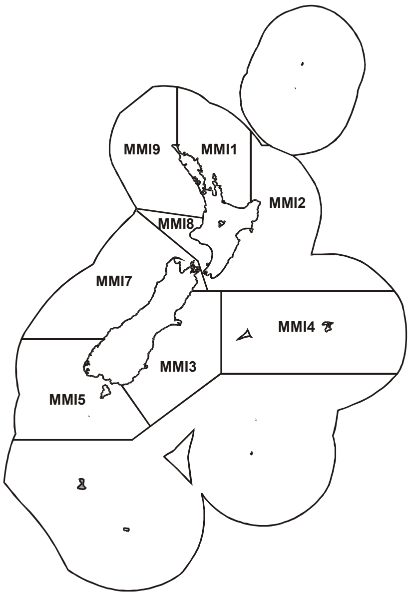
LARGE TROUGH SHELL (MMI)

(*Mactra murchisoni*)



1. FISHERY SUMMARY

1.1 Commercial fisheries

Large trough shells (*Mactra murchisoni*) were introduced into Quota Management System on 1 April 2004 with a combined TAC and TACC of 162 t. No allowances were made for customary, recreational or other sources of mortality. The fishing year is from 1 April to 31 March and commercial catches are measured in greenweight. All reported landings have been from MMI 7. Between the 1991–92 and 1995–96 fishing years, landings were 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 then the reported catch has ranged between about 2.6 t to 60 t (Table 1).

Table 1: TACCs and reported landings (t) of Trough Shell by Fishstock from 1990–91 to 2006–07 from CELR and CLR data.

	MMI 1		MMI 2		MMI 3		MMI 4		MMI 5	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1991–92	0	–	0	–	0	–	0	–	0	–
1992–93	0	–	0	–	0	–	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	–	0	–	0	–
2001–02	0	–	0	–	0	–	0	–	0	–
2002–03	0	–	0	–	0	–	0	–	0	–
2003–04	0	2	0	3	0	44	0	1	0	1
2004–05	0	2	0	3	0	44	0	1	0	1
2005–06	0	2	0	3	0	44	0	1	0	1
2006–07	0	2	0	3	7.476	44	0	1	0	1

Table 1: (*Continued*):

Fishstock	MMI 7		MMI 8		MMI 9		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1991–92	0.349	–	0	–	0	–	0.349	–
1992–93	1.541	–	0	–	0	–	1.541	–
1993–94	8.327	–	0	–	0	–	8.327	–
1994–95	10.432	–	0	–	0	–	10.432	–
1995–96	0.142	–	0	–	0	–	0.142	–
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	–
2001–02	0	–	0	–	0	–	0	–
2002–03	22.623	–	0	–	0	–	22.623	–
2003–04	29.681	61	0	25	0	25	29.681	162
2004–05*	59.184	61	0	25	0	25	60.023	162
2005–06*	50.006	61	0	25	0	25	53.961	162
2006–07	54.091	61	0	25	0	25	61.567	162

*In 2004–05 and 2005–06 0.84 and 3.9554 t respectively were reportedly landed, but the QMA is not recorded. These amounts are included in the total landings for these years.

1.2 Recreational fisheries

Offshore clams such as *M. murchisoni* are likely to have been harvested for recreational use only when washed ashore after storms. There are no estimates of recreational take for this surf clam.

1.3 Customary non-commercial fisheries

Offshore clams such as *M. murchisoni* are likely to have been harvested for customary use only when washed ashore after storms. Shells of this clam have been found irregularly, and in small numbers in a few middens. There are no estimates of current customary non-commercial catch of this clam.

1.4 Illegal catch

There is no known illegal catch of this clam.

1.5 Other sources of mortality

There is no quantitative information on other sources of mortality, although this clam is subject to localised catastrophic mortality from erosion during storms, high temperatures and low oxygen levels during calm summer periods, blooms of toxic algae and excessive freshwater outflow (Cranfield & Michael 2001).

2. BIOLOGY

M. murchisoni is most abundant in the South Island, but also occurs around the North Island and Stewart Island. It is found most commonly between about 4 m. and 8 m. Maximum length is variable between areas, ranging from 63 to 102 mm (Cranfield *et al*. 1993) The sexes are separate, they are broadcast spawners, and the larvae are thought to be planktonic for between 20 and 30 days (Cranfield & Michael 2001). Recruitment of spat is to the same depth zone that adults occur in, although recruitment between years is highly variable.

3. STOCKS AND AREAS

For management purposes stock boundaries are based on QMAs, however, the boundaries of stocks of surf clams are likely to be the continuous lengths of exposed sandy beaches between geographical features (rivers, headlands etc). The circulation patterns that maintain the separation of the surf zone habitat to form a self contained ecosystem also retain planktonic larvae of surf clams probably isolating surf clams genetically as well as ecologically.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

4.1 Sea-bed disturbance
The immediate impact of hydraulic dredging is not discernable a few hours after dredging. The surf zone is a high-energy environment subjected to frequent natural disturbance and high sand mobility. This environment tends to recover faster from disturbance than those in deeper water. Widespread and intensive hydraulic dredging however, has the potential to adversely modify the environment.

4.2 Incidental catch (fish and invertebrates)
The only significant bycatch associated with surf clams dredging is the echinoid *Fellaster zealandiae* (sand dollar or sea biscuit).

4.3 Incidental Catch (seabirds and mammals)
Not relevant to surf clam fisheries.

4.4 Community and trophic structure
The effects dredging for *M. murchisoni* on the community and trophic structure are unknown.

4.5 Spawning disruption
The effects of hydraulic dredging 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 surf clam on the maintenance and healthy functioning of the natural marine habitat and ecosystems is unknown.

4.8 Aquaculture and enhancement
Not relevant to surf clam fisheries.

5. STOCK ASSESSMENT

5.1 Estimates of fishery parameters and abundance
Von Bertalanffy growth parameters for *M. murchisoni* are available from the Kapiti coast. These were estimated with GROTAG using data from mark-recapture experiments (Cranfield & Michael 2001). The estimates and annual mean growth estimates at lengths α and β are shown in Table 2.

Table 2: Mean annual growth estimates (mm/year) at lengths α and β (95% confidence intervals in parentheses), and von Bertalanffy growth parameters from Cloudy Bay and the Kapiti coast. – not estimated.

Site	Mean growth (g_{30})	Mean growth (g_{40})	Mean growth (g_{70})	L_∞	K
Cloudy Bay	–	17.83 (17.4–18.2)	4.65 (4.3–4.9)	80.6 mm	0.57
Kapiti coast	35.70 (33.2–38.0)	–	2.03 (1.2–2.6)	72.4 mm	1.84

Growth estimates for this species have also been estimated from sequential length frequency distributions using MULTIFAN. Estimates from Cloudy Bay and the Kapiti coast are shown in Table 3.

Table 3: Von Bertalanffy growth parameter estimates from Cloudy Bay and the Kapiti coast estimated using MULTIFAN. (SE in parentheses).

Site	L_∞ (mm)	K
Cloudy Bay	88.00 (0.44)	0.57 (0.01)
Kapiti coast	72.3 (0.41)	0.60 (0.02)

Estimates of natural mortality (M) ranged from 0.40–0.46 at both Cloudy Bay and the Kapiti coast (Cranfield *et al*. 1993).

The maximum age for this species was estimated from the number of age classes indicated in MULTIFAN analyses, and from shell sections. Estimated maximum ages from these methods were respectively 8 and 11 years, at both Cloudy Bay and the Kapiti Coast.

5.2 Biomass estimates

Biomass has been estimated at Cloudy Bay with a stratified random survey using a hydraulic dredge (Table 4).

Table 4: A summary of biomass estimates in tonnes green weight with standard deviation in parentheses from exploratory surveys of Cloudy Bay, Marlborough (Cranfield et al., 1994b), and Clifford Bay, Marlborough (Michael *et al.* 1994), and Foxton beach, Manawatu coast (Haddon et al., 1996). . (– = not estimated).

Area	Cloudy Bay	Clifford Bay	Foxton Beach
Length of beach (km)	11	21	27.5
Biomass (t)	248 (96)	192 (79)	145 (–)

5.3 Estimation of Maximum Constant Yield (MCY)

Growth and mortality data from Cloudy Bay, Marlborough and Kapiti Coast, Manawatu have been used in a yield per recruit model to estimate the reference fishing mortality $F_{0.1}$ (Cranfield *et al*. 1994b). Estimates of MCY are available from 13 locations (Figure 1), and were calculated using Method 1 for a virgin fishery (Annala *et al*. 2001) with an estimate of virgin biomass B_0., where

$$MCY = 0.25 * F_{0.1}\, B_0$$

These are shown in Table 5.

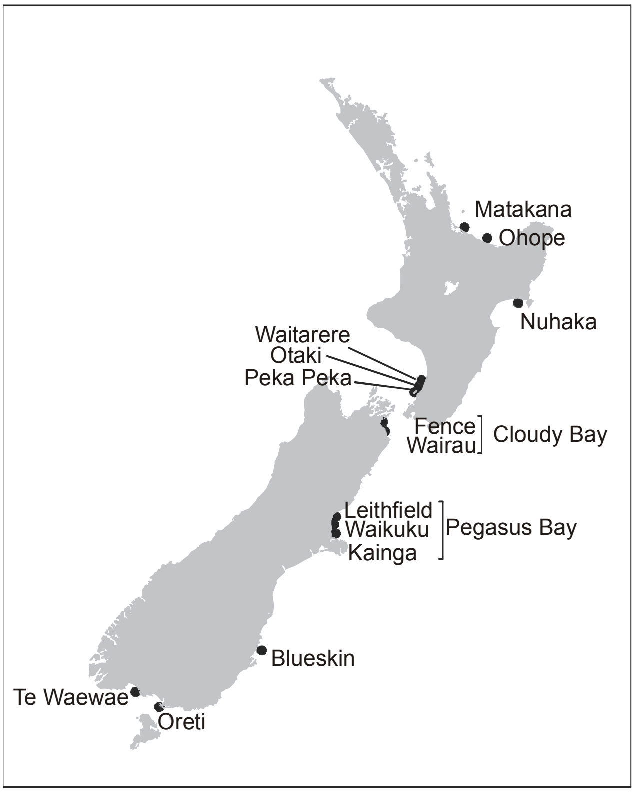


Figure 1: Location of sites surveyed.

Table 5: MCY estimates (t) for *M. murchisoni* from virgin biomass in 450 m transects at locations sampled around New Zealand (data from Cranfield et al., 1994b).

Location	$F_{0.1}$	MCY
Matakana	0.70	0.03
Ohope	0.70	0.989
Nuhaka	0.70	0.327
Waitarere	0.70	1.046
Otaki	0.70	1.098
Peka Peka	0.70	0.714
Fence	0.43	0.096
Wairau	0.43	2.231
Leithfield	0.43	1.340
Waikuku	0.43	0.219
Kainga	0.43	1.059
Te Waewae	0.43	0.108
Oreti	0.43	0.116

5.4 Estimation of Current Annual Yield (CAY)

CAY has not been estimated for *M. murchisoni*.

6. STATUS OF THE STOCKS

Because of the relatively low levels of exploitation of *M. murchisoni*, it is likely that all stocks are still effectively in a virgin state. Because recruitment is variable and natural mortality caused by storm events may be high, biomass is likely to be highly variable.

7. FOR FURTHER INFORMATION

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