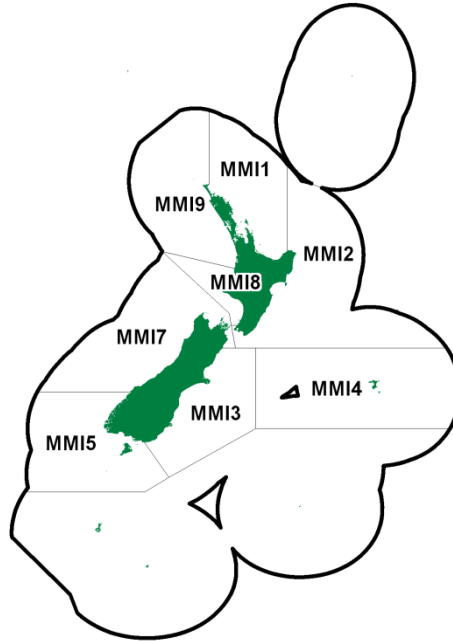


LARGE TROUGH SHELL (MMI)

(Mactra murchisoni)

1. FISHERY SUMMARY

This species is part of the surf clam fishery and the reader is guided to the surf clam introductory chapter for information common to all relevant species.

Large trough shells (*Mactra murchisoni*) were introduced into the Quota Management System on 1 April 2004 with a total TACC of 162 t. No allowances were made for customary, recreational or other sources of mortality. Biomass surveys in QMA 2 supported a TACC increase from April 2010. This increased the TACC for MMI 2 to 62 t. A subsequent biomass survey in 2012 supported a TACC increase in April 2013. This increased the TACC in MMI 8 from 25 to 631 t and the total MMI TACC from 183 to 789 t (Table 1).

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

Fishstock	TAC (t)	TACC (t)	Customary Allowance (t)	Other sources of mortality (t)
MMI 1	2	2	0	0
MMI 2	3	3	0	0
MMI 3	65	62	0	3
MMI 4	1	1	0	0
MMI 5	1	1	0	0
MMI 7	61	61	0	0
MMI 8	631	589	10	32
MMI 9	25	25	0	0
Total	789	744	10	35

1.1 Commercial fisheries

All reported landings have been from MMI 3 and MMI 7. Between the 1991–92 and 1995–96 fishing years landings were small and confined to MMI 7. No further landings were reported until 2002–03; since then the reported catch has ranged between about 20 t to 60 t (Table 2). Figure 1 shows the historical landings and TACCs for the two main MMI stocks.

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.

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Table 2: TACCs and reported landings (t) of Large Trough Shell by Fishstock from 1991–92 to 2013–14 from CELR and CLR data. Fishstocks where no catch has been reported are not tabulated. MMI 1, 2, 4, 5, 8 and 9 have TACCs of 2, 3, 1, 1, 569 and 25 t, respectively.

Fishstock	MMI 3		MMI 7		Total	
	Landings	TACC	Landings	TACC	Landings	TACC
1991–92	0	0	0.349	-	0.349	-
1992–93	0	0	1.541	-	1.541	-
1993–94	0	0	8.327	-	8.327	-
1994–95	0	0	10.432	-	10.432	-
1995–96	0	0	0.142	-	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	0	0	22.623	-	22.623	-
2003–04	0	44	29.681	61	29.681	162
2004–05*	0	44	60.023	61	60.863	162
2005–06*	0	44	53.961	61	57.916	162
2006–07	7.476	44	54.091	61	61.567	162
2007–08	36.901	44	15.036	61	51.937	162
2008–09	32.149	44	6.657	61	38.806	162
2009–10	25.764	44	3.416	61	29.180	162
2010–11	12.600	62	17.432	61	30.032	180
2011–12	0	62	47.338	61	47.338	180
2012–13	44.445	62	32.81	61	77.265	180
2013–14	63.867	62	4.886	61	68.753	744

*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.

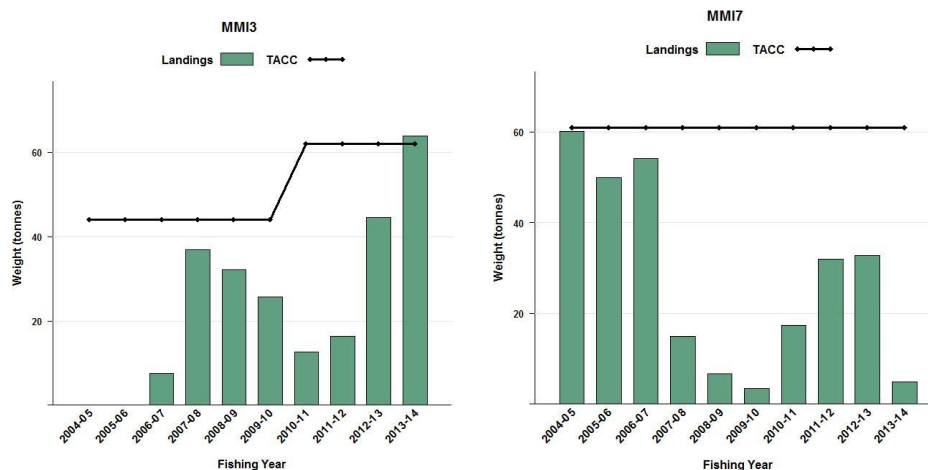


Figure 1: Reported commercial landings and TACC for MMI 3 (South East Coast), and MMI 7 (Challenger). Note that these figures do not show data prior to entry into the QMS.

1.3 Customary 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 (Conroy et al 1993). There are no estimates of current customary catch of this clam.

1.4 Illegal catch

There is no documented 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 lower half of the North Island and the South Island. It is found most commonly between about 4 m and 8 m in depth. 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 (Conroy et al 1993).

3. STOCKS AND AREAS

For management purposes stock boundaries are based on FMAs, 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). Circulation patterns may isolate surf clams genetically as well as ecologically.

4. ENVIRONMENTAL AND ECOSYSTEM CONSIDERATIONS

See the introductory surf clam chapter.

5. STOCK ASSESSMENT

5.1 Estimates of fishery parameters and abundance

No estimates of fisheries parameters or abundance are available for this species.

5.2 Biomass estimates

Biomass has been estimated at one site within MMI 3 and 8 and multiple sites within MMI 2 and 7 with stratified random surveying using a hydraulic dredge (Tables 3 and 4).

Table 3: A summary of biomass estimates in tonnes greenweight with standard deviation in parentheses from exploratory surveys of Cloudy Bay (Cranfield et al 1994a) and Clifford Bay in Marlborough (Michael et al 1994), and Foxton beach on the Manawatu coast (White et al 2012). - not estimated.

Area	Cloudy Bay (MMI 7)	Clifford Bay (MMI 7)	Foxton Beach (MMI 8)
Length of beach (km)	11	21	46 [#]
Biomass (t)	248 (96)	192(79)	3603 (342) [#]

[#] Biomass was estimated at Foxton Beach from a mix of a systematic survey in the North and a stratified survey in the South of this location.

Table 4: A summary of biomass estimates in greenweight (t) from the surveys in MMI 2 and 3 (Triantifillos 2008a, Triantifillos 2008b). Note: unless otherwise stated the CV is less than 20%.

Location	Five sites (MMI 2)	Ashley River to 6 nm south of the Waimakariri River (MMI 3)
Area surveyed (km ²)	28.0	13.4
Biomass (t)	33.8	444.1

5.3 Yield estimates and projections

Growth and mortality data from Cloudy Bay in Marlborough and the Kapiti Coast in Manawatu (Cranfield et al 1993) have been used in a yield per recruit model to estimate the reference fishing mortality $F_{0.1}$ (Cranfield et al 1994a, Triantifillos 2008a, 2008b). The shellfish working group did not accept these estimates of $F_{0.1}$ as there was considerable uncertainty in both the estimate and the method used to generate them. The *MCY* estimates of Triantafillos (2008a, b) and White et al (2012) using the full range of $F_{0.1}$ estimates from Cranfield et al (1993) are shown in Table 5, but should be interpreted cautiously.

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Estimates of *MCY* are available from numerous locations and were calculated using Method 1 for a virgin fishery (Annala et al 2001) with an estimate of virgin biomass B_0 , where:

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

Table 5: *MCY* estimates (t) for *M. murchisoni* from virgin biomass at locations sampled around New Zealand (Triantifillos 2008a and b, White et al 2012).

Location	$F_{0.1}$	<i>MCY</i>
Five sites (MMI 2)	0.43/0.57	47.7/63.3
Ashley River to 6 nm south of the Waimakariri River (MMI 3)	0.70/0.89	5.9/7.5
46km of coast north and south of the Manawatu River (MMI 8)	0.70/0.89	630.6/801.7

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

6. STATUS OF THE STOCKS

- MMI 3, 7 & 8 - *Macra murchisoni*

Stock Status	
Year of Most Recent Assessment	2008 for MMI 3, 1994 for MMI 7 and 2012 for MMI 8
Assessment Runs Presented	Survey biomass
Reference Points	Target: Not defined, but B_{MSY} assumed Soft Limit: 20% B_0 Hard Limit: 10% B_0
Status in relation to Target	Because of the relatively low levels of exploitation of <i>M. murchisoni</i> , it is likely that all stocks are still effectively in a virgin state, therefore they are Very Likely (> 90%) to be at or above the target.
Status in relation to Limits	Very Unlikely (< 10%) to be below the soft and hard limits
Historical Stock Status Trajectory and Current Status	
Unknown	

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Unknown
Recent Trend in Fishing Mortality or Proxy	Fishing is light in all Fishstocks other than MMI 3 and MMI 7. In MMI 7 landings have averaged 34.6 t since 2002–03 and in MMI 3 landings have averaged 25.5 t since 2006–07.
Other Abundance Indices	-
Trends in Other Relevant Indicators or Variables	-

Projections and Prognosis	
Stock Projections or Prognosis	-
Probability of Current Catch or TACC causing decline below Limits	For all stocks current catches are Very Unlikely (< 10%) to cause declines below soft or hard limits.

Assessment Methodology	
Assessment Type	Level 2 - Partial Quantitative Stock Assessment
Assessment Method	Absolute biomass estimates from quadrat surveys
Main data inputs	Abundance and length frequency information

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Period of Assessment	2008 for MMI 3, 1994 for MMI 7 and 2012 for MMI 8	Next assessment: Unknown
Changes to Model Structure and Assumptions	-	
Major Sources of Uncertainty	-	

Qualifying Comments

Stock size could fluctuate markedly as a result of catastrophic mortality from a number of causes. There is a need to review fishery parameters for this species.

Fishery Interactions

MMI can be caught together with other surf clam species and non-QMS bivalves.

For all other MMI stocks there is no current evidence of appreciable biomass.

7. FOR FURTHER INFORMATION

- Annala, J H; Sullivan, K J; O'Brien, C J; Smith, N W M (compilers.) (2001) Report from the fishery assessment plenary, May 2001: stock assessments and yield estimates. 515 p. (Unpublished report held in NIWA library, Wellington.)
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- Triantifillos, L (2008b) Survey of subtidal surf clams in Quota Management Area 2, June–August 2008. Prepared by NIWA for Seafood Innovations Limited and SurfCo. Limited. : 40 p.
- White, W; Millar, R; Breen, B; Farrington, G (2012) Survey of subtidal surf clams from the Manawatu Coast (FMA 8), October–November 2012, Report for the Shellfish Working Group Meeting 19th November 2012, 35 p. + Addendum.