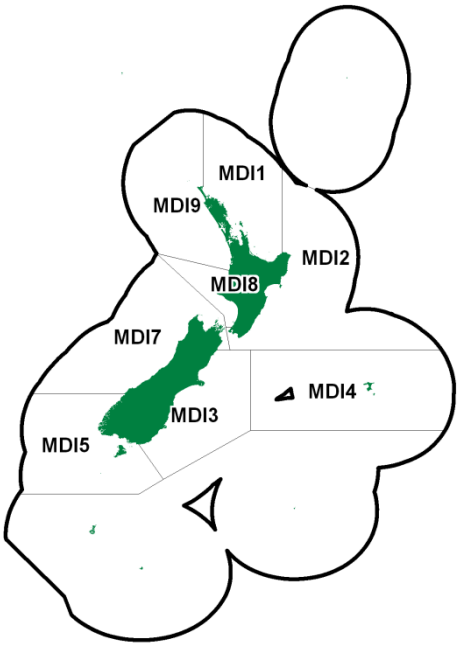
TROUGH SHELL (MDI)

(*Mactra discors*)



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.

Trough shells (*Mactra discors*) were introduced into Quota Management System on 1 April 2004 with a total TACC of 98 t. No allowances were made for customary or recreational usage, or for other sources of mortality. New survey information for QMA 2 and 3 resulted in increases to a number of surf clam TACCs from 1 April 2010, including MDI 2. This change included an increase in TACC and a new allowance for other sources of mortality. The total TAC is currently 163 t (Table 1).

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

Fishstock	TAC (t)	TACC (t)	Other sources of mortality (t)
MDI 1	1	1	0
MDI 2	66	63	3
MDI 3	1	1	0
MDI 4	1	1	0
MDI 5	14	14	0
MDI 7	26	26	0
MDI 8	27	27	0
MDI 9	27	27	0
Total	163	160	3

1.1 Commercial fisheries

Most reported landings have been from MDI 7. Between 1994 and 1996, landings of a few kilograms were also reported from MDI 3 and MDI 5. No further landings were reported until 2002–03; since then the only significant reported catch has been from MDI 7, with only one other landing in MDI 1. These landings have ranged from about 0.7 t to 3.8 t. Landings and TACCs for fishstocks with historical landings are shown in Table 2. The historical landings and TACC values for MDI 7 are depicted in Figure 1.

1.2 Recreational fisheries

Offshore clams such as *M. discors* 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 fisheries

Offshore clams such as *M. discors* are likely to have been harvested for customary use only when washed ashore after storms (Carkeek 1966). There are no estimates of current customary use of this clam.

Table 2: TACCs and reported landings (t) of Trough Shell for Fishstocks with landings from 1992–93 to 2012–13 from CELR and CLR data. MDI 2, 4, 8 and 9 have TACCs of 63, 1, 27 and 27 t, respectively.

	MDI 1		MDI 3		MDI 5		MDI 7		Total	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1992–93	0	-	0	-	0	-	0.254	-	0.254	-
1993–94	0	-	0	-	0	-	2.198	-	2.198	-
1994–95	0	-	0	-	0.033	-	2.399	-	2.432	-
1995–96	0	-	0.049	-	0	-	0.017	-	0.066	-
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	-	0.691	-	0.691	-
2003–04	0	1	0	1	0	14	2.685	26	2.685	98
2004–05	0	1	0	1	0	14	3.304	26	3.375*	98
2005–06	0.041	1	0	1	0	14	3.207	26	3.525*	98
2006–07	0	1	0	1	0	14	3.889	26	3.889	98
2007–08	0	1	0.015	1	0.001	14	1.045	26	1.061	98
2008–09	0	1	0	1	0	14	0.009	26	0.009	98
2009–10	0	1	0.057	1	0	14	0.118	26	0.175	98
2010–11	0	1	0	1	0	14	0.007	26	0	160
2011–12	0	1	0	1	0	14	0	26	0	160
2012-13	0	1	0	1	0	14	0.133	26	0.133	160
2013-14	0	1	0.01	1	0	14	0	26	0.01	160

*In 2004–05 and 2005–06, 71 and 277 kg respectively were reportedly landed, but the QMA is not recorded. This amount is included in the total landings for that year.

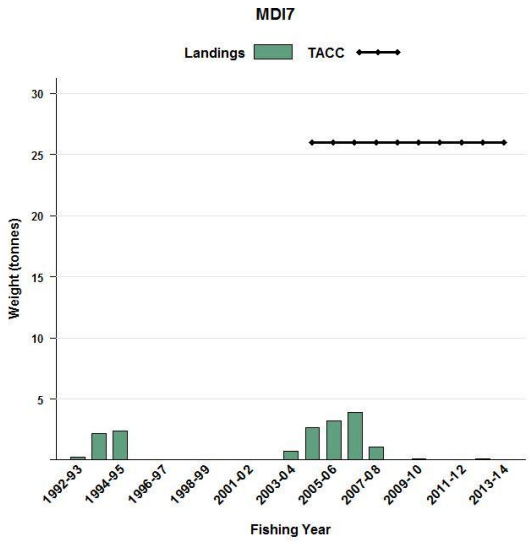


Figure 1: Reported commercial landings and TACC for MDI 7 (Challenger).

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. 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. discors is most abundant in Southland (Te Waewae and Oreti), Otago (Blueskin Bay), Wellington, Manawatu and Cloudy Bay. Maximum length is variable between areas, ranging from 63 to 95 mm (Cranfield et al 1993). The sexes are separate; the species is a broadcast spawner; 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 as adults occur in and 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 MDI 3 and 8 and multiple sites within MDI 2 and 7 using stratified random surveying with a hydraulic dredge (Tables 3 and 4).

Table 3: A summary of biomass estimates in tonnes green weight with standard deviation in parentheses from exploratory surveys of Cloudy Bay (Cranfield et al 1994b) and Clifford Bay in Marlborough (Michael et al 1994) and Foxton beach on the Manawatu coast (Haddon et al 1996). - = not estimated

Area	Cloudy Bay (MDI 7)	Clifford Bay (MDI 7)	Foxton Beach (MDI 8)
Length of beach (km)	11	21	27.5
Biomass (t)	55 (11)	89 (3)	195 (-)

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

Location	Five sites (MDI 2)	Ashley River to 6 n. miles south of the Waimakariri River (MDI 3)
Area surveyed (km^2)	28.0	13.4
Biomass (t)	471.2	0

5.3 Yield estimates and projections

Growth and mortality data from Cloudy Bay, Marlborough and the Kapiti Coast, 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 1994b, Triantifillos 2008a and 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 (2008b) that use the full range of $F_{0.1}$ estimates from Cranfield et al (1993) are shown in Table 5, but should be interpreted cautiously.

Estimates of *MCY* are available from five sites in MDI 2 and were calculated using Method 1 for a virgin fishery (Annala et al 2001) from an estimate of virgin biomass B_0, where:

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

Table 5: *MCY* estimates (t) for *M. discors* from virgin biomass at locations within MDI 2 (Triantifillos 2008b).

Location	$F_{0.1}$	*MCY*
Five sites (MDI 2)**	0.56/0.87	66.1/102.7

CAY has not been estimated for *M. discors*

6. STATUS OF THE STOCKS

- MDI 2, 7 & 8 - *Mactra discors*

Stock Status	
Year of Most Recent Assessment	2008 for MDI 2, 1994 for MDI 7 and 1996 for MDI 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 *M. discors*, 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	Catches are minimal in all QMAs other than MDI 7. In MDI 7 catches have been light, averaging 2.12 t since 2002–03
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	
Period of Assessment	Latest assessment: 2008 for MDI 2, 1994 for MDI 7 and 1996 for MDI 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
MDI can be caught together with other surf clam species and non-QMS bivalves.

For all other MDI 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.)

Beentjes, M P; Baird, S J (2004) Review of dredge fishing technologies and practice for application in New Zealand. *New Zealand Fisheries Assessment Report 2004/37*. 40 p.

Brierley, P (Convenor) (1990) Management and development of the New Zealand sub-tidal clam fishery. Report of the surf clam working group, MAF Fisheries (Unpublished report held in NIWA library, Wellington). 57 p.

Carkeek, W (1966) *The Kapiti Coast*. Reed, Wellington. 187 p.

Conroy, A; Smith, P; Michael, K; Stotter, D (1993) Identification and recruitment patterns of juvenile surf clams, *Mactra discors* and *M. murchisoni* from central New Zealand. *New Zealand Journal of Marine and Freshwater Research* 27: 279–285.

Cranfield, H J; Doonan, I J; Michael, K P (1994b) Dredge survey of surf clams in Cloudy Bay, Marlborough. *New Zealand Fisheries Technical Report* 39: 18 p.

Cranfield, H J; Michael, K P (2001) The surf clam fishery in New Zealand: description of the fishery, its management, and the biology of surf clams. *New Zealand Fisheries Assessment Report 2001/62*. 24 p.

Cranfield, H J; Michael, K P; Stotter, D R (1993) Estimates of growth, mortality, and yield per recruit for New Zealand surf clams. New Zealand Fisheries Assessment Research Document 1993/20. 26 p. (Unpublished document held in NIWA library, Wellington.)

Cranfield, H J; Michael, K P; Stotter, D R; Doonan, I J (1994a) Distribution, biomass and yield estimates of surf clams off New Zealand beaches. New Zealand Fisheries Assessment Research Document 1994/1. 17 p. (Unpublished document held by NIWA library.)

Haddon, M; Willis, T J; Wear, R G; Anderlini, V C (1996) Biomass and distribution of five species of surf clam off an exposed west coast North Island beach, New Zealand. *Journal of Shellfish Research* 15: 331–339.

Michael, K; Cranfield, H; Doonan, I; Hadfield, J (1994) Dredge survey of surf clams in Clifford Bay, Marlborough. *New Zealand Fisheries Data Report*, No. 54

Triantifillos, L (2008a) Survey of subtidal surf clams in Pegasus Bay, November-December 2007. Prepared by NIWA for Seafood Innovations Limited and SurfCo. limited. (Unpublished Report held by MPI).

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.