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Proposed extension to a marine farm in Hikapu Reach, Pelorus Sound

NIWA Client Report: MUS01410
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INTRODUCTION

Hikapu Reach is one of the inner arms of Pelorus Sound, an area of intensive marine farming in the Marlborough Sounds. Numerous marine farms are sited along its eastern shores, and this report deals with the ecological characteristics of an area into which an existing marine farm is proposed to extend (Fig. 1).

Numerous studies have examined hydrology and oceanography within Pelorus Sound (e.g. Bradford et al. 1987; Gibbs et al. 1991, 1992; Gibbs 1993; Gibbs & Vant 1997; Ross et al. 1998). More recently, studies have focussed on the feeding ecology of mussels in Pelorus Sound, and also considered the limiting role of food supply within the sound (e.g. Ogilvie et al. 2000). Those studies suggest that areas toward the head of the sound, for example Kenepuru Sound and Hikapu Reach, would receive the greatest influence of freshwater, whereas further toward Cook Strait the influence of oceanic water was greater. One possible implication of that finding is that phytoplankton production should be high, as long as self-shading does not occur.

McKnight & Grange (1991) reviewed samples from a large number of sites throughout the Marlborough Sounds, in order to provide a background regarding the fauna of the area. The closest site to the area of interest for the present study is their site T569, whose fauna lay in the large Group 1. That grouping is dominated by infaunal mud-dwelling ophiuroids and a heart urchin, as well as infaunal bivalves, polychaetes, a priapulid, and a holothurian. They described the grouping as characteristic of inner sound areas with mud substrata.

Benthic impacts of mussel farms have been relatively little studied. One early study (Kaspar et al. 1985) investigated sediment chemistry in Kenepuru Sound, but included few data concerning effects on the benthic fauna. It is known that whole live mussels may fall to the seabed beneath marine farms (Cole & Grange 1996) and that pseudofaeces and faeces also fall from mussels on farms. The severity of those impacts and the area that they affect obviously depends on current flow and on water depth. Pseudofaeces from a mussel farm in shallow water would be predicted to affect a small area more severely than a mussel farm in deeper water, which would affect a larger area less intensively, due to dispersal of the material as it falls through the water column. There is little known regarding the nature of the impacts of the smaller material on benthic assemblages. It has been suggested that 11-armed starfish *Coscinasterias muricata* may aggregate on the rows of mussels that occur beneath farms, but this is possibly a simple consequence of limited movement of the starfish once they encounter food. The introduced asian seaweed *Undaria pinnatifida* has been widely observed on marine farms, but is thought to grow mainly on the floats and upper parts of the lines.

The present proposal is for an extension of 2.42 ha in size, which would extend offshore from the existing, developed, marine farm licence 179 (Fig. 1). This report details a diving and sounding survey that was undertaken through the proposed extension area in November 2000.

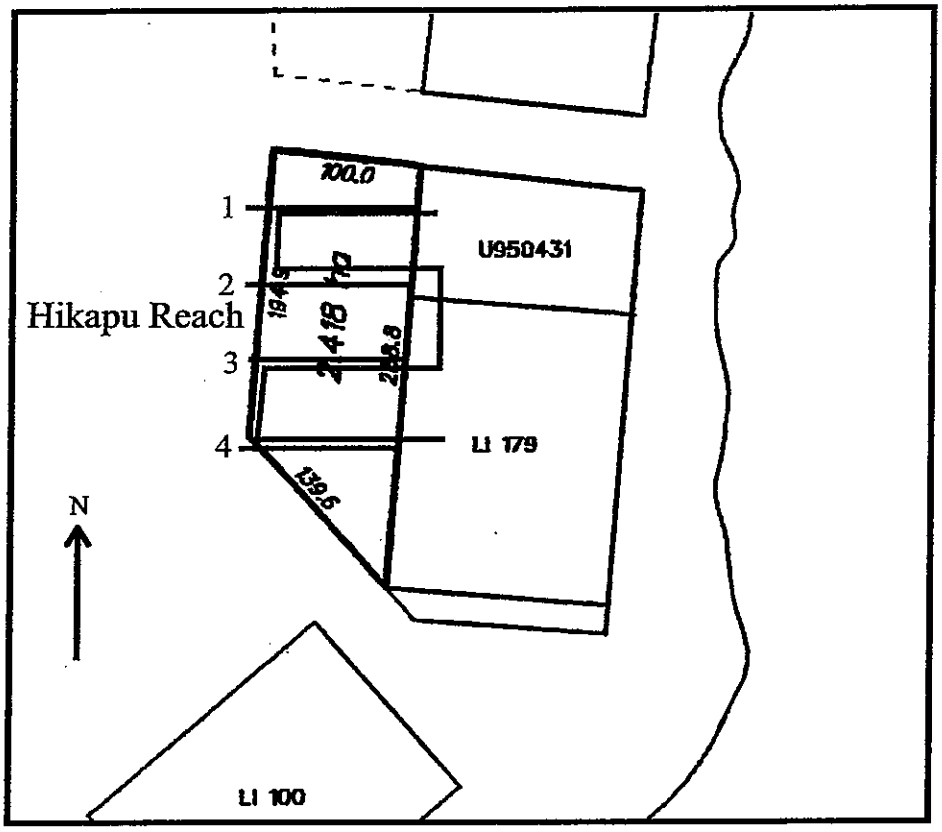

Figure 1. Site diagram of proposed marine farm extension to Licence 179 in Hikapu Reach, Pelorus Sound. Red lines (1-4) indicate the echo-soundings and the blue line indicates the dive survey.

METHODS

The survey was undertaken in November 2000 by echo-sounding and SCUBA diver inspection. Indications of the location of the soundings and the dive transects are given on Fig. 1. Diving scientists swam along the indicated paths, taking notes and recording video. The notes recorded conspicuous habitats and species, including estimates of their abundances and locations. These were compiled, and combined with our observations in other areas to produce an assessment of the sensitivity of the area to marine farming impacts.

RESULTS

The sounding survey indicated very little variation from 10 m in depth over the entire area surveyed. Water depth was greatest on the northern side, but varied little in an onshore – offshore direction.

The dive survey was done in 3 transects that ran perpendicular to the shore. It was found that the seabed mainly comprised mud and shell rubble over the entire area. There was a limited fauna and flora, comprising seaweeds, sponges, mussels and horse mussels, echinoderms and fishes.

Beneath the existing farm lines the volume of mussels was relatively small, with clumps dispersed on a seabed of mud. Some 11-armed starfish *Coscinasterias muricata* were observed, as were cushion starfish *Patiriella regularis*, an as-yet-unidentified orange finger sponge, and the introduced Japanese seaweed *Undaria pinnatifida*. In patches *Coscinasterias* reached local densities of 2-3 per m^2, but overall abundances were much lower than that (estimated to be < 1 per 20 m^2).

Away from the farm site, the seabed comprised mud and shell rubble, with an orange sponge, several small filamentous and leafy red seaweeds at moderate abundances (though not forming a canopy), occasional small brown seaweeds of the genus *Cystophora*, unattached individuals of the brown seaweed *Carpophyllum flexuosum*, the sea cucumber *Stichopus mollis*, the turret shell *Maoricolpus roseus*, and the cushion starfish. Over most of the mud there was a diatom film. In patches there were small tube worms, horse mussel and scallop shells, and spotted stargazers *Genyagnus monopterygium* were observed. Purple finger sponges *Callyspongia* and the unidentified orange finger sponge were also present at low abundances.

At the southern end of the farm, the main substratum type was shell rubble, and there was also moderate amounts of green *Ulva lactuca* and red seaweeds. The japanese seaweed *Undaria* was abundant on the upper parts of the marine farm lines (to 2.5 m depth), but was also found on the seabed, attached to small stones and pieces of shell. This is the first time we have observed *Undaria* below a marine farm.

Horse mussels *Atrina zelandica* occurred over the remainder of the proposed farm area at low densities, with both live and dead individuals being observed. A number of echinoderms, including 11-armed starfish, cushion starfish *Patiriella regularis*, and the large sea cucumber *Stichopus mollis* also occurred at low densities over the area. Several sponges (e.g. *Callyspongia* sp., indet. orange finger sponge) also occurred, and we observed spotties *Notolabrus celidotus*, spotted stargazer *Genyagnus monopterygium*, and an unidentified ray, probably an eagle ray *Myliobatus*

tenuicaudatus.

On the most northern dive there were patches of fine worm tubes *Spirochaetopterus* sp. that covered some 10s of m^2. This habitat type is not common in the outer sounds, and we are uncertain of the prevalence of the habitat in inner sound areas.

CONCLUSIONS

Observations beneath the existing lines suggest that current management practices result in relatively few mussels falling to the seabed. The shallow depth of the proposed extension is such that a relatively small area would be affected by mussel dropoff, and the limited wind fetch will probably lessen the magnitude of dropoff. Most of the existing fauna and flora of the site are typical of areas of the inner sounds, and we anticipate few negative effects of mussel dropoff, because of the limited area affected. The tubeworm beds do not cover a large area (much less than the 10% of the area recommended by Department of Conservation (1995) as a trigger level for a further investigation), and furthermore were only recorded at the northern end of the farm.

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