarding biodiversity and habitat representation are in Section 3 (Question 3.1 & 3.2).

Page 11, 1.2: Which features were omitted? List them here. Perhaps a recommendation to consider adding missing features in the adaptive management plan.

We have included those features identified but not included within the reserves.

Page 11, bottom: drop the sentence "There is insufficient information to assess fully whether ODFWs approach adequately incorporated community interests" because the question doesn't ask about "adequacy" and defining what level is "adequate" is problematic. The question only asks if it was done or not.

Following the request to provide a scholarly review, the discussion of adequacy is important here. We cannot answer the question of whether the Marine Reserves system incorporated community interest with the information provided as we do not know what 'community interests' were precisely. We only have the account of those who designed the reserves, not a study on community interests. We have modified the text to clarify.

Page 12, section 2: delete: "... one set for each monitoring program." Replace with, "... for the ecological and human dimensions monitoring programs."

Done.

Page 12, 2.1: Define abbreviations/acronyms - the executive summary should stand alone.

We have defined acronyms where they first appear in the Technical Summary.

Page 12, bottom: which one of these was most impactful, for example, "funding, logistical, and COVID-19 in that order"?

We confirmed with ODFW that it was 1) funding, 2) logistics, and 3) COVID-19 (in that order), and have updated the text accordingly.

Page 13, section 2.6: "Not applicable" is inconsistent with the statement above, "While substantial data collection occurred, it is not clear which data will be monitored on an ongoing basis." Should the recommendation reflect the ongoing monitoring concern?

The question is referring to baseline data, which it is too late for ODFW to address. We provide recommendations for moving forward in section 4. We removed the Recommendation section for all of Sections 1 & 2, and added a statement highlighting this in the report.

Page 15, top: can't the university team do their recommendation 2 "Compare observed biodiversity in reserve sites to the rest of the Oregon coast, if there is a desire to confirm that the reserves are in higher-than-average biodiversity locations?"

This comparison would require additional biodiversity surveys beyond those done in the reserves and reference sites, which is well beyond the scope of this scholarly review. We explain further the need for additional surveys in the main text of the report.

Page 15, 3.1 recommendation 1 at the top of the page: explain what this means in language suitable for the public.

We have clarified the text as is suitable for a technical summary.

Page 15, 3.2b: regarding the sentence about not including estuaries add the two caveats here that are in the full report: "however, the mouth of the Salmon River is located within the Cascade Head MPA though not within the marine reserve;" "We speculate that omission of estuarine habitat from any of the reserves may be due to the high economic impact of prohibiting fishing within these habitats." This is a place where the university team should consider making a recommendation for expanding the understanding of ecological connectivity between estuaries and marine reserves<sup>2</sup>.

We have added the suggested caveats to the Technical Summary and summary in the main report text for Q3.2.

Page 15, 3.3: explain these terms/phrases for the public: "hypothesized resilience mechanism" and "addressing resilience in Oregon"

We have clarified this point in the Technical Appendix.

Page 16, 3.4, Recommendation: The rationale for when ODFW should take on a recommendation versus work with collaborators is unstated. It would be helpful to clarify what work should be under the purview of ODFW versus done with or by external collaborators.

We feel that ranking the importance of research projects and analysis undertaken by ODFW is outside the scope of this assessment. Rather we have changed the recommendation to "*Evaluate the expected detectability of reserve effects in Oregon's reserves. This is a possible area where ODFW could collaborate with external researchers, recognizing that ODFW's resources are limited.*" This is to acknowledge that, while an important question for ODFW to answer, it may not be possible given their resources and, as such, it is an area where external collaboration may be helpful.

Page 16, 3.5: this section is a good example of where there is a good explanation for a non-technical reader.

Thank you – we have clarified the text Technical Appendix.

First sentence at the top of page 17, 3.6: "We agree..." needs a follow-on statement explaining why.

We have updated the text to *"We agree with ODFW that their focal species approach used in the analysis may have not been the best approach as it resulted in zero-heavy data for some species and overlooked other abundant species, limiting analysis."*

Page 17, 3.6, Recommendation: Is there a role for eDNA in biodiversity assessments?

We have included a suggestion that ODFW consider alternative and complementary methods for assessing biodiversity, including eDNA metabarcoding, noting that these methods are new and not without challenges of their own (Question 3.5, Technical Appendix and Main Report).

Page 17, 3.7a: Here's the place to talk about combining ecology and oceanography, e.g., the marine heat wave of 2015 and forward.

In our recommendation for 3.7a, we have included the text *"analyzing combined oceanographic and ecological data to evaluate changes inside and outside reserves during a perturbation"* to explicitly reflect our larger discussion in the main text.

Page 17, 3.7.a, Summary: "This is due to a lack of a clear definition of "resilience"..." This is also the case for how the authors have also used the word resilience throughout the executive summary.

Where there is ambiguity in the report, we have clarified whether resilience refers to ecological or socio-economic.

Page 17, bottom: that's an interesting suggestion to focus the research and monitoring in 1-2 reserves. Which 1-2? The university team could make a recommendation ... for example, Redfish Rocks and Cascade Head (most former fishing pressure)

In the text we have added the suggestion to focus on Cascade Head, Cape Perpetua and Redfish Rocks, which are the most likely to show any resilience effects (Question 3.3, Table 3.3.1), and span the two biogeographical regions.

Page 17, 3.9: "other stressors"; which stressors? Could give an example like the heat wave

In the Technical Summary, we have clarified that we are referring to heat waves, hypoxic events, rising ocean acidification, and increased pathogens, plastic pollution, marine noise pollution, and ocean development.

Page 20, 5.1, Summary: "However, it is unclear whether those involved represent the most vulnerable or knowledgeable." Why is this called out? Are there other characteristics of populations involved not represented? What is meant by vulnerable or knowledgeable?

We have modified the language to clarify. We call this out to demonstrate that while many non-ODFW individuals were included in the process, it is unclear whether those involved were able to represent those most likely to be impacted by the marine reserves.

Pg 20, 5.1: the level of indigenous involvement could/should be detailed/verified by ODFW, then added to the university report.

We have modified this language to be more precise. See also our comments below under Chapter 5.

Pg 21, top, 5.9: what about ecotourism like in Redfish Rocks?

There is no mention of ODFW supporting ecotourism in Redfish Rocks in the provided report. There is mention that the community outreach group (RRCT) has the goal of developing ecotourism opportunities and that they lead monthly informational and experiential events at the docks, but these are not described as 'economic' opportunities supported by the ORMR program.

Page 21, 5.1 Recommendation 2 at the top of the page: "Use the stakeholder analysis...." This implies there is a stakeholder analysis in place (the use of "the stakeholder"). I am assuming there is not, so reword this to make it clearer what you mean for a general audience.

We have switched "the" to "a" to clarify.

Page 21, 5.2, Recommendation: "...Communication Needs Assessment..." I searched for this term in the synthesis report and did not find that ODFW included this assessment. Rewrite this recommendation to make it clear that it is not a continuation and what you suggest it entails. Every few years is vague.

Phase 3 (C2, page 134) of the communication planning process was a 'Communication Needs Assessment'. It was a thorough and helpful process and report for the communication team. We have clarified the timeline to every 4-6 years.

Page 21, section 5.4.a.3: This seems like a general recommendation for the summary rather than explicit for this question.

We have removed recommendation a.3 from here.

Page 22, 5.7: "...about half the population or fewer..." - Population of what? fisherman, coastal Oregon, Oregon, USA, World?

We have clarified the text: "population of residents living along the I-5 corridor and in coastal Oregon communities".

Page 23, 5.9, Summary: "However, there are equity and accessibility issues." This type of statement does not give the reader any information on what the issues are. Either remove or clarify.

We have clarified this second sentence to "It appears that these contracts are limited to specific individuals and have not been broadly available and/or obtained by vessels across the impacted sites."

Page 23, 6.1 Recommendation: "Not applicable", should this be none?

Correct, we have updated the text to 'none'.

Page 23 6.2 Summary: "...have been used on management decisions, including some beyond the state." Relevance to this report, and specifically to the executive summary?

Also: "More time is needed..." True, but is the case for all of these questions - seems irrelevant here.

We have updated the text for Question 6.2 to reflect the high relevance of the knowledge, data, and methods generated by the Human Dimensions Program to management decisions.

Page 24, 6.4, Summary: This section could be reorganized to flow more clearly.

We have reorganised the summary for clarity.

Page 24: "..., but there are no long-term funding plans." This is true for more than just this part of the marine reserves management plan - remove or clarify.

Correct. However, as the question explicitly asks about long-term funding, we feel this is an important point to make here. We have clarified the text to note that “funding for these does not extend beyond the current MR Program.”

6.5, Summary, This summary does not answer the question well. Have they or have they not – saying ‘could’ implies they might have been but this needs to be clearer.

We have changed the text to clarify that no adaptive management plans currently exist, but the work done by ODFW forms a solid foundation to develop them.

## **Chapter 1: Marine Reserve Design**

[No specific comments]

## **Chapter 2: Marine Reserve Baseline Assessment**

### ***Ecological Monitoring***

[No specific comments]

### ***Human Dimensions Monitoring***

- Conclusion, pg 38, 2<sup>nd</sup> paragraph: This is confusing given the phrase “contemporary context”. Authors should clarify.

We have clarified in the report that because some baseline data were collected after reserves were established, it is important to interpret results of all 'baseline' data within the context of how respondents were reacting to program-wide reserve creation at the time data were collected.

- Section 2.6: Good summary of time trend of studies, good understanding of limitations, and good critique of lack of developing a baseline assessment strategy early on.
- Section 2.7: UAR team emphasizes that studies conducted by multiple authors using different approaches and language makes it difficult to compare study results. A major critique for the HD team (but also a function of the limited research budget and only one staff member which the UAR team recognizes).
- 2.7 (pg 43); UAR team notes that research cannot be internally duplicated by HD team. Consequently, the continued ability to replicate past studies and to detect change in social and economic dimensions requires maintaining the capacity for human dimensions research within ODFW and fostering ongoing collaborations with external partners. Important recommendation.

Thank you – no response.

## **Chapter 3: Ecological Factors**

### ***Planning/Site Evaluation***

3.1: We agree that habitat type is not a perfect surrogate for biodiversity. The evaluators question whether the predominantly rocky sites chosen can be assumed to be the highest diversity sites in Oregon without sampling other regions or other kinds of habitats. There is a good chance that some soft-sediment sites have higher species diversity if small infaunal organisms are sampled. However, if the focus is entirely on megafaunal invertebrates and fishes, then the selections are probably appropriate. The first recommendation suggests that ground-truthing may be possible with the current data collected. Probably not, since the data were only collected in the reserves and comparison areas. The second recommendation is to compare reserve sites to random areas sampled along the coast. A large sample size would be required for this, as many of the sites randomly chosen would be sandy sites.

Limited ground truthing can still be done with the reserve and reference site data. Yes, additional sampling of random areas will require more time and resources. We have added a note of this limitation in our recommendations.

3.2: The university team provides useful comments on key habitats.

3.4: The university team is correct that size and spacing was not adequately addressed from an ecological standpoint because many of the ultimate criteria for selection were based on community input and political considerations.

No response required.

### ***Program Evaluation***

#### Assessing Diversity

The university team accepts the approach taken by ODFW for assessing diversity using Hill numbers and rarefaction. However, as STAC members have pointed out repeatedly over the years, the sampling of invertebrate diversity is inherently flawed because the sampling is limited only to the large, easily identified fauna. See detailed comments in section 3.5

The university team notes correctly that genetic and functional diversity have not been addressed. However, I take exception to their speculation that functional diversity could be assessed with the data in hand. Because the species lists consisted of only a few large taxa, many functional groups would probably not be included in such an analysis.

3.5: The university team feels that diversity was quantified using appropriate metrics and they also note correctly that various sampling methods have unique limitations. However, I do not believe that the methods used for assessing invertebrate diversity were used appropriately.

In the SCUBA surveys, divers were given a predetermined list of species and no “write-ins” were permitted in the surveys. Thus, rarefaction curves and Hill numbers were forced to asymptote at the arbitrarily chosen maximum species number on the species list. Working from a predefined list works o.k. for regional and inter-annual comparisons of abundances, but not for species richness.

The same applies to the ROV surveys, where only large animals were counted and anything that was not identified could not be included in the analysis. The rarefaction curves presented demonstrate the problem perfectly. ROV species lists had 40 species. The asymptotes never exceed this number, and many of the curves reach asymptotes at exactly 40 species. In measuring species richness, it is not necessary to put a name on each organism observed, but it is important to record each different type of organism (e.g. as a morphotype); as presented here, diversity cannot be estimated because the upper limit is artificially constrained by the method.

ODFW have used standard and acceptable methods for assessing diversity for marine reserves. We have considered the methods used by ODFW in the context of the larger question – do the reserves protect areas high in biodiversity? Based on marine reserve research, we expect reserves to offer the most protection for larger, conspicuous species (especially those targeted by fishermen) and species directly interacting with them, and little to no protection for the majority of invertebrates, algae, microbes, and other species that make up biodiversity in the ocean (e.g., Lester et al. 2009). Consequently, it is legitimate to focus on differences in the diversity of certain communities/guilds, rather than ‘true’ biodiversity.

The approach used by ODFW, including a set species list, is a well-accepted approach in most large-scale monitoring programs. As we point out in the report, none of the methods used were designed as true biodiversity monitoring techniques (Question 3.5). Critically, ODFW’s approach takes into account the time, personnel, and funding constraints of the monitoring program. For example, ODFW point out that allowing write-ins for invertebrates and algae took too long and prevented divers completing 2 transects per dive (pg. 17 SCUBA methods). This has been our experience as well when implementing long-term reserve monitoring programs.

We have added a point to the report that notes the caveat that the biodiversity measured by ODFW is not ‘true’ biodiversity, but it is still a widely used approach and applicable in this situation (Question 3.5).

Another problem with the ROV data is that the species list contains only common names. Not all of these are unambiguously attached to any particular species. The intertidal surveyors, to their credit, used scientific binomials.

This is a common scientific practice in all such surveys, and we do not see this as an issue. Often it is very difficult to distinguish subjects to fine taxonomic detail over video.

Consider hypothetically what would happen if ODFW were to take the advice of the university team and compare the diversity of the rocky reserve sites to the diversity of randomly chosen sites along the Oregon coast. None of the species on the list would likely appear in the soft bottom sites because such sites have completely different species assemblages. Would this mean that species richness on mud is zero?

We have updated the text to clarify that we meant stratified by habitat (Question 3.1, main report).

The university team recommends that diversity sampling be continued and suggests increasing sampling frequency. This would be good advice for obtaining better resolution of temporal patterns in the few species studied. However, more sampling using the same flawed methods already employed would give no additional information on species diversity. Such sampling would produce more graphs with artificial asymptotes, but would not increase our knowledge of how many species are actually present in these habitats.

We stand by our assessment that the methods used by ODFW are sufficient (as discussed above), and that increasing the sampling frequency (if logistically possible) would be beneficial, especially for understanding temporal changes due to reserves and any disturbances.

On page 57 the university team states, "For pooled data, rarefaction and extrapolation curves (number of species vs number of sampling units) for each site by method are at an asymptote, or closely approaching one. This partially suggests that enough sampling was undertaken across sites and methods to provide an accurate estimate of diversity (as measured by Hill numbers) at this level of analysis." This is incorrect. As explained above, this would only provide an accurate estimate of diversity if the rarefaction curves were not constrained by an artificial asymptote.

Given that ODFW are technically not sampling true biodiversity - nor do they need to be - we stand by our assessment that enough sampling was done. We have added a caveat noting the limitations of the methods in the text (Question 3.5).

We were surprised to see no mention of considering new methods for assessing biodiversity such as eDNA and metabarcoding.

We have included a suggestion that ODFW consider alternative and complementary methods for assessing biodiversity, include eDNA metabarcoding, noting that these methods are new and not without challenges of their own (Question 3.5, Technical Appendix and Main Report).

3.6. The university team has provided a nice discussion of the limitations of using focal species.

No response needed.

3.11. While it would appear to be wise to limit future changes in methodology, it is also important to recognize (as explained above) that some of the prior methodology was seriously flawed, especially for the estimation of species richness. These methods should be changed going forward.

We have commented throughout the report where we believe the methods definitely require modification moving forward. As discussed above, we disagree that the methods used by ODFW for biodiversity are inadequate for the goals of the MR Program.

#### **Chapter 4: Socioeconomic Characteristics**

On the question of socioeconomic characteristics and criteria for measuring impacts, the report correctly points out that criteria were not clearly established. The draft report goes on to note that:

“Assessing whether ‘significant’ socioeconomic impacts occurred based on statistical significance may lead to understating the importance of impacts on stakeholders based on their valid perspectives and experiences.”

This statement would appear to present a challenge: for some types of measurable impacts, statistical significance is the standard way to establish whether an impact is due to chance or due to some factor of interest. But then in the case of impacts involving stakeholders “valid perspectives and experiences”, how does one establish that these perspectives and experiences (or changes in perspectives and experiences) are also not due to chance, but are related to a factor of interest? The statement needs some clarification; some explanation for how the distinction might be addressed that involves some way of determining for both kinds of impacts that which may be due to chance versus that which can reasonably be attributable to the factor of interest.

Measures of significant impacts can be quantitative, tested for by statistical significance and qualitative, based on the research subject’s determination of causality. Both types of data have potential sources of error. We are an interdisciplinary team of social scientists who accept both qualitative and quantitative assessments as critical for a holistic assessment. Both objective and perceived impacts provide important information about Oregon’s MR management that relate to both technical aspects (e.g., specific regulations) and procedural aspects (e.g., outreach and communication that build trust and understanding).

Moreover, the ‘significance’ of both objective and subjective impacts differs by actor type and by domain of socioeconomic impact (e.g., economic benefits vs. cultural

significance). For purposes of representation, we suggest maintaining this framework of heterogeneity and report on socioeconomic indicators using both quantitative and qualitative metrics.

Regarding chance: in the main text (Question 4.2), we discuss in detail the appropriate use of BACI designs by ODFW for assigning causality for quantitative, objective economic indicators, as well as how causality is often clear for subjective social indicators “as the reserve effects are articulated by those who are meaningfully affected by them”.

We recognise that the aforementioned paragraph from Question 4.1 the (original) Executive Summary was somewhat misleading and overlooked the nuances discussed here and in the main body of the report. We have updated the text in the (now) Technical Summary to better reflect this.

On page 19 in the executive summary, the draft report states:

“Adverse economic impacts include increased perceived and recorded fishery operating and travel costs, increased displacement of recreational and commercial fisheries, and no realization of suggested economic benefits such as increased ecotourism, increased fishery productivity, or equitable distribution of research contracts.”

More detail and nuance is presented in section 4.2, but the first part of the statement in the summary seems to include as an economic impact “perceived costs.” It would be good to clearly separate out what is measurable as an economic impact and what is a perception or opinion. The current wording seems to blend the two. The second part of the statement, referring to the lack of benefits, needs to be qualified to indicate that there was no evidence in the data for these kinds of changes. One cannot state that no such benefits occurred. Something like “based on the evidence compiled...” would convey that qualification.

Thank you for pointing this out; we agree some of the detail and nuance is lost here and have changed the text in the Technical Summary for Question 4.2 to better reflect the findings in the main document.

In the paragraph (also on page 19):

“There was also no change in several socio-economic areas where there was concern that the reserves would have adverse impacts, suggesting that there was no impact these areas. These included reliance, engagement, and employment in the fishing industry, shifts in recreational or commercial fishing effort, charter CPUE and demand, and fisheries landings, earned income, and profitability.”

The "... suggesting that there were no impact(s) (to) these areas" overlooks the problem of not knowing what the counterfactual situation would have been. This is a concern for interpretation of the detailed evidence provided on pages 79-81. The statement needs to recognize that limitation for interpreting the result.

We agree. We have added text to the technical summary (Question 4.2) that discusses this.

The university team conducted a fairly detailed review of the socioeconomic issues. Overall, they were somewhat critical of the approach used by the HD team which they argued prevented them from determining significance or magnitude in analyzing whether ODFW avoided "significant adverse impacts" -- a core legislative goal for designing and managing the marine reserves. Their key concerns included:

In response to this and ODFW's comments (that it is unclear where we are being critical of their methods), we have gone through and tried to soften the wording, or be explicit where we are pointing out limitations or challenges, rather than being critical. For example:

- Question 2.7: we have added text that explicitly notes that the comments are not critiques of ODFW's approach, which follows best practices, more caveats for how the baseline is used.
  - Question 4.1: we have added text that explicitly notes that "ODFW's current research is extensive, valuable and a very important step forward; we highlight these issues not as a critique but as an acknowledgement about how these data were presented in the [Synthesis Report](#)."
  - Likewise in Question 4.2: "Population sampling and data collection tools followed best practices for the representative scientific fields".
- 
- Concepts of "unit of analysis" and "significance": The university team argued that the "unit of analysis" technique used by the ODFW team (unit of analysis refers to relative scale for the analysis e.g., statewide versus local), and the vague definition of "significance" (intensity and context) made it impossible for them to determine whether there were significant adverse (or positive) impacts. Instead, they commented on direction of "change" (or whether there was no change – summarized in Table 4.2.1). Because "significant" is derived from federal law (NEPA) there is federal guidance for interpreting the concept of significant (see Dr. Sylvia's review for STAC from last year). And while a few states have provided their own definition, the state of Oregon has not.
  - The Council of Environmental Quality's list of context and intensity items (section 1508.27) may be a useful framework in considering the environmental policy significance of socioeconomic impacts. Ironically the concept of "context" fits perfectly well with the concept of "unit of analysis" as well as heterogeneity since

“significance” can apply to small locales and small groups as well, for example, as an entire state. It should be noted that ODFW also did not consistently use the concept of significantly adverse (or positive) impact and used substitute words such as “small” or “non-discernible”. We agree with the university team, that ultimately the concept of “significant” is a legal term and unless well- defined is not useful in the context of this review.

There is no statement in any of the ODFW documents, or the OR state legislature documents that created the MR Program, that the definition of significance be based on federal NEPA law. We agree that significance is open for interpretation, and while NEPA does provide a starting point, it doesn’t give a clear working definition that is helpful for Oregon’s MR Process. Our approach to synthesizing the findings of the HD program - recognizing the heterogeneity of impacts across scales and contexts, and considering statistically derived and subjectively expressed importance - echoes that of the NEPA framework that examines impacts in terms of intensity and context. The challenge around the NEPA framework in the context of the MR Program is that it is unclear what scale and context the MR Program should be minimizing negative effects. This needs clear guidance from legislation, and we have included this as a recommendation to Oregon Legislature.

The unit of analysis statements are not critiques, so much as a warning that while aggregation may be important for communication, it may hide impacts at different scales of the social system. Furthermore, it often obscures instances when a minority group is reporting an adverse impact. We clarify the unit of analysis discussion in the final report.

- However, the criticism of “unit of analysis” and “aggregation” and therefore not determining magnitude is unwarranted. Analyzing at different scales is a common and useful technique. I believe the university team is confusing this concept with their more valid criticism of ODFW’s lack of consistent use of a well-defined system of economic and social indicators. If the same indicators were applied across different scales or groups (like nesting dolls) one could look at aggregate measures as well as non-aggregate at local levels or local groups.

We do not suggest that analyzing at different scales and aggregation should be avoided. We applaud the effort to use diverse data collection and analysis methods by the ODFW team. Rather, we suggest that significance should not be determined at a single aggregated unit of analysis. Additionally, establishing the significance of a magnitude of impact depends on creating criteria and reference points.

- Rather than a set of questions to be researched, the university team suggested that ODFW should develop a strategic human dimensions research plan using consistent indicators and metrics within a larger heterogeneous framework such as STE (which they diagrammed in their review (Figure 1, page 75). Even though the budget for the socioeconomics work was relatively small and the ODFW team had to rely on outside researchers using different metrics and techniques, it would be useful in future work to develop consistent metrics and to the extent possible use these to standardize monitoring and methods of analysis across scales and groups.

No response required.

- The university team correctly argued that many negative and positive potential impacts of reserves could not be determined since cause and effect could not be isolated. Conversely, the university team listed ten findings from the work by the HD technical team (pages 80-82) that “suggests that reserves had not had potentially adverse impacts”. With respect to economic domains, particularly those related to fisheries they make a relatively strong statement that “because robust design approaches (before/after, affected/non-affected) were used, we conclude that the monitoring team can be relatively confident that there were minimal positive or adverse economic impacts for most fishermen (but not all) due to the establishment and management of the reserves.” This could be interpreted that for most fishermen there were “no significant adverse impacts”. This is an important conclusion and needs to be highlighted more prominently.

We have clarified our conclusion for this section in the Technical Summary Question 4.2.

- It would have been useful if the university team besides a single comment about “robust designs” had undertaken a more scholarly review of the ten research projects and attest to their credibility.

We have noted multiple times in the report that we believe that ODFW followed best practices. See also our response to overarching comment #4 above.

4.1 Conclusions: both impacts *and benefits* may have been overlooked, not just impacts, no? See last sentence of first paragraph: “Furthermore, by aggregating the findings, it is possible that important impacts were obscured or overlooked.”

Following the language used in the legislation and STACs Request for Proposal, we have changed this to “positive and adverse impacts”.

Page 83: In the Hudson et al. 2018 report, the data are mis-represented. The responses were not only yes and no, but there were also 'I don't know' responses. The report authors seem to lump 'I don't know' into the yes, there was an effect category. This is a misrepresentation and should be re-examined.

We unintendedly did misrepresent the data here. We have updated the text about Hudson et al. 2018 to reflect that the answers included "maybe" and "I don't know".

## **Chapter 5. Level of Community Engagement**

Page 93, 5.1. Conclusion: We note that ODFW has responded to clarify their engagement with Tribes.

We have read ODFW's comments regarding the engagement with Tribes and believe this reinforces our conclusions that Tribal members were not adequately engaged in the MR Process. Specifically, Tribal members were studied as part of the research program, but it is not clear that Tribal consultation occurred or that Tribal representatives were included in proposal development, site selection or any of the following management steps. Tribal consultation is a formal process between U.S. government and Tribal government that can be pursued at the state level and should go beyond meeting with a single liaison.

We have modified the text in Question 5.1 to clarify the extent of engagement with Tribes done by ODFW and our assessment of this.

## **Chapter 6. Governance**

6.3: An important recommendation—the university team recommends that clear, explicit links between monitoring actions and the reserve objectives be included in the monitoring plans to support assessments of whether reserve objectives are being addressed.

No response required.

6.3: the university team notes that given "lack of defined indicators for 'social' impacts and a definition for 'significance', the full extent to which this monitoring plan can address this objective is left to subjective interpretation". The university team may not have realized that concepts of "significance" are open for interpretation and must be defended by showing that the work was reasonable and not capricious and arbitrary.

See our responses above regarding significance and to overarching comment #3.

## **Chapter 7. Enforcement**

[No comments]