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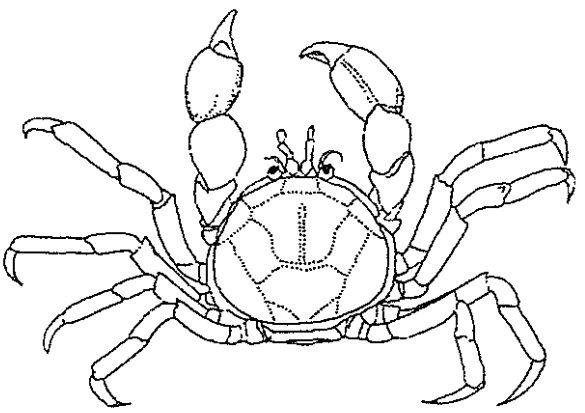
Research, survey and monitoring report number 77

Description of the subtidal macrobenthic community from a proposed marine farm in western Hallam Cove, Pelorus Sound

A report prepared for:

R. Taylor



November, 1995

1.0 INTRODUCTION

This report presents a biological description of the habitats and associated conspicuous macrobenthic communities from an area proposed as a marine farm in western Hallam Cove, Pelorus Sound (Figure 1).

Hallam Cove is the largest bay in the Fitzroy Bay complex comprising a total of five bays. Hallam Cove is located on the northern side of Fitzroy Bay and is some 3.5 km in length and is approximately 1 km wide at its entrance (Garne Point to Sheep Point). Depths in Hallam Cove are relatively consistent between 25 m to 27 m but rise to considerably shallower depths around the edges of small bays such as Cissy Bay and Te Towaka (see Navy Chart NZ 615). The shoreline of Hallam Cove is either pasture, pine plantations or coastal forest. Water residence times in this area have been recorded as some of the longest in the Marlborough Sounds (see Gibbs 1991).

The biological environment of the Fitzroy Bay area is notable for elephant fish (*Callorhinchus millii*) spawning areas recognised in Garne and Savill Bays (Davidson et al. 1990, Davidson et al. in press, Didier, 1994). Hallam Cove is notable for the presence of new species of sponges (Davidson et al, in press).

The inner and offshore boundaries of the proposed 3.0 ha marine farm stretch some 200 metres in length in an approximately north-west/south-east orientation. The proposed farm is 150 m wide along its entire length (Figure 1). Depths on the inshore boundary were approximately 17 m (Point 3) to 18 m (Point 4), while depths along the offshore boundary were approximately 18 m (Point 4) to 26.6 m (Point 1). The proposed activity, details of farm structure and species are outlined by a report by PALMS (Ron Sutherland) on behalf of the applicant R. Taylor.

The Marlborough Sounds lie at the northern end of the South Island, with Cook Strait to the north and east and Golden Bay and the West Coast to the west. The Marlborough Sounds area was formed by submergence of river valleys, the Sounds consist of approximately 1500 km of bays, passages, peninsulas, headlands, estuaries and beaches, often with an adjacent steep terrestrial topography. The Sounds are a resource of major environmental importance. In a nationwide report by the Department of Conservation, the Marlborough Sounds was identified as being of national conservation importance. The Sounds was also identified as having areas of international biological importance (Davidson et al ., 1990; Davidson et al., in press). These values will be important consideration in the soon to be produced Marlborough District and Coastal Plans.

Multiple use (marine farming, fishing, boating, housing, waste water disposal, port development, forestry, agriculture) have the potential to degrade the environment of the Sounds. Marine farming for example, can have considerable impact on the environment through habitat modification or lowering water quality (Kaspar et al., 1985; Gowan and Bradbury, 1987; Kaspar et al., 1988; Gowan et al., 1990; Silvert, 1992). It is therefore important that all new marine farm proposals adequately identify natural values within and adjacent to a proposed marine farm.

The aim of this study was therefore to provide environmental information on the proposed site and to identify features of biological value which could be threatened by the establishment of the proposed marine farming activity.

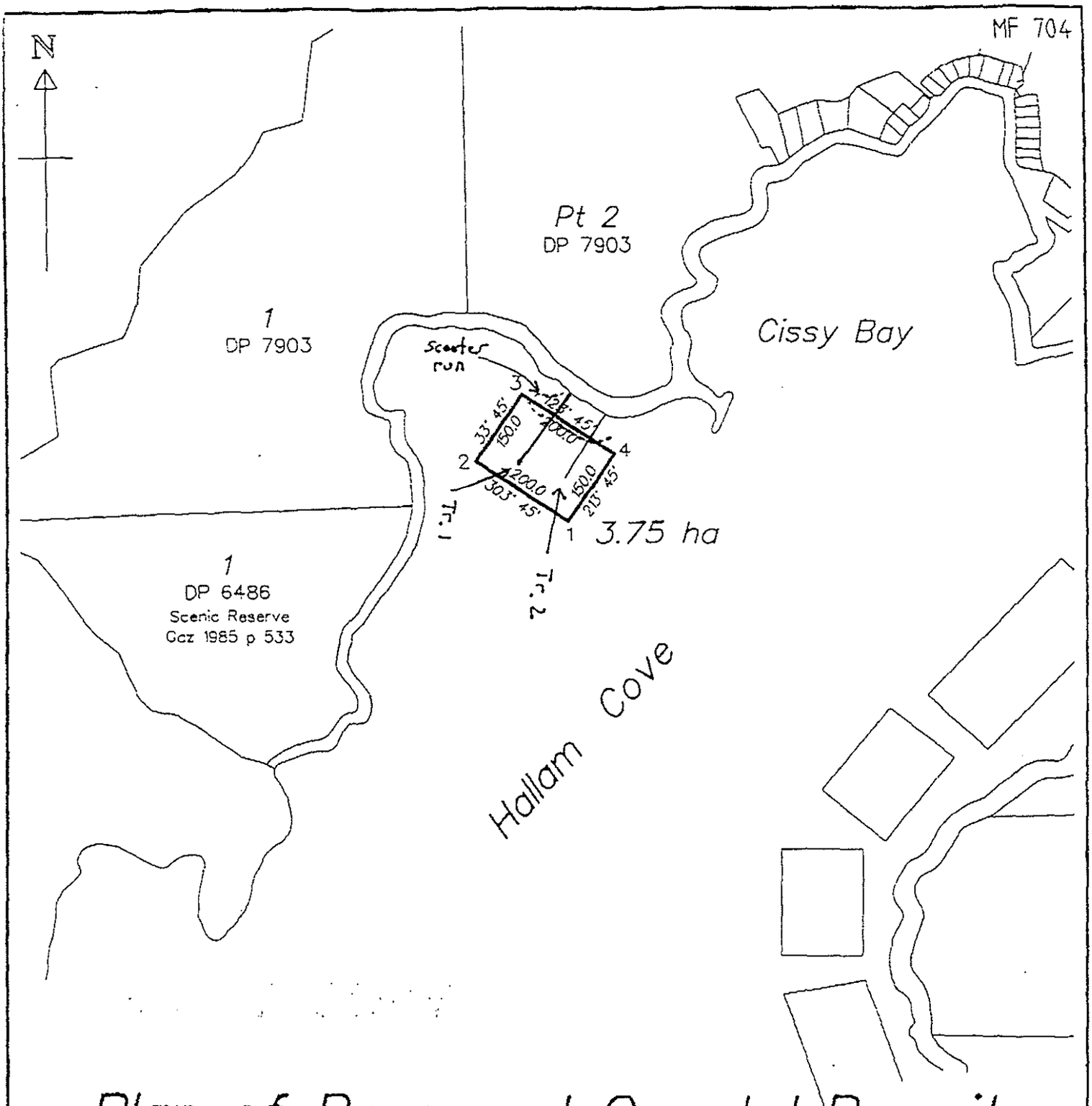
2.0 MATERIALS AND METHODS

The proposed site was qualitatively investigated on 9 th November 1995, using two rapid subtidal survey techniques. All of the inshore boundary and randomly selected parts of the proposed marine farm area and adjacent coast were investigated by a free diver assisted by an Apollo scooter. Results from this preliminary investigation were recorded on waterproof paper. Based on these findings, two representative areas located within the proposed farm backbone structure were selected and a 150 m lead-lined transect line marked at 5 m intervals was installed perpendicular to the shore (Figure 1). These transect sites were considered representative of the substrata, habitats and flora and fauna observed during the free swim.

Using SCUBA, depth, distance, substrate, habitat and associated conspicuous surface dwelling flora and fauna were recorded using waterproof paper, clipboard and a pencil. This process was terminated at a distance of 160 m (transect 1) and 140 m (transect 2) from the low tide mark and at depths of approximately 17 m to 22 m. The abundance of conspicuous macroinvertebrates and macroalgae observed during both scooter and transect investigations, were estimated on a scale of 1 = uncommon (1 or 2 observed), 2 = occasional (observed sporadically), and 3 = common (regularly seen or forming a zone or patches).

Densities of scallops (*Pecten novaezelandiae*), horse mussels (*Atrina zelandica*) lampshell (*Magasella sanguinea*) and elephant fish egg cases (C. *millii*) were collected from 10 x 1 m quadrats from along both transects.

All depths presented in this report are adjusted to datum.



Plan of Proposed Coastal Permit

Coastline is MHWM from DOSLI DCDB

Bearing variation Geodetic Datum 1949 to NZMG +31° 30"

SCALE 1:10,000

200 100 0 100 200 300 400 500 600 700 800 900 1000 metres

LOCAL AUTHORITY: MARLBOROUGH DISTRICT	NELSON LAND DISTRICT
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Te Puna Korero Whenua

Figure 1. Transects and scooter run.

Data collected during the study followed the Department of Conservation guideline on ecological reporting on proposed marine farm areas in the Marlborough Sounds (Department of Conservation, 1995).

3.0 RESULTS AND DISCUSSION

3.1 Scooter Run

Results from the scooter run across random parts of the proposed farm and along the inshore areas of the proposed marine farm and adjacent coast suggested that:

1) substrata present were small boulders, pebbles, cobbles, sands, shell (i.e. dead whole and broken shell) and silts;

2) no reef or rubble habitat was recorded within the boundaries of the proposed marine farm;

3) the marine farm area was dominated by substrata dominated by broken and dead whole shell overlying a silt base; and

4) similar habitats and communities were recorded from the length of the proposed marine farm, but depths with respect to distance from shore were variable with shallower shores observed with greater penetration into the bay.

3.2 Profiles

The intertidal shore adjacent to the proposed marine farm area was dominated by a combination of small bedrock bluffs, and small boulders, cobble and pebble shores. The coast was bordered by a shore clad in pine plantation with isolated fringes of flax and five finger.

Both shore profiles were initially extensions of the intertidal shore being dominated by a cobble/pebble substrata with no large brown macroalgae. The cobble/pebble zone formed a relatively steep bank and terminated in soft substrata at 14m to 16 m depth and approximately 40 m to 45 m distance from shore (Figures 2, 3). A relatively narrow zone dominated by broken and dead whole shell overlying fine sands was observed extending offshore to 60 m to 70 m. With increasing distance from shore, the fine sand component was replaced by silts.

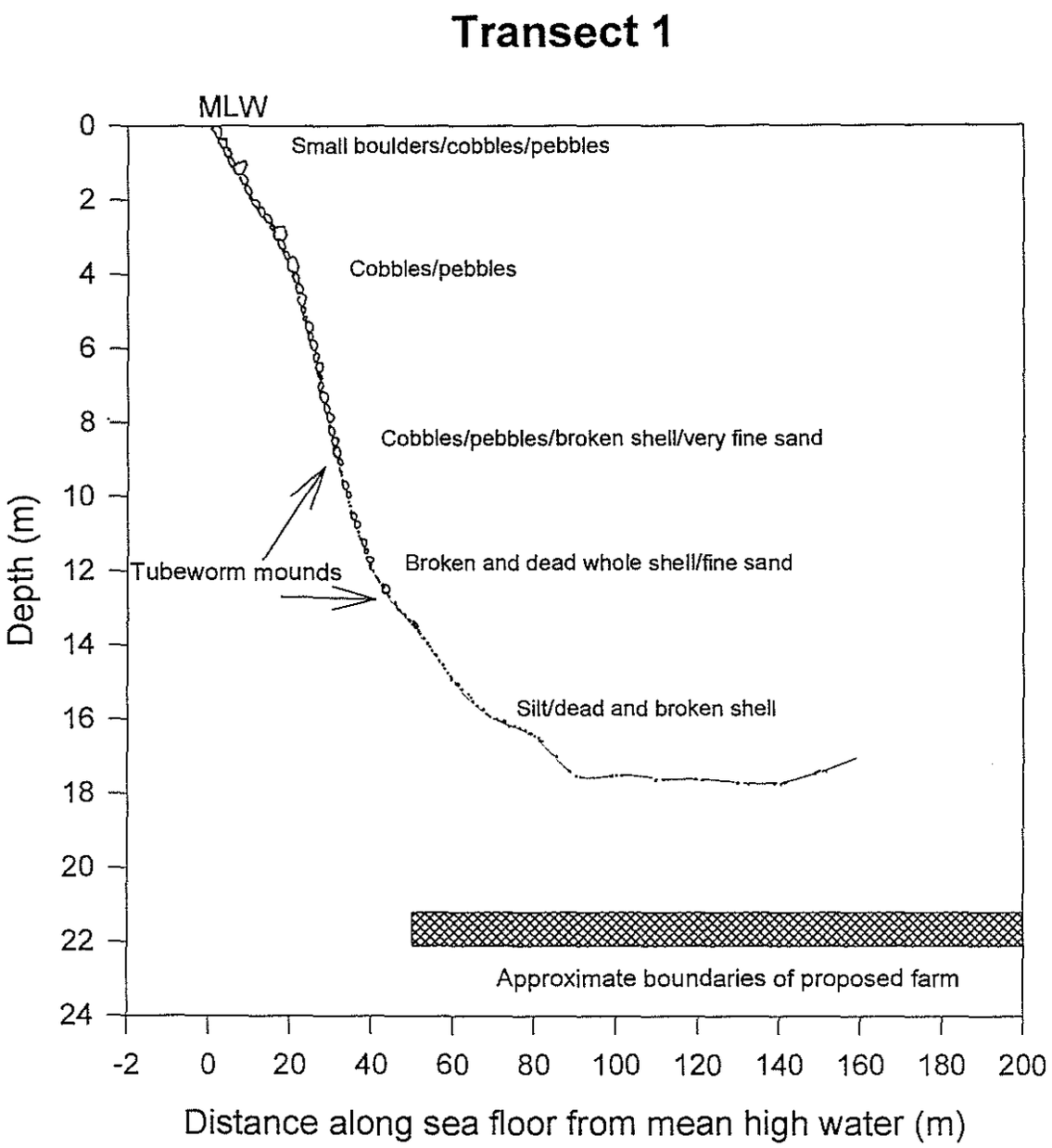

Figure 2 Subtidal shore profile, and substrata from area proposed as a marine farm in western Hallam Cove, Pelorus Sound.

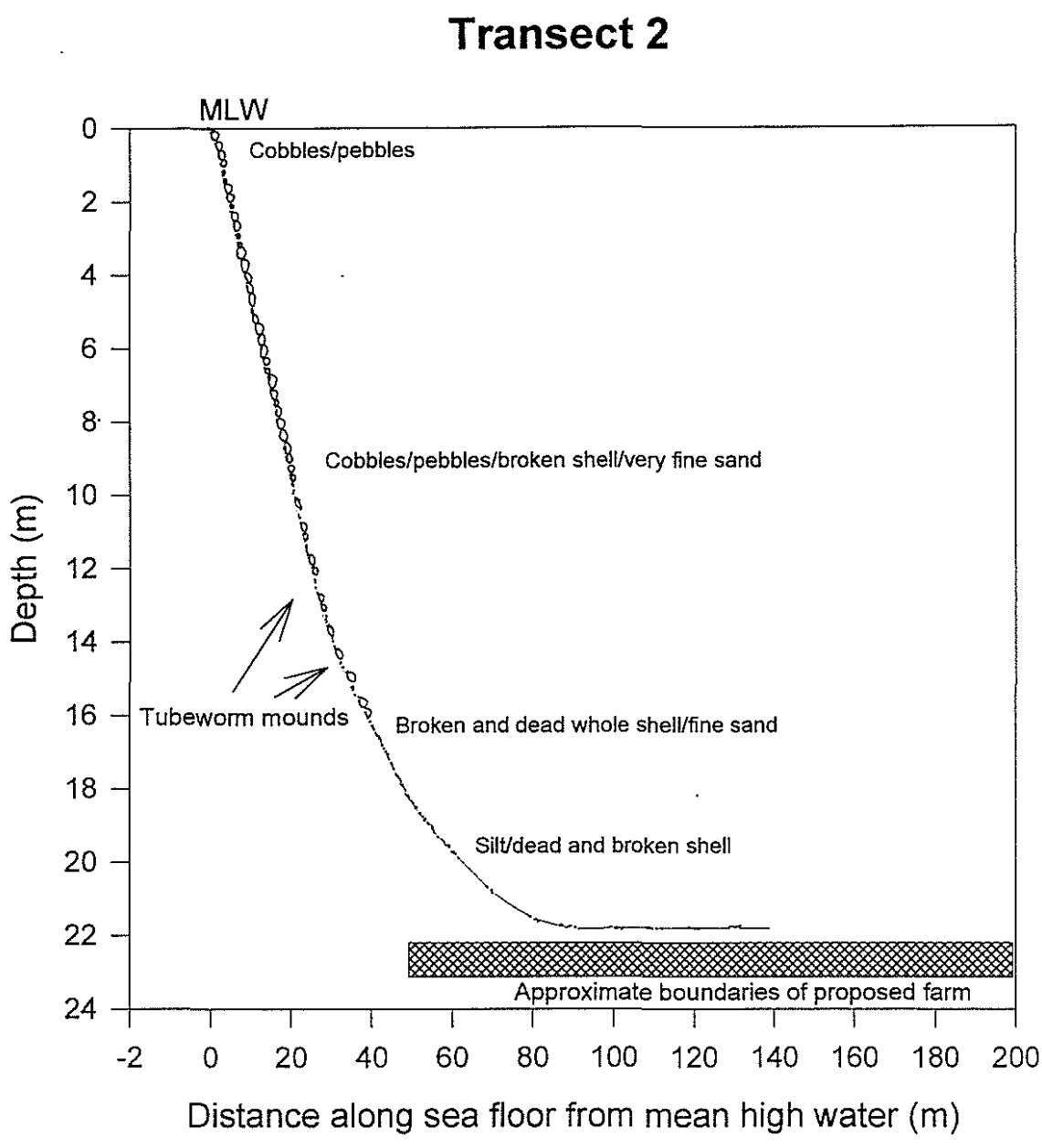

Figure 3 Subtidal shore profile, and substrata from area proposed as a marine farm in western Hallam Cove, Pelorus Sound.

Table 1 Species observed from transects from an area in western Hallam Cove, Pelorus Sound.				
Algae	**Common name**	**Invertebrates**	**Habitat**	**Common name**
Corallina spp.(3)	paint	SPONGIA		
Colpomenia sp. (2)	bubble weed	Ancorina alata (2)	rubble	grey sponge
Hormosira banksii (2)	Neptune's necklace	Crella incrustans (1)	rubble	encrusting sponge
		Tethia sp. (1)	rubble	golf ball sponge
		COELENTERATA		
		Actinothoe albocincta (1)	rubble/bedrock	anemone
		Culicea rubeola (1)	rubble	box anemone
		Obelia sp. (2)	rubble/rock	hydroid fuzz
		GASTROPODA		
		Cellana spp. (2)	rubble	limpet
		Maoricolpus roseus (3)	sand/shell	spire shell
		Trochus viridus (1)	rubble	
		Turbo smaragdus (3)	rock/rubble	cats eye
		BIVALVIA		
		Atrina zelandica (1)	soft	horse mussel
		Chlamys sp. (1)	rock	queen scallop
		Modilarca impacta (3)	rubble	Nestling mussel
		Monia zelandica (3)	rock/rubble	window oyster
		Mytilus edulis (1)	rock	blue mussel
		Pecten novaezelandiae (2)	soft	scallop
		POLYCHAETA		
		Brachiomma sp.(2)	sand/rubble	fan worm
		Galeolaria hystrix (3)	sand/rubble	tube worm
		Spirorbis sp. (3)	rubble/rock	
		Serpulid sp. (1)	soft	tube worm
		CRUSTACEA		
		Pagurus spp (2)	sand	hermit crab
		ECHINODERMATA		
		Allostichaster insignis (2)	rubble	starfish
		Coscinasterias calamaris (2)	sand/shell	11 arm star
		Evechinus choroticus (2)	rock/rubble	kina
		Patiriella regularis (2)	sand/rubble	cushion starfish
		Pectinura maculata (2)	rubble	snake star
		Stichopus mollis (2)	sand/silt	cucumber
		BRACHIOPODA		
		Magasella sanguinea (3)	shell	lamp shell
		ASCIDEACEA		
		Cnemidocarpa sp. (2)	rubble	saddle squirt
		Didemnium sp. (2)	rubble	cream ascidian
		Leptoclinides sp. (2)	rubble	purple ascidian
		BONY FISHES		
		Notolabrus celidotus (3)	rubble	Spotty
		Hemercoetes monopterygius (2)	silt	Opalfish
		Forsterygion lapillum (3)	rubble	common trip.
		Forsterygion varium (2)	rock/rubble	variable trip.
		Parapercis colias (2)	rubble	blue cod
		SHARKS		
		Callorhinchus millii (1)	sand/shell	egg capsules

From the transects and scooter run a total of 28 conspicuous species of invertebrate, 3 algae, 3 ascidians, 5 species of bony fish and 1 shark species egg-case were recorded. A list of species are presented in Table 1, while the profiles are plotted in Figures 2, 3.

Green-lipped mussel (Perna canaliculus) were not observed during the present study. Blue mussel (Mytilus edulis) were observed around low tide

3.3 Reef Fish

Five species of fish were recorded during the investigation. Spotty (*Notolabrus celidotus*) were numerically the most abundant reef fish. Few blue cod (all < 30 cm length) were observed during the investigation. Common triplefins (*Forsterygion lapillum*) were very abundant on the rubble bank.

3.4 Scallops

Scallops were observed from the soft bottom shore within and adjacent to the proposed marine farm. Scallop densities were collected from 20 quadrats of 10 x 1 m^2. Densities were mean = 0.055 per m^2, SE = 0.02. These densities are below those regarded as commercially viable or recreationally acceptable.

Doc guideli 0.1 p m^2

3.5 Horse mussels

Horse mussels were observed from the soft bottom shore within and adjacent to the proposed marine farm. Horse mussel densities were collected from 20 quadrats of 10 x 1 m^2. Densities were mean = 0.021 per m^2, SE = 0.01. These densities are very low compared to densities recorded from horse mussel beds in the Marlborough Sounds.

Doc guideli 0.2 p m^2

3.6 Lampshell

Lampshell (*M. sanguinea*) were observed from both transects but were considerably more common from the eastern transect (T. 2). Lampshell densities were collected from 7 quadrats from only transect 2 where they were most common. Quadrats were 10 x 1 m^2. Densities were mean = 1.91 per m^2, SE = 0.45. These densities are low compared to other areas in Tawhininui reach. Chadderton et al. (in prep.) recorded an average density of 4.1 per m^2 and densities up to 23.3 per m^2.

3.7 Elephant Fish Egg Cases

Elephant fish egg cases were observed from the soft bottom shore within and adjacent to the proposed marine farm from transect 1 only. Elephant fish egg case densities were collected from 12 quadrats along transect 1. Each quadrat measured 10 x 1 m^2. Densities of live egg cases were mean = 0.008 per m^2, SE = 0.008. Densities of hatched egg cases were mean = 0.017 per m^2, SE = 0.011. These densities are very low compared to the abundance of egg cases from Garne and Savill Bays were these cases are very common (author, pers. obs.).

4.0 DISCUSSION OF POTENTIAL IMPACTS OF BIVALVE MARINE FARMS

In a study on the effects of mussel aquaculture, it was recognised that build-up of shell debris and increased sedimentation rates directly below mussel farms strongly influenced benthic communities (Kaspar et al., 1985). Deposition of shell debris can ultimately smother natural benthic communities (Author pers. obs.).

All of the benthos investigated below the proposed marine farm was dominated by soft bottoms composed primarily of silts with a surface component of dead whole shell and broken shell. Around the inshore 15 m to 20 m a fringe of shell overlying fine sands existed. A relatively low variety of conspicuous epibenthic species were observed from these soft bottoms and all were in relatively low numbers. Most sessile species would probably be smothered by any shell debris originating from a farm, while some species such as the mobile opal fish would probably relocate.

Low densities of horse mussel, brachiopod and scallop were recorded from this site. Scallops may relocate but horse mussels and brachiopods would be smothered by shell debris.

Only one live elephant fish egg case was recorded from a transect, while another was observed from the scooter run. Egg cases would be smothered by shell debris while sediment deposition would also detrimentally effect cases. Low densities of live and old egg cases suggest this site has been used rarely in the past 1 to 2 years. Most suitable substrata and depths preferred by this species were observed towards the head of the bay and the western parts of the proposed marine farm. Loss of the area of habitat used by elephant fish to spawn under the proposed marine farm would represent a small and less important part of the total area used by this species in Garne and Savill Bays. Densities of egg cases in these bays are considerably higher than those recorded in the present investigation.

5.0 CONCLUSION

The aims of the study were to provide a biological description of the benthos under and adjacent to a proposed marine farm in western Hallam Cove, Pelorus Sound and to identify potential threats to any subtidal ecological values posed by the proposed activity.

The soft and hard shore communities recorded from the present study were dominated by species that are widespread and common throughout the subtidal shores of the sheltered parts of the Marlborough Sounds, particularly Fitzroy Bay and western Tawhitinui Reach (Dell 1951; Estcourt 1967; McKnight 1969, 1974; Roberts and Asher 1993; McKnight and Grange 1991; Davidson and Duffy, 1992; Davidson, 1994; Davidson and Brown 1994; Duffy et al. in prep; Chadderton et al., in prep, Chadderton and Davidson in prep).

Very low abundances of scallops, horse mussels, lampshells and elephant fish egg cases were recorded within and adjacent to the proposed marine farm. The presence of elephant fish egg cases was not unexpected as adults lay large numbers of eggs predominantly in Garne and Savill Bays (Davidson et al in press), both of which are < 5 km away. The number of live and hatched egg cases was low suggesting this site has been seldom used in the past 2 breeding seasons. The egg case densities recorded during the present study are well below those observed from Garne and Savill Bays where they are very abundant in the 6 m to 20 m depth zone. No other species of special scientific or ecological importance were observed during the present study.

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