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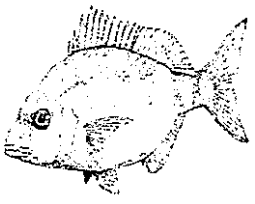

Specialists in:
Marine, and Freshwater Research, Survey and Monitoring

Biological report on a proposed marine farm extension located in Hikapu Reach, Pelorus Sound

Li 120

Research, Survey and Monitoring Report Number 255

A report prepared for:

Marlborough Mussel Company
Nolans Road
Grovetown
Blenheim

By:
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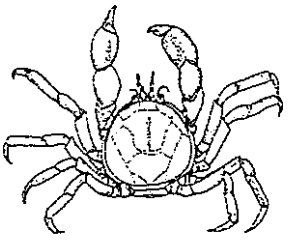

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July, 1999

SUMMARY

1. The aims of the study were to provide a biological description of the benthos within and adjacent to a proposed marine farm extension in Hikapu Reach, Pelorus Sound (Li 120). 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 inner Marlborough Sounds (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 transect and a free diver swim was conducted from areas within and adjacent to the proposed marine farm.

4. The intertidal shore was approximately 25 m wide. The shore was characterised by small boulders, cobbles and pebbles.

5. Cobble and pebble substrata extended offshore from low water to 25 m distance. Beyond hard substrata, the benthos was dominated by soft sediment.

6. Soft shores dominated the benthos within all of the proposed marine farm. Inshore areas were initially dominated by a zone of sorted shell and fine sand (ie. 25 m to 80 m). Dead whole shell on a base of silt extended offshore between 80 m to 100 m distance. Further from shore the benthos was characterised by silt substrata.

7. Scallops and horse mussels were present within the boundaries of the proposed marine farm but were relatively uncommon.

8. Fish burrowing holes were recorded from between 25 to 80 m distance from shore.

9. Based on the initial draft plan (presented in the present investigation), it is recommended that the marine farm area be located no closer than 80 m distance from shore. These adjustments would ensure that the marine farm be located offshore of the sorted shelly zone where fish burrowing holes were recorded.

10. Based on ecological grounds, no other adjustments to the proposed marine farm are recommended.

1.0 INTRODUCTION

The aims of the study were to provide a biological description of the benthos within and adjacent to a proposed marine farm extension in Hikapu Reach, Pelorus Sound (Li 120). Potential threats to any subtidal ecological values posed by the proposed activity were also discussed.

2.0 STUDY AREA

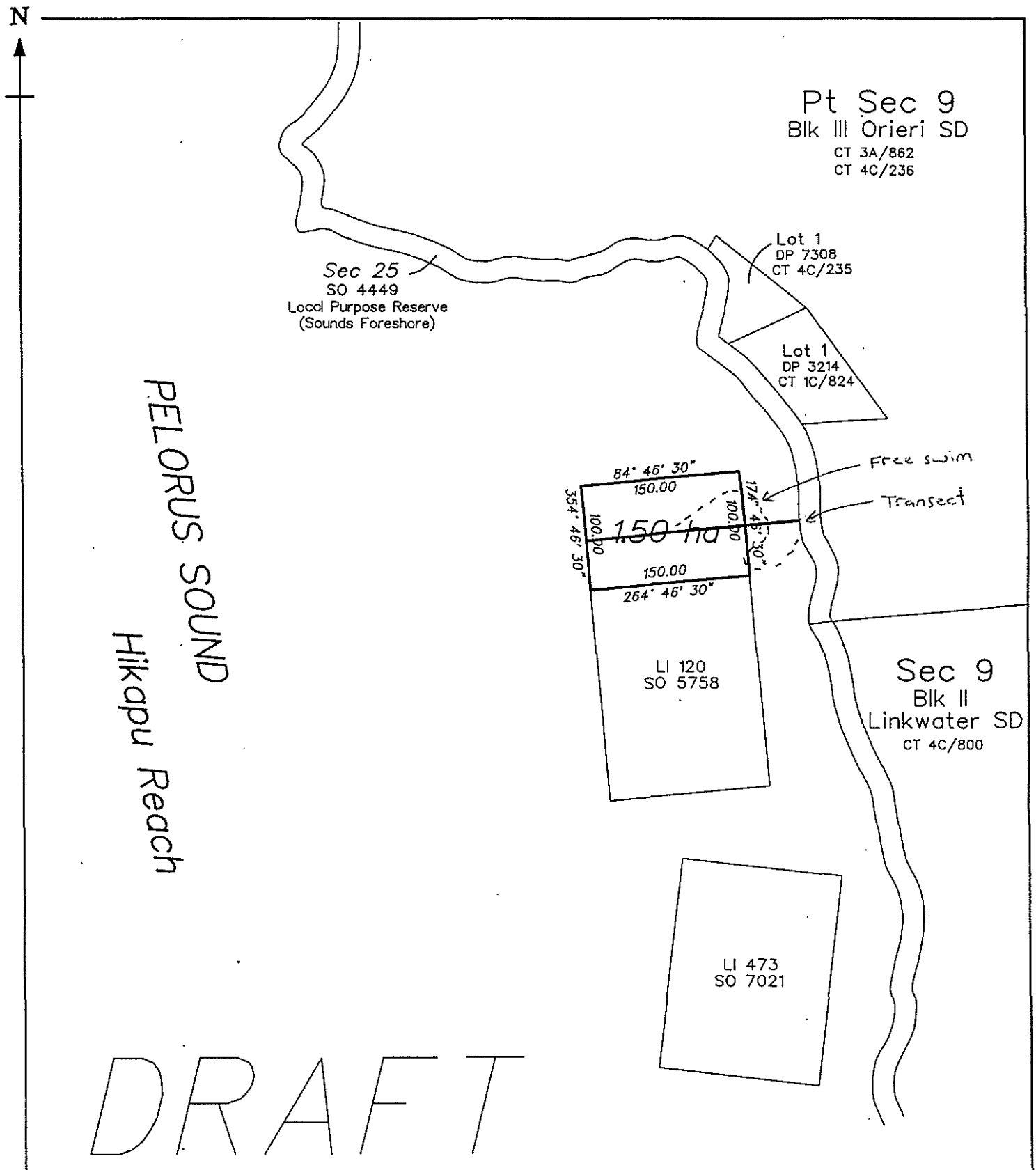
Hikapu Reach represents the main Pelorus channel between the entrance to Kenepuru Sound and Turn Point. Much of the Reach is swept by moderate tidal currents, but relatively low current areas exist in small bays around the edges.

The proposed marine farm is located along the eastern shore of the Reach immediately south of Nikau Bay. The terrestrial environment adjacent to the proposed site is dominated by regenerating broardleaf forest. The intertidal shore is characterised by a low gradient small boulder, cobble and pebble shore.

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.



Plan of Proposed Coastal Permit Being Extension to Licence ~~175~~ 120

Marlborough Mussel Co

NOTE: The position of this application has not been surveyed.

MARLBOROUGH DISTRICT COUNCIL

SCALE 1:5000

50 0 50 100 150 200 250 300 350 400 450metres

Datum: New Zealand Map Grid

Prepared by; DRAUGHTING *Plus*

Date 5/6/99

MF_870.gcd

4.0 MATERIALS AND METHODS

The area was investigated on the 9th June 1999. One transect was extended from the shoreline into the proposed marine farm area (Figure 1). The transect consisted of a lead-line marked at 5 m intervals. One free swim was conducted along the inshore portions of the proposed marine farm area.

Densities of horse mussel (*Atrina zelandica*) and scallop (*Pecten novaezelandiae)* were collected from 10 x 1 m^2 quadrats installed at various intervals along transects lines.

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 3.00 p.m. to 4.30 p.m. These observations were collected during the incoming tide.

5.0 RESULTS AND DISCUSSION

5.1 Water currents, free swim and observations

Observations from within the proposed farm area suggested that:

1) depths gradually increased with increasing distance from shore. Offshore depths were 11 m to 12 m, while the proposed inshore boundary was 6 m to 7 m depth;

2) the marine farm area was dominated by soft substrata. With increasing distance from shore the particle size of substrata decreased (ie. fine sand in inshore shallow areas and silt in offshore deeper areas);

3) no reef substrata were recorded within the proposed marine farm area;

4) horse mussels and scallops were relatively uncommon.

5) fish burrowing holes were abundant in inshore areas.

A light along shore northward tidal current was observed during the present study. Based on the species observed from the site, it is expected that tidal currents remain predominantly light for much of the time.

5.2 Profile

The shore was initially characterised by cobble, small boulder and pebble substrata that extended offshore to approximately 25 m distance from low water (Figure 2). A zone of sorted broken shell and fine sand was recorded between 25 m to 80 m distance. Dead whole shell over a base of silt extended between 80 m to 100 m distance. Offshore of this substratum, the benthos was dominated by silt with very little shell material.

From the transect and free swim a total of 23 conspicuous surface dwelling species of invertebrate, 4 ascidians, 6 species of fish and 7 species of algae were observed. A list of species present are displayed in Table 1. The shore profile has been plotted in Figure 2.

5.3 Fish

Six species of bony fish were recorded during the investigation. The number and composition of fish species were representative of shallow reef habitats in the sheltered inner Sounds. Blue cod were not recorded during the present study. Occasional spotty and triplefin species were recorded form within the proposed farm boundaries.

Abundant fish feeding holes in the substrata were observed between 25 m to 80 m distance from shore during the present study.

5.4 Scallops (*Pecten novaezelandiae*)

Two scallops were recorded from quadrats along the length of the transect. This density was below the Department of Conservation guideline density representing a scallop bed (i.e. 0.1 scallops per m^{-2}).

5.5 Horse mussels (*Atrina zelandica*)

Occasional horse mussels were recorded from the transect and free swim. Horse mussel density was: mean = 0.042 individuals per m^{-2}, SE = 0.017. This density is below the Department of Conservation guideline density representing a horse mussel bed (i.e. 0.2 individuals per m^{-2})(Table 2). Most horse mussels were observed inshore of 90 m distance from shore.

Table 2 Density of horse mussels collected from quadrats.

Number per $10m^2$	Mean density (per m^2)	Standard error
2, 0, 1, 1, 1, 0, 0, 1, 0, 0. 0, 0, 0, 0	0.042	0.017

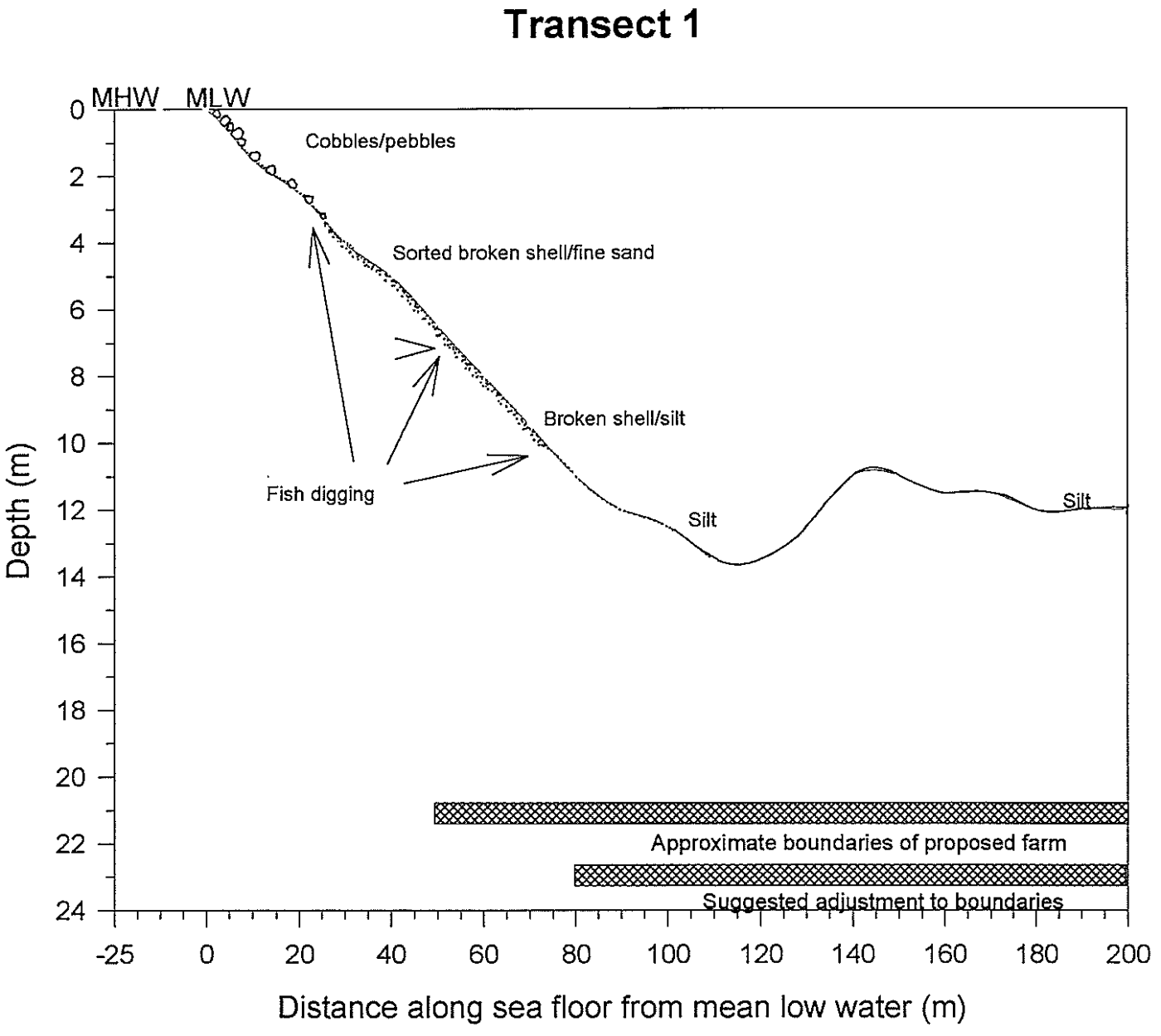


Figure 2 Subtidal shore profile and substratum from an area proposed as a marine farm in Hikapu Reach, Pelorus Sound.

Table 1 Species observed from an area in Hikapu Reach, Pelorus Sound.				
Algae	**Common name**	**Invertebrates**	**Habitat**	**Common name**
Corallina spp.(3)	paint	SPONGIA		
Colpomenia sp. (2)	bubble weed	Crella incrustans (2)	rubble	encrusting sponge
Hormosira banksii (2)	Neptune's necklace	COELENTERATA		
Carpophyllum flexuosum (1)	wide flapjack	Obelia sp. (2)	rubble	hydroid fuzz
Cystophora torulosa (2)	brown alga	BRYOZOA		
Cystophora sp.(2)	brown alga	GASTROPODA		
*Rhodomenia sp. (1)	red alga	Crypotoconchus porosus (2)	rubble	butterfly chiton
		Cellana spp. (3)	rubble	limpet
		Maoricolpus roseus (2)	sand/shell	spire shell
		*Penion sp. (1)	soft	whelk
		Trochus viridus (2)	rubble	topshell
		Turbo smaragdus (3)	rock/rubble	cats eye
		BIVALVIA		
		*Atrina zelandica (1)	soft	horse mussel
		Monia zelandica (1	rock/rubble	window oyster
		Mytilus edulis (3)	rock	blue mussel
		*Pecten novaezelandiae (1)	soft	Scallop
		Perna canaliculus (1)	rock	green mussel
		POLYCHAETA		
		*Brachiomma sp.(2)	sand/rubble	fan worm
		Galeolaria hystrix (1)	sand/rubble	tube worm
		*Maldanidae sp (1)	soft	tube worm
		Spirorbis sp. (3)	rubble/rock	spiral worm
		CRUSTACEA		
		*Pagurus spp (2)	sand	hermit crab
		ECHINODERMATA		
		Allostichaster insignis (1)	rubble	sea star
		Coscinasterias calamaris (2)	sand/shell	11 arm star
		Evechinus choroticus (3)	rock/rubble	kina
BONY FISHES		Patiriella regularis (2)	sand/rubble	cushion starfish
Notolabrus celidotus (3)	Spotty	Stichopus mollis (2)	sand/silt	cucumber
*Hemercoetes monopterygius (2)	Opalfish	ASCIDEACEA		
Forsterygion varium (2)	variable trip.	Cystodytes dellechiajei (1)	shell/rubble	opaque ascidian
Forsterygion sp. (2)	yellow/black trip.	Cnemidocarpa sp. (2)	rubble	saddle squirt
Forsterygion lapillum (3)	common trip.	Didemnium sp. (2)	rubble	cream ascidian
Forsterygion nigripinne (2)	estuarine trip.	Leptoclinides sp. ? (2)	rubble	purple ascidian

* = species observed within adjusted marine farm boundaries

Abundance score: 1 = uncommon, 2 = occasional, 3 = common

5.6 Lampshells

Lampshells (*Magasella sanguinea*) were not observed during the present study.

5.7 Hydroids and Bryozoans

No conspicuous hydroid species were observed during the present6 study. No bryozoan mounds were observed during the present investigation.

5.8 Tube worm mounds (*Galeolaria hystrix*)

No tube worm mounds were observed within the study area.

5.9 Burrowing anemone (*Cerianthus* sp.)

No burrowing anemones were recorded during the present study.

5.10 Red algal beds

No red algal beds were recorded from areas investigated.

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.

Soft bottom substrata and associated communities dominated all of the area under the proposed marine farm. Areas offshore of 100 m distance were characterised by silt substrata. This substratum supported a relatively low variety of species often in low abundance. Of the range of substratum types in the Marlborough Sounds, mud represents the habitat that would be least altered by a mussel marine farm (Kaspar *et al.* 1985; deJong 1994).

The inshore sorted shell zone and associated fish feeding area would probably be adversely impacted if a mussel marine farm was placed overhead.

7.0 SUGGESTED ADJUSTMENTS TO THE PROPOSED BOUNDARIES

Based on the initial draft plan (presented in the present investigation), it is recommended that the marine farm area be located no closer than 80 m distance from shore. These adjustments would ensure that the marine farm be located offshore of the sorted shelly zone where fish burrowing holes were recorded.

No other adjustments are recommended as offshore area:

- were dominated by soft substrata supporting a relatively low variety of species in relatively low abundance;
- the habitat and community present were representative 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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