Horoirangi Marine Reserve, North Nelson, rocky shore baseline biological report

Research, Survey and Monitoring Report Number 513

A report prepared by

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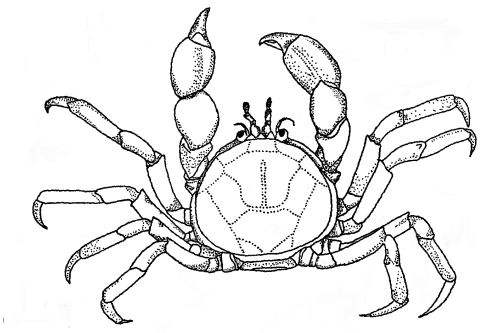

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1.0 ABSTRACT

Horoirangi Marine Reserve was established on 26th January 2006. The present report provides a biological quantitative dataset for the rocky shores of the reserve and adjacent control areas based on surveys undertaken from 14th March 2006 to 17th May 2006.

Data collected included:

- Shore profiles and video
- Key benthic invertebrate density and size
- Macroalgae percentage cover estimates
- Reef fish densities and size estimates of selected species
- Rock lobster densities, size and sex

Baited underwater video sampling was not collected during the present study and is scheduled to be collected summer of 2006-2007.

These raw data have been presented in the appendices of the present report. Analysis of the data has been provided in the main sections of the report.

Recommendations for ongoing monitoring conclude the report.

2.0 INTRODUCTION

Horoirangi Marine Reserve was established on 26th January 2006. The present study establishes a quantitative biological baseline for the area encompassed by Horoirangi Marine Reserve, North Nelson. The study also establishes data for a number of adjacent control sites.

A combination of key species such as blue cod (*Parapercis colias*) and spiny lobster (*Jasus edwardsii*) were selected for study primarily because these species are widespread in the reserve (Cole *et al*., 2003) and represent an important component of the recreational fishery. These species have also been the focus of other studies in New Zealand, both in relation to marine reserves and fisheries research (Mace and Johnson, 1983; Cole *et al*., 2000; Carbines, 1998, 1999; Blackwell, 1997, 1998; MacDiarmid and Breen, 1993; Kelly *et al*.; 2000; Davidson *et al*., 2002, 2005, Shears et al. 2006). These species have also shown that they often respond to protection. A variety of other species and general habitat features were also investigated during the present study (e.g. shore profiles, selected invertebrates). Changes due to reservation for these biological features have seldom been recorded as these features are not often studied and change may take a considerable period of time compared to species removed by fishing activities.

3.0 STUDY AREA

Horoirangi Marine Reserve is located along the coastline approximately 11 km north of Nelson City and immediately north of the settlement of Glenduan. The reserve is 904 hectares in size and stretches along approximately 5 km of coastline (Figure 1). It is contiguous with the Nelson Boulder Bank, which extends back towards Nelson. To the north of the reserve is Cable Bay, Pepin Island, and Delaware Bay (located on the northern side of Pepin Island). Control sites were established on the Boulder Bank, in Cable Bay, around Pepin Island and in Delaware Bay.

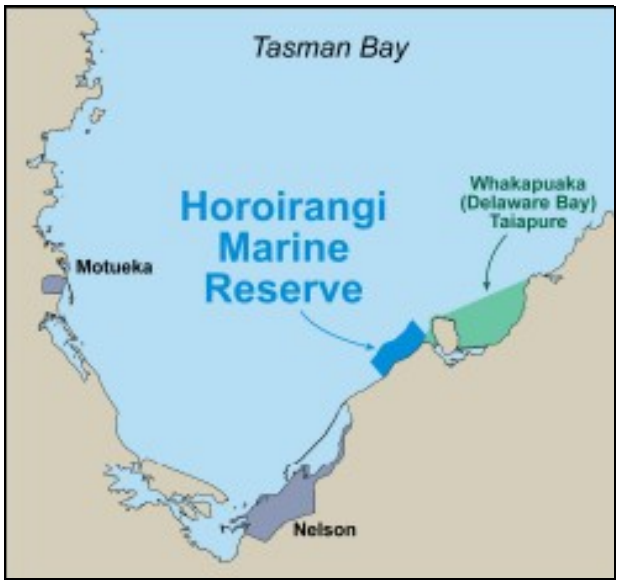


Figure 1. Location of Horoirangi Marine Reserve in Tasman Bay.

4.0 MATERIALS AND METHODS

4.1 Shore profiles

Eight reserve and six control shore profiles were established from March to May 2006. The reserve profile sites were located along the length of the marine reserve and were established in representative areas of the reserve (Figure 2, Appendix 1). Two control sites were situated south of the reserve along the Nelson Boulder Bank, one control site was situated immediately north of the reserve in Cable Bay, while three control sites were situated on Pepin Island (Figure 2). All control sites were selected in an effort to find shores with comparable shore aspects, depth regimes, tidal currents and wave exposure.

At each site, a lead-line rope marked at 5 m intervals was positioned from the low water mark extending perpendicular to the shoreline and reaching 150 m distance seaward. At some profiles divers swam out an additional 50 m tape measure thereby extending the offshore extent of the profile. The low water mark was determined using biological indicator species such as macroalgae and particular invertebrates. Along each profile divers recorded distance (m), depth

(m) below mean low water, dominant substratum, dominant macroalgae species and the estimated percentage cover of macroalgae. Divers also recorded a digital video of each shore profile from 150 m to the low water mark. On particular occasions, the video was collected from 200 m distance from shore. Video footage was digitised using Microsoft Movie Maker 2 and supplied to the Department of Conservation on a DVD disc.

4.2 Benthic invertebrate and macroalgae quadrats

Selected macroinvertebrate species and percentage cover of brown macroalgae were sampled from six reserve and six control sites from April and May 2006. Sample sites were established at the location of shore profile sites (Figure 2).

At each site three depth strata were sampled (0-0.5 m, 2.5-3 m, and 5-5.5 m depth mean low water). A total of ten 1 m^2 quadrats were deployed haphazardly at each site and each depth strata (Table 1). Density of black-foot and yellow-foot paua and maximum length of black-foot paua were recorded by divers. Due to low number of black-foot paua present in the quadrats, divers thoroughly searched the shore and measured up to 50 individuals at each site.

Density of selected other invertebrates were recorded from all quadrats. The total percentage cover of large brown seaweeds within each quadrat was also recorded. The percentage composition of selected species of brown seaweed were also collected from quadrats.

Table 1. Summary of 1 m^2 invertebrate and macroalgae quadrats. Note: a total of 30 quadrats were collected from each site (10 quadrats per depth strata).

Treatment	Number of sites	Habitat and strata	Total number of quadrats
Reserve	6	Hard shore 0-0.5 m	60
		Hard shore 2.5-3.0 m	60
		Hard shore 5.0-5.5 m	60
Control	6	Hard shore 0-0.5 m	60
		Hard shore 2.5-3.0 m	60
		Hard shore 5.0-5.5 m	60
TOTAL	12		360

4.3 Fish density from underwater visual transects

Blue cod and other reef fish abundance was investigated from March to May 2006 using established underwater visual transect methods (Bell, 1983; McCormick and Choat, 1987; Choat *et al*., 1988; Buxton and Smale, 1989; Cole *et al.,* 1990; Cole, 1994; Willis *et al*., 2000, Davidson, 2001).

Twelve replicate 30 m long fish transects were sampled from each of six reserve and six control sites (Table 2, Figure 3 and 4, Appendix 4 and 5). All transects were established parallel to shore in boulder and reef habitat from 5 to 10 m depth below low water.

Table 2. Summary of 60 m^2 underwater fish count sites.

Treatment	Number of sites	Habitat	Replicates per site	Total number of transects
Reserve	6	Hard shore	12	72
Control	6	Hard shore	12	72

At each site, a lead weight at the start of the transect line was dropped onto the substrate within the designated depth range. The line was automatically reeled off a spool as the diver holding the spool swam away from the lead weight. At a distance of 5 m from the weight (indicated by a marker on the line), the diver started counting fish present within an estimated 2 m wide x 2 m high x 30 m long "tunnel". Transects were swum at a constant slow speed, but fast enough to ensure that swimming fish did not overtake the divers. Underwater visibility was at least 4.5 m horizontal distance for the collection of fish transect data.

Blue cod, blue moki, red moki, magpie moki, tarakihi and butterfish sizes were estimated by divers to the nearest centimetre of body length. Any of these species observed outside transects while divers retrieved each transect line were also estimated for total length. Care was taken not to repeat measure fish. This was possible due to the very low numbers of reef fish observed from both control and reserve sites. Divers excluded triplefins and cave and crevice-dwelling species. Diver estimation of fish size was standardised using clipboards with clearly labelled length measurements to assist fish length estimation accuracy.

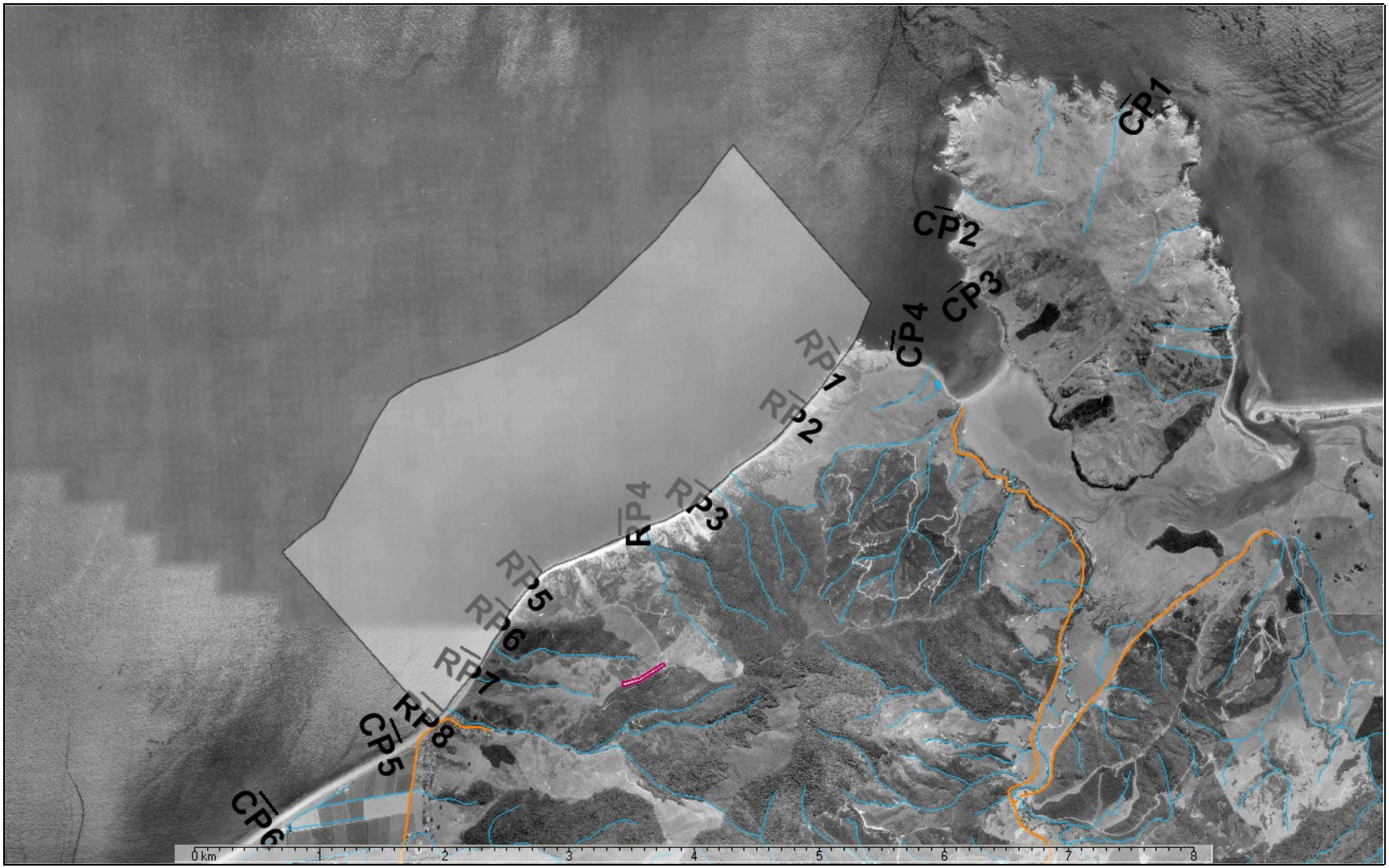


Figure 2. Location of shore profiles in Horoirangi Marine Reserve and control sites. Benthic invertebrate sample sites (CB1-CB6 and RB1-RB6) were collected from inshore areas at each corresponding shore profile (excluding RP2 and RP6).

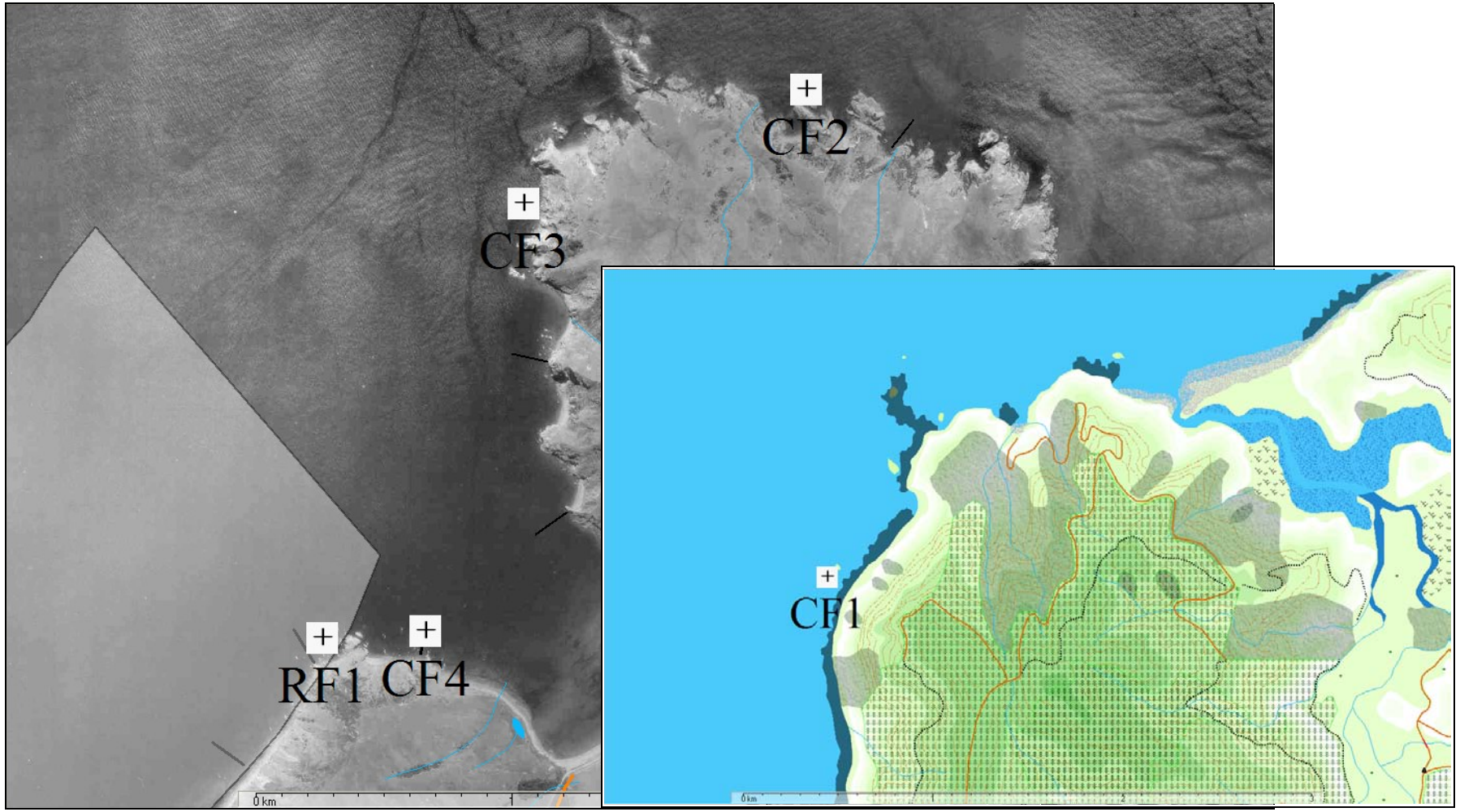


Figure 3. Fish visual underwater sample sites (Pepin Island and Delaware Bay). Insert = CF1 site located in northern Delaware Bay. + = approximate location of sample sites, coordinates for each site have been presented in Appendix 4.

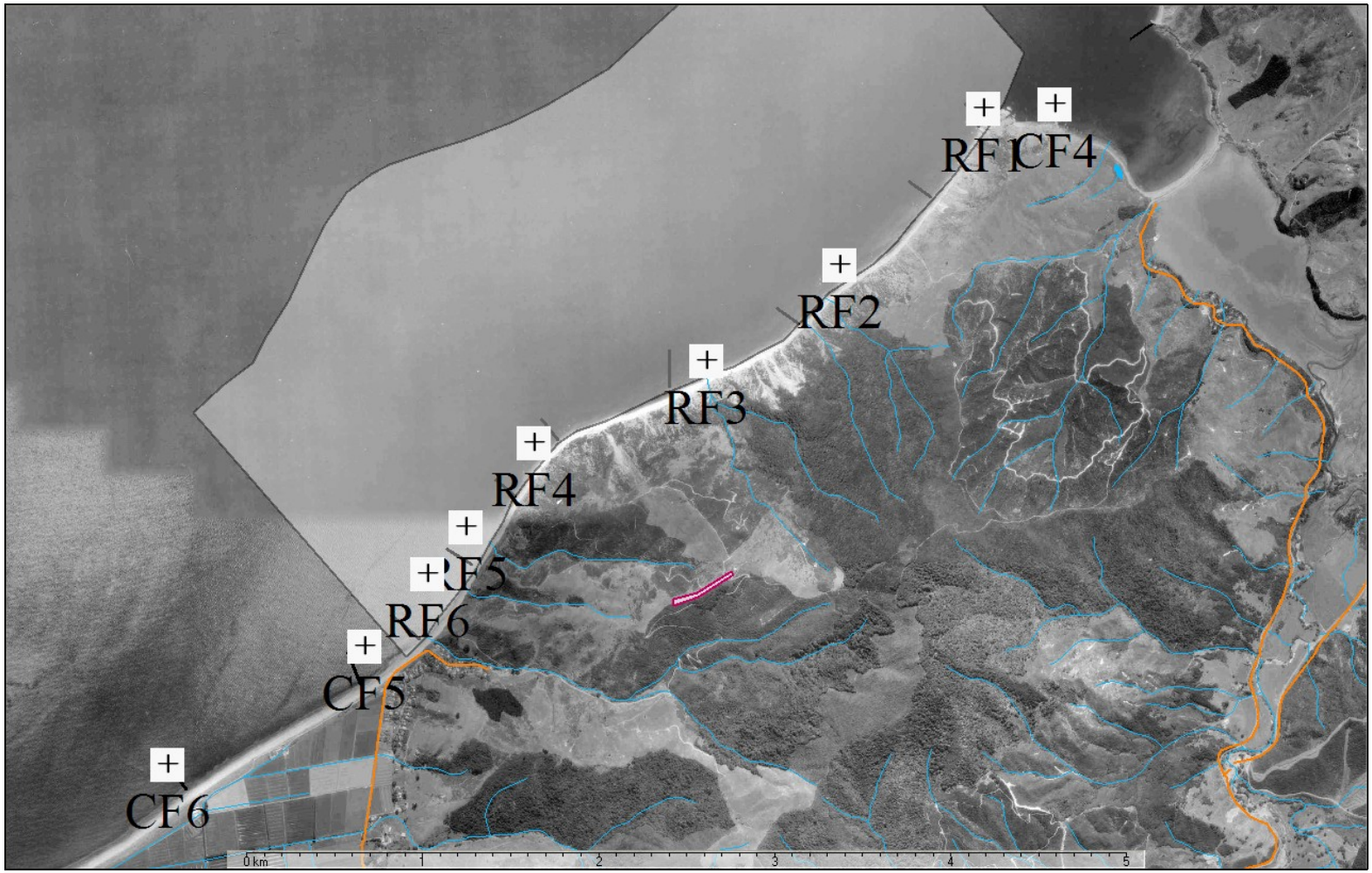


Figure 4. Fish visual underwater sample sites (Marine Reserve and Boulder Bank). + = approximate location of sample sites, coordinates for each site have been presented in Appendix 4.

4.4 Baited underwater video (BUV)

BUV allows accurate measurements of reef fish, particularly blue cod and tarakihi. Snapper also respond to BUV stations. These data will provide validation of diver-collected fish sizes, allow comparison with BUV data collected in future years, and may also sample fish such as snapper that avoid divers.

Due to adverse weather conditions, it was not possible to deploy the BUV during the April to May 2006 sampling period. Instead, it is proposed to sample six reserve sites and six control sites in late spring to early summer 2006-2007 (post the present report) using BUV methods. Control and reserve sites will be selected in an effort to represent comparable environmental variables (e.g. depth, substratum, shore aspect). Sites close to or at the existing UVC sites will be used where appropriate. At each site, GPS coordinates and water depth will be recorded.

The BUV system used consists of an Ikelite EV-CAM Hz colour camera mounted on a stainless steel tripod positioned 115 cm above the substratum and facing straight down. A bait holder (containing a supermarket fisherman's burley bag) is attached to the square base of a stand fixed to the tripod so that it lies in the centre of the camera's field of view. The base is exactly 400 mm square, allowing spatial calibration of digitised images and accurate calculation of fish lengths responding to the bait. Each 30 minute deployment will be made on soft or combinations of soft and hard substrata. When deployed on soft substratum, the camera will be placed immediately adjacent to or within 5 m of reef habitat.

The BUV assembly will be lowered to the sea floor from an aft- and stern-anchored vessel. The camera will be deployed for 30 minutes from the time contact is made with the bottom. Digital video will be monitored on a LCD screen using a Sony DC-TRV25E PAL 1-mega pixel, fully digital colour camera with video data captured directly into the laptop computer. Additional still images will be collected every 30 seconds onto the memory card of the video camera. At the laboratory, video footage on tapes will be digitised and copied onto DVD discs for future analysis.

Table 3. Summary of BUV sites to be sampled in Spring to Summer 2006-2007.

Treatment	Number of sites	Habitat	Data collected per site
Reserve	6	Adjacent to hard shore	30 minute video, 60 photos per site
Control	6	Adjacent to hard shore	30 minute video, 60 photos per site

4.5 Spiny lobster density, sex and size

Spiny lobster density was investigated from six reserve and six control sites from March to May 2006 (Table 4, Figures 5 and 6, Appendices 6, 7, 8a & b). Sites supporting suitable habitat for lobsters (i.e. hard substratum with cover) were selected for study. Efforts were also made to spread sites throughout the reserve and at comparble control areas. Not all areas in the reserve or control sites had habitat considered appropriate for lobsters.

Where habitat was located, lobster quadrats (25m long by 4 m wide) were haphazardly placed and oriented within a pre-determined depth stratum. Two divers independently searched all crevices, caves and cracks within each 100 m^2 quadrat using a dive torch. The size and sex of lobsters encountered were recorded. A core group of three divers were involved in the lobster survey. The size and sex of some lobsters could not be measured because they were deeply concealed beneath boulders or within caves. As a result, the number of lobsters in density and size data sheets do not correspond. Underwater visibility was > 3 m horizontal distance during all lobster counts.

Table 4. Summary of 100 m^2 lobster quadrats.

Treatment	Number of sites	Habitat	Replicates per site	Total number of quadrats
Reserve	6	Hard shore	10	60
Control	6	Hard shore	10	60

Lobster size estimate methodology was based on diver estimates/measurements of carapace length (CL) to the nearest 5 mm. Most lobsters were able to be measured using a plastic ruler. In cases where measurement was not possible, lobster size was estimated by divers.

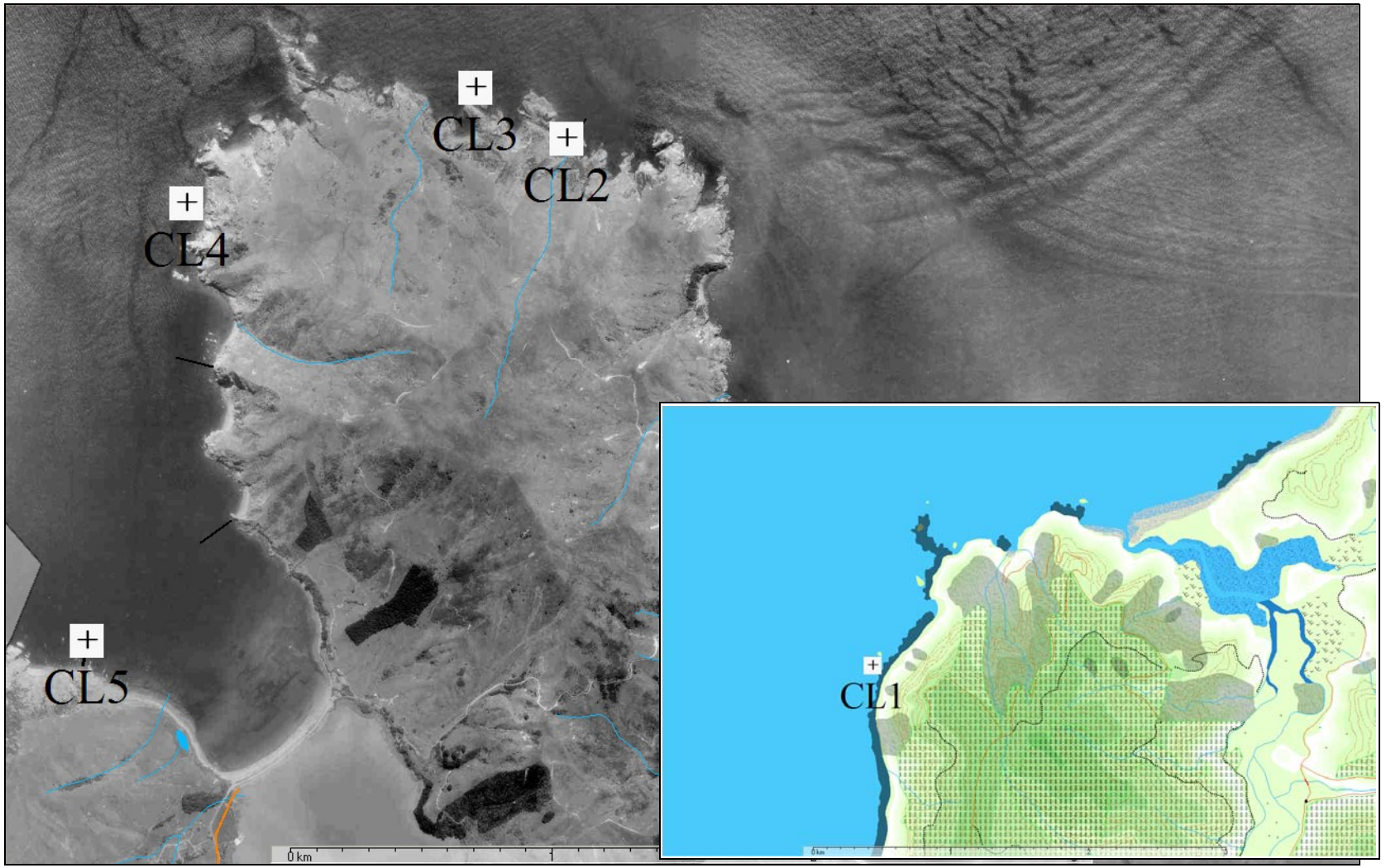


Figure 5. Lobster sample sites (Pepin Island, Cable Bay and Delaware Bay). Insert is the northern Delaware Bay site. + = approximate location of sample sites, coordinates for each site have been presented in Appendix 6.

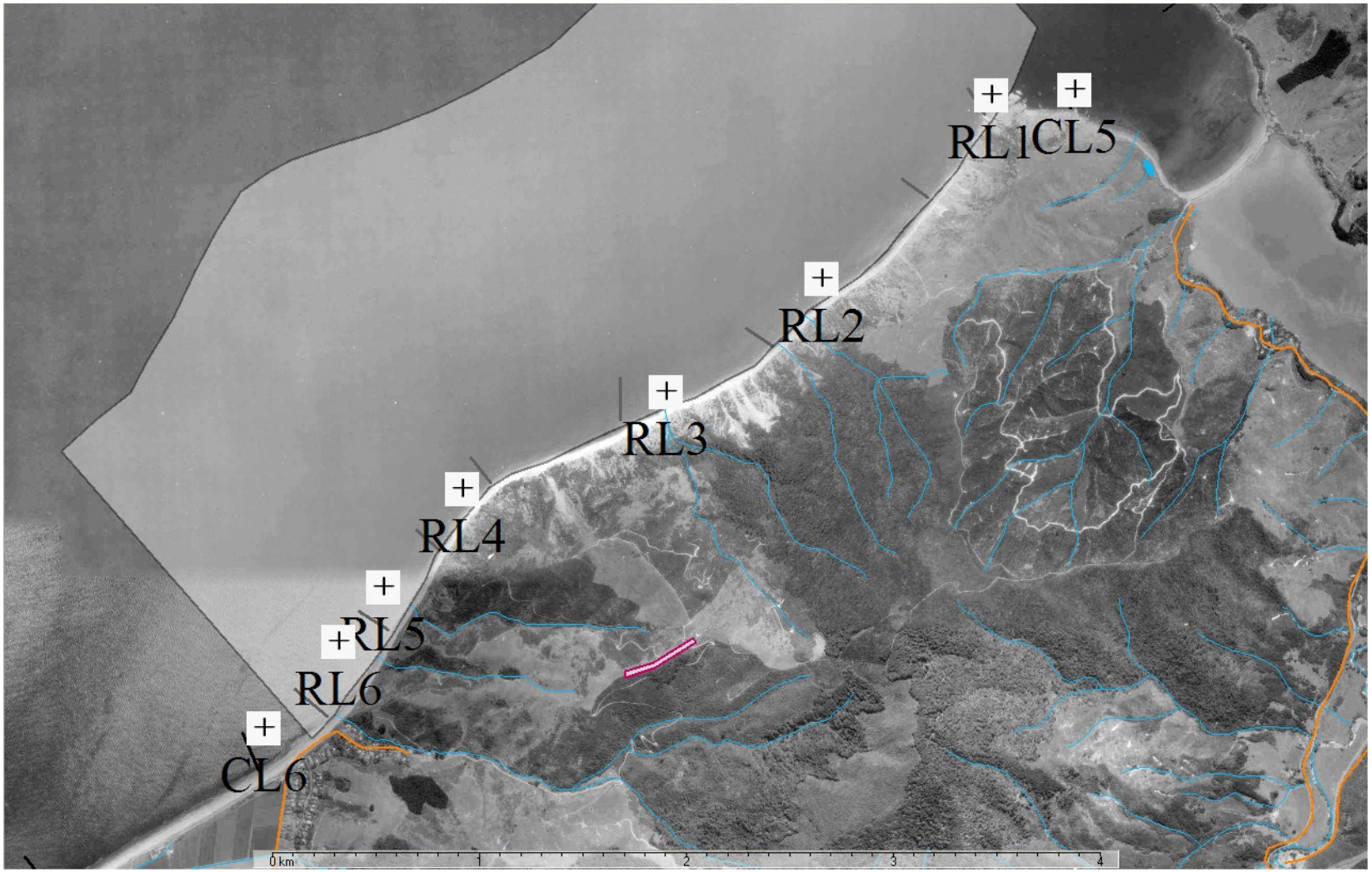


Figure 6. Lobster sample sites (Horoirangi Marine Reserve, Cable Bay and Boulder Bank). + = approximate location of sample sites, coordinates for each site have been presented in Appendix 6.

5.0 RESULTS AND DISCUSSION

5.1 Subtidal shore profiles

Six control and eight reserve subtidal shore profiles have been presented in Appendix 2, while video footage has been stored on a DVD at the Department of Conservation, Nelson Conservancy office. No obvious visual differences that were not related to physical features at each site were recorded between reserve and control profiles.

All subtidal profiles were initially extensions of the intertidal zone. Shores around Pepin Island were dominated by bedrock, however, this was usually quickly replaced by boulders with increasing depth and distance from shore. Boulder substratum dominated the near-shore subtidal at both reserve and control sites. Boulders ranged in size from 300 mm to 6 metres diameter. Very large boulders were recorded from Mackay Bluff and south of Ataata Point. Boulder size decreased towards the Cable Bay boulder bank and the Nelson boulder bank. Apart from areas south of Glenduan, boulder shores were mixed with areas of bedrock and outcropping bedrock. In places (notable around Ataata Point and parts of Pepin Island), bedrock dominated with interspersed areas of boulder substratum.

With increasing depth and distance from shore, boulder size decreased and the component of cobbles, pebbles, shell and sand increased. At varying distances from shore, hard substratum ended and was replaced by soft substratum (Appendix 2). At particular shore profiles, hard shores extended to 220 m distance from low tide. In general, the subtidal shore gradient was relatively low with depths seldom exceeding 14 m and sometimes < 8 m at 150 m distance from low water. Where sand was present on these shallow offshore areas, the benthos was characterised by mega-rippled sand (Plate 1).

For locations in the reserve between Mackay Bluff and south of Ataata Point, the shallow subtidal was dominated by a relatively dense cover of brown macroalgae (Plates 4 and 5). This dense macroalgal zone extended to 30-40 m distance offshore from low water (Appendix 2). Dominant species were *Carpophyllum maschalocarpum*, *C. flexuosum*, *Glossophora* sp., *Ulva* sp., and a variety of *Cystophora* species (Plates 4 and 5). Subtidal

shores at these sites are relatively shallow and received considerable wave action during afternoon sea breezes and violent wave action during northerly storms. These relatively wide macroalgal zones were also observed on the north side of Pepin Island and at particular locations in Delaware Bay (Appendix 2). At most other sites, the macroalgal zone was restricted to a relatively narrow sublittoral fringe (< 15 m wide below low water).

Below the macroalgal zone, shores were dominated by boulder and bedrock barrens (Plates 2 and 3). In some areas, patches of *C. flexuosum* were observed from boulder tops or growing on boulders isolated by patches of sand. Barren rock was dominated by gastropods, sea stars, and occasional sponges. These barrens were comparable in appearance to barrens of the Abel Tasman coastline (Davidson, 1992; Davidson and Chadderton, 1994) and Delaware Bay to Cape Soucis (pers. obs.).

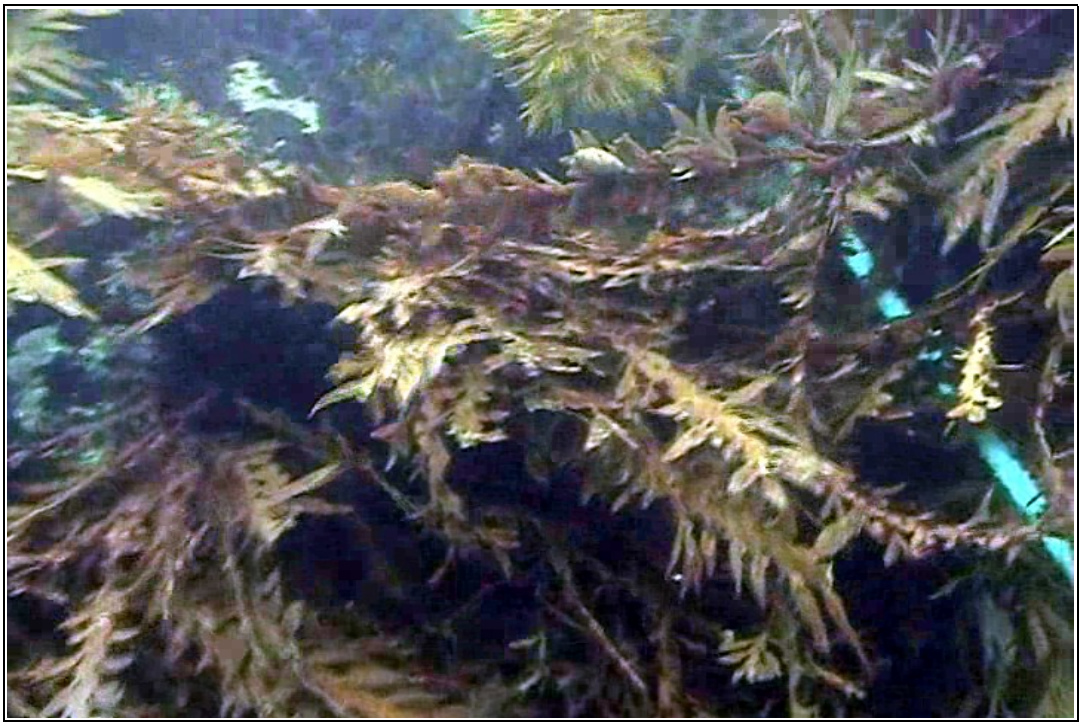
Plate 1. Mega-rippled sand from areas offshore of the southern reserve boundary at 10 m depth.

Plate 2. Boulder barren habitat.

Plate 3. Boulder barren habitat.

Plate 4. *Cystophora* sp. on shallow boulder habitat.

Plate 5. *Carpophyllum maschalocarpum* on shallow boulder habitat.



5.2 Benthic invertebrates and brown macroalgae

Benthic raw data collected from three depth strata (0-0.5 m, 2.5-3 m, and 5-5.5 m) are provided in Appendix 3 and have been pooled in Tables 5a, 5b and 5c. Of the three depth zones, large brown macroalgae were most common from the shallowest zone. At some sites, macroalgae were also recorded from the deeper zone (2-2.5m depth), but the % cover of macroalgae declined with increasing depth. *Carpophyllum maschalocarpum* and *Cystophora* spp. were dominant in the shallow zone, while *C. flexuosum* was more common from the deeper zone (Figures 7a, 7b and 7c, Tables 5a, 5b and 5c).

Invertebrates in the shallow zone were dominated by kina (*Evechinus chloroticus*), cushion seastar (*Patiriella regularis*), and cats eye snails (*Turbo smaragdus*). Other invertebrates present but recorded in relatively low densities were black- and yellow-foot paua (*Haliotis iris* and *H. australis*), 11 arm seastar (*Coscinasterias muricata*), Cook's turban (*Cookia sulcata*) and the topshell *Trochus* sp. (Figure 7a). With increasing depth, the number and abundance of invertebrate species increased and the percentage cover of macroalgae declined (Figure 7b). Invertebrates in the 2.5-3 m depth zone were again dominated by kina, cushion seastar and cats eye snails. Topshells increased in abundance compared to the shallow zone, as did ambush seastars (*Stegnaster inflatus*), 11 arm seastars, sea cucumber (*Stichopus mollis*), and Cook's turban. Occasional sponges were recorded from this depth zone (Table 5b, Figure 7b). In the deep zone (5-5.5 m depth), the same three species of macroinvertebrate were dominant (Figure 7c, Table 5c). Other species were recorded in comparable densities to the mid-depth zone, with sponges being present but relatively rare. No paua species were recorded at either the mid- or deep sample depths.

Natural differences between species densities were recorded between reserve and control treatments, however, the same range of species were usually found at both treatments. In the shallow zone, a notable difference was higher densities of cats eye snails and cushion seastars at the control treatments (Figure 7a). In the mid-depth range, cats eye snails were again more abundant at the control treatment, while cushion seastars were more abundant from the reserve treatment (Figure 7b). For the deep zone, the only notable difference between treatments was the near absence of cats eye snails from the reserve treatment.

Table 5a. Mean densities (per m^2) for selected benthic species sampled from pooled rocky reserve and control treatments in April 2006. Depth = 0-0.5 m depth.

Depth:0-0.5 m	Pooled reserve sites (n-=6)				Pooled control sites (n=6)			
	Replicates	Mean	SD	SE	Replicates	Mean	SD	SE
Evechinus chloroticus	60	2.67	3.27	0.42	60.00	2.58	3.49	0.45
Haliotis iris	60	0.32	1.00	0.13	60.00	0.33	0.91	0.12
Haliotis australis	60	0.05	0.29	0.04	60.00	0.00	0.00	0.00
Stegnaster inflatus	60	0.02	0.13	0.02	60.00	0.03	0.18	0.02
Coscinasterias muricata	60	0.12	0.32	0.04	60.00	0.13	0.39	0.05
Stichaster australis	60	0.05	0.22	0.03	60.00	0.00	0.00	0.00
Patiriella regularis	60	0.77	1.23	0.16	60.00	1.43	1.72	0.22
Stichopus mollis	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Cookia sulcata	60	0.12	0.37	0.05	60.00	0.08	0.28	0.04
Turbo smaragdus	60	0.38	0.90	0.12	60.00	2.07	3.06	0.40
Trochus spp.	60	0.00	0.00	0.00	60.00	0.15	0.44	0.06
Mauria punctulata	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Macrobrown total % cover	60	57.45	22.18	2.86	60.00	25.80	24.60	3.18
Cystophora spp. % cover	60	32.05	24.43	3.15	60.00	7.93	15.34	1.98
C. flexusosum % cover	60	0.17	0.83	0.11	60.00	2.07	5.02	0.65
C. maschalocarpum % cover	60	23.68	24.66	3.18	60.00	14.92	19.48	2.51
Sponge total % cover	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Tethya spp. (number)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Crella sp. (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Iophon minor (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Callyspongia sp. (number)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Polymastia spp. (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Ancorina sp. (number)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00

Table 5b. Mean densities (per m^2) for selected benthic species sampled from pooled rocky reserve and control treatments in April 2006. Depth = 2.5-3 m depth.

Depth: 2.5-3.0 m	Pooled reserve sites (n-=6)				Pooled control sites (n=6)			
	Replicates	Mean	SD	SE	Replicates	Mean	SD	SE
Evechinus chloroticus	60	4.38	3.67	0.47	60.00	3.65	2.39	0.31
Haliotis iris	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Haliotis australis	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Stegnaster inflatus	60	0.15	0.52	0.07	60.00	0.20	0.48	0.06
Coscinasterias muricata	60	0.07	0.25	0.03	60.00	0.30	0.59	0.08
Stichaster australis	60	0.03	0.18	0.02	60.00	0.03	0.18	0.02
Patiriella regularis	60	2.10	1.57	0.20	60.00	1.07	1.40	0.18
Stichopus mollis	60	0.07	0.25	0.03	60.00	0.28	0.64	0.08
Cookia sulcata	60	0.28	0.67	0.09	60.00	0.27	0.55	0.07
Turbo smaragdus	60	0.32	0.60	0.08	60.00	1.40	2.04	0.26
Trochus spp.	60	0.93	1.48	0.19	60.00	0.73	1.59	0.21
Mauria punctulata	60	0.00	0.00	0.00	60.00	0.02	0.13	0.02
Macrobrown total % cover	60	8.58	16.89	2.18	60.00	7.72	17.11	2.21
Cystophora spp. % cover	60	5.22	13.62	1.76	60.00	0.37	1.57	0.20
C. flexusosum % cover	60	2.37	4.58	0.59	60.00	7.33	16.64	2.15
C. maschalocarpum % cover	60	0.80	2.23	0.29	60.00	0.00	0.00	0.00
Sponge total % cover	60	0.01	0.02	0.00	60.00	0.42	2.05	0.26
Tethya spp. (number)	60	0.12	0.58	0.08	60.00	0.02	0.13	0.02
Crella sp. (% cover)	60	0.00	0.00	0.00	60.00	0.42	2.05	0.26
Iophon minor (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Callyspongia sp. (number)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Polymastia spp. (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Ancorina sp. (number)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00

Table 5c. Mean densities (per m^2) for selected benthic species sampled from pooled rocky reserve and control treatments in April 2006. Depth = 5-5.5 m depth.

Depth: 5-5.5 m	Pooled reserve sites (n-=6)				Pooled control sites (n=6)			
	Replicates	Mean	SD	SE	Replicates	Mean	SD	SE
Evechinus chloroticus	60	2.27	1.60	0.21	60.00	2.48	1.70	0.22
Haliotis iris	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Haliotis australis	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Stegnaster inflatus	60	0.35	0.58	0.07	60.00	0.25	0.51	0.07
Coscinasterias muricata	60	0.07	0.25	0.03	60.00	0.27	0.55	0.07
Stichaster australis	60	0.03	0.18	0.02	60.00	0.00	0.00	0.00
Patiriella regularis	60	1.42	1.20	0.15	60.00	1.50	1.31	0.17
Stichopus mollis	60	0.17	0.42	0.05	60.00	0.43	0.67	0.09
Cookia sulcata	60	0.57	1.06	0.14	60.00	0.22	0.61	0.08
Turbo smaragdus	60	0.02	0.13	0.02	60.00	0.43	1.16	0.15
Trochus spp.	60	0.33	0.73	0.09	60.00	0.65	1.47	0.19
Mauria punctulata	60	0.00	0.00	0.00	60.00	0.02	0.13	0.02
Macrobrown total % cover	60	0.01	0.02	0.00	60.00	0.09	0.65	0.08
Cystophora spp. % cover	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
C. flexusosum % cover	60	0.01	0.02	0.00	60.00	0.09	0.65	0.08
C. maschalocarpum % cover	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Sponge total % cover	60	0.22	0.84	0.11	60.00	0.11	0.40	0.05
Tethya spp. (number)	60	0.12	0.45	0.06	60.00	0.08	0.42	0.05
Crella sp. (% cover)	60	0.19	0.83	0.11	60.00	0.05	0.29	0.04
Iophon minor (% cover)	60	0.00	0.00	0.00	60.00	0.00	0.00	0.00
Callyspongia sp. (number)	60	0.00	0.00	0.00	60.00	0.02	0.13	0.02
Polymastia spp. (% cover)	60	0.02	0.13	0.02	60.00	0.03	0.14	0.02
Ancorina sp. (number)	60	0.00	0.00	0.00	60.00	0.03	0.26	0.03

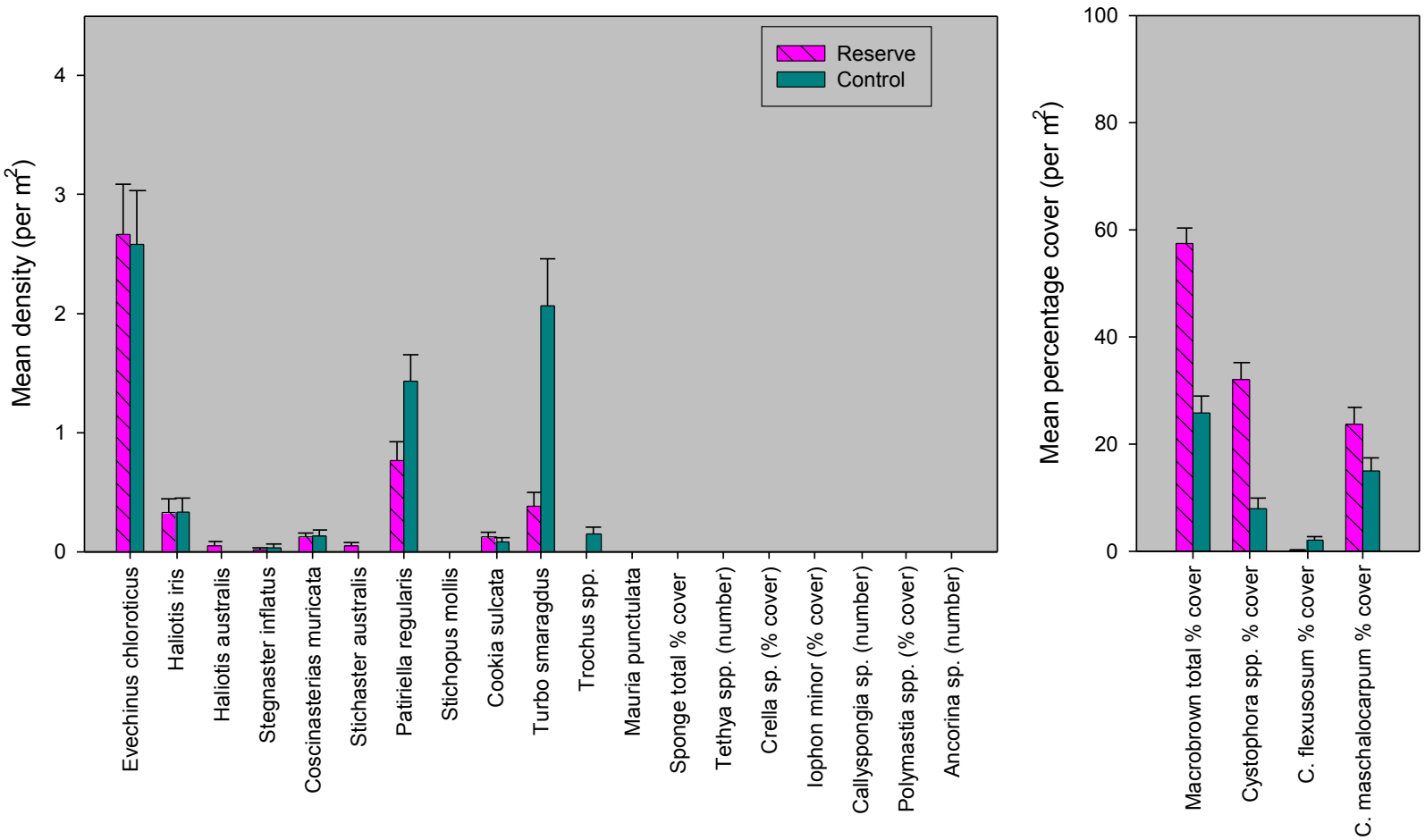


Figure 7a. Mean density of selected benthic invertebrates and macroalgae percentage cover valves recorded from 0-0.5 m at pooled reserve and control sites in April 2006. Error +/- 1 s.e.

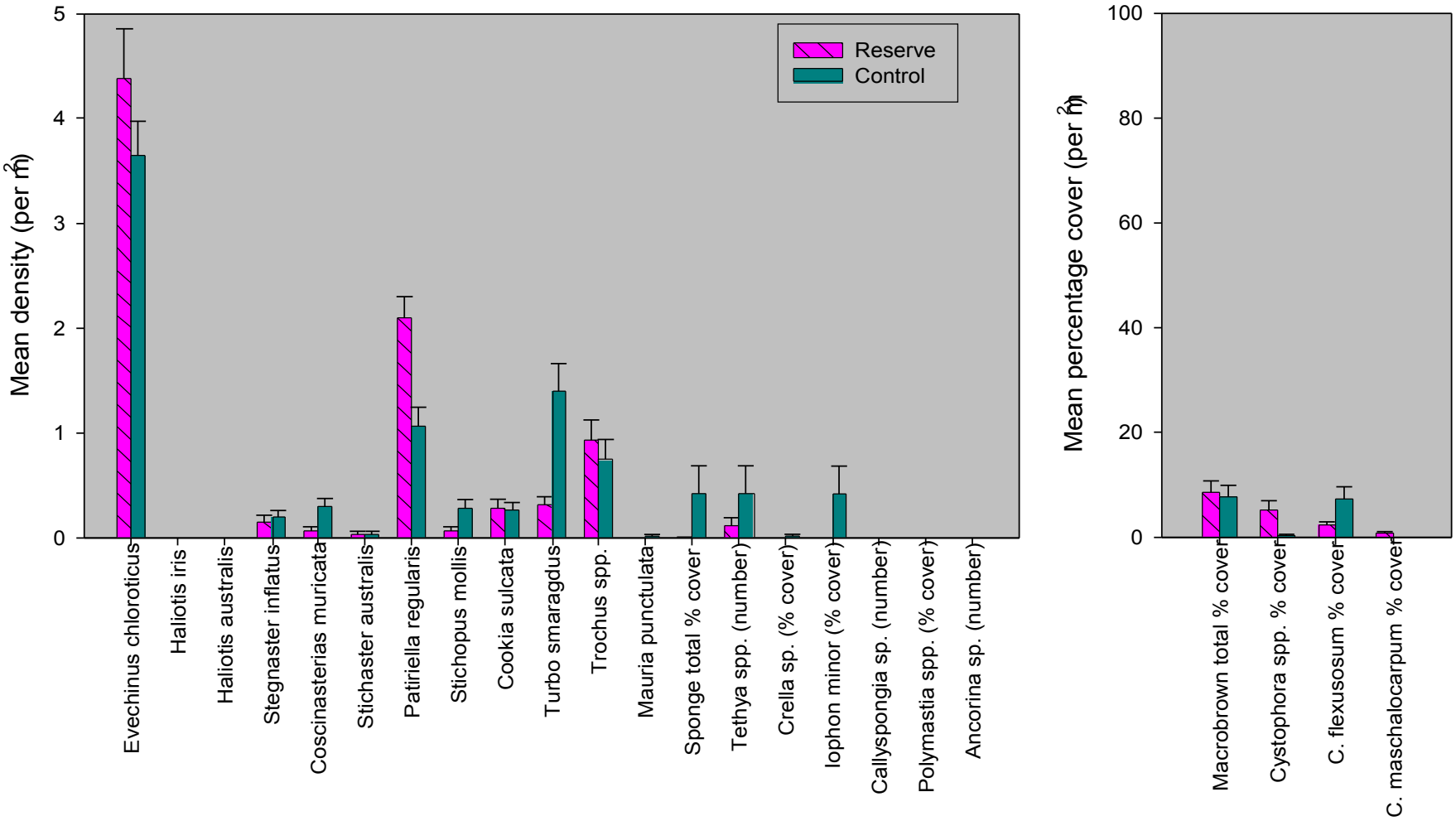


Figure 7b. Mean density of selected benthic invertebrates and macroalgae percentage cover valves recorded from 2.5-3.0 m depth at pooled reserve and control sites in April 2006. Error +/- 1 s.e.

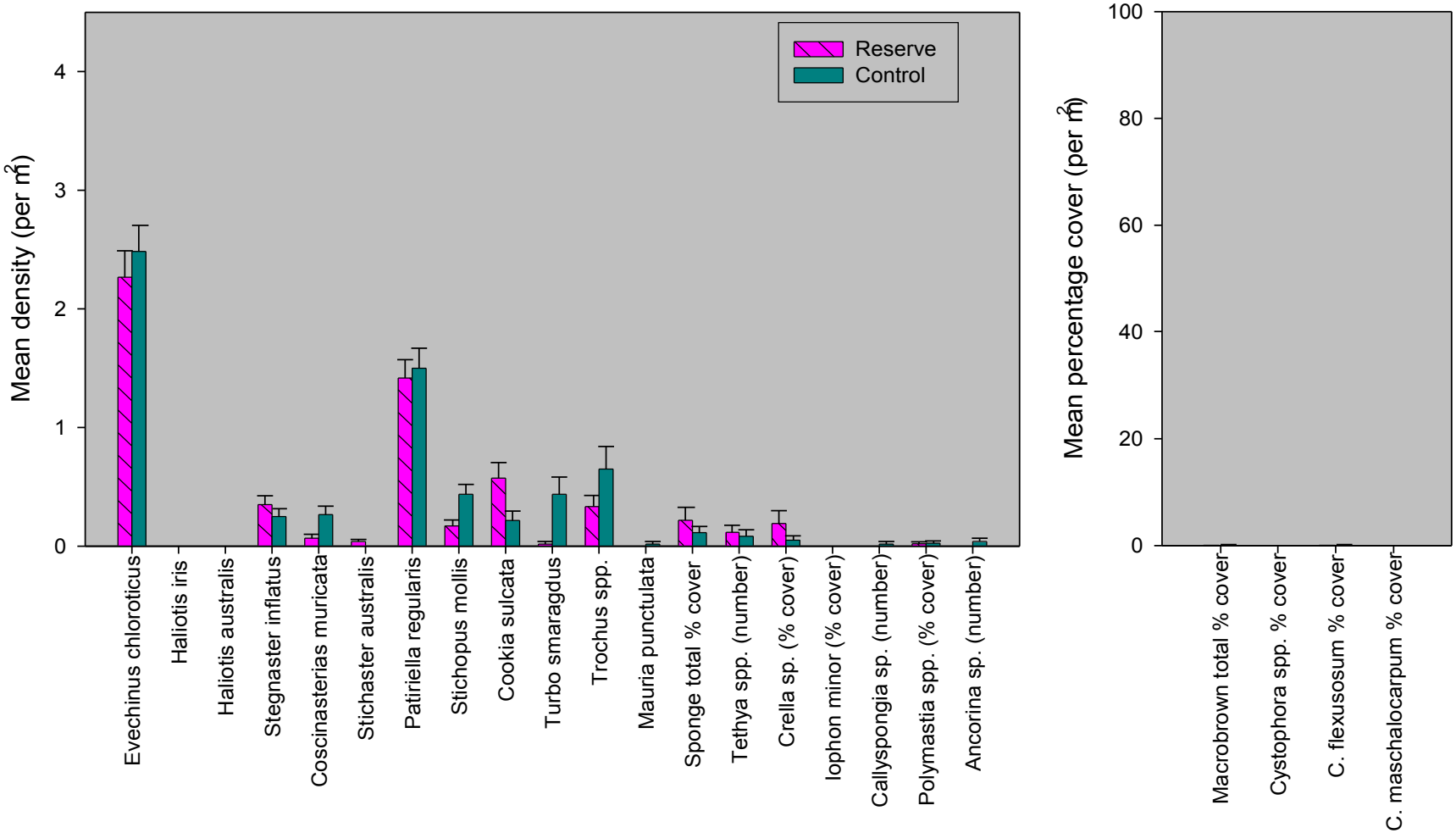


Figure 7c. Mean density of selected benthic invertebrates and macroalgae percentage cover valves recorded from 5.0-5.5 m depth at pooled reserve and control sites in April 2006. Error +/- 1 s.e.

5.3 Underwater visual fish transects

Visual fish site GPS coordinates have been presented in Appendix 4, while count data collected from March to April 2006 have been presented in Appendix 5. Divers observed a total of 14 species of reef fish from hard shore habitats in the Horoirangi Marine Reserve and control sites (Figure 8). Spotty (*Notolabrus celidotus*) and goatfish (*Upeneichthys lineatus*) were the most abundant reef fish on all sample occasions from both reserve and control treatments (Appendix 5, Figure 8). Tarakihi (*Nemadactylus macropterus*), blue moki (*Latridopsis ciliaris*), marblefish (*Aplodactylus arctidens*), and sweep (*Scorpis lineolatus*) were occasionally recorded from sites while all other species were uncommon or rare, including blue cod (*Parapercis colias*). Goatfish ($P < 0.005$) and tarakihi ($P < 0.17$) were more abundant from the reserve treatment, while spotty ($P < 0.002$) and blue moki ($P < 0.25$) were more abundant from the control treatment compared to the reserve (Figure 8). These differences were only statistically significant for goatfish and spotty.

Blue cod were very uncommon from underwater visual counts. A total of four < 30 cm blue cod and no > 30 cm blue cod were recorded from reserve sites throughout the study. A total of four < 30 cm blue cod and one large blue cod were recorded from the control treatments. No juvenile (< 10 cm length) blue cod were recorded from either treatment.

Pooled blue cod densities from reserve and control treatments for the two size classes were comparable (i.e. not significantly different, $P > 1.0$ for < 30 m blue cod and $P > 0.3$ for > 30 cm blue cod) (Figure 9). No significant difference between blue cod densities were recorded between reserve and control treatments ($P > 0.7$).

No butterfish (*Odax pullus*) were recorded from transects or were observed by divers from areas outside transects.

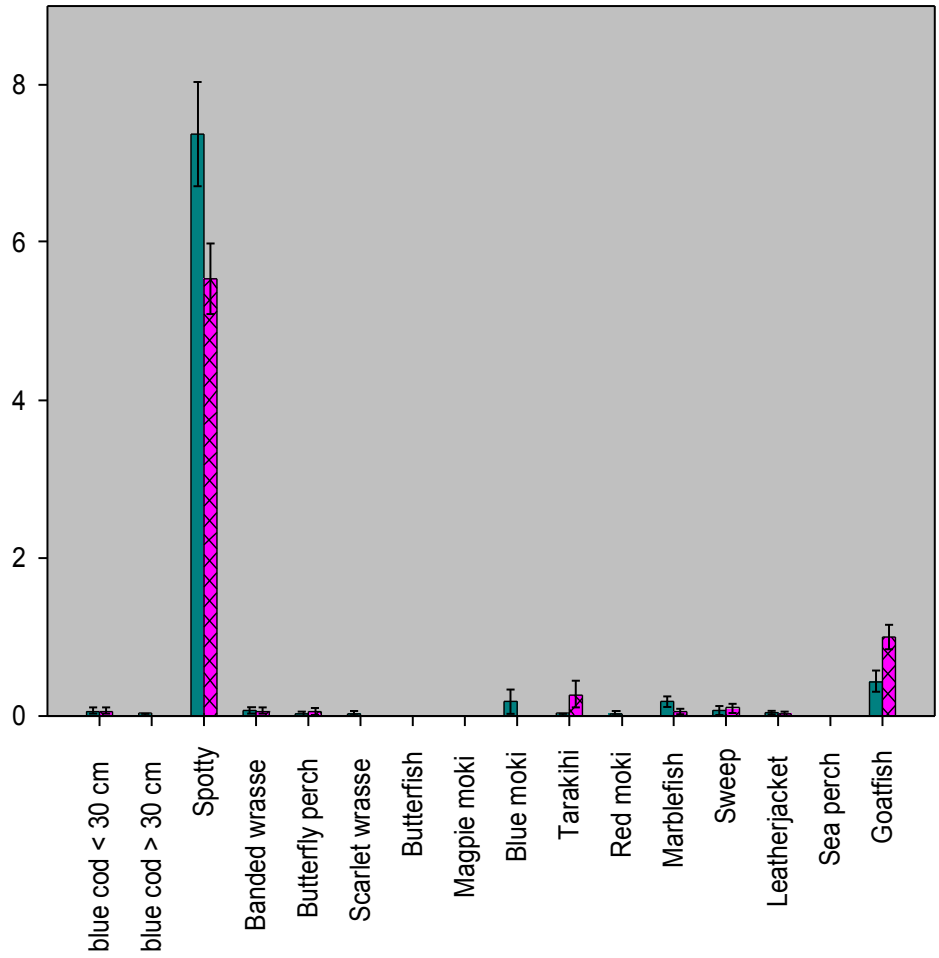


Figure 8. Mean densities of all reef fish sampled in March-April 2006 from pooled reserve (pink hatched) and control sites (green). Error bars are +/- 1 s.e.

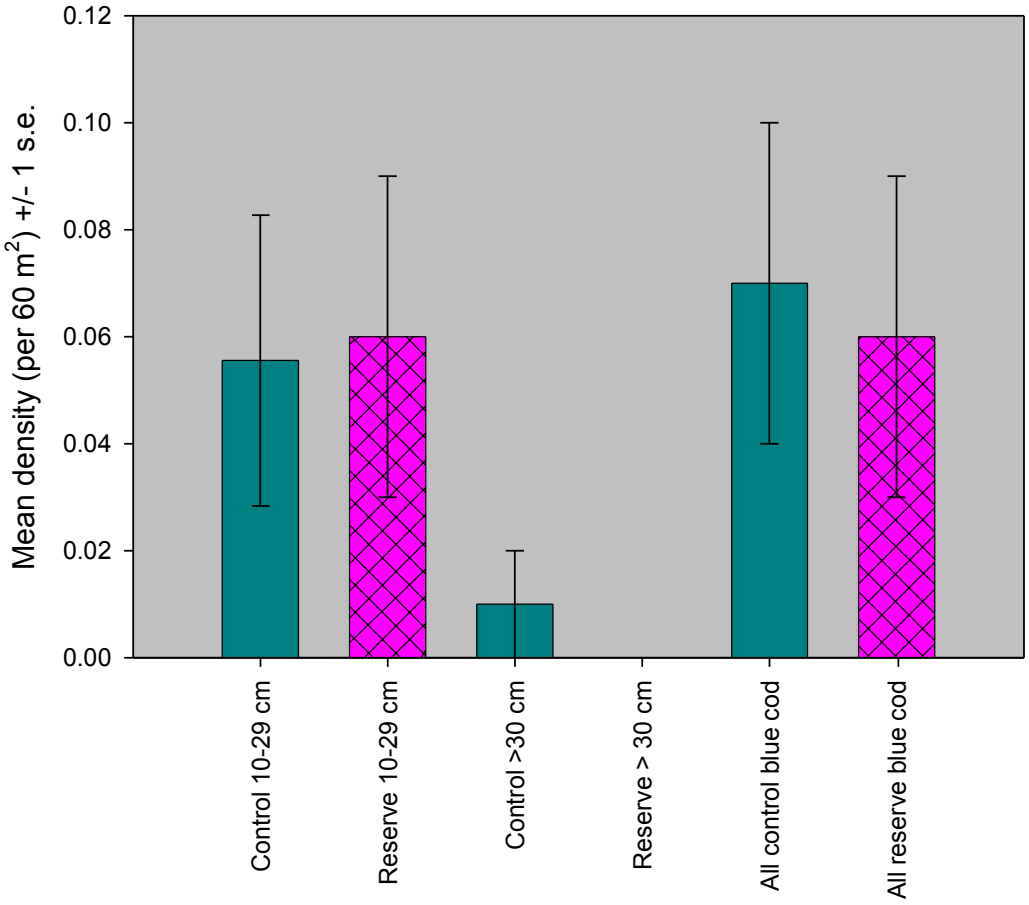


Figure 9. Pooled mean density of blue cod from all control (green) and reserve sites (pink hatched). Error bars are +/- 1s.e.

Diver-estimated size-frequency graphs using fish sizes from transects and from wider diver searches for pooled reserve and control treatments showed little difference between treatments (Figure 10). Insufficient numbers of red moki (*Cheilodactylus spectabilis*) and tarakihi were collected to determine accurate and reliable mean sizes for each treatment. No red moki and only one tarakihi observed were of legal size. In the reserve, 12.8% of all blue cod were legal size (i.e. > 30 cm length) compared to 32.3% in the control treatment. For blue moki, 28% were legal size (i.e. > 40 cm length) compared to 21% in the control treatment (Figure 10).

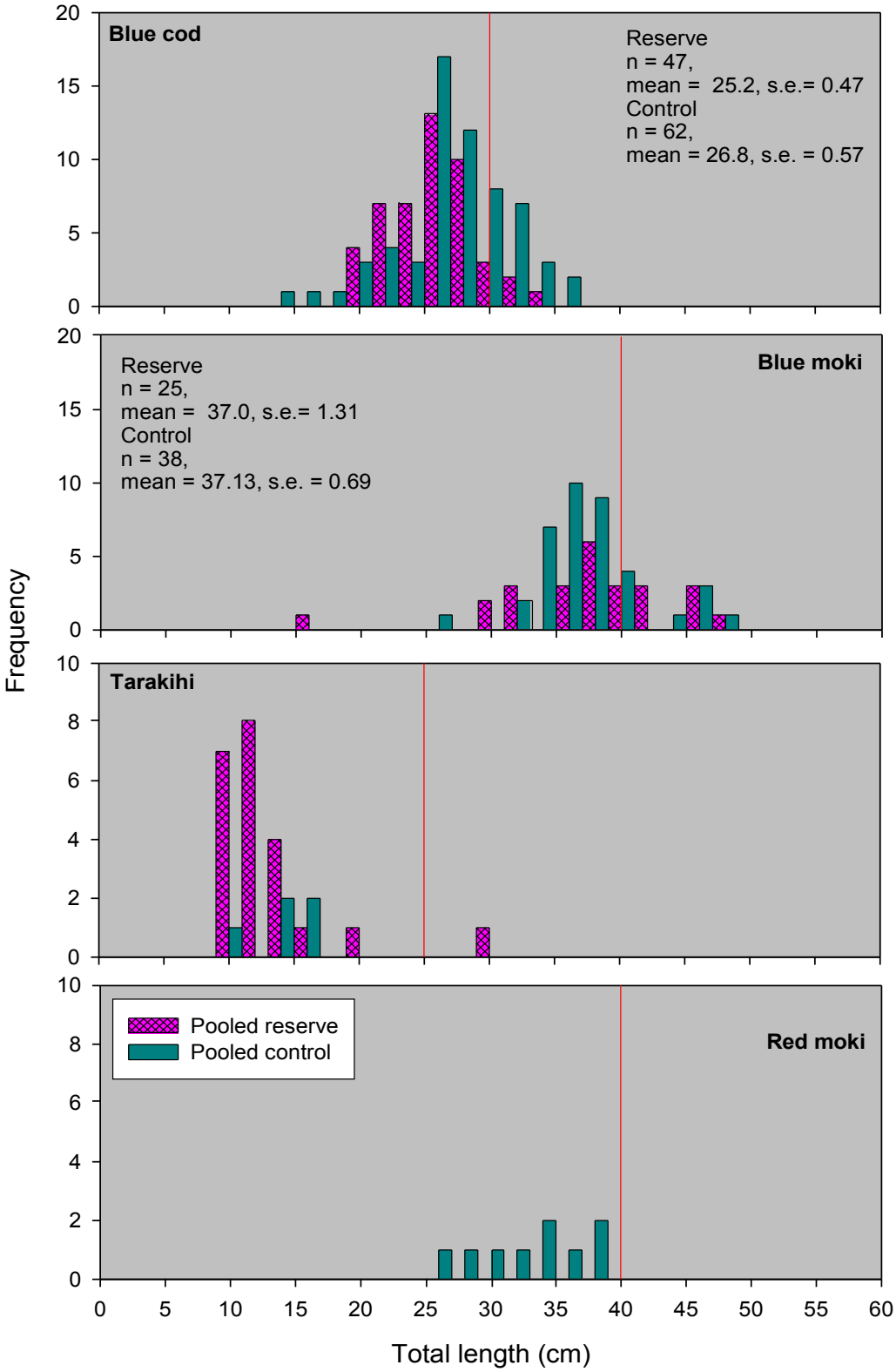


Figure 10. Pooled total length estimates for selected reef fish species from reserve (pink hatched) and control (green) treatments (March-April 2006).

5.4 Spiny lobster density, sex, and size

At reserve and control sites, lobsters were always recorded from boulder or bedrock habitats. Rocky habitat was most often located in relatively shallow water (i.e. < 10 - 12 m depth). All counts in the present study were conducted between 5 m to 12 m depth.

Lobster density varied between sites both inside the reserve and at control sites. No lobsters were recorded from two reserve and two control sites (Figure 11). At all the other sites lobsters were present but at densities < 2 individuals per 100 m^2. For the pooled reserve treatment, the overall density was 0.95 individuals per 100 m^2, while the density for the pooled control treatment was slightly lower at 0.7 individuals per 100 m^2 (Figure 11).

Male lobsters dominated the population at both reserve and control treatments (Table 5). The number of females recorded from both treatments was < 26% of sexually identifiable lobsters (i.e. lobsters that could be reliably sexed by divers), while juveniles represented < 16% of the population (Table 6). The mean size of lobsters was higher for the pooled control treatment compared to the reserve treatment (Figure 12). The largest lobster was recorded from the RL1 reserve site located at the northern end of the reserve.

Table 6. Sex composition of spiny lobsters with a known sex sampled in Horoirangi Marine Reserve and control sites. March-April 2006.

Site	Reserve sites			Control sites		
	Male	Female	Juvenile	Male	Female	Juvenile
1	4	3	2	7	7	2
2	12	3	2	2	0	1
3	3	1	2	6	1	1
4	6	4	1	14	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
Pooled sites	25	11	7	29	8	4
Percentage	58	26	16	70	20	10

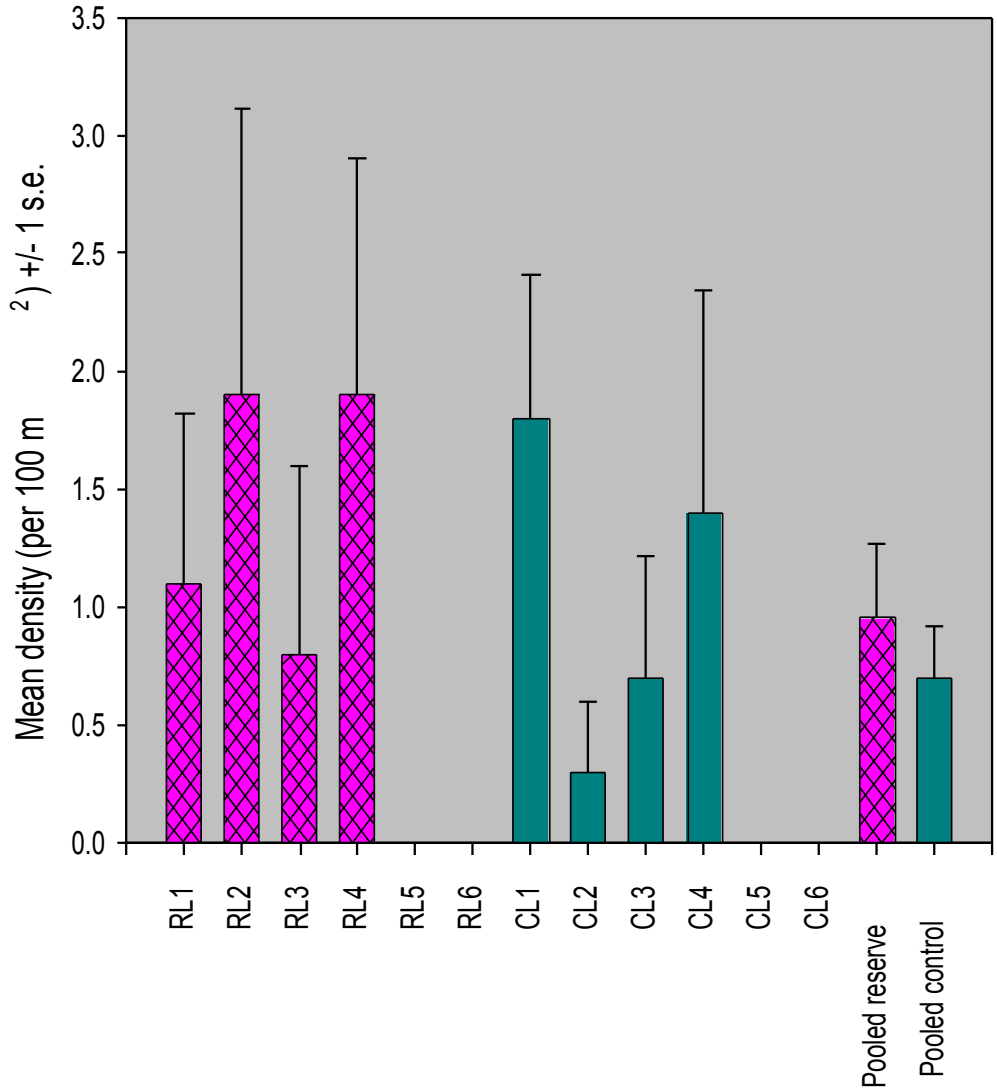


Figure 11. Pooled mean density of lobsters from all control and reserve sites sampled from March-April 2006 in Horoirangi Marine Reserve (pink hatched) and adjacent control sites (green). Error bars are +/- 1s.e.

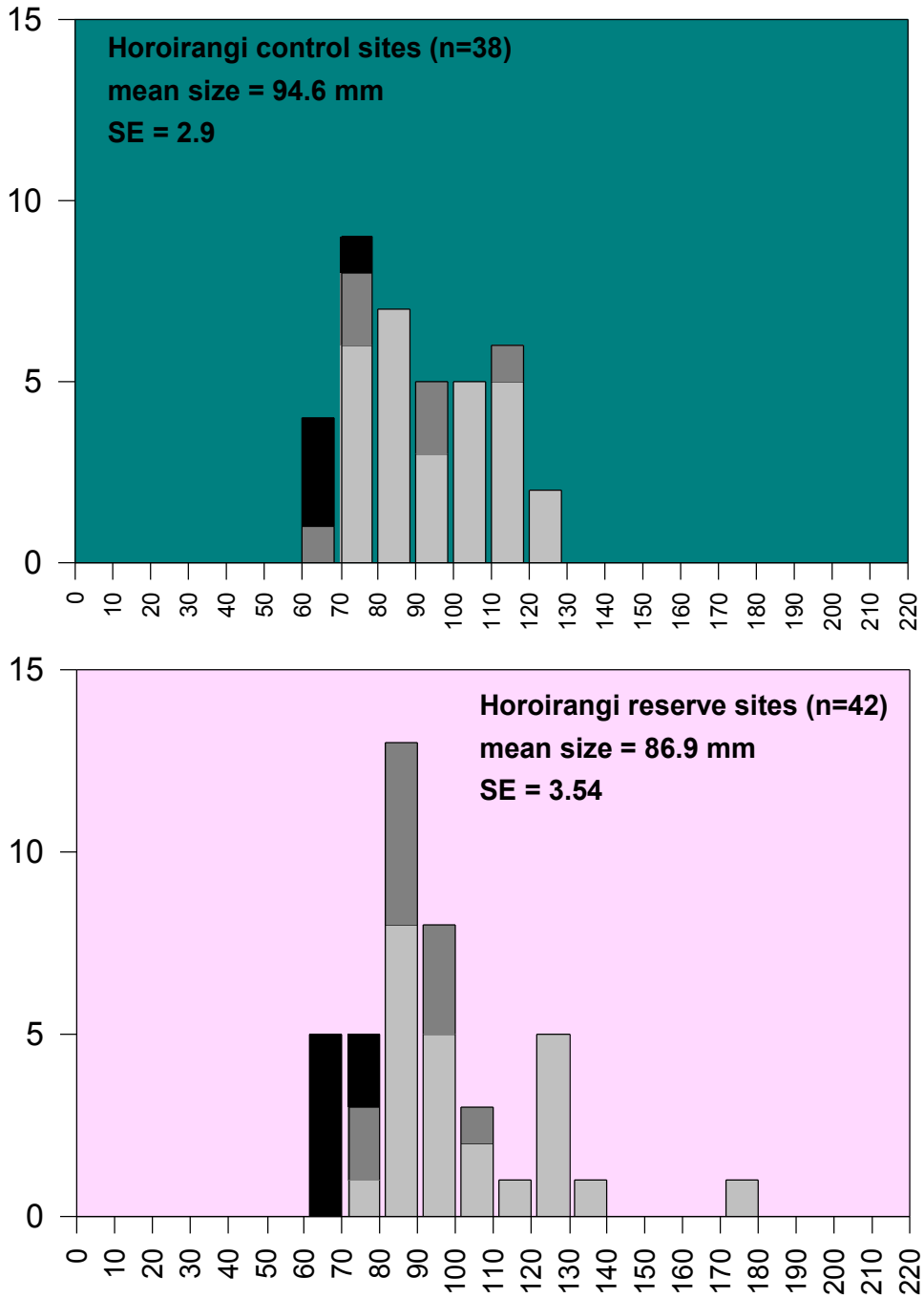


Figure 12. Size-frequency distributions of spiny lobster that could be sexed pooled across reserve and control treatments from March-April 2006. Sizes are estimated carapace length (mm). Bar shades are black = juvenile, dark grey = female, light grey = male. n = individuals where sex could be determined.

5.5 Black-foot paua density and size

Black-foot paua (*Haliotis iris*) density was 0.32 individuals per m^2 in the pooled reserve treatment and 0.13 individuals per m^2 in the pooled control treatment. These densities are relatively low, however, it is probable that more paua (especially small individuals) are present than were recorded as many appeared to be hidden under boulders. In order to standardise methodology, boulders were not overturned during invertebrate counts.

Black-foot paua length measurements were collected from all control and reserve sites in the present study. There were few yellow foot paua at most sites to allow sufficient size-frequency data to be collected.

Black-foot paua were relatively small in the reserve (38 mm – 99 mm) and from control sites (28 mm – 109 mm) (Figure 13). Mean sizes varied between sites both in the reserve and from control sites, but there was no obvious pattern in relation to location. The smallest mean paua size was recorded at CB2 on the western side of Pepin Island, while the largest mean paua size was recorded from RB2 towards the north of the reserve.

Mean black-foot paua lengths were larger from the reserve treatment compared to the control treatment (Figure 13). This may be related to the extensive shallow macroalgal beds located between Mackay Bluff and Ataata Point representing a better food source than for other sample sites in the study.

No black-foot paua reached legal size (125 mm length), the largest being 109 mm recorded from a Pepin Island control site. This is consistent with paua observed from other areas in Tasman and Golden Bays (Davidson 1992, Davidson *et al.* 1995). The reason for this phenomenon is likely related to limited or poor food availability rather than recreational or commercial fishing pressure.

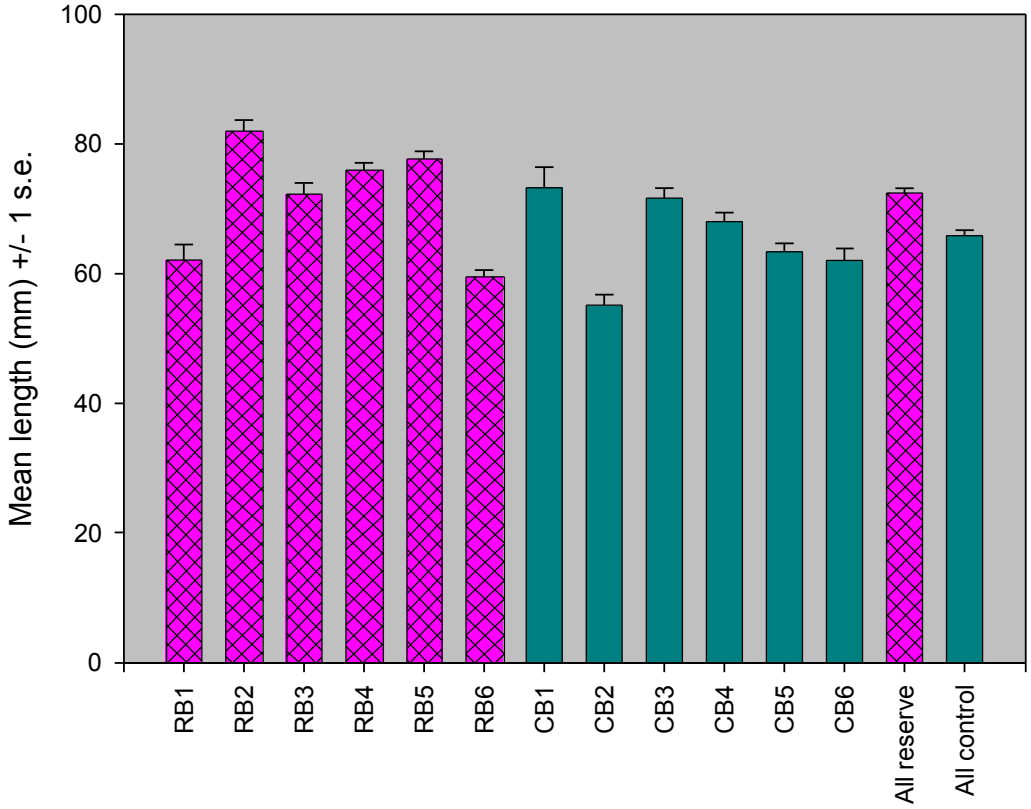


Figure 13. Mean maximum length (mm) of black-foot paua collected from reserve (pink hatched) and control (green) sites in April 2006. Error bars are +/- 1 s.e.

6.0 CONCLUSIONS

This present study provides a biological baseline dataset for rocky shores within and in the vicinity of Horoirangi Marine Reserve, North Nelson. These data were collected in the first few months following the opening of the marine reserve. Based on the results, it is clear that no change as a result of reservation has occurred in the reserve at this point in time. This was expected as little time had lapsed since the start of reservation. Small differences were recorded for pooled treatments, however, these differences were due to natural variation and between-site differences. It is expected that changes due to the removal of fishing from the reserve sites will gradually outweigh natural between-site differences. Based on other marine reserve studies this change as a result of reservation could take years (Cole *et al*., 1990; Kelly *et al*., 2000; Davidson, 2001; Davidson *et al*., 2002;

Freeman and Duffy, 2003; Willis *et al*., 2003; Denny *et al.,* 2004; Davidson and Richards, 2005; Shears *et al*., 2006).

6.1 Shore profiles and benthic quadrat data

The shore profiles represented typical shore types found within the reserve and from control areas. Profiles sampled a range of habitat types that were also considered representative of reserve and control areas. No changes to the location or number of baseline reserve or control shore profiles are suggested for future monitoring.

Quantitative benthic quadrat counts for selected species varied little between reserve and control sites or between pooled treatments. Distributional patterns related to depth were recorded for algae and sponge species at all reserve and control sites. No major patterns related to gastropod or echinoderm density and distribution were obvious from the data.

It is recommended that profiles and benthic quadrats be repeated once every six years or if habitat changes are visually observed by divers during the collection of other data. Based on the presence of black foot paua in the 0-0.5 m depth zone, it is recommended that the number of benthic quadrats in this zone be increased as this species was relatively uncommon and poorly sampled using 10 quadrats. It is suggested that sufficient quadrats be deployed to sample a minimum of 20 black foot paua at each site.

6.2 Reef fish

There has been a growing body of studies that have shown changes in marine reserves in New Zealand (McCormick and Choat, 1987; Cole *et al*., 1990; Creese and Jeffs, 1993; Jones *et al*., 1993; MacDiarmid and Breen, 1993; Cole, 1994; Cole and Keuskamp, 1998; Kelly, 1999; Kelly *et al*., 1999, 2000; Willis *et al*., 2000; Cole *et al.,* 2000; Davidson, 2001; Davidson *et al*., 2002, Freeman and Duffy, 2003; Davidson and Richards, 2005; Shears *et al*., 2006). Changes observed in marine reserves in this country have generally been directly attributed to the cessation of fishing, as all of New Zealand's marine reserves are no-take.

The abundance of reef fish that are typically targeted by recreational fishers was very low from both reserve and control sites in the present study. Similar results were recorded by Cole *et al*. (2003) for this area, the only notable difference being that tarakihi were more abundant in the Cole *et al.* (2003) study.

In the present study, densities of reef fish species differed little between individual reserve and control sites or between the pooled treatments. Based on these results, it is recommended that all these sites be retained for future monitoring. In order that the number of fish length measurements are increased, it is recommended that at least two new reserve and two new control sites be added for the purpose of measuring fish. At these sites, it is suggested that divers spend 40 minutes collecting reef fish length measurements being careful to avoid re-measurement of the same fish. These data would be added to reef fish length measurements collected during fish transects. Suggested species to measure are blue cod, tarakihi, red moki, butterfish, blue moki, and magpie moki.

6.3 Spiny lobsters

Spiny lobsters are intensively fished in many areas of New Zealand (Lipcius and Cobb, 1994). Several studies have shown abundance and size of spiny lobsters to be greater in protected areas than in nearby fished areas (e.g. MacDiarmid and Breen, 1993; Edgar and Barrett, 1999**;** Kelly *et al.*, 1999, 2000; Davidson *et al*., 2002; Shears *et al*., 2006). Those findings suggest that some lobsters remain within un-fished areas, but there is also evidence that migrations may cross reserve borders (e.g. Kelly *et al.*, 2000; Kelly, 2001). There is also evidence that egg production may be limited in intensively-fished populations that lack large males (MacDiarmid and Butler, 1999).

Spiny lobsters were present at four out of the six reserve and control sites with lobsters being recorded in comparable densities between reserve and control treatments. Lobster habitat was present at all of the sample sites, but was relatively poor quality at CL6 (Glenduan playground). It is not recommended, however, that CL6 be rejected as it represents the only control site south of the reserve. No change to any other reserve or

control sites is suggested as they supported varying qualities of lobster habitat and are comparable between the two study treatments (reserve and control).

6.4 Baited underwater video

These data have yet to be collected. Once collected, images and video will be stored for later analysis. It is not recommended that BUV be collected again until densities of fish in the reserve increase. It is hoped that this technique will sample snapper within the reserve as this species is understood to have been targeted in this area by fishers prior to reservation.

7.0 ONGOING BIOLOGICAL MONITORING

This baseline study was designed to enable ongoing monitoring of all or selected aspects of the baseline. Based on experience with other long-term marine reserve monitoring programmes, the following monitoring protocol is recommended.

Spiny lobster and reef fish

Re-sample all reef fish and spiny lobster sites sites annually. Collect additional fish measurements from two new reserve and two new control sites.

Benthic macro-invertebrates and shore profiles

Re-sample all benthic quadrat and shore profile sites once before 2002. Increase the number of quadrats in the 0-0.5 m depth zone (for black-foot and yellow-foot paua only). It is suggested that additional quadrats be sampled until a minimum of 20 black foot paua are sampled per site.

BUV

Re-sample once before 2012 and repeat more often if results show improvements in the numbers of fish that can be measured using this technique.

Paua length measurements

Re-sample every four years until it can be determined that the reserve has no impact on the present population of sub-legal black-foot paua.

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Appendix 1. Inshore and offshore coordinates of shore profiles.

Profile number	Coordinates
C1	41 08.31121,173 25.71747
C1	41 08.25155,173 25.77905
C2	41 08.76676,173 24.76191
C2	41 08.74848,173 24.66022
C3	41 09.08347,173 24.81450
C3	41 09.13018,173 24.72972
C4	41 09.38207,173 24.41066
C4	41 09.30318,173 24.42726
C5	41 11.02474,173 21.55860
C5	41 11.124,173 21.613
C6	41 11.35082,173 20.80908
C6	41 11.445,173 20.904
R1	41 09.40127,173 24.11124
R1	41 09.33251,173 24.05685
R2	41 09.61882,173 23.91817
R2	41 09.57114,173 23.83002
R3	41 10.009,173 23.383
R3	41 09.96160,173 23.29526
R4	41 10.20256,173 22.86086
R4	41 10.09536,173 22.85989
R5	41 10.369,173 22.409
R5	41 10.30441,173 22.34497
R6	41 10.49244,173 22.15760
R6	41 10.544,173 22.236
R7	41 10.70644,173 21.95863
R7	41 10.752,173 22.061
R8	41 10.90937,173 21.73719
R8	41 10.980,173 21.850

Appendix 2. Shore profile data from Horoirangi Marine Reserve and control sites in March 2006.

Profile: CP1 Date: 12 May 2006

Distance (m)	Depth (m)	Habitat	Macroalgae	% cover
0	0	Bedrock fringe	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	2-50%
10	0.3	Large, medium, small boulders	*C. flexuosum, Cystophora* sp., *Ulva* sp.	40-50%
20	1.8	Large, medium, small boulders	*C. flexuosum, Cystophora* sp., *Ulva* sp.	40-50%
30	1.6	Large, medium, small boulders	*C. flexuosum*	0-5%
40	1.4	Large, medium, small boulders		
50	3.3	Small, medium, large boulders, cobble, pebble, shell silt		
60	3.6	Small, medium, large boulders, cobble, pebble, shell silt		
70	5.4	Small, medium, large boulders, cobble, pebble, shell silt		
80	6.8	Small, medium, large boulders, cobble, pebble, shell silt		
90	8.7	Small, medium, large boulders, cobble, pebble, shell silt		
100	10.4	Small, medium, large boulders, cobble, pebble, shell silt		
110	11	Cobble, pebble, shell silt		
120	11.9	Cobble, pebble, shell silt		
130	12.7	Cobble, pebble, shell silt		
140	12.9	Cobble, pebble, shell silt		
150	13.1	Cobble, pebble, shell silt		

Profile: **CP2** **Date: 12 May 2006**

Distance (m)	Depth (m)	Habitat	Macroalgae	% cover
0	0	Bedrock	*C. maschalocarpum* , *Cystophora* sp., *Ulva* sp.	0-30%
10	1.1	Small & medium boulders, cobbles, pebbles		
20	2	Small & medium boulders, cobbles, pebbles		
30	2.8	Small & medium boulders, cobbles		
40	4.1	Small & medium boulders, cobbles		
50	6.2	Small & medium boulders, cobbles		
60	7.7	Cobbles, small & medium boulders, pebbles, shell, silt		
70	8.9	Cobbles, small & medium boulders, pebbles, shell, silt		
80	9.6	Sand,pebbles, shell, silt		
90	10.1	Sand,pebbles, shell, silt		
100	10.8	Sand,pebbles, shell, silt		
110	11.4	Dead whole and broken shell, fine sand		
120	12.1	Dead whole and broken shell, fine sand		
130	12.5	Dead whole and broken shell, fine sand		
140	13.2	Dead whole and broken shell, fine sand		
150	13.4	Dead whole and broken shell, fine sand		
160	13.5	Dead whole and broken shell, fine sand		

Profile: **CP3** **Date: 12 May 2006**

Distance (m)	Depth (m)	Habitat	Macroalgae	% cover
0	0	Bedrock	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	0-10%
10	3	Bedrock		
20	4.4	Small & medium boulders, cobbles, pebbles		
30	5.5	Cobbles, pebbles, occasional small boulders		
40	6.3	Cobbles, pebbles, occasional small boulders		
50	6.8	Cobbles, pebbles, shell, silt		
60	6.9	Cobbles, pebbles, shell, silt		
70	7.2	Cobbles, pebbles, shell, silt		
80	7.2	Cobbles, pebbles, shell, silt		
90	7.3	Cobbles, pebbles, shell, silt		
100	7.5	Cobbles, pebbles, shell, silt		
110	7.8	Sand, dead whole and broken shell, pebbles		
120	7.8	Sand, dead whole and broken shell, pebbles		
130	7.8	Sand, dead whole and broken shell		
140	7.8	Sand, dead whole and broken shell		
150	7.9	Sand, dead whole and broken shell		

Profile: **CP4** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Outcroping bedrock, medium & small boulders	*C. maschalocarpum* , *Cystophora* sp., *Ulva* sp.	30-40%
10	1.6	Outcroping bedrock, medium & small boulders	*C. maschalocarpum* , *Cystophora* sp., *Ulva* sp.	30-40%
20	2.1	Outcroping bedrock, medium & small boulders	*C. maschalocarpum* , *Cystophora* sp., *Ulva* sp.	50-60%
30	2.8	Large, medium, small boulders, shell silt	*C. flexuosum, Ulva* sp.	60-80%
40	3.5	Large, medium, small boulders, shell silt	*C. flexuosum, Ulva* sp.	40-60%
50	4.5	Large, medium, small boulders, shell silt	Turfing *C. flexuosum*	40-60%
60	5	Bedrock outcrops, large, medium, small boulders, shell silt	*C. flexuosum* on rock tops	5%
70	5.7	Bedrock outcrops, large, medium, small boulders, shell silt		
80	6.1	Bedrock		
90	4.2	Bedrock		
100	7.4	Bedrock outcrops, large, medium, small boulders, shell silt		
110	8.5	Bedrock outcrops, large, medium, small boulders, shell silt		
120	8.7	Bedrock outcrops, large, medium, small boulders, shell silt		
130	10.4	Bedrock outcrops, large, medium, small boulders, shell silt		
140	11.1	Bedrock outcrops, large, medium, small boulders, shell silt		
150	12.2	Bedrock outcrops, broken & whole dead shell, silt		

Profile: **CP5** **Date: 15 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Large, medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	5%
10	1.7	Large, medium, small boulders, cobbles, sand		
20	1.5	Large, medium, small boulders, cobbles, sand		
30	1.4	Large, medium, small boulders, cobbles, sand		
40	2.2	Large, medium, small boulders, cobbles, sand		
50	2.3	Large, medium, small boulders, cobbles, sand		
60	3.1	Large, medium, small boulders, cobbles, sand		
70	3.3	Large, medium, small boulders, cobbles, sand		
80	3.4	Large, medium, small boulders, sand		
90	3.5	Large, medium, small boulders, sand		
100	4	Large, medium, small boulders, sand		
110	4.5	Large, medium, small boulders, sand		
120	5	Large, medium, small boulders, sand		
130	5.4	Large, medium, small boulders, sand		
140	6	Large, medium, small boulders, sand		
150	6	Large, medium, small boulders, sand		
160	6.5	Large, medium, small boulders, sand		
170	6.8	Large, medium, small boulders, sand		
180	7.6	Mega-rippled sand, outcroping boulders	*C. flexuosum* on outcroping rocks	5%
190	8	Mega-rippled sand, outcroping boulders	*C. flexuosum* on outcroping rocks	5%
200	8.1	Mega-rippled sand, outcroping boulders		

Profile: **CP6** **Date: 15 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Large, medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	10%
10	0.4	Large, medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	40-60%
20	0.5	Large, medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	30-50%
30	1.3	Large, medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	10-20%
40	1.5	Medium, small boulders, cobbles		
50	1.5	Medium, small boulders, sand		
60	1.7	Medium, small boulders, sand		
70	2.4	Medium, small boulders, sand		
80	2.8	Medium, small boulders, sand		
90	3.5	Medium, small boulders, sand		
100	3.7	Medium, small boulders, sand		
110	4.1	Medium, small boulders, sand		
120	4.4	Medium, small boulders, sand		
130	4.8	Medium, small boulders, sand		
140	5.3	Medium, small boulders, sand		
150	5.7	Medium, small boulders, sand		
160	6	Medium, small boulders, sand		
170	6.5	Mega-rippled sand, outcroping boulders		
180	7.1	Mega-rippled sand, outcroping boulders		
190	7.4	Mega-rippled sand, outcroping boulders		
200	7.5	Medium, small boulders, sand		
210	8.3	Mega-rippled sand, medium, small boulders		
220	8.9	Mega-rippled sand, medium, small boulders		

Profile: **RP1** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Bedrock face	*C. maschalocarpum*, *Cystophora* sp.	60-80%
10	0.5	Medium & small boulders		
20	3.9	Bedrock outcrops, large, medium, small boulders		
30	4	Bedrock outcrops, large, medium, small boulders		
40	5.6	Bedrock outcrops, large, medium, small boulders		
50	6.7	Large, medium, small boulders, shell silt		
60	6.3	Large, medium, small boulders, shell silt	*C. flexuosum* on rock tops	5%
70	7.1	Large, medium, small boulders, shell silt		
80	8.2	Large, medium, small boulders, shell silt		
90	9.8	Large, medium, small boulders, shell silt		
100	11.6	Large, medium, small boulders, shell silt		
110	13.9	Large, medium, small boulders, shell silt		
120	15.9	Large, medium, small boulders, shell silt		
130	18.1	Broken shell, silt		
140	18.3	Broken shell, silt		
150	18.3	Broken shell, silt		

Profile: **RP2** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Large, medium, small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	60-80%
10	0.4	Large, medium, small boulders, pebbles, coarse sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	80-100%
20	1.3	Large, medium, small boulders, pebbles, coarse sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	80-100%
30	1.8	Large, medium, small boulders, pebbles, coarse sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	60-100%
40	2.5	Large, medium, small boulders, pebbles, coarse sand		
50	3.3	Large, medium, small boulders, pebbles, coarse sand		
60	4	Large, medium, small boulders, pebbles, coarse sand		
70	3.9	Large, medium, small boulders, shell silt		
80	4.6	Large, medium, small boulders, shell silt		
90	5.1	Large, medium, small boulders, shell silt		
100	6	Bedrock outcrops, large, medium, small boulders		
110	5.8	Bedrock outcrops, large, medium, small boulders	*C. flexuosum* on rock tops	1%
120	6.7	Bedrock		
130	9	Bedrock outcrops, large, medium, small boulders		
140	9.9	Bedrock outcrops, large, medium, small boulders		
150	10.8	Bedrock outcrops, mega-rippled sand		

Profile: **RP3** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Medium, small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	30-40%
10	0.4	Medium, small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	70-80%
20	1.3	Medium, small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	30-40%
30	1.8	Medium, small boulders	*C. maschalocarpum*, *Ulva* sp.	5%
40	2.5	Medium, small boulders		
50	3.3	Large, medium, small boulders		
60	4	Large, medium, small boulders		
70	3.9	Medium, small boulders, shell silt		
80	4.6	Bedrock outcrops, large, medium, small boulders, mega-rippled sand		
90	5.1	Large, medium, small boulders, mega-rippled sand		
100	6	Bedrock outcrops, large, medium, small boulders, mega-rippled sand		
110	5.8	Bedrock outcrops, large, medium, small boulders, mega-rippled sand		
120	6.7	Bedrock outcrops, large, medium, small boulders		
130	9	Bedrock outcrops, large, medium, small boulders		
140	9.9	Bedrock outcrops, large, medium, small boulders		
150	10.8	Bedrock outcrops, large, medium, small boulders		

Profile: **RP4** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Medium & small boulders, sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	30%
10	0.1	Medium & small boulders, sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	30-40%
20	0.6	Medium & small boulders, sand	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	40%
30	1.6	Bedrock, medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	10%
40	2.3	Bedrock, rippled sand		
50	2.1	Bedrock, medium, small boulders in gutters	*C. flexuosum*	5%
60	1.8	Bedrock, medium, small boulders in gutters	*C. flexuosum*	5%
70	2.8	Bedrock, medium, small boulders in gutters		
80	3.3	Bedrock, medium, small boulders in gutters		
90	5.4	Bedrock		
100	6.5	Bedrock outcrops, large, medium, small boulders, gutters of rippled sand		
110	7.2	Bedrock outcrops, large, medium, small boulders		
120	7.8	Bedrock outcrops, large, medium, small boulders		
130	9.5	Bedrock		
140	10.5	Large, medium, small boulders, mega-rippled sand		
150	10.7	Large, medium, small boulders, mega-rippled sand		
160	11.6	Large, medium, small boulders, shell, silt		
170	12.3	Large, medium, small boulders, shell, silt		
180	12.6	Large, medium, small boulders, shell, silt		
190	12.9	Bedrock outcrops, large, medium, small boulders, shell, silt		
200	14.1	Bedrock outcrops, large, medium, small boulders, shell, silt		

Profile: **RP5** **Date: 14 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Small, medium, large boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	90-100%
10	0.9	Small, medium, large boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	90-100%
20	2	Small, medium, large boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	70-95%
30	2.4	Small, medium, large boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	20-40%
40	2.7	Bedrock outcrops, medium, small boulders	*C. flexuousum*	5%
50	3.3	Bedrock outcrops, large, medium, small boulders	*C. flexuousum*	25%
60	4	Bedrock outcrops, large, medium, small boulders	*C. flexuousum*	5-10%
70	5.3	Bedrock		
80	6.5	Bedrock outcrops, large, medium, small boulders, mega-rippled sand		
90	7	Large, medium, small boulders		
100	6.6	Large, medium, small boulders		
110	7.2	Large, medium, small boulders		
120	8.8	Large, medium, small boulders		
130	10	Large, medium, small boulders		
140	12.1	Large, medium, small boulders, shell, silt		
150	13.3	Mega-rippled dead-broken shell, silt		

Profile: **RP6** **Date: 15 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	80-90%
10	0.2	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	80-90%
20	1.2	Bedrock, medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	50-70%
30	1.7	Bedrock, medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	70-80%
40	1.6	Bedrock, medium & small boulders	*Cystophora* sp. turf	80-90%
50	2.8	Bedrock, medium & small boulders	*C. flexuosum on rocks*	5%
60	3.7	Bedrock, medium & small boulders	*C. flexuosum on rocks*	5%
70	4.6	Mega-ripples, bedrock outcrops, medium, small boulders	*C. flexuosum on rocks*	5%
80	4.6	Mega-ripples, bedrock outcrops, medium, small boulders	*C. flexuosum on rocks*	5%
90	4.6	Bedrock outcrops, large, medium, small boulders, sand, silt		
100	4.6	Bedrock outcrops, large, medium, small boulders, sand, silt		
110	5.5	Bedrock outcrops, large, medium, small boulders, sand, silt		
120	7.4	Bedrock outcrops, large, medium, small boulders, sand, silt		
130	8.1	Bedrock outcrops, large, medium, small boulders, sand, silt		
140	8.5	Bedrock outcrops, large, medium, small boulders, sand, silt		
150	10.3	Bedrock outcrops, large, medium, small boulders, sand, silt		
160	12	Mega-rippled sand		

Profile: **RP7** **Date: 15 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	10-20%
10	0.3	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	40-60%
20	0.6	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	90-100%
30	0.4	Medium & small boulders	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	90-100%
40	1.8	Bedrock outcrops, large, medium, small boulders, cobbles		
50	2.5	Bedrock outcrops, large, medium, small boulders, cobbles, sand	*C. flexuosum*	5%
60	2.4	Bedrock outcrops, large, medium, small boulders, sand	*C. flexuosum*	5%
70	3	Bedrock outcrops, large, medium, small boulders, sand		
80	4.5	Bedrock outcrops, large, medium, small boulders, sand		
90	5	Bedrock outcrops, large, medium, small boulders, sand		
100	5.4	Bedrock outcrops, large, medium, small boulders	*C. flexuosum*	5%
110	5.7	Bedrock outcrops, large, medium, small boulders	*C. flexuosum*	5%
120	5.7	Occasional boulders surrounded by rippled sand	*C. flexuosum*	5%
130	5.8	Large, medium, small boulders, rippled sand	*C. flexuosum*	5%
140	6.4	Mega-rippled sand		
150	7.3	Large, medium, small boulders, rippled sand		
160	9.4	Large, medium, small boulders, rippled sand		
170	11.1	Mega-rippled sand		

Profile: **RP8** **Date: 15 March 2006**

Distance (m)	Depth (m)	Substratum	Macroalgae	% cover
0	0	Medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	5%
10	1.7	Medium, small boulders, cobbles	*C. maschalocarpum*, *Cystophora* sp., *Ulva* sp.	20%
20	1.6	Large, medium, small boulders, cobbles		
30	1.2	Large, medium, small boulders, cobbles		
40	1.4	Large, medium, small boulders, cobbles		
50	2.8	Large, medium, small boulders, cobbles, sand		
60	4	Large, medium, small boulders, cobbles, sand		
70	3.9	Large, medium, small boulders, cobbles, sand		
80	3.5	Large, medium, small boulders, cobbles, sand		
90	3.5	Large, medium, small boulders, cobbles, sand		
100	3.5	Large, medium, small boulders, cobbles, sand		
110	4.3	Large, medium, small boulders, cobbles, sand		
120	4.7	Large, medium, small boulders, cobbles, sand		
130	5.7	Large, medium, small boulders, cobbles, sand		
140	6.3	Large, medium, small boulders, sand		
150	6.9	Large, medium, small boulders, sand		
160	7.3	Large, medium, small boulders, sand		
170	8.2	Mega-rippled sand, outcroping boulders		
180	8.3	Mega-rippled sand, outcroping boulders		
190	8	Large, medium, small boulders, sand		
200	8.8	Large, medium, small boulders, sand		
210	9.7	Large, medium, small boulders, sand		

Appendix 3. Benthic quadrat data April May 2006.

RB1 Bedrock

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	12	14	0	1	0	3	9	2	3	5	4.90	5.04	1.59
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	1	0	0	0	0	0	0	0	2	0.30	0.67	0.21
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	1	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Stichaster australis	0	1	0	0	0	0	0	1	1	0	0.30	0.48	0.15
Patiriella regularis	3	5	0	0	0	1	1	2	4	0	1.60	1.84	0.58
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	1	0	0	2	0	0	0	1	1	1	0.60	0.70	0.22
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	60	40	80	90	70	80	20	45	30	30	54.50	24.77	7.83
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	5	0	0	0	0.50	1.58	0.50
C. maschalocarpum % cover	60	40	80	90	70	80	15	45	30	30	54.00	25.58	8.09
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	4	7	4	5	5	4	4	3	4	3	4.30	1.16	0.37
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	2	1	0	0	3	0.60	1.07	0.34
Coscinasterias muricata	0	0	0	0	0	0	0	1	0	1	0.20	0.42	0.13
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	3	0	1	1	2	1	4	2	4	1	1.90	1.37	0.43
Stichopus mollis	0	0	0	0	0	1	0	0	1	0	0.20	0.42	0.13
Cookia sulcata	0	0	1	1	1	0	0	0	1	0	0.40	0.52	0.16
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	3	0	0	0	0	0	1	1	0.50	0.97	0.31
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	10	30	5	1	2	0	0	0	0	0	4.80	9.43	2.98
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	5	25	5	1	0	0	0	0	0	0	3.60	7.79	2.46
C. maschalocarpum % cover	5	5	0	0	2	0	0	0	0	0	1.20	2.10	0.66
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	4	1	2	1	2	1	1	1	0	1.60	1.17	0.37
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	1	0	0	0	0	1	0	0	0.30	0.48	0.15
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	2	1	1	1	1	0	0	1	2	0.90	0.74	0.23
Stichopus mollis	2	0	0	0	1	0	0	0	0	1	0.40	0.70	0.22
Cookia sulcata	0	0	0	3	0	1	1	0	0	0	0.50	0.97	0.31
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	1	0	0	0	0	0	0	0	1	4	0.60	1.26	0.40
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	5	4	0	0	0	0.90	1.91	0.60
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	5	4	0	0	0	0.90	1.91	0.60
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

RB2 Boulder-bedrock

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	1	2	1	0	0	0	0	1	0	4	0.90	1.29	0.41
Haliotis iris	0	0	0	0	2	0	0	0	0	0	0.20	0.63	0.20
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	0	1	3	0	0	1	3	5	2	1.50	1.72	0.54
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	0	0	0	0	2	0	0	0	0	0	0.20	0.63	0.20
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	60	45	70	15	20	80	60	90	80	90	61.00	26.96	8.52
Cystophora spp. % cover	40	40	50	10	15	60	20	80	50	20	38.50	22.37	7.07
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	20	5	20	5	5	20	40	10	30	50	20.50	15.54	4.91
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder-bedrock

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	5	2	5	1	4	4	1	4	0	0	2.60	2.01	0.64
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	0	3	4	7	0	2	0	2	1	2.10	2.18	0.69
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Turbo smaragdus	0	0	1	0	0	1	0	0	0	0	0.20	0.42	0.13
Trochus spp.	0	0	1	0	0	0	0	2	0	0	0.30	0.67	0.21
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	15	0	1	0	0	5	0	0	5	2.60	4.81	1.52
Cystophora spp. % cover	0	10	0	0	0	0	0	0	0	0	1.00	3.16	1.00
C. flexusosum % cover	0	5	0	1	0	0	5	0	0	5	1.60	2.37	0.75
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	2	3	2	3	3	1	2	0	2	1	1.90	0.99	0.31
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	1	0	0	1	0	1	1	0	0.50	0.53	0.17
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	0	0	1	1	1	0	1	0	1	0.50	0.53	0.17
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

RB3

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	5	0	2	4	1	5	1	6	3	5	3.20	2.10	0.66
Haliotis iris	0	0	1	1	0	0	0	1	0	0	0.30	0.48	0.15
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	1	1	0	1	1	0	0	1	0	0.50	0.53	0.17
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	3	0	1	5	0	0	2	0	1	0	1.20	1.69	0.53
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	70	80	70	45	40	75	60	55	50	70	61.50	13.55	4.28
Cystophora spp. % cover	35	65	65	45	25	30	55	22	10	15	36.70	19.97	6.32
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	35	0	5	0	15	40	0	25	40	55	21.50	20.28	6.41
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	2	2	4	1	2	1	7	2	5	2.90	1.91	0.60
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	1	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	3	2	0	1	2	1	1	2	1	3	1.60	0.97	0.31
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	1	0	1	0	0	0	0	0	0	0	0.20	0.42	0.13
Turbo smaragdus	0	0	0	0	0	1	0	0	0	1	0.20	0.42	0.13
Trochus spp.	0	5	7	0	4	3	2	1	1	0	2.30	2.41	0.76
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder-bedrock

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	6	0	4	1	1	2	0	1	6	1	2.20	2.30	0.73
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	0	0	0	0	1	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Patiriella regularis	1	1	2	1	0	1	1	0	1	0	0.80	0.63	0.20
Stichopus mollis	1	0	0	0	0	1	0	0	0	1	0.30	0.48	0.15
Cookia sulcata	0	0	0	0	0	0	0	0	1	0	0.10	0.32	0.10
Turbo smaragdus	0	0	0	0	0	0	0	1	0	0	0.10	0.32	0.10
Trochus spp.	0	0	1	0	1	1	1	0	0	0	0.40	0.52	0.16
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	1	0.1	0	0	0	0	0	0.1	0	0	0.12	0.31	0.10
Tethya spp. (number)	1	0	0	0	0	0	0	1	0	0	0.20	0.42	0.13
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	1	0.1	0	0	0	0	0	0	0	0	0.11	0.31	0.10
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

RB4

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	2	3	1	0	0	0	1	1	0	0.80	1.03	0.33
Haliotis iris	0	2	0	0	0	0	0	0	0	0	0.20	0.63	0.20
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	0	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	60	80	60	65	30	70	30	25	40	32	49.20	19.91	6.30
Cystophora spp. % cover	40	40	20	60	30	20	25	28	40	30	33.30	12.11	3.83
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	20	40	40	5	40	5	0	0	0	0	15.00	18.26	5.77
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Bedrock

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	7	8	2	9	1	9	6	2	1	0	4.50	3.63	1.15
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	1	0	0.10	0.32	0.10
Patiriella regularis	5	2	3	4	3	2	1	0	2	2	2.40	1.43	0.45
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	2	0	1	0	0	0	0	0.30	0.67	0.21
Turbo smaragdus	0	1	0	0	0	1	0	2	0	0	0.40	0.70	0.22
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	3	0	0	55	10	60	30	15	35	20.80	22.99	7.27
Cystophora spp. % cover	0	0	0	0	45	0	40	5	10	28	12.80	17.94	5.67
C. flexusosum % cover	0	3	0	0	5	2	10	15	5	2	4.20	4.89	1.55
C. maschalocarpum % cover	0	0	0	0	0	8	8	10	0	5	3.10	4.18	1.32
Sponge total % cover	0	0	0.1	0	0	0	0	0	0	0	0.01	0.03	0.01
Tethya spp. (number)	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Bedrock

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	2	3	2	2	1	3	2	5	1	2.40	1.17	0.37
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	1	0	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	3	2	1	3	3	2	1	1	1	1.70	1.06	0.33
Stichopus mollis	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Cookia sulcata	0	0	0	1	0	0	0	0	0	1	0.20	0.42	0.13
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0.1	0	0	0	0	0	0	0	0	0	0.01	0.03	0.01
Tethya spp. (number)	3	0	0	0	0	0	0	0	0	0	0.30	0.95	0.30
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

RB5

Boulder-bedrock

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	0	0	0	1	2	3	0	0	0	0.60	1.07	0.34
Haliotis iris	0	0	0	1	0	0	0	0	1	0	0.20	0.42	0.13
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	2	1	2	0	0	0	0	0	0	0.50	0.85	0.27
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	1	0.10	0.32	0.10
Turbo smaragdus	1	0	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	70	90	70	50	90	95	95	65	70	50	74.50	17.23	5.45
Cystophora spp. % cover	60	88	68	49	88	50	5	35	30	70	54.30	26.20	8.29
C. flexusosum % cover	0	0	1	0	0	4	0	0	0	0	0.50	1.27	0.40
C. maschalocarpum % cover	0	0	1	0	0	40	90	25	40	10	20.60	29.41	9.30
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder-bedrock

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	9	5	5	4	24	3	5	7	1	2	6.50	6.57	2.08
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	1	0	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	0	3	2	2	5	0	0	1	0	1.50	1.65	0.52
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Turbo smaragdus	0	0	0	1	1	0	1	0	0	0	0.30	0.48	0.15
Trochus spp.	0	0	1	0	1	0	1	0	0	0	0.30	0.48	0.15
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	5	15	10	25	5	10	3	25	70	65	23.30	24.56	7.77
Cystophora spp. % cover	0	0	4	15	5	9	2	20	60	60	17.50	23.31	7.37
C. flexusosum % cover	5	15	1	5	0	1	1	5	10	5	4.80	4.69	1.48
C. maschalocarpum % cover	0	0	0	5	0	0	0	0	0	0	0.50	1.58	0.50
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Bedrock

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	1	1	3	7	3	3	4	4	3	1	3.00	1.83	0.58
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	2	2	1	0	1	1	0	1	2	1.00	0.82	0.26
Coscinasterias muricata	0	0	0	0	0	0	0	0	1	0	0.10	0.32	0.10
Stichaster australis	0	1	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Patiriella regularis	0	1	3	4	1	3	4	4	1	2	2.30	1.49	0.47
Stichopus mollis	0	0	0	0	0	0	0	0	1	1	0.20	0.42	0.13
Cookia sulcata	3	0	1	2	4	0	1	0	1	3	1.50	1.43	0.45
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	1	0	1	2	0	0	0	2	0	0.60	0.84	0.27
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0.1	0	0	0	0	0.1	0.02	0.04	0.01
Tethya spp. (number)	0	0	0	0	1	0	0	0	0	1	0.20	0.42	0.13
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

RB6

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	2	7	3	8	5	6	8	2	4	11	5.60	2.95	0.93
Haliotis iris	0	1	0	0	1	7	0	0	0	1	1.00	2.16	0.68
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	1	1	1	1	1	0	0	0.50	0.53	0.17
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	1	0	1	0	1	0	0	0	0	0.40	0.52	0.16
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	0	1	0	2	1	2	0	1	0	1	0.80	0.79	0.25
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	15	45	80	35	45	70	45	40	25	40	44.00	19.12	6.05
Cystophora spp. % cover	10	30	65	30	5	60	10	35	20	30	29.50	20.20	6.39
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	15	10	5	35	0	30	2	3	5	10.50	12.52	3.96
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	4	4	10	7	6	4	3	3	2	12	5.50	3.27	1.04
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	0	1	0	0	0	0	0	0	0.20	0.42	0.13
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Patiriella regularis	4	2	3	5	3	1	5	2	2	4	3.10	1.37	0.43
Stichopus mollis	0	0	1	0	0	0	0	1	0	0	0.20	0.42	0.13
Cookia sulcata	0	0	1	0	0	1	4	0	0	0	0.60	1.26	0.40
Turbo smaragdus	0	1	1	2	2	0	0	2	0	0	0.80	0.92	0.29
Trochus spp.	1	3	2	1	4	3	2	3	1	2	2.20	1.03	0.33
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0.1	0.1	0.02	0.04	0.01
Tethya spp. (number)	0	0	0	0	0	0	0	0	4	2	0.60	1.35	0.43
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	1	1	3	2	5	4	5	1	0	2.50	1.78	0.56
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	0	0	1	0	0	0	0	0	0.20	0.42	0.13
Coscinasterias muricata	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	4	2	3	3	1	2	1	4	2	1	2.30	1.16	0.37
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	2	0	0	1	4	3	0	0	0	1.00	1.49	0.47
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	2	0	0	0	0	0	0	0	0	0.20	0.63	0.20
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0.1	0	0	0.1	0	0	0	0.1	0.03	0.05	0.02
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0.1	0	0	0.1	0	0	0	0.1	0.03	0.05	0.02
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	1	1	0.1	0	0	0.5	0	0	0	0.26	0.42	0.13
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	1	1	0	0	0	0.5	0	0	0	0.25	0.42	0.13
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0.1	0	0	0	0	0	0	0.01	0.03	0.01
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Davidson Environmental Ltd.

CB1

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	0	0	0	0	0	1	0	0	1	0.30	0.48	0.15
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	6	25	5	50	35	30	10	5	2	15	18.30	16.04	5.07
Cystophora spp. % cover	1	10	2	5	5	10	4	2	1	0	4.00	3.59	1.14
C. flexusosum % cover	5	20	0	5	0	20	4	1	1	0	5.60	7.85	2.48
C. maschalocarpum % cover	0	0	3	40	30	0	2	2	0	15	9.20	14.51	4.59
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	1	2	3	6	3	2	2	5	10	3.40	2.91	0.92
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	0	0	0	0	0	0	0	2	0.30	0.67	0.21
Coscinasterias muricata	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	0	0	0	0	1	0	0	0	0	0.20	0.42	0.13
Stichopus mollis	0	0	0	0	0	0	0	1	0	0	0.10	0.32	0.10
Cookia sulcata	0	0	0	1	0	0	0	0	0	1	0.20	0.42	0.13
Turbo smaragdus	0	0	0	2	0	0	0	0	0	1	0.30	0.67	0.21
Trochus spp.	0	0	0	0	2	1	0	0	0	0	0.30	0.67	0.21
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	40	35	10	15	5	5	20	0	0	0	13.00	14.57	4.61
Cystophora spp. % cover	10	5	0	2	0	0	5	0	0	0	2.20	3.43	1.08
C. flexusosum % cover	30	30	10	12	5	5	15	0	0	0	10.70	11.42	3.61
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	6	2	5	3	2	5	3	2	1	0	2.90	1.91	0.60
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	0	0	1	0	0	2	0	1	0.50	0.71	0.22
Coscinasterias muricata	1	0	1	0	2	0	0	0	0	0	0.40	0.70	0.22
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	0	1	3	0	1	1	0	0	0	0.70	0.95	0.30
Stichopus mollis	0	0	0	1	2	1	0	0	0	1	0.50	0.71	0.22
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	1	0	0	0	0	0	0	0	0	1	0.20	0.42	0.13
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

CB2

Boulder-bedrock

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	0	8	6	3	6	2	3	0	2	3.00	2.83	0.89
Haliotis iris	0	0	0	0	0	3	0	0	1	5	0.90	1.73	0.55
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	2	0	0	1	0	0	0	0	0	1	0.40	0.70	0.22
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	1	1	1	0	0	0	0	0	1	0.40	0.52	0.16
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	1	2	5	1	1	3	2	4	7	3	2.90	1.97	0.62
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	10	15	3	0	30	0	5	5	0	15	8.30	9.55	3.02
Cystophora spp. % cover	10	5	0	0	30	0	5	5	0	15	7.00	9.49	3.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	10	0	0	0	0	0	0	0	0	1.00	3.16	1.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	1	2	1	1	1	3	5	2	2	0	1.80	1.40	0.44
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	1	0	1	0	0	1	1	0	0.50	0.53	0.17
Coscinasterias muricata	1	0	2	1	0	0	0	0	0	0	0.40	0.70	0.22
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	3	5	0	3	2	3	1	0	1	2.00	1.56	0.49
Stichopus mollis	1	0	0	0	0	0	2	1	0	1	0.50	0.71	0.22
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	5	3	0	1	0	2	1	1	3	2	1.80	1.55	0.49
Trochus spp.	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	2	0.20	0.63	0.20
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	2	0.20	0.63	0.20
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	3	2	3	2	1	3	4	0	2	2.30	1.16	0.37
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	1	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	2	1	2	1	2	3	1	1	2	1.70	0.67	0.21
Stichopus mollis	0	0	2	0	1	2	0	0	0	2	0.70	0.95	0.30
Cookia sulcata	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Turbo smaragdus	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Trochus spp.	1	0	0	0	0	0	1	1	1	0	0.40	0.52	0.16
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	2	0	0	0	0	0	0	0	0	0.20	0.63	0.20
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	2	0	0	0	0	0	0	0	0	0.20	0.63	0.20

CB3

Boulder-bedrock

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	2	3	7	3	4	4	4	5	2	0	3.40	1.90	0.60
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	1	0	0	0	0	0	1	0	0	0	0.20	0.42	0.13
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	6	3	4	5	2	3	2	2	0	0	2.70	1.95	0.62
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	11	6	5	1	10	13	5	3	6	2	6.20	3.97	1.25
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	10	1.00	3.16	1.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	10	1.00	3.16	1.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder-cobble

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	2	2	3	2	1	4	4	2	7	5	3.20	1.81	0.57
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	1	0.10	0.32	0.10
Coscinasterias muricata	0	0	1	0	1	0	0	1	0	1	0.40	0.52	0.16
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	0	0	1	1	3	1	1	1	1	0.90	0.88	0.28
Stichopus mollis	0	0	0	0	0	0	1	2	1	3	0.70	1.06	0.33
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	3	3	4	4	9	6	2	9	4	0	4.40	2.88	0.91
Trochus spp.	0	1	0	0	0	1	0	1	0	3	0.60	0.97	0.31
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder-cobble

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	2	3	1	0	0	1	4	1	1	3	1.60	1.35	0.43
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	1	0	0	1	1	2	2	0.70	0.82	0.26
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	0	0	0	0	0	0	0	0	1	1	0.20	0.42	0.13
Stichopus mollis	0	0	1	0	1	1	0	0	1	1	0.50	0.53	0.17
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	1	1	0	4	2	3	1	2	7	0	2.10	2.13	0.67
Trochus spp.	4	0	0	9	0	0	0	2	2	0	1.70	2.91	0.92
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

CB4

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	10	4	14	4	0	1	0	0	1	2	3.60	4.77	1.51
Haliotis iris	0	0	3	2	0	0	0	0	0	1	0.60	1.07	0.34
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	0	0	0	0	1	2	1	1	3	0.90	0.99	0.31
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	1	0	0.10	0.32	0.10
Turbo smaragdus	0	0	0	2	0	0	0	0	0	2	0.40	0.84	0.27
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	35	60	50	30	32	15	5	20	55	25	32.70	17.81	5.63
Cystophora spp. % cover	0	0	5	5	5	14	0	0	5	3	3.70	4.32	1.37
C. flexusosum % cover	5	10	5	5	2	2	2	17	0	20	6.80	6.78	2.14
C. maschalocarpum % cover	30	50	40	10	25	0	3	3	50	2	21.30	20.30	6.42
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulders

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	7	2	8	4	1	2	0	6	9	4	4.30	3.09	0.98
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	2	0	0	0	0.20	0.63	0.20
Coscinasterias muricata	0	0	1	0	0	1	0	0	0	1	0.30	0.48	0.15
Stichaster australis	0	0	0	0	0	1	0	0	0	0	0.10	0.32	0.10
Patiriella regularis	2	1	0	2	5	6	1	1	0	0	1.80	2.10	0.66
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	1	1	0	0	0	0	0	0	0	0	0.20	0.42	0.13
Turbo smaragdus	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Trochus spp.	0	1	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	40	60	20	5	10	8	5	60	65	60	33.30	26.14	8.27
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	40	60	20	5	10	8	5	60	65	60	33.30	26.14	8.27
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	15	5	0	0	0	0	2	0	0	0	2.20	4.78	1.51
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	15	5	0	0	0	0	2	0	0	0	2.20	4.78	1.51
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	0	3	2	1	0	1	6	0	2	1	1.60	1.84	0.58
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	1	1	1	0	1	0	0	0	2	1	0.70	0.67	0.21
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	1	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	2	2	2	2	2	2	2	1	1	1.80	0.42	0.13
Stichopus mollis	1	2	0	0	1	0	1	0	0	0	0.50	0.71	0.22
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0.2	0	0	0.02	0.06	0.02
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0.2	0	0	0.02	0.06	0.02
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0.1	0.1	0	0	0	0	0	0	0.1	0	0.03	0.05	0.02
Tethya spp. (number)	1	3	0	0	0	0	0	0	1	0	0.50	0.97	0.31
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	1	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

CB5

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	4	17	6	1	8	1	7	2	1	1	4.80	5.07	1.60
Haliotis iris	0	0	0	0	0	0	0	1	0	0	0.10	0.32	0.10
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	1	0	0	0	0	1	0	0	0	0	0.20	0.42	0.13
Coscinasterias muricata	0	0	0	1	0	1	0	0	0	0	0.20	0.42	0.13
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	1	3	2	1	1	1	2	0	1	0	1.20	0.92	0.29
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	1	1	1	0	0	0	1	0	0.40	0.52	0.16
Turbo smaragdus	1	0	1	0	0	0	0	0	0	0	0.20	0.42	0.13
Trochus spp.	2	2	1	0	0	0	0	0	0	0	0.50	0.85	0.27
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	35	20	45	55	50	65	60	80	90	70	57.00	20.84	6.59
Cystophora spp. % cover	1	0	20	20	5	2	35	55	90	35	26.30	28.84	9.12
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	30	20	20	30	40	60	20	20	0	30	27.00	15.67	4.96
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	7	3	4	5	3	4	3	8	2	5	4.40	1.90	0.60
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	3	0	0	0	1	0	0	0	0	0.40	0.97	0.31
Stichaster australis	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Patiriella regularis	0	0	1	0	2	1	0	1	0	0	0.50	0.71	0.22
Stichopus mollis	2	0	0	0	0	0	0	0	0	1	0.30	0.67	0.21
Cookia sulcata	1	0	2	0	1	0	0	0	2	2	0.80	0.92	0.29
Turbo smaragdus	0	0	0	3	1	1	1	2	3	0	1.10	1.20	0.38
Trochus spp.	0	0	0	1	2	0	0	5	0	7	1.50	2.51	0.79
Mauria punctulata	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0.2	0	0	0	0	0	0	0	0	0	0.02	0.06	0.02
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0.2	0	0	0	0	0	0	0	0	0	0.02	0.06	0.02
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	7	2	4	4	2	5	2	3	1	3	3.30	1.77	0.56
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	1	0	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	1	0	0	0	1	0	0	0.20	0.42	0.13
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	0	1	2	0	2	3	2	2	2	1.60	0.97	0.31
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	3	1	2	2	2	1	0	0	1.10	1.10	0.35
Turbo smaragdus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Trochus spp.	0	2	0	2	0	4	2	0	0	3	1.30	1.49	0.47
Mauria punctulata	0	0	0	0	0	1	0	0	0	0	0.10	0.32	0.10
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	1	1	0	0	2	0	0	0	0.5	0	0.45	0.69	0.22
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	1	0	0	0	2	0	0	0	0	0	0.30	0.67	0.21
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	1	0	0	0	0	0	0	0.5	0	0.15	0.34	0.11
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

CB6

Boulder

Depth **0-0.5m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	1	2	3	0	0	0	0	0	0	0	0.60	1.07	0.34
Haliotis iris	2	1	0	0	1	0	0	0	0	0	0.40	0.70	0.22
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	5	1	0	2	3	4	6	7	1	2	3.10	2.33	0.74
Stichopus mollis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cookia sulcata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Turbo smaragdus	8	2	1	1	2	4	8	0	1	0	2.70	3.02	0.96
Trochus spp.	1	0	0	0	1	0	0	0	1	0	0.30	0.48	0.15
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	30	40	85	45	60	15	15	20	25	40	37.50	22.02	6.96
Cystophora spp. % cover	0	0	0	0	5	0	1	15	15	30	6.60	10.22	3.23
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	29	40	85	45	53	15	13	5	5	10	30.00	25.91	8.19
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **2.5-3 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	3	5	3	6	8	8	5	4	3	4.80	1.99	0.63
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	1	0	0	0	0.10	0.32	0.10
Coscinasterias muricata	0	0	0	0	0	0	0	1	0	1	0.20	0.42	0.13
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	2	1	1	0	0	0	0	2	0	4	1.00	1.33	0.42
Stichopus mollis	0	0	0	0	1	0	0	0	0	0	0.10	0.32	0.10
Cookia sulcata	0	0	0	0	1	0	1	1	1	0	0.40	0.52	0.16
Turbo smaragdus	0	2	2	1	1	0	0	0	0	1	0.70	0.82	0.26
Trochus spp.	1	0	3	7	3	0	4	0	0	0	1.80	2.39	0.76
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0.1	1	0	0	0.1	0	0	0	0	0	0.12	0.31	0.10
Tethya spp. (number)	1	0	0	0	0.1	0	0	0	0	0	0.11	0.31	0.10
Crella sp. (% cover)	0	1	0	0	0	0	0	0	0	0	0.10	0.32	0.10
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Boulder

Depth **5-5.5 m**

	1	2	3	4	5	6	7	8	9	10	Mean	SD	SE
Evechinus chloroticus	3	6	4	2	1	3	2	2	5	4	3.20	1.55	0.49
Haliotis iris	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Haliotis australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Stegnaster inflatus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Coscinasterias muricata	0	0	1	0	0	0	0	0	0	0	0.10	0.32	0.10
Stichaster australis	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Patiriella regularis	6	2	2	4	4	1	1	5	1	4	3.00	1.83	0.58
Stichopus mollis	1	1	0	0	2	0	0	0	0	0	0.40	0.70	0.22
Cookia sulcata	0	0	0	1	0	0	0	0	0	0	0.10	0.32	0.10
Turbo smaragdus	0	0	0	0	0	0	0	0	1	1	0.20	0.42	0.13
Trochus spp.	0	0	2	0	0	1	0	1	1	0	0.50	0.71	0.22
Mauria punctulata	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Macrobrown total % cover	0	0	0	0	0	0	0	0	5	0	0.50	1.58	0.50
Cystophora spp. % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
C. flexusosum % cover	0	0	0	0	0	0	0	0	5	0	0.50	1.58	0.50
C. maschalocarpum % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Sponge total % cover	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Tethya spp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Crella sp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Iophon minor (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Callyspongia sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Polymastia spp. (% cover)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Ancorina sp. (number)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

Appendix 4. Location of fish transects.

Site	Coordinates
CF1	41 07.83760,173 30.31003
CF2	41 08.18976,173 25.47934
CF3	41 08.43218,173 24.69114
CF4	41 09.33501,173 24.42510
CF5	41 11.00987,173 21.63140
CF6	41 11.37377,173 20.83302
RF1	41 09.351,173 24.135
RF2	41 09.833,173 23.552
RF3	41 10.130,173 23.016
RF4	41 10.384,173 22.314
RF5	41 10.642,173 22.041
RF6	41 10.786,173 21.886

Appendix 5a. Fish data collected from divers from Horoirangi Marine Reserve and Control sites, 2006.

Species	Common Name	Site RF1												Site RF2												Site RF3											
Parapercis colias	Blue cod < 10 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod 10 - 30 cm	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Parapercis colias	Blue cod > 30 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notolabrus cilaris	Spotty	1	7	3	0	5	2	1	2	2	3	4	4	4	5	2	10	3	16	8	5	9	6	1	4	11	7	12	8	3	3	2	6	3	23	9	6
Notolabrus fucicola	Banded wrasse	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesioperca lepidoptera	Butterfly perch	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudolabrus miles	Scarlet wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odax pullus	Butterfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilodactylus nigripes	Magpie moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latridopsis ciliaris	Blue moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemadactylus macropterus	Tarakihi	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	13	0	0	0	0	0	0	0	0	0
Cheilodactylus spectabilis	Red moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aplodactylus arctidens	Marblefish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Scorpis lineolatus	Sweep	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parika scaber	Leatherjacket	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helicolenus papillosus	Sea perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upeneichthys lineatus	Goatfish	0	4	2	0	0	0	0	0	2	0	5	2	0	0	0	0	0	0	0	0	0	1	2	1	2	0	0	1	2	2	0	0	0	2	0	0
	Depth (m)	8	9	10	7	8	8	9	8	10	10	7	9	9	11	10	7	7	7	9	6	7	9	12	11	6	6	6	7	9	11	8	10	9	6.5	6	6

Species	Common Name	Site RF4												Site RF5												Site RF6											
Parapercis colias	Blue cod < 10 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod 10 - 30 cm	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod > 30 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notolabrus cilaris	Spotty	2	5	5	1	6	8	8	12	8	3	4	6	8	10	7	10	10	5	10	4	4	5	5	4	2	2	6	2	3	4	2	4	4	6	8	6
Notolabrus fucicola	Banded wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Caesioperca lepidoptera	Butterfly perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudolabrus miles	Scarlet wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odax pullus	Butterfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilodactylus nigripes	Magpie moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latridopsis ciliaris	Blue moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemadactylus macropterus	Tarakihi	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cheilodactylus spectabilis	Red moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aplodactylus arctidens	Marblefish	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scorpis lineolatus	Sweep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parika scaber	Leatherjacket	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helicolenus papillosus	Sea perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upeneichthys lineatus	Goatfish	2	0	0	0	0	2	0	0	2	1	0	0	2	0	0	3	0	1	0	1	2	0	4	0	2	1	2	0	1	4	2	1	3	5	1	2
	Depth (m)	9	11	12	8	9	8	9	7	8	9	9	8	10	8	6	9	6	5	8	9	9	7	6	7	10	10	10	10	11	10	8	8	9	8	8	8

Appendix 5b. Fish data collected from divers from Horoirangi Marine Reserve and Control sites, 2006.

Species	Common Name	Site CF1												Site CF2												Site CF3											
Parapercis colias	Blue cod < 10 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod 10 - 30 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod > 30 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notolabrus cilaris	Spotty	26	5	5	3	12	4	23	8	9	6	8	6	6	3	5	3	5	10	3	6	20	9	12	6	7	2	3	4	4	11	2	12	7	2	3	8
Notolabrus fucicola	Banded wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Caesioperca lepidoptera	Butterfly perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Pseudolabrus miles	Scarlet wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Odax pullus	Butterfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilodactylus nigripes	Magpie moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latridopsis ciliaris	Blue moki > 40 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nemadactylus macropterus	Tarakihi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilodactylus spectabilis	Red moki	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aplodactylus arctidens	Marblefish	0	0	0	0	0	0	0	0	0	0	3	0	1	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Scorpis lineolatus	Sweep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0
Parika scaber	Leatherjacket	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helicolenus papillosus	Sea perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upeneichthys lineatus	Goatfish	0	0	2	0	0	1	1	1	8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Depth (m)	5	6	6	5	5	5	6	6	6	6	4	4	8.2	10	9	8	7	7	9	10	10	8	9	9	8	8	8	6.2	6.2	6.2	7	8	10	7	6	6

Species	Common Name	Site CF4												Site CF5												Site CF6											
Parapercis colias	Blue cod < 10 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parapercis colias	Blue cod 10 - 30 cm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Parapercis colias	Blue cod > 30 cm	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Notolabrus cilaris	Spotty	14	21	11	8	9	11	11	2	4	6	4	2	1	1	7	2	5	12	6	5	3	14	23	7	6	8	7	3	5	2	7	5	3	6	21	1
Notolabrus fucicola	Banded wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caesioperca lepidoptera	Butterfly perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudolabrus miles	Scarlet wrasse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Odax pullus	Butterfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cheilodactylus nigripes	Magpie moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latridopsis ciliaris	Blue moki > 40 cm	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemadactylus macropterus	Tarakihi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Cheilodactylus spectabilis	Red moki	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aplodactylus arctidens	Marblefish	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scorpis lineolatus	Sweep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parika scaber	Leatherjacket	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Helicolenus papillosus	Sea perch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upeneichthys lineatus	Goatfish	0	0	0	0	1	0	2	0	1	1	0	0	0	2	0	0	0	0	0	1	1	1	0	1	1	0	1	0	0	0	1	0	1	0	0	1
	Depth (m)	7	7	7	7	7	7	7	9	10	7	8	10	5	6	6	5	6	6	6	6	6	6	6	6	5	6	6	5	6	6	6	6	6	6	6	6

Appendix 6. Lobster sample sites 2006.

Site	Coordinates
CL1	41 06.71852,173 30.46279
CL2	41 08.29355,173 25.72865
CL3	41 08.18976,173 25.47934
CL4	41 08.43218,173 24.69114
CL5	41 09.33501,173 24.42510
CL6	41 11.01073,173 21.63083
RL1	41 09.351,173 24.135
RL2	41 09.833,173 23.552
RL3	41 10.130,173 23.016
RL4	41 10.384,173 22.314
RL5	41 10.642,173 22.041
RL6	41 10.786,173 21.886

Appendix 7. Lobster sizes from February 2004.

Spiny lobster abundance data collected from 100 m^2 quadrats during April 2006. Error = 1 SE. M = male, F = female, J = juvenile, ? = unknown sex.

Site name	Site no.	Treatment	N quadrats	Depth (m)	Habitat	Number per quadrat										Total number	Sex				Density ($100m^2$)	SD	SE
						1	2	3	4	5	6	7	8	9	10		Male	Female	Juvenile	Unknown			
Ataata Point	RL1	Reserve	10	5-10 m	Boulder, bedrock	7	0	0	3	0	0	0	0	0	1	11	4	3	2	2	1.10	2.28	0.72
Ataata Point (south)	RL2	Reserve	10	5-10 m	Boulder, bedrock	0	3	0	0	0	0	0	4	12	0	19	12	3	2	2	1.90	3.84	1.22
Pillar Creek	RL3	Reserve	10	5-10 m	Boulder, bedrock	8	0	0	0	0	0	0	0	0	0	8	3	1	2	2	0.80	2.53	0.80
Mackay Bluff	RL4	Reserve	10	5-10 m	Boulder, bedrock	0	3	0	0	0	1	9	6	0	0	19	6	4	1	8	1.90	3.18	1.00
Mackay Bluff (south)	RL5	Reserve	10	7-10 m	Boulder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Waihi Creek	RL6	Reserve	10	7-10 m	Boulder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Hori south	CL1	Control	10	6-10 m	Boulder, bedrock	1	1	3	3	6	0	0	1	3	0	18	7	7	2	7	1.80	1.93	0.61
Puketi Point	CL2	Control	10	6-12 m	Bedrock, boulder	0	3	0	0	0	0	0	0	0	0	3	2	0	1	1	0.30	0.95	0.30
Echinus Cove	CL3	Control	10	5-12 m	Bedrock, boulder	0	0	0	5	0	0	0	0	2	0	7	6	1	1	0	0.70	1.64	0.52
Maheipuku Point	CL4	Control	10	5-10 m	Boulder, bedrock	0	0	8	0	0	0	0	0	6	0	14	14	0	0	4	1.40	2.99	0.95
Ataata Point	CL5	Control	10	5-10 m	Bedrock, boulder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Glenduan	CL6	Control	10	5-6 m	Boulder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00

		Number	Density ($100m^2$)	SD	SE
ALL	RESERVE	57	0.95	2.49	0.32
ALL	CONTROL	42	0.70	1.72	0.22

Appendix 8a. Raw lobster data from reserve sites, March - April 2006. ? = individual that could not be measured, Unknown = individuals that could not be sexed due to physical obstructions.

																		All sexes		
Site name	Site no.	Sex	Size (CL)											Number	Total per site	Mean size (mm)	SD	SE	Mean size (mm)	SD	SE
Ataata Point	RL1	Male	85	75	8	8								4	11	44.00	41.77	20.88	60.60	29.07	8.76
		Female	85	75	75									3		78.33	5.77	3.33			
		Juvenile	55	65										2		60.00	7.07	5.00			
		Unknown	75	?										2		75.00	#DIV/0!	#DIV/0!			
Ataata Point (south)	RL2	Male	17	12	9	9	11	9	8	12	8	75	115	85	12	19	30.83	37.82	10.92	37.00	39.09	8.97
		Female	8	85	95										3		62.67	47.61	27.49			
		Juvenile	65	6											2		35.50	41.72	29.50			
		Unknown	?	?											2		#DIV/0!	#DIV/0!	#DIV/0!			
Pillar Creek	RL3	Male	1	12	13										3	8	8.67	6.66	3.84	7.50	3.74	1.32
		Female	7												1		7.00	#DIV/0!	#DIV/0!			
		Juvenile	6	6											2		6.00	0.00	0.00			
		Unknown	8	7											2		7.50	0.71	0.50			
Mackay Bluff	RL4	Male	8	8	1	7	12	?							6	19	7.20	3.96	1.62	15.00	24.74	5.68
		Female	8	85	7	8									4		27.00	38.67	19.33			
		Juvenile	6												1		6.00	#DIV/0!	#DIV/0!			
		Unknown	?	?	?	?	?	?	?	?					8		#DIV/0!	#DIV/0!	#DIV/0!			
Mackay Bluff (south)	RL5	Male													0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		Female													0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile													0		#DIV/0!	#DIV/0!	#DIV/0!			
		Unknown													0		#DIV/0!	#DIV/0!	#DIV/0!			
Waihi Creek	RL6	Male													0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		Female													0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile													0		#DIV/0!	#DIV/0!	#DIV/0!			
		Unknown													0		#DIV/0!	#DIV/0!	#DIV/0!			

Appendix 8b. Raw lobster data from control sites, March - April 2006 (continued). ? = individual that could not be measured, Unknown = individuals that could not be sexed due to physical obstructions.

Hori south	CL1	Male	?	115	9	12	11	115	8							7	23	45.00	54.24	20.50	57.44	45.87	9.56
		Female	?	95	7	?	95	12	8							7		43.40	47.14	17.82			
		Juvenile	7	65												2		36.00	41.01	29.00			
		Unknown	?	?	115	85	95	85	95							7		95.00	12.25	4.63			
Puketi Point	CL2	Male	11	12												2	4	11.50	0.71	0.50	10.50	2.38	1.19
		Female														0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile	7													1		7.00	#DIV/0!	#DIV/0!			
		Unknown	12													1		12.00	#DIV/0!	#DIV/0!			
Echinus Cove	CL3	Male	125	8	15	1	9	95								6	8	42.17	53.58	21.87	50.38	47.76	16.89
		Female	75													1		75.00	#DIV/0!	#DIV/0!			
		Juvenile	75													1		75.00	#DIV/0!	#DIV/0!			
		Unknown														0		#DIV/0!	#DIV/0!	#DIV/0!			
Maheipuku Point	CL4	Male	1	12	8	9	11	9	9	11	85	13	75	8	85	8	14	18	24.57	31.15	8.32	24.57	31.15	7.34
		Female															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Unknown	?	?	?	?											4		#DIV/0!	#DIV/0!	#DIV/0!			
Ataata Point	CL5	Male															0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		Female															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Unknown															0		#DIV/0!	#DIV/0!	#DIV/0!			
Glenduan	CL6	Male															0	0	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
		Female															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Juvenile															0		#DIV/0!	#DIV/0!	#DIV/0!			
		Unknown															0		#DIV/0!	#DIV/0!	#DIV/0!			