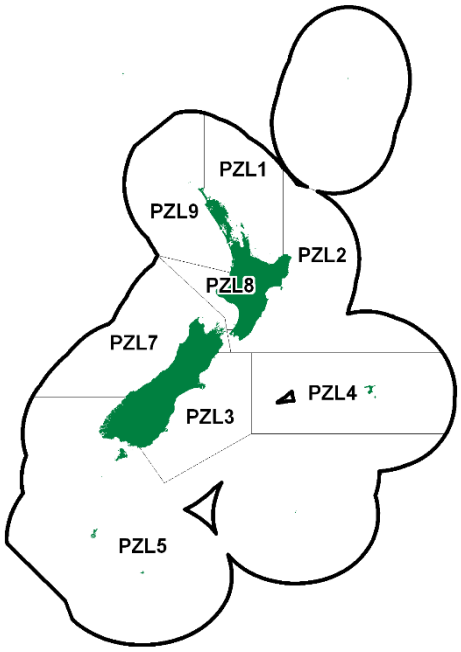
DEEPWATER (KING) CLAM (PZL)

(*Panopea zelandica*)



1. FISHERY SUMMARY

Deepwater clams (*Panopea zelandica*), commonly referred to as geoducs or geoducks, were introduced into the Quota Management System on 1 October 2006 with a total TAC of 40.5 t, consisting of 31.5 t TACC and a 9 t allowance for other sources of mortality (Table 1). No changes have occurred to the TAC since. The fishing year is from 1 October to 30 September and commercial catches are measured in greenweight. Deepwater clams are harvested by divers using underwater breathing apparatus and a hydraulic jet.

Table 1: Current TAC, TACC and allowances for other sources of mortality for *Panopea zelandica.*

Fishstock	TAC (t)	TACC (t)	Other sources of mortality
PZL 1	1.5	1.2	0.3
PZL 2	1.5	1.2	0.3
PZL 3	1.5	1.2	0.3
PZL 4	1.5	1.2	0.3
PZL 5	1.5	1.2	0.3
PZL 7	30.0	23.1	6.9
PZL 8	1.5	1.2	0.3
PZL 9	1.5	1.2	0.3
Total	40.5	31.5	9.0

1.1 Commercial fisheries

The largest landings since 1989 were reported between 1989 and 1992 (Table 2), almost all taken in the Nelson-Marlborough region under a special permit for investigative research. Targetted fishing was also carried out under a special permit in PZL 7 between 2004 and 2005. Rare catches have also been made by trawlers. The largest catch since 1993 (10.885 t) occurred in 2011–12 and was mainly taken from the Nelson-Marlborough region (Table 2).

1.2 Recreational fisheries

There are no estimates of recreational take for this surf clam. Recreational take is likely to be very small or non-existent.

1.3 Customary fisheries

This clam is harvested for customary use when washed ashore after storms but there are no estimates of this use of this clam. Customary take is likely to be very small or non-existent.

Table 2: TACCs and reported landings (t) of deepwater clam by Fishstock from 1988–89 to present, taken from CELR and CLR data. There have never been any reported landings in PZL 2, 4, 5, 8, or 9.

	PZL 1		PZL 3		PZL 7		Total	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1989–90	0.315	-	0	-	95.232	-	95.547	-
1990–91	0	-	0	-	29.293	-	29.293	-
1991–92	0	-	0.725	-	31.394	-	32.119	-
1992–93	0	-	0.053	-	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	-	0.146	-	0	-	0.146	-
2001–02	0.003	-	0.068	-	0	-	0.071	-
2002–03	0	-	0.001	-	0	-	0.001	-
2003–04	0	-	0	-	1.444	-	1.444	-
2004–05	0	-	0	-	2.944	-	2.944	-
2005–06	0	-	0	-	0	-	0	-
2006–07	0	1.2	0	1.2	0	23.1	0	31.5
2007–08	0	1.2	0.132	1.2	0.320	23.1	0.450	31.5
2008–09	0	1.2	0.016	1.2	5.100	23.1	5.116	31.5
2009–10	0	1.2	0	1.2	4.578	23.1	4.578	31.5
2010–11	0	1.2	0.076	1.2	7.880	23.1	7.956	31.5
2011–12	0	1.2	0.036	1.2	10.849	23.1	10.885	31.5
2012–13	0	1.2	0	1.2	1.746	23.1	1.746	31.5
2013¬14	0	1.2	0	1.2	6.072	23.1	6.072	31.5
2014¬15	0	1.2	0.003	1.2	3.927	23.1	3.93	31.5
2015¬16	0	1.2	0	1.2	4.686	23.1	4.686	31.5

1.4 Illegal catch

There is no documented 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. Adults show poor reburial after being dug out (Gribben & Creese 2005).

2. BIOLOGY

There are two similar *Panopea* species in New Zealand, *P. zelandica* and *P. smithae*, both of which are endemic and occur around the North, South and Stewart Islands. *P. smithae* has also been reported from the Chatham Islands. Their distributions overlap, but *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 in the substrate. In samples of commercial and exploratory catches, *P. zelandica* is more abundant than *P. smithae*, and in the early 1990s it comprised virtually all of the catch.

Deepwater clams are broadcast spawners with separate sexes. Protandric development (where an organism begins life as a male and then becomes a female) is considered likely for a proportion of the population (Gribben & Creese 2003). Fifty percent sexual maturity was calculated at 55 and 57 mm length for populations in Wellington and on the Coromandel Peninsula, respectively. Samples taken from three locations between the Coromandel Peninsula and Nelson showed spawning between spring and late summer (Gribben et al 2004). Spawning may be temperature controlled because it occurred at the Coromandel and Wellington sites when water temperature reached approximately 15°C (Gribben et al 2004). The larval life is thought to be about two to three weeks (Gribben & Hay 2003), and there is evidence of significant recruitment variation between years.

The oldest *P. zelandica* based on annual ring counts in Golden Bay, Shelly Bay and Kennedy Bay were 34, 34 and 85 years respectively (Breen 1991, Gribben & Creese 2005); ring counts were validated from Shelly Bay only. Growth in shell length appeared to be rapid for the first 10–12 years in these populations and total weight increased rapidly until at least 12–13 years of age. Differences in growth

rates were seen between the Kennedy and Shelly Bay populations: estimates of K varied between 0.16 and 0.29, t_0 between 1.67 and 3.8 and L_∞ between 103.6 and 116.5 mm, respectively (Breen 1991, Gribben & Creese 2005)[1].

Estimates of M, instantaneous natural mortality, from catch curve analysis, estimates of maximum age, and the Chapman-Robson estimator from Kennedy Bay and Shelly Bay populations were all between 0.02 and 0.12 (Gribben & Creese 2005). The estimate by Breen (1991) for Golden Bay was 0.15, but in modeling this parameter was varied from 0.1 to 0.2.

3. STOCKS AND AREAS

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

4. STOCK ASSESSMENT

No stock assessments have been carried out for any deepwater clam stocks. Sustainable fishing rate estimates were made by Breen (1994).

4.1 Estimates of fishery parameters and abundance

No abundance estimates are available for any geoduc stocks. Sustainable fishing rate estimates were made by Breen (1994).

4.2 Biomass estimates

Biomass has not been estimated for any deepwater clam stocks.

4.3 Yield estimates and projections

MCY has not been estimated for any deepwater clam stocks. However, an age-structured stochastic model suggested that sustainable yields for this species, with realistic management constraints, appear to be on the order of 2% to 4% of virgin biomass (Breen 1994).

CAY has not been estimated for any deepwater clam stocks.

5. STATUS OF THE STOCKS

PZL 7 - *Panopea zelandica*

Stock Status	
Year of Most Recent Assessment	No formal assessment done for any stock
Assessment Runs Presented	-
Reference Points	Target: Not defined, but B_{MSY} assumed Soft Limit: 20% B_0 Hard Limit: 10% B_0 Overfishing threshold: -
Status in relation to Target	Because of the relatively low levels of exploitation of *P. zelandica*, it is likely that this stocks is still effectively in a virgin state, therefore it is Very Likely (> 60%) to be at or above the target.
Status in relation to Limits	Very Unlikely (< 40%) to be below the soft or hard limit
Historical Stock Status Trajectory and Current Status	-

[1] No confidence intervals were available for these estimates.

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Unknown
Recent Trend in Fishing Mortality or Proxy	In 1989–92 the landings for PZL 7 averaged 52 t; however, since that time fishing has been light in all QMAs with a maximum of only 10.9 t taken across all QMAs in the 2011–12 fishing year.
Other Abundance Indices	-
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	-
Probability of Current Catch or TACC causing Biomass to remain below or to decline below Limits	Current catches are Unlikely (< 40%) to cause declines below soft or hard limits.
Probability of Current Catch causing Overfishing to continue or to commence	-

Assessment Methodology and Evaluation		
Assessment Type	-	
Assessment Method	-	
Assessment Dates	Latest assessment: -	Next assessment: -
Overall assessment quality rank	-	
Main data inputs (rank)		
Data not used (rank)		
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments
Early surveys show that density is generally low compared with North American species but that productivity is higher.

Fishery Interactions
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7. FOR FURTHER INFORMATION

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