



Proposed sites for a quantitative assessment of the intertidal rocky shore ecology of Chatham Island

Our people, our Islands, our future



chatham islands council

Environment Canterbury Science Summary:
Lesley Bolton-Ritchie (Environment Canterbury)
Helen Kettles (Department of Conservation)

Approved by: Elaine Moriarty
Section Manager

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Key messages

- ❖ Chatham Island has extensive areas of intertidal rocky shore, but to date there has been no collection of quantitative data on the marine life present on these rocky shores.
- ❖ Five intertidal rocky reef sites were identified as appropriate for quantitative assessment of biota and ongoing monitoring.
- ❖ A brief description and a preliminary list of biota is provided for each of the five sites.
- ❖ A detailed quantitative baseline assessment and monitoring of rocky shore biota is recommended to assess current state and to demonstrate any changes over time.

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1 Abstract

Chatham Island/Rēkohu/Wharekauri has extensive areas of intertidal rocky shore that supports a diversity and abundance of marine plants and animals. However, to date there has been no collection of quantitative data on the marine life of the intertidal rocky shore on the island. Having quantitative data on the presence and abundance of the plant and animal species will allow for an evaluation of the current state of the intertidal rocky shore, and enable any changes over time to be identified. It will also provide data that can be used to assess the overall intertidal biodiversity on Chatham Island.

The authors of this report visited many rocky reefs on Chatham Island and using three criteria identified five potential intertidal rocky reef sites where quantitative assessments of the biota could be undertaken. A brief description of the site and a preliminary list of biota is provided for each of the five sites.

One or more of these sites could be established as a long term monitoring site. Monitoring, which is routine sampling at a site over time, provides data to assess for changes over time including from impacts of human activities.

2 Introduction

Chatham Island/Rēkohu/Wharekauri (referred to as Chatham Island through this report) has extensive areas of intertidal rocky shore, which characteristically have a range of habitats (e.g. rock pools, cracks and crevices, overhangs, and loose rocks) and support a diversity and abundance of marine plants and animals. However, while a qualitative assessment of the intertidal rocky shore biota of this island was undertaken during the Royal Society of New Zealand Expedition 1954 (Knox, 1954; see Morton & Miller 1973), no further formal assessments have been reported, and no quantitative assessments have ever been undertaken.

Quantitative assessments of the intertidal rocky shore biota can involve establishing transect lines along the shore at, at least, three different tide levels and sampling a predetermined number of quadrats along each transect (Lilley et al. 2016). The number of individuals of each animal species and the percentage cover of the plant and sessile invertebrate species is then determined in each quadrat. A quantitative assessment of the intertidal rocky shore biota would provide baseline data on the state of the intertidal rocky shore areas of Chatham Island.

This report provides background information on five potential intertidal rocky reef sites on Chatham Island where quantitative assessments of the biota could be undertaken. A brief description of the site and a preliminary list of biota is provided for each site.

3 Sites

Three criteria were used to select the proposed assessment sites:

- easily accessible
- sufficient alongshore length to allow three or more transects to be established
- sufficient downshore distance to allow a suitable number of quadrats to be sampled at different tidal levels (e.g. upper shore, mid-shore, mid-low shore and low shore)

Based on these criteria, five sites were selected: Owenga, Kaingaroa, Wharekauri, Port Hutt and Waitangi. The locations of these sites are shown in Figure 3-1.

The assessment of the sites was carried out between 30 January and 2 February 2012.



Figure 3-1: Map of Chatham Island showing the general location of each site

3.1 Owenga



Figure 3-2: Proposed study area at Owenga

The proposed study area at Owenga is between the two yellow lines shown in Figure 3-2. The boundaries of this area are -44.02389, -176.36884 and -44.02446, -176.37012.

This site is west of Owenga wharf and the embayment where commercial fishing boats are either launched from the beach or permanently moored. The Chatham Island Food Company factory is located on the headland in proximity to the rocky reef (see Figure 3-2).

This site is accessed by parking near the jetty and walking along the shore.

The shore in this area is volcanic rock with scattered rock pools and occasional loose stones (Figure 3-3).

A



B



Figure 3-3: The rocky shore at the Owenga site

- A. Close to the low shore at the southern end of the site
- B. Mid shore at the northern end of the site

3.2 Kaingaroa



Figure 3-4: Proposed study area at Kaingaroa

The proposed study area at Kaingaroa is between the two yellow lines shown in Figure 3-4. The boundaries of this area are $-43.73048, -176.26817$ and $-43.732999, -176.26863$.

This site is north of Kaingaroa wharf and the embayment where commercial fishing boats are either launched from the beach or permanently moored. We selected the northern part of the rocky shore to avoid the area where juvenile pāua (*Haliotis iris*) had been seeded to the rock pools by children from Kaingaroa School.

This site is accessed by parking near the boating club building and walking along the shore.

The shore in this area is schist with scattered rock pools and occasional loose stones (Figure 3-5).

A



B



Figure 3-5: The rocky shore at the Kaingaroa site

- A. From the upper shore
- B. At the mid-low shore

3.3 Wharekauri



Figure 3-6: Proposed study area at Wharekauri

The proposed study area at Wharekauri is between the two yellow lines shown in Figure 3-6. There is no continuous intertidal rocky reef in this area but rather a series of small reefs, and the alongshore distance of any one reef is insufficient for sampling the number of transects that will be required. Therefore, sampling will need to be undertaken down three of the intertidal reefs. The boundaries of the three areas are: 1) -43.70679, -176.57562 and -43.70683, -176.57535; 2) -43.70475, -176.58208 and -43.70478, -176.58182; and 3) -43.70815, -176.57074 and -43.70822, -176.57108.

Access to this area requires driving across private land, so permission for access must be obtained from the land owner. This is a special area for tōrea / Chatham Island oystercatcher (*Haematopus chathamensis*), which is classified as Threatened – Nationally Critical (Robertson et al. 2021). The tōrea nest at the top of the sand beach and are under the watchful eye of a land owner, who runs a predator trapping programme in the area. It should be noted that the area at the eastern end of the beach is on an island and is accessible for approximately two hours either side of low tide.

The shore in this area is volcanic rock with scattered rock pools (Figure 3-7).

A



B



Figure 3-7: The rocky shore at the Wharekauri site

- A. Close to the low shore on one of the reefs
- B. The shoreward view on one of the reefs

3.4 Port Hutt



Figure 3-8: Proposed study area at Port Hutt

The proposed study area at Port Hutt is between the two yellow lines shown in Figure 3-8. The boundaries of this area are -43.81937 , -176.70250 and -43.81987 , -176.70197 . This area is south of the Port Hutt wharf.

This site is accessed by parking near the fish factory at the southern end of the harbour and walking for 30 minutes along the shore/farmland to reach the study area. Accessing this area requires crossing private land, so permission for access must be obtained from the land owner.

The shore in this area is horizontal or near horizontal schist with channels and ledges (Figure 3-9).

A



B



Figure 3-9: The rocky shore at the Port Hutt site

- A. The reef from the adjacent hillside
- B. The low shore of the reef

3.5 Waitangi



Figure 3-10: Proposed study area at Waitangi

The proposed study area at Waitangi is between the two yellow lines shown in Figure 3-10. The boundaries of this area are $-43.94220, -176.56718$ and $-43.94266, -176.56586$.

The study area is delineated by a gut across the rock flat at the western end and an elevated line of rock at the eastern end (indicated by the arrow in Figure 3-11A). This area is northwest of Waitangi wharf.

This site can be accessed at mid to low tide by parking near the wharf and then walking along the shore to reach the study area.

The shore in this area is a flat platform with cracks, channels and elevated lines of volcanic rock (Figure 3-11). The platform extends from the base of a cliff, with a notable high-tide line along the cliff face.

A



B



Figure 3-11: The rocky shore at the Waitangi site. The arrow in panel A points to the eastern end of the recommended study area

- A. The rocky platform looking toward Waitangi. The arrow points to the eastern end of the recommended study area
- B. The rocky platform from the upper shore

4 The biota

The proposed assessment sites have different geologies and aspects (see section 3), which will affect the presence and abundance of intertidal plant and animal species. In addition, the diversity of habitats such as cracks, crevices, channels, rock pools and stones at a site will influence the presence and abundance of species. Consequently, it is highly likely there will be significant differences in the presence and abundance of species between sites.

4.1 Plants

A diversity and abundance of plants occur on Chatham Island's rocky shores, particularly at the mid-low and low shore levels (Figure 4-1 & Figure 4-2). We have not attempted to list all the intertidal species of algae found here but have provided a snapshot of what is present in Figure 4-1 to Figure 4-3.

Wendy Nelson has previously undertaken some work on the Chatham Island algae (e.g. Nelson et al. 1991), and limited species information is also provided in Morton & Miller (1968), Knox (1954) and Schiel (1990).

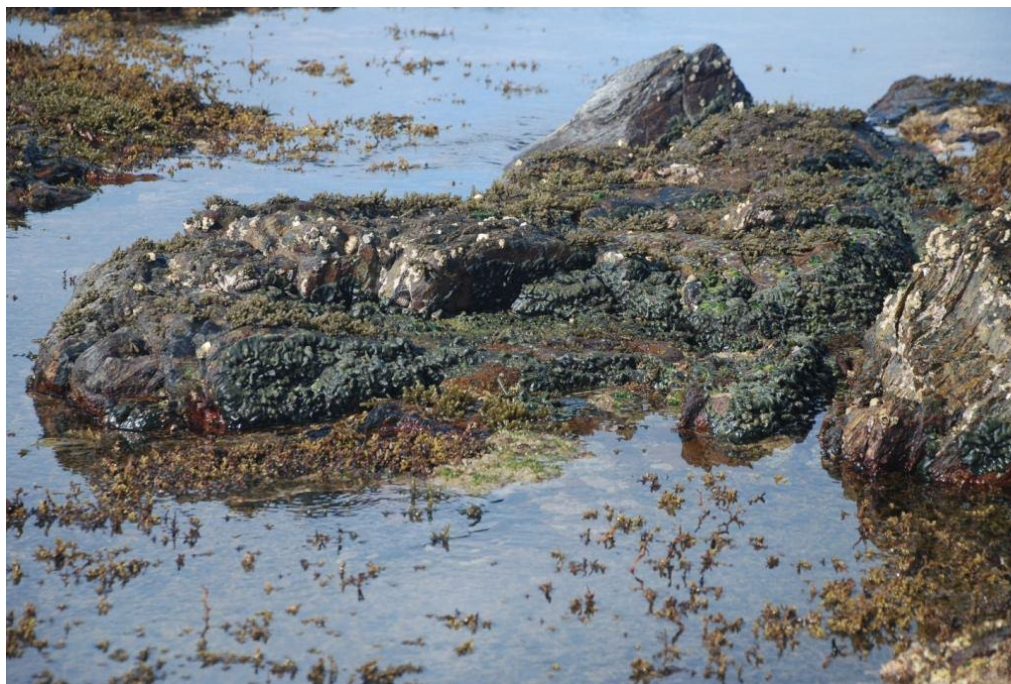
4.2 Animals

A diversity and abundance of animals are also found on Chatham Island's rocky shores. A list of the species we observed at the various sites is provided in Table 4-1. This is by not a definitive list of all intertidal animal species but rather a list of the more common and obvious species seen. Some of the animal species that are present are shown in Figure 4-4 to Figure 4-7.

We noted variation in the size and abundance of the molluscs *Cellana strigilis*, *Melagraphia aethiops*, *Haustrum haustorium*, *Siphonaria* sp. and various chitons between sites. Additionally, some of the species listed were not observed at all sites, suggesting geographical variation in species composition.

Additional information on the fauna of Chatham Island's rocky shores is provided in Morton & Miller (1968), Knox (1954), Schiel (1990) and McIlwraith (1976).

A



B



Figure 4-1: Low-shore algae species

- A. Kaingaroa
- B. Port Hutt

C



D



Figure 4 1: Low-shore algae species (continued)

- C. Waitangi
- D. Wharekauri



Figure 4-2: Mid-low-shore algae species at Owenga

A



B



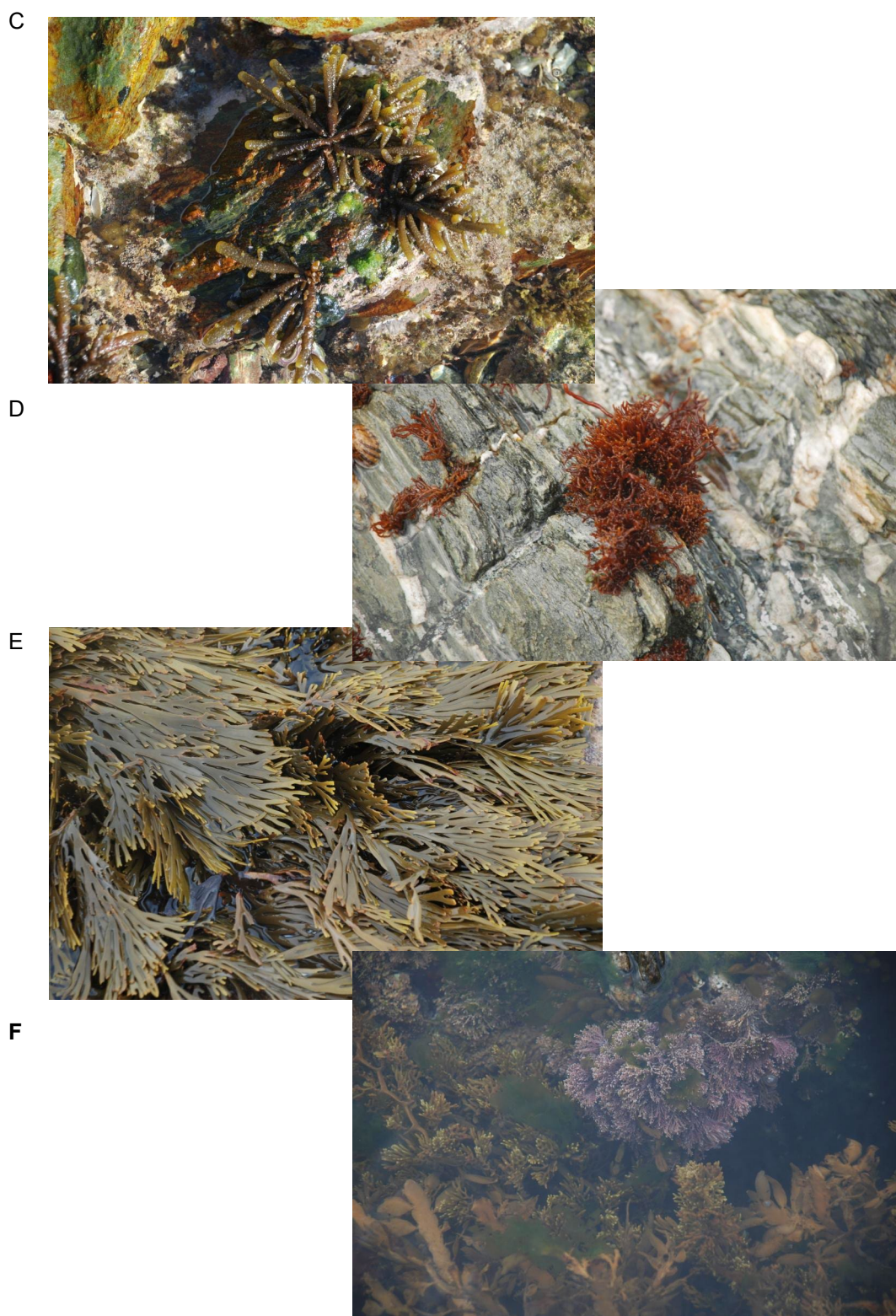


Figure 4-3: A. *Hormosira banksii*, B. *Porphyra* sp., C. *Splachnidium rugosum*, D. *Apophloea* sp., E. *Xiphophora chondrophylla* and F. a variety of species in a rock pool

**Proposed sites for a quantitative assessment of the intertidal rocky shore ecology
of Chatham Island**

Table 4-1: Intertidal animal species observed at the sites

Animal group	Species
Anemones	<i>Actinia tenebrosa</i> <i>Actinothoe albocincta</i> Candy stripe anemone <i>Isactinia olivacea</i> <i>Oulactis muscosa</i>
Snails and shellfish	<i>Aulacomya ater maoriana</i> <i>Austrolittorina antipodum</i> <i>Austrolittorina cincta</i> <i>Cellana strigilis</i> <i>Chiton pelliserpentis</i> <i>Cominella adpersa</i> <i>Cominella maculosa</i> <i>Doris wellingtonensis</i> <i>Haliotis iris</i> <i>Haustrum haustorium</i> <i>Lepsiella scobina</i> <i>Ischnochiton maorianus</i> <i>Melagraphia aethiops</i> <i>Novastoa lamellosa</i> <i>Onchidella nigricans</i> <i>Onithochiton neglectus neglectus</i> <i>Plaxiphora</i> ? Large chiton with broad soft girdle <i>Risselopsis varia</i> <i>Scutus breviculus</i> <i>Siphonaria</i> sp. <i>Sypharochiton pelliserpentis</i> <i>Trochus viridis</i> <i>Zeacumantus subcarinatus</i>
Worms	Nemertine worm Nereid worm Orange tentacled worm (Terebellidae) Spirorbid worm
Crustaceans	<i>Chamaesipho brunnea</i> <i>Elminius plicatus</i> Hoppers Hymenosomatid crab Isopods Shrimps Stalked barnacle
Starfish and brittle stars	<i>Allostichaster</i> sp. <i>Ophiomyxa brevirima</i> ? <i>Ophionereis fasciata</i> <i>Patiriella regularis</i> <i>Pentagonaster pulchellus</i>
Ascidians	<i>Corella eumyota</i>
Fishes	<i>Trachelochismus</i> sp. Triplefin sp.

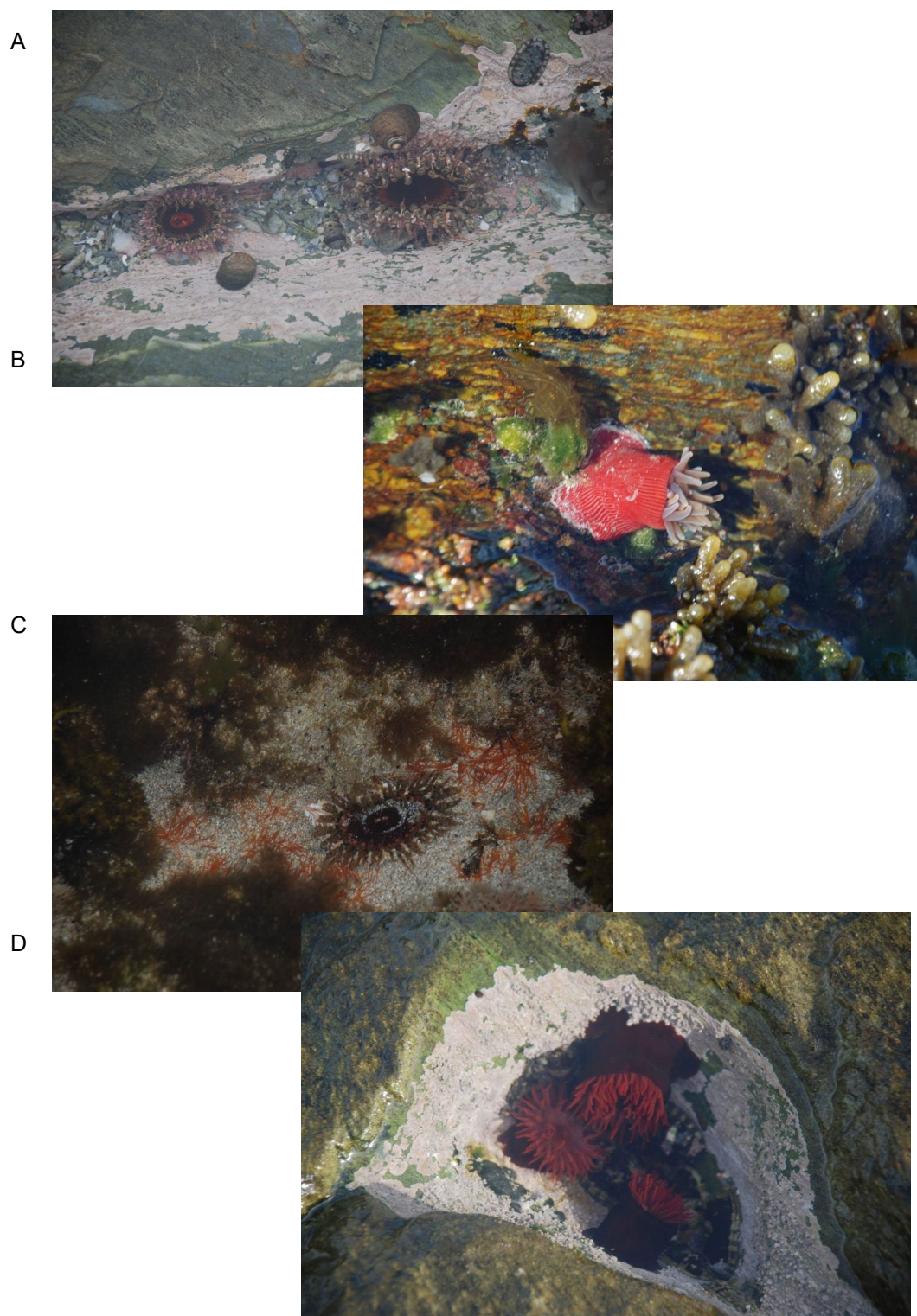


Figure 4-4: Intertidal anemone species

- A. *Oulactis mucosa*
- B. Candy stripe anemone
- C. *Isactinia olivacea*
- D. *Actinia tenebrosa*

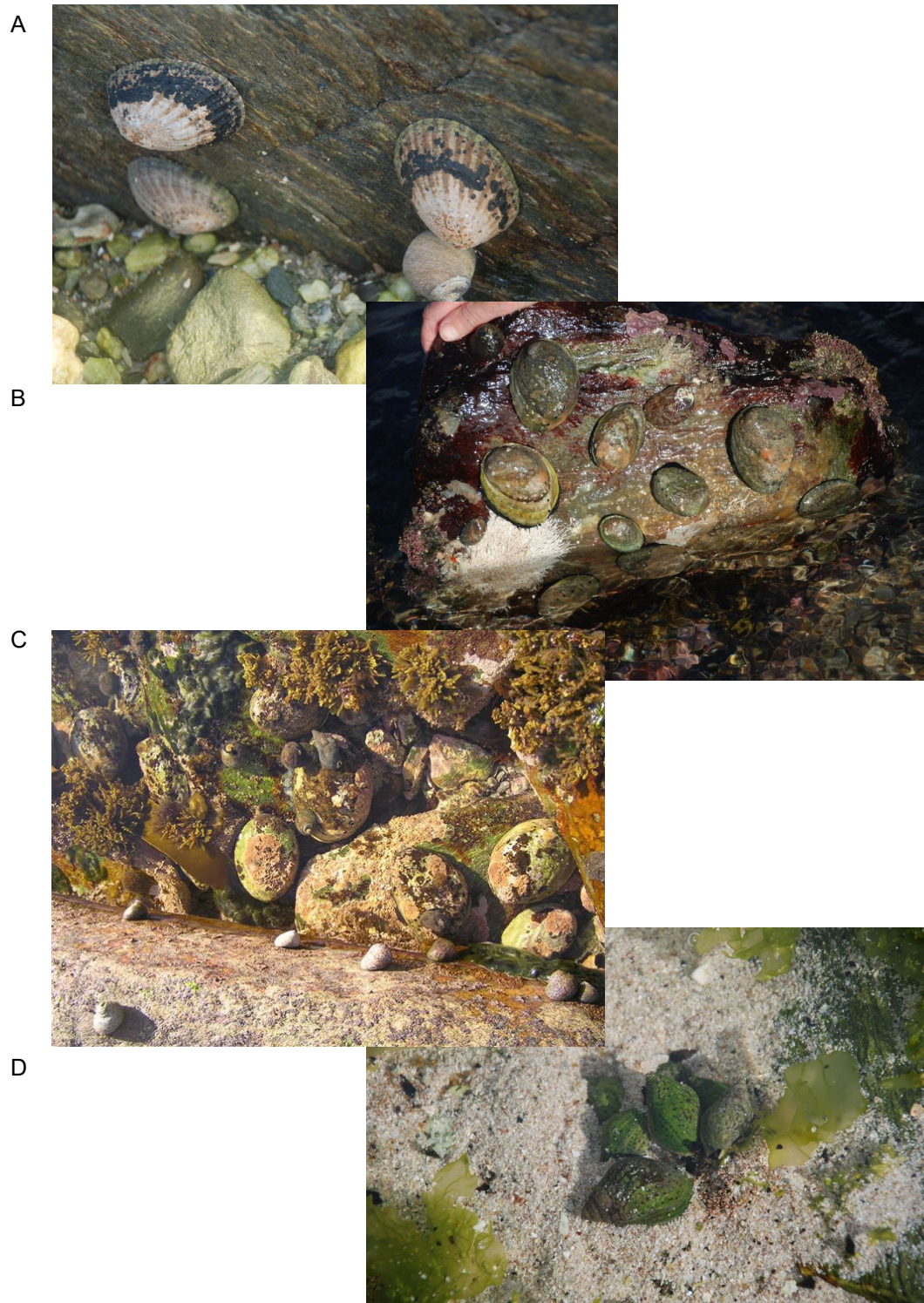


Figure 4-5: Intertidal molluscs

- A. *Cellana strigilis* (limpet),
- B. *Haliotis iris* (pāua),
- C. *Melagraphia aethiops* (topshell),
- D. *Cominella maculosa* (whelk),

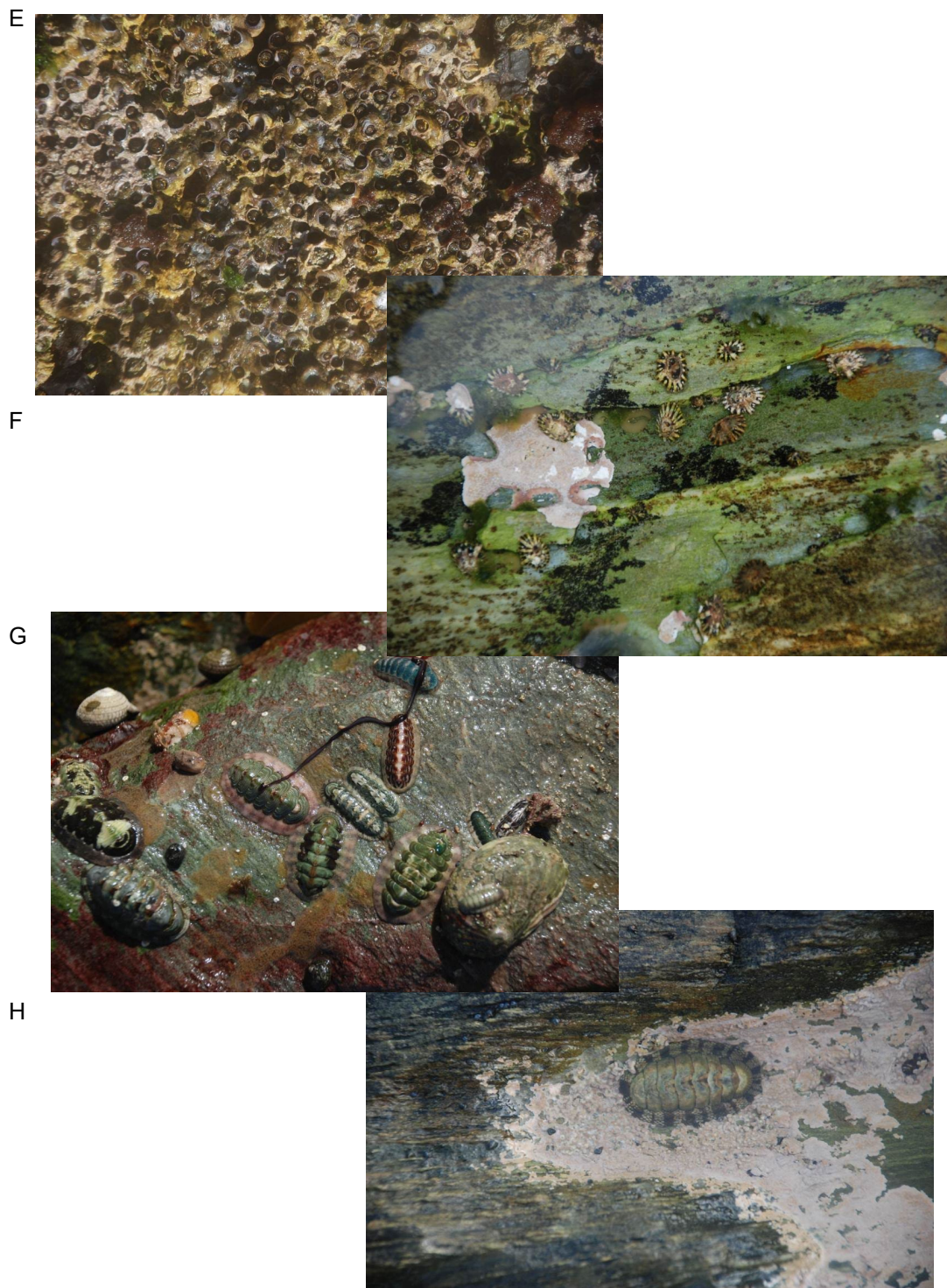


Figure 4 5: Intertidal molluscs (continued)

- E. *Novastoa lamellosa*,
- F. *Siphonaria* sp. (limpet),
- G. *Ishnochiton maorianus* (most abundant chiton) with *Haliotis iris* (pāua) and nemertine worm, and
- H. *Chiton pelliserpentis*

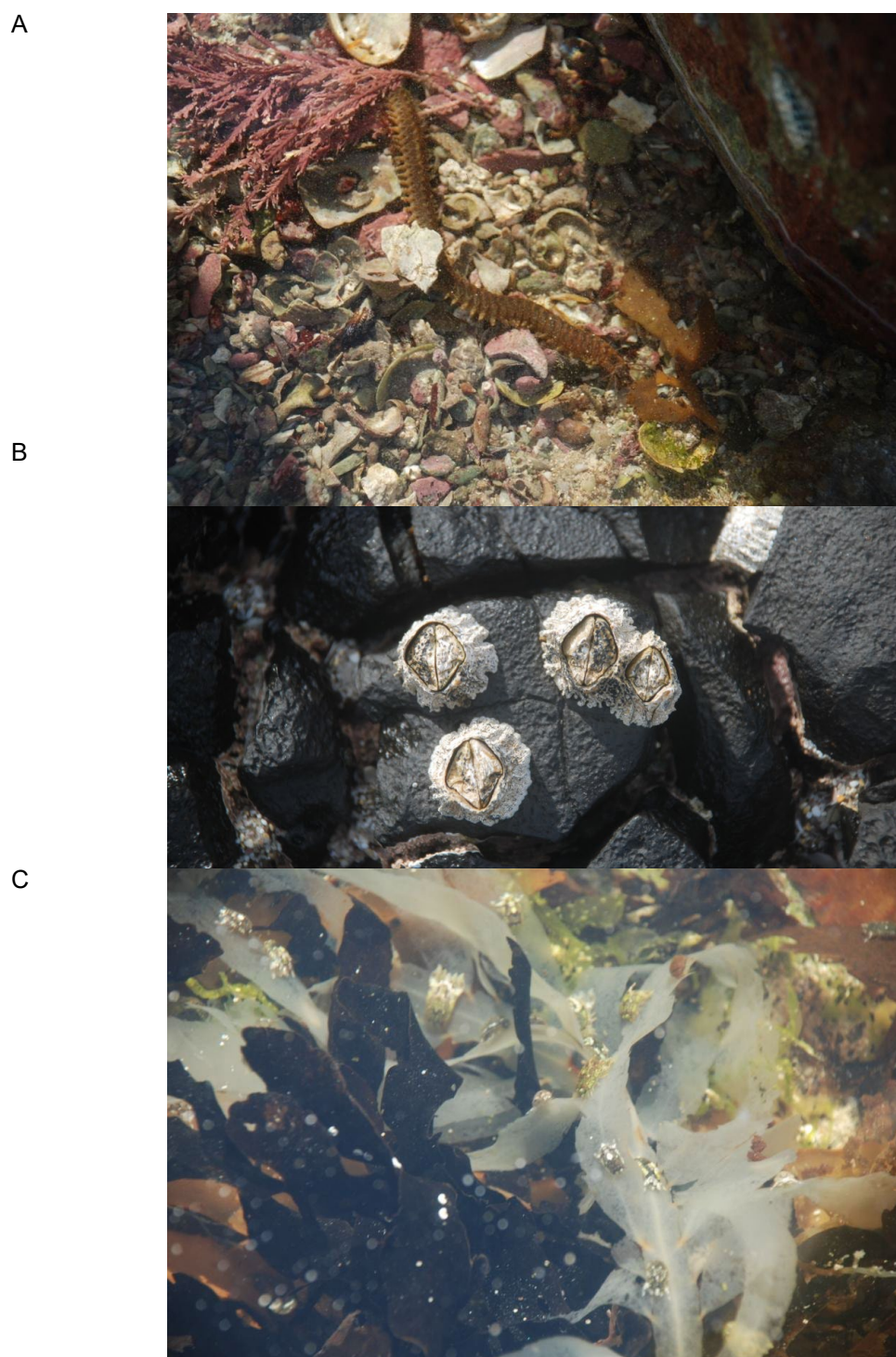


Figure 4-6: Intertidal worms and crustaceans

- A. nereid worm
- B. *Chamaesipho brunnea* (barnacle)
- C. isopods

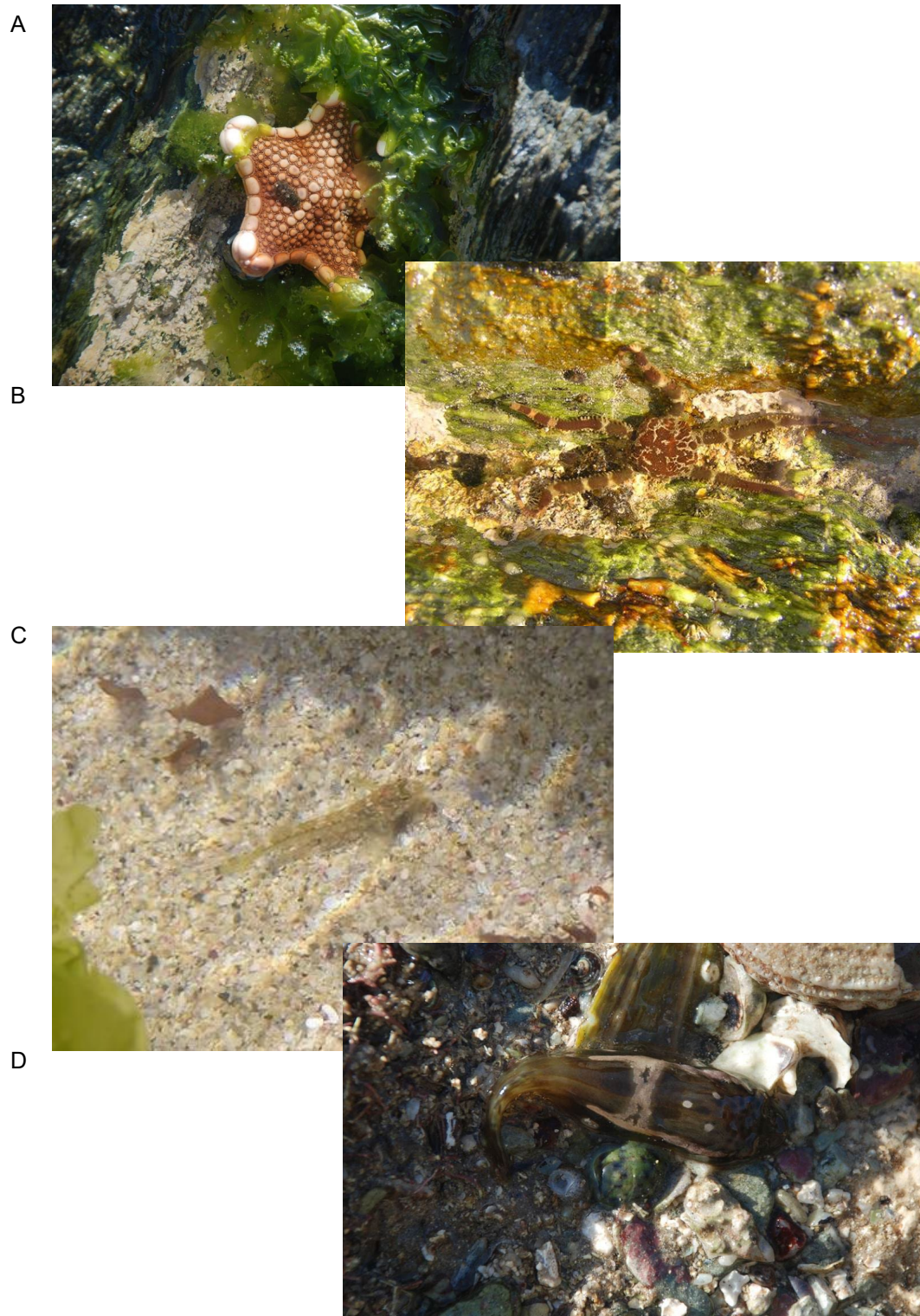


Figure 4-7: Intertidal echinoderms and fishes

- A. *Pentagonaster pulchellus* (biscuit star),
- B. *Ophionereis fasciata* (brittle star),
- C. triplefin
- D. *Trachelochismus* sp. (clingfish)

5 Conclusions and Recommendations

We describe the rocky shore environment of Chatham Island and have identified a number of suitable intertidal monitoring sites. We have then carried out preliminary monitoring and descriptions of the flora and fauna of these sites to enable justification and easy implementation of fully quantitative monitoring.

We recommend that consideration is given to including quantitative rocky shore monitoring in the suite of environmental monitoring undertaken by or for the Chatham Island Council on Chatham Island. This should include:

1. A detailed quantitative baseline assessment of the intertidal rocky shore biota undertaken at each of the five proposed sites

This baseline assessment will provide robust data that will:

- allow for an evaluation of the current state of the intertidal rocky shore at each of the five sites.
- provide data that can be used to assess the intertidal biodiversity on Chatham Island.
- allow for comparisons to be made about the ecology in different locations around the island.
- allow for comparisons to be made of the ecology of shores between Chatham Island and the three main islands of Aotearoa New Zealand.

Furthermore, the baseline assessment will provide data that will allow for the determination of:

- Sites for future monitoring
- Appropriate shore level(s) to focus on for long term monitoring
- Refining suitable methods for monitoring, including the length of horizontal transects and the size and number of sampling units (e.g. quadrats per transect)

2. Establish a long term intertidal rocky shore biota monitoring¹ regime at sites on Chatham Island

This monitoring would provide long-term data which can be used to assess the:

- a) functioning of Chatham Island's intertidal rocky shores.
- b) Impact of climate change on the presence and abundance of intertidal rocky shore species.
- c) occurrence of any invasive marine species.
- d) effects of and recovery from the following possible impacts to the open coastal environment:
 - oil spills from fishing boats, particularly in wharf areas (Kaingaroa, Waitangi, Owenga and Port Hutt).
 - grounding of a sizeable vessel and the potential oil spills, etc. resulting from this (e.g. *Oyang 77*, which grounded on Chatham Island in the 1990s).
 - construction and operation of coastal structures such as wharves, retaining walls and reclamations.
 - discharges of wastewater into the coastal environment.
 - proliferation of one or more invasive species.

¹ Monitoring is routine sampling at a site over time.

6 References

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Chatham Islands Council
PO Box 24
Tuku Road
Waitangi
Chatham Islands

Ph: (03) 3050 033
(03) 3050 034
Fax: (03) 3050 044
Email: info@cic.govt.nz
Web: cic.govt.nz

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