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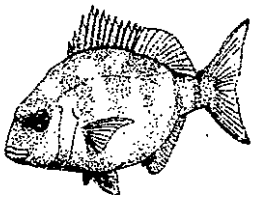


# Biological report on a proposal marine farm extension in Hallam Cove, Pelorus Sound

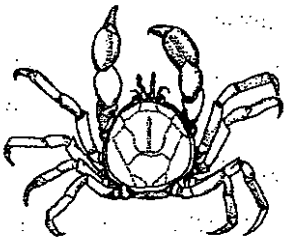
*Extension to LI 181 & LI 197*

Research, Survey and Monitoring Report Number 200

***A report prepared for:***

**Southern Mussel Farms Ltd**
**P. O. Box 32**
**Nelson**

By:
Robert J. Davidson & Derek A. Brown



***MARCH, 99***

**Bibliographic reference:**
Davidson, R. J.; Brown, D. A. 1999: Biological report on a proposed marine farm extension in Hallam Cove, Pelorus Sound. Prepared by Davidson Environmental Limited for Southern Marine Farms Ltd.. Survey and Monitoring Report No. 200.



**Prepared by:**
Davidson Environmental Limited
98a Quebec Road
Nelson
March, 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 located in Hallam Cove, Pelorus Sound. 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 very sheltered bays of the 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. Two transects and one fee swim was installed within the proposed marine farm extension.

4. Fish burrowing was observed between 30 m to 80 m distance from shore at transect 2 located adjacent to a small promontory.

5. All areas located within the proposed marine farm areas were composed of soft substrata.

6. Based on the initial draft plan for the extension (presented in the present investigation), it is recommended that the inshore boundary of the proposed extension be relocated a minimum of 90 m distance from shore.

## 1.0 INTRODUCTION

This report presents a biological description of habitats and associated conspicuous macrobenthic communities from an area proposed as a marine farm extension to two existing marine farms (LI 197 and 181) located in Hallam Cove, 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.

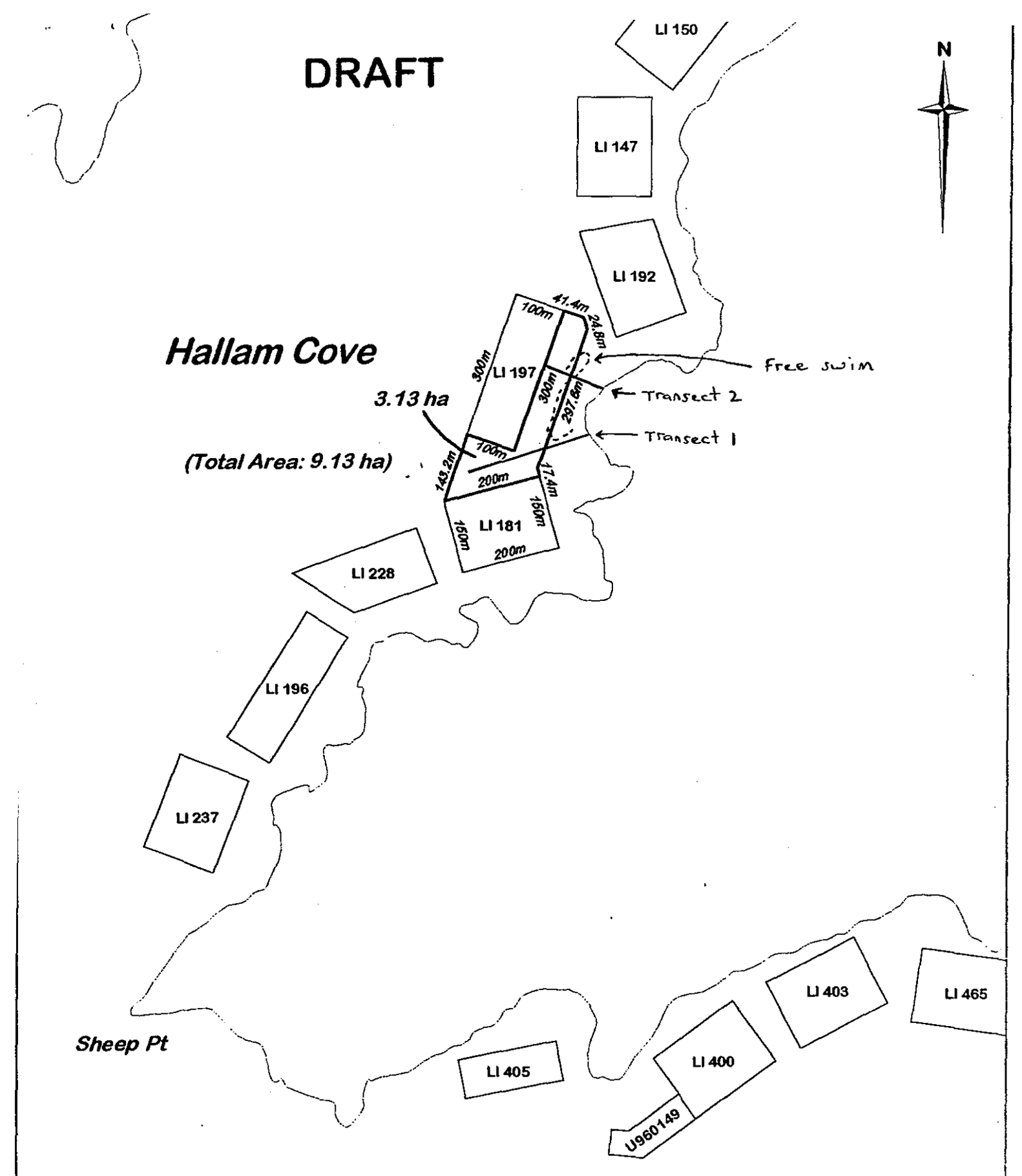
## 2.0 STUDY AREA

Hallam Cove is the largest bay in the Fitzroy Bay complex comprising a total of five bays. Hallam Cove is located on the northern side of Fitzroy Bay and is some 3.5 km in length and is approximately 1 km wide at its entrance (Garne Point to Sheep Point). Depths in Hallam Cove are relatively consistent between 25 m to 27 m but rise to considerably shallower depths around the edges of small bays such as Cissy Bay and Te Towaka (see Navy Chart NZ 615). The shoreline of Hallam Cove is pasture, pine plantations or coastal forest. Water residence times in this area have been recorded as some of the longest in the Marlborough Sounds (see Gibbs 1991).

## 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.




# PROPOSED EXTENSION TO COASTAL PERMITS LI 181 & 197

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

SCALE 1:10,000

# 4.0 MATERIALS AND METHODS

The 3.13 ha area was investigated on the 12th March 1999. Two areas, one located between the two existing marine farms and the other inshore of the existing backbones of the northern mussel farm (Figure 1). At these stations, a lead-lined transect line marked at 5 m intervals was installed either perpendicular to the shore. A free swim was conducted along the inshore area of the north-eastern proposed extension area (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 transects lines. 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 11.00 p.m. to 12.30 p.m. These observations were collected during the outgoing tide.

# 5.0 RESULTS AND DISCUSSION

## 5.1 Water Currents and Free Swim

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

1) substrata were small boulders, cobbles, broken and dead whole shell, silt and clay;

2) no reef structures or shallow abnormalities were observed within the proposed farm;

4) no outcropping rock, bedrock, boulder or cobble dominated habitats were recorded within the boundaries of the proposed marine farm extension;

5) horse mussels, scallops and brachiopods were 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 remain predominantly light or very light for much of the time.

## 5.2 Transects

The shore of both transects was initially dominated by cobble/pebble substrata and a mix of shell and sand. With increasing depth and distance from shore the proportion of shell and sand increased. By 45 m distance at Transect 1 and 55 m distance at transect 2 the cobble and pebble material had been replaced by soft bottoms (Figures 2 and 3). By 90 m distance from shore the benthos was dominated by silt and clay material.

From transects and free swim a total of 27 conspicuous species of invertebrate, 2 ascidians, 5 algae and 5 species of bony fish were observed. Species recorded from the extension have been displayed in Table 1, while transects have been plotted in Figures 2 and 3. Greenshell™ mussel (*Perna canaliculus*) were observed from the benthos during the study.

## 5.3 Fish

Five species of bony fish was recorded during the investigation. The number and composition of fish species were representative of sheltered cobble habitats in the Marlborough Sounds. Opal fish were regularly recorded and relatively widespread over the benthos.

## 5.4 Scallops (*Pecten novaezelandiae*)

Scallops were recorded from the proposed extension area. Scallop densities were low from the proposed extension area. Densities were: mean = 0.02 per $m^{-2}$, SE = 0.003. These densities are below the Department of Conservation guideline trigger levels (i.e. > 0.1 individuals per $m^{-2}$)(DOC 1995).

## 5.5 Horse mussels (*Atrina zelandica*)

Horse mussels were recorded from the proposed extension area. Horse mussel densities were low from the southern half of the proposed extension area. Densities were: mean = 0.02 per $m^{-2}$, SE = 0.0095. These densities are below the Department of Conservation guideline trigger levels (i.e. > 0.2 individuals per $m^{-2}$)(DOC 1995).

## 5.6 Lampshells

No lampshells (*Magasella sanguinea*) were observed during the present investigation.

## 5.7 Hydroids and Bryozoans

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

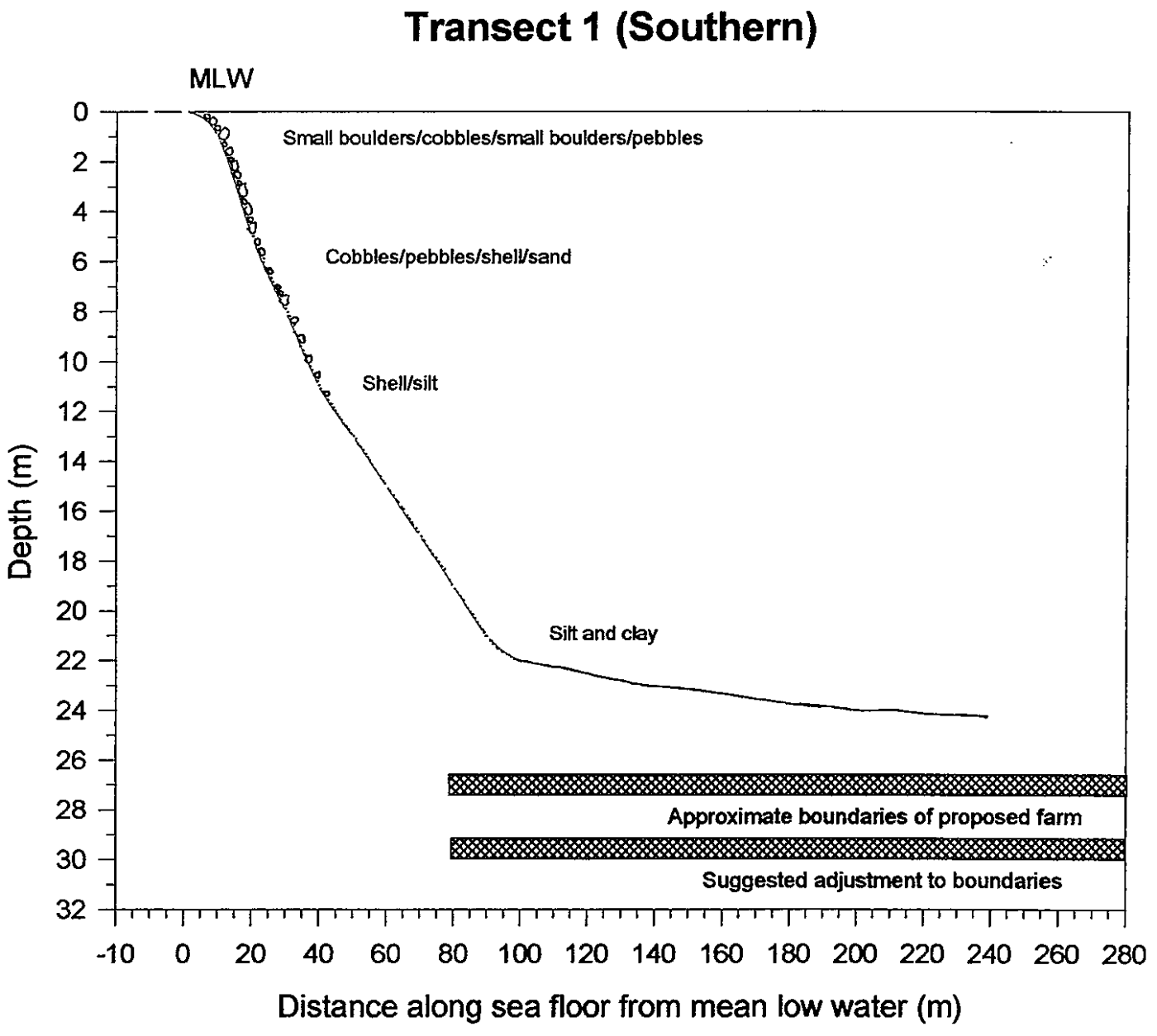



Figure 2 Subtidal shore profile and substratum from an area proposed as an extension to a marine farm located in Hallam Cove.

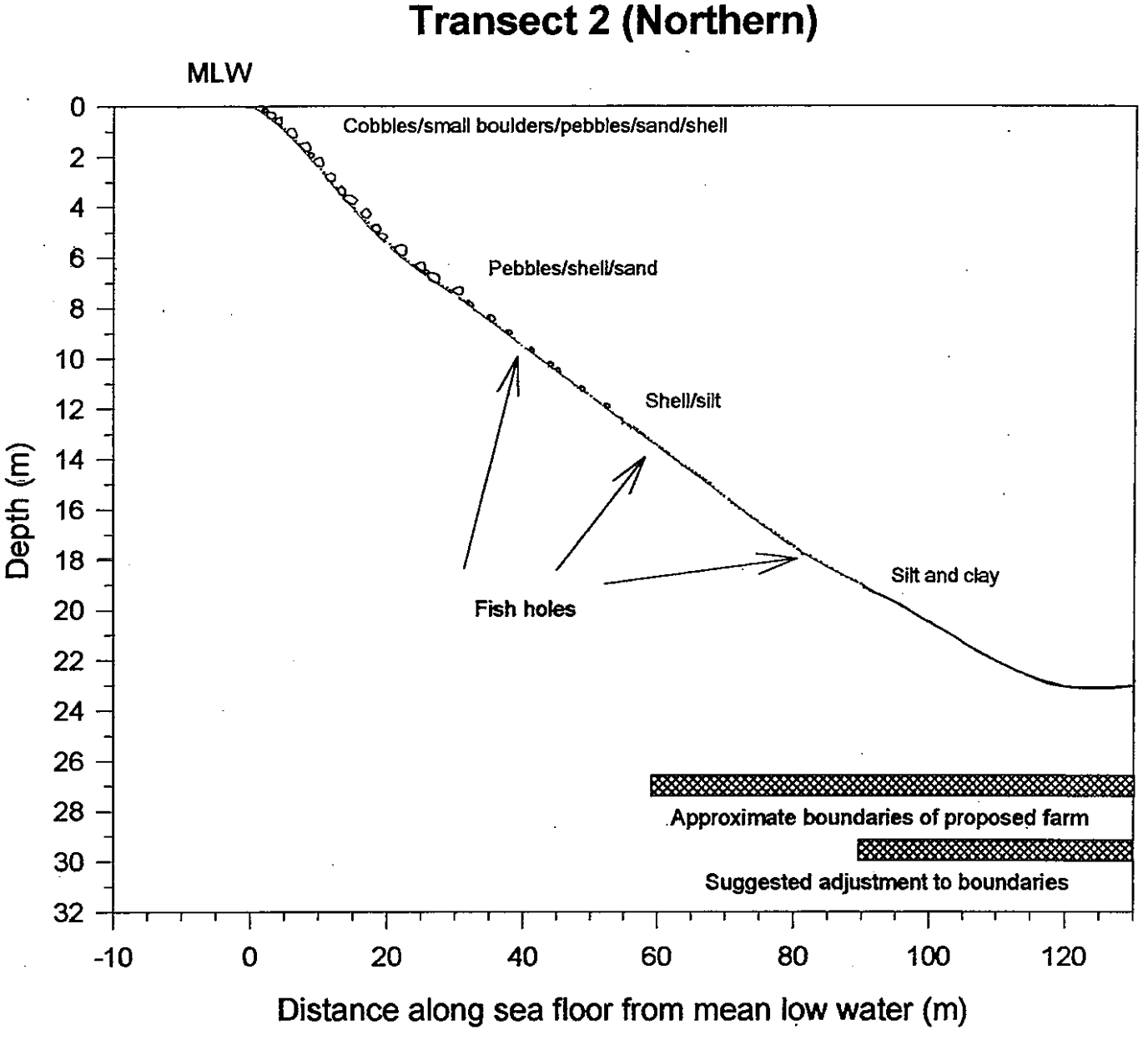



Figure 3 Subtidal shore profile and substratum from an area proposed as an extension to a marine farm located in Hallam Cove.

| Table 1 Species observed from transects from an area in Hallam Cove, Pelorus Sound. | | | | |
|---|---|---|---|---|
| **Algae** | **Common name** | **Invertebrates** | **Habitat** | **Common name** |
| Corallina spp.(3) | paint | SPONGIA | | |
| Colpomenia sp. (2) | bubble weed | Crella incrustans (1) | rubble | encrusting sponge |
| Hormosira banksii (1) | Neptune's necklace | COELENTERATA | | |
| Ulva sp. (2) | Green alga | Actinothoe albocincta (1) | rubble/bedrock | anemone |
| Rhodomenia sp. (2) | red alga | Culicea rubeola (1) | rubble | box anemone |
| | | Obelia sp. (2) | rubble/rock | hydroid fuzz |
| | | GASTROPODA | | |
| | | Cellana spp. (2) | rubble | limpet |
| | | Maoricolpus roseus (2) | sand/shell | spire shell |
| | | Trochus viridus (1) | rubble | |
| | | Turbo smaragdus (3) | rock/rubble | cats eye |
| | | BIVALVIA | | |
| | | Atrina zelandica (1) | soft | horse mussel |
| | | Chlamys sp. (1) | rock | queen scallop |
| | | Modilarca impacta (3) | rubble | Nestling mussel |
| | | Monia zelandica (3) | rock/rubble | window oyster |
| | | Mytilus edulis (1) | rock | blue mussel |
| | | Pecten novaezelandiae (1) | soft | scallop |
| | | POLYCHAETA | | |
| | | Brachiomma sp.(2) | sand/rubble | fan worm |
| | | Galeolaria hystrix (2) | 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 |
| | | Pentagonaster pulchellus (1) | rubble | broach star |
| BONY FISHES | | Stichopus mollis (2) | sand/silt | cucumber |
| Notolabrus celidotus (3) | Spotty | BRACHIOPODA | | |
| Hemercoetes monopterygius | Opalfish | Magasella sanguinea (1) | 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 study.

## 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.

Fish burrowing habitat was observed from transect 2 between 30 m and 80 m distance from shore. This habitat would probably be modified by the presence of a mussel farm overhead. The remaining benthos within the proposed extension was dominated by silt and clay habitat with or without a proportion of dead whole and broken shell material. This habitat is widespread in the Marlborough Sounds and more suitable for marine farming.

Due to the mild tidal currents observed from the site there appears little threat to the inshore habitats of the bay due to the presence of a marine farm.

## 7.0 SUGGESTED ADJUSTMENTS TO THE PROPOSED BOUNDARIES

Based on results from the present investigation, it is recommended that the inshore boundary be placed no close than 90 m distance from shore as measure along the length of transect 2 as it supported a habitat ultilized by fish as a feeding area.

No other changes to the proposed extension appear necessary on ecological grounds as:

- the habitat and community present was 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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