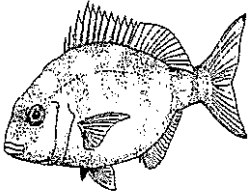


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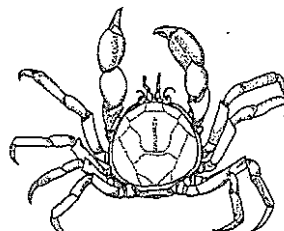
Biological report on a proposed marine farm located in southern Crail Bay, Pelorus Sound

Research, Survey and Monitoring Report Number 355

A report prepared for:

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AUGUST, 2000

Bibliographic reference:

Davidson, R. J.; Brown, D. A. 2000. Biological report on a proposed marine farm located in southern Crail Bay, Pelorus Sound. Prepared by Davidson Environmental Limited for Marlborough Mussel Company. Survey and Monitoring Report No. 355.

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August, 2000

SUMMARY

1. The aims of the study were to provide a biological description of the benthos within a proposed marine farm (4.9 ha) located in southern Crail Bay, Pelorus Sound.
2. Potential threats to any subtidal ecological values posed by the proposed activity have also been discussed.
3. The soft shore communities recorded from the present study were dominated by species that occur on subtidal shores swept by light tidal currents in sheltered Pelorus Sound, Marlborough Sounds (Dell 1951; Estcourt 1967; McKnight 1969, 1974; Roberts and Asher 1993; McKnight and Grange 1991; Davidson and Duffy, 1992; Davidson, 1995; Davidson and Brown 1994; Duffy *et al.* in prep; Chadderton and Davidson in press).
4. The proposed marine farm area was remotely investigated using a Furuno colour scrolling depth sounder. Positions were established from the shoreline using a GPS chart plotter.
5. Divers investigated four haphazardly placed offshore transects established within the proposed marine farm boundaries.
6. A scallop dredge tow was conducted along the length of the proposed marine farm area.
7. Hillsides around the bay were dominated by either early regeneration scrub or recently logged pine plantation.
8. The intertidal shore was dominated by boulder and cobble substrata with isolated areas of bedrock. On average, the shore was approximately <15 m wide.
9. Depths within the application area were relatively consistent ranging from 17 m to 24 m.
10. All areas within the application area were dominated by soft substrata (i.e. silt and clay with a small proportion of broken and dead whole shell). No cobble or other hard shore substrata were recorded from within the area.
11. Scallops, horse mussels and brachiopods were recorded by divers during the present investigation. An area where scallops and horse mussels were relatively common was located at the northern end of the proposed marine farm site. This area was avoided by the modified marine farm boundaries.
12. Scallop and horse mussel densities within the adjusted proposed marine farm site were below the Department of Conservation guideline levels.
13. The initial draft plan was moved 50 m distance to the south to avoid a shallow area that supported a bed of scallops and horse mussels. Based on the modified draft plan (presented in the present investigation) no further modifications of the area on ecological grounds have been recommended.

1.0 INTRODUCTION

The aims of the study were to provide a biological description of the benthos within a proposed marine farm (4.9 ha) located in southern Crail Bay, Pelorus Sound.

Potential threats to any subtidal ecological values posed by the proposed activity have also been discussed.

2.0 STUDY AREA

The study area was located in southern Crail Bay near the outer entrance to Wet Inlet (Figure 1). Crail Bay is one of three relatively large bays located at the eastern end of Tawhitinui Reach. The bay is some 7 km in length and up to 3.4 km wide. The offshore depths of the bay range from 12 m to 33 m (see NZ Navy chart 615). The shoreline and terrestrial environment are typical of many of the bays inside Pelorus Sound. The hillside are clad in combinations of pine plantation, regenerating forest, scrub, and pasture.

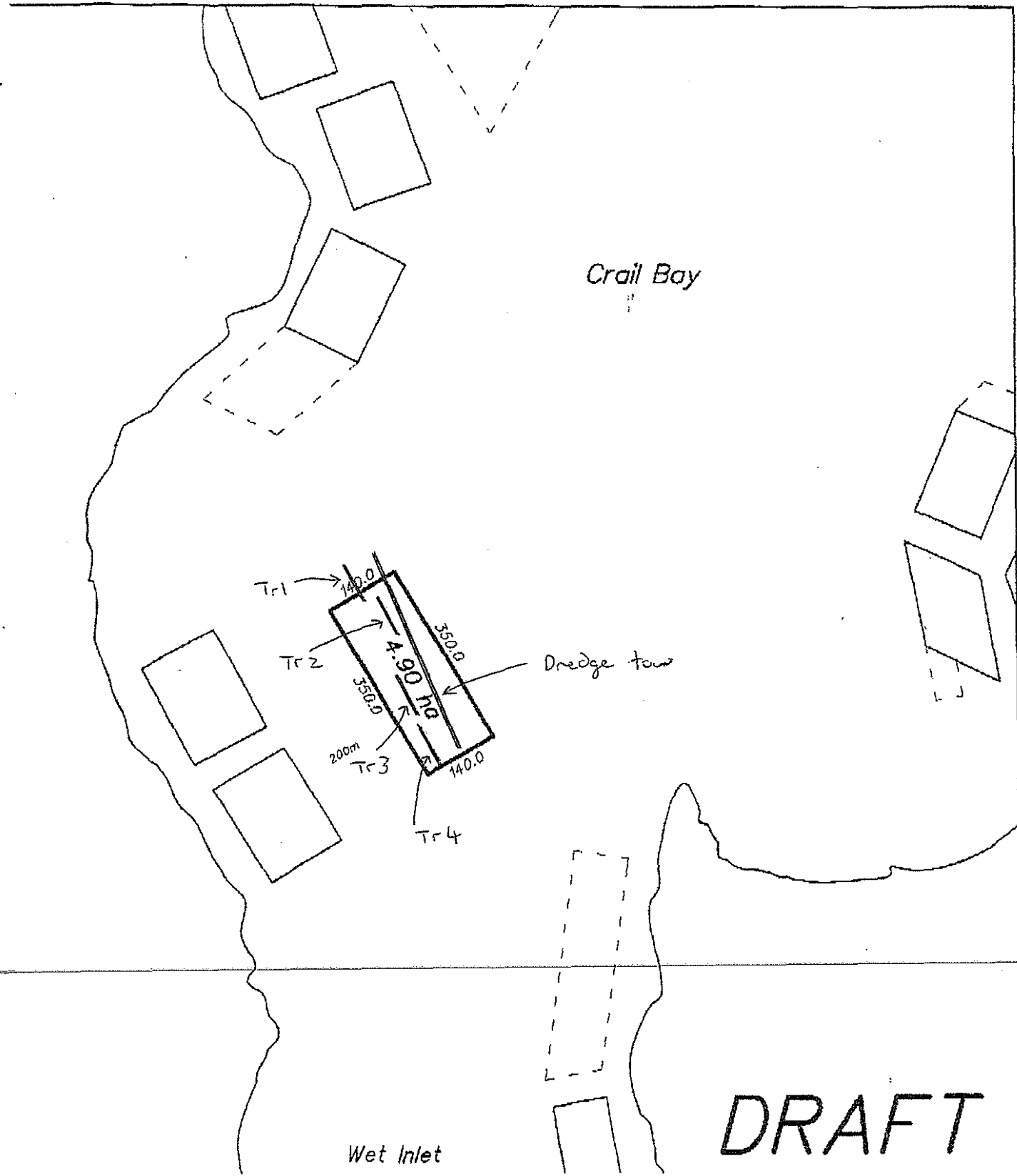
The proposed marine farm area was located offshore of south-western shoreline of Crail Bay (Figure 1). Hillsides around the bay were dominated by either early regeneration scrub or recently logged pine plantation. The intertidal shore was dominated by boulder and cobble substrata with isolated areas of bedrock. On average, the shore was approximately <15 m wide.

3.0 BACKGROUND

The Marlborough Sounds lie at the northern end of the South Island, with Cook Strait to the north and east and Golden Bay and the West Coast to the west. The Marlborough Sounds were formed by a submergence of river valleys. The Sounds consist of approximately 1500 km of bays, passages, peninsulas, headlands, estuaries and beaches, often with an adjacent steep terrestrial topography. The Sounds are a resource of major environmental importance. In a nationwide report by the Department of Conservation, the Marlborough Sounds as one ecological unit was identified as having national conservation importance. Within the Sounds, areas have been ranked ranging from areas of international to regional biological importance (Davidson *et al.*, 1990; Davidson *et al.*, 1995). These values have been included in the Marlborough District Council's draft Marlborough Sounds Regional Plan.

Multiple use (marine farming, fishing, boating, housing, waste water disposal, port development, forestry, agriculture) all have the potential to degrade the marine environment of the Sounds. Marine farming for example, can have considerable impact on the environment through habitat modification or lowering of water quality (Kaspar *et al.*, 1985; Gowan and Bradbury, 1987; Kaspar *et al.*, 1988; Gowan *et al.*, 1990; Silvert, 1992; deJong 1994). It is therefore important that all new marine farm and farm extension proposals adequately identify natural values within and adjacent to a proposed marine farm.

N



Crail Bay

Dredge tow

Wet Inlet

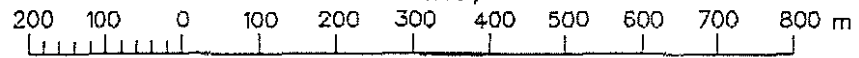
DRAFT

Proposed Coastal Permit

NOTE: The position of this application has not been surveyed.

MARLBOROUGH DISTRICT COUNCIL

SCALE 1:10,000



Datum: New Zealand Map Grid

Prepared by;
DRAUGHTING Plus

Date 24/07/00
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4.0 MATERIALS AND METHODS

The area was investigated on the 12th July 2000. A wide ranging depth sounder run was conducted throughout the proposed marine farm area. Divers investigated four 75 m long transects placed haphazardly within the proposed marine farm boundaries (Figure 1). These offshore transects were not plotted as graphs as depths, substratum and species recorded by divers remained relatively consistent over their length. Each transect consisted of a lead-line marked at 5 m intervals.

Densities of horse mussel (*Atrina zelandica*) and scallop (*Pecten novaezelandiae*) were collected from 10 x 1 m² quadrats installed at various intervals along transects lines. Brachiopod (*Magasella sanguinea*) abundance estimates were collected from areas where brachiopods were most common. A dredge was used to sample takable scallops from a tow that extended the length of the proposed marine farm.

All depths presented in this report are adjusted to datum. Data collected during the study follow the Department of Conservation guideline outlining procedures for the investigation of marine farm areas in the Marlborough Sounds (Department of Conservation, 1995). Observations on water current direction and relative speed were collected at a variety of depths between 1.00 p.m. to 2.30 p.m on the outgoing tide.

5.0 RESULTS AND DISCUSSION

5.1 Water currents and diver observations

Observations from within the proposed farm area suggested that:

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- 1) depths within the application area were relatively consistent varying from 17 m to 24 m.
 - 2) all areas within the application area were dominated by soft substrata (i.e. fine sands, silt, broken and dead whole shell).
 - 3) no cobble or pebble substrata were recorded within the marine farm area;
 - 4) no reef structures were observed within proposed farm area;
 - 5) scallops and horse mussels were observed within the proposed farm boundaries;
 - 6) brachiopods were relatively rare from the proposed marine farm area.

A south-eastward tidal southward current was observed on the benthos during the present study. Based on the species observed from the site, it is expected that light tidal currents regularly occur at the site.

5.2 Transects

The transects were characterised by a relatively uniform silt/fine sand substratum. Broken and dead whole shell was present throughout the site representing approximately < 1%. From the transect a total of 22 conspicuous surface dwelling species of invertebrate, one algae and 3 species of bony fish were recorded during the present investigation. A list of species present within the boundaries of the proposed marine farm have been displayed in Table 1. The transects have not been plotted as depths and substrata remained relatively consistent over their length.

5.3 Fish

Three species of bony fish were recorded during the investigation (Table 1). The number and composition of fish species were representative of sheltered offshore mud habitats of the Marlborough Sounds. No fish feeding holes in the substratum were observed during the present study.

5.4 Scallops (*Pecten novaezelandiae*)

Scallops were observed within the application area and from an area located to the north of the proposed marine farm area. The density of scallops from 27 quadrats collected within the application area was mean = 0.05 individuals per m⁻², se = 0.02. This density was below the Department of Conservation trigger level of 0.1 individuals per m⁻².

The density of scallops from 6 quadrats collected from outside the application area was mean = 0.38 individuals per m⁻², se = 0.1. This density was above the Department of Conservation trigger level of 0.1 individuals per m⁻².

5.5 Horse mussels (*Atrina zelandica*)

Horse mussels were observed from within the application area and from an area located to the north of the proposed marine farm area. The density of scallops from 27 quadrats collected within the application area was mean = 0.004 individuals per m⁻², se = 0.004. This density was below the Department of Conservation trigger level of 0.2 individuals per m⁻².

The density of horse mussels from 6 quadrats collected from outside the application area was mean = 0.47 individuals per m⁻², se = 0.32. This density was above the Department of Conservation trigger level of 0.2 individuals per m⁻².

5.6 Lampshells

An occasional lampshell (*Magasella sanguinea*) was observed attached to shell material within the application area.

Table 1 Species observed from transects from an area in southern Crail Bay, Pelorus Sound.				
Algae	Common name	Invertebrates	Habitat	Common name
Rhodomenia sp. (1)	red algae	PORIFERA		
		<i>Callyspongia</i> sp. (1)	shell	finger sponge
		BRYOZOA		
		<i>Bugula</i> sp. (1)	shell	erect bryozoa
		GASTROPODA		
		<i>Alcithoe fucus</i> (1)	soft	volute
		<i>Amalda novaezelandiae</i> (1)	soft	olive shell
		<i>Cominella</i> sp. (1)	soft	whelk
		<i>Penion</i> sp. (1)	soft	whelk
		<i>Struthiolaria vernis</i> (1)	soft	ostrich foot
		BIVALVIA		
		<i>Atrina zelandica</i> (2)	soft	horse mussel
		<i>Modiolarca impacta</i> (1)	soft	nestling mussel
		<i>Perna canaliculus</i> (1)	soft	green mussel
		<i>Pecten novaezelandiae</i> (1)	soft	scallop
		<i>Poiriera zelandica</i> (1)	soft	spiny murex
		POLYCHAETA		
		<i>Brachiomma</i> sp. (1)	soft	fan worm
		Maldanidae sp. (1)	soft	soft tube worm
		<i>Spirorbis</i> sp. (2)	soft	
		CRUSTACEA		
		<i>Pagurus</i> spp (2)	soft	hermit crab
		ECHINODERMATA		
		<i>Coscinasterias calamaris</i> (1)	soft	11 arm star
		<i>Echinocardium cordatum</i> (3)	soft	sea mouse
		<i>Patiriella regularis</i> (2)	soft	cushion starfish
		<i>Pseudechinus albocinctus</i> (2)	soft	pink urchin
		<i>Stichopus mollis</i> (1)	soft	cucumber
BONY FISHES		BRACHIOPODA		
<i>Notolabrus celidotus</i> (1)	Spotty	<i>Magasella sanguinea</i> (2)	shell	lamp shell
<i>Rhombosolea</i> sp.	flatfish	ASCIDEACEA		
<i>Hemercoetes monopterygius</i> (2)	Opalfish	<i>Cnemidocarpa</i> sp. (1)	soft	saddle squirt
1 = occasional, 2 = common, 3 = abundant				

5.7 Hydroids and Bryozoans

No conspicuous bryozoans or hydroids were recorded by divers during the present investigation.

5.8 Tube worm mounds (*Galeolaria hystrix*)

No tubeworm mounds were observed during the present study.

6.0 POTENTIAL IMPACT OF A BIVALVE MARINE FARM

The impact of shell and sediment deposition on the benthos under a mussel marine farm results in a shift from the initial ecological state to a new state. The degree of change depends on the habitat type and communities present prior to mussel material deposition. In general, a build up of mussel shell on a mud bottom will result in an increased diversity of species living on the surface and a decrease of infaunal species due to increased sedimentation (Kaspar *et al.* 1985; deJong 1994). On a rocky bottom, a decrease in species diversity as a result of shell and sediment deposition would be expected.

Soft bottom substrata and associated communities dominated the area under the proposed marine farm. This relatively uniform silt and clay supported a low variety of species often in low abundance. Of the range of substratum types in the Marlborough Sounds, mud represents the habitat that would be least altered by a mussel marine farm (Kaspar *et al.* 1985; deJong 1994).

7.0 SUGGESTED ADJUSTMENTS TO THE PROPOSED BOUNDARIES

The initial draft plan was moved 50 m distance to the south to avoid a shallow area that supported a bed of scallops and horse mussels. Based on the modified draft plan (presented in the present investigation) no further modifications of the area on ecological grounds have been recommended as:

- the proposed offshore area was dominated soft substrata supporting a relatively low variety of species in relatively low abundance;
- the habitat and community present within the offshore area was representative of the most widespread and common habitat in the Marlborough Sounds and
- no ecological values identified in the Department of Conservation report (DOC 1995) were recorded above trigger levels during the present study.

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