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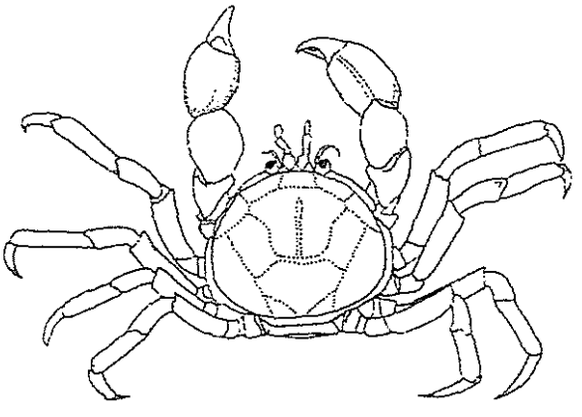
Research, survey and monitoring report number 71

Description of the subtidal macrobenthic community from a proposed marine farm in Waitata Bay, Pelorus Sound

A report prepared for:
Marlborough Mussel Co.



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 southern Waitata Bay, Pelorus Sound (Figure 1).

Waitata Bay is a relatively large bay in central Pelorus Sound. It is approximately 2 km wide at its entrance between Boat Rock Point and Reef Point and is some 3.5 km to 4.0 km in length. The bay reaches averages depths of 22 m to 25 m depth (Navy Chart NZ 615). The shoreline of Waitata Bay is typical of much of Pelorus Sound being dominated by a narrow rubble or bedrock intertidal zone with a backdrop of steep hill sides often with relatively rounded tops. Waitata Bay is located on the western side of Waitata Reach some 6 km from the entrance to Pelorus Sound. Consequently, water residence times in this area are probably considerably shorter than those recorded for the back-waters of Pelorus Sound such as Hallam Cove, and Crail and Beatrix Bays (Gibbs 1991).

The proposed marine farm area lies immediately west of a small promontory south of the southern headland of Waitata Bay (Figure 1).

The proposed inner and offshore boundaries of this 3.45 ha marine farm stretch some 230 metres in length. The proposed farm is 150 m wide along its entire length (Figure 2). Depths on the inshore boundary were approximately 16 m (Point 1) and 18 m (Point 2), depths along the offshore boundary were between 23 m (Point 3) to 24 m (Point 4). The proposed activity, details of farm structure and species are outlined in a report by Resource Management Consulting (Justine Brennan) on behalf of the applicant, Marlborough Mussel Company.

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 a combination of tectonic processes and sea level rise. 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 Marlborough District Council's 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 and associated impacts from the proposed marine farming activity.

2.0 MATERIALS AND METHODS

The proposed site was investigated on the 12 th October 1995, using three rapid subtidal survey techniques. The entire inshore boundary was firstly remotely sensed using a Furuno colour sounder. Distance from shore was determined using a Furuno radar set. Depths and any inconsistencies on the benthos were noted. The inshore boundary of the proposed marine farm was investigated by a free swimming diver assisted with an Apollo underwater scooter. Results from this preliminary investigation were recorded on waterproof paper. Based on these findings, two representative stations located within the proposed farm backbone structure was 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 from the proposed backbone area 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 110 m from the low tide mark (transect 1) and 100 m distance (transect 2)and at depths of approximately 21 m to 22 m. The abundance of conspicuous macroinvertebrates, and macroalgae 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 scallop (*Pecten novaezelandiae) and h*orse mussel (*Atrina zelandica*) were collected from 10 m x 1 m quadrats along the transect lines.

All depths presented in this report are adjusted to datum.

Data collected during the study followed the Department of Conservation guideline to the investigation of marine farm areas in the Marlborough Sounds (Department of Conservation, 1995).

3.0 RESULTS AND DISCUSSION

3.1 Scooter Run

Results from the free swim across random parts of the proposed farm suggested that:

1) substrata present were bedrock, outcroping rock, pebbles, cobbles, fine sands, shelly mixes, (i.e. dead whole and broken shell) and silts and clays;

2) bedrock reef habitat was not recorded inside the boundaries of the proposed marine farm. Outcroping reef habitat was observed towards the western end of the proposed marine farm but was located outside the boundaries of the farm;

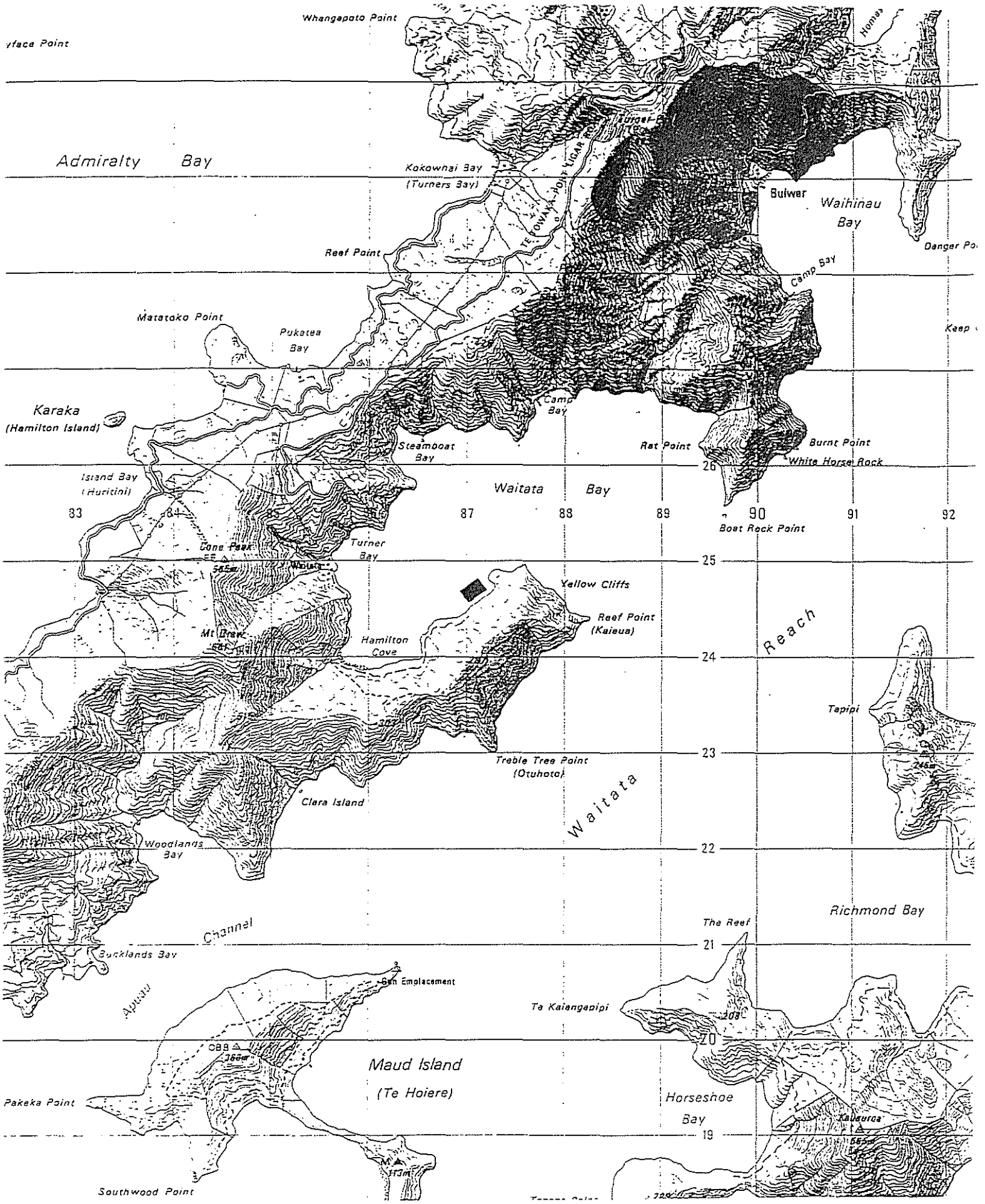


Figure. 1.

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Locality Map of Proposed Coastal Permit

Applicant: Marlborough Mussel Co.

LOCAL AUTHORITY: MARLBOROUGH DISTRICT	NELSON LAND DISTRICT
CROWN COPYRIGHT RESERVED	SCALE 1:50,000

Department of Survey & Land Information

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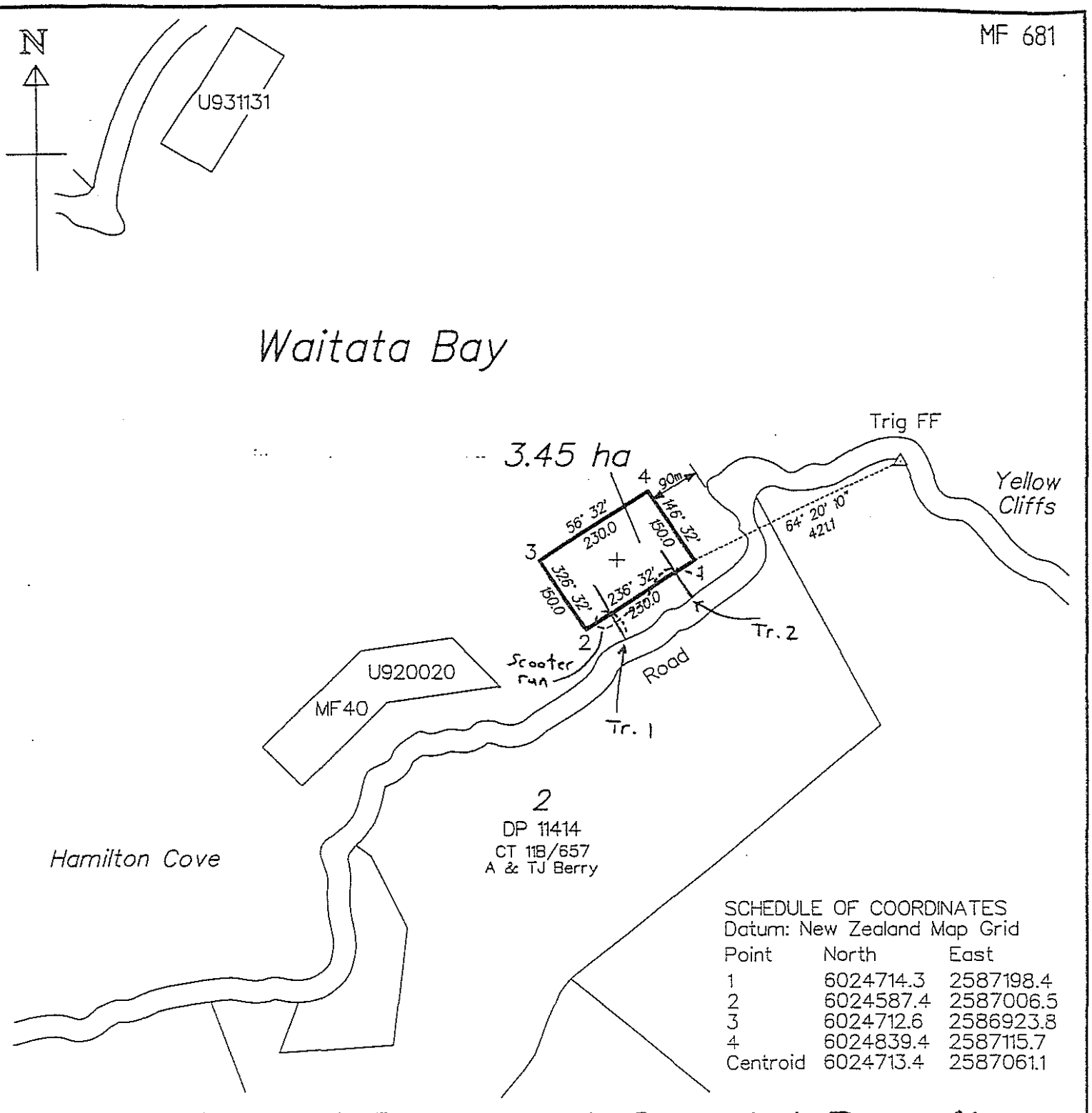

SCHEDULE OF COORDINATES
Datum: New Zealand Map Grid

Point	North	East
1	6024714.3	2587198.4
2	6024587.4	2587006.5
3	6024712.6	2586923.8
4	6024839.4	2587115.7
Centroid	6024713.4	2587061.1

Plan of Proposed Coastal Permit

Marlborough Mussel Co.

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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Prep. By JB	Date 12/9/95	Job No 726733	File 6475/01/02	Reference P26/4.3

Department of Survey & Land Information
Te Puna Korero Whenua

Figure 2. Transects and scooter run.

3) a low proportion of pebble substrata and an occasional cobble were recorded within the inshore areas of the proposed marine farm;

4) apart from the reef located at the western end, outside proposed marine farm area, habitats and communities were relatively consistent along the length of area investigated; and

5) soft bottom substrata especially, dead whole and broken shell overlying silts and silts and clays (mud), dominated the majority of the proposed marine farm area investigated.

3.2 Profiles

The intertidal shore adjacent to the proposed marine farm area was dominated by a combination of short bedrock bluffs and cobble shores. The adjacent terrestrial environment was steep hillside clad low lying coastal scrub mostly kanuka.

The subtidal shore profiles were initially an extension of the intertidal shore being dominated by bedrock in the west and cobbles and pebbles in the east (Figure 3, 4). The hard shore zone terminated in soft shores at approximately 14 m to 16 m depth and approximately 40 m to 50 m distance from shore (Figure 3, 4). Further from shore, a transitional zone where a small proportion of pebbles and the occasional cobble were found in association with dead and broken shell and silts/fine sands. This transitional zone was between approximately 40 m and 60 m distance from shore.

On the hard shores, a shallow subtidal zone of very sparse brown turfing algae occurred and was dominated by Hormosira banksii. With increasing depth encrusting invertebrate communities, particularly tubeworms (*Galeolaria hystrix*) and numerous grazing and filter feeding species.

Soft bottom areas were dominated by whole dead whole and broken shell overlying fine sands in inshore areas and overlying silts at greater depths (Figure 2). At a distance of approximately 80 m to 90 m from shore the benthos was dominated by mud. Apart from the western bedrock reef area, the patterns in hard and soft bottom communities and substrata remained relatively consistent along the shoreline.

From the transects and free dives a total of 27 conspicuous subtidal species of invertebrate, 4 algae, 4 ascidians and 4 species of bony fish were observed by divers. A list of species are presented in Table 1, while the profiles are plotted in Figures 3, 4.

Green-lipped mussel (*Perna canaliculus*) were not observed during the present study. Blue mussel (*Mytilus edulis*) were recorded forming a zone at low tide.

3.3 Reef Fish

Four species of fish were recorded during the investigation. Most abundant reef fish observed were spotty (*Notolabrus celidotus*) and blue cod (*Parapercis colias*). Spotty were numerically the most abundant reef fish, while blue cod were relatively common. During the investigation, cod greater than

30 cm length were seldom observed from inshore reef and cobble habitats. Very few spotty or blue cod were observed from the benthos below the proposed marine farm. This was particularly apparent in deeper (i.e. > 20 m depth) mud habitats.

3.4 Scallops

Scallop densities were calculated from 4 10 m x 1 m quadrats. Densities were mean = 0.05 individuals per m^2. SE = 0.05. This density is very low and below that considered as an acceptable density for commerial dredging and well below that considered acceptable to recreationalists.

3.5 Horse mussels

Horse mussels were not observed from the soft bottom shores in the present study.

3.6 Brachiopods

Brachiopod or lampshell (*Magasella sanguinea*) was noted as uncommon from the soft bottom shore in the present study. Lampshells were recorded mostly between 60 m to 70 m distance from shore.

3.7 Hydroids

Hydroids were not observed from the soft bottom shores in the present study

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.).

The benthos investigated below the proposed marine farm was dominated by a soft bottom (dead whole and broken shell, silts and clays with occasional cobble material in the inshore 10 m). In most areas under the proposed marine farm, these substrata were colonised by relatively low range of conspicuous epibenthic species. Modification of these habitats would occur as a result of shell and sediment deposition.

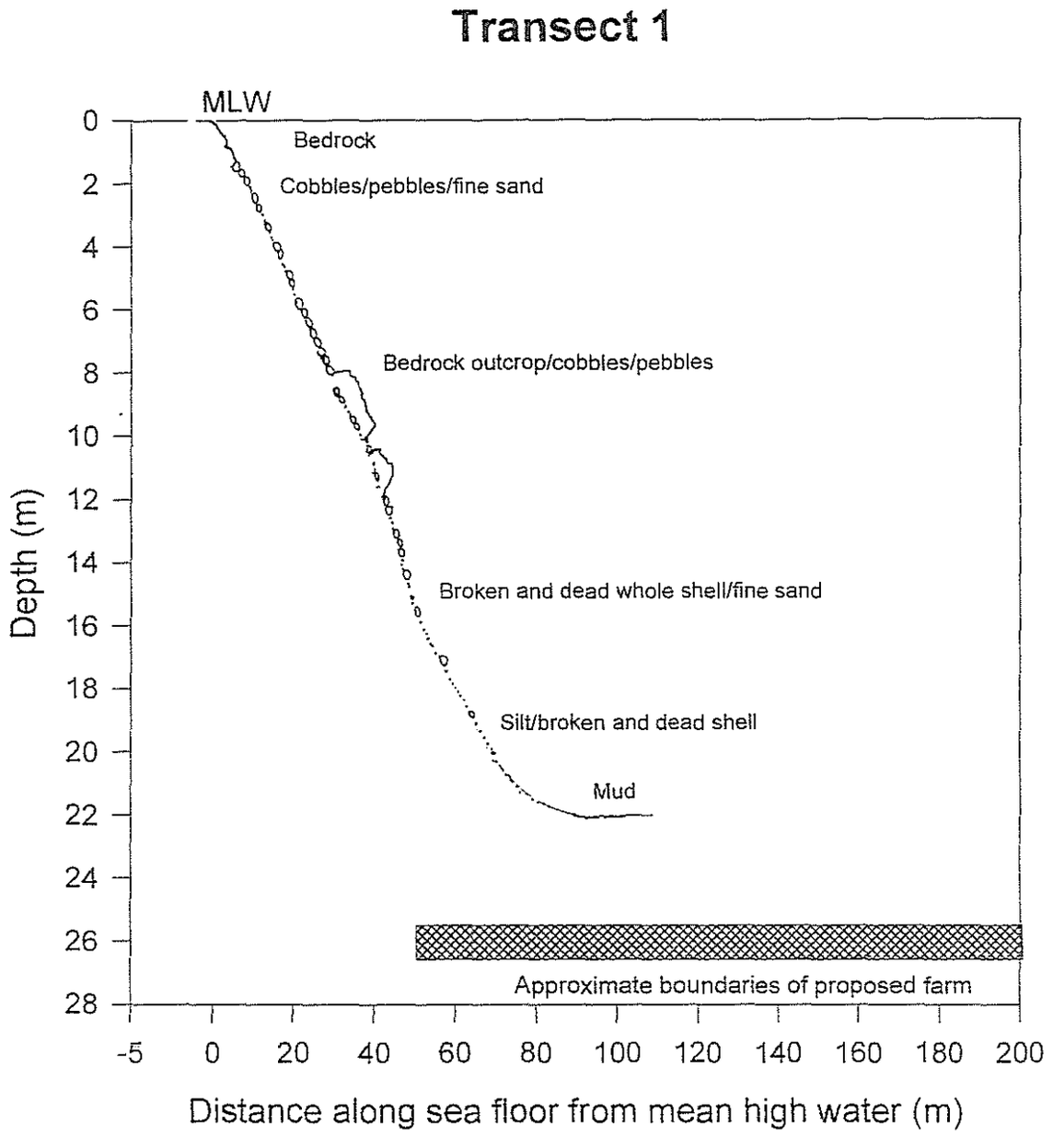

Figure 3 Subtidal shore profile, and substrata from area proposed as a marine farm in Waitata Bay, Pelorus Sound.

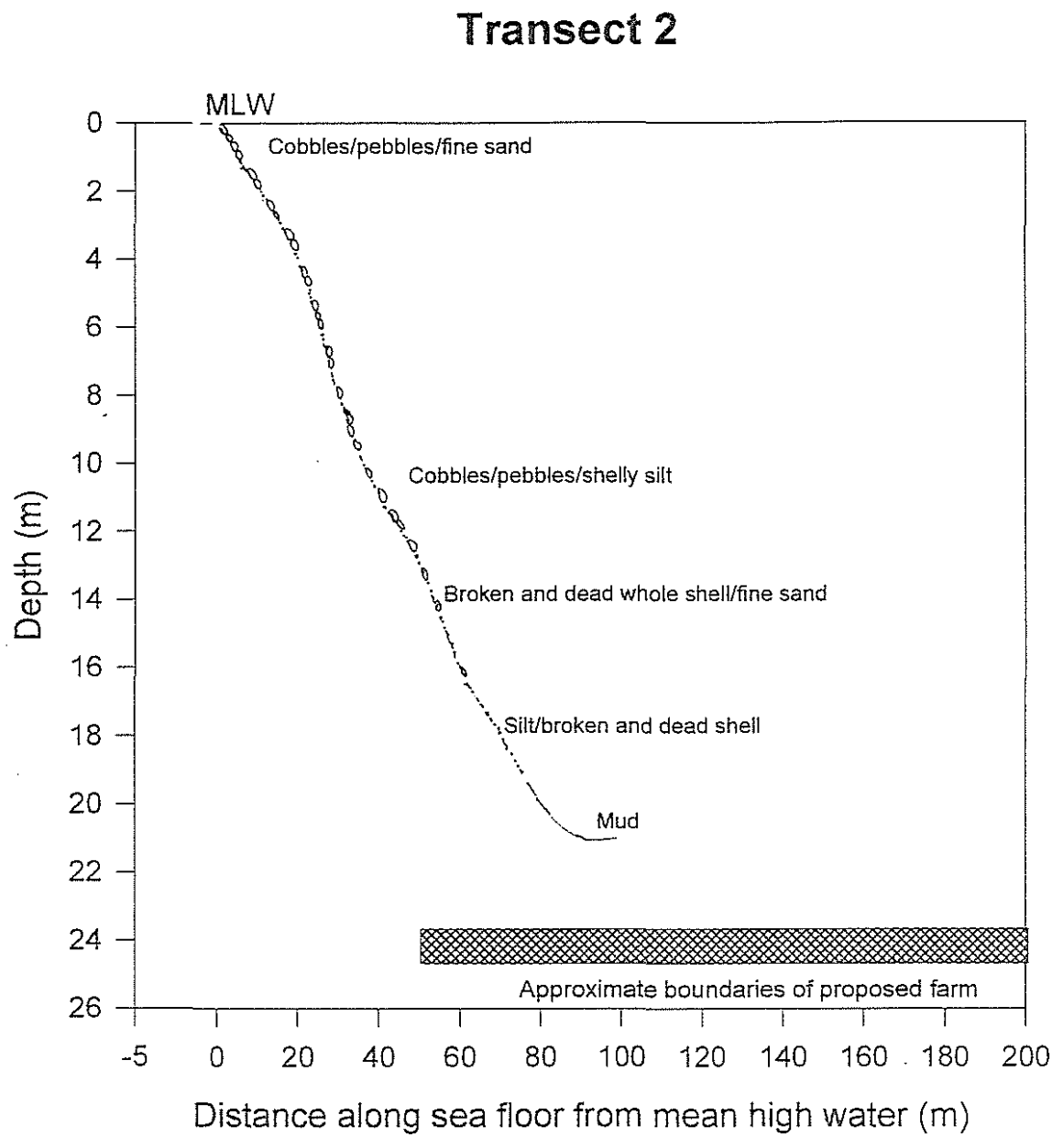

Figure 4 Subtidal shore profile, and substrata from area proposed as a marine farm in Waitata Bay, Pelorus Sound.

Table 1 Species observed from transects from an area in Waitata Bay, 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
Caulerpa sediodes (3)	grape weed	COELENTERATA		
		Culicea rubeola (1)	rubble	box anemone
		Obelia sp. (2)	rubble/rock	hydroid fuzz
		GASTROPODA		
		Cellana spp. (2)	rubble	limpet
		Cryptoconchus porosus (2)	rubble	butterfly chiton
		Maoricolpus roseus (2)	sand/shell	spire shell
		Trochus viridus (2)	rubble	
		Turbo smaragdus (3)	rock/rubble	cats eye
		BIVALVIA		
		Chlamys sp. (1)	rock	queen scallop
		Modilarca impacta (1)	rubble	Nestling mussel
		Monia zelandica (3)	rock/rubble	window oyster
		Mytilus edulis (3)	rock	blue mussel
		Pecten novaezelandiae (2)	soft	scallop
		Triostrea lutaria (2)	rock	oyster
		POLYCHAETA		
		Brachiomma sp.(3)	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 (2)	shell	lamp shell
		ASCIDEACEA		
		Cnemidocarpa sp. (2)	rubble	saddle squirt
		Didemnium sp. (2)	rubble	cream ascidian
		Solitary sp. (2)	rubble	warty species
		Aplidium phortax (1)	rubble	opaque ascidian
		BONY FISHES		
		Notolabrus celidotus (3)	rubble	Spotty
		Hemercoetes monopterygius (2)	silt	Opalfish
		Forsterygion varium (2)	rock/rubble	variable trip.
		Parapercis colias (2)	rubble	blue cod

At the western end of the proposed marine farm, a submerged reef habitat was observed. This was outside the proposed marine farm by sone 5 m distance. It is inlikely that deposition of shell material would influence this outcropuing rock habitat.

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 Waitata Bay, Pelorus Sound and to identify potential threats to any subtidal ecological values posed by the proposed marine farming 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 central Pelorus Sound (Dell 1951; Estcourt 1967; McKnight 1969, 1974; Roberts and Asher 1993; McKnight and Grange 1991; Davidson and Duffy, 1992; Davidson, 1995; Davidson and Brown 1994; Duffy et al. in prep; Chadderton et al., in prep, Chadderton and Davidson in prep). Brachiopods, horse mussels and scallops were either absent or in very low numbers from inshore soft bottom areas. No other species of special scientific or ecological importance were observed during the study.

It appeared that the substrata under most the proposed marine farm was dominated by dead whole shell overlying silts or mud. In inshore areas, a low proportion of pebble and isolated cobbles were observed. This transitional zone of soft and hard shore mixes were colonised by a low diversity of species and due to the very low proportion of hard material appear to be more consistent with communities recorded from dead and broken shell habitats. The associated flora and fauna associated from the remaining and dominant proportion of the proposed marine farm were colonised by a low diversity of species. A submerged reef habitat was observed at the western end of the proposed marine farm, but outside its proposed boundaries. This area was characterised by relatively high species abundances and diversities compared to cobble and shell habitats recorded in the present study. It is unlikely that this area of outcroping rock habitat would be detrimentally impacted by an adjacent mussel marine farm.

Based on ecological data collected in the present study, no modifications to the boundaries of the proposed marine farm are suggested.

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