Survey and Monitoring Report No. 27

# Description of the subtidal macrobenthic community from a proposed marine farm at Orieri, Tawhitinui Reach, Pelorus Sound

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A report prepared for

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## 1.0 INTRODUCTION

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

The proposed site is located on the coast east of Brightlands Bay (Orieri Block) in Tawhitinui Reach, Pelorus Sound. This large headland is 2.3 km south-west of Maud Island and 7 km west of Tawero Point. The Orieri Block headland is north orientated with a bay on either side. The proposed marine farm area is located on the northern shore aspect of this headland (Figure 1).

Tawhitinui Reach is regarded as the central part of Pelorus Sound. It reaches depths of up to 29 m but most of the area is between 24 to 25 m depth. The shoreline of Tawhitinui Reach area is typical of much of the inner Marlborough Sounds dominated by a narrow rubble or bedrock intertidal zone with a backdrop of steep hill sides with relatively rounded tops. Water residence times in this area are probably shorter than those recorded for the back-waters of the central Pelorus Sound such as Hallam Cove, and Crail and Beatrix Bays (Gibbs 1991).

The inner boundary of the proposed marine farm is located between 50 to ~~150~~ 90 metres distance from shore (Figure 1). The proposed marine farm stretches 320 metres in length in an approximate east/west direction and is 130 m wide along its entire length. The total distance from shore is between 180 to ~~280~~ 220 m distance. Depths on the inside boundary were approximately 12 m (Point 1) to 14 m (Point 4), while depths on the outside boundary ranged between approximately 26 m (Point 2) to 26 m (Point 3). The proposed activity, details of farm structure and species are outlined by a report by R. Sutherland (PALMS) on behalf of the applicants (J. Foote and R. Roach).

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 Council Coastal Plan and District Plan.

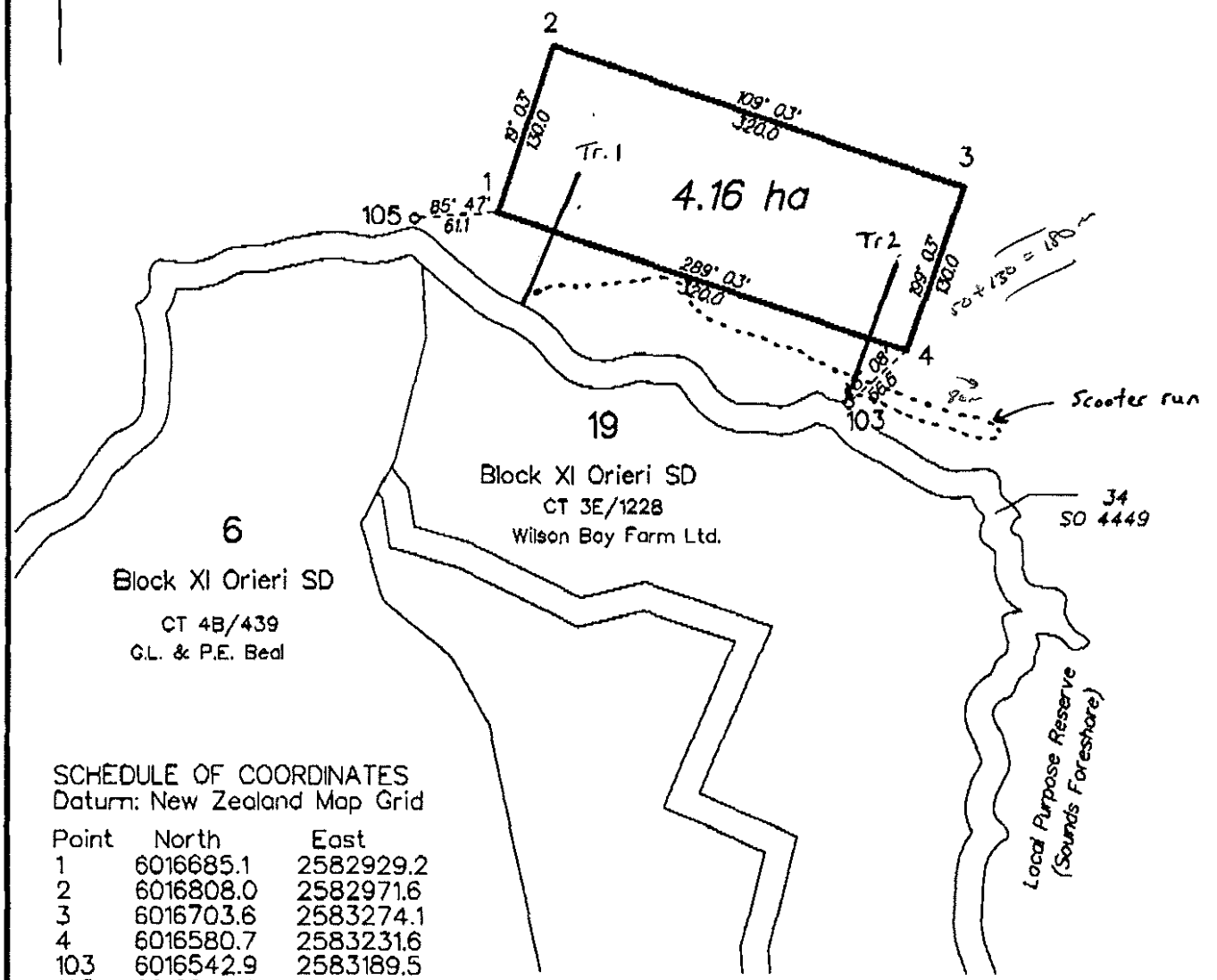
Multiple use (marine farming, fishing, boating, housing, waste water disposal, port development, forestry, agriculture) have the potential to degrade the environment of the Sounds. Marine farming for example, can have considerable impact on the environment through habitat modification or lowering water 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.

## 3.0 MATERIALS AND METHODS

The proposed site was qualitatively investigated on the 15 th November 1994, using two rapid subtidal survey techniques. Almost all of the inshore boundary and randomly selected parts of the proposed marine farm area and adjacent coast between 1.5 to 16.5 metres depth were investigated using an Apollo scooter. Results from this preliminary investigation were recorded on waterproof paper. Based on these findings two representative areas, one in the western and the other in the eastern portion of the proposed farm were selected and a 100 m to 130 m lead-lined transect line marked at 5 m intervals was installed perpendicular to the shore (Fig. 1). These transect sites were considered representative of the substrata, habitats and flora and fauna

# Tawhitinui Reach




SCHEDULE OF COORDINATES
Datum: New Zealand Map Grid

| Point | North | East |
|---|---|---|
| 1 | 6016685.1 | 2582929.2 |
| 2 | 6016808.0 | 2582971.6 |
| 3 | 6016703.6 | 2583274.1 |
| 4 | 6016580.7 | 2583231.6 |
| 103 | 6016542.9 | 2583189.5 |
| 105 | 6016680.7 | 2582868.3 |

# Plan of Proposed Marine Farming Licence

## J. Foote & R. Roach

Survey marks adopted from SO 160

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

SCALE 1:5000

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

| LOCAL AUTHORITY: MARLBOROUGH DISTRICT | MARLBOROUGH LAND DISTRICT |
|---|---|
| Produced by the Department of Survey and Land Information under the Authority of the Surveyor General. CROWN COPYRIGHT RESERVED. REPRODUCTION PROHIBITED without the permission of the Chief Surveyor. | Approved for internal reproduction by; J. Foote & R. Roach |

| Prep. By GJR | Date 17.10.94 | Job No 726578 | File 6475/01/02 | Reference P26/3.4 |
|---|---|---|---|---|

Department of Survey & Land Information
Te Puna Korero Whenua

Figure 1. Location of shore profiles and scooter run at proposed marine farm.

found over the proposed farm during the scooter run.

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 100 to 130 m from the low tide mark and at depths of 24 metres. The abundance of conspicuous macroinvertebrates, macroalgae and fish 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).

All depths presented in this report are adjusted to datum.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Scooter Run

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

1) substrata present were pebbles, cobbles, small and large boulders (eastern inshore area), shelly mixes and silts and clays;

2) no reef or rubble habitats were recorded within the proposed marine farm;

3) little difference between the habitats and associated communities were recorded between the two shore profiles; and

4) soft bottom substrata especially dead whole shell, broken shell and very fine sands, silts and clays (mud) dominated the majority of the proposed marine farm area.

## 4.2 Profiles

The intertidal shore adjacent to the proposed marine farm area was dominated by a combination of short bluffs, rubble and bedrock shore. All of the coast was bordered by a shore clad in pasture with small patches of coastal scrub.

The shore profiles were initially an extension of the intertidal shore dominated by a rubble substrata with an occasional small boulder. Rubble substrata formed a steep subtidal shore which ended relatively abruptly in depths of 10 to 12 m (Figure 2). A shelly/silt soft bottom started at approximately 12 m depth and a distance of about 18 m distance from the low tide mark (Figure 2). At depths of 24 to 26 m the shore gradient levelled and the benthos was dominated by silts and clays with overlying dead whole shell (Figure 2).

From the transects and scooter run a total of 28 conspicuous species of invertebrate, 8 algae, 3 ascidians and 5 species of bony fish were recorded. A list of species are presented in Table 1, while both profiles are plotted in Figure 2.

Tube worms *Galeolaria hystrix* were recorded on rubble substrata in depths of 10 to 12 m in the present study. These mounds were relatively uncommon and small in stature (20-25 cm high).

Only five species of fish were recorded from the transect, with spotty (*Notolabrus celidotus*), common triplefin (*F. lapillum*) being numerically the most abundant. Blue cod (*Parapercis colias*) were recorded but were uncommon with mostly < 30 cm length.

Brachiopods(*Magasella sanguinea, Waltonia inconspicua*) were recorded in low numbers from the study area, mostly in depths of 18 to 22 m. Both *M. sanguinea* and *W. inconspicua* have been recorded as widespread throughout much of the Marlborough Sounds (Duffy et al. in prep). Green-lipped mussel (*Perna canaliculus*) were not recorded from during the present study. Blue mussels (*Mytilus edulis aoteanus*) were recorded at and around the low tide mark along the shore adjacent to the proposed marine farm.

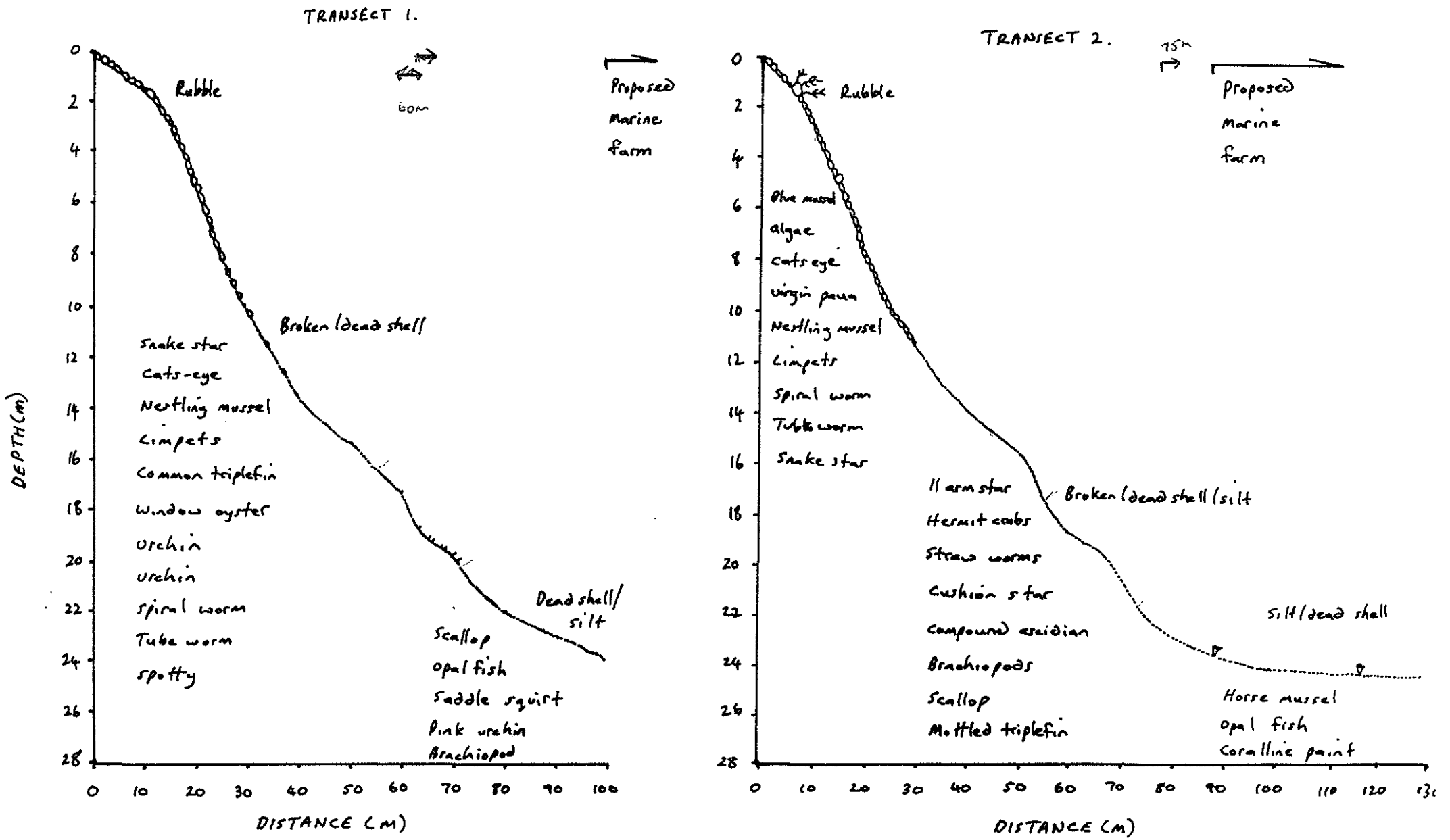



Figure 2. Shore profiles from proposed marine farm in Tawhitinui Reach.

| Table 1 Species recorded from transects at Orieri, Tawhitinui Reach. | | | | |
|---|---|---|---|---|
| Algae | Common name | Invertebrates | Habitat | Common name |
| Carpophyllum maschalocarpum (2) | narrow flap jack | SPONGIA | | |
| Corallina spp.(2) | paint | Ancorina alata (2) | rock/rubble | grey sponge |
| Cystophora spp. (2) | | Crella encrustans (1) | rock/rubble | encrstung sponge |
| Carpophyllum flexuosum (1) | wide flap-jack | MOLLUSCA | | |
| Halopteris sp. (1) | | GASTROPODA | | |
| Colpomenia sp. (1) | | Anomia trigonopsis (2) | rock/rubble | window oyster |
| Hormosira banksii (1) | Neptune's necklace | Cellana ornata (2) | rubble | limpet |
| Lenormandia chauvini (1) | red alga | Cellana radians (3) | rubble | limpet |
| | | Cryptoconchus porosus (1) | rubble | butterfly chiton |
| | | Haliotus virginea (2) | rubble | virgin paua |
| | | Maoricolpus roseus (2) | sand/shell | spire shell |
| | | Trochus viridus (1) | rubble | |
| | | Turbo smaragdus (2) | rock/rubble | cats eye |
| | | BIVALVIA | | |
| | | Atrina zelandica (1) | soft | horse mussel |
| | | Modilarca impacta (2) | rubble | Nestling mussel |
| | | Mytilus edulis aoteanus (2) | rubble | blue mussel |
| | | Pecten novaezelandiae (2) | sand/shell | scallop |
| | | POLYCHAETA | | |
| | | Brachiomma sp.(2) | sand/rubble | fan worm |
| | | Galeolaria hystrix (2) | sand/rubble | tube worm |
| | | Spirorbis sp. (3) | rubblerock | |
| | | Serpula sp. (1) | sand/shell | |
| | | Maldanidae sp. (3) | soft | straw worms |
| | | CRUSTACEA | | |
| | | Pagurus spp (2) | sand | hermit crab |
| | | ECHINODERMATA | | |
| | | Coscinasterias calamaris (2 | sand/shell | 11 arm star |
| | | Evechinus choroticus (2) | rock/rubble | kina |
| | | Patiriella regularis (1) | sand/rubble | cushion starfish |
| | | Pectinura maculata (1) | rubble | snake star |
| | | Pseudechinus albocinctus ( | soft | pink urchin |
| | | Stichopus mollis (2) | sand/silt | cucumber |
| | | BRCHIOPODA | | |
| | | Magasella sanguinea (2) | sand/shell | lamp shell |
| | | Waltonia inconspicua (1) | soft | lamp shell |
| | | ASCIDEACEA | | |
| | | Cnemidocarpa sp. (2) | rubble | saddle squirt |
| | | Purple colonial sp. (2) | rubble | |
| | | Warty solitary sp. (2) | rubble | |
| | | BONY FISHES | | |
| | | Notolabrus celidotus (2) | rubble | Spotty |
| | | Hemercoetes monopterygiu | silt | Opalfish |
| | | Forsterygion lapillum (3) | rubble | common trip |
| | | Forsterygion malcomi (1) | rubble | mottled trip. |
| | | Parapercis colias (1) | rubble | blue cod |

## 5.0 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.).

Most of the benthos below the proposed marine farm was dominated by very fine sands, silts and clays and whole dead shell material. These substrata were colonised by relatively few conspicuous epibenthic species (horse mussel, pink urchin, cushion star, opal fish, scallop, saddle squirt). These species were all recorded in relatively low numbers in the present investigation. The sessile species would probably be smothered by any shell debris originating from a farm, while the mobile opal fish would probably relocated onto its preferred substrata of mud.

## 6.0 CONCLUSION

The aims of the study were to provide a biological description of the benthos under and adjacent to a proposed marine farm at Orieri, Tawhitinui Reach and to identify potential threats to any subtidal conservation values posed by the proposed activity.

The soft and hard shore communities recorded from the present study contained species that are widespread and common throughout the subtidal shores the north-east coast of Tasman Bay and the outer 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). Species diversity was typical of sites in the central Pelorus Sound. No rare or threatened species were recorded from the study area.

The substrata under most of the proposed marine farm was composed of very fine sands, silts and clays and dead whole shell material. The associated flora and fauna was represented by a relatively low diversity of marine biota. This soft bottom habitat and its associated species are widespread in Pelorus Sound, and also in many of the sheltered parts of the Marlborough Sounds. This habitat has a relatively low diversity of species compared to many rich and diverse habitats and communities recorded from particular parts of the Sounds. The establishment of a marine farm over this benthos would probably mean the ultimate modification of this soft bottom benthos and its associated community. This impact would, however, represent a small fraction of this habitat type in the sheltered parts of the Marlborough Sounds.

A reef habitat extending offshore approximately 200 m distance to the east of the proposed marine farm was not investigated in the present study. It is recommended that should the present application be approved, that no eastwards extension of this farm be considered without an ecological inspection of the reef habitat being first carried out.

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