Inclusion of all species of Chambered Nautiluses in the Family Nautilidae in Appendix II

Proponents: Fiji, India, Palau and United States of America

Summary: The Family Nautilidae, or Chambered Nautiluses, is a highly distinctive group of marine molluscs occurring in tropical, reef, and deep-water habitats in the Indo-Pacific. Two genera are recognised *Allonautilus* and *Nautilus.* The genus *Allonautilus* is generally considered to have two species: *A. perforatus* (known from Indonesia and possibly Papua New Guinea[1]) and *A. scrobiculatus* (known from Papua New Guinea and possibly the Solomon Islands[1]). The number of species in the genus *Nautilus* ranges from two to 12 according to different authors; the most recent taxonomic work considers that there are two species, *Nautilus pompilius* and *N. macromphalus*[1]. *N. pompilius* has a wide range, being known from 11 range States and possibly occurring in five others, from India in the west to American Samoa in the east. The Supporting Statement lists four other species: *N. macromphalus* endemic to New Caledonia and also *N. belauensis, N. repertus* and *N. stenomphalus* which are from Palau and Australia and are now considered to be part of *N. pompilius*. It is thought there may also be other as yet unrecognized but separate species existing as genetically distinct, geographically-and reproductively-isolated populations.

Chambered Nautiluses are extreme habitat specialists living in close association with steep-sloped fore reefs and associated silty, muddy or sandy-bottomed substrates, in preferred depths of 150 to 300m and rarely down to 700m. Distribution is patchy and erratic and they may be absent from apparently suitable habitats. They have a relatively narrow temperature range tolerance. Geographic barriers to movement include shallow areas where water temperatures exceed 25°C and open water areas which Chambered Nautiluses avoid, presumably because they are vulnerable to predation there.

They are slow-growing, late-maturing (10 to 15 years) and long-lived (at least 20 years), producing one large egg at a time[1] that requires a lengthy incubation period (about one year) and lacking a mobile larval stage. It is not known how many eggs a single wild female might lay over an entire year. Trapping data indicate that juvenile Chambered Nautiluses represent less than 10 to 20% of populations, indicative of a low-productivity species. The majority of animals captured in traps are male suggesting a male-biased sex ratio and a population structure based on multiple paternity; there is no evidence to suggest that adult males might be more likely to enter baited traps[1].

There are no global population estimates but there is good evidence that populations are naturally sparse, small, and isolated. Surveys have found abundance of most unexploited populations of *N. pompilius* to be low and in some cases less than one individual per km^2 (Australia, Fiji, American Samoa), but on one reef in Australia, abundance was found to be 10 to 15 individuals per km^2. Their attraction to baited traps and ease of recapture[1] may give a false impression of their abundance.

Chambered Nautiluses are the object of targeted fisheries and may also be caught incidentally in other fisheries. Commercial harvesters use fish traps baited with meat dropped to depths of 130 to 250m. The largest commercial fisheries are in the Philippines and Indonesia. The shells and the meat are both used, although the latter is thought to be essentially a by-product, with the shell the primary product in trade. Shells are sold whole as decorative objects or collectors' items and also in pieces, for example in inlay. There is both domestic use and international trade. Much of the domestic sale of shells is to tourists; a proportion of this is likely to be destined for export as personal effects. Some, though probably only a small proportion, of the supply of Chambered Nautilus shells is provided by beach-drift specimens. There is a small amount of use of live specimens for display in aquaria and research.

The Philippines and Indonesia have the largest commercial fisheries. In the Philippines harvest and trade of Chambered Nautiluses has occurred at least since the 1970s. A catch survey in 2001/2002 in Panay estimated an annual harvest of some 12,200 *N. pompilius*; in Palawan, about 9000 animals were reported harvested in 2013 and 37,000 in 2014. More than 18,500 whole shells were found in a recent survey of 162 shops across the Philippines. Commercial harvested reportedly occurs widely in Indonesia with products sold locally and exported. Export in recent years has been notable. According to USA trade data, between 2004 and 2013, some 3700 shells, were exported from Indonesia to the USA, the majority (2630) in 2007[2]. In addition between 2007 and 2010 up to 25,000 specimens were reportedly exported for their meat from Indonesia to China. Overall, however, there is little information on the relative importance of harvest for export compared with that for domestic use in Indonesia.

Targeted fisheries are reported to have taken place in the past in New Caledonia (France), Palau and Vanuatu. Harvests are also thought to take place in China (notably Hainan) and Papua New Guinea, but the extent and impact of these and the proportion, if any, of the harvest that enters international trade is unknown.

There are numerous importing countries but data are available for the USA only. In the period 2005 to 2014, an annual average of around 12,000 whole individuals and over 85,000 parts was imported into the USA, almost all from the Philippines (85%) and Indonesia (12%)[2]. Virtually all imports were reported as *N. pompilius*, but all other species except *A. scrobiculatus and N. stenomphalus* were reported in trade albeit in very small numbers (some in under 10 specimens). Total annual imports to the USA declined over this period. Imports from the Philippines to the USA declined markedly after 2009, and a shift to imports from Indonesia suggests there may have been a switch from Philippine suppliers to Indonesian suppliers.

Most information on population changes comes from the Philippines. Abundance estimates on a reef in Bohol that is subject to commercial harvest were one to three orders of magnitude lower than those of unfished populations. Trap yields from Tañon Strait reportedly declined by 97% between the 1970s when a fishery started and the 1980s when the fishery ceased as the species was considered commercially extinct; Chambered Nautiluses now appear to be completely absent here[1]. Anecdotal reports and results of surveys of harvesters and traders indicate declines, some severe, elsewhere (Palawan, the Visayan Regions and Tawi-Tawi Province). It has been suggested that *N. pompilius* populations in the Philippines are being serially depleted and that trade may be shifting to Indonesia and elsewhere.

There are reports of declines associated with harvest in India (where *N. pompilius* occurs), Indonesia (where *A. perforatus* and *N. pompilius* occur) and New Caledonia (where *N. macromphalus* and *N. pompilius* occur), although very little quantitative information is available.

The habitat on which Chambered Nautiluses are dependent is affected by pressures that have an impact on deep reefs (150m and deeper) such as pollution, sedimentation, deep water mining and fishing[3], and climate change (sea water warming and acidification).

Chambered Nautiluses are not known to be included in any fisheries management plans. Chambered Nautiluses have been protected in Indonesia since 1990. Enforcement is reportedly poor, as evidenced by the quantities exported to the USA, although seizures of shells have been made. Harvest of *N. pompilius* in China requires a permit. Captive-breeding has never been successful; eggs have been hatched but none has been raised to maturity.

The shells of different Chambered Nautilus species resemble each other. Experts are generally able to distinguish between different species but non-experts have difficulty doing so, and species are usually not differentiated in international trade.

Analysis: Chambered Nautiluses are believed generally to occur in small, scattered populations. They are highly vulnerable to overexploitation and are known to be targeted in fisheries, with the products, chiefly shells, known to enter international trade. The main species in trade, *Nautilus pompilius* has an extensive range in the Indo-Pacific. In one range State – the Philippines – harvest has been associated with severe local population declines; the country has exported large quantities of Chambered Nautiluses and it seems that international trade is a significant driver of the harvest. There are indications that harvest for trade has now shifted elsewhere. There are reports of historic and ongoing declines associated with harvest in other parts of the range. It is unclear how extensive such declines are or how important international trade is as a driver of harvest relative to domestic consumption. However, given the extreme vulnerability of Chambered Nautiluses to overharvest, any additional fishing pressure as a result of harvest for export is likely to lead to depletion or local extirpation of populations. Given this and the absence of management plans for the species, it is likely that *N. pompilius* at least meets the criteria for inclusion in Appendix II in Annex 2a of *Res. Conf. 9.24 (Rev. CoP16).*

Chambered Nautilus species resemble each other in the major form in which they appear in trade (shells) so given that *N. pompilius* appears to meet the criteria, all other species in the Family Nautilidae would therefore appear to meet the criteria in Annex 2b (lookalike criteria).

Reviewers: P. Ward and E. Woods.

References:

Information not referenced in the Summary section is from the Supporting Statement.

[1] Ward, P. (2016) *In litt.* to the IUCN/TRAFFIC Analyses Team. Cambridge, UK.
[2] Analysis of US Fish & Wildlife Service Law Enforcement Management Information System (LEMIS) data, May 2016.
[3] Woods, E. (2016) *In litt.* to the IUCN/TRAFFIC Analyses Team. Cambridge, UK.