REC 749
U990923

ATTACHMENT F

Survey of Benthic Macrobiota in Crail Bay

By TJM Edwards B Sc and Rod Asher NZSC (Cawthron Institute, Nelson)

Introduction

The survey covers a 46.8ha spat holding area within Crail Bay in the Marlborough Sounds.

The survey is an investigation of the benthic macrobiota undertaken to accompany a marine farming application.

Methods

Transects were sampled by video and grab sample on 21.7.99. The transects cross the site as shown in Figure 1 attached.

Core samples were taken by a grab sampler to visually ascertain sediment type, and show infaural communities present.

Real-time video footage was taken by a camera and light attached to an umbilical, suspended just above the seafloor of the site. GPS marks were taken to record the start and stop points of video while the survey vessel drifted slowly over the site.

Results

Dredge Sampling

Dredge sampling was not feasible at this site because of the remote potential of disturbing an adjacent subaqueous power cable. Instead grab and video sampling techniques, (shown to be both effective and accurate in describing benthic communities on adjacent sites) were used.

Grab Samples

This sampling technique, along with increased video sampling, was used throughout the site as shown in Appendix.

Grab samples show that the sediment is soft grey-brown silt mud. A very small amount of dead shell debris was found, and sediments here were particularly fine. Very little of anything was found.

Video Transects

A number of video transects were taken as set out in the Appendix throughout the site. All video transects showed a uniformity across the entire site of soft mud flats with sparse and low numbers of invertebrates or any conspicuous species. Occasional fish were noted (see species list). There were no horsemussels present. Communities of invertebrates seen were typical of soft mud bottoms (which are extensive throughout the Sounds). Most visually obvious were the protruding arms of brittle stars (*ophionereis sp.*) from their mud holes. Only 2 scallops in total were noted in video transects. Video was taken both in daylight hours and at night, when more fish species were present - presumably attracted by the video light.

Discussion

Dredging technique was not appropriate at this site. However clear video footage from extensive transects and several grab samples were considered sufficient to give a clear indication of the seafloor environment.

The grab survey found very few infaunal species (ie species that live below the sediment surface) suggesting that the seafloor does not have rich or diverse populations of infaunal organisms.

Video enhanced the sampling regime by showing the presence of fish which escaped the dredge, and confirmed the relative lack of other species.

The impact of sedimenting pseudo-faeces from mussel would be insignificant in this already sedimentary environment. The effect of any shell drop-off would be to provide surface onto which encrusting organisms could attach, thus increasing the diversity of the area. This could be at the expense of very small areas of the habitat directly under a clump of mussel stet presently available to current inhabitants. However over the whole area the affect is likely to be insignificant.

Conclusion

No species, communities or habitats of scientific or ecological importance, as identified in the DOC Guidelines (1995), have been indicated by the survey. Given the consistent presence of species associated with soft sediment. and given the results from sonar tracking, the entire area appears to be similar soft sediment habitat. Areas of this soft sediment habitat are considered suitable biologically for the location of mussel farms and biologically more appropriate than near shore areas.

References

Department of Conservation 1995. Guideline for ecological investigations of proposed marine farm areas in the Marlborough Sounds. Nelson/Marlborough Conservancy Occasional publication No 25, 21pp

Appendices

1. Relative abundance or presence of organisms on video and dredge samples.

2 Video and grab sample .

Appendix Summary data from video transects and dredge tows.

Site Crail Bay South

Notes:
1. Relative Density codes: S=Sparce (<5 individuals), O=occasional (5-20 individuals), C=common (21-50 inviduals), A=abundant (51-100 individuals), VA=very abundant (>100 individuals)
2. P= Present (when relative abundance is not appropriate)

Taxon	Sampling method	Video	Dredge	Grab
ANEMONES & HYDROIDS				
Unidentified Thecate hydroid		S		
Unidentified anemone 1		S		
Cerianthid (tube anemone)		S*[1]		
BIVALVES				
Ennucula strangei				C
Neilo australis				P
Nemocardium pulchellum		S		P
Pecten novaezelandiae		S		
CRABS				
Paguridae		S*[1.]		
ECHINODERMS (SEA STARS/URCHINS)				
Echinocardium cordatum		O		P
Patiriella regularis		S*[1.]		
FISH (video done at night)				
Flatfish		S		
Mullet		O		
Opalfish		O		
Red gurnard		S		
Skate		S		
Unidentified fish (juvenile?)		O		
GASTROPODS (SNAILS)				
Amalda mucronata		S		
Austrofusus glans		S		
Cadulus teliger				S*[1.]
Poirieria zelandica		S		
HOLOTHURIANS (SEA CUCUMBERS)				
Rynkatorpa uncinata				S*[1.]
ISOPODS				
Flabellifera		S		
DECAPOD				
Shrimps		C		

Appendix 3 (cont.)

Taxon	Sampling method	Video	Dredge	Grab
OPHIUROIDS (BRITTLE STARS)				
Amphiura rosea		A		C
Ophionereis sp.		O		
SPONGES				
Callyspongia sp.				
Encrusting sponge 1 (orange)		S		
Erect sponge 1 (orange)		S		
Tethya sp. (golf ball sponge)		S*[1]		
WORMS (POLYCHAETES)				
Aphroditidae		S		
Maldanidae		O		P
Onuphidae				P
Sabellidae		S		
Sabella sp.		S		
Total no. taxa		33		

*[1]. Single specimen only

Video recording of transects done at night, which attracted more fish to the lights.

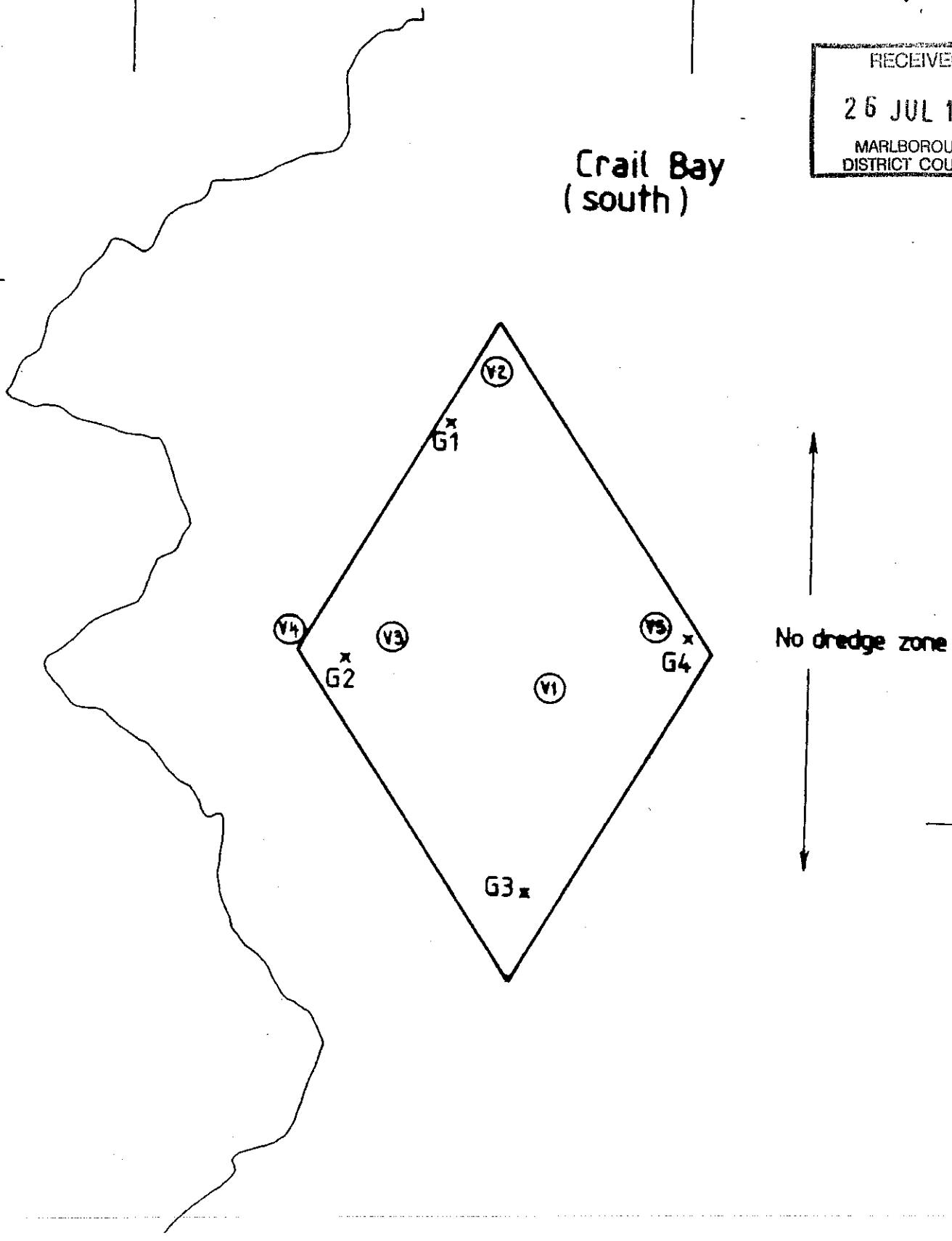
Summary of the area.

A relatively flat site (approx. 29-31m depth) consisting of fine, soft, brown/grey mud substrate with a very low occurrence of shell debris.

The site is uniform in habitat throughout. The assemblage of organisms is typical of soft mud bottoms throughout the Sounds area.

The small brittle star (Amphiura rosea) is abundant with shrimp common. The rest of the invertebrate species recorded were only occasionally seen and in some cases only single specimens spotted.

A single specimen of the tube anemone (Cerianthid) was seen on the video. Although considered rare, in this case numbers are well below trigger levels.



Indicative Plan of Grab Samples & Video Locations

July 1999
Scale 10,000

EVIDENCE OF PAUL ALBERT GILLESPIE

1. QUALIFICATIONS AND EXPERIENCE

My full name is **PAUL ALBERT GILLESPIE**

- PhD Microbiology, Oregon State University, 1970
- Senior research scientist & environmental consultant, Cawthron Institute, Nelson (1977-present)
- Leader of a long-term government-funded programme of research into the productivity and micro-algal ecology of Tasman Bay.
- 26 publications in the field of aquatic microbiology and ecology in internationally accepted, refereed journals.
- More than 70 environmental characterisation and impact reports (primarily dealing with the coastal marine environment in New Zealand).

2. SCOPE OF EVIDENCE

2.1 I have been retained by MacLab NZ Ltd. to provide scientific evidence relevant to its proposal to establish a marine farm in South Crail Bay within Pelorus Sound, Marlborough Sounds. The proposed site location is illustrated in Figure 1, appended to my evidence.

2.2 In this context, I have been asked to comment on

(a) the current scientific knowledge of the seabed (benthic) ecology of the proposed Crail Bay site and the Marlborough Sounds (with specific reference to the work already carried out by MacLab in support of its applications);
(b) the likely effects of large scale mussel farming on the benthic ecology of soft-sediment habitats in the vicinity of the proposed farm (having regard to the proposed stocking density, *etc.*);
(c) the likelihood of flow-on effects on the wider ecology of the Bay due to food web implications;
(d) the need for monitoring and review conditions to ensure sustainable development within the areas.

Consideration of the potential for nutrient and food depletion within the water column, and related implications for the sustainability of nearby farms, will be addressed elsewhere in the hearing evidence (see evidence of Barbara Hayden).