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Lineage – Scientific methodology

Annual distribution of the four-blotched umbrella octopus lineage

1. Literature

Literature sources were searched for distributional information on the four-blotched umbrella octopus *Cirroctopus hochbergi* O'Shea, 1999 (Suborder Cirrata, Family Opisthoteuthidae [Opisthoteuthidae, or a different family altogether, according to some authors]) around New Zealand. This octopus has been recorded only from New Zealand. All specimens have been taken in the deep sea, particularly on seamounts and in cold seep environments, at depths between 700 and 1350 m.

- a. Using the keywords **Cirroctopus** or **hochbergi**, extracts were made from Aquatic Sciences and Fisheries Abstracts and NIWAcad (all records at 14 August 2005). Relevant publications were obtained and used to help define distribution.
- b. Using the keyword **Cirroctopus**, Google records were examined on 12 August 2005. Relevant entries were obtained and used to help define distribution.
- c. Guided searches of library catalogues using the keywords (anywhere or global) **Cirroctopus AND thesis** and **umbrella AND octopus AND thesis** (The University of Auckland, Auckland University of Technology, Massey University, Victoria University of Wellington, University of Canterbury, The University of Waikato, University of Otago) on 14 August 2005 registered no hits.

2. Ministry of Fisheries electronic databases.

No MFish databases were checked as it was decided that they would not contain any useful information on the distribution of *C. hochbergi*. This species is rarely taken, its identity not easily confirmed, and it is not listed in the MFish species database administered by NIWA.

3. Museum holdings.

Holdings of *C. hochbergi* in the following museums were considered. Other museum holdings were not considered because discussions with Dr

O'Shea, Auckland University of Technology, Auckland, indicated that any material received after that referred to in O'Shea (1999) would have either been shelved without formal identification or the identification would require confirmation.

- a. NIWA Greta Point. The **AllSeaBio** database was examined for records on 26 August 2005, with none being present. Additions made to the collection since about 1995 have not been loaded onto this database; in a search of more recent shelved material made on 29 August 2005, no additional material—formally identified as *C. hochbergi*—was found.
- b. Museum of New Zealand Te Papa Tongarewa records of *C. hochbergi* formed the basis of O'Shea (1999); no additional material—formally identified as *C. hochbergi*—has been added (Bruce Marshall, Collection Manager Molluscs, Museum of New Zealand, pers. comm.).

2009 updates: Examination of the NIWA Invertebrate Collection database **Specify** in May 2009 revealed four recently identified records of *Cirroctopus hochbergi*. These records were from within the known spatial and depth distribution for the species.

4. Summary

Cirroctopus hochbergi O'Shea, 1999 has been reported only off the east coast of the North Island of New Zealand, between 35°57–58' and 40°06–09' S, at depths of 700–1350 m. It has been found in a number of discrete areas, associated with seamounts and cold seep/vent features. O'Shea ([www.tonmo.com/science/public/Finned octopoda.pdf](http://www.tonmo.com/science/public/Finned_octopoda.pdf) —26 August 2005) considers that the species, while once relatively common between East Cape and Napier, may now be locally extinct there.

It is important to note that O'Shea (1999) considered *C. hochbergi* to be so similar to *C. mawsoni* that it was not without reservation that he described it as a separate species. He treated the two species as distinct because their distributions are strongly allopatric (*C. mawsoni* and *C. cf. mawsoni* are known only from off Antarctica), and there are differences in the degree of ventral mantle pigmentation and in the lower arm-sucker counts. O'Shea (1999) notes that more material is required before the systematic status of the species group can be fully resolved. (The DNA analyses of Piertney et al. (2003) do not shed light on this.)

The above information on the distribution of the four-blotched umbrella octopus *C. hochbergi*, derived primarily from O'Shea (1999) and discussions with Dr O'Shea, was integrated by hand onto a large-scale map of New Zealand. The maximum depth was taken to be 1500 m, the minimum 500 m. The rounded lines, after being reviewed by Dr O'Shea,

were then digitised and imported into a GIS software package as layers. Because of the small number of specimens it was not possible to estimate anything more detailed about distribution and abundance of the species than the 100% distribution. The area of the 100% distribution class was calculated and the layer linked to attribute and metadata files. It is possible that the geographic extent of this species may increase as more seamounts and other deep waters are sampled more thoroughly.

There is no reason to believe that the seasonal distributions of this species are any different to this annual one.

No additional records of the species outside of the known range were identified in reviews carried out in November 2007 and May 2009.

5. References

The following publications were the key references and/or the ones most useful in describing the annual distribution of the four-blotched umbrella octopus *C. hochbergi*. The list is not intended to be an exhaustive bibliography of publications about this species.

- O'Shea, S. (1998). The deepsea finned Octopoda of New Zealand. *Seafood New Zealand October*: 26–28.
- O'Shea, S. (1999). The marine fauna of New Zealand: Octopoda (Mollusca: Cephalopoda). *NIWA Biodiversity Memoir* 112.
- Piertney, S.B; Hudelot, C.; Hochberg, F.G.; Collins, M.A. (2003). Phylogenetic relationships among cirrate octopods (Mollusca: Cephalopoda) resolved using mitochondrial 16S ribosomal DNA sequences. *Molecular Phylogenetics and Evolution* 27: 348–353.