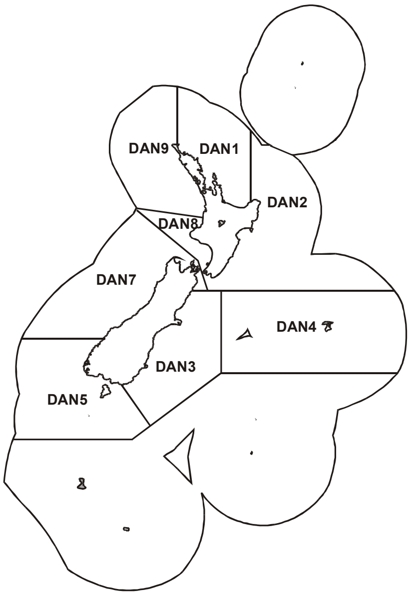
RINGED DOSINIA (DAN)

(*Dosinia anus*)



1. FISHERY SUMMARY

1.1 Commercial fisheries

Ringed Dosinia (*Dosinia anus*) were introduced into Quota Management System on 1 April 2004 with a combined TAC of 112 t. There were no allowances 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. Prior to 2006–07 landings have only been reported from DAN 7. Small catches (< 1 t) were reported in DAN 3 for 2006–07. Between the years 1992–93 and 1995–96 landings were only reported from DAN 7 these ranged from about 10 to 300 kgs. From 2002–03 onwards, landings have fluctuated around 0.2 t for DAN 7 (Table 1).

Table 1: TACCs and reported landings (t) of Ringed Dosinia by Fishstock from 1991–92 to 2006–07 from CELR and CLR data.

	DAN 1		DAN 2		DAN3		DAN 4		DAN 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	7.0	0	18.0	0	4.0	0	1.0	0	1.0
2004–05	0	7.0	0	18.0	0	4.0	0	1.0	0	1.0
2005–06	0	7.0	0	18.0	0	4.0	0	1.0	0	1.0
2006–07	0	7.0	0	18.0	0.086	4.0	0	1.0	0	1.0

Table 1 (*Continued*):

Fishstock	DAN 7		DAN 8		DAN 9		Total	
	Landings	TACC	Landings	TACC	Landings	TACC	Landings	TACC
1992–93	0.164	–	0	–	0	–	0.164	–
1993–94	0.293	–	0	–	0	–	0.293	–
1994–95	0.07		–	0	–	0	–	0.17
1995–96	0.012		–	0	–	0	–	0.012
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	0.114	–	0	–	0	–	0.114	–
2003–04	0.895	15.0	0	33.0	0	33.0	0.895	112.0
2004–05*	1.982	15.0	0	33.0	0	33.0	2.016	112.0
2005–06*	1.095	15.0	0	33.0	0	33.0	1.022	112.0
2006–07	2.464	15.0	0	33.0	0	33.0	2.477	112.0

In 2004–05 and 2005–06 32.4 and 90 kg were reported but the QMA is not recorded. This amount is included in the total landings for these years.

1.2 Recreational fisheries
There are no known records of recreational use of this surf clam.

1.3 Customary non-commercial fisheries
Offshore clams such as *D. anus* 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 use 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 probably sometimes taken as a bycatch in inshore trawling. Harvesters claim that the hydraulic clam rake does not damage surf clams and minimises damage to the few species of other macrofauna captured. Surf clam populations also are 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

D. anus is found around the New Zealand coast on sandy bottoms. It is found around New Zealand, in the North Island at depths between 5 and 8 m, and in the South Island between 6 and 10 m. It is larger and rougher than *D. subrosea*, and is usually found on more exposed beaches shallower in the substrate. Maximum length is variable between areas, ranging from 58 to 82 mm (Cranfield *et al.* 1993). The sexes are likely to be separate, and they are likely to be broadcast spawners with planktonic larvae. Spawning is likely to occur in the summer months and spat probably recruit to the deeper water of the outer region of the surf zone. Recruitment of surf clams is thought to be highly variable between years.

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 (such as rivers and headlands). 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 *D. anus* 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 *D. anus* 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) for *D. anus* 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_{20})	Mean growth (g_{55})	Mean growth (g_{48})	L_∞	K
Cloudy Bay	12.5 (12.0–13.2)	1.99 (1.8–2.2)	–	61.6 mm	–
Kapiti coast	13.52 (13.3–14.0)	–	2.05 (1.7–2.5)	53.0 mm	0.53

Estimates of natural mortality (M) range from 0.20–0.26 at Cloudy Bay, and 0.17–0.23 on 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 16 and 22 years at both Cloudy Bay, and 19 and 26 years on the Kapiti Coast.

5.2 Biomass estimates

Biomass has been estimated at Cloudy Bay with a stratified random survey using a hydraulic dredge (Table 3).

Table 3: A summary of biomass estimates for *D. anus* 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).

Area	Cloudy Bay	Clifford Bay
Length of beach	11	21
Biomass (t)	72 (30)	5 (3)

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 14 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 4.

Table 4: MCY estimates (t) for *D. anus* from virgin biomass in 450 m transects at locations sampled around New Zealand (data from Cranfield *et al.* 1994b).

Location	$F_{0.1}$	MCY
Great Exhibition	0.27	0.032
Te Arai	0.27	0.017
Matakana Island	0.27	1.77
Ohope	0.27	1.705
Nuhaka	0.27	2.254
Waitarere	0.27	0.719
Otaki	0.27	2.085
Peka Peka	0.27	0.973
Fence	0.25	0.200
Wairau	0.25	0.357
Leithfield	0.25	0.107
Waikuku	0.25	0.163
Kainga	0.25	1.773
Te Waewae	0.25	0.014

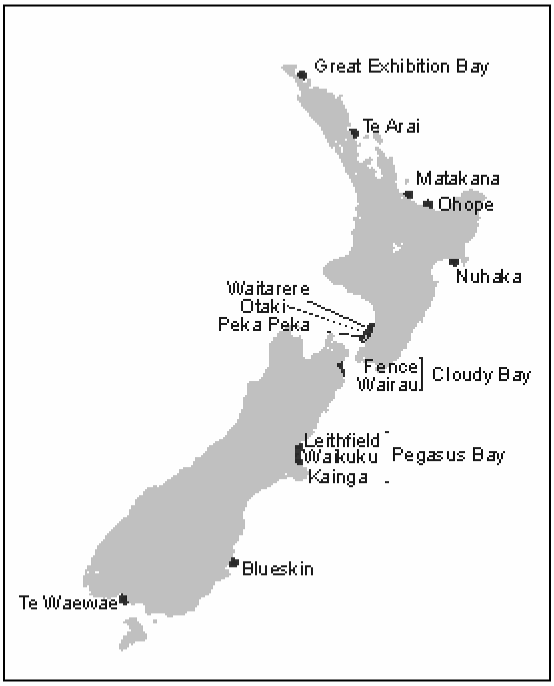


Figure 1: Location of sites surveyed.

5.4 Estimation of Current Annual Yield (CAY)
CAY has not been estimated for *D. anus*.

6. STATUS OF THE STOCKS

Because of the relatively low levels of exploitation of *D. anus*, 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

Annala JH., Sullivan KJ., O'Brien CJ., Smith NWMcL. (comps.) 2001. Report from the fishery assessment plenary, May 2001: stock assessments and yield estimates. 515p. (Unpublished report held in NIWA library, Wellington.)

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). 57p.

Cranfield HJ., Michael KP. 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. 24p.

Cranfield HJ., Michael KP., Stotter DR. 1993. Estimates of growth, mortality, and yield per recruit for New Zealand surf clams. New Zealand Fisheries Research Assessment Document 1993/20. 26p.

Cranfield HJ., Michael KP., Stotter DR., Doonan IJ. 1994a. Distribution, biomass and yield estimates of surf clams off New Zealand beaches. New Zealand Fisheries Research Assessment Document 1994/1. 17p.

Cranfield HJ., Doonan IJ., Michael KP. 1994b. Dredge survey of surf clams in Cloudy Bay, Marlborough. New Zealand Fisheries Technical Report 39: 18p.

Haddon M., Willis TJ., Wear RG., Anderlini VC. 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.