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Proposed Marine Farm in Onauku Bay, East Bay, in Queen Charlotte Sound

NIWA Client Report: MUS00417 / 1
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INTRODUCTION

Onauku Bay is a small bay on the eastern side of East Bay in outer Queen Charlotte Sound. This report presents the results of a dive, dredge and profile study undertaken as background for a proposed marine farm of 3.541 ha in this bay.

Grange and McKnight (1991) studied two stations within East Bay as part of a greater Marlborough Sounds study. That study described the sea floor as being mud and consisting of typical mud communities of fauna. The Marlborough Sounds resource management plan identifies East Bay as Coastal Marine Zone 2 status and notes that it is an area containing New Zealand's large brachiopod *Neothyris lenticularis*. Marine chart NZ615 indicates the depths in Onauku Bay are approximately 21 m.

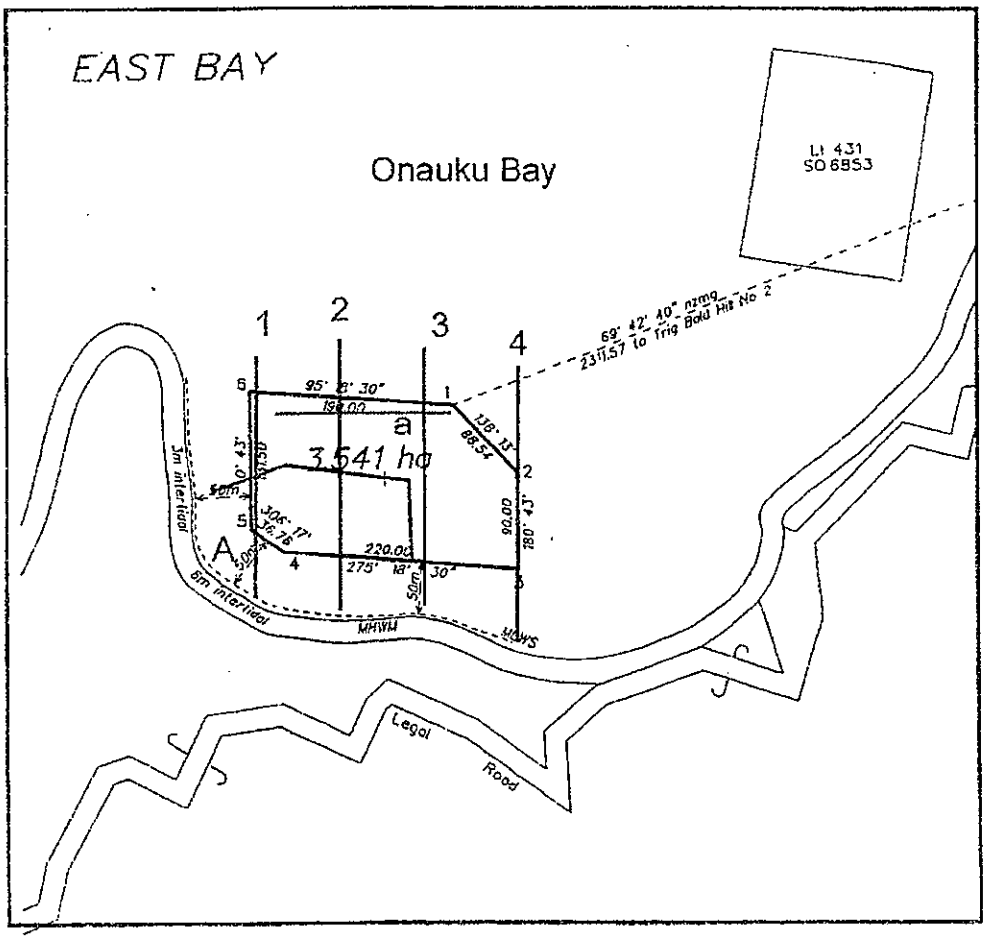

Figure 1. Proposed marine farm, Onauku Bay, East Bay, Queen Charlotte Sound. Red lines (1-4) show where the echo sounding transects were taken, Green line (a) indicates where the dredge was and the blue line (A) indicates the dive transect.

METHODS

The fieldwork for this proposal was carried out in October 1999. Four depth profiles were taken perpendicular to the shore using a laser rangefinder (accuracy ± 1 m out to 400 m distance) and echo-sounder. The raw depth data were plotted as a 3-D profile and a generalised 2-D profile with sediment and benthic types included.

A dredge sample was taken along the outer boundary of the proposed farm using a custom built dredge. This dredge has a 260 x 800 mm opening and is covered with a 2 mm mesh which retains most material.

One dive transect was completed where divers entered the water at the shore and swam down depth profile 3 and then swam along the inner boundary to depth profile 1, where they also descended. Divers recorded all conspicuous species and estimated abundances. Data were recorded on underwater slates and a Hi-8 videotape of the dive was recorded to assist with the site description.

RESULTS

Depth profile

The surveyed area has a shallow constant gradient which drops down to approximately 29-32 m at the outer boundary of the proposed farm (~ 200 m) (Fig. 2). There were no rock outcrops or subtidal reefs evident from these sounding profiles.

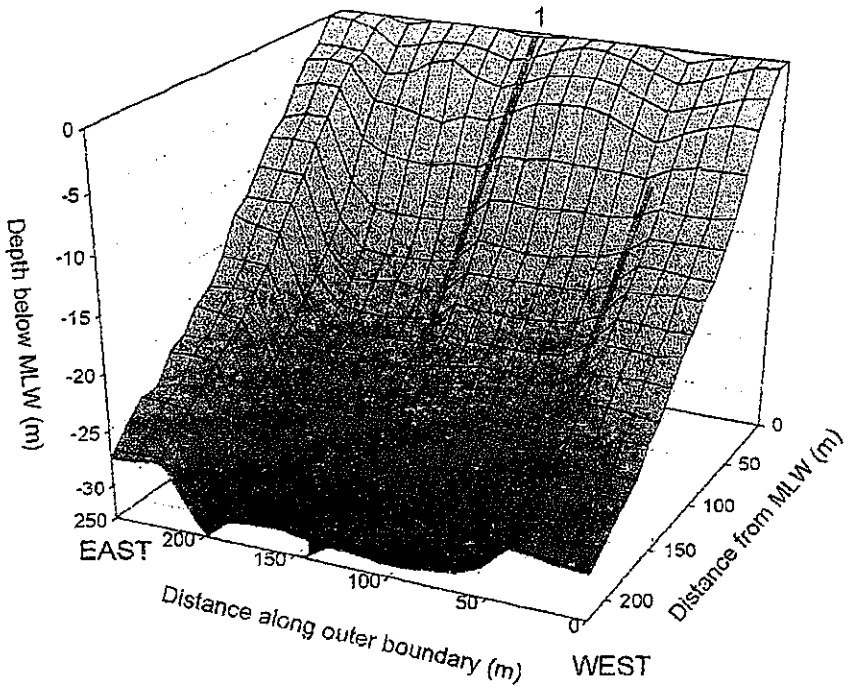

Figure 2. 3-D profile of proposed marine farm, Onauku Bay, East Bay, Queen Charlotte Sound. The red line (1) indicates the dive transect.

The dive results and echo-sounding transects have been combined and presented in a generalised diagram (Fig. 3).

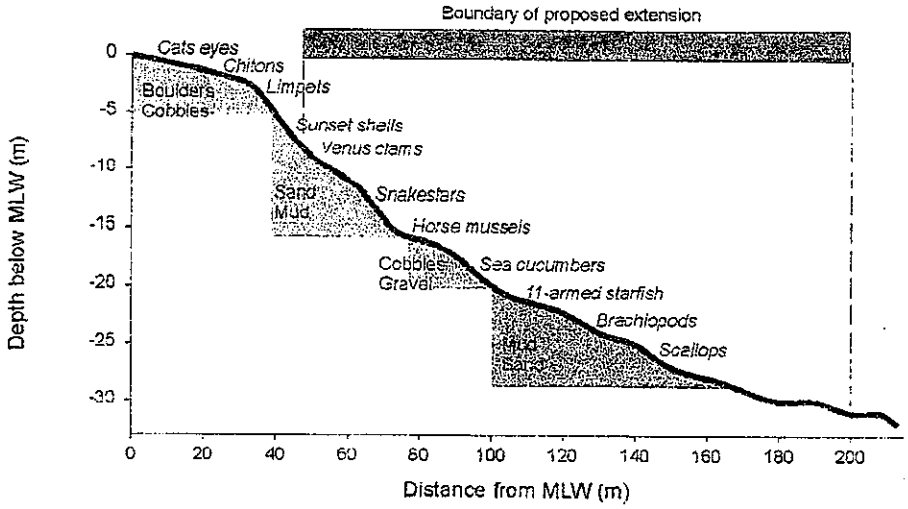

Figure 3. Generalised profile of proposed marine farm, Onauku Bay, East Bay in Queen Charlotte Sound.

Conspicuous species

In the shallows (0-5 m) the reef areas were occupied by limpets *Cellana* sp., catseye snails *Turbo smaragdus*, kina *Evechinus chloroticus*, sea cucumbers *Stichopus mollis*, cushion starfish *Patiriella regularis*, and saddle squirts *Cnemidocarpa bicornuta*. Several fish occurred in the area, including blue cod *Parapercis colias*, spotties *Notolabrus celidotus*, and common triplefins *Forsterygion lapillum*.

Slightly deeper in the areas with sand and mud (~5-15 m) there were horse mussels at low densities (1 or 2 seen), some evidence of bioturbation at about 12 m depth, kina, sea cucumbers, 11-armed starfish *Coscinasterias muricata*, and cushion starfish occurred throughout that zone. There were also spotties present, and some small blue cod were observed. Colonial parchment worms *Megalomma suspiciens* occurred in this zone. There appeared to be intensive infaunal activity in this habitat, with numerous wormtubes, holes, burrows etc. occurring in the soft sediment. Large numbers of empty paired shells of the ridged bivalve *Bassina yatei* were also observed in the shallow sand / mud habitat, suggesting that population densities might be high. (The shells are assumed to have been opened by whelks or starfish). One conspicuous feature of this and the deeper sandy / muddy zone was the large number of *Atrina* shells which were moved out of the sediment. This could be due to dredging activities, or perhaps feeding by rays.

There was a distinct zone of gravel and cobbles at about 15 – 20 m. The macrofauna (echinoderms and solitary ascidians) found was much the same as the habitats inshore and offshore of the habitat, but the substratum was conspicuously different. Small blue cod were observed in the gravel / cobble habitat also. The origin of this distinct habitat is unknown.

In the deepest part of the survey (> 20 m depth, depth of 27 m reached), the conspicuous macrofauna comprised live and dead horse mussels (estimated densities of live individuals 1 per 5 m^2), 11-armed starfish and kina. Small blue cod persisted at this depth. The substratum was muddy sand, and there were occasional orange sponges, worm tubes, and large gastropods such as *Penion* and *Alcithoe* present.

There were some signs of human activity in the area; on the first dive at 18 m there was some rope, and at 20 m there was a piece of net. A bottle was also observed.

Table 1. Species recorded from SCUBA transect, Onauku Bay, East Bay, Queen Charlotte Sound. (1 = rare; 2 = common; 3 = dominant in that habitat).

Species	Common name	Boulders / Cobbles 0-5 m	Sand / Mud 5-15 m	Cobbles / Gravel 15- -20 m	Mud / Sand 20-27 m
	Green filamentous alga	1			
Caulerpa sp.	Green bubble weed				1
	Red fuzzy alga			1	1
Magasella sanguinea	Red brachiopod				1
Neothyris lenticularis	Pink brachiopod				1
Galeolaria hystrix	Spiny tubeworms (keeled)	1			
Vermiliopsis sphaeropomatus	Calcareous tubeworm (white)	1			
Unidentified serpulid	Tubeworm mounds		1	1	1
Branchiomma sp.	Sabellid fan worm (purple)	1			
Protula bispiralis	White spiral worm	1			
Megaloma suspiciens	Colonial parchment tube worm		1	1	1
Chiton pelliserpentis	Chiton	2			
Cellana sp.	Limpets	2			
Turbo smaragdus	Cats eye snail	3			
Penion sp.	Whelk				1
Monia zelandica	Window oyster	1			
Ruditapes largillierti	Venus clam		2		
Gari stangeri	Sunset shell		2		
Maoricolpus roseus	Turret shell	2	2	2	
Atrina zelandica	Horse mussel		1	1	1
Pecten novaezelandiae	Scallop				1
Pagurus sp.	Hermit crabs		1	1	1
Coscinasterias muricata	11-armed starfish	2	2	2	2
Evechinus chloroticus	Kina	2	2	2	2
Pseudechinus huttoni	Pink urchin	1			1
Stichopus mollis	Sea cucumber	2	2	2	2
Patiriella regularis	Cushion star	2	2	2	2
Pentagonaster pulchellus	Biscuit star		1		
Ophiopsammus maculata	Snakestar		2	2	
Ophiopteris antipodum	Oar snakestar	1			
Cnemidocarpa bicornuta	Saddle squirt	2	2	2	2
Unidentified ascidian	Large saddle squirt		1	1	1
Pennaria sp.	Feather hydroid	1			
Ancorina sp.	Black sponge				1
Unidentified compound ascidian	White compound ascidian				1
	Orange encrusting sponge				1
	Yellow encrusting sponge				1
	Brown sponge		1	1	
Forsteryglon varium	Variable triplefin				

Forsterygion lapillum	Common triplefin	2			
Parapercis colias	Blue cod	1	1	1	1
Notolabrus celidotus	Spotty	2	1		
Total no.		21	18	15	**22**

Dredge species

The conspicuous species recorded from the dredge samples included a variety of molluscs, crustaceans, echinoderms and polychaetes (Table 2).

Table 2. Species recorded from the dredge tow. An estimation of abundance is included. 1= rare (i.e. only one specimen) and 5 = very abundant.

Class	Species	Common name	Dredge #1
Bivalvia	*Leptomya retiaria*		3
Bivalvia	*Nemocardium pulchellum*	Strawberry cockle	5
Bivalvia	*Gari lineolata*		3
Bivalvia	*Notocallistra multistriata*		2
Bivalvia	*Tellina charlottae*		2
Crustacea	*Pagurus* sp.	Hermit crab	2
Crustacea	Unidentified isopoda	Sea lice	1
Echinoidea	*Echinocardium cordatum*	Heart Urchin	5
Gastropoda	*Struthiolaria vermis*	Ostrich foot	1
Gastropoda	*Poirieria zelandica*	Spiny murex	1
Holothuroidea	*Heterothyone alba*	Burrowing sea cucumber	2
Polychaeta	*Hyalinoecia tubicola*		1
Scaphopoda	*Dentalium zelandicum*	Tusk shell	1
		No. species	13

The most abundant species in the dredge sample were the strawberry cockle *Nemocardium pulchellum* and the heart Urchin *Echinocardium cordatum*. Both of these species are known to be common and widespread in the Marlborough Sounds area (McKnight and Grange 1991) and are typical of mud habitats. There are no species in this dredge sample considered to be of ecological significance and warranting further investigation (DOC 1995).

CONCLUSIONS

The rocky habitat that lies between 15 and 20 m depth did not appear to be occupied by large numbers of invertebrates. However, because the small area of cobble – rock habitat at those depths could be buried by shell drop, we consider it prudent to move the

inner boundary of the farm beyond that habitat. This corresponds to a distance of 140-150 m offshore. The brachiopod *Neothyris lenticulatis* is identified in the DoC guidelines (Department of Conservation 1995) as being a species of national significance. However, it is relatively common in East Bay, and we do not believe that its presence should be a barrier to marine farm placement, given (a) that *Neothyris* is relatively common there, and (b) that numerous other marine farms occur over similar habitat in the area, and this species commonly occurs beneath existing marine farms (pers. obs.). Positioning the farm in depths greater than 25 m would limit the impact on the majority of benthic species.

REFERENCES

Department of Conservation. 1995. Guidelines for ecological investigations of proposed marine farm areas. *Occasional Publication 25*, Nelson/Marlborough Conservancy.

McKnight, D.G., & Grange, K.R. 1991. Macrobenthos-sediment-depth relationships in Marlborough Sounds. NZ Oceanographic Institute. DSIR Report P692.