

Lineage

Annual Distribution of the Horse Mussel

1. Literature sources were searched for distributional information for the horse mussel, *Atrina zelandica* (Gray, 1835).
 - a. General texts on the ecology and species of the New Zealand shore have this bivalve living subtidally, from just below low water level to at least 50 m, in soft substrates on both sheltered and open coasts of the North, South, and Stewart Islands (Morton & Miller 1968, Powell 1979).
 - b. Using the keywords **atrina zelandica or a zelandica**, extracts were made from Aquatic Sciences and Fisheries Abstracts (all records at 27 July 2003). Using the keywords **atrina zelandica or a zelandica or horse mussel**, extracts were made from NIWAcat (all records at 27 July 2003). Using the keywords **atrina zelandica**, extracts were made from Google (all records, 10 September 2003). Relevant publications were obtained but none (except Bull 1990 and Marston 1996 – discussed later) was useful in extending the distribution of the species beyond that described above.
 - c. Using subject indices for 1986–2002, *Seafood New Zealand* was checked for articles dealing with horse mussel distribution and research. None was useful in extending the distribution of the species beyond that described above.
 - d. *New Zealand Fishing News*, 1998–2002 inclusive, was checked for articles dealing with horse mussels to help estimate presence/absence. None was found.
 - e. Using the keywords (anywhere or global) **mussel and thesis** or **atrina and thesis** (The University of Auckland, Auckland University of Technology, Massey University, The University of Waikato, Victoria University of Wellington, and University of Canterbury), and **mussel or atrina or zelandica and thesis** (University of Otago) library catalogues were checked between 7 July and 12 August 2003, and relevant theses obtained and examined. None was useful in extending the distribution of the species beyond that described above, but some provided more detailed local distribution and abundance information.
2. Ministry of Fisheries electronic databases.
 - a. Total estimated **CELR** database landings for the 13-year period from 1 October 1989 to 30 September 2002 (extracted in late 2002) were plotted by statistical area. All significant (> 0.1 t) reported landings were made from east coast statistical areas from Tauranga south to Otago, in Tasman/Golden Bays, and near the

Auckland Islands. The positions of the landings, both small and large, in statistical areas well offshore and including the Auckland Islands (Statistical Areas 021, 023, 204, 402, 602, and 702) were thought not to have been accurately reported. Reported catches on the **CLR** database were examined, but these were not further helpful because the fishery areas are so large.

- b. Research bottom trawl records: **trawl** database. All records of this species being taken, 10 February 1979 to 11 September 2003, were extracted on 11 September 2003 and the positions of the stations plotted in 0.25 degree rectangles. The data were used to estimate presence and absence. A record from well offshore of the southeast of the South Island was assumed to have had its position miss-recorded or else it was not a live mussel.
- c. Scientific observer records from larger vessels: **obs** database. All records of this species being taken to 11 September 2003 were extracted on 11 September 2003 and the positions of the stations plotted in 0.25 degree rectangles. The data were used to estimate presence and absence. A record from well offshore of the west of the South Island was assumed to have had its position miss-recorded or else it was not a live mussel.
- d. The recreational fishing database **rec_data** was examined on 18 August 2003. The **recDiary** database contained no records of *A. zelandica*. The **recRamp** database contained a single record, from the Nelson region. In published reports of recreational catches, *A. zelandica* was so little taken that the species did not deserve particular mention, or all species of mussels were combined (eg., Teirney et al. 1992, Bradford 1997, 1998, 1999, Hartill & Cryer 2001).

No other Ministry of Fisheries databases were checked because none was thought to contain useful information on the distribution of horse mussels.

3. Museum holdings.

Holdings of *A. zelandica* in the following museums were examined. Other museum holdings were not investigated because it was considered that they would not add anything to the record. Data were used to help estimate presence/absence.

- a. NIWA Greta Point. The **AllSeaBio** database was examined for records on 23 July 2003, with a single specimen of *A. zelandica* taken from beyond North, South, and Stewart Islands - at the Chatham Islands in May 1961. Several of the records were from depths much greater than 50 m, but these were probably dead shells; according to the catalogues, live mussels came only from depths to 75 m.

Additions made to the collection since about 1995 have not been loaded onto this database; in a search on 19 September 2003, none of the specimens of live-caught *A. zelandica* identified to species level and shelved were from beyond the North, South, or Stewart Islands.

- b. Museum of New Zealand Te Papa Tongarewa records of this species based on voucher specimens held in their collection had layer was certified by Bruce Marshall, Collection Manager Molluscs, Museum of New Zealand Te Papa Tongarewa.

4. Summary.

The horse mussel *A. zelandica* is an endemic species, adults of which live from just below low water level to about 75 m, in soft substrates on both sheltered and open coasts. Horse mussels have widespread effects on ecosystem structure and function and so may be termed 'ecosystem engineers' (Cummings et al. 1998, Anon 2001). No information on the size or age at which breeding begins was found. Being benthic, the seasonal distributions for adult *A. zelandica* are the same as this annual one. But there can be large year to year changes, widespread die-offs being a feature of this species (eg., Allan & Walshe 1984; Grant-Mackie 1987, Hayward et al. 1999).

Most of the information on the distribution and abundance of *A. zelandica* is general in nature. This mussel is locally common around mainland New Zealand and at least in parts of Stewart Island (Morton & Miller 1968, Powell 1979); it extends well into fiords and sounds (eg., Hopkins 2002); and museum, fisheries (Bull 1990) and general collection (Marston 1996) data show that there is also a (probably small) Chatham Islands population.

The hotspots and 90% distribution as presently determined overlap. Because of the conspicuous form of this species, and the fact that trawling would be expected to reveal its presence, its absence from all the Sub-Antarctic Islands is strongly indicated. It would be expected to be present at the Poor Knights Islands but is probably absent from the Three Kings Islands. It has not been reported from the Kermadec Islands (Brook & Marshall 1998).

The above information on the distribution of *A. zelandica*, derived mostly from general accounts in the literature and museum records, was provided to an expert scientist (Mr Bruce Marshall) who integrated this information with their expert opinion to produce hand-drawn distributional zones hand onto a large-scale map of New Zealand. The rounded lines were digitised and imported into a GIS software package as layers. The areas of each distribution class were calculated and the layers were linked to attribute and metadata files. The map, because of its scale, cannot be taken to accurately define the local distribution of this species.

5. References.

The following publications were the key references and/or the ones most useful in describing the recent/current annual distribution of the horse mussel, *A. zelandica*. The list is not intended to be an exhaustive bibliography of publications about this species.

Allan, L.; Walshe, K. (1984). Update on New Zealand horse mussel research. *Catch '84* 11(8): 14.

Anon (2001). Horse mussels enhance biodiversity in coastal soft sediments. *Biodiversity Update* 2: 5.

Bradford, E. (1997). Estimated recreational catches from Ministry of Fisheries North region marine recreational fishing surveys, 1993–94. *New Zealand Fisheries Assessment Research Document 97/7*.

Bradford, E. (1998). Harvest estimates from the 1996 national marine recreational surveys. *New Zealand Fisheries Assessment Research Document 98/16*.

Bradford, E. (1999). Harvest of major recreational species: comparison of results from the regional and national diary surveys. *NIWA Technical Report 60*.

Brook, F.J.; Marshall, B.A. (1998). Appendix: Checklist of benthic coastal marine chitons, bivalves, gastropods and cephalopods of the northern Kermadec Islands. *In*: Brook, F.J. The coastal molluscan fauna of the northern Kermadec Islands, Southwest Pacific Ocean. *Journal of The Royal Society of New Zealand* 28: 185–233.

Bull, M.F. (1990). Report on a survey of the scallop resource at the Chatham Islands, 22 April – 5 May 1990. *Central Fisheries Region Internal Report 16*.

Cummings, V.J.; Thrush, S.F.; Hewitt, J.E.; Turner, S.J. (1998). The influence of the pinnid bivalve *Atrina zelandica* (Gray) on benthic macroinvertebrate communities in soft-sediment habitats. *Journal of Experimental Marine Biology and Ecology* 228: 227–240.

Grant-Mackie, E. (1987). Aspects of the biology of the horse mussel, *Atrina zelandica*. Unpublished MSc thesis, University of Auckland.

Hartill, B.; Cryer, M. (2001). Recreational catch and effort in the Ministry of Fisheries North Region. *NIWA Technical Report 101*.

Hayward, B.W.; Morley, M.S.; Hayward, J.J.; Stephenson, A.B.; Blom, W.M.; Hayward, K.A.; Grenfell, H.R. (1999). Monitoring studies of the

benthic ecology of Waitemata Harbour, New Zealand. *Records of the Auckland Museum* 36: 95–117.

Hopkins, G.A. (2002). Aspects of the biology of the horse mussel *Atrina zelandica* Gray in Doubtful Sound and off the Otago coast, New Zealand. Unpublished MSc thesis, University of Otago.

Marston, J. (1996). The molluscs of the Chatham Islands –1994. *Cookia* 7(3): 15–56.

Morton, J.; Miller, M. (1968). The New Zealand sea shore. Collins Auckland.

Powell, A.W.B. (1979). New Zealand mollusca. Marine, land and freshwater shells. Collins Auckland.

Teirney, L., Bell, S., Bell, J. (1992). MAF Fisheries South Region survey of marine recreational fishers. Summary of findings. *New Zealand Fisheries Management: Regional Series 1*.

2007 Update.

A Google search (***Atrina zelandica***) on 7 September 2007, and searches of Seafood New Zealand (September 2005 to August 2007) and New Zealand Fishing News for 2006, did not yield any information that extended or altered the above distributions.

An examination on 17 September 2007 of the **specify** database of the NIWA National Invertebrate Collection for any new (post-July 2005) collections and any new (post-July 2005) identifications of old material did not lead to any extension or change to the distribution map. Similarly, there have been no further, formally identified shelveings of material in the Te Papa collections that extended or altered the distribution (Bruce Marshall, Curator of Molluscs, Museum of New Zealand Te Papa Tongarewa, pers. comm.).

The above was discussed with Mr Bruce Marshall on 18 September 2007. It was agreed that the current distribution map remains the best understanding of the distribution of this species. However, because of its scale, this map cannot be taken to accurately define the local distribution of this species.

2010 Update.

A Google search (***Atrina zelandica***) on 7 September 2007, and searches of Seafood New Zealand (September 2007 to September 2010) and New Zealand Fishing News (October 2009 to October 2010), did not yield any information that extended or altered the above distributions.

An examination on 12 September 2010 of the **specify** database of the NIWA National Invertebrate Collection for any new (post-August 2007) collections and any new (post-August 2007) identifications of old material, as well as catch effort data from the Ministry of Fisheries (1 August 2007 to 19 October 2010, Rep Log 7940) did not lead to any extension or change to the distribution map. However, because of its scale, this map cannot be taken to accurately define the local distribution of this species.