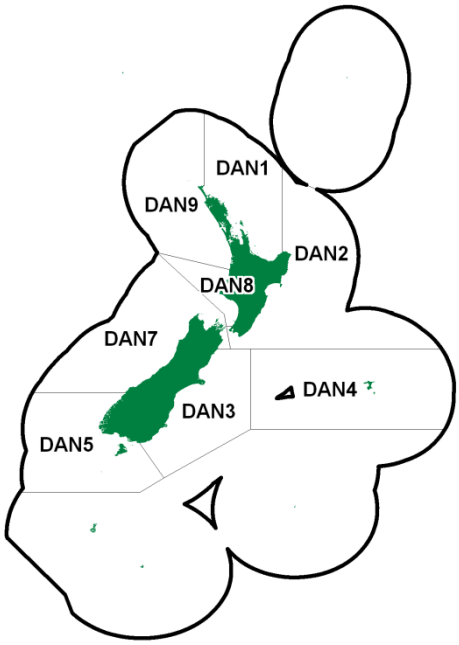
RINGED DOSINIA (DAN)

(*Dosinia anus*)



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.

Ringed Dosinia (*Dosinia anus*) were introduced into the Quota Management System on 1 April 2004 with a combined TAC of 112 t and catches are measured in greenweight. There were initially no allowances for customary, recreational or other sources of mortality, but changes in 2013 and 2016 introduced some allowances in DAN 8 and 7, respectively. Biomass surveys in QMA 2 and 3 supported a TACC increase from April 2010. This increased the TACC for DAN 2 from 18 to 61 t and DAN 3 from 4 to 52 t. A subsequent biomass survey in DAN 8 resulted in a TAC increase in DAN 8 from 33 to 236 t in April 2013. Another biomass survey increased the DAN 7 TAC from 15 to 133 t in April 2016. The total TAC is now 530 t (Table 1).

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

Fishstock	TAC (t)	TACC (t)	Recreational Allowance (t)	Customary Allowance (t)	Other sources of mortality (t)
DAN 1	7	7	0	0	0
DAN 2	64	61	0	0	3
DAN 3	55	52	0	0	3
DAN 4	1	1	0	0	0
DAN 5	1	1	0	0	0
DAN 7	133	120	1	5	7
DAN 8	236	214	0	10	12
DAN 9	33	33	0	0	0
Total	530	489	1	15	25

1.1 Commercial fisheries

Prior to 2006–07 landings had only been reported in DAN 7 and ranged from about 10 to 300 kg. Small catches (less than 1 t) were reported in DAN 3 for 2006–07, but increased to 1.4 t in 2008–09. From 2002–03 onwards, landings in DAN 7 increased up to a maximum of 2.4 t in 2006–07, but have since varied between 0.2 t in 2008–09 and 2009–10 and 9.5 t in 2015–16 (Table 2).

Table 2: TACCs and reported landings (t) of Ringed Dosinia by Fishstock from 1991–92 to the present day from CELR and CLR data. Fishstocks where no catch has been reported are not tabulated. See Table 1 for TACC of stocks not landed.

	DAN 3		DAN 7		Total	
Fishstock	Landings	TACC	Landings	TACC	Landings	TACC
1991–92	0	-	0	-	0	
1992–93	0	-	0.164	-	0.164	-
1993–94	0	-	0.293	-	0.293	-
1994–95	0	-	0.07	-	0	-
1995–96	0	-	0.012	-	0	-
1996–97	0	-	0	-	0	-
1997–98	0	-	0	-	0	-
1998–99	0	-	0	-	0	-
1999–00	0	-	0	-	0	-
2000–01	0	-	0	-	0	-
2001–02	0	-	0	-	0	-
2002–03	0	-	0.114	-	0.114	-
2003–04	0	4.0	0.895	15.0	0.895	-
2004–05	0	4.0	1.982	15.0	2.016*	112.0
2005–06	0	4.0	1.095	15.0	1.022*	112.0
2006–07	0.086	4.0	2.464	15.0	2.55	112.0
2007–08	0.768	4.0	0.821	15.0	1.589	112.0
2008–09	1.398	4.0	0.159	15.0	1.557	112.0
2009–10	0.836	4.0	0.209	15.0	1.045	112.0
2010–11	0.768	52.0	2.199	15.0	3.022	203.0
2011–12	0	52.0	5.303	15.0	5.303	203.0
2012–13	0.547	52	3.531	15.0	4.078	203.0
2013–14	5.483	52	0.729	15.0	6.212	384.0
2014–15	7.118	52	0.311	15.0	7.429	384.0
2015–16	7.008	52	9.507	120.0	16.742	489.0

*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 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 (Carkeek 1966). 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 sediments 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. Anecdotal evidence suggests that 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 FMAs, 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). 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 Cloudy Bay and Clifford Bay in DAN 7 and Foxton beach in DAN 8 with a stratified random survey using a hydraulic dredge (Table 3). Survey size has been recorded as either length of beach or area, which makes comparison difficult.

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 (Cranfield et al 1994b[1], White et al 2015[2]), and Clifford Bay, both in Marlborough (Michael et al 1994) as well as on the Manawatu coastline (White et al 2012).

Area	Cloudy Bay[1] (DAN 7)	Cloudy Bay[2] (DAN 7)	Clifford Bay (DAN 7)	Foxton Beach (DAN 8)
Length of beach (km)	11		21	46
Area (km^2)		5.7		
Biomass (t)	72 (30)	1270 (156)	5 (3)	3498 (329)

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 1994b, Triantifillos 2008a and 2008b). The shellfish working group (SFWG) 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 Triantifillos (2008a and b) and White et al (2012**,** 2015) that use the full range of $F_{0.1}$ estimates from Cranfield et al (1993) are shown in Table 4. The SFWG recommended that MCY estimates are adequate to use to inform management decisions relevant to all surf clam fisheries, with the following caveats: 1) due to the uncertainty in $F_{0.1}$ values, for all species other than SAE, the MCY estimates should use the $F_{0.1}$ values toward the higher end of the range, and 2) there is a need to account for any substantial catch that has already come out of any surf clam fishery when estimating MCY, however there was no consensus on the best method.

Estimates of *MCY* were calculated using Method 1 for a virgin fishery (MPI 2015) with an estimate of virgin biomass B_0, where:

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

Table 4: Mean *MCY* estimates (t) for *D. anus* from virgin biomass from DAN 2 (Triantifillos 2008b), DAN 3 (Triantifillos 2008a), DAN 7 (White et al 2015) and DAN 8 (White et al 2012). The two $F_{0.1}$ values, which are subsequently used to estimate MCY are the minimum and maximum estimates from Cranfield et al. (1993).

Location	$F_{0.1}$	*MCY*
Five sites (DAN 2)	0.25/0.42	52.8/88.7
Ashley River to 6 n. mile south of the Waimakariri River (DAN 3)	0.27/0.54	63.8/127.7
Cloudy Bay (DAN 7)	0.25/0.42	79.4/133.4
Foxton beach (DAN 8)	0.27/0.54	236.1/472.2

CAY has not been estimated for *D. anus*.
The SFWG recommended moving all surfclam fisheries away from an MCY management strategy and towards an exploitation rate management strategy. The SFWG recognised that an exploitation rate approach is more survey intensive, but better allows for the variable nature of biomass for surf clams as it allows greater flexibility in catch (in order to take greater landings from available biomass) whilst keeping catches sustainable.

6. STATUS OF THE STOCKS

- DAN 2, 3, 7 & 8- *Dosinia anus*

Stock Status	
Year of Most Recent Assessment	2008 for DAN 2 and 3, 2015 for DAN 7 and 2012 for DAN 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 Overfishing threshold: -
Status in relation to Target	Because of the relatively low levels of exploitation of *D. anus*, 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
Status in relation to Overfishing	Overfishing is Very Unlikely (< 10%) to be occurring
Historical Stock Status Trajectory and Current Status Unknown	

Fishery and Stock Trends	
Recent Trend in Biomass or Proxy	Unknown
Recent Trend in Fishing Intensity or Proxy	Fishing is minimal in all Fishstocks other than DAN 3 and 7. In DAN 7 fishing has been light with landings averaging 1.5 t from 2002–03 to 2014–15.
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 in the short to medium term.
Probability of Current Catch or TACC causing Overfishing to continue or to commence	Very Unlikely (< 10%)

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 DAN 2 and 3, 2015 for DAN 7, 2012 for DAN 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
DAN can be caught together with other surf clam species and non-QMS bivalves.

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

7. FOR FURTHER INFORMATION

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