NIWA

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Marine farm survey for consent renewal – MF 357, Yncyca Bay, Marlborough Sounds

NIWA Client Report: NEL2005-14
May 2005

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Prepared for

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Executive Summary

NIWA Nelson has been requested by Sanford South Island Ltd to undertake a benthic survey of an existing marine farm, MF 357 in Yncyca Bay, Marlborough Sounds, to provide information as part of the resource consent renewal process. This report presents the results of the survey, focussing on characterising benthic (seabed) habitats and epifauna (animals living on the surface of the seabed) within the existing farm.

The site is located at the mouth of Yncyca Bay, sheltered from the south but exposed to a long fetch from the north and west. Water depth at the site is 11-22 m. MF 357 forms an extension to the eastern and offshore parts of licence area Li 29. Sampling was done in April 2005 using sidescan sonar surveys and benthic video transects to ground-truth the sidescan images and characterise the epifauna.

Evidence from this study, and from studies of marine farm sites in the Marlborough Sounds generally, indicates that the footprint of the farms is limited to the vicinity of the area covered by mussel lines. Within this zone, there may be some organic enrichment of the sediment (although not usually to the extent that it becomes anoxic) and the accumulation of live and dead mussels on the seabed. The present study does not suggest that there has been any severe, adverse effect of the existing farm on the seabed beneath. Other than the continued accumulation of shell material and live mussels, and assuming that stocking densities remain similar, this situation is not likely to change significantly in the future.

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1. Introduction

NIWA Nelson has been requested by Sanford South Island Ltd to undertake a benthic survey of an existing marine farm, MF 357 in Yncyca Bay, Marlborough Sounds, to provide information as part of the resource consent renewal process. This report presents the results of the survey, focussing on characterising benthic (seabed) habitats and epifauna (animals living on the surface of the seabed) within the existing farm.

The site is located at the mouth of Yncyca Bay, sheltered from the south but exposed to a long fetch from the north and west (Figure 1). Water depth at the site is 11-22 m. MF 357 forms an extension to the eastern and offshore parts of licence area Li 29 (see Figure 2). Li 29 has been in operation for more than 15 years and extension MF 357 was developed prior to 1999 (M. Mandeno, Sanford Havelock, pers. comm.).

2. Methods

Fieldwork was done on 4-5 April 2005 and included sidescan sonar surveys of the site and benthic video transects to ground-truth the sidescan images and characterise the epifauna. Locations of all sampling stations were determined using a Garmin handheld GPS.

Four sidescan sonar swaths of the site, each 60 m wide, were made using a high-frequency (675 kHz) Tritech towfish, running along the outer and inner boundaries of the extension, and further offshore through the offshore boundary of the area currently occupied by longlines (parallel to the shore: Figure 2). The area that is currently occupied by longlines extends offshore beyond both the original licence and the extension area. The inshore track also covered part of the adjoining licence area (Li 29). The position of the towfish was automatically recorded every 2 seconds along each swath and saved with the digital sonograph image. Positional information was obtained from a shipboard GPS and adjusted for the distance between the boat and the towfish. Both the digital image and the GPS positions were used to geo-reference the resulting sidescan tracks, allowing them to be imported to GIS (ArcMap v.9) and the locations of features of interest determined (Figure 2).

Benthic video transects were made using a small remote-operated vehicle (ROV) attached to a sled at 4 locations within MF 357 and one just outside the offshore boundary (Figure 2). The position of the start and finish of each transect was recorded from GPS. Four of the locations were outside the area currently occupied by longlines, and one inside. At each location, the sled was dragged for approximately 10-60 m

along the seabed, sampling an area of ca 5-30 m^2. A reasonably constant towing speed was achieved by hauling the ROV's tether with the winch on the support vessel. Numbers of biological features (including living and dead organisms, and holes) were recorded from each transect.

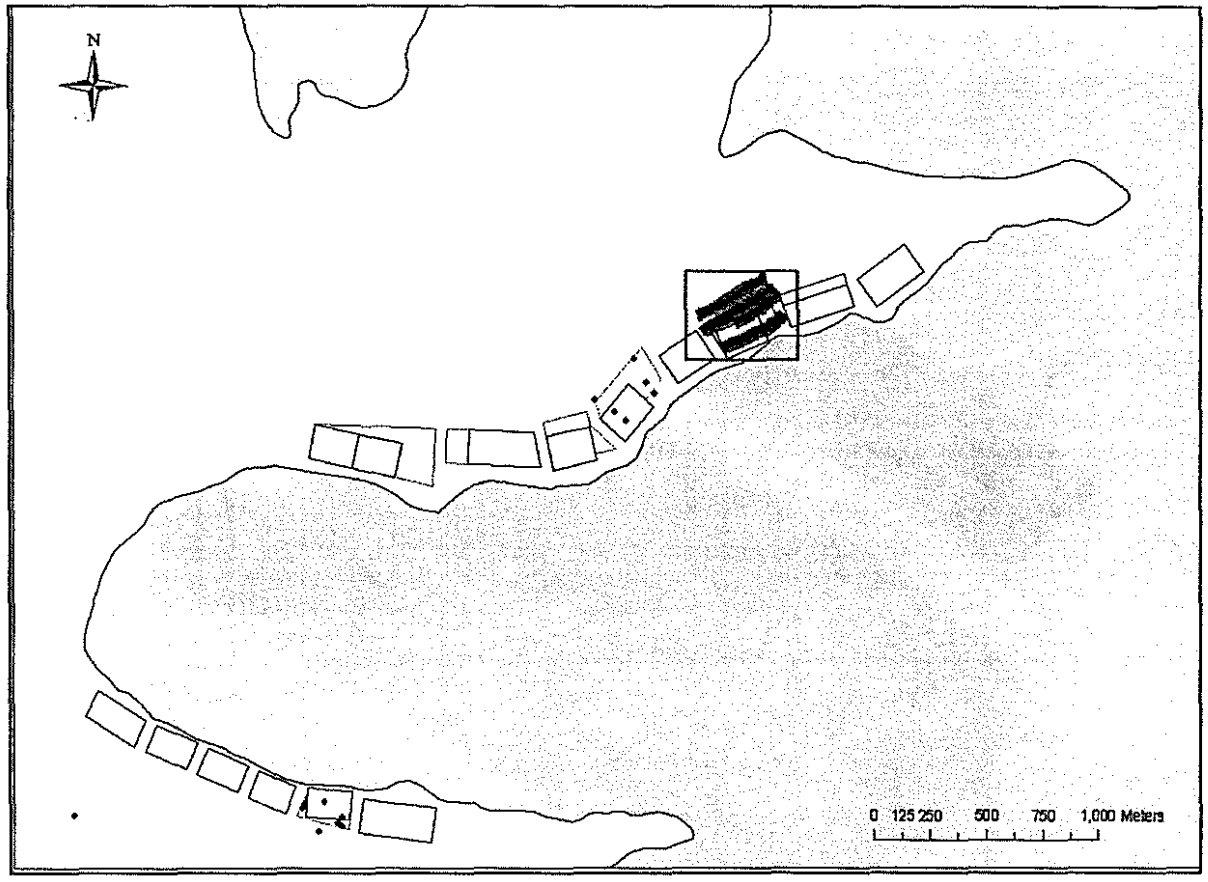

Figure 1 **Yncyca Bay, Marlborough Sounds, showing location of farm site MF 357 in box. Proposed extensions are shown in yellow, and consent areas in white.**

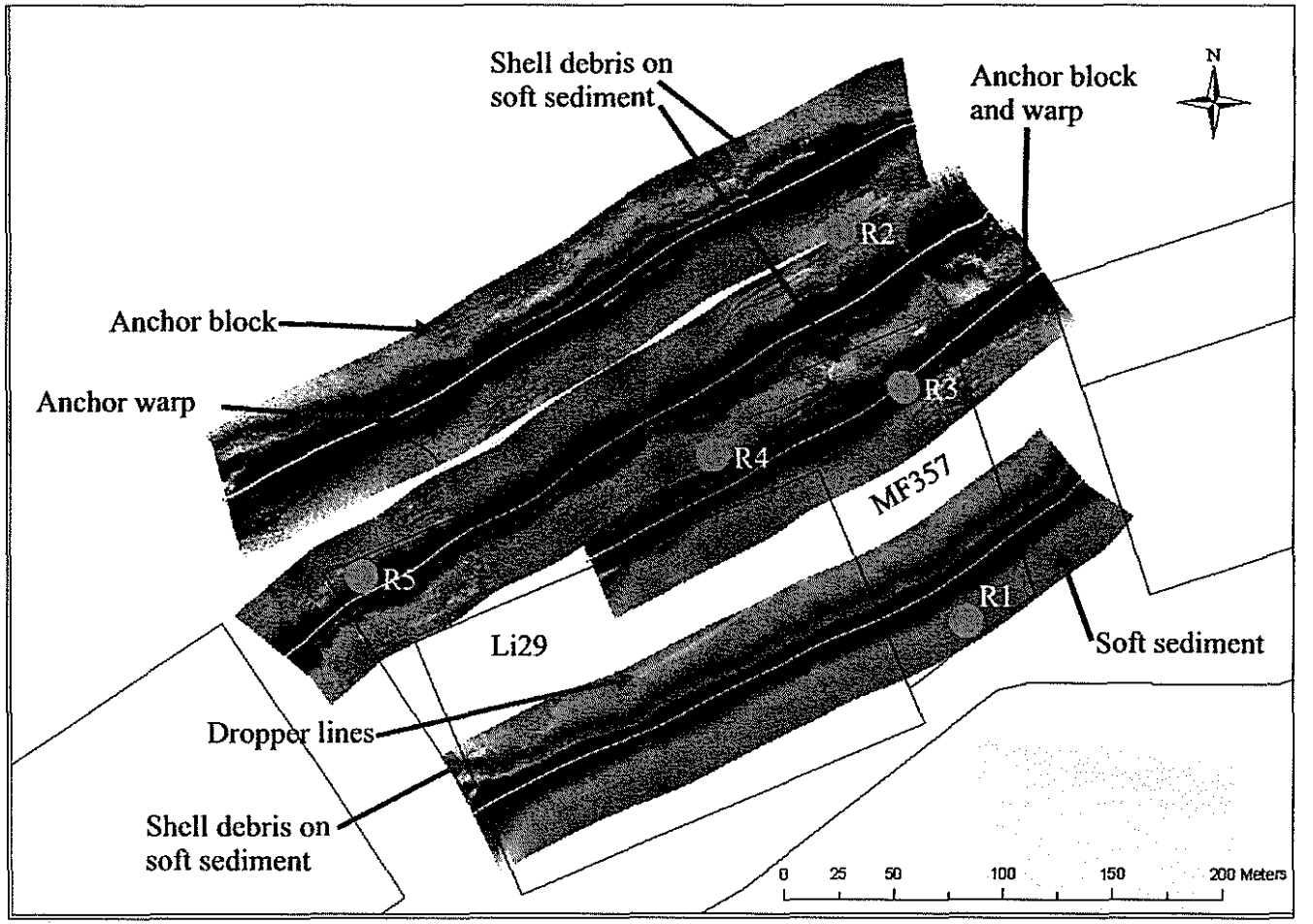

Figure 2 **Location of sonar tracks and ROV transects (green dots) at MF 357, Yncyca Bay and identification of features on the seabed.**

3. Results

3.1 Character of the seabed and sediments below and adjacent to the farm

3.1.1 Sidescan sonar

The sidescan surveys of the site show that the seabed consisted of soft sediment throughout the consent area (Figure 2). Mussel shell debris was generally restricted to the area within the boundaries of the existing farmed area. The existing lines at this site (not shown in Figure 2) occupy the central part of MF 357, but extend 50-75 m further offshore than the outer boundary of MF 357. Debris was dense beneath much of the existing farm and included clumps of mussels. No reef or cobble was detected within MF 357.

3.1.2 Video transects

Ground-truthing of the sidescan swaths along the inshore margin of the extension with the video (outside the area occupied by longlines: R1 in Table 1) showed that the seabed consisted of mud with shell gravel and no mussel debris. Outside the area of existing longlines, and at an intermediate distance from shore (tow R3), the seabed was mud. The offshore parts of the consent areas outside (tows R2 and R5) and inside (tow R4) the area of existing longlines contained muddy sediments with mussel debris. Clumps of live mussels were only present inside the existing farmed area (R4).

3.2 Epifauna of the seabed below and adjacent to the farm

The conspicuous epifauna of the site, as identified from the video tows of the seabed (Table 1), was relatively diverse in comparison with other farm sites surveyed in the Marlborough Sounds (Stenton-Dozey et al. 2003). A single horse mussel was recorded offshore and inside the existing farm (R4). Red algae were abundant at the inshore location but absent further offshore, while brown algae were present at 3 stations, probably drifted from shallower areas or fallen from the droppers. Other taxa, such as sea cucumbers (*Stichopus mollis*) and cushion stars (*Patiriella regularis*) occurred in 3 or more transects. Holes were present at all stations. A single *Coscinasterias muricata* was recorded within the area of existing longlines. These observations do not indicate a major impact of the farm, given that most taxa were present inside and outside the existing farmed area.

4. Discussion

4.1 Nature and extent of effects of the existing farm on the seabed

The presence of mussel farms might be expected to alter the underlying seabed through the input of live and dead mussels, fine-grained particulate matter in the form of faeces and pseudofaeces, and organic material in the form of faeces/pseudofaeces and fouling organisms dislodged from the lines. However, the degree to which this occurs can vary considerably among farms, depending on factors such as the hydrodynamic environment, the depth of water and the level of stocking of the farm.

The presence of shell material on and in the sediment is clearly shown in the sidescan images (Figure 2). This material appears to be confined generally to the area immediately around the mussel lines.

The most obvious effect of the farm on the epifauna is the accumulation of clumps and individual mussels within the farm area. As with many farm sites (e.g. Inglis & Gust 2003), the starfish (*Coscinasterias muricata*) was also present, feeding on the mussels (though it did not appear to be abundant: Table 1). Large, sessile epifauna, such as sponges and horse mussels, were not abundant at any of the sampling locations, but were no less diverse or abundant inside than outside the existing area of longlines. Mobile epifauna and holes presumed to be made by infaunal animals were equally abundant inside and outside.

5. Conclusion

Evidence from this study, and from studies of marine farm sites in the Marlborough Sounds generally, indicates that the footprint of the farms is limited to the vicinity of the area covered by mussel lines. Within this zone, there is likely to be some organic enrichment of the sediment (although not usually to the extent that it becomes anoxic: Stenton-Dozey et al. 2003) and the accumulation of live and dead mussels on the seabed. The present study does not suggest that there has been any severe, adverse effect of the existing farm on the seabed beneath. Other than the continued accumulation of shell material and live mussels, and assuming that stocking densities remain similar, this situation is not likely to change significantly in the future.

6. References

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Kaiser, M. J., B. E. Spencer (1996). The effects of beam-trawl disturbance on infaunal communities in different habitats. *Journal of Animal Ecology* **65**: 348-358.

Stenton-Dozey, J., Ross, A., Stevens, C., Grange, K. (2003). Fisheries resource impact assessment for mussel farm permit applications in Forsyth and Orchard Bays, Marlborough Sounds. NIWA Client Report No. CHC2003-120 for Mussel Farmers' Consortium for Forsyth and Orchard Bays, Christchurch, December 2003.

Table 1 **Sediment characteristics and biological features identified from video transects of the seabed. The locations of the start and end of each transect, and the water depth, are shown. Sediment type was assessed visually. 'Mussel clumps' refers to numbers of clumps of live Greenshell mussels (*Perna canaliculus*). Algae were present as fragments of drift material or possibly as living plants but it was not generally possible to distinguish between these. The presence of holes in the seabed (presumably made by infauna) is indicated. The ROV was not towed at R1.**

	R1 (inshore, outside existing farm)	R2 (offshore, outside existing farm)		R3 (middle, outside existing farm)		R4 (offshore, inside existing farm)		R5 (offshore, outside existing farm)	
		Start	End	Start	End	Start	End	Start	End
Easting	2585861	2585788	2585755	2585821	2585796	2585741	2585696	2585613	2585600
Northing	6008075	6008074	6008054	6008005	6007993	6007980	6007958	6007943	6007948
Water depth (m)	11.7	22.2	21.7	19.2	19.4	18.9	19.4	18.9	19.2
Sediment type	Mud/Shell	Mud/Mussel shell		Mud		Mud/Mussel shell		Mud/mussel shell	
Mussel clumps						7			
Atrina zelandica						1			
Coscinasterias muricata						1			
Patiriella regularis	2			1		4		1	
Stichopus mollis	2	1				3			
Triplefin	1								
Hydroid or bryozoan		2							
Yellow encrusting sponge	1								
Red alga	10								
Brown alga	2			1		1			
Holes	Present	Present		Present		Present		Present	
Image quality	Good	Poor		Moderate		Poor		Moderate	