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NIWA Client Report: MUS00408 / 1
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Biological survey of a proposed extension to a marine farm in Kauauroa Bay, Pelorus Sound

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INTRODUCTION

Kauauroa Bay faces south into Tawhitinui Reach, about halfway along Pelorus Sound. It is adjacent to areas of intensive marine farming such as Beatrix Bay, and is itself the location of numerous marine farms. Hydrographic Chart NZ615 shows most of the bay to lie at depths shallower than 25 m.

The present report deals with a proposal to extend a marine farm licence in the northeastern corner of Kauauroa Bay, by adding trapezoid-shaped areas to either end (Fig. 1). The proposal involves a 0.349 ha extension to the southern end of the farm, and a 1.65 ha extension to the northern end of the farm. Here dive observations and dredge samples are used to evaluate the biological effects of extending the farm in this way.

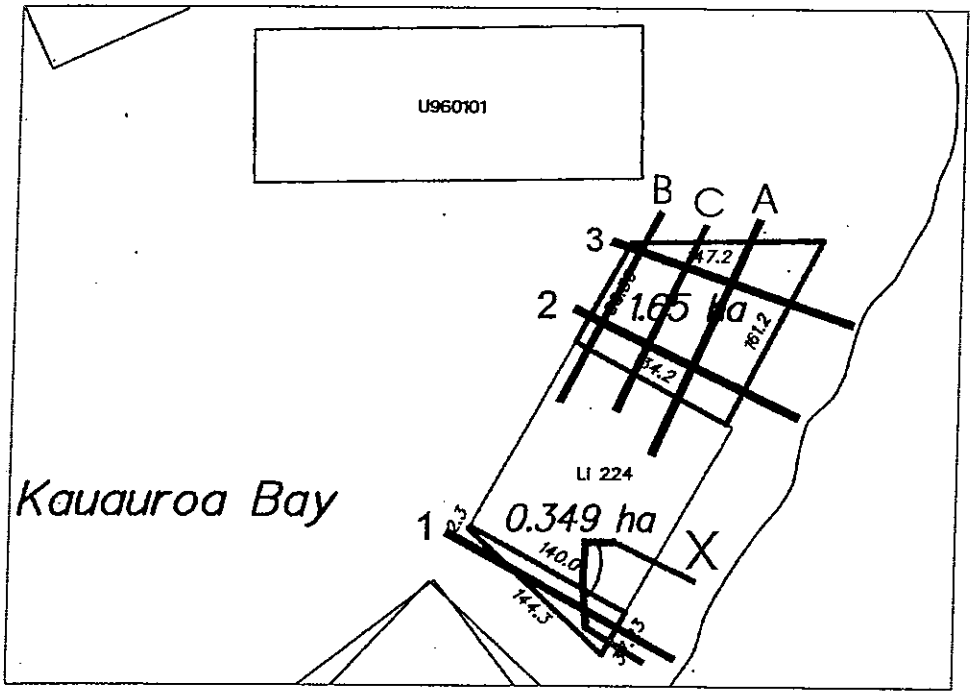

Figure 1. site of proposed extension to marine farm Li 224, Kauauroa Bay. 1-3 = Depth-profiling transects; A-C = dredge transects; X = dive transect.

METHODS

Fieldwork was done in late July 1999. Three depth profiles were run through the extension areas, using the vessel's depth sounder and a laser range finder (accurate to ~3 m). A diving biologist carried out a SCUBA transect at the southern end of the farm,

farm, to ascertain the level of shell build-up present, and to determine the fauna present. Also, 3 biological dredge (800 mm wide dredge entrance, 2 mm mesh) tows were made through the existing farm. These were used to supplement the diving observations, and their main advantage is that they obtain coverage over the entire area, whereas divers can only observe a relatively small area. The positions of dredge tows and dive observations are indicated in Figure 1.

RESULTS

The sounder profiles indicated a gently sloping seabed, which reached a maximum depth of about 21 m (Figs 2, 3). There were some difficulties with the placement of the farm, because the plan as drawn up shows most of the extension occurring at the north end, whereas at the site the farm already abuts licence U960101, and the larger extension can only occur at the south end. Thus 2 sounder transects were done at the northern end where the only possible extension is small, and only 1 at the southern end, where there is room to extend the farm. However, this will not affect the conclusions drawn regarding the depth profiles, as they were relatively uniform. The applicant intends to realign the farm if the permit is granted, in light of these observations (B. Cardwell, Sanford South Island Ltd., pers. comm.).

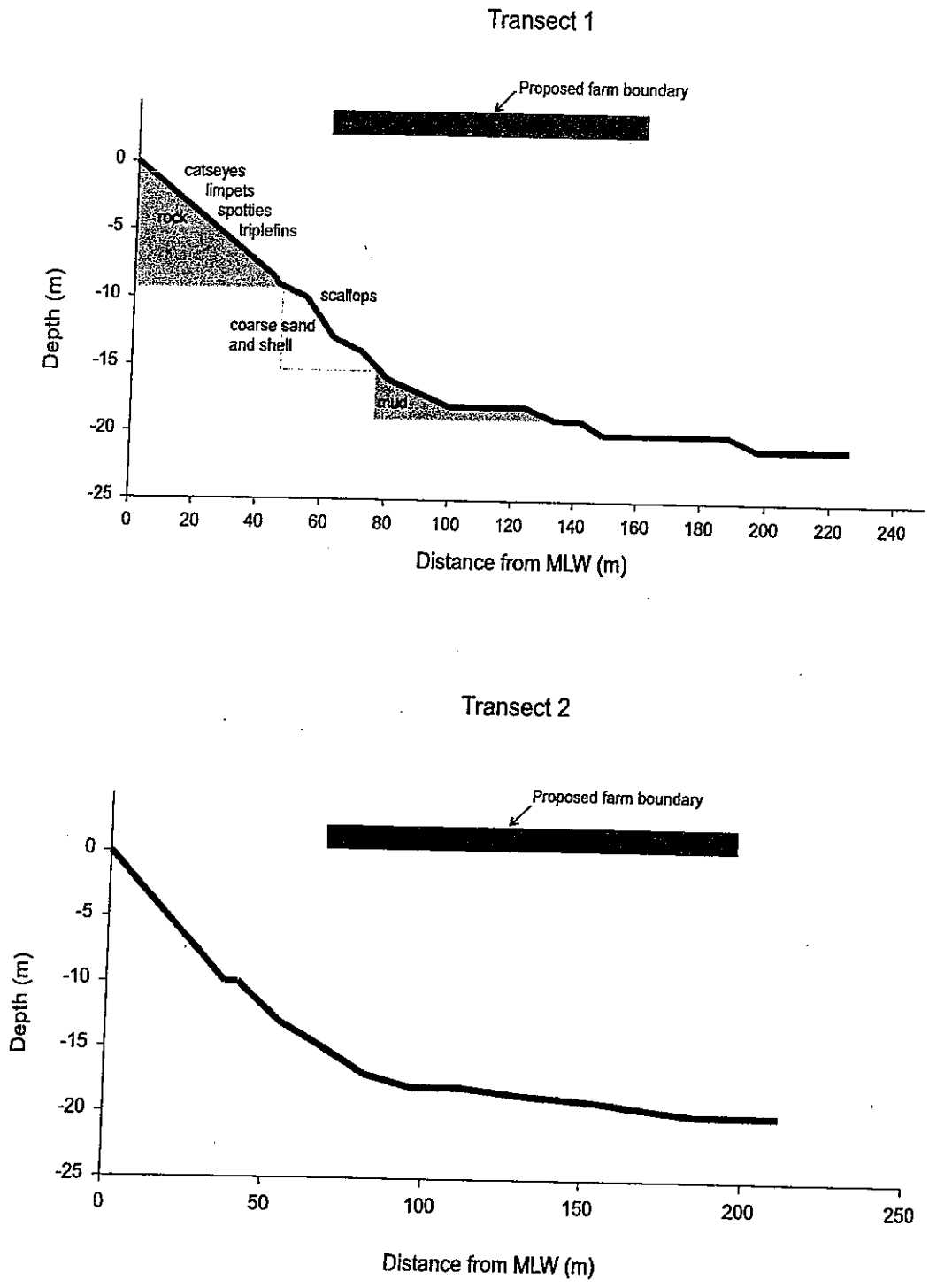

Figure 2. Depth profiles along transect positions 1 & 2, shown in Figure 1. Conspicuous species and habitats are also shown along Transect 1, which was the site of the dive transect.

The substratum (as observed by divers) consisted of boulders and cobbles inshore at depths of about 3 m, turning to shell rubble and sand by 8 m, while beyond about 16 m

depth, the substratum was entirely mud. The change from sand to mud was quite abrupt.

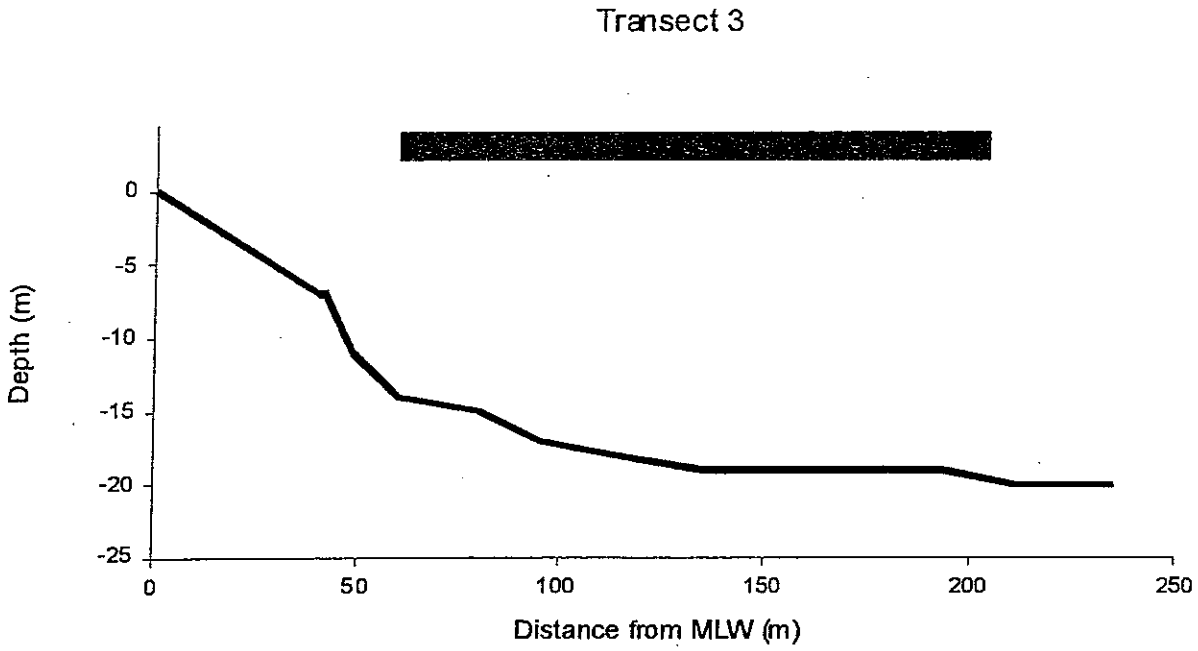

Figure 3. Depth profile along Transect position 3, shown in Figure 1.

Dead mussel shells were observed beneath the existing farm area at about 18 m, in areas where there was only mud, indicating appropriate placement of the existing farm in an area where there were few organisms that might be damaged.

The inshore rocky areas were occupied by echinoderms and molluscs (Table 1, Fig. 2), while further offshore (~8 m depth) the molluscs were much less abundant, though the echinoderms persisted. Areas of scallops *Pecten novaezelandiae* (with densities up to 1 m^{-2}) occurred inshore of the farm at about 12 m depth, though these were less abundant at 16 m depth, and did not occur at all at 18 m. At 16 m there was an abrupt change from the sandy biologically diverse sediments that occurred inshore, to mud. In the area near the existing farm site there were abundant opalfish *Hemerocoetes monoptergius*, some horse mussels *Atrina zelandica*, and several echinoderms (11-armed starfish *Coscinasterias calamaria*, sea cucumbers *Stichopus mollis*, cushion starfish *Patiriella regularis*). There was also bioturbation at a depth of about 14 m, in the sandy sediments.

Table 1. Organisms observed in SCUBA diving transects.

Organism	3 m	6-8 m	10-12 m	16 m	18 m
Maoricolpus roseus Turret shell		•			
Turbo smaragdus Catseye	•	•			
Cellana sp. Limpet	•	•			
Monia zelandica Window oyster	•	•			
Trochus viridis Trochus	•				
Atrina zelandica Horse mussel			•	•	•
Pecten novaezelandiae Scallops			•	•	
Coscinasterias muricata 11-armed starfish	•	•	•	•	•
Evechinus chloroticus Kina	•	•			
Stichopus mollis Sea cucumber		•	•	•	•
Patiriella regularis Cushion starfish		•	•	•	•
Cnemidocarpa bicornuta Saddle squirt	•	•			•
Hemerocoetes monopterygius Opal fish					•
Forsterygion lapillum Common triplefin	•	•			
Forsterygion varium Variable triplefin	•	•			
Notolabrus celidotus Spotty	•	•	•		

The dredge tows were taken between the farm lines, and sampled a wide variety of molluscs, echinoderms and other animals (Table 2). The most noteworthy feature of the samples was the presence of the two introduced bivalves *Theora lubrica* and *Limaria orientalis*.

Table 2. Species and their relative abundances in the 3 dredge tows taken at Licence 224.

Species	Common name	Dredge 1	Dredge 2	Dredge 3
Echinocardium cordatum	Heart Urchin	1	1	-
Nucula strangei	Nutshell	4	2	3
Unidentified polychaete	Cased worm	1	-	-
Theora lubrica	Japanese bivalve	1	1	-
Nemocardium pulchellum	Strawberry cockle	1	2	1
Neilo australis	Bivalve	2	2	1
Halicarcinus sp.	Crab	1	-	2
Amphiura rosea	Small brittle star	1	-	1
Pentadactyla longidentis	Burrowing sea cucumber	-	-	1
Amalda novaezelandiae	Olive shell	1	1	1
Pagurus sp.	Hermit crab	-	1	-
Unidentified amphipoda	Amphipoda	1	-	-
Amphiura correcta	Large brittle star	1	-	1
Lumbrinereis sp.	Uncased worm	1	1	1
Turbo smaragdus	Cats-eye snail	-	1	-
Magasella sanguinea	Brachiopod	-	1	1
Notocallista multistriata	Bivalve	1	-	-
Edwardsia sp.	Burrowing anemone	-	-	1
Rynkatorpa uncinnata	Burrowing sea cucumber	2	-	1
Maoricolpus roseus	Turret shell	1	1	1
Tellina huttoni	Bivalve	1	-	1
Dosinia greyi	Bivalve	-	1	-
Red sea squirt	Ascidian	-	1	-
Thracia vegrandis	Bivalve	-	1	-
Limaria orientalis	Japanese file shell	-	1	-

CONCLUSIONS

The observations and samples indicate that the farm has been appropriately placed to minimise biological impacts, and that the impact from current farming practices is small. We can see no reason to decline the application to extend the farm on biological grounds. The proposed farm boundaries will avoid the area where scallops are most abundant.