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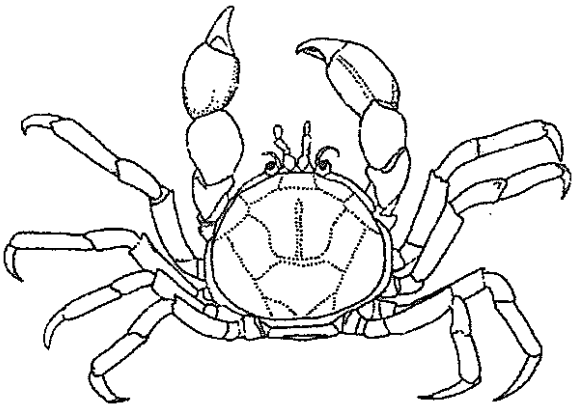
Research, survey and monitoring report number 81

Description of the subtidal macrobenthic community from a proposed marine farm in southern Port Gore

A report prepared for:
Ngati Apa



December, 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 Port Gore (Figure 1).

Port Gore is a large blind bay in the outer Marlborough Sounds. The entrance to Port Gore between Cape Jackson and Cape Lambert is some 6.5 km distance and the Port is some 9.5 km in length. Depths vary considerably depending on location within the Port. A large area in the outer reaches of the Port ranges between 15 m to 25 m depth, while the inner Port, including Melville Cove, is considerably deeper ranging between 31 m to 40 m depth (see Navy Chart NZ 615). The shoreline of Port Gore is exhibits a variety of intertidal and subtidal shore type subject to a variety of environmental conditions from very exposed bedrock through to sheltered cobble and gravel beaches. Water residence times in this area are probably considerably shorter shorted than those recorded for the sheltered waters of Pelorus Sound (see Gibbs 1991).

The proposed marine farm is in an unnamed semi-enclosed bay along the south eastern shore of the southern most area in Port Gore some 11 km south-east of Cape Jackson. Most of this bay is farmed or is in various stages of regenerating scrub.

The inner and offshore boundaries of the proposed 6.75 ha marine farm stretch some 450 metres in length along both inshore and offshore boundaries and are 150 m wide along the entire length (Figure 1). Depths on the inshore boundary were approximately 8 m (Point 2), to 4 m (Point 3), while depths along the offshore boundary were approximately 15 m (Point 4) to 27 m (Point 1). The proposed activity, details of farm structure and species are outlined by a report by Resource Management Consulting (Justine Brennan) on behalf of the applicant Ngati Apa.

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 were formed by a 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 having national conservation importance. The Sounds has areas of international biological importance (Davidson et al., 1990; Davidson et al., in press). These values will be important consideration in the Marlborough District and Coastal Plans.

Multiple use (marine farming, fishing, boating, housing, waste water disposal, port development, forestry, agriculture) has 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 of 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 that could be threatened by the establishment of the proposed marine farming activity.

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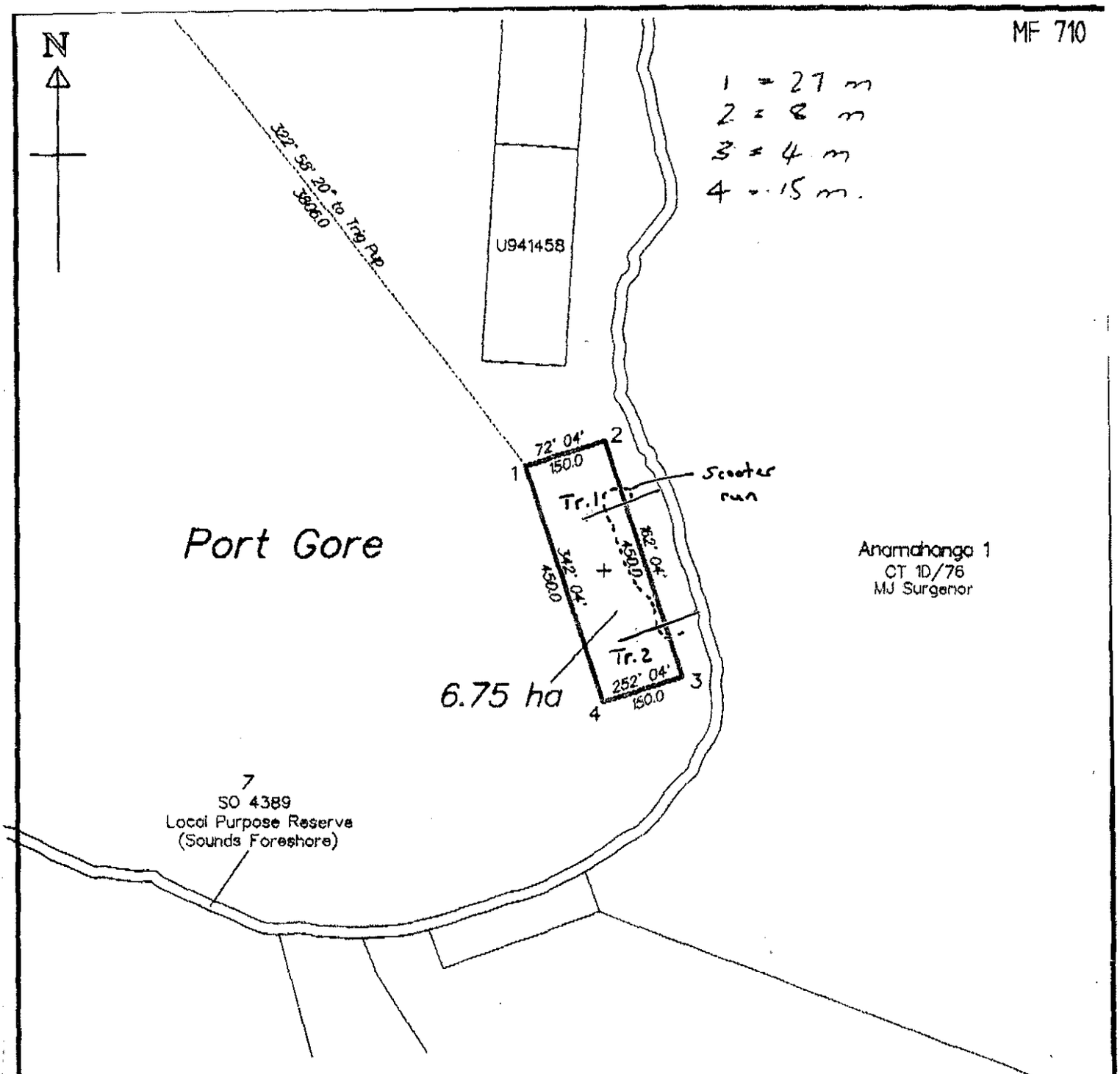

Plan of Proposed Coastal Permit

Ngati Apa

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	MARLBOROUGH LAND DISTRICT
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Te Puna Korero Whenua

Fig. 1. Transects and scooter.

2.0 MATERIALS AND METHODS

The proposed site was qualitatively investigated on 3 rd November 1995, using two rapid subtidal survey techniques and one remote sensing technique. The inshore and offshore boundaries were scanned using a Furuno scrolling colour sounder. The inshore boundary and randomly selected parts of the proposed marine farm area and adjacent coast were investigated by a free swimming diver assisted by an Apollo scooter. Results from these preliminary investigations were recorded for later reference. Based on these findings, two representative areas located within the proposed farm back-bone 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 and targeted any abnormalities identified on the benthos by the colour sounder.

Using SCUBA, depth, distance, substrata, habitat and associated conspicuous surface dwelling flora and fauna were recorded from shore transects using waterproof paper, clipboard and a pencil. This process was terminated at a distance of 150 m from the low tide mark and at depths of approximately 18 m (transect 1) and 17 m (transect 2). 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 horse mussel (*Atrina zelandica*) and scallop (*Pecten novaezelandiae)* were collected from 10 m x 1 m quadrats along the length of the shore profiles. Brachiopod (*Magasella sanguinea*) densities were not collected due to their absence from the study area.

All depths presented in this report are adjusted to datum.

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 and Colour Soundings

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 pebbles, cobbles, fine and medium sands, broken and dead shell and silts and clays;

2) no cobble or pebble substrata were recorded within the boundaries of the proposed marine farm;

3) along the length of the proposed marine farm a soft bottom community comprising of horse mussels, green alga, tube worms and bivalves were observed within the boundaries of the proposed marine farm; and

4) beyond this soft bottom community, mud dominated the remainder of the study area.

3.2 Profiles

The intertidal shore adjacent to the proposed marine farm area was dominated by cobble and pebble shores fringed by a low gradient hillside in pasture with isolated patches or regenerating scrub in gully areas.

Shore profiles were initially extensions of the intertidal shore being dominated by a cobble and pebble substrata. Brown macroalgae was observed from transect 2 only (Figure 1, 2). Similar patterns of depth, substrata and benthic community assemblages were observed from both transects. Cobble and pebble substratum was replaced by medium sand by 20 m distance from shore. With increasing depth the medium sand graded into fine sands and supported a community dominated by horse mussels (*Atrina zelandica*), green alga (*Ulva* sp.), tube worms (*Owenia* sp.) and bivalves (*Panopea zelandica*). This conspicuous community ended abruptly at approximately 110 m distance from shore and in depths of 13 m. Beyond 13 m depth the substrata were dominated by mud (silt and clays) with a relatively low diversity of species in low abundances.

From the transects and scooter run a total of 33 conspicuous species of invertebrate, 6 algae, 1 ascidian, 6 species of bony fish and 1 species of shark. A list of species is presented in Table 1, while the profiles are plotted in Figures 2 and 3.

Green-lipped mussel (Perna canaliculus) was not observed during the present study. Blue mussels (*Mytilus edulis*) were present.

3.3 Fish

Six species of fish were recorded during the investigation. Spotty (*Notolabrus celidotus*) were the most abundant reef fish observed during the investigation. Blue cod (*Parapercis colias*) was relatively uncommon, but an occasional large individual was observed from the horse mussel bed. A lone carpet shark, sole, giant star gazer and spotty were also observed from the horse mussel bed.

3.4 Scallops

Scallops were observed during the study within the boundaries of the proposed marine farm. Scallops were recorded as wide spread over the study area. Densities within the horse mussel bed from 16 quadrats were mean = 0.038 per m^2, SE = 0.018. Densities from the offshore mud habitat were collected from 10 quadrats. Results were mean = 0.043, SE = 0.02. Most scallops observed were of legal size.

3.5 Horse mussels

Horse mussels were observed only observed from both transects over the entire length of each transect, but were most abundant from a zone between approximately 30 m to 110 m distance from

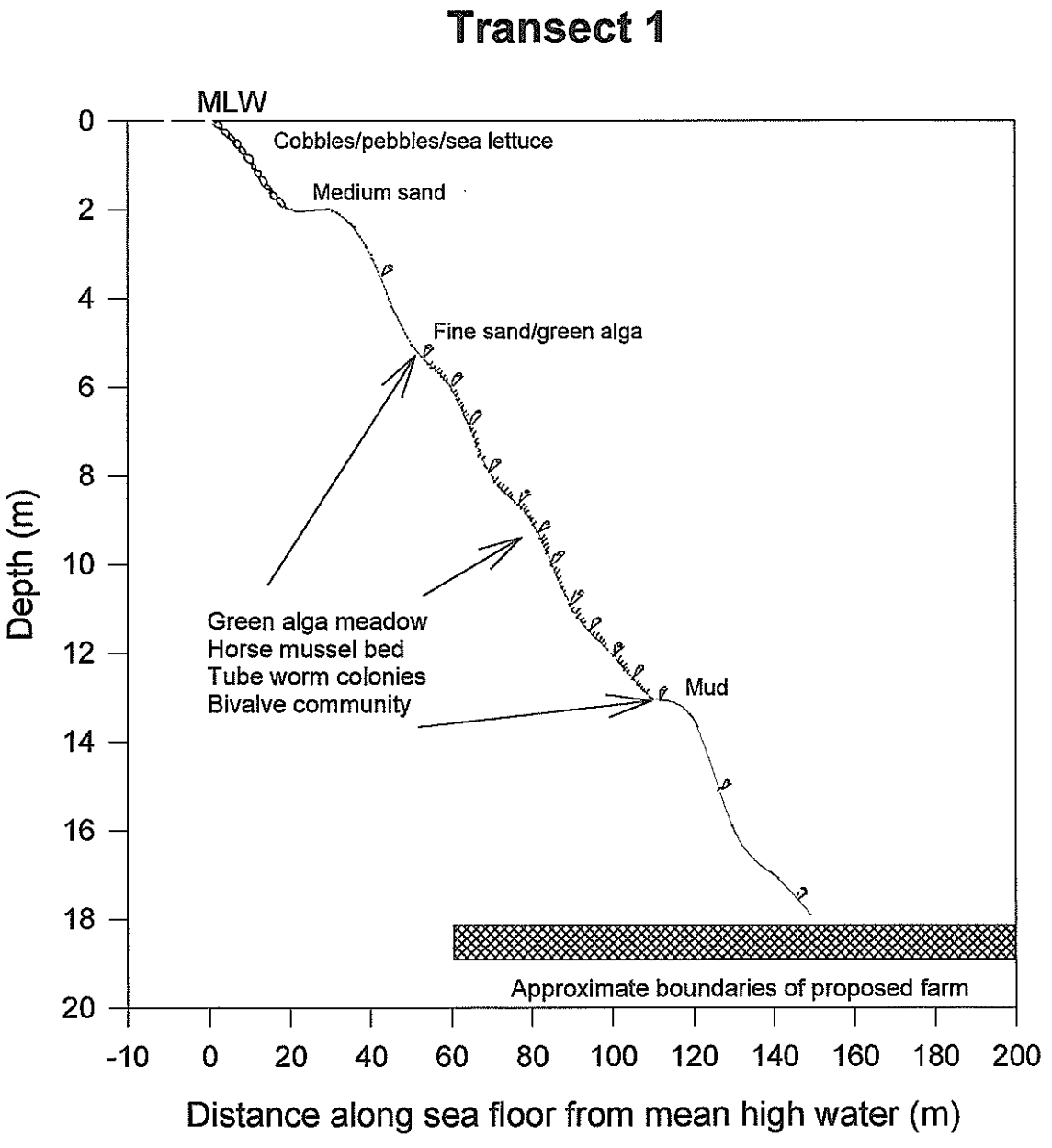

Figure 2 Subtidal shore profile, and substrata from area proposed as a marine farm in southern Port Gore.

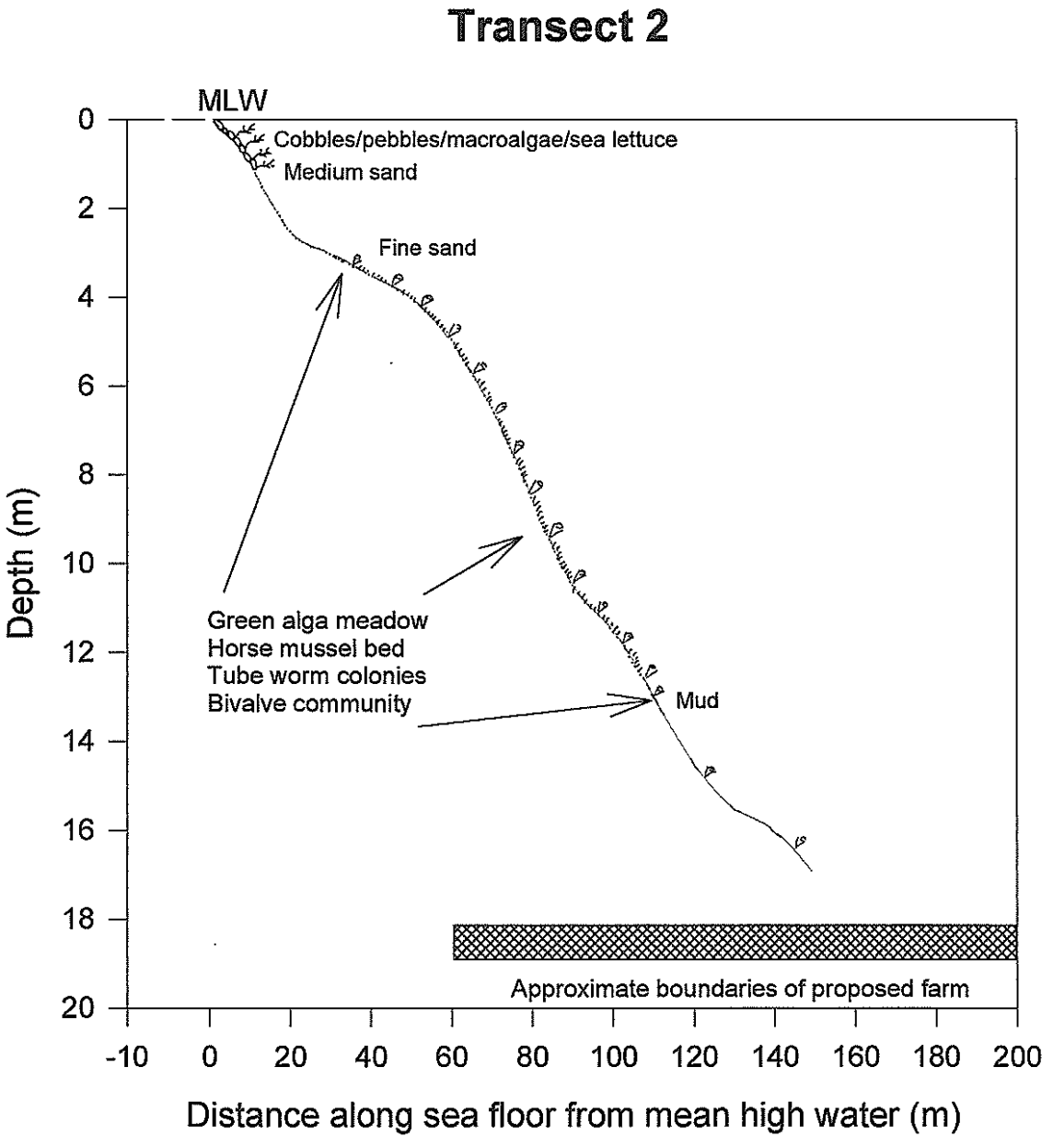

Figure 3 Subtidal shore profile, and substrata from area proposed as a marine farm in southern Port Gore.

Table 1 Species observed from transects from an area in southern Melville Cove, Port Gore.				
Algae	**Common name**	**Invertebrates**	**Habitat**	**Common name**
Corallina spp.(2)	paint and artciulate	COELENTERATA		
Hormosira banksii (1)	Neptune's necklace	Phylctenactis tuberculosa (3)	soft	wandering anemone
Lenormandia chauvinii (1)	red alga	GASTROPODA		
Ulva sp. (3)	sea lettuce	Austrofucus glans (3)	soft	whelk
Carpophyllum flexuosum (2)	wide flap jack	Cellana spp. (2)	rubble	limpet
Cystophora torulosa (2)		Chiton pelliserpentis (1)	rubble	chiton
		Cryptoconcus porosus (2)	rubble	butterfly chiton
		Cominella adspersa (2)	soft	whelk
		Haliotis iris (3)	rubble	black-foot paua
		Maoricolpus roseus (2)	sand/shell	spire shell
		Penion sp. (1)	soft	whelk
		Scutus breviceps (2)	rubble	slug
		Trochus viridus (2)	rubble	
		Turbo smaragdus (2)	rock/rubble	cats eye
		BIVALVIA		
		Atrina zelandica (3)	soft	horse mussel
		Chlamys diefenbachii (2)	shell	queen scallop
		Modilarca impacta (1)	rubble	Nestling mussel
		Monia zelandica (2)	rock/rubble	window oyster
		Mytilus edulis (3)	rock	blue mussel
		Panopea zelandica (2)	soft	geoduck
		Pecten novaezelandiae (3)	soft	scallop
		POLYCHAETA		
		Brachiomma sp.(2)	sand/rubble	fan worm
		Galeolaria hystrix (1)	sand/rubble	tube worm
		Owenia sp. (3)	soft	shell worms
		Spirorbis sp. (3)	rubble/rock	
		Serpulid sp. (1)	soft	tube worm
		CRUSTACEA		
		Mysids sp. (3)	soft	shrimps
		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
		Echinocardium astrale (3)	soft	heart urchin
		Pseudechinus albocinctus (2)	soft	pink urchin
		Stichopus mollis (2)	sand/silt	cucumber
		BRACHIOPODA		
		ASCIDEACEA		
		Cnemidocarpa sp. (2)	rubble	saddle squirt
		BONY FISHES		
		Notolabrus celidotus (2)	rubble	Spotty
		Kathetostoma giganteum (1)	soft	giant stargazer
		Hemercoetes monopterygius (2)	silt	Opalfish
		Forsterygion varium (2)	rock/rubble	variable trip.
		Peltorhamphus sp. (1)	soft	sole
		Parapercis colias (1)	rubble	blue cod
		SHARKS		
		Cephaloscyllium isabella (1)	soft	carpet shark

shore. Densities in this zone were collected from fifteen 10 m x 1 m quadrats. Mean densities were mean = 0.433 per m^2, SE = 0.084. Densities from nine quadrats from the mud habitat were mean = 0.04 per m^2, SE = 0.018.

3.6 Lampshells

Lampshells (*M. sanguinea*) or (*Waltonia inconspicua)* were not observed during the present study.

3.7 Geoduck

Geoduck (*Panopea zelandica*) was common within the boundaries of the proposed marine farm within the horse mussel bed particularly in the inshore parts of this area. No densities were collected.

4.0 POTENTIAL IMPACT OF A BIVALVE MARINE FARM

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.

The benthos investigated below most of the proposed marine farm was dominated by soft bottoms with a low variety of conspicuous epibenthic species. In contrast, soft bottoms from the inshore parts of the proposed farm area were characterised by a zone of dense tube worm colonies, horse mussels and green algae. The impact of a mussel marine farm on tube worm, horse mussel and green alga would result in smothering of these species by shell debris. Worm and horse mussel feeding apparatus may be smothered by sediment derived from a mussel farm.

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 southern Port Gore 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 moderately sheltered Marlborough Sounds (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). No rare or unusually distributed species were observed during the present study.

The proposed marine farm site is situated in a relatively sheltered part of Port Gore. Two distinctive zones were recorded from the proposed marine farm area. In offshore areas, a mud bottom colonised by a relatively low diversity of species in relatively low abundances were observed. In contrast, a soft

bottom community dominated by a range of conspicuous species in relatively high abundances were recorded. This inshore community was dominated by horse mussels, tube worms, scallops, geoduck and green algae. This inshore community would be adversely impacted by mussel shell debris and increased sediment from a mussel marine farm.

Considering ecological data collected during the present study in southern Port Gore, it is suggested that the inshore boundary be relocated farther offshore in order that the horse mussel, tube worm, bivalve, green alga zone is avoided. This relocation would effectively situate the marine farm 110 m distance from shore.

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