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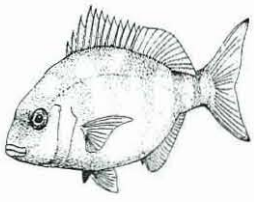

Specialists in:
Marine, and Freshwater Research, Survey and Monitoring

Biological information in relation to a proposed marine farm extension located in Crail Bay, Pelorus Sound

Li 32 & 67

Research, Survey and Monitoring Report Number 417

A report prepared for:

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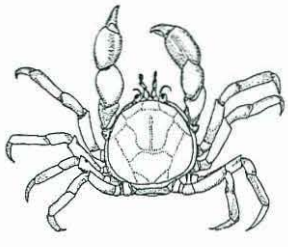

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SUMMARY

1. The aims of the study were to provide a biological description of the benthos within a proposed 9.6 ha offshore marine farm extension to Li 32, Li 67 and U991325. The proposed extension is located approximately 3 km south of Opani-aputi Point along the western shoreline of 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 the sheltered bays of central 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 boundaries and random areas within the extension were remotely investigated using a Lowrance LC X-15 MT scrolling depth sounder. The positions of the corners of the proposed marine farm, the associated depths and the position of the transect were all established using a GPS chart plotter linked to a PC based chart plotting programme. The error associated with this system is less than 10 m distance.

5. Divers investigated ten offshore transects on the 29th January 2002.

6. Hillsides adjacent to the site were dominated early regeneration scrub dominated by kanuka, fern, flax and broadleaf vegetation.

7. The intertidal shore was dominated by combinations of boulder, cobble, and pebble substratum.

8. Depths around the draft proposed extension boundaries were: Point 1 = 32 m, Point 4 = 30 m, Point 5 = 31.5 m, Point 6 = 33 m, Point 7 = 31 m, Point 8 = 30 m.

9. All areas investigated within the draft application area were dominated by soft shore substrata. The benthos was dominated by silt and clay substratum (i.e. mud).

10. No cobble, reef, outcropping rock or other hard shore substrata were recorded by divers or from depth soundings conducted from within the application area.

11. No fish feeding holes of fish feeding habitat were observed from diver collected transects.

12. No horse mussels were recorded by divers from the ten transects.

13. One scallop was recorded from diver transects.

14. No brachiopods, red algae beds or large colonies of bryozoans or hydroids were recorded during the present investigation.

15. Based on the results from the present study, no modifications the extension boundaries have been recommended on ecological grounds as the site is situated over a silt and clay benthos. This habitat is widespread in the Marlborough Sounds, would be the least impacted habitat from the range of subtidal habitats present in the Sounds, and lastly it supports a relatively low range of conspicuous surface dwelling species compared to inshore and hard substratum habitats.

1.0 INTRODUCTION

The aims of the study were to provide a biological description of the benthos within a proposed 9.6 ha offshore marine farm extension to Li 32, Li 67 and U991325. The proposed extension is located approximately 3 km south of Opani-aputi Point along the western shoreline of Crail Bay, Pelorus Sound. Potential threats to any subtidal ecological values posed by the proposed activity have also been discussed.

2.0 STUDY AREA

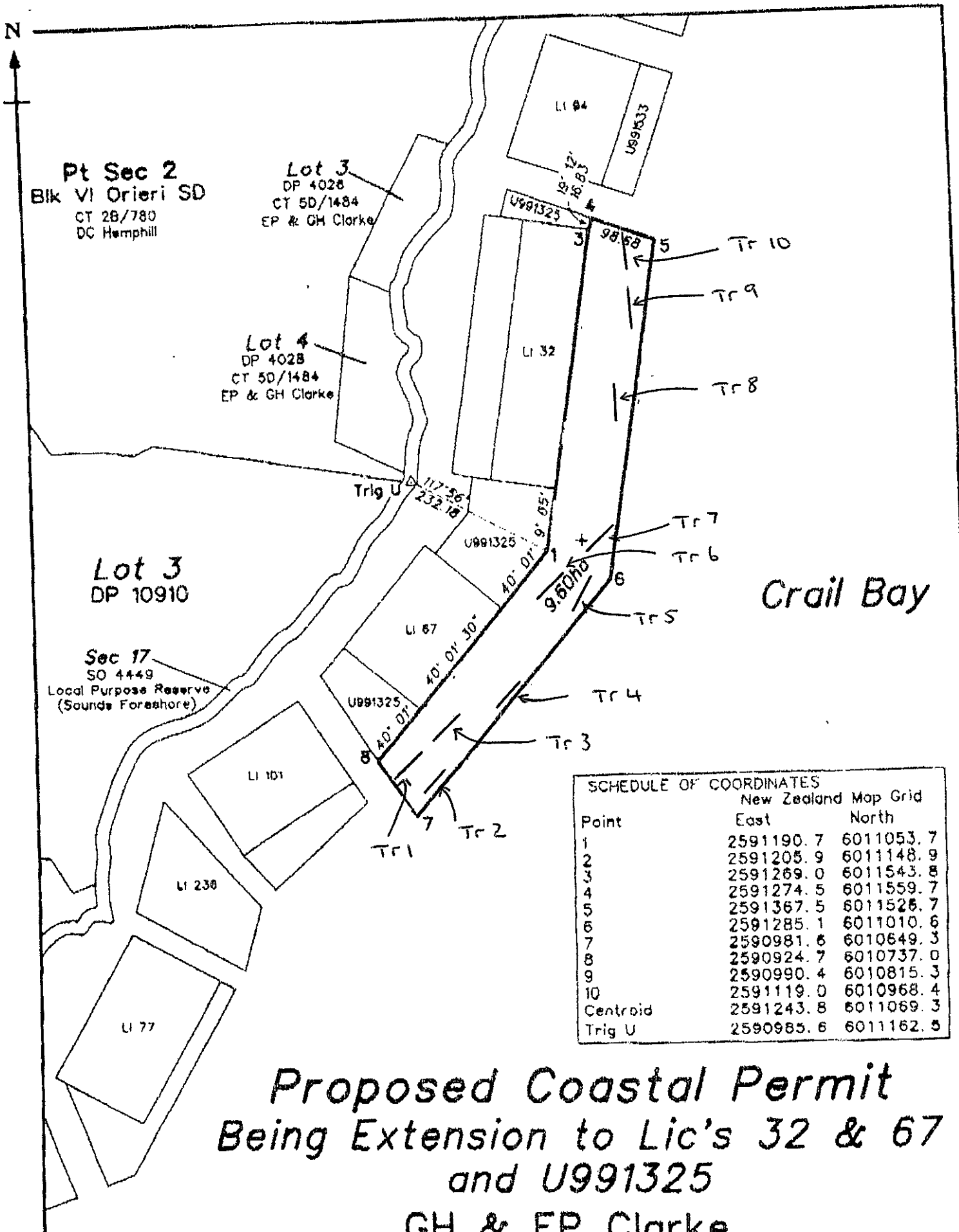
The study area was located on the western shore of Crail Bay (Figure 1). Crail Bay is one of three relatively large bays located at the eastern end of Tawhitinui Reach. The bay is some 7 km in length and up to 3.4 km wide. The offshore depths of the bay range from 12 m to 33 m (see NZ Navy chart 615).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

The terrestrial environment adjacent to the proposed marine farm site was dominated by early regeneration scrub. The intertidal shore was dominated by combinations of boulder, cobble and pebble substratum.

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.



SCHEDULE OF COORDINATES

Point	New Zealand Map Grid East	North
1	2591190.7	6011053.7
2	2591205.9	6011148.9
3	2591269.0	6011543.8
4	2591274.5	6011559.7
5	2591367.5	6011526.7
6	2591285.1	6011010.6
7	2590981.6	6010649.3
8	2590924.7	6010737.0
9	2590990.4	6010815.3
10	2591119.0	6010968.4
Centroid	2591243.8	6011069.3
Trig U	2590985.6	6011162.5

Proposed Coastal Permit

Being Extension to Lic's 32 & 67 and U991325

GH & EP Clarke

NOTE. The position of this application has not been surveyed
MHWM Plotted from SO's 5413, 5650, 5698, 5709 & 5923

MARLBOROUGH DISTRICT COUNCIL

SCALE 1:7500

100 0 100 200 300 400 500 600 metres

Datum: New Zealand Map Grid

Prepared by: DRAUGHTING Plus

Date 28/11/01

MF_1320.gcd

4.0 MATERIALS AND METHODS

The area was investigated on the 30th January, 2002. The proposed marine farm boundaries and random areas within the extension were remotely investigated using a Lowrance LC X-15 MT scrolling depth sounder. The positions of the corners of the proposed marine farm, the associated depths and the position of the transect were all established using a GPS chart plotter linked to a PC based chart plotting programme. The error associated with this system is less than 10 m distance.

Divers investigated ten offshore transects within the proposed extension area (Figure 1). Transect consisted of a lead-line marked at 5 m intervals and was deployed from the survey vessel close to parallel to the existing mussel line on Li 32 and Li 67.

Densities of horse mussel (*Atrina zelandica*) and scallop (*Pecten novaezelandiae)* were collected from 10 x 1 m^2 quadrats installed at various intervals along transects lines. Percentage cover estimates of any community forming species such as red algae beds or the relative abundance of biological features such as brachiopod beds were collected from areas along the transect. 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 10.30 a.m. to 3.30 p.m. on the high tide followed by the outgoing tide.

5.0 RESULTS AND DISCUSSION

5.1 Water currents and diver observations

Observations from within the proposed farm area suggested that:

1) Depths around the draft proposed extension boundaries were: Point 1 = 32 m, Point 4 = 30 m, Point 5 = 31.5 m, Point 6 = 33 m, Point 7 = 31 m, Point 8 = 30 m.

2) All areas within the application area were dominated by soft shore substrata (i.e. silt and clay);

3) No cobble or other hard shore substrata were recorded from within the application area;

4) No reef structures were observed within proposed farm area;

5) No fish feeding holes were observed by divers.

6) Horse mussels were not observed, while diver recorded one scallop.

A light northward tidal current was observed during the present study. A light northward tidal current was observed on the benthos during the present study.

5.2 Transects

Offshore transects
The substratum and associated community recorded from the ten offshore transects was consistent. Silt and clay substrata with very little shell material dominated all transects. An occasional individual whole dead mussel shell was observed occasionally along transects.

From the transect a total of 17 conspicuous surface dwelling species of invertebrate, one ascidian, two species of algae and two species of bony fish were recorded during the present investigation. A list of species present within the boundaries of the proposed marine farm has been displayed in Table 1.

5.3 Fish

Two species of bony fish were recorded during the investigation (Table 1). The presence of opalfish is indicative of offshore mud areas of the Marlborough Sounds. Spotty were recorded when divers came close to an existing anchor block. No blue cod, tarakihi or blue moki were recorded during the present investigation. No fish feeding holes or fish feeding substratum were observed during the present study.

5.4 Scallops (*Pecten novaezelandiae*)

One individual scallop was recorded from an area of 750 m^2 investigated quantitatively by divers.

5.5 Horse mussels (*Atrina zelandica*)

No horse mussels were recorded from the ten offshore transects sampled during the present study.

5.6 Lampshells

No lampshells (*Magasella sanguinea, Neothyrus lenticularis*) were recorded during the present study. It is possible that the tiny lampshell *Waltonia inconspicua* may be present attached to dead whole shell substrata at the site. This species is widespread around New Zealand in comparable locations.

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.

Table 1 Species observed from transects from an offshore area in Crail Bay, Pelorus Sound.

Algae	Common name	Invertebrates	Habitat	Common name
Microalgal mat (1)	slime	GASTROPODA		
Unidentified filamentous red	red algae	*Armandia australis (1)*	soft	olive shell
		Struthiolaria sp. (1)	soft	ostrich foot
		Poiriera zelandica (2)	soft	spiny murex
		BIVALVIA		
		Mytilus edulis (1)	soft	blue mussel
		Nemocardium pulchellum (1)	soft	strawberry cockle
		Pecten novaezelandiae (1)	soft	scallop
		Perna canaliculus (1)	soft	green mussel
		POLYCHAETA		
		Megalomma sp.(1)	soft	parchment worm
		Spirorbis sp. (1)	soft	spiral worm
		Serpulid sp. (1)	soft	tube worm
		CRUSTACEA		
		Pagurus spp (1)	soft	hermit crab
		ECHINODERMATA		
		Amphiura rosea (1)	soft	tiny snake star
		Coscinasterias calamaris (1)	soft	11 arm star
		Echinocardium cordatum (2)	soft	sea mouse
		Patiriella regularis (1)	soft	cushion starfish
		Stichopus mollis (1)	soft	cucumber
		UCHIURA		
BONY FISHES		*Urechis novaezelandiae*		sausage worm
Notolabrus celidotus (1)	Spotty	ASCIDEACEA		
Hemercoetes monopterygius (2)	Opalfish	*Cnemidocarpa* sp. (1)	soft	saddle squirt

1 = occasional, 2 = common, 3 = abundant

5.9 Red algae beds

No red algae beds were observed during the present study, however, occasional clumps of an unidentified filamentous red algae were recorded from along transects. This species is probably seasonal and did not at any stage reach 1 % cover.

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.

Silt and clay soft bottom substrata and associated communities dominated most all of the area investigated under the proposed marine farm extension. This habitat supports a relatively low variety of surface dwelling 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). Mud substratum is also the most common and widespread habitat present in the Sounds. The community associated with deep mud habitats is relatively consistent over the Marlborough Sounds (McKnight and Grange 1991) and for mud-dominated harbours and sounds around New Zealand (McKnight 1969).

7.0 ADJUSTMENTS TO PROPOSED BOUNDARIES

Based on the results from present the study, no modifications the extension boundaries have been recommended on ecological grounds as the site is situated over a silt and clay benthos. This habitat is widespread in the Marlborough Sounds, would be the least impacted habitat from the range of subtidal habitats present in the Sounds, and lastly it supports a relatively low range of conspicuous surface dwelling species compared to inshore and hard substratum habitats.

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