

Lineage

Annual distribution of Large trough shell

1. Electronic databases were used to generate initial maps and summary tables of species distributions.
 - a. Commercial fishing returns: **Catch-effort data**. All records from 01 Oct 1989 to 07 November 2006 were extracted on 9 November 2006. A summary of estimated catches by statistical area was created from these data. Many of these records did not have position information, but those that did were used to create draft maps of species distributions. Information from statistical areas 1–10 was down-weighted because of likely mis-recording of FMA or QMA instead of statistical area. Only the top five species caught are reported on these forms so information on the absence of a species is not available.
 - b. Commercial fishing returns: **Landings data**. All records from 01 Oct 1989 to 07 November 2006 were extracted on 9 November 2006. From this extract a summary of landings by species, year, and fishstock (either the species QMAs or the generic FMAs numbered 1–10) was created.

2009 update: Catch-effort and landings data, the observer database (**cod**), and the **trawl** database were re-examined for the period 31 August 2006 to 13 May 2009. Numerous new records of large trough shell were available from both **catch-effort** and **landings** data, as well as from subtidal surf clam surveys done in Pegasus Bay in 2007 (Triantafillos 2008a), and in QMA 2 in 2008 (Triantafillos 2008b), but none were from locations outside of the full range previously described for this species.

2. Literature sources were searched for distributional information that added to the distributional ranges determined from databases.
 - a. Aquatic Sciences and Fisheries Abstracts.
 - b. *New Zealand Professional Fisherman* and *Seafood New Zealand* for 1986–2006.
 - c. *New Zealand Fishing News* for 1998–2006.
 - d. Scientific papers, unpublished reports, species monographs, and university theses available to the expert who prepared the distributional layers.
 - e. Other online sources such as OBIS, Fishbase, Google, and the ISI Web of knowledge.
3. Summary
 - a. Maps and summary tables generated from the electronic databases were provided to an expert scientist who integrated this information

with other information from the literature, and expert opinion, and produced hand-drawn distributional zones on a template map showing the coastline and containing depth contours at 250 m, 500 m, and 1000 m. These maps were then digitised and imported into a GIS software package as layers. The areas of the zones were calculated, and the layers were linked to attribute and metadata files. In some areas of mainly rocky coastline, such as the Fiordland coast, the distribution of this species is mapped as unknown because the fine scale bathymetry in these areas is not known at sufficient resolution to determine whether suitable habitat exists. That is, surf clams may exist off rocky shores if the rocky reef is sufficiently shallow for shallow sand habitat to occur at the edge of the reef.

- b. The primary sources of distributional data for large trough shells were the reported commercial landings, Fisheries Assessment Research Documents, and publications in the primary literature as listed below. The distribution of this species was also discussed with K. Michael (NIWA) who was involved with many of the early surveys of surf clams around the New Zealand coast.
- c. *Mactra murchisoni* is most abundant in the South Island, but also occurs around the North and Stewart Islands. The mactrids *M. murchisoni* and *M. discors* are sympatric, and dominate in southern New Zealand (Blueskin Bay, Te Waewae, and Oreti) where they account for more than 80% of the total surf clam biomass. They are most abundant at depths between 3 and 7 m. Hotspots of abundance occur in Pegasus Bay and Cloudy Bay in the South Island, and along the coastline north of Kapiti Island on the North Island west coast.
- d. Large trough shells were introduced into Quota Management System on 1 April 2004. All reported landings have been from MMI 7. Landings since 1991–92 have been small, apart from the 1993–94 and 1994–95 fishing years when about 8 and 10 t respectively were reported as landed. No further landings were reported until 2002–03, since when the reported catch has ranged between about 2.6 t and 60 t.

5. References

The following sources provided useful information on the distribution of this species. This is not an exhaustive list of all references to the species.

Brierley, P. (Convenor) (1990). Management and development of the New Zealand sub-tidal clam fishery. Report of the surf clam working group, MAF Fisheries (unpublished report held in NIWA library, Wellington). 57 p.

Cranfield, H.J., Michael, K.P. (2002). The surf clam fishery in New Zealand: description of the fishery, its management, and the biology of surf clams. *New Zealand Fisheries Assessment Report 2002/62*. 24 p.

- Cranfield, H.J., Michael, K.P., Stotter, D.R. (1993). Estimates of growth, mortality, and yield per recruit for New Zealand surf clams. *New Zealand Fisheries Research Assessment Document 93/20*. 26 p. (Unpublished report held in NIWA library, Greta Point, Wellington.)
- Cranfield, H.J., Michael, K.P., Stotter, D.R., Doonan, I.J. (1994a). Distribution, biomass and yield estimates of surf clams off New Zealand beaches. *New Zealand Fisheries Research Assessment Document 94/1*. 17 p. (Unpublished report held in NIWA library, Greta Point, Wellington.)
- Cranfield, H.J., Doonan, I.J., Michael, K.P. (1994b). Dredge survey of surf clams in Cloudy Bay, Marlborough. *New Zealand Fisheries Technical Report 39*: 18 p.
- Dell, R.K. (1960). Chatham Island marine Mollusca based upon the collections of the Chatham Islands expedition, 1954. In: Biological results of the Chatham Islands 1954 expedition: Part 4. Marine mollusca and Sipunculoidea. *New Zealand Department of Scientific and Industrial Research Bulletin 139*: 141–157.
- Haddon, M., Willis, T.J., Wear, R.G., Anderlini, V.C. (1996). Biomass and distribution of five species of surf clam off an exposed west coast North Island beach, New Zealand. *Journal of Shellfish Research 15*: 331–339.
- Ministry of Fisheries Science Group (Comps.) (2007). Report from the Fishery Assessment Plenary, May 2007: stock assessments and yield estimates. (In Prep.)
- 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.
- Spencer, H.G., R.C. Willan, B.A. Marshall & T.J. Murray. (2002). Checklist of the Recent Mollusca described from the New Zealand Exclusive Economic Zone. <http://toroa.otago.ac.nz/pubs/spencer/Molluscs/index.html>
- Triantafillos L. (2008a). Survey of subtidal surf clams in Pegasus Bay, November-December 2007. Client Report prepared for Seafood Innovations Limited and Surfco Limited as part of NIWA Project SIL07302. NIWA Client Report: WLG2008/24. 39p.
- Triantafillos L. (2008b). Survey of subtidal surf clams in Quota Management Area 2, June-August 2008. Client Report prepared for Seafood Innovations Limited and Surfco Limited as part of NIWA Project SIL07302. NIWA Client Report: WLG2008/72. 36 p.