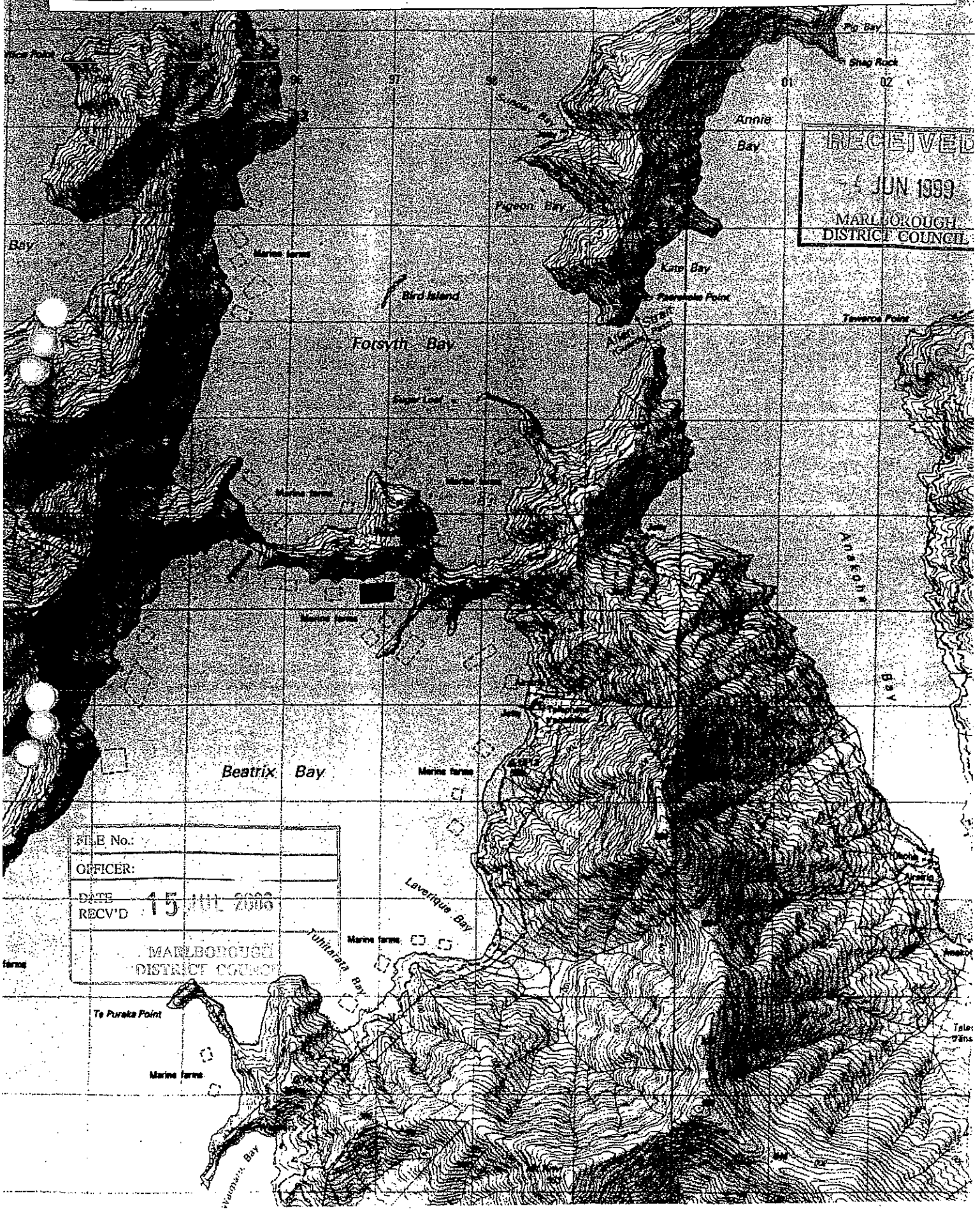
Locality Map of Proposed Coastal Permit
SOUTHERN MUSSEL FARMS LTD

990598

Scale 1:50000

500m 0 500m 1km 2km 3km 4km 5km



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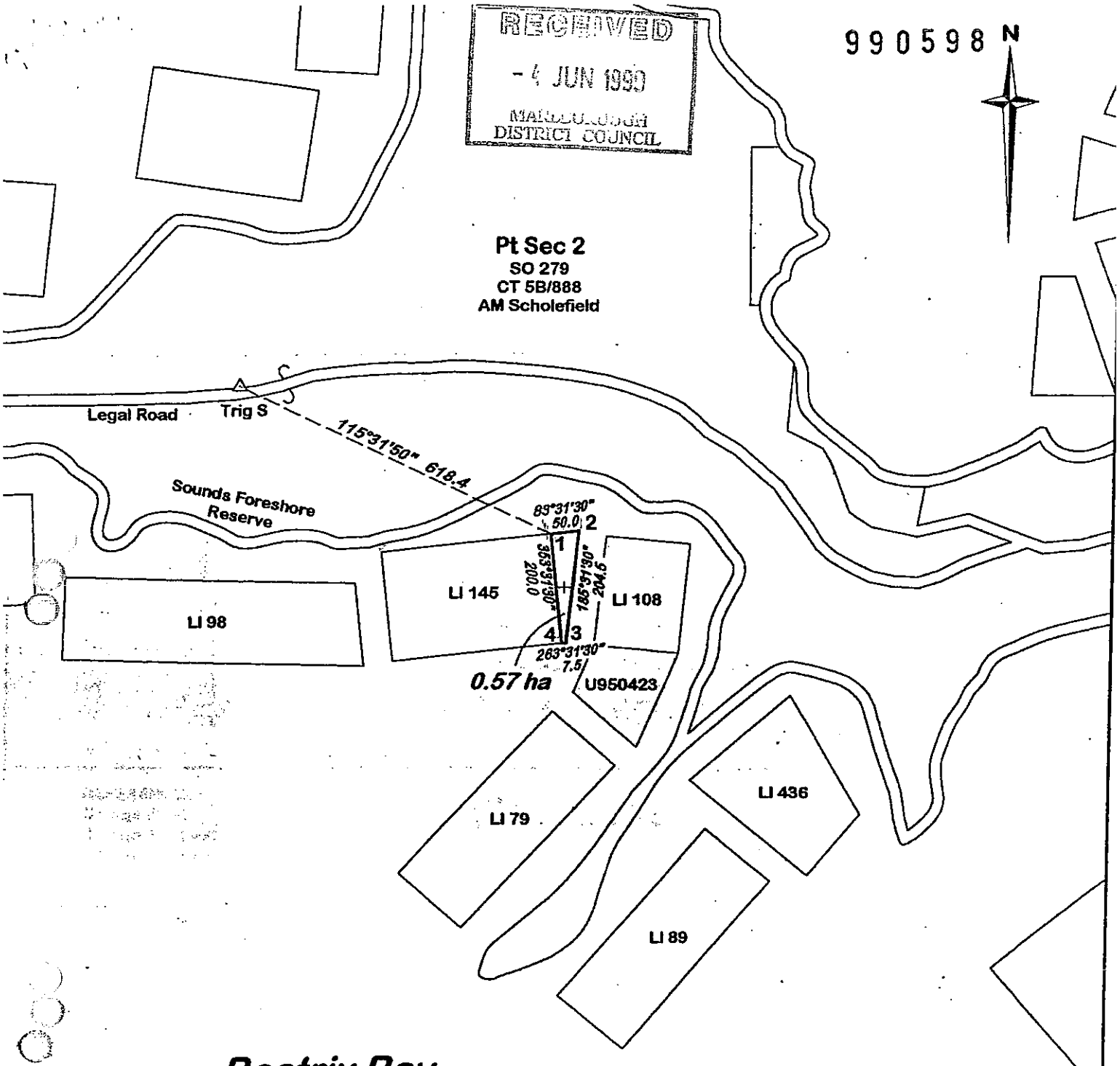

Beatrix Bay

SCHEDULE OF COORDINATES
Datum: New Zealand Map Grid

	North	East
1	6020300.2	2597052.2
2	6020305.8	2597101.9
3	6020102.3	2597082.2
4	6020101.5	2597074.8
Centroid	6020202.4	2597077.8
Trig S	6020566.7	2596494.3

Proposed Extension to Coastal Permit LI 145
SOUTHERN MUSSEL FARMS LTD

100m 0 100 200 300 400 500 600 700 800 900 1km

SCALE 1:10,000

990598

Plan

- 4 JUN 1999
MARLBOROUGH DISTRICT COUNCIL

FILE No.:
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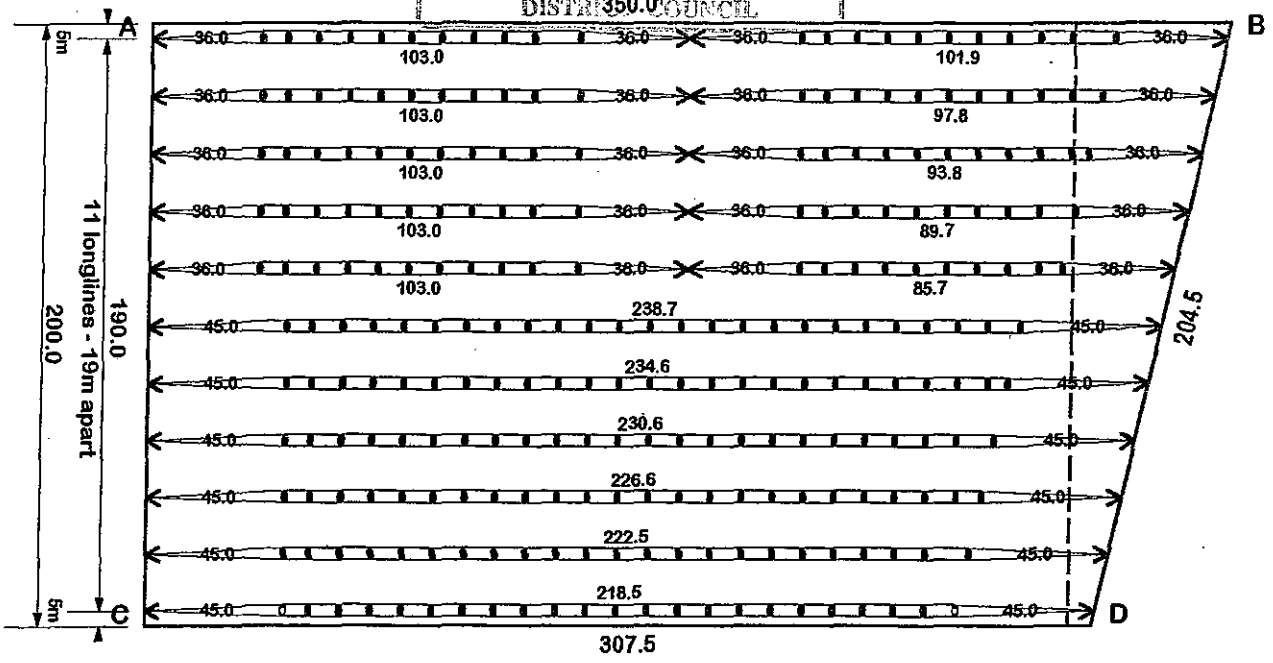
MARLBOROUGH DISTRICT COUNCIL

N

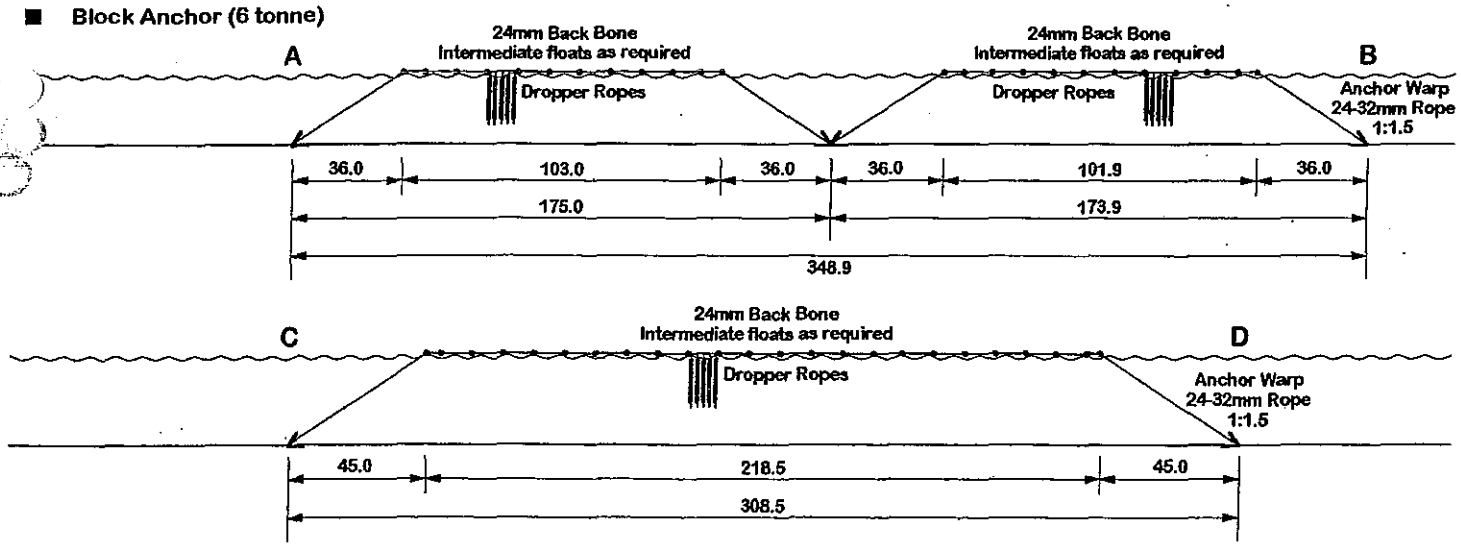
REFERENCE:
- Orange Float
- Orange Float with Light and Reflector
- Black Float
- Screw Anchor
- Licence Boundary
- Extension Boundary

Beatrix Bay



Elevations

REFERENCE:
- Orange Float
- Orange Float with Light and Reflector
- Black Float
- Screw Anchor
- Block Anchor (6 tonne)

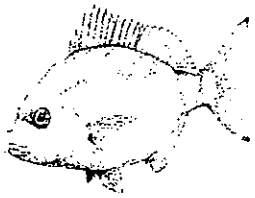


Layout Details - Ext LI 145
SOUTHERN MUSSEL FARMS LTD

20m 0 20 40 60 80 100 120 140 160 180 200m

SCALE 1:2500

Davidson Environmental
98a Quebec Road, Nelson
Ph. (03) 546 8413, Fax (03) 545 9399, Email: davidson@xtra.co.nz



Specialists in:
Marine, and Freshwater Research, Survey and Monitoring

Biological report on a proposed marine farm extension in northern Beatrix Bay, Pelorus Sound

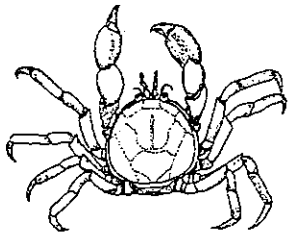
Li 145

Research, Survey and Monitoring Report Number 216

A report prepared for:

Southern Mussel Farms Ltd
P.O. Box 32
Nelson

By:
Robert J. Davidson & D. A. Brown



MAY, 1999

Bibliographic reference:

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Prepared by:

Davidson Environmental Limited
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Nelson
May, 1999

SUMMARY

1. The aims of the study were to provide a biological description of the benthos within a proposed marine farm extension to an existing marine farm (LI 145) located in northern Beatrix Bay, Pelorus Sound, Marlborough Sounds. Potential threats to any subtidal ecological values posed by the proposed activity were also discussed.

2. The soft shore communities recorded from the present study were dominated by species that occur on subtidal shores swept by light tidal currents in the sheltered bays of 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).

3. One transects and two free swims were conducted within the proposed marine farm extension.

4. Cobble habitat, fish feeding habitat and an algal bed was located inshore of the proposed marine farm extension.

5. All areas within the proposed extension were composed of shell and silt substrata or silt and clay substrata.

6. Based on the initial draft plan for the extension (presented in the present investigation), no changes based on ecological grounds are recommended.

1.0 INTRODUCTION

This report presents a biological description of habitats and associated conspicuous macrobenthic communities from an area adjacent to an existing marine farm (LI 145) located in northern Beatrix Bay, Pelorus Sound (Figure 1).

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

2.0 STUDY AREA

Beatrix Bay is a large bay (approximately 5 km in long and up to 4 km wide), located in central Pelorus Sound. Depths in most of the offshore areas of the bay are between 30 m to 33 m but rise to considerably shallower depths in the numerous small bays around its edges (see Navy Chart NZ 615). The shoreline is dominated by cobble and pebble substrata with beaches at the heads of many small bays and rock headlands located at prominent locations around the bay. Reverting pasture and scrub with isolated areas of pasture dominate the terrestrial environment of Beatrix Bay.

3.0 BACKGROUND

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 as one ecological unit was identified as having national conservation importance. Within the Sounds, areas have been ranked ranging from areas of international to regional biological importance (Davidson *et al.*, 1990; Davidson *et al.*, 1995). These values have been included in the Marlborough District Council's draft Marlborough Sounds Regional Plan.

Multiple use (marine farming, fishing, boating, housing, waste water disposal, port development, forestry, agriculture) all have the potential to degrade the marine 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; deJong 1994). It is therefore important that all new marine farm and farm extension proposals adequately identify natural values within and adjacent to a proposed marine farm.

4.0 MATERIALS AND METHODS

The proposed extension area (0.57 ha) was investigated on the 21st April 1999. One transect was installed within the proposed extension area (Figure 1). A lead-lined transect line marked at 5 m intervals was installed in an offshore orientation to the shoreline. A free swim was conducted along the inshore boundary and in the offshore portion of the proposed extension (Figure 1).

Densities of horse mussel (*Atrina zelandica*) and scallop (*Pecten novaezelandiae)* were collected from 10 x 1 m^2 quadrats installed at various intervals along the transect. Brachiopod (*Magasella sanguinea*) abundance estimates were collected from areas where brachiopods were most common.

All depths presented in this report are adjusted to datum. Data collected during the study follow the Department of Conservation guideline outlining procedures for the investigation of marine farm areas in the Marlborough Sounds (Department of Conservation, 1995). Observations on water current direction and relative speed were collected at a variety of depths between 1.30 p.m. to 2.30 p.m. These observations were collected on the outgoing tide.

5.0 RESULTS AND DISCUSSION

5.1 Depths, Water Currents and Free Swim

Results from the free swim and observations conducted within the proposed farm extension area suggested that:

1) depths along the inshore boundary were 24 m and 30 m along the offshore boundary;

2) substrata were small boulders, cobbles, pebbles, broken shell and silt;

3) no reef structures were observed within the proposed farm boundaries;

4) no hard shore substrata (i.e. cobble, small boulder substrata) were observed within the boundaries of the proposed marine farm extension;

5) a soft bottom zone characterised by sorted broken shell and fine sand was observed. This area represented a fish feeding area as indicated by the presence of fish holes; and

6) horse mussels, brachiopods and scallops were relatively uncommon within the proposed marine farm extension.

No tidal currents were detected on the seafloor during the present investigation. Based on the species observed from the site, it is expected that tidal currents may remain light for much of the tidal cycle.

5.2 Shore transect

The shore was initially dominated by small boulder and cobble substrata that extended offshore to 28 m distance (Figure 2). A zone of well sorted broken shell and fine sand habitat extended offshore to 70 m distance. Fish holes were recorded in this shell/sand habitat. Patched of the green alga *Caulerpa sediodes* were observed from this sand/shell zone. Beyond 70 m distance from shore the benthos was dominated by shell and silt substrata to 110 m distance and silt and clay substrata beyond.

From transects and free swims a total of 24 conspicuous species of invertebrate, 2 ascidians, 6 algae and 4 species of bony fish were observed. Species recorded from the extension have been displayed in Table 1, while the transect has been plotted in Figure 2. Greenshell™ mussel (*Perna canaliculus*) were observed from the benthos during the study.

5.3 Fish

Four species of bony fish were recorded during the investigation. The number and composition of fish species were representative of sheltered areas located in the central Pelorus Sound. Blue cod was observed from the cobble areas and from soft shores immediately seaward of the hard shores. Fish feeding holes were observed from the transect between 30 m to 70 m distance from shore. Opal fish were regularly recorded and were relatively widespread over the offshore soft bottom benthos.

5.4 Scallops (*Pecten novaezelandiae*)

No scallops were recorded from along the length of the transect.

5.5 Horse mussels (*Atrina zelandica*)

No horse mussels was recorded from along the length of the transect collected from within the proposed extension area.

5.6 Lampshells

Lampshells (*Magasella sanguinea*) were observed during the present investigation between 90 m and 120 m distance from shore. Maximum densities were estimated at 5 individuals per m^{-2}.

5.7 Hydroids and Bryozoans

No large hydroid species were observed during the present study. No bryozoans mounds were observed within the study area.

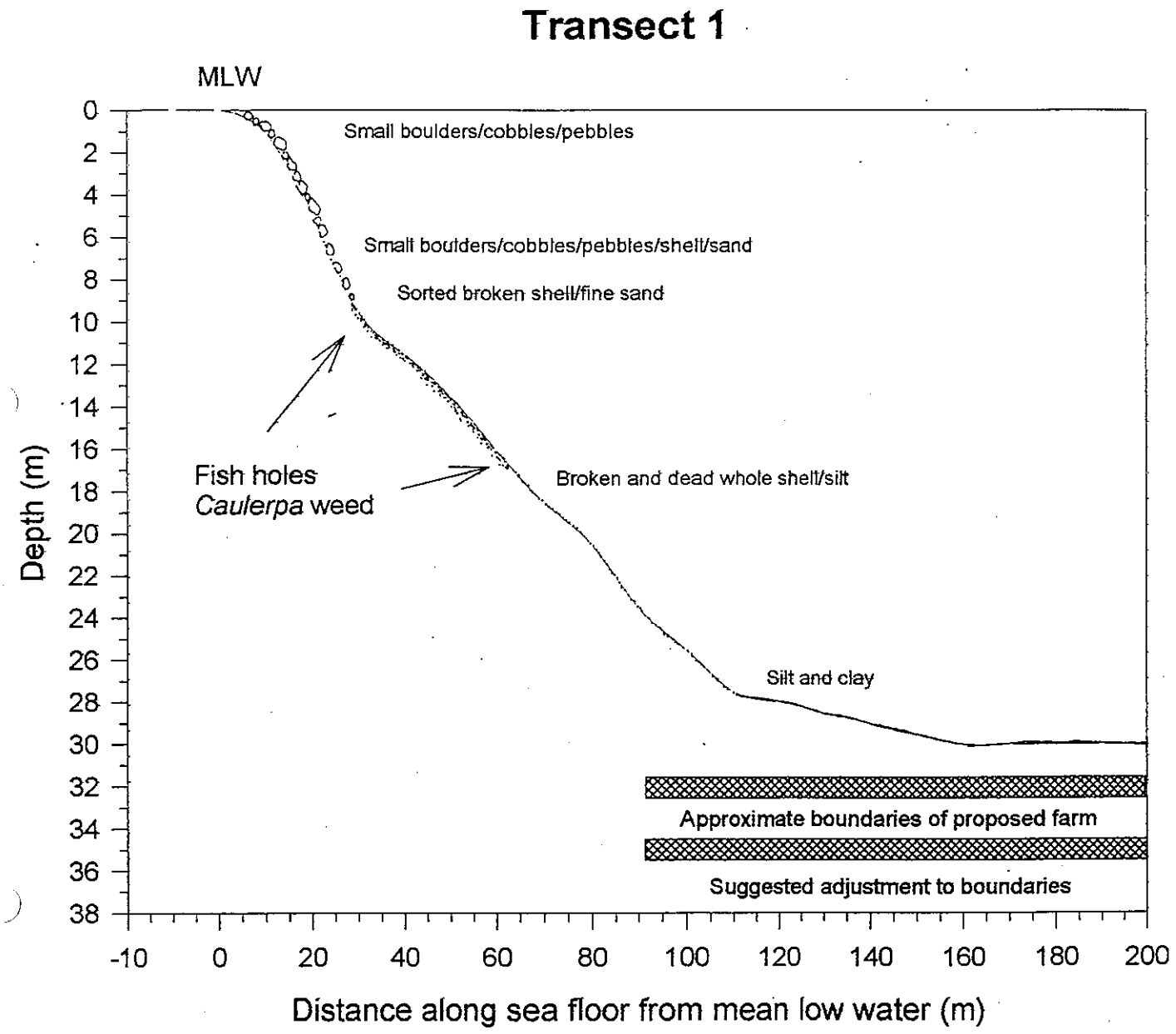

Figure 2 Subtidal shore profile and substratum from an area proposed as an extension to a marine farm located in northern Beatrix Bay.

Table 1 Species observed from an area in northern Beatrix Bay, Pelorus Sound.				
Algae	**Common name**	**Invertebrates**	**Habitat**	**Common name**
Corallina spp.(3)	paint	SPONGIA		
Colpomenia sp. (1)	bubble weed	Ancorina alata (2)	rubble	grey sponge
Hormosira banksii (1)	Neptune's necklace	Crella incrustans (1)	rubble	encrusting sponge
Carpophyllum flexuosum (1)	wide flapjack	Aplysilla sulphurea (1)	rock	sulphur sponge
Caulerpa sedoides (2)	grape weed	COELENTERATA		
Cystophora sp. (1)		GASTROPODA		
		Cellana spp. (2)	rubble	limpet
		Cookia sulcata (1)	rock	Cook's tuban
		Maoricolpus roseus (1)	sand/shell	spire shell
		Penion sp. (1)	soft	whelk
		Trochus viridus (1)	rubble	
		Turbo smaragdus (3)	rock/rubble	cats eye
		BIVALVIA		
		Chlamys sp. (1)	rock	queen scallop
		Modilarca impacta (1)	rubble	Nestling mussel
		Monia zelandica (1)	rock/rubble	window oyster
		Mytilus edulis (3)	rock	blue mussel
		Perna canaliculus (2)	rock	green mussel
		POLYCHAETA		
		Brachiomma sp.(2)	sand/rubble	fan worm
		Galeolaria hystrix (2)	sand/rubble	tube worm
		Spirorbis sp. (2)	rubble/rock	
		Maldanidae (2)	soft	tube worm
		CRUSTACEA		
		Pagurus spp (2)	sand	hermit crab
		ECHINODERMATA		
		Coscinasterias calamaris (2)	sand/shell	11 arm star
		Evechinus choroticus (2)	rock/rubble	kina
		Patiriella regularis (2)	sand/rubble	cushion starfish
BONY FISHES		Stichopus mollis (2)	sand/silt	cucumber
Notolabrus celidotus (3)	Spotty	BRACHIOPODA		
Hemercoetes monopterygius (2)	Opalfish	Magasella sanguinea (2)	shell	lamp shell
Forsterygion lapillum (3)	common trip.	ASCIDEACEA		
Forsterygion varium (2)	variable trip.	Cnemidocarpa sp. (2)	rubble	saddle squirt
Parapercis colias (2)	blue cod	Didemnium sp. (2)	rubble	cream ascidian

5.8 Tube worm mounds (*Galeolaria hystrix*)

No tube worm mounds were observed during the present investigation.

6.0 POTENTIAL IMPACT OF A BIVALVE MARINE FARM

The impact of shell and sediment deposition on the benthos under a mussel marine farm results in a shift from the initial ecological state to a new state. The degree of change depends on the habitat type and communities present prior to mussel material deposition. In general, a build up of mussel shell on a mud bottom will result in an increased diversity of species living on the surface and a decrease of infaunal species due to increased sedimentation (Kaspar *et al.* 1985; deJong 1994). On a rocky bottom, a decrease in species diversity as a result of shell and sediment deposition would be expected.

All rocky, algal and fish feeding habitats were observed offshore of 70 m distance from shore. This provides a 20 m distance between ecological values and the proposed marine farm extension. This separation should ensure that inshore values are not impacted by mussel farming activities.

7.0 SUGGESTED ADJUSTMENTS TO THE PROPOSED BOUNDARIES

Based on results from the present investigation, no changes to the proposed extension appear necessary on ecological grounds as:

- offshore habitats and associated communities were representative of some of the most widespread and common habitat in the Marlborough Sounds and
- no ecological values identified in the Department of Conservation report (DOC 1995) were recorded above trigger levels.

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