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PROPOSED DETERMINATION

Nereia lophocladia – Brown alga

The Fisheries Scientific Committee, established under Part 7A of the *Fisheries Management Act 1994* (the Act), is proposing to omit *Nereia lophocladia* from Part 1 of Schedule 5 Vulnerable Species of the Act and insert *Nereia lophocladia* into Part 1 of Schedule 4A Critically Endangered Species of the Act. The amendment of the threatened species lists is provided for by Part 7A, Division 2 of the Act.

The Fisheries Scientific Committee, with reference to the criteria relevant to this species, prescribed by Part 11B of the *Fisheries Management (General) Regulation 2002* (the Regulation) has found that:

Background

1. *Nereia lophocladia* is a valid, recognised taxon and is a species as defined in the Act.

2. The marine brown alga, *Nereia lophocladia* J. Agardh 1897 of the family Sporochnaceae, Order Sporochnales, Division Heterokontophyta, has not been known by any other name.

3. *Nereia lophocladia* is one of four species in the genus *Nereia*: the others being *Nereia filiformis* (J. Agardh) Zanardini from the Mediterranean, *Nereia intricata* Yamada from Japan and Hawaii, and *Nereia tropica* Taylor from the Galapagos Islands. Two undescribed species have since been discovered, one from Norfolk Island and one from New Caledonia. Phylogenetically *Nereia* is basal to the entire order Sporochnales and *Nereia lophocladia* is the most basal extant member of the genus.

4. *Nereia lophocladia* displays a heteromorphic alternation of generations in which both stages of the life history are influenced by the same environmental factors and are thought to have limited dispersal capabilities. Gametophytes consist of microscopic branched creeping filaments, are dioecious and can survive indefinitely (i.e. are free living). Longevity of individual gametophytes, however, is thought to be several years if suitable environmental conditions prevail. Sporophytes are erect, multicellular, pseudoparenchymatous, macroscopic plants that grow to 10-15 cm high.

5. *Nereia lophocladia* has been collected from only two localities, the type and only southern Australian collection from Port Phillip Heads in the late 1800s, and the north and south sides of Muttonbird Island at Coffs Harbour, northern New South Wales from 1980 until the present. The species has not since been collected from southern Australia despite concerted efforts over 50 years by phycological experts, and is thus endemic to New South Wales.

Criteria – reduction in abundance, geographic distribution or genetic diversity (Regulation clause 340F)

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1. *Nereia lophocladia* exists only as the population at Coffs Harbour and has not increased in extent since its discovery in 1980. This population was known to cover an area of some 10-20 sq m at Muttonbird Island on either side of the man-made breakwall/marina that joins the island to the mainland. Sporophytes grow on rock at the sand/rock interface on the seabed in about 5-7 m depths on the immediate northern side of the island and in the harbour itself next to the breakwall. Surveys in March 2002 found plants growing on the north side of the breakwall, but not on the harbour or southern side. Surveys in 2004 and 2006 have failed to find any plants at all.

2. In light of the above, the Fisheries Scientific Committee has found that the species has undergone an extremely large reduction in abundance within a time frame appropriate to the life cycle and habitat characteristics of the taxon; this meets the criteria of Critically Endangered.

Criteria – threatening processes (Regulation clause 340G)

1. *Nereia lophocladia* grows within the confines of the Solitary Islands Marine Park. The north side of Muttonbird Island was designated as a Refuge Zone, but has since been rezoned as a Habitat Protection Zone that decreases the protection level of this area. The south (harbour) side of Muttonbird Island has no zoning and is not within the Solitary Islands Marine Park.

2. Physical disturbance by the building of the breakwall separating the Coffs Harbour Marina from the ocean and the harbour has possibly reduced the numbers of plants. Anecdotal evidence over 25 years of recreational diving suggests that an increase in the numbers of the sea-urchin, *Centrostephanus rodgersii* has threatened the macroalgal beds on the north side of Muttonbird Island with large scale grazing pressure. The physical presence of the breakwall has also impacted on the sand scouring effect on the seabed on both sides of the marina. Within the confines of the marina, the sand has built up by several meters. Large amounts of sand (1-2 m deep) now heavily impacts on the seabed on the northern side of the breakwall and appears to move in and out through storm activity. Depth of rocks on which plants were observed in the 1980s were 7 m deep. The same rocks are now often 2 m under sand cover.

3. Current threats to this very small population include the reduction in the level of protection within the Marine Park, ongoing harbour activities and other anthropogenic impacts. *In situ*, the species is brilliantly iridescent and could be targeted for illegal aquarium collection.

4. In light of the above, the Fisheries Scientific Committee has found that these threatening processes continue to operate within the geographic distribution of the species and existing reserve systems or other forms of refuge do not protect the species.

Conclusion pursuant to section 220F(3) of the Act

In the opinion of the Fisheries Scientific Committee:

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a. *Nereia lophocladia* is facing an extremely high risk of extinction in New South Wales in the immediate future, as determined in accordance with the criteria prescribed by the Regulation as discussed above, and

The species is eligible to be listed as a Critically Endangered species.

Sources and links

Agardh, J.G. (1897). Analecta Algologia. Continuatio IV. *Lunds Universiteta Arsskrift* 33: 1-106.

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