



Total Allowable Catch Review for Surf Clams FMA 8

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Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
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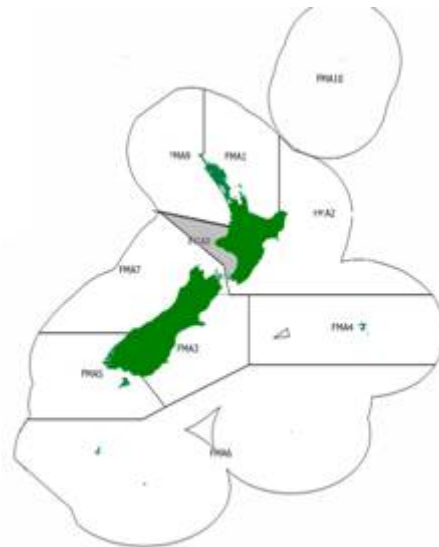
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TOTAL ALLOWABLE CATCH REVIEW FOR SURF CLAMS FMA 8

Figure 1. Location of Fisheries Management Area 8 (FMA 8) boundaries.



INTRODUCTION

1 New information is available on surf clam stocks in FMA 8 (see Figure 1), which suggests an increase to the total allowable catch (TAC), total allowable commercial catch (TACC) and allowances for these stocks can be considered.

2 The Ministry for Primary Industries (MPI) is seeking tangata whenua and stakeholder information and views on this proposal. Submissions should be received by MPI by 8 February 2013 and sent to:

Surf Clam Submissions
Fisheries Management – Inshore Fisheries
Ministry for Primary Industries
Private Bag 1926
Dunedin 9054

or emailed to FMSubmissions@mpi.govt.nz

3 All submissions are subject to the Official Information Act and can be released, if requested, under the Act. If you have specific reasons for wanting to have your submission withheld, please set out your reasons in the submission. MPI will consider those reasons when making any assessment for the release of submissions if requested under the Official Information Act.

4 The New Zealand surf clam fishery has seven species of subtidal surf clams: *Paphies donacina* (PDO), *Crassula*¹ *aequilatera* (SAE), *Macra discors* (MDI), *Macra murchisoni* (MMI), *Dosinia anus* (DAN), *Dosinia subrosea* (DSU), and *Bassina yatei* (BYA). These species are all managed within the quota management system, which sets incentives to develop such fisheries within environment limits.

5 In this paper, the TAC and associated sector allowances for PDO, SAE, MMI and DAN in FMA 8, are being reviewed. MPI proposes the following options for these stocks:

Option 1:	Retain the existing TACs and sector allowances for these surf clam stocks in FMA 8.
Option 2	Increase the TACs, retain the existing customary and recreational allowances, provide for other sources of fishing-related mortality, and increase the TACCs for these surf clam stocks in FMA 8 as set out in Table 1.

6 MPI's initial view is to recommend Option 2 to the Minister of Primary Industries. This will provide an additional 2 984 tonnes (t) of TAC across the four surf clam stocks, and allow for greater economic value from the fishery. Available information is that the surf clam stocks in FMA 8 are in an un-fished state and can sustainably support higher TACs.

Table 1. Options (tonnes) for setting TACs, sector allowances and TACCs for surf clam stocks in FMA 8

Stock	TAC (t)	Customary Allowance (t)	Recreational Allowance (t)	TACC (t)	Other sources of fishing – related mortality (t)
PDO 8					
Option 1 (<i>status quo</i>)	19	9	9	1	0
Option 2	296	9	9	263	15

¹ This species was previously known as *Spisula aequilatera* but is now known as *Crassula aequilatera* as a correction to the classification. Powell, A.W.B. 1979: *New Zealand Mollusca: Marine, Land and Freshwater Shells*. Collins, Auckland 500p (p.414)

SAE 8					
Option 1 (<i>status quo</i>)	8	-	-	8	0
Option 2	1821	-	-	1730	91
MMI 8					
Option 1 (<i>status quo</i>)	25	-	-	25	0
Option 2	631	-	-	599	32
DAN 8					
Option 1 (<i>status quo</i>)	33	-	-	33	0
Option 2	236	-	-	224	12

7 Because of their sub-tidal location, surf clam stocks, with the possible exception of PDO, are generally inaccessible using usual customary and recreational collection methods. There is no new information to suggest that the existing sector allowances for customary and recreational are inadequate. However, MPI requests input from customary and recreational submitters on this issue to confirm this is the case.

CONTEXT

Need to Act

8 Through MPI's annual planning process under the National Fisheries Plan for Inshore Shellfish Fisheries (refer <http://www.fish.govt.nz/en-nz/Fisheries+Planning>) quota holders have provided MPI with new information about surf clam biomasses and distributions in FMA 8. The information is from a biomass survey² which shows substantial surf clam abundances that could support the development of the sub-tidal surf clam fishery. MPI's Shellfish Working Group has reviewed the survey methodology and results and agrees that a TAC review is warranted.

Management Approach

9 Management objectives for developing fisheries, such as surf clams, in MPI's National Fisheries Plan involve enabling annual yield from the fishery to be maximised while maintaining the stock size at or above the level required to ensure sustainability and the spawning stock biomass.

10 The current TACs (Option 1 in Table 1) were set in 2004 based on limited and uncertain information regarding yield estimates across entire FMAs and are consequently conservative.

² White, W.L., Millar, R.B., Breen, B., and Farrington, G. 2012. *Survey of Sub-tidal surf clams from the Manawatu Coast (FMA 8)*, October – November 2012.

11 Although surf clam stocks overseas support major fisheries, the New Zealand surf clam stocks have only recently become the focus of commercial development. Prior to being put in the quota management system (QMS), only a few commercial fishers held the required permits to target surf clams and there were also difficulties in adapting overseas dredge design to suit New Zealand conditions.

12 In addition, the cost of entry to surf clam fisheries is relatively high because of the required shellfish sanitation surveys³. Before harvesting can begin, each harvest area must meet specific shellfish sanitation requirements overseen by MPI Verification and Services. Applications require ongoing monthly and annual testing, and annual reporting. In FMA 8 there are currently no harvesting areas that have shellfish sanitation clearance for the extraction of surf clams.

13 Customary and recreational harvesting of shellfish from the open beaches in FMA 8 has been confined largely to the accessible inter-tidal species *Paphies subtriangulata* (inter-tidal tuatua) and *P. ventricosum* (toheroa). This proposal does not relate to these inter-tidal beach shellfish. The sub-tidal surf clam species included in this review are usually inaccessible to both customary and recreational fishers as the clams are located offshore. MPI notes the possible exception of the deepwater tuatua *P. Donacina* which may be accessible in shallow water at low spring tides.

14 Sub-tidal surf clams may occasionally be harvested by customary or recreational fishers when stranded ashore in high tides after storms. This is considered to be natural mortality as the majority of stranded shellfish die, regardless.

15 MPI have estimates of recreational tuatua harvest for 1992-93 and 1993-94, being 33t and 1t respectively. However, there is a wide disparity in these historic figures and further, no reference to species. MPI assumes that they apply to *P. subtriangulata* and are not relevant to this paper, but seeks stakeholder confirmation of this assumption.

Biological Characteristics of surf clams

16 The four surf clam species under review represent the three families of subtidal surf clams that occur in New Zealand: Veneridae, (DAN); Mactridae, (MMI&SAE); and Mesodesmatidae, (PDO).

17 Surf clams are found in, and immediately beyond, the surf zone of exposed sandy beaches. Surf clam species are distributed sub-tidally to depths of 10 m, each species generally within a distinct depth zone. The various surf clam species follow the same order of

³ New Zealand Legislation: Animal Products (Regulated Control Scheme - Bivalve Molluscan Shellfish) Regulations 2006

depth succession throughout New Zealand, but the depth distribution of each species may vary between locations. The zonation of species with depth allows a degree of species targeting during harvest.

18 Maximum age has been estimated from shell sections and from the numbers of age classes and this estimate used to infer the probable rate of mortality (M), however, it is acknowledged it will be difficult to get reliable estimates of M for this fishery. Surf clam populations 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.

Stock Status

19 Because of the relatively low levels of exploitation of each species, the MPI Plenary reports it is likely that all surf clam stocks in FMA 8 are still effectively in an un-fished state. However, because recruitment of surf clams is variable and natural mortality may be high, biomass can be highly variable both spatially and temporally.

Biomass survey

20 The biomass survey was conducted in October–November 2012 on the Manawatu coast covering about 23 kilometres either side of the Manawatu River. The survey has been reviewed by the MPI Shellfish Working Group and biomass estimates with suitable coefficients of variation (CV) have been accepted, including potential maximum constant yield (MCY⁴) values.

21 Effectively, two surveys were undertaken. Firstly, an exploratory systematic survey of both areas north and south of the Manawatu river, followed by a stratified survey that, because of time and weather constraints, was only carried out on the southern area. Comparison of the estimates derived from the systematic and stratified surveys for the southern area were not significantly different. Therefore, the Shellfish Working Group agreed estimates based on the systematic survey for the northern area could be combined with the estimates from the stratified survey of the southern area to give biomass estimates for the total survey area as shown in Table 2.

22 The biomass survey estimates the current combined biomass of the four species of surf clams at 18 384 tonnes.

⁴ MCY = $0.25 * F_{0.1} * B_0$. $F_{0.1}$ is the fishing mortality rate at which the increase in equilibrium yield per recruit in weight per unit of effort is 10% of the yield per recruit produced by the first unit of effort on the unexploited stock. B_0 is an estimate of the virgin recruited biomass.

23 MCY estimates have been calculated for each of the four main species (Table 2) under varying estimates of fishing mortality ($F_{0.1}$). MCY is considered the maximum constant catch that can be caught each year that is estimated to be sustainable at all probable future levels of species biomass. $F_{0.1}$ was calculated using growth data from the Wellington west coast for *Crassula aequilatera*, *Macra murchisoni* and *Dosinia anus*, while values for *Paphies donacina* were taken from Cloudy Bay in the South Island.

Table 2. Mean values and 95% confidence intervals of MCY (t) of four surf clam species in FMA 8 based on variable estimates of $F_{0.1}$ ⁵

Species	Biomass	Value of $F_{0.1}$	Mean MCY	95% Confidence Intervals	
				Lower	Higher
PDO	3289.5	0.36	296.1	199.5	392.6
		0.52	427.6	288.2	567.1
SAE	7992.9	1.12	2238.0	1820.7	2655.3
		1.56	3117.2	2536.0	3698.4
MMI	3603.2	0.7	630.6	512.6	748.5
		0.89	801.7	651.8	951.7
DAN	3498.1	0.27	236.1	192.5	279.7
		0.54	472.2	385.1	559.4

Areas of uncertainty

24 MPI notes that there is uncertainty around M and the fishing mortality ($F_{0.1}$) estimates used, as:

- Mortality and recruitment of surf clams are known to be highly variable;
- M was estimated from growth rings that were assumed to be annual and used to calculate $F_{0.1}$. However, this assumption is unverified;
- $F_{0.1}$ values used are assumed to be similar to those from previous work on the Wellington west coast;
- There is no data on dredge mortality, which could affect the estimate of $F_{0.1}$;
- The range of natural mortality estimates used to determine $F_{0.1}$ may be too small;
- There are no current biomass trends for the surf clam fisheries in FMA 8 and;
- $F_{0.1}$ values for SAE appear concerningly high and, therefore, MCY estimates for SAE should be interpreted with caution.

25 On the other hand, the estimates of biomass found in these studies are considered conservative because:

- Surf clams are known to exist in the rest of FMA 8 outside the surveyed sites and;
- The analysis was undertaken assuming a dredge efficiency of 100%, which is acknowledged by the Shellfish Working Group to be an over estimate, which reduces the estimate of $F_{0.1}$.

⁵ Estimates of $F_{0.1}$ were calculated based on natural mortality rates from the Wellington west coast and Cloudy Bay. Cranfield, H.J., Michael, K.P., and D.R. Stotter. 1993. *Estimates of growth, mortality, and yield per recruit for New Zealand surf clams*. New Zealand Fisheries Assessment Research Document 93/20.

PROPOSED RESPONSE

26 The TAC for surf clams is set under section 13 of the Fisheries Act 1996 (the Act). Section 13(2) of the Act requires an assessment of B_{CURRENT} and B_{MSY} . While estimates of B_{CURRENT} for part of the FMA 8 coastline are available from the biomass survey, B_{MSY} ; the biomass that would produce the maximum sustainable yield, has not been established.

27 Under such circumstances, section 13(2A) of the Act provides for the Minister to use the best available information to set a TAC that is not inconsistent with the objective of maintaining the stock at or above, or moving the stock towards or above, B_{MSY} . The available MCY estimates provide a guide on a sustainable yield for the surf clam fishery. Increasing catch levels can increase the risk of lowering stock biomass below the level that produces the MSY. However, the MCY estimates set out above are considered conservative in the short-medium term with the objective of maintaining the stocks at, or above, or moving the stock towards or above a level that can produce the assumed reference target, B_{MSY} .

Option 1 (Status Quo)

28 Option 1 is the *status quo* (see Table 1). The current TACs were established in 2004 when surf clams entered the quota management system. TACCs were based on historic commercial landings, however, the surf clam fishery is a newly developing fishery and these settings are no longer appropriate with the development of the fishery or consistent with the recent biomass survey.

29 Retaining the current TACs for the above surf clam stocks in FMA 8 will result in no change to the sustainability of these fisheries. The MPI Science Group Report from the Fisheries Assessment Plenary (May 2011 stock assessments and yield estimates) states the current TACs are sustainable and that the surf clam stocks in FMA 8 are still effectively in their un-fished state.

Option 2

30 Option 2 is based on the MCY estimates from the recent biomass survey while taking into account the uncertainties associated with the survey. The surf clam TACs are proposed to be set at the lower mean MCY estimate (Table 2) for PDO 8, MMI 8, and DAN 8. And, for SAE 8, given the concern associated with the $F_{0.1}$ values, set at the lower 95% confidence interval bound of the lower $F_{0.1}$ value.

31 Increasing the TACs for these selected stocks will enable industry to develop the surf clam fisheries and increase the potential economic value derived from these stocks.

32 MPI is aware that the TACs are being set for the whole of FMA 8 based on the limited biomass survey area, but also that the fishery will be constrained to those parts where approved sanitation areas are established. MPI is also aware that calculation of the estimates assumes 100% dredge efficiency which will make estimates more cautious.

33 While Option 2 poses a greater sustainability risk than Option 1 to the surf clam stocks, this risk is considered to be low. Under Option 2 there will be greater fishing impacts on the benthic environments (see Environment Impacts section) that have been given sanitation clearance. The level of risk is dependent on the size of the sanitation areas where harvesting can occur and the amount of surf clams that are extracted from these areas.

34 Nevertheless, MPI is aware that surf clam biomass can vary significantly both locally and over short time frames, and have an important role in the coastal marine food webs. This is taken into account in the cautious MCY estimates upon which Option 2 is based.

Allocation of the TAC

35 Under Option 1 MPI proposes no change to the existing sector allowances for surf clam stocks in FMA 8.

36 Option 2 proposes changes to the TACCs and to provide for other sources of fishing-related mortality for surf clam stocks. Sections 20 and 21 of the Act provide for the Minister to vary a TACC after allowing for non-commercial fishing interests and fishing related mortality.

Customary Maori and recreational allowances

37 MPI is proposing to retain the existing customary Maori and recreational allowances for the reviewed surf clam stocks in FMA 8 under both Options 1 and 2.

38 Information on catch levels of Maori customary and recreational fishers is limited and uncertain. Customary permit information shows no evidence of customary catch of these species. The species' compositions of customary and recreational harvests are likely constrained to *P. donacina*, which is more accessible. MPI has no information to indicate the catches by these sector groups has changed since the species were put into the QMS and TACs set. MPI invites customary Maori and recreational interest groups to submit any additional information they hold on their current catch levels and catch aspirations for surf clams.

Other sources of fishing-related mortality

39 When the original TACs for surf clam stocks were set, MPI did not make an allowance for other sources of fishing-related mortality for surf clam stocks. The level of mortality from this source was estimated to be low given the size of the proposed TACs. Today, the quantity of surf clam mortality as a result of interaction with commercial dredges (but not being caught) is still considered low. The proportions of damaged surf clams in earlier gear trials (pre-1990) ranged between 0 – 21%⁶ depending on species and dredge design, but advances in technology and hydraulics have likely reduced the level of fishing-related mortality.

40 In the absence of specific research results, MPI is proposing an allowance for other sources of fishing-related mortality that is equivalent to approximately 5% of the proposed TAC for each surf clam stock. MPI seeks any further information stakeholders may have on other sources of fishing related mortality.

Total Allowable Commercial Catch (TACC)

41 Under Option 2, MPI is proposing to increase the TACCs for PDO 8, SAE 8, MMI 8, and DAN 8.

42 The proposed TACCs will provide industry with the opportunity to develop the surf clam fisheries in FMA 8. This will provide additional return to the local fishing sectors through increased employment of additional crew, processing of landed surf clams, and other benefits to the economy.

43 Information supplied by the surf clam industry indicates that export returns of up to \$8.00 a kilogram could be achieved. Based on the TACCs in Option 2, export returns of \$20M could be realised. Further, operation of the fishery, when fully developed, would require employment of 15 to 20 people.

Environmental Impacts

44 Previous research⁷ has concluded that use of hydraulic dredges in the surf clam fishery has little adverse effect on the surf zone substrate where surf clams are found. There is little evidence of dredge tracks on the substrate within 20 minutes of use and no evidence within 24 hours. These shallow water environments are subject to frequent natural disturbance and tend to recover faster from the effects of mobile fishing compared to those in

⁶ Beentjes, M.P., and S.J. Baird. 2004. *Review of dredge fishing technologies and practice for application in New Zealand*. New Zealand Fisheries Assessment Report 2004/37.

⁷ Ibid, no. 6.

deeper water. Similarly, the species that live in these systems must adapt to turbulence and shifting sand.

45 MPI notes that surf clams will play a role in the coastal marine food webs, however, there is very limited information on this matter.

Other Management Controls

Deemed Values

46 MPI proposes to leave the current annual and interim deemed value rates unchanged.

47 MPI implemented a backstop differential deemed value into all surf clam stocks in April 2009. The differential deemed value rates limit harvesting by non-ACE holders, who face the highest rate after the first kilogram is caught. It should be noted that surf clams are on Schedule 6 of the Fisheries Act and as such, if incidentally caught, may be returned to the sea.

Potential Further Development

48 The settings of these surf clam stock TACs, using the current MCY estimates, are considered to have a low sustainability risk in the short-medium term. MPI considers further monitoring of the fishery (for example by a biomass survey) be conducted in approximately 3 to 5 years to reassess the status of the surf clam stocks in FMA 8..

49 If further development of the fisheries is desirable, it may be worth considering a move to a Current Annual Yield (CAY) harvesting strategy to maximise yield in years of high productivity. A CAY strategy recognises that fish populations fluctuate in size annually, so that to get the best yield from a fishery the annual catch is adjusted every year. This management strategy costs more as it involves conducting annual biomass surveys and recalculating yield to account for the variability in surf clam populations from year to year.

50 MPI aims to discuss with quota holders the most appropriate management strategy for these fisheries including supporting information needs. For example, MPI acknowledges there are no reliable estimates of natural mortality and commercial dredge efficiency for these surf clam stocks. Provision of this information would improve precision when assessing the sustainability of the fishery in the longer term. The potential exists to collect much of the data needed as part of commercial fishing activities.

INITIAL CONSULTATION

51 On the 29th of August MPI meet with Te Tai Hauauru Fisheries Forum in Whanganui as part of the National Inshore Fisheries Planning process and to seek input into the proposed review of surf clam stocks in FMA8.

52 At this meeting Te Ohu Kaimoana and the major quota holder for FMA 8 surf clams, Cloudy Bay Clams, gave a presentation of the proposed stock assessment survey they were planning for Foxton Beach. There was a positive response from the forum to this proposal. MPI discussed the way information from the biomass survey would be processed. At a further Forum meeting on 7 November, an update was given on the status of the biomass survey, and all members of the forum were invited to attend the MPI Shellfish Working Group meeting that was held on 13th November to discuss the results of the survey.

CONCLUSION

53 MPI's initial view is to increase the TAC and TACC for surf clams in FMA 8 to the levels shown in the following table.

Table 3. Proposed TACs, sector and other fishing-related mortality allowances and TACCs (tonnes) for surf clam stocks in FMA 8.

Stock	TAC (t)	Customary Allowance (t)	Recreational Allowance (t)	Other sources of fishing related mortality (t)	TACC (t)
PDO 8	296	9	9	15	263
SAE 8	1821	-	-	91	1730
MMI 8	631	-	-	32	599
DAN 8	236	-	-	12	224

54 MPI considers the proposed TACs will not have an adverse impact on the sustainability of the surf clam stocks in FMA 8 in the short to medium-term, or on customary and recreational use opportunities. The proposed TACs will allow greater economic return, and reflect the developing nature of the fishery.