

**Review of the  
'Status review of 82 Coral Species under the Endangered Species Act'**

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**Submitted to:** Center for Independent Experts (CIE)  
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**Full citation of reviewed report:**

Brainard, R.E., C. Birkeland, C.M. Eakin, P. McElhany, M.W. Miller, M. Patterson, and G.A. Piniak 2010. Status review of 82 Coral Species under the Endangered Species Act. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-xx, xxx p. + 1 Appendix.

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## **Executive Summary**

This report presents the results of the consultant's review of the draft document "Status review of 82 Coral Species under the Endangered Species Act." This document is intended for publication as a NOAA NMFS Technical Memorandum. It was prepared in response to the October 20, 2009, petition by the Center for Biological Diversity for the NOAA National Marine Fisheries Service (NMFS) to list 83 coral species as endangered or threatened under the U.S. Endangered Species Act. NMFS assembled a Biological Review Team (BRT) to prepare the report, which intended to review the status of the listed species, but not to make actual recommendations as to their official listings. The BRT used an extensive compilation of existing data to establish a series of species-specific Extinction Risk Analyses based on a voting process among the BRT members.

The 'Status Review' is the most informative, authoritative and widely useful compilation of coral reef information this reviewer has had the privilege to read in the last two decades. Every year, hundreds of research projects are undertaken around the world with the specific intent of improving coral reef management at some scale. Most of these have resulted in scientific publications that individually have never had any identifiable impact on decision-making. The 'Status Review' has pulled together hundreds of these papers, incorporated them into a useful knowledge structure, and with them, constructed a body of coherency which itself will constitute a major advance in applied coral reef science. Once finalized and made publically available, this document will not only very adequately serve its stated task, but also serve as an invaluable information resource for scientists and managers around the world.

In the early sections of the report, a very traditional definition of coral reefs is presented. This definition, unfortunately omits much of the total habitat of the focal coral species, which survive quite well on volcanic rocks and exposed bedrock in addition to structural coral reefs. This is a common omission, which can be easily corrected. It has no impact on the species-specific habitat descriptions, which are primarily focused on environmental conditions in the immediate vicinity of the coral colonies. Other omissions, such as the 'bail-out' process, are minor and also easily corrected. A correction is in order about vertebrate vs. invertebrate species range divisions. There are a large number of grammatical and spelling errors, as to be expected in a draft of this size. There are errors and repetitions of species names, many of which are listed along with other corrections in the page-specific comments presented below.

This consultant eagerly awaits the finalization of the document and its availability to the general public, at which time he intends to recommend it widely as a source of definitive information on reefs and corals which can potentially greatly accelerate the growth of coral reef science and the improvement of coral reef management.

## **Background**

This report covers the consultant's review of the draft document "Status review of 82 Coral Species under the Endangered Species Act." This document was prepared in response to the October 20, 2009, petition by the Center for Biological Diversity for the NOAA National Marine Fisheries Service (NMFS) to list 83 coral species as endangered or threatened under the U.S. Endangered Species Act. NMFS assembled a Biological Review Team (BRT) to prepare the report, which intends to review the status of the listed species, but not to make actual recommendations as to their official listings. The BRT compiled existing information into a relatively comprehensive report, and then summarized the information in terms of Extinction Risk Analyses based on a voting process among the BRT members. The document is intended for publication within the **NOAA Technical Memorandum NMFS** series. The consultant was engaged to review the document, along with other experts, through the Center for Independent Experts.

### **Description of the Individual Reviewer's Role**

The consultant was contracted by the Center for Independent Experts (CIE) to review the 'Status review of 82 Coral Species under the Endangered Species Act' under the following terms of reference.

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

1. In general, does the Status Review include and cite the best scientific and commercial information available on the species, its biology, stock structure, habitats, threats, and risks of extinction?
2. Are methods used valid and appropriate?
3. Are the scientific conclusions factually supported, sound, and logical?
4. Where available, are opposing scientific studies or theories acknowledged and discussed?
5. Are uncertainties assessed and clearly stated?

Evaluate the findings made in the Status Review.

1. Are the results of the Extinction Risk Analysis supported by the information presented?"

### **Summary of Findings**

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

Overall, the Status Review does a superb job of citing the best available scientific information on the focal species, their biology, stock structure (in terms of available genetic information), threats, and risks of extinction.

The habitat information is nearly adequate, but additional emphasis should be placed on the roles of non-structural coral communities. The report clearly defines structural coral reefs. However, this report is focused not on the ecology of structural reefs, but rather on the risk of extinction of certain coral species. Reef-building corals are often found growing on volcanic rock or exposed bedrock. In some countries the area of these 'non-structural coral communities' approaches or exceeds that of true structural coral reefs. The total area of coral reefs in the world estimated by Spalding et al. (2001 pgs. 18 and 90) used mapped coral reef areas to estimate the world's coral reef cover at 238,300 sq. km. This estimate included primarily shallow-water structural reefs, which are those most visible from aerial surveys and thus are likely to appear on modern maps. Kleypas (1997) used a global model based on coral survival requirements to estimate a total modern coverage of  $584-746 \times 10^3 \text{ km}^2$ . This confirmed an earlier cruder estimate by Smith (1978) of  $613 \times 10^3 \text{ km}^2$  based on estimates of coral community and reef areas on continental and insular shelves. The latter two cases clearly included large areas of coral habitats which do not occur as shallow-water high relief areas, and whose distributions are important in assessing coral distributions and connectivity. Examples of areas with extensive shallow-water non-structural coral community development are Sombrero Island, Batangas, Philippines (McManus et al. 1981) and Ambon Bay, Indonesia (McManus and Wenno 1981). The distinction between structural reefs and 'coral communities' was made by T.F. Goreau in the 1960's, but the term 'coral community' was later used to describe coral assemblages on structural coral reefs by T. Done. A definition of 'nonreef coral community' is found in McManus 1988, and 'non-structural coral community' in McManus 2001.

It is noted, however, that the descriptions of the habitats on a per-species basis within the report are not at all dependent on the limited definition of habitat in the early portion of the report. Thus, a simple clarification in these early pages will suffice to convey the appropriate concepts concerning extinction risk.

- Kleypas JA (1997) Modeled estimates of global reef habitat and carbonate production since the last glacial maximum, *Paleoceanography* 12(4):533-545
- McManus, John. 2001. Coral Reefs. p. 524-534 In: J.H. Steele, S.A. Thorpe and K.K. Turekian (eds.) *Encyclopedia of Ocean Sciences*. Academic Press, London. 2000 pp.
- McManus, J.W. 1988. Coral reefs of the ASEAN Region: status and management. *Ambio* 17(3):189-193.
- McManus, J.W., Miclat, R.I., and Palaganas, V.P. 1981. Coral and fish community structure of Sombrero Island, Batangas, Philippines. *Proceedings of the 4th International Coral Reef Symposium*. 2:263-269.
- McManus, J.W. and Wenno, J.J. 1981. Coral Communities in Outer Ambon Bay, Indonesia: a general assessment survey. *Bulletin of Marine Science* 31(3):574-580.
- Smith SV (1978) Coral reef area and the contributions of reefs to processes and resources of the world's oceans. *Nature* 273:225-226
- Spalding MD, Ravilious C, Green EP (2001) *World atlas of coral reefs*. University of California Press, Berkeley, California, 416 p

*Are methods used valid and appropriate?*

The use of a voting procedure among participants will undoubtedly raise some concerns among the scientific community. However, under the constraint of access to highly sparse and very patchy information on the parameters, this seems to be the best approach possible. There are those among coral reef scientists who seem to believe that scientists should say nothing at all unless a particular level of certainty has been reached. Fortunately, their numbers are dwindling as the nature of the impending crisis becomes ever clearer. This is an applied science study intended to support impending management decisions-making, and as such it must rely on a best available approach.

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

The conclusions of this study are sound, logical, and supported by the best available published scientific information. Going beyond this into interview-based anecdotal information would be tempting, but would result in far less confidence in the results.

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

Wherever opposing views are available in the peer-reviewed literature, they have been clearly acknowledged. There are, of course, a plethora of opinions available on some of the controversial issues (even on the existence of climate change and ocean acidification!), but unless those have appeared in the formal literature, there is no basis for rational scientific discussion within the report.

*Are uncertainties assessed and clearly stated?*

This report is admirably self-critical, with limitations clearly elucidated.

*Are the results of the Extinction Risk Analysis supported by the information presented?*

Given the limits of available information, the best possible approach to evaluating Extinction Risk Analysis (ERA) seems to have been taken. The bases for the evaluations are clearly presented and supported as clearly as possible.

## Specific Comments by Page

Below are presented informal notes made by the reviewer as they were made during the review. They are presented unedited as short phrases or coding, which are likely to be useful in the process of finalizing the document. They serve in lieu of in-text edits.

Table of contents: CO2 -> CO<sub>2</sub>

3.3.4 does the fishery section include increased fishing pressure due to losses and changes on land?

6.14.x All *Monitpora* should be *Montipora*

6.19 *Pacheseris* should be *Pachyseris*.

Page ix – The process is like a highly informal Delphi approach, but non-anonymous. Each member makes a judgment call based on much the same gathered information but differing field and other experiences. Worrisome, but perhaps the best that could be done?

Page xii – Has multiples of the following entries:

Acanthastrea	brevis	2
Acanthastrea	hemprichii	2
Acanthastrea	ishigakiensis	2
Acropora	acuminata	2
Acropora	horrida	2
Acropora	palmerae	2
Acropora	paniculata	2
Acropora	polystoma	2
Acropora	vaughani	2
Astreopora	cucullata	2
Barabattoia	laddi	2
Pavona	diffluens	2
Physogyra	lichtensteini	2
Pocillopora	danae	2
Pocillopora	elegans (W. Pac)	3
Porites	horizontalata	2
Porites	napopora	2
Porites	nigrescens	2

Also *Porites pukoensis* is treated both as a clade and as a species in the same table.

It includes the following misspellings (correct spelling in last column), also found elsewhere in the document:

Dichocoenia	stokesii	stokes
Pavona	biparti	bipartite
Turbinaria	mesenteriana	mesenterina

Parentheses should be corrected for:  
dilatata/flabellata(/turgescens)  
patula(/verrilli)

Page 1: *Dichocoenia stokesii* should be *Dichocoenia stokesi* according to usage in works by Veron, Romano and Cairns.

Page 3.

“A coral is a marine invertebrate, not a vertebrate species; therefore, it may not be subdivided into distinct population segments.” This is a meaningless sentence. Whether or not one can divide a species’ range into distinct population segments has nothing to do with its being vertebrate or invertebrate. Note that the average fish stays longer in the open water as a larva than the average broadcast coral planulae (despite some individual species exceptions), and brooded coral planulae stay much closer to home (see McManus and Meñez 1997). I suggest simply stating that “Most corals have planulae that drift widely with ocean currents, and so subdivision of the species ranges into distinct segments is not practical in terms of the assessment of vulnerability.”

McManus, J.W. and Meñez, L.A.B.. 1997. The proposed Spratly Island international marine park: biological considerations. Proc. 8th Intl. Coral Reef Symp. 2:1943-1948.

Page 3.

If the petitioner mentioned the criteria for selecting these particular US-hosted corals and not others, it would be good to mention this.

Page 5.

“Cnidaria include members of both the class Hydrozoa (fire corals) and true stony corals (class Anthozoa, order Scleractinia).” Suggest change this to “Within the Cnidaria are fire corals (part of the class Hydrozoa) and true stony corals (class Anthozoa, order Scleractinia).”

Page 7.

‘genetically’ - > genetically

“(i.e. cryptic species adding to diversity).” The term ‘cryptic’ usually means hard to see. Suggest deleting this phrase.

“(Montipora, Porites clades),” change to “(some clades within the genera *Montipora* and *Porites*),”

‘earth’ without the definite article should be capitalized.

“Today’s reefs are less than 10,000 years old as they are found on shallow seafloors that were dry land during the last glacial period (Siddall et al. 2003).” Reefs as geomorphological structures can be much older. Suggest change to “Today’s reef ecosystems are less than 10,000 years old as they are found on shallow seafloors that were dry land during the last glacial period (Siddall et al. 2003).”

Page 10.

Omitted asexual “bail-out” strategy of *Seriatopora* (at least *hystrix*, but possibly others). See: Sammarco 1982. Polyp Bail-Out: An Escape Response to Environmental Stress and a New Means of Reproduction in Corals. Mar. Eco. Prog. Ser. 10: 57-65

Need citation for last sentence on genetics. Suggest:

Baums, IB; Miller, MW; Hellberg, ME 2006. Geographic variation in clonal structure in a reef-building Caribbean coral, *Acropora palmata*. Ecological Monographs [Ecol. Monogr.]. Vol. 76, no. 4, pp. 503-519. Nov 2006. (already in the references?).

Page 11.

‘maintaine’ -> maintained

By now, the document is showing signs of uneven level of scientific jargon. Earlier, all terms were well defined. Later, terms such as mixotrophy are used without specific definitions. Perhaps there should be a glossary, or better use of in-line definition.

It is important to explain about nonstructural coral reefs, given that the report is about coral survival and not reef ecology per se. Corals grow fine on hard substrates other than high-relief limestone reefs, and these communities may well support large proportions of coral populations. The distinction between structural reefs and ‘coral communities’ was in early papers by Tom Goreau Senior on Jamaica and Saipan. However, the term ‘coral community’ was later used by Done to describe communities of coral on structural reefs. Thus, the term nonstructural coral community is recommended. The term ‘coral reef’ is often applied to these nonstructural coral communities, even when the corals are growing on sandstone on volcanic rocks. See:

McManus, John. 2001. Coral Reefs. p. 524-534 In: J.H. Steele, S.A. Thorpe and K.K. Turekian (eds.) Encyclopedia of Ocean Sciences. Academic Press, London. 2000 pp.

Or (using the term ‘nonreef coral communities’)

McManus, J.W. 1988. Coral reefs of the ASEAN Region: status and management. *Ambio* 17(3):189-193.

Page 15.

The “Loss of resilience” sentence is missing one “and”.

Otherwise this paragraph is very well done.

*Acropora palamata* -> *Acropora palmata*

Page 16.

Should add ‘approximately’ to “(700 species....”

Should add ‘may’ to “have provided substantial buffering...”

Page 16.

Biogeography handled very well.

Page 17.

“This has come about through..” sentence missing ‘and’.

Page 17.

Should list the corals restricted to the Eastern Pacific, or modify the sentence to read “local extinction” and otherwise adjust it.

Page 18.

“The BRT was not tasked with considering Section 4(a)(1) Factor 4 (Inadequacy of Existing Regulatory Mechanisms).” So, another report should be prepared to cover this prior to threat status determination.



The sentence following ‘\*’ this is very unclear, has inappropriate capitalizations, and perhaps should be broken down into multiple sentences with more clarifications, especially concerning insolation.

I would have made nutrients and sedimentation ‘medium’, given the rise of coastal construction and deforestation.

Page 19.

Table 3.1.1 caption needs clarification regarding offset of columns in all but last column.

Page 20-21.

The population impacts should include a paragraph relating them to the US coral ranges – such as the problems of population rise on small islands (e.g. limits to farm size leading to increased fishing pressure) and in South Florida (e.g. increased tourist development).

Page 26.

Table 3.2.1 needs much more extensive explanation (symbol definitions) and a year for Donner. What is “Commit”? What does all that mean?

Page 26.

It matters how long the warming occurs (multiple day has worse effects than one day). Maybe Al Strong has published this somewhere?

Page 27.

‘Baker’ should be ‘Baker et al.’ or something like that.

‘recognizes’ -> ‘recognized’

Page 28.

“(Polovina et al.)” needs year

Page 34.

(Albright et al.) needs year.

Also repeated table header.

Page 35.

Table 3.2.1 references appear to have been cut off. They should be there, perhaps in numbered form with list relating numbers to authors as footnote.

Page 43.

“Buddemeier et al.” needs year

Page 47.

Sediment can come directly from land during storms without only going through rivers.

“community structure. Elevated nutrients” -> “community structure. This may be particularly the case when herbivory has been reduced, as by overfishing or disease. Elevated nutrients”

Page 54.

Table 3.3.1. Delete the extra ‘int’s.

Page 58.

“history (Sammarco and Andrews 1989, Cowen et al. 2006). Coral colonies” -> “history (Sammarco and Andrews 1989, Cowen et al. 2006). However, even the arrival of a few larvae over a great distance may be important in cases of re-establishment following local extinction on a reef. Coral colonies”

Page 57.

Need introductory mention of corallivorous snails, sea-stars, etc. even though discussed later.

Page 63 .

“depensatory Allee effects will have commenced” -> “depensatory Allee effects may have commenced”  
Note that this depends on the species and its reproductive needs, as well as local currents and other factors.

Page 64.

“practices (Green and Shirley 1999). An additional” -> “practices (Green and Shirley 1999). There are often concerns raised that permitting the export of cultured dead or live corals may open up the trade in non-cultured corals, because of difficulties in tracking and enforcement. An additional”

Page 69.

Is it Carajoa or Carijoa? You used both.

Page 70.

“invasion is potentially” -> “invasion has potentially”

Errors decline considerably after this page, possibly due to the concise nature of the species-specific information.

Page 200.

Mention that the congener hystrix also exhibits ‘bail-out’ phenomenon, not yet established for this species.

Page 299.

*Anacropora puertogalerae* and *A spinosa* are yet more species not found in US waters. Does this make it less relevant, or will the threat category ultimately affect trade in these species?

Page 473.

Large patches of an unknown *Euphyllia* form large patches in silty coral communities of Outer Ambon Bay Indonesia, indicating a tolerance for sedimentation.

McManus, J.W. and Wenno, J.J. 1981. Coral Communities in Outer Ambon Bay, Indonesia: a general assessment survey. *Bulletin of Marine Science* 31(3):574-580.

That reference has the following useful quote:

“Corals with large polyps may be able to withstand siltation better than some with smaller polyps (Roy and Smith, 1971)”

Roy, K. J., and S. V. Smith. 1971. Sedimentation and coral reef development in turbid water: Fanning Lagoon, *Pacific Science* 25: 234-248,

Good work on species info. Frustratingly, lots of unpublished observations abound, but they cannot be used for this (predation on *Isopora*, etc.)

## **Appendix 1: Bibliography of materials provided for review**

Review materials included a single combined document consisting of the report itself and appendices including all species descriptions:

Brainard, R.E., C. Birkeland, C.M. Eakin, P. McElhany, M.W. Miller, M. Patterson, and G.A. Piniak 2010. Status review of 82 Coral Species under the Endangered Species Act. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-xx, xxx p. + 1 Appendix.

**Appendix 2: Copy of the CIE Statement of Work**

## **Attachment A: Statement of Work for Dr. John McManus**

### **External Independent Peer Review by the Center for Independent Experts**

#### **Status Review of 82 Species of Coral**

**Scope of Work and CIE Process:** The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from [www.ciereviews.org](http://www.ciereviews.org).

**Project Description:** A Status Review of 82 species of coral was conducted by a team at the Pacific Islands Fisheries Science Center pursuant to a petition for NMFS to list 83 coral species and designate critical habitat for them under the Endangered Species Act. Of the petitioned species, 8 occur in the Atlantic and 75 in the Pacific. NMFS has found that the petitioned action may be warranted for 82 of the 83 species; the status review is for these 82 species. The draft Report of the status review team is the subject of the peer review. For each coral species, the report presents and evaluates information on the species' distribution, biology, abundance trends, natural and anthropogenic threats, and danger of extinction throughout all or a significant portion of its range. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**.

**Requirements for CIE Reviewers:** Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. The combination of required expertise of the CIE reviewers shall include working knowledge and recent experience in the biology and ecology of corals, population dynamics of marine invertebrates, quantitative assessment of extinction risk. Each CIE reviewer's duties shall not exceed a maximum of 10 days to complete all work tasks of the peer review described herein.

**Location of Peer Review:** Each CIE reviewer shall conduct an independent peer review as a desk review, therefore no travel is required.

**Statement of Tasks:** Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, and other pertinent information. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Desk Review: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

**Specific Tasks for CIE Reviewers:** The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

- 1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
- 2) Conduct an independent peer review in accordance with the ToRs (**Annex 2**).
- 3) No later than REPORT SUBMISSION DATE, each CIE reviewer shall submit an independent peer review report addressed to the “Center for Independent Experts,” and sent to Mr. Manoj Shivilani, CIE Lead Coordinator, via email to [shivlanim@bellsouth.net](mailto:shivlanim@bellsouth.net), and Dr. David Die, CIE Regional Coordinator, via email to [ddie@rsmas.miami.edu](mailto:ddie@rsmas.miami.edu). Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

**Schedule of Milestones and Deliverables:** CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

25 October 2010	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
28 October 2010	NMFS Project Contact sends the CIE Reviewers the report and background documents
1-15 November 2010	Each reviewer conducts an independent peer review as a desk review
19 November 2010	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
3 December 2010	CIE submits the CIE independent peer review reports to the COTR
10 December 2010	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

**Modifications to the Statement of Work:** Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

**Acceptance of Deliverables:** Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via [William.Michaels@noaa.gov](mailto:William.Michaels@noaa.gov)).

**Applicable Performance Standards:** The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:

- (1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
- (2) each CIE report shall address each ToR as specified in **Annex 2**,
- (3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

**Distribution of Approved Deliverables:** Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in \*.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

**Support Personnel:**

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## **Annex 1: Format and Contents of CIE Independent Peer Review Report**

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.
2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.
3. The reviewer report shall include the following appendices:
  - Appendix 1: Bibliography of materials provided for review
  - Appendix 2: A copy of the CIE Statement of Work

## **Annex 2: Terms of Reference for the Peer Review**

### **Status Review of 82 Species of Coral**

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

6. In general, does the Status Review include and cite the best scientific and commercial information available on the species, its biology, stock structure, habitats, threats, and risks of extinction?
7. Are methods used valid and appropriate?
8. Are the scientific conclusions factually supported, sound, and logical?
9. Where available, are opposing scientific studies or theories acknowledged and discussed?
10. Are uncertainties assessed and clearly stated?

Evaluate the findings made in the Status Review.

2. Are the results of the Extinction Risk Analysis supported by the information presented?

All information associated with the Status Review document is to remain strictly confidential until the Status Review is posted to the PIFSC website and/or the Federal Register by NMFS.