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Biological investigation of a proposed marine farm extension, Port Ligar

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INTRODUCTION

Port Ligar is a large embayment at the northwestern extremity of Pelorus Sound. Its shores plunge steeply to about 30 m (Chart NZ615), and round the edges of the bay are numerous mussel farms. Little is known regarding the environment of Port Ligar; site reports associated with previous surveys of marine farms are not in the public domain. There are, however, a few biological assessments (McKnight & Grange 1991).

A proposed extension of 1.465 ha to one of those farms is the subject of this report. The farm, License 238, lies on the western side of Port Ligar, near its entrance (Fig. 1). It is bounded to the north and south by other marine farms. The proposal is to extend the northern and eastern boundaries of the farm, so that the farm reaches 200 m offshore (Fig. 1).

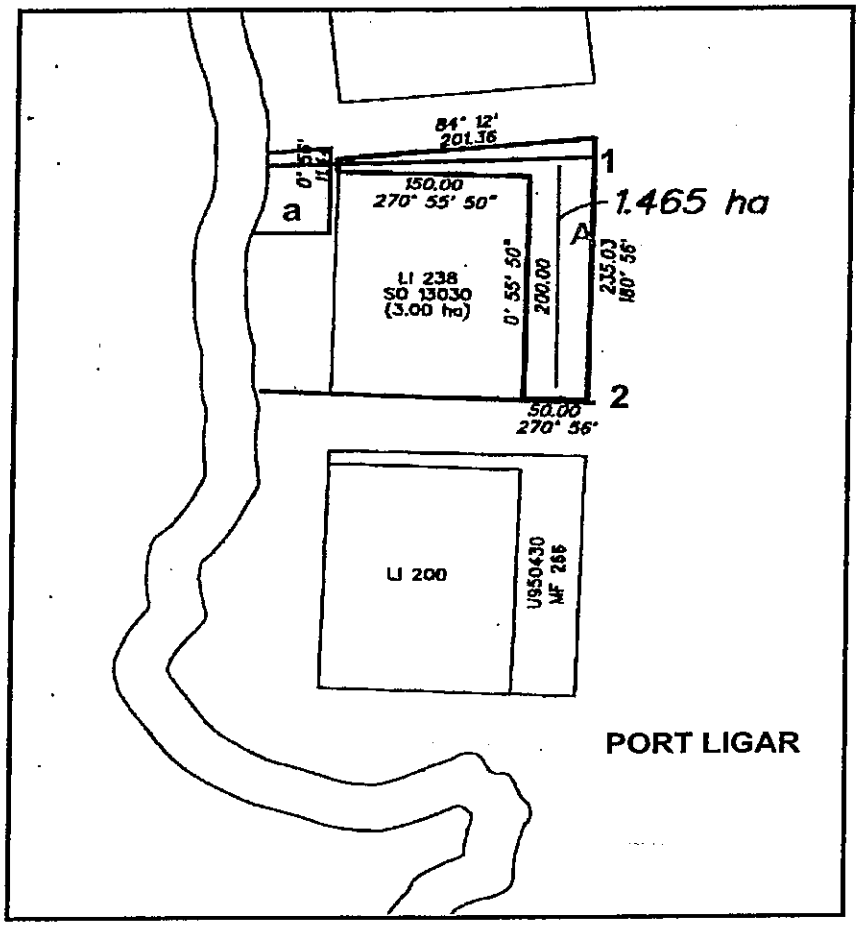

Figure 1. Proposed extension to marine farm (License 238), Port Ligar, Pelorus Sound. Red lines (1-2) show where the depth profiles were taken, green line (A) indicates the dredge and Blue line (a) is where the dive occurred.

METHODS

A laser range finder and the survey vessel's depth sounder were used to provide a physical description of two profiles at either end of the site. The depth offshore at both ends of the proposed extension was also recorded during sounder runs. Dive survey and dredging techniques were used to describe the fauna of the proposed extension. The dredge samples were preserved in formalin and subsequently analysed in the laboratory, by identifying them to the lowest possible taxonomic level.

RESULTS

The shores plunged steeply, so that 50 m offshore the depths were 15 and 20 m on the northern and southern ends respectively (Fig. 2A & B). The depths at the first lines offshore were 25 m and 22 m at northern and southern ends. At the northern end there was a distinctive trench between about 130 and 170 m, which reached 37 m depth. The outer areas of the site rose to a depth of about 30 m offshore of that trench, of which there was no indication at the southern end of the farm.

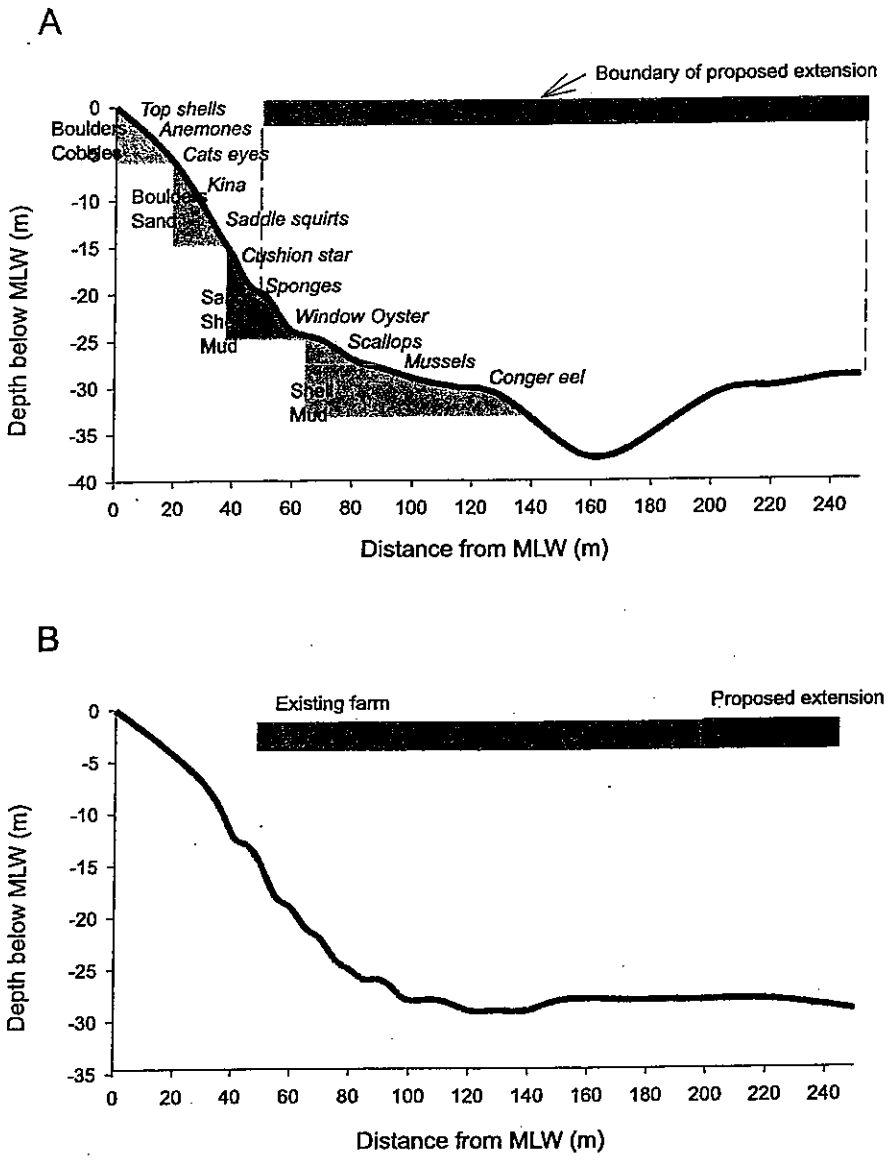

Figure 2. Profiles of the echo-sounding transects. A. Transect 1 depth profile showing main habitat types and benthic communities with depth. B. Transect 2 depth profile

On the dive transect, the divers inspected under the existing farm at its northern end, then swam along that edge out of the farm, and ascended in the area of the proposed extension. There was a general pattern of decreasing substratum particle size, from cobbles inshore to mud offshore (Fig 2A). The inner rocky parts of the transect contained species typical of that environment in the outer Marlborough Sounds (Fig. 2, Table 1), including starfish, sea urchins, triplefin fishes, and various tubeworms and snails. Underneath the farm there were abundant blue and green mussels, 11-armed starfish *Coscinasterias muricata*, cushion starfish *Patiriella regularis*, a fanworm *Branchiomma* sp., several sea lettuce plants *Ulva* sp., a carpet shark *Cephaloscyllium*

isabellum was observed, and a grey sponge, tentatively identified as *Ancorina* sp., was also recorded. Most of the mussels appeared to be dead, and there were few large clumps of live individuals, resulting in little modification to the physical height of the substratum. Beneath the farm there was also one long piece of "stocking", in which the mussels are seeded onto the farm. Generally though, there was little evidence other than shells that it was a farm site.

Outside the farm, at a depth similar to that under the farm, the substratum was somewhat rockier, with a greater component of gravel and shell rubble. One or 2 scallops were recorded, but densities were low in the muddier areas. A large hole was also observed; likely occupants include hagfish *Eptatretus cirrhatus* and conger eels *Conger verreauxi*. Echinoderms such as cushion starfish and 11-armed starfish were the only other conspicuous organisms at this depth.

Slightly shallower (~20 m depth) there occurred a sandier substratum, with a gravel / cobble component. It was occupied by scallops at densities of about 1 per 10 m^2, saddle squirts *Cnemidocarpa bicornuata*, common sea cucumbers, horse mussels *Atrina zelandica*, tubeworm mounds, cushion starfish, and numerous other organisms (Table 2). As shallower areas were reached on the ascent the substratum grainsize got progressively larger, with boulders being common at 10 and 15 m depths, and bedrock occurring below a small headland, to a depth of about 6 m.

No bioturbation was recorded throughout either the farm transect, or the survey of the adjacent area.

Table 1. Species observed during dive transects.

Group	*Species*	Common name	Depth range (m)	Habitat*
Algae	*Ulva lactuca*	Sea lettuce	~25	M
	Lithothamnion sp.	Coralline paint	0 – 25	B
	Caulerpa sp.	Green bubbleweed	15	B
	Rhodymenia sp.	Fine red weed	1-3	B
Porifera		Red massive sponge	10-20	C
	Ircinia sp.	Grey massive sponge	10-25	B, C
	Suberites sp.	Yellow sponge	15-25	S
	Chelonaplysilla violacea	Purple sponge	10-25	B, C
	Tedania sp.	Red encrusting sponge	15-20	C
Actinia	*Actinothoe albocincta*	Anemone	2-6	B
Polychaeta	*Galeolaria hystrix*	Tubeworm	6-20	B, M
	Terebellid	Terebellid worm	25	S
	Sabellid	Sand fan worm	20-25	S
Crustacea	*Pagurus* sp.	Hermit crab	5-27	B, S, M
	Notomithrax sp.	Camouflage crab	13	B
Gastropoda	*Maoricolpus roseus*	Turret shell	10-27	B, S, M
	Trochus viridis	Top shell	3-10	B
	Turbo smaragdus	Cats eye shell	1-6	B
	Cookia sulcata	Cooks turbinid	6	B
Bivalvia	*Perna canaliculus*	Greenshell mussel	0-1, 20-25	B, M
	Mytilus edulis aoteanus	Blue mussel	0-1, 20-25	B, M
	Monia zelandica	Window oyster	5-20	B, C, M
	Atrina zelandica	Horse mussel	25	S, M
	Pecten novaezelandiae	Scallop	20-25	S
	Chlamys zelandiae	Queen scallop	15	B
Asteroidea	*Patiriella regularis*	Cushion star	0-27	B, S, M
	Pentagonaster pulchellus	Jewel starfish	25	B
	Coscinasterias muricata	11-armed starfish	0-27	B, S, M
	Allostichaster insignis	Orange starfish	25 m	M, Sh
	Ophiopsammus maculatus	Large brittle starfish	3	B
	Ophiopteris antipodum	Purple brittle starfish	3	B
Echinoidea	*Evechinus chloroticus*	Kina	0-15	B, C, S
	Pseudechinus huttoni	Pink kina	16	C
Ophiuroidea	*Ophiopsammus*	Snake star	3	S, M

	maculata			
Holothuroidea	*Stichopus mollis*	Sea cucumber	3-27	B, S, M
Ascidiacea	*Cnemidocarpa bicornuata*	Saddle squirt	5-27	B, C
	Hypscistozoon fasmerica	Orange colonial ascidian	6-10	B, C
Pisces	*Cephaloscyllium isabellum*	Carpet shark	25	S, M
	Parapercis colias	Blue cod	3-15	B, C
	Notolabrus celidotus	Spotty	1-15	B, C, S
	Forsterygion lapillum	Common triplefin	3-15	B, C
	Forsterygion flavonigrum	Yellow-black triplefin	10-20	B, C
	Obliquichthys maryannae	Oblique-swimming triplefin	6	B
	Forsterygion malcolmi	Mottled triplefin	20	B
	Forsterygion varium	Variable triplefin	1-6	B

*Habitats: B=boulders; C=cobbles; Sh=shell; S=sand; M=mud.

Dredge samples

A variety of organisms were collected from the dredge sample along the outer area of the proposed extension (Table 2).

Table 2. Abundance of species found in dredge samples. Abundance categories are ranked as 5= high abundance and 1 = low abundance (i.e. only one specimen found).

Group	Species	Common name	Abundance
Echinodermata	*Echinocardium cordatum*	Heart Urchin	5
Echinodermata	*Amphiura rosea*	Small brittle star	3
Echinodermata	*Heterothyone alba*	Burrowing sea cucumber	2
Bivalvia	*Nemocardium pulchellum*	Strawberry cockle	5
Bivalvia	*Neilo australis*		3
Bivalvia	*Nucula strangei*	Nutshell	3
Bivalvia	*Pecten novaezelandiae*	Scallop	1
Bivalvia	*Cuspidaria willetti*		1
Gastropoda	*Amalda novaezelandiae*	Olive shell	2
Gastropoda	*Maoricolpus roseus*	Turret shell	1
Gastropoda	*Zegaleurus tenuis*		1
Polychaeta	Unidentified polychaete	Cased worm	2
Polychaeta	*Lepidonatus sp.*	Sea mouse	1
Polychaeta	Unidentified polychaete		1
Crustacea	Unidentified amphipoda	Sea lice	2
		No. species	15

The most abundant species found at this site were the heart urchin *Echinocardium cordatum* and the strawberry cockle *Nemocardium pulchellum*. Also relatively common were the brittle star *Amphiura rosea,* and bivalves *Neilo australis* and *Nucula strangei*. All of these organisms are common and widespread in the Marlborough Sounds area (McKnight & Grange, 1991). There were no species of ecological significance in abundances high enough to warrant further investigation.

CONCLUSIONS

The area over which the farm would lie has a large proportion of shell rubble and cobbles on the substratum. However, observations at the adjacent farm site suggest that build-up of mussel shell is not a severe problem under current management practices.

REFERENCES

Department of Conservation (1995). Guideline for ecological investigations of proposed marine farm areas in the Marlborough Sounds. *Occasional Publication No. 25* 21p.

McKnight, D.G, Grange, K.R. 1991. Macrobenthos-sediment-depth relationships in Marlborough Sounds. *DSIR Contract Report 1991/14,* prepared for Department of Conservation, Wellington.