

ECOLOGICAL RESERVES COLLECTION
GOVERNMENT OF BRITISH COLUMBIA
VICTORIA, B.C.
V8V 1X4

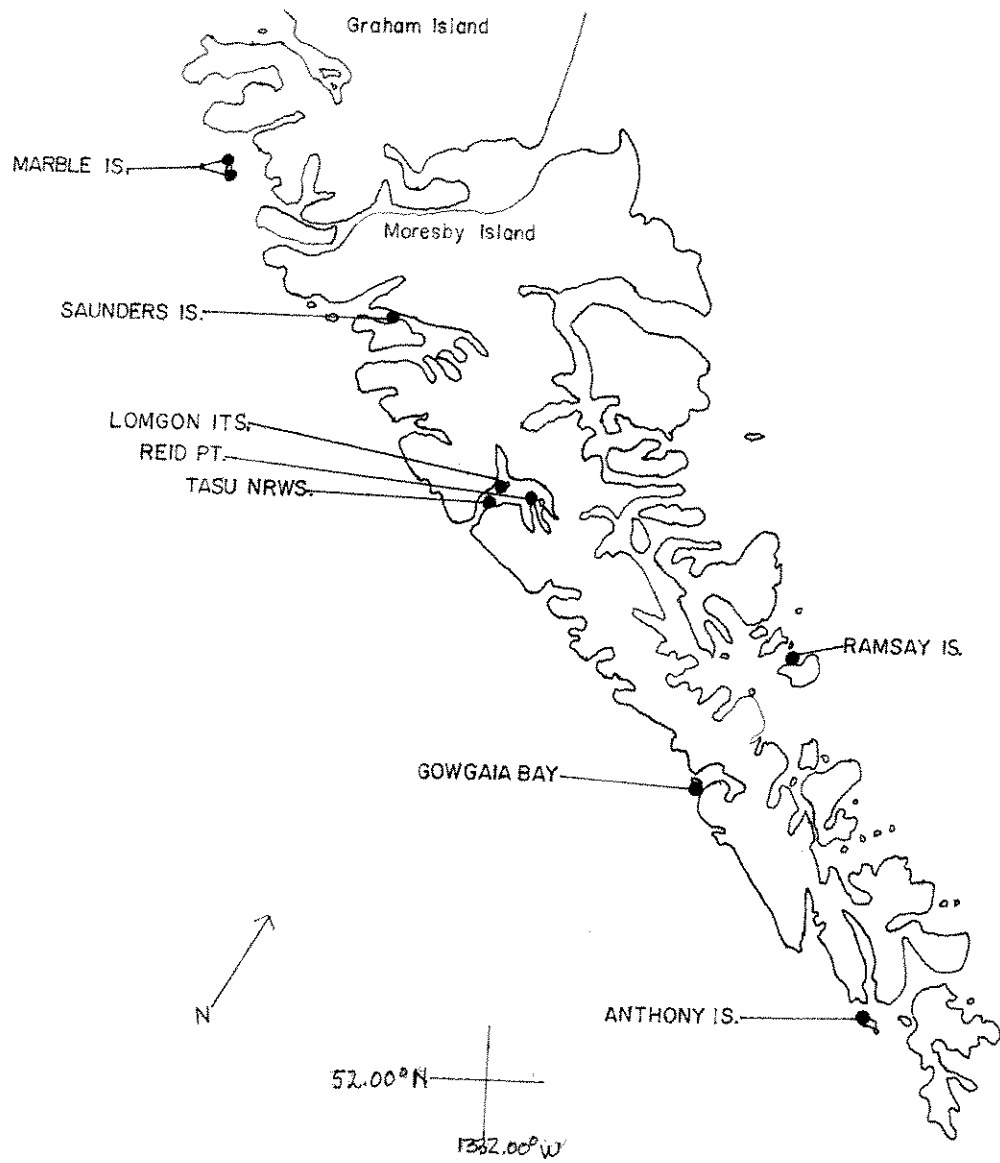
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REPORT TO THE ECOLOGICAL RESERVES UNIT ON THE
1977 MARINE PHYCOLOGICAL SURVEY

Anne Stewart
1977
53p.



Map of the southern Queen Charlotte Islands showing 1977 observation sites

Marble Island

Location: west of western entrance to Skidegate Narrows, Queen Charlotte Islands.

Latitude: 53°11.8'N; longitude: 132°39'W.

Date of observations: 20 June 1977

Time: 9:00-12:15

Tide height: Site 'a' 3.5 (m)
Site 'b' 1.5 (m)

Species observed

Site 'a'

Phanerogams

Phyllospadix scouleri

Chlorophyta

Codium fragile
Enteromorpha sp.
Spongomorpha (*saxitalis*?)
Ulva sp.
plus unidentified green

Phaeophyta

Alaria nana
Fucus distichus
Hedophyllum sessile
Laminaria sp.
Pterygophora californica
Sorantnera ulvoidea (epiphytic on *Odonthalia floccosa*)

Rhodophyta

Coralliniaceae (unidentified)
Endocladia muricata
Farlowia mollis
Gigartina 'pappillata stellata' complex
Halosaccion glandiforme
Hymenena sp
Iridaea cornucopiae
Microcladia borealis
Odonthalia floccosa
Porphyra sp
Prionitis lanceolata
Rhodome la larix

Site 'b'

Chlorophyta

Spongomorpha (saxitalis?)
plus two unidentified greens

Phaeophyceae

Alaria nana
Fucus distichus
Hedophyllum sessile
Pterygophora californica

Rhodophyta

unidentified corallines
Endocladia muricata
Gigartina sp
G. ('*papillata*:*stellata*') complex
Halosaccion glandiforme
Iridaea cornucopiae
Porphyra sp
Rhodymenia palmata

Saunders Island

Location: Engelfield Bay, west coast Moresby Island.

Latitude: 53°40'N; longitude: 131°27.8'W

Date of dive: 21 June 1977

Time: 16:30-17:25

Tide height: 2.47 - 2.86 (m)

Species observed

Phanerogams

Phyllospadix scouleri

Chlorophyta

Spongomorpha sp

Phaeophyta

Alaria sp
Desmarestia aculeata
D. ligulata
Egregia menziesii
Laminaria sp
Nereocystis luetkeana
Pterygophora californica

Rhodophyta

unidentified corallines
Callithamnion pikeanum
Callophyllis firma
Callophyllis sp
Fauchea laciniata
Gigartina spp
Iridaea sp
Odonthalia sp
Palmaria palmata
Pseudogloiphloea confusa
Ptilota sp
Rhodymenia palmata
Smithora naidum (epiphytic on *Phyllospadix*)

Reid Point

Location: Tasu Sound, west coast Moresby Island.

Latitude: 52°47.2'N; longitude: 132°01.5'W

Date of dive: 23 June 1977

Time: 12:40-13:25

Tide height: 1.10-1.72 (m)

Species observed

Phanerogams

Zostera marina

Phaeophyta

Desmarestia ligulata

Dictyota binghamiae

Petalonia fascia

Rhodophyta

Ceramium sp

Longon Islets

Location: Tasu Sound, west coast of Moresby Island.

Latitude: 52°46.8'N; longitude: 132°01.5'W

Date of dive: 23 June 1977

Time: 14:25-15:15

Tide height: 1.58-2.07 (m)

Species observed

Phanerogams

Phyllospadix scouleri

Phaeophyta

Alaria sp
Desmarestia ligulata
Dictyota binghamiae

Rhodophyta

Bossiella sp
Calliarthron sp
Corallina sp
Gigartina sp
Hymenena flabelligera
Iridaea sp
Lophosiphonia sp
Neoptilota californica
Odonthalia floccosa
O. lyallii
Polysiphonia sp
Pseudogloiphloea confusa
Pterosiphonia dendroidea
P. gracilis
Rhodomela larix

Tasu Narrows

Location: entrance to Tasu Sound, west coast Moresby Island.

Latitude: 52°44.8'N; longitude: 132°05'W

Date of dive: 25 June 1977

Time: 14:20-15:20

Tide height: 1.71-1.45 (m)

Species observed

Chlorophyta

Ulva sp

Phaeophyta

Desmarestia ligulata

Dictyota binghamiae

Rhodophyta

Callophyllis sp

Callophyllis firma (cystocarpic)

Coramium sp

Gigartina sp

Hollenbergia nigricans

Lophosiphonia sp

Odonthalia lyalli

Polysiphonia sp

Porphyra sp

Pterosiphonia dendroidea

Ptilota pectinata

plus one unidentified red

Islet off North Anthony Island

Location: southwest coast of Moresby Island.

Latitude: 52°04.8'N; longitude: 131°14.5W

Date of dive: 2 July 1977

Time: 18:30-19:30

Species observed

Chlorophyta

Codium fragile
C. setchellii

Phaeophyta

Alaria sp
Costaria costata
Desmarestia ligulata

Egregia menziesii
Laminaria sp
Leathesia difformis
Lessionopsis (littoralis?)
Macrocystis integrifolia
Nereocystis luetkeana
Pterygophora californica

Rhodophyta

Bonnemaisonia sp
Bossiella sp
Botryoglossum farlowianum
Calliarthron sp
Constantinea simplex
C. subulifera
Corallina sp
Iridaea sp
Opuntiella californica
Plocamium coccineum
Ptilota sp
Porphyra sp (epiphytic on *Pterygophora*)

Ramsay Island

Location: east coast of Moresby Island.

Latitude: 52°34.4'N; longitude: 130°23.3'W

Date of dive: 5 July 1977

Time: 15:20-16:15

Tide height: 1.40 - 1.68(m)

Species observed

Chlorophyta

Codium fragile
C. setchellii
Derbesia marina

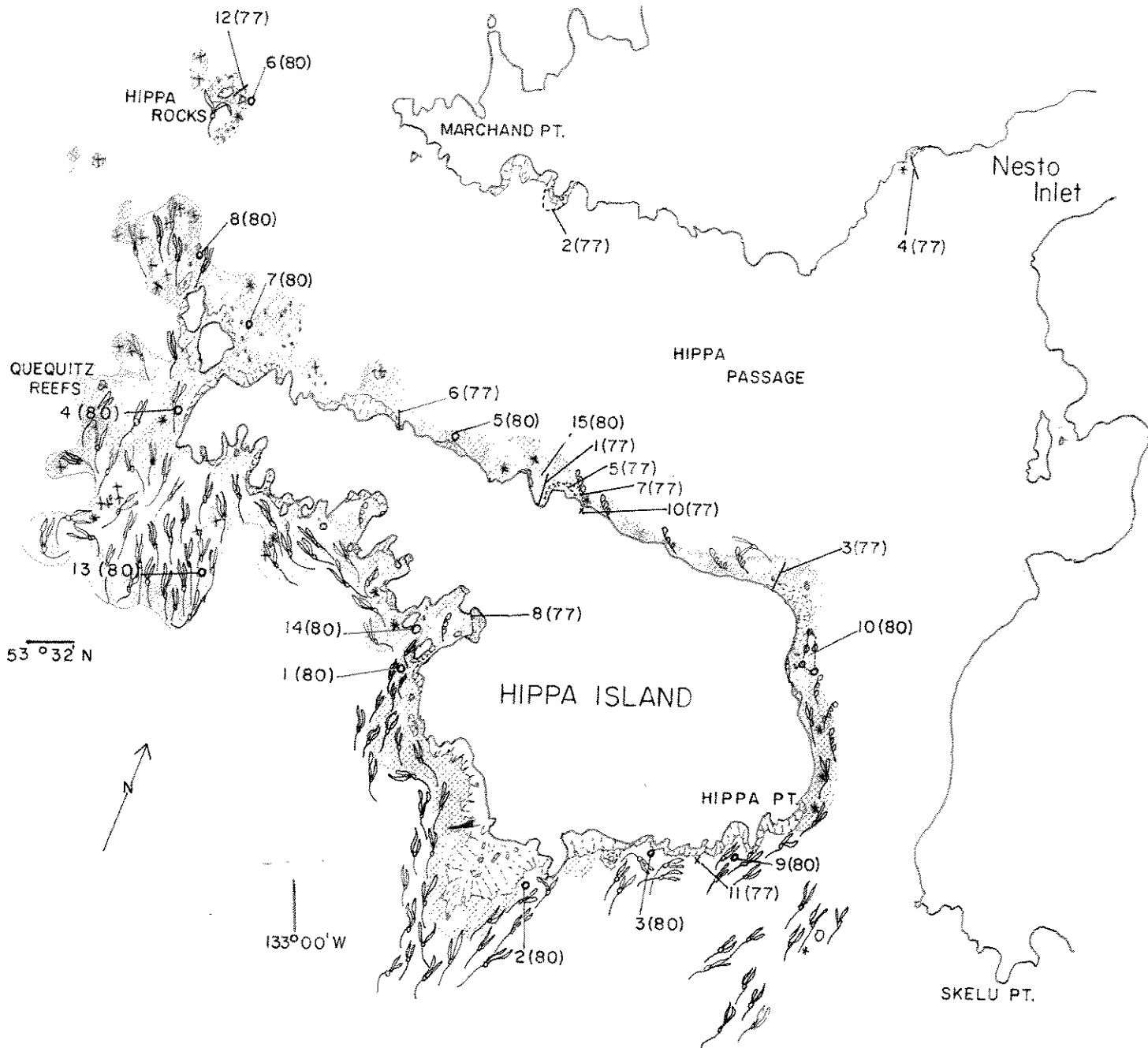
Phaeophyta

Alaria sp
Costaria costata
Egregia menziesii
Hedophyllum sessile
Laminaria setchellii
Leathesia difformis
Lessionopsis littoralis
Nereocystis luetkeana
Soranthera ulvoidea

Rhodophyta

Bossiella sp
Calliarthron sp
Corallina sp
Gigartina exasperata
Gigartina ('papillata stellata' complex)
Gymnogongrus sp
Iridaea sp
Plocamium coccineum
P. tenue
Prionitis lanceolata
Rhodoglossum sp





Map of Hippa Island and environs showing observation sites from 1977 and 1980

Hippa Island ("Camp Bay")

Location: west coast of Graham Island, Queen Charlotte Islnds.

Latitude: 53°32.5'N; longitude: 132°58.5'W

Date of observations: 7 August 1977

Time: 13:30-14:50

Quadrat 1

Area very heavily grazed by *Strongylocentrotus franciscanus*. Only macroalgal species present, consisting of encrusting corallines such as *Lithothamnium* sp.

Quadrat 2: Species observed

Phanerogams

Phyllospadix scouleri

Chlorophyta

Codium setchellii

Phaeophyta

Alaria sp
Costaria costata
Desmarestia aculeata
D. ligulata
Laminaria sp

Rhodophyta

unidentified corallines
Botryoglossum farlowianum
Neogardhiella baileyi
Pseudogloiophloea confusa
Smithora naiadum (epiphytic on *Phyllospadix scouleri*)

Quadrat 3: Species observed

Phanerogams

Phyllospadix scouleri

Phaeophyta

Alaria sp
Cymathere triplicata
Desmarestia aculeata
D. ligulata
Laminaria sp

Rhodophyta

unidentified corallines
Botryoglossum farlowianum
Laurencia spectabilis
Smithora naiadum (epiphytic on *Phyllospadix scouleri*)

Quadrat 4: Species observed

Phanerogams

Phyllospadix scouleri

Phaeophyta

Costaria costata
Desmarestia ligulata
Laminaria sp
Pleurophycus gardneri

Rhodophyta

unidentified corallines
Botryoglossum farlowianum
Fauchea sp
Laurencia spectabilis

Quadrat 5: Species observed

Chlorophyta

Ulva spp

Phaeophyta

Alaria sp
Costaria costata
Cystoseira geminata
Laminaria sp
Petalonia fascia

Rhodophyta

Bossiella sp
Botryoglossum farlowianum
Corallina sp
Fauchea sp
Gigartina sp
Gymnogongrus sp
Hymenena sp
Iridaea cordata
Odonthalia floccosa
O. washingtoniensis
Opuntiella californica
Palmaria palmata
Polysiphonia sp

Rhodophyta (cont)

Pterosiphonia sp
Ptilota pectinata
Rhodoglossum sp
Rhodomela laris

"Driftwood Bay"

Location: on the west coast of Graham Island directly north of Hippa Island.

Latitude: 53°33.8'N; longitude: 132°58.7'W

Date of dive: 9 August 1977

Time: 15:45-16:45

Tide height: 6.9-7.2 ft

This dive was carried out just off the easternmost headland at the entrance to the bay. The bedrock cliffs (slope 40°) extended from nearshore to 33' where a gently sloping gravel bottom continued out for an undetermined distance. The area below the surge zone (-10') was very heavily grazed by *Strongylocentrotus franciscanus* and a few *S. purpuratus* in the upper areas. Encrusting corallines covered 85% of the bedrock substrate in this urchin-barren.

In the surge zone *Laminaria setchellii*, *Phyllospadix scouleri* and *Costaria costata* were the visually important understory species with *Nereocystis luetkeana* forming a canopy. Turf species included numerous jointed corallines, *Polyneura latissima*, *Pseudogloiophloea confusa* and *Ahnfeltia gigartinoides*.

In the flat gravel area below 33' *Neoagardhiella baileyi* and crustose corallines were the only algae observed.

Fish observed between 15' and 33' included *Sebastes maliger*, *S. nebulosus*, *S. flavidus*, *Oxylebius pictus*, *Hexagrammos decagrammus*, *H. lagocephalus* and small surf perch.

Species observed

Phanerogams

Phyllospadix scouleri

Phaeophyta

Costaria costata
Laminaria setchellii
Nereocystis luetkeana

Rhodophyta

unidentified corallines
Ahnfeltia gigartinoides
Calliarthron sp
Corallina sp
Neoagardhiella baileyi
Polyneura latissima
Pseudogloiophloea confusa

Hippa Island (Hippa Village site, NNE point on Hippa Passage)

Location: west coast of Graham Island, Queen Charlotte Islands.

Latitude: 53°32.2'N; longitude: 132°57.2'W

Date of observations: 10 August 1977

Time: 17:30-18:30

Tide height:

Quadrat 1: Species observed

Phanerogams

Zostera marina

Chlorophyta

Enteromorpha sp

Ulva spp

Phaeophyta

Desmarestia aculeata

D. ligulata var *ligulata*

Laminaria spp

Macrocystis integrifolia

Rhodophyta

Callophyllis flabellulata (epiphytic on *Laminaria* sp & *Neoagardhiella*

C. haenophylla (epiphytic on worm tubes & bryozoans) *baileyi*)

Ceramium californicum

Cryptonemia sp

Fauchea laciniata

Gagirtina exasperata

Gracilariaopsis sjoestedtii

Halymenia hollenbergii

Lophosiphonia obscurum

L. villum

Neoagardhiella baileyi

Porphyra spp

Porphyra lanceolata

Polysiphonia hendryi

Pseudogloiophloea confusa

Smithora naiadum (epiphytic on *Zostera marina*)

Quadrat 2: Species observed

Phanerogams

Zostera marina

Chlorophyta

Enteromorpha sp

Phaeophyta

Desmarestia aculeata
D. ligulata var *ligulata*

Rhodophyta

Callophyllis sp
Ceramium californicum
Gracilaria verrucosa
Gracilariopsis sjoestedtii
Laurencia spectabilis
Lophosiphonia obscurum
Neoagardhiella baileyi
Polysiphonia sp
Porphyra spp
Pterosiphonia gracilis
Smithora naiadum (epiphytic on *Zostera marina*)

Quadrat 3: Species observed

Chlorophyta

Ulva sp

Phaeophyta

Desmarestia aculeata
D. ligulata var *ligulata*

Rhodophyta

Ceramium californicum
C. pacificum
Gracilariopsis sjoestedtii
Neoagardhiella baileyi
Plocamium sp
Porphyra sp

Quadrat 4: Species observed

Chlorophyta

Ulva sp

Baccillariophyta

Navicula sp

Rhodophyta

Lophosiphonia obscurum
L. villum
Polysiphonia sp

Quadrat 5: Species observed

Chlorophyta

Enteromorpha sp

Bacillariophyta

Navicula sp

Nesto Inlet (east of Hippa Island on Graham Island)

Location: off small beach facing SSE on north shore.

Latitude: 53°32.8'N; longitude: 132°56'W

Date of observations: 12 August 1977

Time: 14:05-15:15

Species observed

Quadrat 1

Area very heavily grazed by *Strongylocentrotus franciscanus*. No algal cover excepting crustose corallines such as *Lithothamnium* sp.

Quadrat 2: as above

Quadrat 3

Phanerogams

Phyllospadix scouleri

Chlorophyta

Ulva sp

Phaeophyta

Alaria marginata

Costaria costata

Rhodophyta

Gigartina exasperata

G. papillata

Halosaccion glandiforme

Iridaea cordata

Odonthalia floccosa

Prionitis lanceolata

unidentified articulated corallines

Quadrat 4

Chlorophyta

Ulva sp

Enteromorpha sp

Spongiomorpha sp

Phaeophyta

Alaria marginata

Scytosiphon lomentaria

Rhodophyta

Ahnfeltia plicata

Gigartina spp

Halosaccion glandiforme

Rhodomela larix (some with *Halosaccion glandiforme*: (epiphytic))

R. lycopodioides

Hippa Island

Location: off west coast of Graham Island. On north shore of Hippa Island just east of Camp Bay.

Date of dives: 14 and 17 August, 1977

The purpose of these two dives was to document the area photographically and make observations on fish species present in the area. Several attempts at gillnetting in this same area produced no results. Species are listed below with an estimate of abundance as follows: (-) rare, (0) common, (+) very common, and a number which corresponds to the area in which they were sighted (see figure).

Species observed

Hexagrammos decagrammus (+) (1-5)
Damalichthys vacca (+) (4-5)
Artedius sp (-) (3)
Sebastes maliger (+) (4-5)
Embiotoca lateralis (-) (5)
Sebastes melanops (+) (4-5)
Hexagrammos lagocephalus (0) (2)
Harengus clupei pallasii (+) (4) hundreds of individuals
Coryphopterus nicholosi (-) (1)
Enophrys bison (-) (5)
Pholis sp (-) (1)
Sygnathis griseolineatus (0) (6)
Hyperprosopon ellipticum (-) (2)

Hippa Island

Location: rocky shore to east of Camp Bay

Latitude: 53°32.5'N; longitude: 132°58.5'W

Date of observations: 14 and 17 August, 1977

Note: During both these dives, observations concentrated on fish and invertebrate species, thus explaining the paucity of phycological specimens. Please see 1980 data for the same area referring to algae.

Phaeophyta

Macrocystis integrifolia

Rhodophyta

Ceramium sp

Faucheia sp

Odonthalia washingtoniensis

Pikea californica

Ptilota californica

Hippa Island ("Double Bay")

Location: on WNW coast of Hippa Island

Latitude: $53^{\circ}32.1'N$; longitude: $132^{\circ}59.1'W$

Date of observations: 18 August 1977



Figure 1 . Map of Double Bay showing observation sites referred to below.

- a) Gravel beach exposed to southwesterlies; gravel very clean and water clear; no algal growth in mid- to upper intertidal area (gravel movement during storms must be considerable); some *Macrocystis integrifolia* about 50 m offshore.
- b) Large boulders and bedrock substrate (very crumbly rock); *Fucus distichus* dominant alga in upper intertidal with about 30% cover; small tidepools at the end of the surge channel harboured several *Oligocothus* sp.
- c) Gravel beach similar to a) but somewhat more protected.
- d) Small bedrock projection. Upper tidepools dominated almost entirely by *Enteromorpha* sp, *Endocladia muricata*, *Littorina* sp and *Oligocothus* sp. In the lower intertidal and subtidal surrounding this small peninsula, *Egrecia menziesii* and *Macrocystis integrifolia* were the obvious canopy species.
- e) Steep bedrock slope ($\sim 30^{\circ}$). *Fucus distichus* was the intertidal "dominant" with *Macrocystis integrifolia* "dominating" subtidally.

Hippa Rocks

Location: western entrance to Hippa Passage west coast of Graham Island.

Latitude: $53^{\circ}33.8'N$; longitude: $133^{\circ}00.4'W$

Date of dive: 22 August 1977

Time: 15:50-16:30

This dive was carried out on the vertical wall extending down from the larger islet on the reef area between the two main islets (see figure). Observations were made at two stations indicated on the accompanying map (figure).

Station 1

Depth 60' (uncorrected)

Time: 15:55

Slope: 85°

Substrate: bedrock

This nearly vertical wall was entirely grazed of erect algae by *Strongylocentrotus franciscanus* (estimated density $20/m^2$). Seven *Sebastes nebulosus* individuals were sighted, hiding in overhangs and small holes. One of the larger holes housed 3 individuals of various sizes. None of the *S. nebulosus* were observed swimming. Approximately 10 *S. flavidus* were seen in a loose aggregation in the water column adjacent to the rock wall; they were accompanied by many *S. melanops*.

Station 2

Depth 20-30' (uncorrected)

Time: 16:05

Slope: 40°

Substrate: bedrock

The vegetation/urchin-barren interface was at approximately 30' and was dominated by *Desmarestia aculeata* and *D. ligulata*. There were a few juvenile *Nereocystis luetkeana* growing here and a very sparse growth of mature plants. Total algal cover at this depth was estimated to be 65%.

Moving into the vegetated area, total algal cover was 100%. *Nereocystis luetkeana* was the canopy species here but was sparsely distributed. Understory species included *Laminaria setchellii*, *Pleurophyucus gardneri*, *Desmarestia ligulata* and *Dictyota binghamiae*. The turf species consisted of coralline and non-coralline reds such as: *Bossiella* sp, *Callophyllis heanophylla*, *C. thompsonii*, *Corallina* sp, *Erythrophyllum delesserioides*, *Gagartina* sp, *Hymenena kyllini*, *Iridaea* sp, *Opuntiella californica*, *Turnerella pacifica* (cystocarpic) as well as several species yet to be identified. Algal cover was estimated as follows: kelps 35%, other browns 15%, non-coralline reds 25%, erect corallines 25%, encrusting corallines 60%.

Hippa Rocks

Location: western entrance to Hippa Passage.

Latitude: 53°33.8'N; longitude: 133°00.4'W

Date of observations: 22 August 1977

Species observed

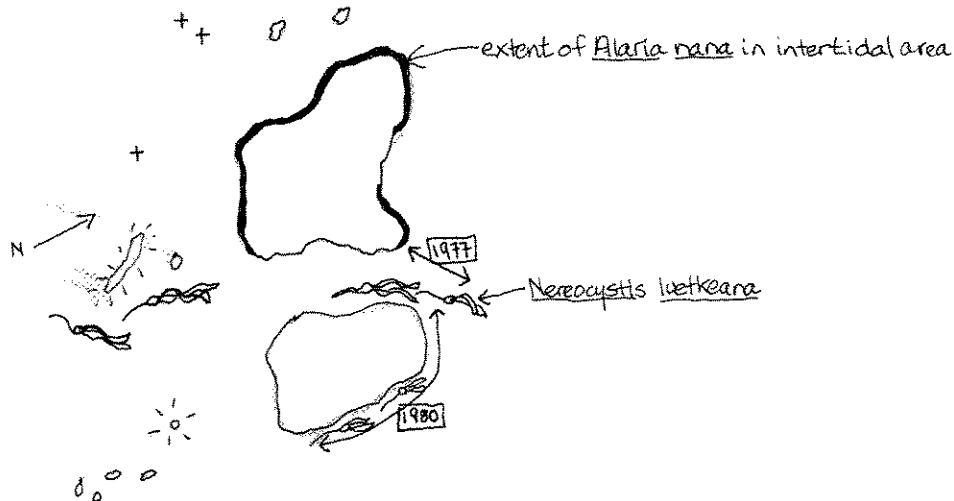
Phaeophyta

- Desmarestia aculeata*
- D. ligulata*
- Laminaria* sp
- juvenile laminariales
- Nereocystis leutkeana* (many juveniles as well as mature plants)
- Pleurophycus gardneri*

Rhodophyta

- unidentified corallines
- Callophyllis haenophylla*
- C. (thompsoni)*
- Cryptonemia obovata*
- Erythrophyllum delesserioides*
- Gigartina* sp
- Hymenena kylinii*
- Iridaea* sp
- Neoptilota californica*
- Opuntiella californica*
- Turnerella pacifica* (cystocarpic)
- unidentified reds

Figure . Map of Hippa Rocks indicating areas of observation.



Rhodophyta (cont)

Constantinea simplex

Iridaea sp

Laurencia spectabilis

Opuntiella californica

Polyneura latissima

plus one unidentified red

Hippa Island Intertidal

Location: small cove facing NNE just east of Camp Bay, Hippa Island.

Latitude: 53°32.6'N; longitude: 132°58.8'W

Date of observations: 15 August 1977

Time: 8:30-9:30

Transect bearing: 0° North

Storm exposure: NW

This small cove was divided into 5 "biotypes" or zones which are described below.

1. Spray area at 0'HHW consisted of barren bedrock excepting approximately 90% cover by the black lichen *Verrucaria* sp (0-1.5 m on transect).
2. Upper intertidal area (-6 to -8'HHW) had a bedrock substrate highest up and mixed boulder/cobble substrate lower. The three most evident species were *Fucus distichus*, *Endocladia muricata* and *Hedophyllum sessile* (the latter being confined to the lower part of this "biotype"). The *Hedophyllum* was heavily grazed by *Littorina scutulata*. Other algae found here included *Calithamnion pikeanum*, *Gigartina agardhii*, *G.* ("papillata stellata" complex), *Halosaccion glandiforme*, *Odonthalia* sp, *Porphyra* sp and *Rhodomela larix*. Percentage cover values varied from 10% to 70%, the higher percentage cover being found lower down in the area (1.5 to 6 m on transect).
3. Mid-intertidal area (-8 to -11'HHW) had a boulder/cobble substrate higher up which changed to bedrock moving out into the bay. The overstory algal species were *Alaria marginata*, *Hedophyllum sessile*, *Costaria costata*, (only inside bay, appeared in subtidal on more exposed point) and *Fucus distichus*, in order of importance. The turf species were comprised of *Gigartina agardhii*, *G.* ("papillata stellata" complex), *Iridaea* sp, *Iridaea cornucopiae*, *Microcladia borealis*, *Odonthalia floccosa*, *O. washingtoniensis*, *Plocamium tenue*, *Ptilota pectinata* and *Turnerella mertensiana*. Percentage cover values were high, 80-100% in this area (6 to 12 m on transect).
4. The low intertidal to subtidal (> -11HHW) area had a canopy of *Egregia menziesii*, *Phyllospadix scouleri*, and *Laminaria* sp and a turf composed of a variety of species such as *Polyneura latissima*, *Botryoglossum farlowianum*, *Microcladia borealis* and *Callophyllis* sp.

Species observed

Sample 1 (Tidepools)

Phanerogams

Phyllospadix scouleri

Phaeophyta

Desmarestia ligulata
Laminaria sp
Nereocystis luetkeana (juvenile)
Soranthera ulvoidea (epiphytic on *Odonthalia lyalli*)

Rhodophyta

unidentified corallines
Gigartina exasperata
Halosaccion glandiforme
Microcladia borealis
Odonthalia lyalli
Plocamium tenue
Polysiphonia sp

Sample 2 (High Intertidal)

Rhodophyta

Cryptosiphonia woodii
Halosaccion glandiforme

Sample 3 (High to Mid-Intertidal)

Phaeophyta

Fucus distichus
Hedophyllum sessile

Rhodophyta

Calliarthron pikeanum
Endocladia muricata
Gigartina agardhii
G. ("papillata stellata" complex)
Halosaccion glandiforme
Odonthalia floccosa

Rhodophyta (cont)

Porphyra sp
Rhodomela larix

Sample 4 (Mid-Intertidal)

Phaeophyta

Alaria marginata
Costaria costata
Hedophyllum sessile

Rhodophyta

Ceramium sp
Gigartina agardhi
G. ("papillata stellata" complex)
Hymenena sp
Iridaea sp
Iridaea cornucopiae
Microcladia borealis
Odonthalia floccosa
O. washingtoniensis
Plocanium tenue
Ptilota pectinata
Turnerella mertensiana

Sample 5 (Low intertidal to Subtidal)

Phanerogams

Phyllospadix scouleri

Chlorophyta

Codium fragile
C. setchellii

Phaeophyta

Egregia menziesii
Laminaria sp

Rhodophyta

unidentified corallines
Botryoglossum farlowianum
Callophyllis sp
Ceramium sp (epiphytic on *Codium fragile*)
Halosaccion glandiforme
Hymenena or *Cryptopleura*?
Hymenena flabelligera
Iridaea sp

Rhodophyta (cont)

Iridaea cornucopiae

Microcladia borealis

Odonthalia floccosa

O. washingtoniensis

Plocamium tenue

Polyneura latissima

Ptilota pectinata

Smithora naiadum (epiphytic on *Phyllospadix*)

Turnerella mertensiana

Hippa Island (tidepool fish survey)

Location: north shore of Hippa Island just east of Camp Bay.

Latitude: 53°32.6'N; longitude: 132°58.4'W

Date of observations: 21 August 1977

Note: most effort was concentrated on collecting tidepool fish and algal specimens collected were incidental to this.

Species observed

Phanerogams

Phyllospadix sp

Rhodophyceae

unidentified corallines

Ahnfeltia plicata

Endocladia muricata

Farlowia mollis

Odonthalia floccosa

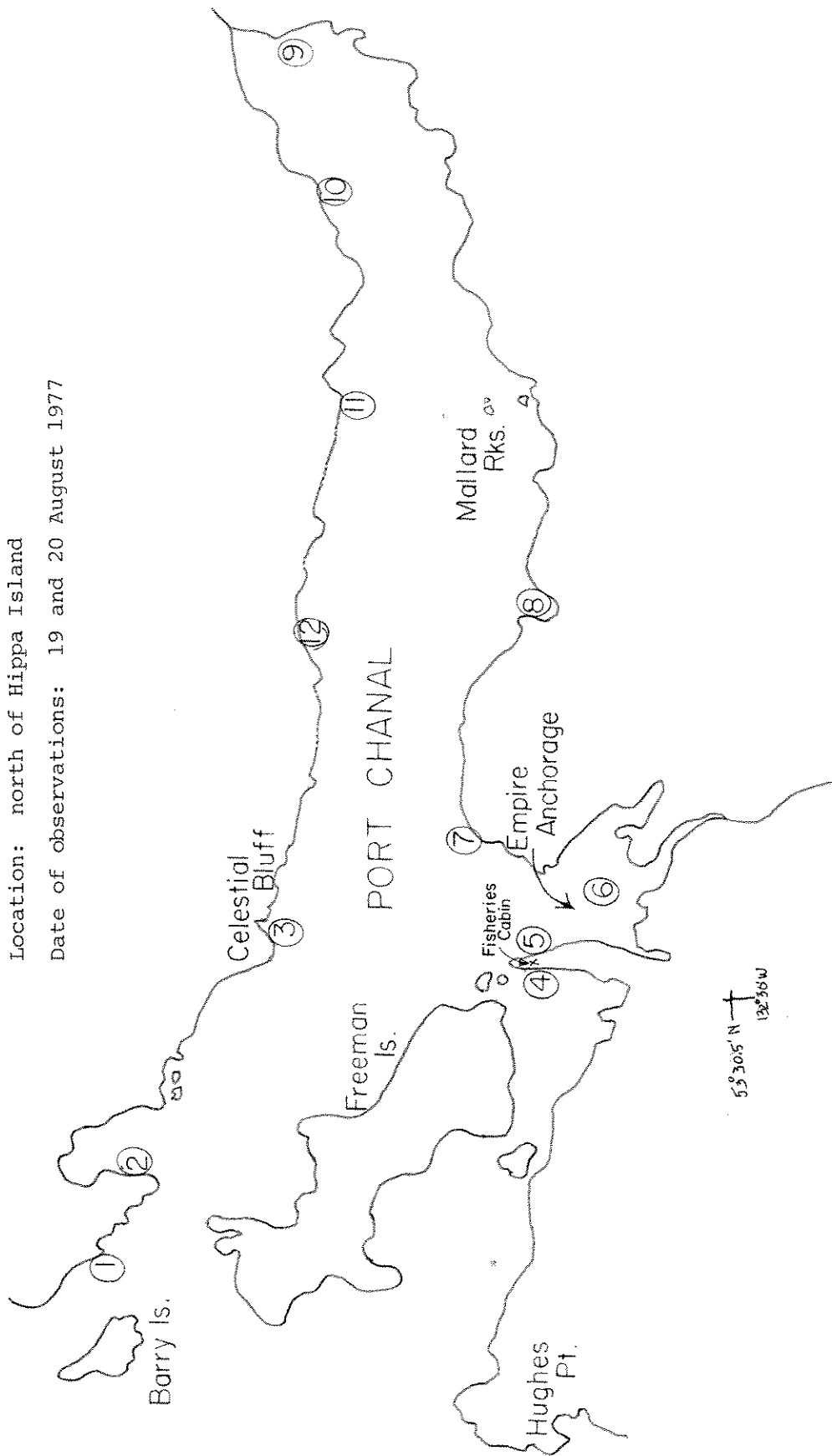
Prionitis filiformis

Rhodomela larix

(a) Graham Island: Port Chanal snorkel survey

Location: north of Hippa Island

Date of observations: 19 and 20 August 1977



(b) Map of Port Chanal indicating observation stations. Areas which appeared to be representative of the various biotypes were surveyed by snorkelling to note vertical distribution patterns of "dominant invertebrate and algal species".

Station 1 - *only 1.0*

Location description: this area was sampled just east of the cove site on Graham Island behind Barry Island where the nearly vertical cliffs extend into the water.

Time: 8:30-8:45

Maximum depth 15' (uncorrected)

Substrate: bedrock

Slope: $\sim 90^\circ$

Total algal cover; approximately 100% down to 10'; below 10' area entirely urchin grazed excepting crustose coralline algae (i.e. *Lithothamnium* sp).

Vertical distribution: each "zone" extended 3-4' vertically.

Zone 1: Invertebrates *Chthamalus dalli*
Endocladia muricata
Notoacmaea scutum
Pisaster ochraceus (aggregation just below surface of water)

Zone 2: Laminarians

Zone 3: *Alaria* sp
Phyllospadix scouleri
coralline red turf

Zone 4: >12' urchin grazed; both *Strongylocentrotus franciscanus* and *S. purpuratus*; crustose corallines.

Station 2

Location description: site located at west entrance to the little bay just west of Celestial Bluff.

Time: 8:50-9:15

Maximum depth: 15' (uncorrected)

Substrate: mixed gravel with bedrock outcrops

Slope: from 5° - 20° .

Vertical distribution:

Zone 1: Invertebrates *Anthropleura elegantissima*
Balanus cariosus
Chthamalus dalli
Dermasterias imbricata
Fucus distichus
Leathesia difformis
Odonthalia floccosa
Pisaster ochraceus

Zone 2: unidentified filamentous green algae
Phyllospadix sp with understory of coralline and non-
coralline reds

Zone 3: urchin grazed by both *Strongylocentrotus franciscanus* and some
S. purpuratus

Station 3

Location description: area just east of the slight point below
Celestial Bluff.

Time: 9:30-9:50

Substrate: large boulders (1-4' diameters) and bedrock

Slope: $\sim 10^{\circ}$

Vertical Distribution:

Zone 1: *Chthamalus dalli*
Pisaster ochraceus
Fucus distichus $\sim 90\%$ cover

Zone 2: *Anthropleura elegantissima*
Odonthalia floccosa
Phyllospadix scouleri
Rhodomela larix

Zone 3: *Astraea gibberosa*
Tegula sp
Egregia menziesii (20% cover)
Phyllospadix scouleri (30% cover)
reds and coralline reds (15% cover)

Zone 4: *Agarum cribosum* (40% cover)
Laminaria sp (5% cover)
Rhodophyceae (10% cover)

Station 4

Location description: west beach at Fisheries Cabin.

Time: 10:00-10:45

Maximum depth: 25' (uncorrected)

Substrate: intertidally shale with bedrock outcropping; subtidally,
mixed bedrock/boulder/cobble (see figure).

Slope: from 25° to $>75^{\circ}$

Vertical distribution:

Zone 1: *Zostera marina* $\sim 90\%$ cover (pure stand) on mud/sand/pebble
substrate

Zone 2: canopy of *Macrocystis integrifolia* with understory of Laminarians and turf of non-coralline reds and both decumbent and crustose corallines. Total algal cover ~60%
Mixed boulder/bedrock substrate
Depth 15-20' (uncorrected)

Zone 3: *Laminaria* sp with coralline turf (both crustose and decumbent forms)
Total cover 40%
Bedrock substrate
Depth 20-25' (uncorrected)

Station 5

Location description: east beach on point with Fisheries Cabin (west side of Empire Anchorage).

Time: 11:00-11:45

Maximum depth: 25'

Substrate: bedrock with many pools, shelves and outcroppings

Slope: overall ~5^o, however, much relief so variable

Vertical distribution (see figures also):

Zone 1: *Balanus cariosus*
Chthamalus dalli
Endocladia muricata
Fucus distichus
Littorina sp
Notoacmaea personna
Total algal cover 40%
Bedrock substrate
Depth 0-5' (uncorrected)

Zone 2: *Cucumaria miniata*
coralline reds (erect and crustose)
Leathesia difformis
Ulva sp
Total algal cover 35%
Bedrock with coarse sand and gravel pockets
Depth 5-10' (uncorrected)

Zone 3: *Calliostoma canaliculatum*
Macrocystis integrifolia
Tegula sp
Zostera marina (in small patches)
Total algal cover 40%
Bedrock with coarse sand pockets
Slope 30-40^o

Station 6

Location description: south corner of Empire Anchorage. This station was very similar to Station 5 with *Leathesia difformis* forming a large percentage of the algal cover in Zone 2, and patchy beds of *Macrocystis integrifolia* in deeper water. From spot checks it appeared that the majority of Empire Anchorage was quite similar although in the tidal portion of the Mercer River there were marked differences, most likely due to decreased salinity. Tidal effects appear to extend up the Mercer River approximately $\frac{1}{4}$ mile to a set of small rapids. In the estuarine area there was heavy growth of filamentous greens and the low salinity tolerant morph of *Fucus distichus* (see figure).

Station 7

Location description: point below eastern Fisheries boundary marker.

Time: 12:45

Maximum depth: 20' (uncorrected)

Substrate: bedrock cliffs extending into water with large boulders on adjacent beach.

Slope: overall ~40%

Zone 1: *Endocladia muricata*
Fucus distichus

Zone 2: *Desmarestia ligulata*
Laminaria sp
Phyllospadix sp (~50% cover)

Zone 3: >15' urchin grazed by *Strongylocentrotus franciscanus*
encrusting corallines
Cucumaria miniata
Haliotis kamstchatkana (many juveniles 1-2" long)
Tealia crassicornis
Tegula sp

Station 8

Location description: tiny cove on south shore midway down Port Canal.

Time: 13:45

Maximum depth: 25' (uncorrected)

Substrate: see figure

Location a) <20' cobble bottom
5° slope
~70% total algal cover
~10% filamentous reds
~20% laminarians
~40% corallines

Location a) (cont)

Astraea gibberosa
Cucumaria miniata
Tegula sp
>20' urchin grazed by *Strongylocentrotus franciscanus*

Location b) bedrock substrate

slope $\sim 90^\circ$
Acmaea mitra
Agarum cribosum
A. fimbriatum
Ceratostoma folliatum
Hinnites multirugosus
Laminarians

Station 9

Location description: wide area at the head of Port Channel. The shoreline here was bordered with extensive salt marshes on a muddy substrate. Intertidally and subtidally there were large *Zostera marina* beds on a mud/gravel bottom. In the low salinity area there were filamentous greens and low salinity morph *Fucus distichus*. General observations in area: 20 harbour seals on Mallard Rocks; a flock of 40-50 juvenile Black Oyster Catchers; 4 adult bald eagles, 4 common loons, 2 peregrin^e falcons.

Station 10

Cobble beach with a slope of $5-10^\circ$.

Zone 1: *Fucus distichus* (60% cover)

Zone 2: <15' *Zostera marina* (90% cover)

Zone 3: >15' *Zostera marina* (70% cover)
Agarum sp (10% cover)

Station 11

Location description: on north shore \sim one third of the way out of inlet. Boulder/cobble beach with slope of $\sim 10^\circ$

Zone 1: *Fucus distichus*
Hedophyllum sessile

Zone 2: encrusting reds
filamentous browns

Zone 3: *Agarum cribosum*) 30% cover
A. fimbriatum)
Astraea gibberosa
coralline reds (50% cover)

Station 12

Location description: on north shore half way out of inlet. Vertical cliffs extending into water.

Zone 1: *Balanus glandula*
Fucus distichus

Zone 2: *Agarum cribosum* (70% cover)
coralline turf (5% cover)

Zone 3: >20' *Agarum cribosum* (60% cover)

Port Chanad (appendix)

An attempt was made to sample the fish population in the *Macrocystis integrifolia* bed adjacent to the west shore of the Fisheries Cabin point. Nothing was caught during the day set of the $\frac{1}{2}$ " mesh gillnet. The net was reset at dusk and pulled at 10:00 the following morning. The results are noted below.

1. *Thelagra chaliogramma* (male) 21.8 cm std. length.
Stomach contents unidentifiable.
2. *Sebastes caurinus* (one male) 24 cm std. length.
Stomach contents unidentifiable (the other 2 specimens were partially eaten by *Pycnopodia helianthoides*).

One unidentifiable juvenile *Sebastes* sp. std. length 4.2 cm.

A minnow trap was also set overnight in the same area and caught one *Coryphopterus nicholsii*.

Maynard Cove

Location: Ten-Mile Point area, south of Cadboro Point, Victoria.

Latitude: 49°28'N; longitude: 123°16'W

Date of observations: 30 & 31 May, 1977

Two transects 100 m in length were set in the cove. The first ran diagonally from the inner, northern side of Maynard Cove out to a kelp bed lying just off the southern point at the mouth of the bay. The second transect ran out to the middle of the mouth of the bay from about one third of the way along the northern shore. (See Tables 1 and 2 for tabulated accounts of the floral and faunal "associations" and other condensed transect data.

Transect 1

Sample 600001 Depth: 6m
 Transect location: 100 m
 Substrate: boulder/sand/shell/pebble
 Slope: 5°
 % cover: 60%

Chlorophyta

Ulva sp

Phaeophyta

Costaria costata
Desmarestia intermedia
Laminaria sp
Nereocystis luetkeana

Rhodophyta

Ceramium sp
Odonthalia floccosa
Plocamium violaceum
Polysiphonia sp
unidentified corallinaceae

Sample 600002 Depth: 6.7 m
 Transect location: 80 m
 Substrate: sand/mud/shell/pebble
 Slope: 0
 % cover: 40%

Phanerogams

Zostera marina with *Hollenbergia* sp epiphytic

Phaeophyta

Laminaria sp

Distance Along Transect (m)	Depth (m) (uncorrected)	Substrate (see key)	Plant "Associations"	Percent cover	Faunal Representatives	Sample Number
0 - 10	0 - 3	Bed	low intertidal red turf	85	<i>Cucumaria/Pisaster</i> <i>Katherina/Balanus</i>	600006
15 - 53	4 - 5	Bold/Cob/Sh/M	<i>Desmarestia</i> - red turf	90	<i>Cryptochiton/</i> <i>Anthropleura</i> <i>Cucumaria</i>	600005 600004
53 - 89	5 - 6	Peb/M/S/Sh	<i>Zostera</i> - <i>Laminaria</i>	40-100	<i>Sebastes/Idotea</i> <i>Anthropleura/Cancer</i>	600003 600002
89 - 100	6 - 6.7	Bold/Bed/S/Sh/Peb	<i>Mereocystis-Costaria</i> <i>Desmarestia</i> - <i>Laminaria</i> red turf	60	<i>Cucumaria/Balanus</i> <i>nubilus</i> <i>Strongylocentrotus</i>	600001

Key to abbreviations: Bed - bedrock; Bold - boulders; Cob - cobbles; Sh - shell; M - mud; Peb - pebbles; S - sand

Table 1. Synopsis of data gathered on Transect 1.

Distance Along Transect (m)	Depth (m) (uncorrected)	Substrate (see key)	Plant "Associations"	Percent cover	Faunal Representatives	Sample Number
0 - 10	1 - 5	Bed/Bold	<i>Mereocystis-Costaria</i> <i>Desmarestia</i> red turf	100	<i>Balanus coriosus</i> <i>Katharina</i> <i>Pisaster</i>	600013
10 - 18	5 - 6	Bold/Cob/M/S	<i>Laminaria-Desmarestia</i> red turf	85	<i>Cucumaria/Haliotis</i> <i>Tealia/Sebastes</i>	600009
18 - 30	6	M/Sh/S	<i>Zostera-Laminaria</i>	85	<i>Henrycia/Parastichopus</i> <i>Saccidomus/Clinocardium</i>	600011
30 - 80	6 - 7.5	M/Sh	<i>Zostera-Laminaria</i> <i>Desmarestia</i> red turf	50-80	<i>Mya/Clinocardium</i>	600010
80 - 100	7 - 8.5	M/Sh/Cob/S	<i>Laminaria-Costaria</i> <i>Agarum-Desmarestia</i> red turf	5-45	<i>Parastichopus/</i> <i>Strongylocentrotus/</i> <i>Clinocardium</i>	600008 600012

Key to abbreviations: Bed - bedrock; Bold - boulders; Cob - cobbles; Sh - shell; M - mud; Peb - pebbles; S - sand.

Table 2. Synopsis of data gathered on Transect 2.

Sample 60003 data

Phaeophyta

Costaria costata
Desmarestia ligulata
D. intermedia

Rhodophyta

Gracilaria verrucosa

Sample 600004 Depth: 5.3 m
 Transect location: 51-52 m
 Substrate: mud/sand/shell/pebble/cobble
 Slope: 0
 % cover: 70%

Chlorophyta

Ulva sp

Phaeophyta

Desmarestia intermedia
D. ligulata
D. viridis
Laminaria sp

Rhodophyta

Callophyllis flabellulata
Ceramium sp
Cryptopleura sp
Gigartina exasperata
Hollenbergia sp
Laurencia spectabilis
Odonthalia floccosa
Opuntiella californica
Palmaria palmata
Plocamium coccineum
P. tenue
P. violaceum
Polyneura latissima
Polysiphonia sp
Prionitis lanceolata
Pterosiphonia dendroidea
Rhodomenia californica
R. pertusa
plus 2 unidentified reds

Sample 600005 Depth: 4m
 Transect location: 50 m
 Substrate: sand/mud/shell/pebble/cobble/boulder
 Slope: 1%
 % cover: 90%

Chlorophyta

Ulva sp

Phaeophyta

Desmarestia sp

Rhodophyta

Callophyllis flabellulata

Constantinea subilifera

Dilsea californica

Gigartina sp

Gymnogongrus leptophyllus

Iridaea sp

Laurencia spectabilis

Plocanium tenue

P. violaceum

unidentified corallinaceae

Sample 600006 Depth: 3 m
 Transect location: 15 m
 Substrate: boulder/cobble/mud/sand
 Slope: 5%
 % cover: 85%

Phaeophyta

Costaria costata

Desmarestia intermedia

Laminaria sp

Rhodophyta

Ceramium spp

Cryptonemia sp

Gigartina exasperata

Gigartina sp

Iridaea sp

Odonthalia floccosa

Opuntiella californica

Plocanium tenue

P. violaceum

Polyneura latissima

Prionitis lanceolata

Rhodymenia palmata

R. pertusa

Transect 2

Sample 6000012 Depth: 8.5 m
 Transect location: 93-95 m
 Substrate: mud/sand/shell/wood chips
 Slope: 0
 % cover: 5-15%

Invertebrates

Abietinaria sp
Balanus nebulosus
Clinocardium nuttali
Crepidula sp
Cryptochiton stelleri
Cucumaria miniata
Glycera sp
Lacuna sp
Lophopanopeus hellus
Macoma nasuta
Oregonia gracilis
Parastichopus californica
Pugetia gracilis

Chlorophyta

Ulva sp

Phaeophyta

Colpomenia sp
Costaria costata
Desmarestia ligulata
D. intermedia
Laminaria sp

Rhodophyta

Callophyllis flabellulata
Callophyllis sp
Ceramium sp
Laurencia spectabilis
Odonthalis washingtoniensis

Sample 600008 Depth: 8 m
 Transect location: 85-87 m (just at outer edge of
 Zostera bed)
 Substrate: mud/shell
 Slope: 0
 % cover: 45%

Invertebrates

Clinocardium nuttali
Cryptochiton stelleri
Euphasids (clouds of them)
Parastichopus californica
Strongylocentrotus franciscanus
S. drobachiensis

Phaeophyta

Agarum fimbriatum
Desmarestia ligulata
Laminaria sp

Rhodophyta

Callophyllis sp
Ceramium sp
Constantinea subilifera
Laurencia spectabilis
Neogardhiella baileyi
Porphyra sp
Pterosiphonia dendroidea
Rhodoptilum plumosa

Sample 600010 Depth: 6.7 m
 Transect location: 47-54 m
 Substrate: mud/shell
 Slope: 0
 % cover: 50-60%

Invertebrates

Clinocardium nuttali (shells)
Epiactus prolifera
Lacuna sp
Mya arenaria (shells)
Saxidomis sp (shells)

Phanerogams

Zostera marina (70% of total cover)

Phaeophyta

Desmarestia ligulata
D. intermedia
Laminaria saccharina

Rhodophyta

Callophyllis sp
Neogardhiella baileyi
Odonthalia floccosa

Sample 600011 Depth: 6 m
 Transect location: 18-24 m
 Substrate: mud/shell/pebble/cobble/boulder
 Slope: 0
 % cover: 85%

Invertebrates

Clinocardium nuttali (shells)
Cryptochiton stelleri
Haliclona sp
Halichondria sp
Henrycia liviscula
Leptasterias hexactis
Parastichopus californica
Saxidomus sp (shells)
Spirorbis sp
Tonicella lineata

Chlorophyta

Ulva sp

Phaeophyta

Laminaria sp

Rhodophyta

Gigartina exasperata
Iridaea sp
Plocamium tenue
P. violaceum
Pterosiphonia dendroidea

Sample 600009 Depth: 5 m
 Transect location: 10-11 m
 Substrate: mud/shell/boulder/cobble
 Slope: 0
 % cover: 85%

Invertebrates

Anthropleura xanthogrammica
Cucumaria miniata
Haliclona sp
Haliotis kamstchatkana
Spirorbis sp
Tealia crassicornis

Fish

Apodichthyes flavidus
Sebastes maliger

Chlorophyta

Ulva sp

Phaeophyta

Desmarestia viridis
Laminaria sp
Nereocystis luetkeana

Rhodophyta

Ceramium sp
Odonthalia floccosa
Palmaria palmata
Plocanium coccineum var *pacificum*
P. violaceum
Polysiphonia sp

Sample 600013 Depth: 5 m
 Transect location: 2-4 m
 Substrate: bedrock/boulder/shell/mud
 Slope: ~3%
 % cover: 100%

Invertebrates

Balanus cariosus
Hemigrapsus nudus
Katherina tunicata
Pisaster ochraceus
Pugetia sp

Phaeophyta

Costaria costata
Desmarestia viridis

Rhodophyta

Botryoglossum farlowianum
Callophyllis sp
Odonthalia floccosa
Opuntiella californica
Plocanium tenue
(unidentified articulated corallines)

Rose Islets

Location:

Latitude: 49°00.5'N; longitude: 123°37.0'W

Date of observations: 1 June 1977

Time: 15:15-17:15

Tide height:

Species observed

Chlorophyta

Ulva sp

Phaeophyta

Agarum fimbriatum
Costaria costata
Desmarestia ligulata var *firma*
Laminaria saccharina
Sargassum muticum

Rhodophyta

Callophyllis sp
Ceramium sp
Constantinea subilifera
Corallina sp
Cryptosiphonia woodii
Gigartina sp
G. exasperata
G. ("papillata stellata" complex)
Gracilaria verrucosa
Gracilariopsis sjoestedtii
Grateloupia doryphora
Gymnogongrus leptophyllus
Halosaccion glandiforme
Iridaea sp
Iridaea cordata
Laurencia spectabilis
Lomentaria hakodatensis
Microcladia borealis
Neogardhiella baileyi
Polysiphonia sp
Prionitis lanceolata
Rhodomela larix
Rhodoptilum plumosum

Transect Data

Bearing: 210° SSE running off southwest tip of northernmost islet.

Length: 100 m

After swimming the length of the transects, making general notes on visual "dominants" and substrate types the divers divided the transect into 5 "zones" or biotypes which were then subsampled more intensively. The first zone extended from 100 m to 52 m offshore where the depth ranged from 14 up to 10 m. The substrate was a composite of mud, sand and shell with a very gradual slope and algal cover was estimated to be less than 5%. Invertebrates living here included: *Pycnopodia helianthoides*, *Pachyæranthes* sp, *Dendronotis iris*, *Eupentacta* sp and *Clinocardium nuttali*. There were also several empty *Balanus nubilus* tests which had been bored by *Clione* sp. The only algae observed here were *Neogardhiella baileyi* and an as yet unidentified red alga, possibly *Grateloupia* sp.

Zone 2 extended from 50 to 40 m on the transect line and was a plateau area, (depth: 6 m) characterized by a greater algal cover (5-10%) and diversity on a similar substrate to the deeper area. The most important species were *Agarum fimbriatum* and *Laminaria saccharina* (70% and 10% cover respectively). There were also a variety of red algae here including *Callophyllis* sp, *Grateloupia* sp, *Gracilaria verrucosa*, *Gracilariopsis sjoestedtii*, *Iridaea* sp, *Laurencia spectabilis*, *Neogardhiella baileyi*, *Rhodomela larix* and *Rhodoptilum plumosum* and the ubiquitous green alga *Ulva* sp. Invertebrates noted were the same as those near the end of the transect.

From 30 m to 28 m on the transect line there appeared to be a transition "zone" where the substrate and slope were still similar yet different algal associations were apparent. *Desmarestia ligulata* made up 60% of the algal cover which covered almost the entire bottom. *Laminaria* sp was the other important species covering 20%. *Nereocystis luetkeana* had appeared at this depth with less than 5% cover, however, all the plants were juveniles, perhaps owing to the unstable substrate or seasonality. *Neogardhiella baileyi*, *Gracilaria verrucosa* and *Ulva* sp were the other important species covering 15% of the bottom collectively. Other species noted here were: *Ceramium* sp, *Callophyllis* spp, *Lomentaria hakodatensis*, *Microcladia borealis* and *Polysiphonia* sp.

The only invertebrate differing from those observed further out on the transect line was *Pollinices lewisii*. From 12 m to 10 m on the transect line (depth 5 m) the substrate was a sand-shell mixture without the silty mud found deeper. Visually important algal species are listed below in decreasing order of importance. *Desmarestia ligulata*, *Laminaria saccharina*, *Ulva* sp, *Sargassum muticum*, *Neogardhiella baileyi*, *Halosaccion glandiforme* and *Ceramium* sp.

This area was heavily populated with *Clinocardium nuttali* estimated at a density of 100/m². Other invertebrates were caprellids, polyclads, and errantate polychaetes.

Zone 5 extended from 7 m to 5 m on the transect (depth: 3 m) and the sand-shell substrate was largely replaced with bedrock intrusions.

Algal cover was almost 100% with *Costaria costata* forming nearly 50% of this. *Sargassum muticum* formed an estimated 5%, *Ulva* sp 10% and the following algae covered remaining space: *Callophyllis* sp, *Ceramium* sp, *Constantinea subulifera*, *Corallina* sp, *Cryptosiphonia woodii*, *Gigartina exasperata*, G. ("papillata stellata" complex), *Gracilaria verrucosa*, *Gracilariopsis sjoestedtii*, *Gymnogongrus leptophyllus*, *Halosaccion glandiforme*, *Iridaea* sp, *Laurencia spectabilis*, *Microcladia borealis*, *Navicula* sp, *Neogardhiella baileyi* and *Prionitis lanceolata*.

Invertebrate species included many juvenile pleuronocteds, *Crepidula* sp, *Pisaster ochraceus*, *Katherina tunicata*, *Oregonia gracilis*, *Balanus* spp, *Glycera* sp, coprellids and orchestoid amphipods.

Baeria Rocks

Location: Imperial Eagle Channel, Barkley Sound.

Latitude: 48°57.0'N; longitude: 125°09.3'W

Date of observations: 9, 11, 12 June 1977

Dive 1 Time: 7:55-8:55

Tide height: 2.65-2.56 m

Phaeophyta

Alaria marginata
Costaria costata
Desmarestia
D. ligulata
D. viridis
Nereocystis luetkeana (many juveniles)
Pterygophora californica

Rhodophyta

articulated corallines (as yet unidentified)
Botryoglossum farlowianum
Callophyllis spp
Callophyllis flabellulata
Fryella gardneri
Gigartina exasperata
Hymenena sp (epiphytic on Laminariales)
Iridaea sp
Laurencia spectabilis
Plocamium violaceum
Polyneura latissima
Pterosiphonia gardneri
Rhodoptilum plumosa
Rhodymenia californica
R. palmata
Stenogramme interrupta

Dive 2

Phaeophyta

Desmarestia ligulata
D. aculeata
Nereocystis luetkeana

Rhodophyta

articulated corallines (unidentified)
Botryocladia pseudodichotoma
Botryoglossum farlowianum
Callophyllis firma
C. flabellulata