

PEER REVIEW REPORT

Draft Status Review for Endangered Species Act consideration of three foreign corals

We solicited review of the draft status review report from 10 potential external peer reviewers. Four people agreed to be reviewers and three provided reviews.

External Peer Reviewers:

- Antoine Gilbert, Ginger Soproner, Noumea, New Caledonia.
- Dr. Héctor M. Guzmán, Smithsonian Tropical Research Institute, Panama City, Panama.
- Dr. Jean Kenyon, U.S. Fish and Wildlife Service, Honolulu, HI.

Peer Reviewer Comments (not associated with order of names as they appear above):

Peer Reviewer A:

Terms of Reference Question: In general, does the Status Review include and cite the best scientific and commercial information available on the species, their biology, population structure, habitats, threats, and risks of extinction?

The author appears to have conducted a thorough exploration and review of information available through 25 December 2013 regarding each of the three species using printed information (e.g., peer-reviewed journal articles), credible webpages, and personal communications with known experts. The classification of *Cantharellus noumeae* as "endangered" and the other two species as "critically endangered" on the IUCN Red List is openly stated. The author's sources are clearly acknowledged throughout the text and cited in the References section.

Terms of Reference Question: Where available, are opposing scientific studies or theories acknowledged and discussed?

Given the scarcity of information of species-specific information for the three species, it is to be expected that opposing studies or theories would also be scarce. The author does clearly include a genetic study that is unable to differentiate between the alternatives that (1) *Siderastrea glynii* is conspecific to the Caribbean *S. siderea*, and (2) *S. glynii* evolved from *S. siderea* 2 - 2.3 million years ago. The working assumption for the purposes of the Status Review is that *S. glynii* is a separate, valid species.

Terms of Reference Question: Are uncertainties assessed and clearly stated?

The Status Review clearly points out that the determination of whether a species is threatened or endangered should be made on the basis of the best scientific and commercial information available regarding its current status. By logical deduction, scarcity of information may lead to a false conclusion regarding a species actual status, i.e., data deficiency increases uncertainty. The scarcity of species-specific data regarding aspects of distribution, abundance, life history, and response to stressors, all of which contribute to uncertainty in assessing extinction risk, are acknowledged numerous times throughout the draft Status Review. Ambiguity regarding the occurrence of *Cantharellus noumeae* in Papua New Guinea (i.e., a wider range than New Caledonia) is stated. The uncertain taxonomic status of *Siderastrea glynni* (conspecific to *S. siderea* or separated for 2 - 2.3 million years?) is clearly stated, as is the working assumption that *S. glynni* is a unique and valid species. The uncertainty surrounding the pace and magnitude of climate change as expressed in ocean ecosystems, which also increases uncertainty in assessments of extinction risk, is addressed.

Terms of Reference Question: Are the scientific conclusions factually supported, sound, and logical?

My primary discomfort with the draft Status Review is an inadequate explanation of the logical synthesis by which extinction risk of each of the three species is assessed. In assessing the likely extinction risk of each of the 3 coral species, the author considers both demographic risks (abundance, growth rate/productivity, spatial structure/connectivity, and diversity) and threats, to the extent that each of these factors is currently known. Based on these factors, the author assesses the extinction risk of *Cantharellus noumeae*, *Siderastrea glynni*, and *Tubastraea floreana* to be moderately high, high, and very high, respectively. I would like to see these assessments more explicitly laid out, perhaps in the form of a table showing specific risk criteria and the relative vulnerability/resilience to each criterion for each species. Although demographic viability risk criteria are generally described in the paragraph under Assessment of Extinction Risk, it is hard for the reader to follow the logic of these conclusions, i.e., understand the writer's synthesis of relative vulnerabilities. There is no identification of the thresholds by which the categories used in the decision-making process are differentiated. Moreover, there is no identification of the full range of possible categories, e.g., is "very high" the highest category possible, or is there a more extreme category? Given the general and species-specific information provided in the preceding sections of the Status Review (i.e., the reader now has the same information as the writer), the reader should be able to follow the logic of the writer in a more detailed fashion in arriving at the assessments of moderately high, high, and very

high. Given that this assessment is based on the reasoning of a single individual, it is especially important to have the factors and categorizations used in the decision-making process more explicitly spelled out.

This peer reviewer also made comments within the draft report document itself. Below, we indicate the applicable sections of the report, provide the specific portions of text that the reviewer commented on, and the reviewer's comment on the particular portion of text.

Key Questions in ESA Evaluations

Text: *3) Significant portion of its range*

Comment: This should be its own subsection, not couched within Key Questions, particularly as the first sentence in Key Questions refers to 2 questions, not 3. Elevating to its own subsection (in bold letters) would also be consistent with the Table of Contents

Distribution and Abundance

Text: *This may be problematic for a number of reasons: the habitat loss data are broad geographic estimates that do not necessarily reflect the actual range of the petitioned species; it is unclear on what basis and using what data Wilkinson (2004) was able to estimate future habitat loss; and not all species respond the same way to the threats underlying the assumed habitat loss*

Comment: Agreed! I'm glad to see these errors in reasoning called out.

Text: *Gilbert (personal communication) confirmed the lack of species-specific studies in New Caledonia.*

Comment: Who is this person, i.e. on the basis of what credentials, experience, or affiliation should his comments be considered? He is not in the References.

ANALYSIS OF THE ESA SECTION 4(A)(1) FACTORS

Issues Common to All Petitioned Species

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Text: *The species under consideration here are not necessarily the most vulnerable based on those traits.*

Comment: It would be informative to expand on those traits that Wooldridge identified as relating to bleaching vulnerability, then discuss in the following species sections how those traits do not characterize each individual species.

Cantharellus noumeae

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Text: I have found no species-specific information on the susceptibility of this species to bleaching or ocean acidification.

Comment: As indicated in the previous comment, it would be useful to provide more detail regarding the relative absence of traits in this species that were identified by Wooldrige (2013) as relating to bleaching vulnerability.

Siderastrea glynni

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Text: This suggests this species is vulnerable to increased ocean temperatures, though there is no specific research on this point.

Comment: As for the previous species, it would be informative to provide more detail regarding the relative absence of traits in this species that were identified by Wooldrige (2013) as relating to bleaching vulnerability.

Assessment of Extinction Risk

Comment: How are these terms applied to corals? Is “diversity” meant to be “genetic diversity”? If so, be explicit. What is meant by coral “productivity”? The concept is not explained anywhere. If these terms are used to make a relative assessment (i.e., “low”), their applicability to a coral species should be explained.

I would like to see these assessments more explicitly laid out, perhaps in the form of a table showing specific risk criteria and the relative vulnerability/resilience to each criterion for each species. Although demographic viability risk criteria are generally described in the paragraph under Assessment of Extinction Risk, it’s hard for the reader to follow the logic of these conclusions, i.e., understand the writer’s synthesis of relative vulnerabilities. There is no identification of the thresholds by which the categories used in the decision-making process are differentiated. Moreover, there is no identification of the full range of possible categories, e.g., is “very high” the highest category possible, or is there a more extreme category? Given the general and species-specific information provided in the preceding sections of the Status Review (i.e., the reader now has the same information as the writer), the reader should be able to follow the logic of the writer in a more detailed fashion in arriving at the assessments of moderately high, high, and very high. Given that this assessment is based on the judgment of a single individual, it is especially important to have the factors and categorizations used in the decision-making process more explicitly spelled out.

Peer Reviewer B:

Globally the status review is scientifically sound and offers an updated overview of the information available for the species biology, habitats, threats, and risks of extinction. We agree with the outcomes of the review regarding the status of *C. noumeae*. The review also underlines the need of complementary field investigations and monitoring programs.

Recent field surveys conducted by the French research institute (IRD, Figure 1) have to be considered in this manuscript, more specifically in the Range and Habitat Uses section. Indeed, the occurrence of this species on fringing reefs at Noumea and at Balabio in the north-eastern part of New Caledonia leads to an extension of the geographic range of this species.

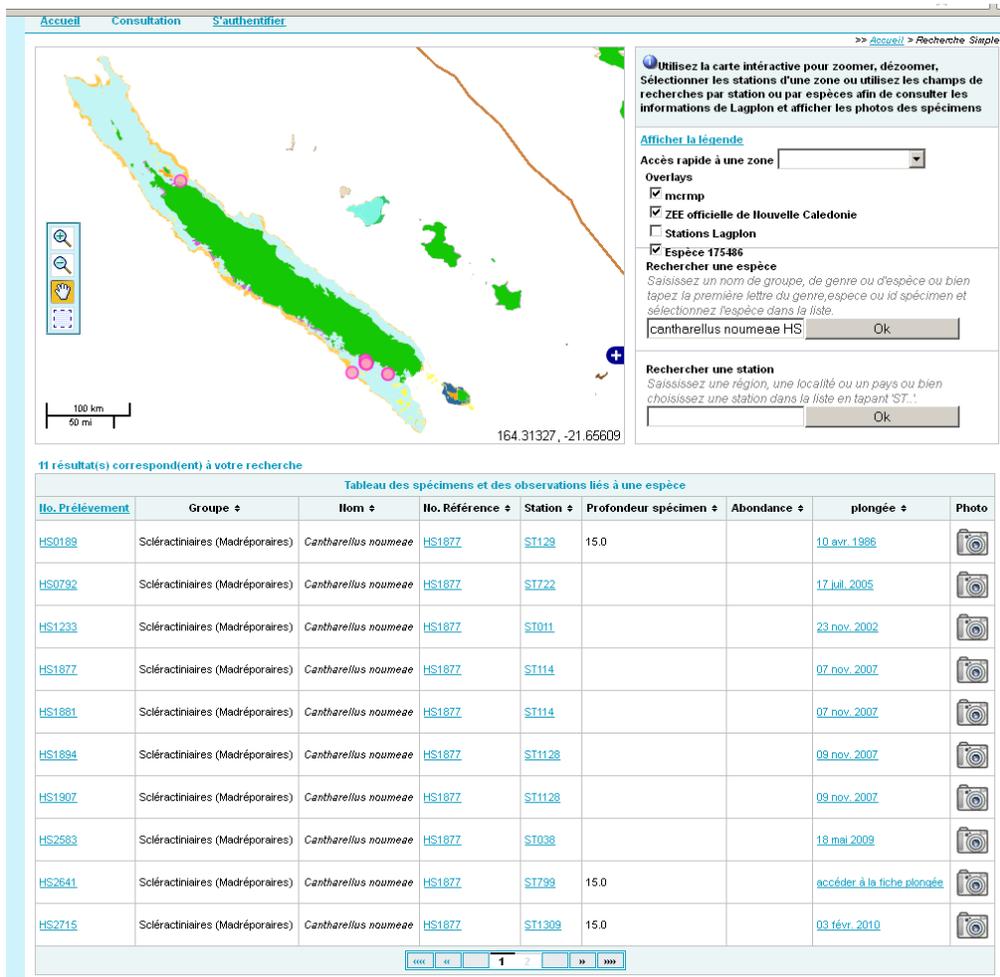


Figure 1: Screenshot of Lagplon (www.lagplon.ird.nc) data base output request for *Cantharellus noumeae*. Data comes from IRD, a french research institut

Cantharellus noumeae is uncommon and usually found on fringing reefs where sedimentation is quite intense like in the Prony Bay (in the southern tip of the main island) or in most of the locations where it was identified (Figure 1). This species likes muddy areas like other species of its family and it appears to have the ability to actively remove sediments (Bongaerts et al., 2012). Recent observations of this species (Figure 2) in the biggest harbour of New Caledonia (La Grande Rade) reveal that this species appears to be quite tolerant to environmental stress (Gilbert com. pers.), especially sedimentation and high metals concentrations (Dalto et al. 2006).



Figure 2: *Cantharellus noumeae* settled on hard substratum of the slope of artificial shores (embankment) in the biggest (commercial and industrial) harbour of New Caledonia: la Grande Rade.

Although further field investigations dedicated to this species are needed to get precise quantitative and systematic data regarding its abundance and geographical range, we believe that the range of this species is larger than expected in this review. Coral bleaching and ocean acidification are induced effects of climate change that are impacting corals. Climate change also predicts increased frequency of severe storms and flooding (Butler et al. 2013), leading to reduced salinity and elevated levels of turbidity and nutrients known to impact coral reefs communities. A big flooding even took place in Prony Bay last July (2013) and induced coral bleaching and fish and invertebrates mortality (EMR 2013). With climate change, this bay will probably suffer of more frequent chronic flooding events that cause mortality, with shorter intervals of recovery. This effect was not taken into account and should be considered in the review. This could allow the ESA to consider SPR for this part of New Caledonia.

Regarding current regulations, the mentioned federal legislation of 2004 is no more applicable. Collection of live corals (and other marine resources) is prohibited locally for 2 of the 3 Provinces of New Caledonia (Province Sud1, Province Nord2). Coral collection is restricted to licensed fishers or scientists with a special permit. Today this restriction allows collection for the local market but it's still in its infancy. International commercial trade of *C. noumeae* under CITES is unlikely since this species is not attractive for the aquarium trade.

As mentioned in the manuscript, nickel mining needs to be considered as an important cause of erosion and sediments runoff that are known to affect coral reefs. Since the application of the

new Mining Code in New Caledonia, mining companies must monitor coral reefs surrounding their extraction sites. Most of the monitoring programs use the LIT method (English et al, 1994) which is not a species specific method needed for the evaluation of species specific treats.

The designation of the Caledonian lagoon as an UNESCO World Heritage site (<http://whc.unesco.org/en/list/1115>) induced the creation of a wide monitoring program all around New Caledonia (Andréfouët 2008). The design of this program is also suffering of a lack of sampling methods at a species level needed for the ESA evaluation.

Finally, some key references are missing and should be mentioned especially regarding competition, diseases and predation. *Acanthaster planci* does not appear to be major cause of coral mortality in New Caledonia (Adjeroud 2012) but several remote reefs surveyed during the Global Reef Expedition in November 2013 on the outer-slope of Guilbert's atolls showed evidence of past outbreaks (LOF 20133, Figure 4). Globally, COT outbreaks are not well documented and only small outbreaks were observed in the south of New Caledonia in 2012 (Adjeroud 2012). Moreover, the prevalence and the number of identified coral diseases are limited in New Caledonia compared to other pacific regions (Tribollet et al. 2011). There is also a reference that could be added to the natural disturbance section regarding the effects of the last huge cyclone that impacted coral cover in New Caledonia (Guillemot et al., 2010).

References

Adjeroud M. (2012) Prolifération de l'étoile de mer corallivore *Acanthaster planci* dans le lagon sud-ouest de Nouvelle-Calédonie : état de lieux en juin 2012 et impacts sur les communautés coralliennes. 48p. (<http://www.oeil.nc/cdrn/index.php/files/bibliographie/2392>)

Andréfouët S. (2008) Définition des points de suivi du récif corallien de Nouvelle-Calédonie inscrit au patrimoine mondial de l'UNESCO (avec mise à jour pour Ouvéa). IRD, Centre de Nouméa, 55 pages + annexes (http://www.ifrecor.nc/IMG/pdf/NC_rapport_def-points-desuivi_Andrefouet_2008.pdf)

Bongaerts, P., B. W. Hoeksema, K. B. Hay & O. Hoegh-Guldberg (2012) Mushroom corals overcome live burial through pulsed inflation. *Coral Reefs*, 31, p.399.

Butler I.R., Sommer B., Zann M., Zhao J.-x., Pandolfi J.M. (2013) The impacts of flooding on the high-latitude, terrigenoclastic influenced coral reefs of Hervey Bay, Queensland, Australia. *Coral Reefs*. 32.,p.1149-1163.

Dalto, A.G., Grémare, A., Dinet, A., Fichet, D.(2006) Muddy-bottom meiofauna responses to metal concentrations and organic enrichment in New Caledonia South-West Lagoon. *Estuar. Coast. Shelf Sci.* 64, 629–644.

EMR (2013) Expertise environnementale des conséquences des fortes précipitations observées les 02 et 03 juillet 2013 sur les communautés récifo-lagonaires des baies Kué et Port-Boisé. Rapport OEil. 96p (<http://www.oeil.nc/cdrn/index.php/resource/bibliographie/view/5618>)

English S, Wilkinson C, Baker V (1994). Survey Manual for Tropical Marine Resources. ASEAN Australia Marine Science Project, Living Coastal Resources Project.

Guillemot N, Chabanet P, Le Pape (2010) Cyclone effects on coral reef habitats in New Caledonia (South Pacific). *Coral Reefs*, 29 , p. 445-453.

Tribollet A, Aeby G, Work T (2011) Survey and determination of coral and coralline algae diseases/lesions in the lagoon of New Caledonia. CRISP report. 26p.

(http://www.biocenosemarine.net/images/stories/biocenose/ENG2011_Surveycoral%20disease.s.pdf)

Peer Reviewer C:

This peer reviewer made comments within the draft report document itself. Below, we indicate the applicable sections of the report, provide the specific portions of text that the reviewer commented on, and the reviewer's comment on the particular portion of text.

Executive Summary

Text: *Here I err on the side of caution by concluding that S. glynni is a valid and unique species until more precise genetic studies can resolve the uncertainty about its status.*

Comment: I have seen millions invested in genetic studies for over a decade for scleractinian corals and always there is an argument about the required resolution to actually separate two species. Only a handful of species have been properly separated. Therefore, I truly don't believe in this option yet. I guess, we should wait, however.

Taxonomy and Distinctive Characteristics

The species is a light reddish-brown in color and occur on ~~coarse sand-rubble-rocky~~ substrates.

Distribution and Abundance

According to Guzmán (personal communication) the colonies were fragmented to increase the number of specimens, but their growth rate has been very slow and some fragments did not survive. Currently, three of the fragments are being considered for cryopreservation further reducing the population size.

ANALYSIS OF THE ESA SECTION 4(A)(1) FACTORS

Issues Common to All Petitioned Species

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Text: *Climate change and its effects on coral habitat, especially through coral bleaching and ocean acidification, is the major threat cited by the petitioners and will be considered in this section.*

Comment: I would like to point out that sedimentation and associated habitat lost is important too.

Other Natural or Manmade Factors Affecting Continued Existence

Siderastrea is right at the entrance of the Panama Canal where continues dredging and oil-based compounds (bunker, diesel, gasoline, etc.) are spilled from nearby port facilities as well as commercial vessels anchored there, in front of the original habitat. That is why it was decided in part to keep them in the aquariums.

Siderastrea glynni

Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Text: Should this species ever be restored to the wild, it faces considerable habitat degradation threats from coastal development, oil production, eutrophication and other pollution, and increased transportation activities in the Panama City area, the Gulf of Panama, and the enlarged Panama Canal, which is due to open in 2016 (Mate, 2003; Guzmán and Edgar, 2008).

Comment: Actually, all that is ongoing now. I did some work long ago on both sides of the isthmus and there we pointed out the present and future degradation.

Evaluation of Adequacy of Existing Regulatory Mechanisms

Text: There are no national laws in Panama for coral reef protection (Pacific Islands Regional Office, 2012).

Comment: There is some regulation that prohibits coral extraction or mining (see Guzman 2003). Also the island where species was found is near a protected area called Taboga. The reference is:

Guzman, H.M. 2003. Caribbean Coral Reefs of Panama: Present Status and Future Perspectives. In: J. Cortes (ed.), pp. 241-274. Latin American Coral Reefs. Elsevier Science B.V., Amsterdam.

Conservation Efforts

Text: The joint USFWS and NOAA Policy on Evaluation of Conservation Efforts When Making Listing Decisions ("PECE Policy", 68 FR 15100; March 28, 2003) further identifies criteria NOAA Fisheries use to determine whether formalized conservation efforts that have yet to be implemented or to show effectiveness contribute to making listing unnecessary, or to list a species as threatened rather than endangered.

Comment: Well that is why we will cryopreserve some fragment of colonies.

Text: The certainty that this effort will be implemented is unclear. It is confirmed already. Further, the effectiveness of cryopreservation effort for species recovery are largely unknown

and thus it is impossible to determine whether this effort will be effective in conserving or improving the status of this species. Your are right on that too...