



Lineage

Annual distribution of King clam

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 king clam were available from both **catch-effort** and **landings** data, 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 - d. Scientific papers, unpublished reports, species monographs, and university theses available to the expert who prepared the distributional layers.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, these 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 king clams 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. Because deepwater clams are usually buried within the top 30-45 cm of the substrate, beach cast shells, especially in sheltered waters may not be common, which may tend to mask areas of high abundance. The only hotspot of abundance known is in Golden Bay at the top of the South Island, where a commercial fishery for king clams has operated in a number of fishing years, mainly in the early 1990s.
- c. There are two very similar *Panopea* species in New Zealand, *P. zelandica* and *P. smithae*, both of which are endemic and widely distributed around the North, South and Stewart Islands. *P. smithae* has also been reported from the Chatham Islands. Locally, their distribution can be patchy. These clams are commonly referred to as deepwater clams, king clams, geoducs and geoducks, and also gapers in reference to the shell not being closed at either end. Although distributions can overlap, *P. zelandica* occurs mainly in shallow waters (5–25 m) in sand and mud off sandy ocean beaches, while *P. smithae* lives mainly at greater depths (110–130 m) on coarse shell bottoms, and is also thought to burrow deeper.
- d. King clams were introduced into the Quota Management System on 1 October 2006. The commercial fishery in recent years has been small. The largest landings were reported in 1989–90 (95.5 t). Almost all of this catch was taken in the Nelson-Marlborough region using underwater breathing apparatus (UBA) under a special permit for the purpose of investigative research. Exploratory catch was also undertaken in the Bay of Plenty, between Cape Farewell and Cape Foulwind, as well as on the Kapiti coast. In PZL 3 (the area between the Clarence River, Marlborough, and Slope Point on the Catlins coast), in 1992–93 and between 2001 and 2003, rare catches were made by trawling. Fishing was also carried out under a special permit in the Nelson-Marlborough region between 2004 and 2006.

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.

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Breen, P.A. (1991). The New Zealand deepwater clams (geoducs), *Panopea zelandica* and *P. smithae*. New Zealand Fisheries Assessment Research Document 91/5.

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Breen, P.A.; Gabriel, C.; Tyson, T. (1991). Preliminary estimates of age, mortality, growth, and reproduction in the hiatellid clam *Panopea zelandica* in New Zealand. *New Zealand Journal of Marine and Freshwater Research* 25: 231–237.

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