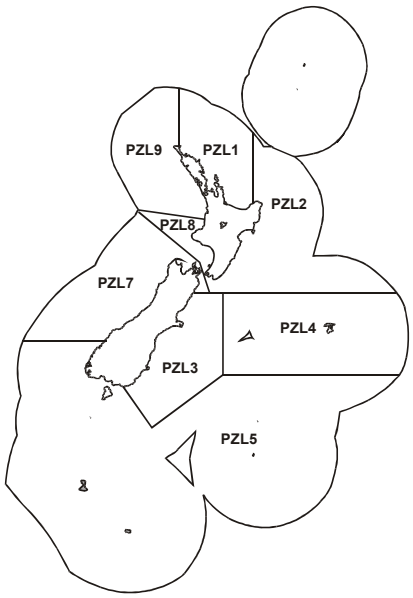
DEEPWATER (KING) CLAM (PZL)

(*Panopea zelandica*)



1. FISHERY SUMMARY

1.1 Commercial fisheries

Deepwater clams (*Panopea zelandica*), commonly referred to as geoducs (geoducks), were introduced into Quota Management System on 1 October 2006. The fishing year is from 1 October to 30 September and commercial catches are measured in greenweight. The commercial fishery in recent years has been small. The largest landings since 1989–90 were reported between 1989 and 1992 (Table 1). 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, in 1991–92 and between 2001 and 2003, rare catches were made by trawling. Fishing was also carried out under a special permit in PZL 7 between 2004 and 2005.

Table 1: TACCs and reported landings (t) of deepwater clam by Fishstock from 1988–89 to 2006–07 from CELR and CLR data.

	PZL 1		PZL 2		PZL 3		PZL 4		PZL 5	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1989–90	0.315	–	0	–	0	–	0	–	0	–
1990–91	0	–	0	–	0	–	0	–	0	–
1991–92	0	–	0	–	0.725	–	0	–	0	–
1992–93	0	–	0	–	0.053	–	0	–	0	–
1993–94	0	–	0	–	0	–	0	–	0	–
1994–95	0	–	0	–	0	–	0	–	0	–
1995–96	0	–	0	–	0	–	0	–	0	–
1996–97	0	–	0	–	0	–	0	–	0	–
1997–98	0	–	0	–	0	–	0	–	0	–
1998–99	0	–	0	–	0	–	0	–	0	–
1999–00	0	–	0	–	0	–	0	–	0	–
2000–01	0	–	0	–	0.146	–	0	–	0	–
2001–02	0.003	–	0	–	0.068	–	0	–	0	–
2002–03	0	–	0	–	0.001	–	0	–	0	–
2003–04	0	–	0	–	0	–	0	–	0	–
2004–05	0	–	0	–	0	–	0	–	0	–
2005–06	1.200	–	0	–	0	–	0	–	0	–
2006–07	0	1.2	0	1.2	0	1.2	0	1	0	1

Table 1 (*Continued*):

Fishstock	PZL 7		PZL 8		PZL 9		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1989–90	95.232	–	0	–	0	–	95.547	–
1990–91	29.293	–	0	–	0	–	29.293	–
1991–92	31.394	–	0	–	0	–	32.119	–
1992–93	0	–	0	–	0	–	0.053	–
1993–94	0	–	0	–	0	–	0	–
1994–95	0	–	0	–	0	–	0	–
1995–96	0	–	0	–	0	–	0	–
1996–97	0	–	0	–	0	–	0	–
1997–98	0	–	0	–	0	–	0	–
1998–99	0	–	0	–	0	–	0	–
1999–00	0	–	0	–	0	–	0	–
2000–01	0	–	0	–	0	–	0.146	–
2001–02	0	–	0	–	0	–	0.071	–
2002–03	0	–	0	–	0	–	0.001	–
2003–04	1.444	–	0	–	0	–	1.444	–
2004–05	2.944	–	0	–	0	–	2.944	–
2005–06	0	–	0	–	0	–	0	–
2006–07	0	23.1	0	1.2	0	1	0	30.9

1.2 Recreational fisheries

The recreational harvest of *P. zelandica* is likely to very small or non-existent as water jets and UBA are required to remove the clam from the substrate. There are no estimates of recreational take for this surf clam.

1.3 Customary non-commercial fisheries

There are no estimates of current customary non-commercial use of this clam, although it is harvested for customary non-commercial use when washed ashore after storms.

1.4 Illegal catch

There is no known illegal catch of this clam.

1.5 Other sources of mortality

There is little information on other sources of mortality, although the clam has on rare occasions been captured during trawling operations. It has been suggested that fishing-related mortality may occur in juvenile clams as a result of displacement by water jets and consequent predation, or failure to re-establish in the substrate.

2. BIOLOGY

There are two very similar *Panopea* species in New Zealand, *P. zelandica* and *P. smithae*, both of which are endemic. Both are widely distributed, and occur 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, and geoducs (geoducks), or 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.

The main distinguishing feature between the two species is the longitudinal indentation of a line or mark along the inner side of the shell (between anterior and posterior muscle scars) known as the pallial sinus. This line is much deeper in *P. smithae*. Samples of commercial and exploratory catches indicate that *P.*

zelandica is more abundant than *P. smithae*, and in the early 1990s it comprised virtually all of the catch.

Deepwater clams filter-feeding burrowers. The foot and pedal openings are small, and a specimen brought to the surface is helpless to re-imbed. The fused siphons (inhalent and exhalent) extend to more than 30 cm, and are heavily sheathed in brown cuticle.

Deepwater clams are broadcast spawners, of separate sexes. All *P. zelandica* sampled (61-135 mm shell length) from a research programme undertaken in Golden Bay were mature; those 61 mm long were estimated to be three years of age. Those taken from near Nelson in March had recently spawned, which indicates that spawning may take place in summer (Breen *et al*. 1991). The larval life of both species is thought to be about two to three weeks, and there is evidence of significant recruitment variation between years.

Based on ring counts (thought to be annual, but not validated) the oldest *P. zelandica* in a Golden Bay sample was 34 years; and the mean estimated age of the sample was 12–13 years. Growth in shell length appeared to be rapid for about 10 years and very slow thereafter, but total weight continued to increase.

3. STOCKS AND AREAS

For management purposes stock boundaries are based on QMAs, however, there is little information on stock structure, recruitment patterns, or other biological characteristics to determine fishstock boundaries.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

4.1 Sea-bed disturbance

Deepwater clams are usually buried within the top 30–45 cm of the substrate and only the siphon hole is visible. Their extraction requires water jets to liquefy the surrounding substrate. This method disturbs the substratum within a 0.5–1 m radius of the targeted individual, and results in the disturbance of all associated infaunal species within the disturbed area. This infauna includes small and juvenile deepwater clams, as well as oysters, scallops, polychaetes, starfish, various annelid species and other infaunal invertebrates. The loss of juvenile deepwater clams when harvesting adult clams may create a sustainability risk.

Overseas research suggests that the benthos recovers quickly after harvesting of clams. In addition, the benthic habitat in which deepwater clams are found is usually subjected to temporal disturbance by environmental conditions such as currents and swells, and in some instances is already modified by long-established existing fishing practices (i.e., oyster and scallop dredge fisheries).

The current relatively low TACCs are likely to minimise adverse environmental effects.

4.2 Incidental catch (fish and invertebrates)

As deepwater clams are harvested by hand, incidental bycatch is unlikely.

4.3 Incidental Catch (seabirds and mammals)

Not relevant to deepwater clam fisheries.

4.4 Community and trophic structure

The effects fishing for deepwater clams on the community and trophic structure are unknown.

4.5 Spawning disruption

The effects fishing for deepwater clams on spawning are unknown.

4.6 Habitats of special significance
Habitats of special significance have not been defined for this fishery.

4.7 Biodiversity
The effect of fishing for this clam on the maintenance and healthy functioning of the natural marine habitat and ecosystems is unknown.

4.8 Aquaculture and enhancement
Not relevant to clam fisheries.

5 STOCK ASSESSMENT

5.1 Estimates of fishery parameters and abundance
Von Bertalanffy growth parameters have been estimated for *P. zelandica* from the Golden Bay near Nelson (Breen *et al*. 1991). The reported estimates are L_∞ = 116.5 mm, and K = 0.16, and assume that growth rings counted in shells are annual.

Estimated natural mortality (M) appeared to be about 0.2 for clams at least 10 years of age, but the estimate was sensitive to the range of ages included, and varied from 0.14 to 0.26 (Breen *et al*. 1991).

5.2 Biomass estimates
Biomass has not been estimated for any deepwater clam stocks.

5.3 Estimation of Maximum Constant Yield (MCY)
MCY has not been estimated for any deepwater clam stocks.

5.4 Estimation of Current Annual Yield (CAY)
CAY has not been estimated for any deepwater clam stocks.

6. STATUS OF THE STOCKS

Because of the relatively low levels of exploitation of *P. zelandica*, it is likely that all stocks are still effectively in a virgin state. There are no estimates of reference or current biomass for any deepwater clam fishstock.

7. FOR FURTHER INFORMATION

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