

Peer Review Report

for

Recovery Status Review for 15 Species of Indo-Pacific Reef-building Corals Listed under the Endangered Species Act

February 2023

Prepared By:

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HI**

Peer Reviewers:

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1.0 INTRODUCTION

Peer review was conducted in late 2022 by three PhD-level and one BS-level coral reef subject matter experts on the draft document “Recovery Status Review for 15 Species of Indo-Pacific Reef-building Corals Listed under the Endangered Species Act” (RSR). This document will be one of three that make up the Recovery Plan for these 15 listed coral species that is currently under development by National Marine Fisheries Service, Pacific Islands Regional Office, and will also be used for the 5-year reviews of these 15 listed corals. The peer reviewers were:

1. Dr. Eric Brown is a coral reef ecologist at the National Park of America Samoa with over 30 years of experience with coral and coral reef surveys and related work throughout the US Pacific Islands.
2. Dr. Douglas Fenner is a coral species expert and coral reef working as an independent contractor with over 40 years of experience with coral and coral reef surveys and related work throughout Caribbean and the Indo-Pacific.
3. Ms. Aja Reyes is a coral reef biologist at Stantec Inc. in Guam with over 10 years of experience with coral and coral reef surveys throughout the US Pacific Islands.
4. Dr. Nadiera Sukhraj is a coral reef biologist with the US Fish & Wildlife Service in Honolulu with over 10 years of experience with coral and coral reef surveys and related work throughout the US Pacific Islands.

The peer reviewers were asked to review the draft Records Document, and provide peer review by answering the following two sets of questions provided in the Terms of Reference:

1. *Evaluate the adequacy, appropriateness and application of data used in the Corals RSR.*
 - a. *In general, does the document include and cite the best scientific and commercial information available?*
 - b. *Are the scientific conclusions factually supported, sound, and logical?*
 - c. *Where available, are opposing scientific studies or theories acknowledged and discussed?*
 - d. *Are uncertainties assessed and clearly stated?*
2. *Evaluate the descriptions and conclusions for Section 2 (including Global Climate Change (2.1), Threats (2.2), Regulatory Mechanisms (2.3), and Threats Conclusion (2.4)) and Section 3 (including each of the 15 species reports and conclusion (Sections 3.1 – 3.15)).*
 - a. *Are the methods used valid and appropriate?*
 - b. *Are the results and conclusions supported by the information presented?*

The peer reviews are provided below, along with any resulting revisions of the RSR. In some cases, responses to reviewer comments are provided in this report to explain why revisions were not made in response to the comments. Reviewer comments are not identified by name nor listed in the order of the reviewer identification list above to preserve anonymity.

2.0 PEER REVIEWS

2.1 REVIEWER #1

1. *Evaluate the adequacy, appropriateness and application of data used in the Corals RSR.*
 - a. *In general, does the document include and cite the best scientific and commercial information available?*

Yes. There are adequate and appropriate studies and reviews included in the document.

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

Yes

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

N/A? I don't think there are many opposing scientific studies to documenting ranges of the species included.

- d. *Are uncertainties assessed and clearly stated?*

Yes and that is appreciated. The document uses terms such as "likely" and "are projected to", which translates to not being absolute. These are estimates of the current and future trends based on the cumulative information available.

The document also addresses areas where current information does not exist, so the conclusions are being based on trends in the metrics (coral disease, predation, ocean warming, etc).

The document identifies which species have very little known information about life history.

2. *Evaluate the descriptions and conclusions for Section 2 (including Global Climate Change (2.1), Threats (2.2), Regulatory Mechanisms (2.3), and Threats Conclusion (2.4)) and Section 3 (including each of the 15 species reports and conclusion (Sections 3.1 – 3.15)).*

- a. *Are the methods used valid and appropriate?*

Yes, the metrics used for evaluation cover a broad range of threats and susceptibilities (11 in each section labeled "Threats"). It is appreciated that Regulatory Mechanisms was identified as inadequate. Enforcement is an ongoing issue, even with the types and amount of technological advances that are becoming available.

- b. *Are the results and conclusions supported by the information presented?*

Yes.

All of the new information beyond 2014 was included as comparison and to show how knowledge of each species has been updated.

The updates in the Distribution and Abundance sections for each species from 2014 looks like it took a lot of work.

The figures of the geographic distributions was helpful and with a generous buffer of the species range.

Appreciate that the Relative Abundance sections identified that even though some of the ESA species could be a dominant species in a small scale area, that they were rare or uncommon in the overall range.

Revisions of the RSR: No revisions were necessary in response to this reviewer.

2.2 REVIEWER #2

1. *Evaluate the adequacy, appropriateness and application of data used in the Corals RSR.*
 - a. *In general, does the document include and cite the best scientific and commercial information available?*

On a scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes), 4. A lot of information appears to be missing. If the purpose of this document is “The purpose of a recovery plan is to provide a roadmap for a species’ recovery, with the goal of improving its status and managing threats to the point at which protections under the ESA are no longer needed...” and “This Recovery Status Review (RSR) is intended to inform the development of a recovery plan for the 15 listed corals and the Indo-Pacific coral reef ecosystems upon which they depend”...then I can’t really make sense of this document. I am not sure who the audience is supposed to be – whether it is U.S. and international government policy makers, managers and private industry or manufacturers of products related to the production of GHG. Overall, it is also very doom and gloom in it’s this current version.

Response: The purpose of the document is to explain what is needed to recover the species,. Since the most important threats are climate change-related, those threats are emphasized. That is, if ocean warming and ocean acidification are not addressed, no amount of reduction of localized threats like fishing and LBSP will be anywhere near adequate for recovery to be possible. The audience is anyone interested in recovery of these listed species. It is “doom and gloom” because the reality is that current projections show that climate change will get much worse in the foreseeable future, and that large-scale action to address it is absolutely necessary for recovery to be possible.

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

On a scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes), 4. This document is less of a review and more of an argument for addressing global climate change so much so that, perhaps, it should just be presented as an argument on why

the United States needs to increase its efforts to reduce GHG production in order to address global climate change.

This document downplays local impacts and appears to disconnect its relationship and contribution to ocean warming and acidification. For example, the threats of LBSP are glossed over. Also, for example, the evaluation that identifies trade and collection as a threat to corals that surpasses over recreation or mis-use is confusing, especially because there is no explanation of why previously identified threats were not mentioned or if they are combined into the current list. Other threats not mentioned or so briefly mentioned that they seem insignificant include expanded demand and traffic in shipping lanes, harbor and marina development, cosmetics, sunblock and pharmaceuticals. Will an executive summary be included, or a glossary of terms?

Response: As explained in the RSR, localized threats like fishing and LBSP have less influence on the extinction risk of the listed corals than the climate change-related threats of ocean warming and ocean acidification. However, LBSP is certainly not glossed over, as shown by the LBSP section. One previously identified threat was not mentioned, but that was intentional: Harbor and marina development was included in the 2011 Status Review Report as part of habitat destruction, however this threat is relatively much less important to the extinction of the listed species than the threats in the RSR, which only covers major threats to the status of the species. Expanded demand and traffic in shipping lanes was not previously mentioned (e.g., in the 2011 Status Review Report or 2014 final listing rule) and is not considered a threat to corals. Cosmetics, sunblock and pharmaceuticals are all included in the LBSP section of the RSR. An executive summary has been added, but we do not include a glossary of terms in this type of document.

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

On a scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes), 4. Again, this document so heavily relies on the presentation of ocean warming and ocean acidification and misrepresents/dismisses the impacts of more local activities that threaten corals. The document appears to have a trickle down approach for the road map, that gives the impression that no actions at the local level will have a positive effect of the status of these ESA protected corals. Simply put, it appears to be “act globally only, nevermind locally”.

Response: As noted above, the de-emphasis of local threats is intentional because if ocean warming and ocean acidification are not addressed, no amount of reduction of local threats like fishing and LBSP will be anywhere near adequate for recovery to be possible. Since the RSR is intended to show what’s needed for recovery, the emphasis must be on addressing climate change.

d. *Are uncertainties assessed and clearly stated?*

No. On a scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes), 3. Again, this document is heavy on presenting the damage caused by ocean warming

and acidification that it gleans over the other uncertainties. The discussion of management is all on the (local) implementation of laws/agreements and management being less than adequate. If “The purpose of a recovery plan is to provide a roadmap for a species’ recovery, with the goal of improving its status and managing threats to the point at which protections under the ESA are no longer needed.” And if “This Recovery Status Review (RSR) is intended to inform the development of a recovery plan for the 15 listed corals and the Indo-Pacific coral reef ecosystems upon which they depend.”, then this document doesn’t address the uncertainties other than to say that they are unquantifiable.

No case studies of mentioned about previous efforts, such as how coral conservation is successful or not. For example that is no review of effects of ideal conditions for management, stakeholder involvement, local capacity, recreation usage, outreach and education, monitoring, permitting, enforcement, reduction of watershed development, stream restoration, top-down and bottom-up management, improved socio-economic status, tourism, reforestation, improved stormwater management, and low impact development. None of the previous efforts that the coral reef conservation were reviewed other than at the level to say that there are so many factors, that they can’t be evaluated. Also, there is no “hope” in this report that anything put forward to remove the listed corals from the ESA would have any impact. The Conclusion of the report is so short and abrupt that all of the information provided seems incomplete.

Response: The purpose of the RSR is to state what is needed for the rangewide recovery of listed corals, not to describe how localized efforts can conserve or restore corals. The scale of recovery is massive whereas the scale of such localized efforts is tiny. And even if the scale of such conservation and restoration efforts were rangewide, they would be a waste of time if the climate-change related threats of ocean warming and ocean acidification are not addressed. The response of this reviewer shows that this message comes across quite clearly in the RSR. Whether the RSR is “doom and gloom” or provides no hope is irrelevant because the document must clearly and honestly state the reality of recovery.

2. *Evaluate the descriptions and conclusions for Section 2 (including Global Climate Change (2.1), Threats (2.2), Regulatory Mechanisms (2.3), and Threats Conclusion (2.4)) and Section 3 (including each of the 15 species reports and conclusion (Sections 3.1 – 3.15)).*

a. *Are the methods used valid and appropriate?*

Section 2: Scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes): 4

Section 3: Scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes): 3.

The subsections on the biology and distribution of the corals species is descriptive, but the subsections of the threats and conclusion are repetitive. I guess that this is done in order to help pull this information for each species recovery plan in the future.

b. *Are the results and conclusions supported by the information presented?*

Section 2: Scale of 1 to 10 (1 being absolutely not, and 10 being absolutely yes): 4

Section 3: I'm not sure how whomever is development and recovery plan for any of these species would be able to use this information.

Again, If the purpose of this document is "The purpose of a recovery plan is to provide a roadmap for a species' recovery, with the goal of improving its status and managing threats to the point at which protections under the ESA are no longer needed..." and "This Recovery Status Review (RSR) is intended to inform the development of a recovery plan for the 15 listed corals and the Indo-Pacific coral reef ecosystems upon which they depend" then I think that this report should include some of the local-scale measures that are being implemented to support management and stakeholder groups. Here are some topics that I would have liked to see discussed:

- (LBSP) Development of engineering and construction standards that address stormwater management
- (Local Capacity) Standardize monitoring requirements/training/education before, during and following construction.
- (Local Capacity) using drone/ROV/other technology to reduce the cost of monitoring and supplement available local capacity
- (Recreation awareness) Public service signage and announcements – parking areas, parks, hotel introduction channels, airplanes announcements
- (LBSP) Increased support of sustainable agriculture and pesticide/fertilizer alternatives
- (Coral Disease) Biosecurity awareness for dive operations and other marine operations
- (Stormwater Management) Understanding costs for private developers (when small-scale development is exempt for stormwater management regulations)
- Coral nurseries
- Coral translocation
- Dredging
- Increasing shipping lane traffic and dredging
- Enforcement
- Reporting – how is funding implementation reported in order to better track effort at the local level.

Response: Since local threats like LBSP and coral disease are considered important although secondary threats to the status of the species, actions to reduce those threats will be included in the Recovery Plan and Recovery Implementation Strategy, not in the RSR. All of the topics mentioned above are highly relevant to the Recovery Plan and Recovery Implementation Strategy, and we plan on including them there. Drafts of the RSR,

Recovery Plan and Recovery Implementation Strategy will be released to the public for comment in the near future, but first this peer review of the RSR must be completed.

Revisions of the RSR: An executive summary was added in response to this reviewer.

2.3 REVIEWER #3

1. *Evaluate the adequacy, appropriateness and application of data used in the Corals RSR.*

a. *In general, does the document include and cite the best scientific and commercial information available?*

Yes, by and large. I have provided a few additional things to strengthen the scientific information.

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

Yes. There are a few things I would add, as outlined below.

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

Yes. I have provided a few additional things to add to the different studies or theories, below.

d. *Are uncertainties assessed and clearly stated?*

Yes. I have provided a few additional things to add to the uncertainties below.

2. *Evaluate the descriptions and conclusions for Section 2 (including Global Climate Change (2.1), Threats (2.2), Regulatory Mechanisms (2.3), and Threats Conclusion (2.4)) and Section 3 (including each of the 15 species reports and conclusion (Sections 3.1 – 3.15)).*

a. *Are the methods used valid and appropriate?*

Yes, they are valid and appropriate.

b. *Are the results and conclusions supported by the information presented?*

Yes, and I provide a few more things to add to the information that can be used to support the results and conclusions.

In addition to the above responses, this reviewer provided the following input:

P 4, it states in the last sentence of the first paragraph that recovery time has decreased. But the definition of recovery time given at the beginning of the paragraph is that ‘recovery time is the time needed to recover’ not ‘the time available for recovery.’ Increasing frequency of disturbance events implies a decrease in the time available for recovery (and hence a decreased likelihood of complete recovery). It appears that this statement means the opposite of that which

was intended. I would suggest using two different terms, “recovery time available” and “recovery time needed.”

P 4, second paragraph, The Hooidonk et al (2016) predictions are likely significantly overstating the immediacy of the threat of ASB (annual summer bleaching). This is because (as some like Hoegh-Guldberg have long done), they have omitted any accounting of acclimatization and adaptation. Als, near the end of Page 4, a reference to Bruno et al (2009) in “that phase shifts have been either rare or reversed (Cheal et al. 2010, Graham et al. 2013)” would add to the point

Bruno, J. F., Sweatman, H., Precht, W. F., Selig, E. R., and Schutte, V. G. W. 2009. Assessing evidence of phase shifts from coral to macroalgal dominance on coral reefs. *Ecology* 90, 1478–1484.

P 5, middle of the second paragraph. In addition to the anecdotal early accounts, there is a paper by Eddy et al (2018) which did a quantitative survey of coral researcher memories of early coral cover. They reported a relatively high estimated early coral cover. This would strengthen this point.

Eddy, T. D., Cheung, W. L., and Bruno, J. F. 2018. Historical baselines of coral cover on tropical reefs as estimated by expert opinion. *PeerJ* 6: e4308.

Also, another reference that would strengthen the point about coral declines beginning before disease and bleaching reduced corals, in addition to the Pandolfi reference, the following would be good:

Cramer, K. L., Jackson, J. B., Donovan, M. K., Greenstein, B. J., Korpany, C. A., Cook, G. M., and Pandolfi, J. M. 2020. Widespread loss of Caribbean acroporid corals was underway before coral bleaching and disease outbreaks. *Science Advances*, 6: eaax9395.

P 5, end of second paragraph. One of the largest coral reef monitoring programs in the world, if not the largest, is the AIMS monitoring program on the iconic and intensively studied Great Barrier Reef. The De’ath (2012) study referred to was published at a time when the GBR had just gone through a period of drastic loss of coral cover. However, the AIMS monitoring program data now shows that the northern and southern GBR have shown remarkable recoveries of coral cover. That is shown in their annual monitoring report on their webpage <https://storymaps.arcgis.com/stories/4a491a1712f94a779c06d339e6310fdf> The De’ath paper correctly describes the drastic decline, but does not extend to recent years in which coral cover recovered there, which leaves an incomplete and now incorrect impression.

P 5, end of page. Each of the graphs for different regions show different trends. One could guess that they might cancel each other out to some extent, but certainly not all show declines, some like the Red Sea and Gulf of Aden, East Asian Seas, and the Western Indian Ocean do not show declines. It is not obvious looking at the individual area trends what the overall trend for the Indo-Pacific might be, because different areas have different coral reef areas, so Australia and Southeast Asia have very large reef areas while the Persian Gulf and the Eastern Pacific have very small reef areas. So the weighting of areas by coral reef area is important in determining

the overall trends of the Indo-Pacific and world. GCRMN also provided a graph for the whole world. That graph shows much less decline than many people assume. The whole world includes the Caribbean, which has had steeper declines than other areas, so the Indo-Pacific (which GCRMN does not provide) would show less decline than the world average. It would be good to include that world graph.

P 5, A second independent global study found strong decreases in coral cover early on, then a slight gradual decrease. It would be good to include that graph as well (Eddy et al, 2021).

Eddy, T. D., Lam, V. W. Y., Raygondeau, G., Cisneros-Montemayor, A. M., Greer, K. Palomares, M. L. D., Bruno, J. F., Ota, Y., and Cheung, W. L. L. 2021. Global decline in capacity of coral reefs to provide ecosystem services. *One Earth* 4:1278-1285.

P 6, a very good point about coral community composition changes not being reflected in coral cover. Excellent examples.

P 6, last paragraph states that “collectively illustrate a steady decline in Indo-Pacific coral reef ecosystems in recent decades” but the very data being cited, the graphs of page 5, when summarized in a worldwide graph by GCRMN, show remarkably little decline so far. A bit more nuanced statement might fit the evidence better, such as a statement that several areas of the Indo-Pacific show significant decline, while others do not, and a few places that have shown steep decline in coral cover such as the GBR, NW Australian reefs, and South Asia, have shown strong recovery from major losses of coral cover. It is also the case that the past is not likely to be a good predictor of the future for coral reefs, since global warming is by all accounts predicted to reach levels not seen in millions of years unless emissions are reduced enough to stay at only 1.5C increase since industrialization, a goal that is now almost beyond any possible reach, and it is the greatest future threat to coral reefs. The fact that past declines are not as large as some have believed, does not mean that the future is any less threatening than is predicted.

P 14, it would be good to mention for each of the studies that projected the impacts on corals from sea temperature rises, whether they took into account of acclimatization and/or adaptation. Some or most did not, largely because those effects are hard to estimate. But if they did not, their estimates of future impacts are likely to be overestimated, because some acclimatization and/or adaptation are likely or surely going to occur. The reader should be alerted to this. In spite of this, I think the last sentence of the Climate Conclusions fairly represents the present state of knowledge of this.

P 17, Observed effects of fishing: It states that “trawl nets dislodge or abrade corals.” However, trawling is not one of the methods of fishing on coral reefs, presumably because corals will damage nets, coral reefs are too rough to allow nets to be dragged along their surface without catching on corals and ripping up the nets. I do not know of invertebrate fisheries on coral reefs that use destructive methods such as blast fishing or poisons.

P 18 Projected effects of fishing: The Coral Triangle does not have “most of the coral reef area.” Indonesia has 16% of the world’s coral reef area and the Philippines has 8%, and the other countries in the Coral Triangle have less, plus the Coral Triangle only includes the eastern half of Indonesia, so the area of the Coral Triangle is closer to 25% of the world’s reefs, not over 50%. It is quite true that it is an area of a high concentration of coral reefs, so this could be restated and still make this point.

P 18, The question here is whether technology is increasing fishing power on coral reefs as well as generally. Generally, fishing technology power certainly is increasing, but on coral reefs it is not as obviously true. Coral reefs are not conducive to industrial-scale fishing, it generally remains very small-scale and uses relatively low technology, with many new fishing technologies such as GPS, fish finding sonar and larger boats and engines, not being useful for coral reef fisheries. On the other hand, modern coral reef fishing uses lots of technology that was not available in traditional societies a few hundred years ago, such as nylon lines and nets, steel hooks, all scuba and snorkeling gear, aluminum boats, boat engines, and many other things. But reef fishing seems to not be using more new technology now, it seems fairly constant.

P 19, Observed effects of LBSP: road-building can also release large amounts of sediment that is washed onto reefs. Roads are often close to shorelines as that area may be more level than inland areas.

P 20 I would add to the list of the most common Indo-Pacific coral diseases, “growth anomalies.”

P 22 Collection & trade: In the past, collection for curios and shell shops was larger than for the aquarium trade, and although the aquarium trade is now much larger than curio collection, I believe the latter still exists and so should be mentioned.

P 26, fishing regulations could include marine protected areas since such MPAs are almost entirely regulations of fishing. Although few if any MPAs would regulate fishing in the whole country, some may be national legislation and many are likely to be more local rules.

P 27 Although some MPAs may regulate coastal development, my impression is that those may be a small minority, most only regulate fishing. Worth mentioning that in at least a few instances, MPA’s have been reduced (as in Palau and American Samoa).

P 32 Relative abundance, the rating scale at the end of the first paragraph needs units, so for instance, 0.1-1, what are the units? (it can’t be coral colonies because there can’t be 0.1 colonies) It would be good to make it clear whether this abundance rating is a measure of numbers of colonies, or what proportion of sites it was present in.

P 33 Abundance trends. The trend of *Acropora globiceps* was recorded over a 10-year period around Tutuila Island, American Samoa by the Territorial Monitoring program, both in line transects and roving search dives. That was true of each of the listed species found in American Samoa. That data would be available.

P 33 Ocean warming: Although it is commonly reported that *Acropora* bleaches more than other types of colonies, Muir et al (2011) reported differences between *Acropora* species in bleaching and Done et al (2003) reported a wide range of bleaching in different *Acropora*, with species distributed widely and evenly between not bleaching and the heaviest bleaching. This makes it more difficult to predict how sensitive to bleaching any *Acropora* species that does not have data is, based on other species in the genus or the genus as whole. The data in these studies shows that this effect is also present in other genera and families such as *Montipora* and the faviids. Further, the Muir paper reports that the order of sensitivity of species within a group differs between locations.

Muir, P. R., Done, T., and Aguirre, J. D. 2011. High regional and intrageneric variation in susceptibility to mass bleaching in Indo-Pacific coral species. *Global Ecology and Biogeography* 30: 1889-1898.

Done, T. J., Turak, E., Wakeford, M., Kininmonth, S., Wooldridge, S., and De'ath, G. 2003. Testing bleaching resistance hypotheses for the 2002 Great Barrier Reef bleaching event. Report to The Nature Conservancy.

P 34, Coral disease: Different colony morphologies such as *Acropora* staghorns, tables, digitate and bushes have different rates of some specific diseases. So for instance, tables have high rates of diseases such as white syndrome and growth anomalies, while staghorns have low rates of those same diseases. Also, tables have higher rates of ball-shaped growth anomalies with rough surfaces than digitate colonies, while digitate colonies have higher rates of smooth, fill-in growth anomalies than tables. This makes it harder to predict the rate for any one *Acropora* species when data for that specific species is not available.

Page 73, Ocean warming: Sheppard et al (2020) reported that *Isopora* was heavily impacted by bleaching mortality in Chagos in the 1998 El Nino mass bleaching. They also found some recovery.

Sheppard, C., Sheppard, A., Fenner, D. 2020. Coral mass mortalities in the Chagos Archipelago over 40 years: Regional species and assemblage extinctions and indications of positive feedbacks. *Marine Pollution Bulletin* 154: 111075

Page 74. I have seen disease rarely on other species of *Isopora*, and I've seen quite a lot of *I. crateriformis* colonies, but not seen any disease on it.

Page 77, I have seen vast numbers of *Montipora* colonies in several hundred of dive sites around the Pacific and Indian Oceans, and I doubt that *Montipora* are subject to most of the diseases other corals are subject to, though I have certainly seen some diseases on *Montipora*.

Page 82, the Baird et al (2009) reference is not in the references.

Page 84, I would say that *Porites* has much less white syndrome than *Acropora* table corals, and that although massive *Porites* get growth anomalies, they are quite different from the ones *Acropora* table corals get (most on *Porites* retain their color and very few die, unlike on *Acropora* table corals).

Revisions of the RSR: In response to Reviewer #3, the following changes were made to the RSR:

- All changes suggested by the reviewer were made except as noted below.
- The recommendations to strengthen existing sections of the report by adding more citations were not implemented because the cited citations are adequate to support the existing points (but the recommendations to cite new papers in order to make new points were implemented).
- The recommendation for p.5 to show global trends in coral cover from the GCRMN report and Eddy et al. 2021 was not implemented because the Caribbean has had much greater declines in coral cover but the area covered by this report is limited to the Indo-Pacific.
- The recommendation for p.32 to provide units for the relative abundance scale from DeVantier and Turak 2017 could not be implemented because the scale has no units. Rather, as explained on p.9 of DeVantier and Turak 2017 “As a measure of the overall distribution of relative abundance, each species was assigned to one of the following categories based on its IWP-wide OA score: Very Rare: OA < 0.1; Rare: OA of 0.1– <1.0; Uncommon: OA of 1.0– < 10.0; Common: OA of 10.0– < 50.0; Very Common: OA of 50– < 100; Near ubiquitous: OA of 100– 500.”
- The recommendation for p.33 to use the abundance data from Am Samoa DMWR that was collected over a 10-year period was not implemented because the 10-year period ended before listing in 2014, and retrieving, analyzing, and illustrating the data would be quite time-consuming but would not provide any post-listing information on the status of the species.
- The recommendation for p.34 to describe differences in coral disease within *Acropora* (i.e., for the different colony morphologies) was not implemented because of lack of data supporting the reviewer’s statements.

2.4 REVIEWER #4

1. *Evaluate the adequacy, appropriateness and application of data used in the Corals RSR.*
 - a. *In general, does the document include and cite the best scientific and commercial information available?*

Yes, it uses the best information available including unpublished federal data.
 - b. *Are the scientific conclusions factually supported, sound, and logical?*

Yes. Well cited with recent publications included.
 - c. *Where available, are opposing scientific studies or theories acknowledged and discussed?*

Yes. I like the way the authors incorporated new data into the review.

d. *Are uncertainties assessed and clearly stated?*

Yes. I appreciated the updated abundance estimates for many of the coral species as new data became available.

2. *Evaluate the descriptions and conclusions for Section 2 (including Global Climate Change (2.1), Threats (2.2), Regulatory Mechanisms (2.3), and Threats Conclusion (2.4)) and Section 3 (including each of the 15 species reports and conclusion (Sections 3.1 – 3.15)).*

Each of the sections appropriately described the current state of the threats.

a. *Are the methods used valid and appropriate?*

Each of the sections appropriately described the current state of the threats.

b. *Are the results and conclusions supported by the information presented?*

Yes, although on some of the species (e.g., *Acropora globiceps*) it would have been helpful to include some graphs or tables to support the updated species evaluations. The review was well cited.

Revisions of the RSR: No revisions were necessary in response to this reviewer.