Chambered Nautilus Status Review Report: ID371

Peer Review Comments

We solicited review of the Draft *Endangered Species Act Status Review Report: Chambered nautilus (Nautilus pompilius)* from four potential reviewers. Three people agreed to be reviewers and two provided reviews. Reviewer responses to the terms of reference questions are compiled below are not in the order of the reviewer identification list below. Specific reviewer comments on the draft status review report are in track changes and found at the end of this report.

Reviewers (listed alphabetically):

Dr. Gregory Jeff Barord
Laboratory Co-Director/Conservation Biologist
Des Moines Public Schools – Central Campus Regional Academy/Save the Nautilus
Iowa, USA

Dr. W. Bruce Saunders
Professor
Bryn Mawr College
Department of Geology
PA, USA

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

Reviewer #1:

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

1. *In general, does the Status Review include and cite the best scientific and commercial information available on the species, including information on its biology, population structure, habitat, threats, and risk of extinction?*

The Status Review cites the majority of the relevant and current scientific and commercial information available for *Nautilus pompilius*. On occasions of missing references, these were noted within track changes, although minor. Each of the above sections is clearly outlined with pertinent information to address the factors facing nautilus survival.

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

Where available, the Status Review relies on the best available data to draw conclusions based on population decline. In particular, regarding catch effort and population abundance/density data, these datasets are presented clearly and effectively.

I think it would be easy, and acceptable, for the Status Review to have ethically exaggerated some aspects of their conclusions based upon the data available. However, the Status Review does a sound job at not over-stating the facts even with all of the information available that would clearly support greater assumptions.

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

The potential causes for population declines in nautiluses are outlined and the best-known information presented in each case. In particular, the most parsimonious reason for nautilus population decline being fisheries is addressed and also compared to other nautilus habitats that may also be declining, but with no fishery present (i.e., in Fiji – perhaps due to coastal run-off). Aside from fisheries, the additional factors that may be at play are presented.

Regarding the sex ratio difference across habitats, studies, and years, the two opposing theories are presented: natural sex ratio versus biased trapping data. While more data could provide insight into this occurrence, the two theories presented are clear.

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

Based on the best available data presented in the Status Review, the Extinction Risk Analysis is supported by these data. When taking into account each of the nautilus populations and habitats, the risk level and confidence rating are appropriate. However, based upon the Status Review, I think it would be appropriate to improve the CR rating on (B) Overutilization from a "2" to a "3". While there certainly are gaps in the data, the best available data clearly shows, and is stated in the Status Review, the impact of the trade on nautilus populations. I think the rating underscores the amount of data that is available and the amount of research cited in the Status Review done to collect the information.

5. *Are uncertainties assessed and clearly stated?*

The uncertainties regarding other factors that may affect population sizes are clearly assessed and their limitations addressed. The gaps are also acknowledged in each area listed but the Status Review provides a thorough assessment based on the best available data and threats facing nautilus populations. While it is true that many nautilus populations remain un-surveyed, the best data available strongly suggests that fished populations decline significantly within 6-20 years and that while non-fished populations may be stable, these populations are relatively small and vulnerable to exploitation and potentially vulnerable to other factors not yet researched.

Other comments:

Overall, the Status Review provides a sound analysis on the data available regarding the current threats facing populations of *Nautilus pompilius* and what the future may hold. The data presented in the Status Review includes the majority of fishery, trade, and biological information on nautiluses and the gaps in this data are clearly presented. Based on the data presented in the Status Review and the conclusions drawn, it is clear that *N. pompilius* is facing an uncertain future if countries sit back and do nothing. It is also clear that enforcement of fisheries and trade at the local level is critical towards ensuring that the CITES listing and potential future conservation action is to be successful.

Reviewer #2:

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

1. *In general, does the Status Review include and cite the best scientific and commercial information available on the species, including information on its biology, population structure, habitat, threats, and risk of extinction?*

Yes. This is an excellent, comprehensive and very up to date review of *Nautilus pompilius.* Not every aspect of the animal is covered here, but that is because there are so many things about it that are unknown and yet to be learned.

I do think a review of what is known of the genetics of *Nautilus* would be useful, because it might help to give a sense of how genetics could assist in defining just what *N. pompilius* is, and the component species of the genus *Nautilus* may be relevant since recognizing the species as subspecies could provide a way to avoid the single-species protected status issue. The genetics are controversial, with a number of papers appearing in just the last decade or so, and there are some thoughts and suggestions out there that might assist in dealing with the taxonomic/conservation issues (see subspecies, in "Taxonomic Dilemma" discussion). Adoption of the "superspecies" concept of *N. pompilius* might just be a simple way to extend protection to include some of the rare, endemic "species" that are much more vulnerable to extinction than *N. pompilius*.

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

Yes. Given how much we still don't know about *Nautilus,* the coverage of *N. pompilius* presented here covers most aspects of the animal that are known and is excellent. Genetics is a bit of a gap (see above).

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

Yes…but there is not much that is opposed here, except the interference that might be caused with relatively small-scale artisanal fisheries, which seem to have turned to other sources of revenue in places where the fisheries have collapsed.

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

Yes. I personally do not believe the species is in danger of immediate extinction. But the trend is here; e.g., —movement of fisheries from the Philippines, where local populations have been severely depleted, to Indonesia is very concerning. And the introduction of modern deep-water trapping techniques, which have added great velocity to artisanal procedures that formerly involved pulling traps by hand from a dugout canoe. Then there is the rise of internet marketing, which threatens to put some sort of *Nautilus* shell or bauble in every household. The trajectory is foreboding. Now is the time to begin enforcing conservation of this unique living fossil, before it loses its "living" status and even more local populations have become inviable.

5. *Are uncertainties assessed and clearly stated?*

Generally, yes. But again, so little is known of *Nautilus*; fisheries and demographic data have been sparse and hard to come by; most operations are artisanal, poorly monitored, and elusive (the fishermen follow the shell dealers, who move to new sites when fisheries crash.