Dive Reports

Canoe Islets
Ref. No.: 88

CANOE ISLETS

Location: Porlier Pass, Latitude: 49° 01.8' N.
Longitude: 123° 37' W.

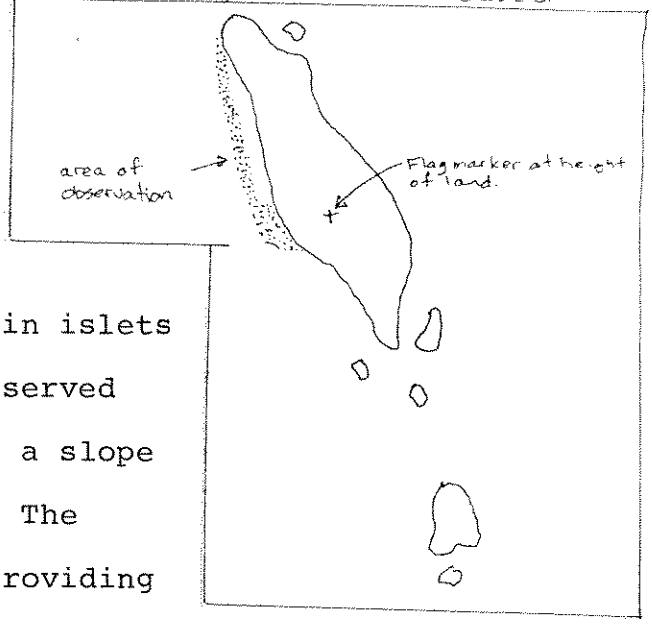
Date of Dive: June 2, 1977

Time: 1125 - 1200

Tide Height: -0.06 to 0.15 (m)

Divers: J.B. Foster, E. A. Stewart

Figure 1. Map showing dive location on Canoe Islets.



The dive was carried out on the west side of the larger of the two main islets (see figure 1). The bedrock bluff observed above water continued subtidally with a slope varying from 40° to 90° (estimated). The bedrock itself had irregular relief providing cracks and crevices as secluded habitat for numerous fish and invertebrates. There were also narrow terraces (up to approximately 1 meter in width) which consisted of a sand/shell substrate. This habitat of steep bedrock face interspersed with soft substrate terraces continued down to a depth of at least 65' (maximum depth during dive).

A band of Nereocystis luetkeana, varying in width from approximately 5' to 10' extended along the edge of the shoreline. The lower limit of this band of kelp was approximately 10' below MWL. This coincided with the upper limit of a moderately heavy population of Stronglyocentrotus fransiscanus which was

most likely controlling the distribution of the kelp downwards. The S. fransiscanus extended down to a depth of 65', however the bulk of the population was found between 25' and 45'. Algal cover in this urchin inhabited area was virtually non-existent excepting encrusting corallines such as Lithothamnion sp.

Ballanophyllia elegans was abundant from approximately 15' to 60' on the bedrock faces. Other sedentary invertebrates inhabiting these rock areas included moderate numbers of Metridium senile, in scattered clumps and some solitary Balanus nubilus, large numbers of Serpula vermicularis, some Abietinaria sp. (as well as other unidentified Calyptoblastids), occasional Hinnites multirugosus and numerous Chlamys spp.

The solid rock areas also had a variety of Asteroids including Henricia leviuscula, Crossaster papposus,Solaster stimpsoni, Leptasterias hexactis, as well as Pycnopodia helianthoides which was found more frequently on the sand/shell terraces. The carnivorous Ceratostoma folliatum was also present in moderate numbers on the rocky areas. Eupentacta quinquesemita and Cucumaria miniata were the only holothuroids noted. C. miniata was most often found in crevices associated with the sand/shell terraces while E. quinquesemita was found on the solid bedrock areas. Other invertebrates which were present on the rock substrate but which were not collected for identification included numerous nudibranchs, bryozoans, sponges and anthozoans.

In the sand/shell terraces the burrowing anemone Pachycorianthus fimbriatus was relatively common and several specimens of Ptilosarcus gurneyi were also observed in this habitat. Other burrowing invertebrates were not observed although their presence was obvious from burrow entrances, empty bivalve shells, feeding mounds, etc.

One moderately large Octopus dolfleini was observed at a depth of 30'. It appeared to be using an overhanging crevice as a hiding spot, however there were no signs (shells, etc.) that the crevice was its usual den.

Numerous fish closely associated with the rock wall were noted, including Sebastes maliger, S. caurinus, S. mystenus, Hexagrammos decagrammos, H. lagocephalus and Oxylebius picta. Several Sebastes flavidus were also noted in the water column adjacent to the rock wall. Numerous Coryphopteris nicholosii, mainly associated with the sand/shell terraces were observed. Other fish, especially cottids were also noted but collection for identification purposes was not possible.

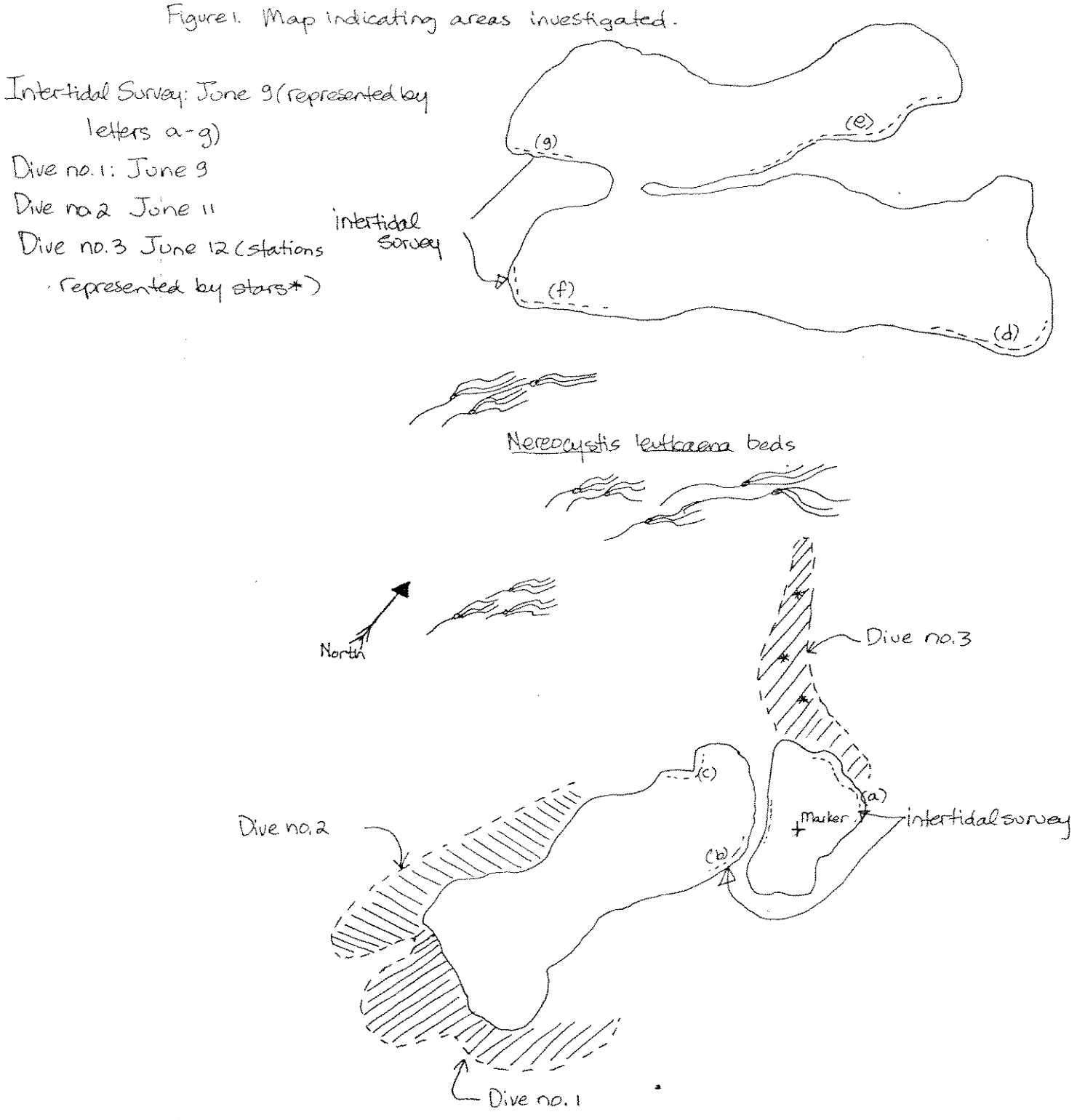
(It should also be mentioned that this area is noted for the presence of Sebastes nigrocinetus, some of which were live-captured off the southern tip of the smaller Canoe Islet at a depth of 75' to 85' by a University of Victoria expedition in the spring of 1977.) (Howard McElderry pers. comm.)

BAERIA ROCKS

Location: Barkley Sound, Latitude: 48° 59.3' N.
Longitude: 125° 10.8' W.

Dates of Dives: June 9, 1977, June 11, 1977, June 12, 1977

Figure 1. Map indicating areas investigated.



BAERIA ROCKS - DIVE NUMBER 1

June 9, 1977

Time: 0755 - 0855

Tide Height: 2.65 to 2.56 (m)

Divers: J.B. Foster. E.A. Stewart, H. McElderry, Bill Austin

This dive was carried out off the east to south sides of the smallest most southerly islets, from a depth of 15' to 75'. Observations were carried out on subtidal macroalgal vegetation by myself and collections were made of those species not readily identifiable in the field. Dr. Bill Austin made observations on invertebrate species with emphasis on the sponges and tunicates (list included in appendix) and Howard McElderry (University of Victoria) noted fish species present and their relative abundance (list included in appendix). The surge zone extending down to a depth of approximately 15' was not examined due to a moderate oceanic swell. The substrate in most of the area investigated consisted of solid bedrock although some large boulders were present in the deeper areas. Moderately sized patches of heavy grazing by Stronglyocentrotus fransiscanus were observed between 40' and 60', overall, however algal cover at these depths was predominant. From 15' to 30' the brown algae, Alaria sp., Costaria costata, Pterygophora sp. and small patches of juvenile Nereocystis luetkeana (about 1 - 2 m. in height) dominated and were accompanied by an assortment of red algal understory species, Polyneura latissima, Corallina sp., Opuntiella californica,

Laurencia spectabilis, Callophyllis sp., Fauchea sp., Botryoglossum farlowianum. In areas bordering heavily grazed patches the Desmarestiale Desmarestia ligulata, D. viridis and D. intermedia appeared to be dominant. Below 60' algal growth was restricted to the ubiquitous encrusting corallines (i.e., Lithothamnion sp. and an as yet unidentified species (possibly Sercodiotheca sp.).

APPENDIX

Fish species noted and their relative abundance
(Howard McElderry, University of Victoria)

Sebastes melanops	+
S. flavidus	+
S. caurines	o
S. maliger	o
S. migrocinctus *	-
S. nebulosus	o
Ophiodon elongatus	-
Embiotoca lateralis	-
Hexagrammos decagrammos	o

Abundance Scale

+	very common
o	common
-	rare

* Sebastes nigocinctus had not been observed in this area before by researchers at the Bamfield Marine Station although Barkley Sound is included in the geographic range outlined by Hart (1973).

References

Hart, J.L. (1973) Pacific Fishes of Canada. Bulletin 180 Fisheries Research Board of Canada, Ottawa.

(Bill Austin's notes separate)

BAERIA ROCKS - DIVE NUMBER 2

June 11, 1977

Time: 1130 - 1215

Tide Height: 2.28 to 2.16 (m)

Divers: E. A. Stewart, Steve MacDonald

The dive location on the west side of the outermost islet is indicated on the accompanying map (see figure 1). Below 15' - 20' this area was very heavily grazed, thus attention was focused on invertebrate and fish species. Most invertebrate identifications were made by Steve MacDonald (S.F.U., Bamfield Marine Station).

Most of the substrate in this area consisted of solid bedrock, a continuation of the above water islet, however there were numerous large boulders at depths greater than 50'.

Between 40' and 60' at the northernmost end of the dive site there was a large patch of coralline algae, both jointed anc crustose. Other algal species occurring in ungrazed patches were the following: Nereocystis leutkaena, Corallina sp., Botryoglossum farlowianum, Dermarestia ligulata, D. intermedia, and Opuntiella californica. Below 60' algal cover was entirely restricted to crustose corallines such as Lithothamnion sp.

Fish and invertebrate species noted are listed below:

Coelenterata

Ballanophyllia elegens

Tealia sp.

Stomphia sp.

Mollusca

Margarites sp.

Ceratostoma folliatum

Tegula puligo

Diodora aspera

Thais canaliculata

Calliostoma ligatum

Calliostoma sp.

Amphissa columbiana

Asteroidea

Solaster dawsoni

Pycnopodia helianthoides

Crossaster papposus

Henricia leviuscula

Orthasterias koehleri

Pteraster tesselatus

Mediaster aequelis

Eupentacta quinquesemita

Fish

Sebastes nebulosus

S. *moliger*

S. *flavidus*

S. *melanops*

S. *nigrocinetus*

Oxylebius picta

Hexagrammos decagrammos

Anarrhichthyes ocellatus

Ophiodon elongatus

Hexagrammos lagosephalus

BAERIA ROCKS - DIVE NUMBER 3

June 11, 1977

Time: 1100 - 1145

Tide Height: 2.65 to 2.59 (m)

Divers: Joachim von Carolsfield, E. A. Stewart

During this dive algal samples were collected and observations made at three 'stations' (area covered at each 'station about 2 x 2 m^2) along a line running out at approximately 330^o north northwest from the smaller 'marker' islet (see figure 1).

Station 1 was located at a depth of approximately 20' about 50' offshore near the lower edge of the heavily vegetated zone. The substrate consisted of bedrock with scattered pockets of shell fragments. The slope in the immediate vicinity varied considerably as there was much relief in the bottom contour (at least 5' attenuation). Total algal cover was moderately heavy, 60 - 70% with approximately 75% of this consisting of Lamianiales (Pterygophora californica, juvenile Nereocystis luetkeana, the Desmaresteales Desmarestia ligulata). Less conspicuous and of lesser importance in terms of biomass were the understory and turf species of red algae (identifications incomplete).

Dominant invertebrates noted included the predatory starfish Pycnopodia helianthoides, Solaster sp. and Dermasterias imbricata, the herbivorous Stronglyocentrotus fransiscanus and the sedentary anemone Tealia sp. Although the area was not

heavily grazed there were S. fransiscanus present and light grazing was evident although possibly the result of some other herbivore.

Only two species of fish were noted, Hexagrammos decagrammos and Hemilepidotus hemilepidotus.

The second station was established at a depth of 25' - 30' approximately 75' offshore. Here the substrate was very similar to that at station 1, however algal cover was very much reduced presumably due to a moderately heavy population of Stronglyocentrotus fransiscanus. Total algal cover excluding encrusting corallines such as Lithothamnion sp. was approximately 20%; 5 - 10% non-coralline red algae, 5 - 10% laminarians and desmarestians and less than 5% articulated corallines. Total cover by encrusting corallines was estimated to be approximately 75%.

The third station was located at a depth of approximately 40' where the substrate consisted of boulders, cobbles, pebble and shell with very small amounts of mud and silt. Total algal cover for the area was estimated to be 60% divided amongst non-coralline red algae - 35%, laminarians - 10%, other brown algae - 10%, articulated corallines - 5%. Crustose corallines covered about 40% of the bottom.

Joachim von Carolsfield (Yogi) (Bamfield Marine Station) also made observations during the dive and noted the following:

Petrocelis sp. abundant on bedrock between 15' and 20'; Alaria sp. and juvenile Nereocystis luetkeana and Laminaria sp. were the dominant brown algae in areas not populated by Stronglyocentrotus fransiscanus. Juvenile Nereocystis luetkeana were observed to a depth of 40'. Laminaria sp. was observed with several epiphytes including Smithora naiadum.

Invertebrates noted other than those already mentioned included Calliostoma sp., several species of limpets, Ballanophylla elegans, amphipods (brown with white stripe), Haliclystus sp. epizoic on Laminaria sp. Fish observed included Hemilepidotus hemilepidotus, Sebastes melanops and Coryphopterus nicholosii.

BAERIA ROCKS - INTERTIDAL OBSERVATIONS

June 9, 1977

Time: 1100 - 1230

Tide Height: Site 'a' about 2.19 Site 'b' about 1.52

Following are the species lists for the sites lettered a - g on accompanying map (figure 1).

Site 'a'

Balanus cariosus
Fucus distichus
Endocladia muricata
Mytilus edulis
M. californicus
Ulva sp.
Balanus glandula
Gigartina papillata
Anthropleura xanthogrammica
A. elegantissima (?)
Pisaster ochraceus
Codium fragile
Navicula sp.
Halosaccion glandiforma
Corallina sp.
Iridaea cordata
Clinocottus maculoxes
Lithothamnion sp.
Clupea harengus pallasi (in adjacent water)
Bossiella sp.
Polysiphoneous reds
Alaria sp. at water level

Site 'b'

Balanus cariosus
Mytilus edulis (in cracks)
Pollicepes polymerus
Endocladia muricata
Fucus distichus
Anthopleura xanthogrammica
Pisaster ochraceus
Ulva sp.
Verrucaria sp.(maritime zone)
Gigartina papillata

Site 'b' continued

Balanus glandula (?)

Mytilus californianus

Clinocottus spp.

Mopalia ciliata

Notoacmaea digitalis

Site 'c'

Balanus cariosus

B. glandula (?)

Mytilis edulis (?)

M. californianus

Pollinices polymerus

Endocladia muricata

Ulva sp.

Amthopleura sp.

Alaria sp. (at water level)

Iridaea cordata (?)

Site 'd'

Chthamalus dalli

Balanus glandula

B. cariosus

Endocladia muricata

Fucus distichus

Microcladia borealis

Pollicipes polymerus

Porphyra sp.

Mytilus californianus

Codium fragile

Pisaster ochraeceus

Ulva sp.

Prionitis lanceolata

Anthopleura sp.

Corallina spp.

Alaria sp.

Pterygophora californica

Site 'e'

Egregia menzeisii

Alaria sp.

Costaria costata

Polysiphonious reds

Ulva sp.

Gigartina exasperata

Lavender sponge (encrusting with raised osteoles)

Pophyra sp.

Corallina sp.

Spongomorpha sp.

Iridaea sp.

Prionitis lanceolata

Pterygophora californica

Anthopleura xanthogrammica

Mutilus californianus

Site 'f'

extensive Mytilus californianus

Verrucaria sp.

Endocladia muricata

Balanus glandula

Pollicipes polymerus

B. carious

Codium fragile

Gigartina papillata

G. exasperata

Alaria sp.

Laminaria andersonii

Pisaster ochraceus

Anthopleura xanthogrammica

Clinocottus (maculosus?)

Corallina sp.

Ulva sp.

Spongomorpha sp. (in crevices)

Site 'g'

similar species to site 'f'

MARBLE ISLAND

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

Latitude: 53° 11.8' N

Longitude: 132° 39' W.

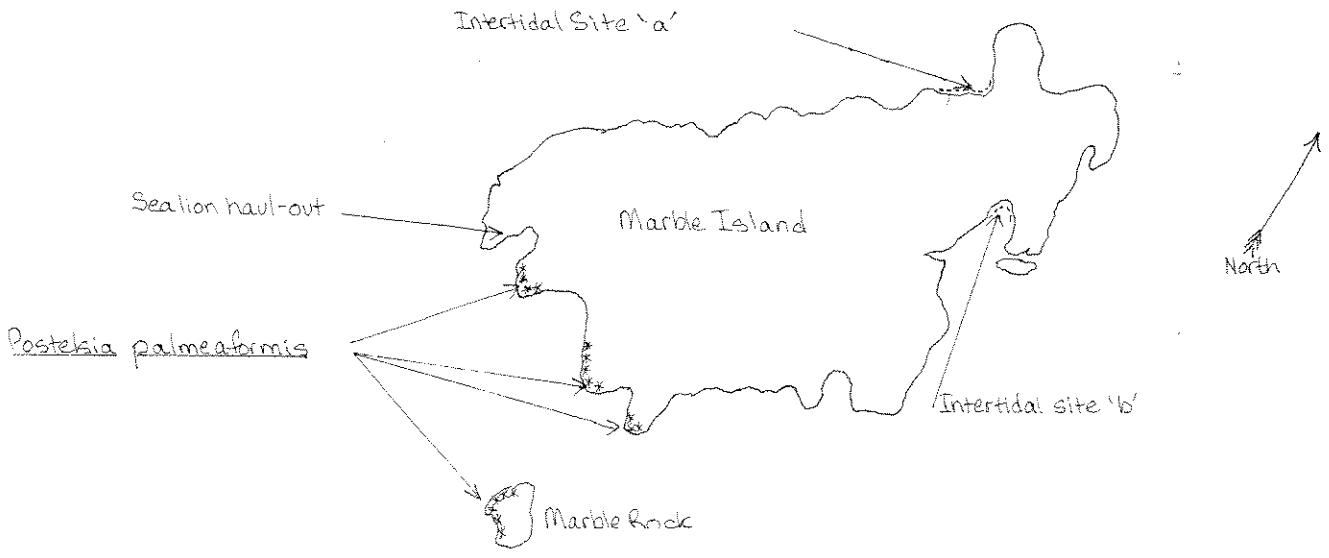
Date of Observations: June 20, 1977

Time: 9:00 - 12:15

Tide Height: Site 'a' about 3.5 (m)

Site 'b' about 1.5 (m)

Figure 1. Map showing Marble Island with study sites indicated.



MARBLE ISLAND - INTERTIDAL OBSERVATIONS

Species Observed

Site 'a'

Phanerogams

Phyllospadix scouleri

Chlorophyceae

Ulva sp.

Spongomorpha sp.

Enteromorpha sp.

Codium fragile

(unidentified filamentous green)

Phaeophyceae

Fucus distichus

Hedophyllum sessile

Pterygophora californica

Alaria sp.

Laminaria sp.

Rhodophyceae

Rhodomela larix

Odonthalia sp.

Halosaccion glandiforme

Corallina vancouverensis

Prionitis sp.

Microcladia borealis

Cryptosiphonia woodii

Hymenena (?) sp.

Unidentified crustose corralines epiphytic on *Phyllospadix scouleri* and other epizoii on *Mytilis californianus*

Gigartina (*papillata* stellata complex)

Fauna

Mytilus californianus

Katharina tunicata

Stronglyocentrotus purpuratus (very abundant in lower tide pools)

Pisaster ochraceus (not very abundant - about 5 individuals seen in area investigated)

Anthopleura sp.

Very few barnacles in area generally; several very small clumps of Pollinices pollicipes and very few Balanus glandula

Postelsia palmaeformis noted from zodiac on exposed coast indicated with ☆ ; Steller's sea lion haul-out indicated on map also.

SAUNDERS ISLAND

Location: Engelfield Bay, West Coast Moresby Island

Latitude: 53° 40' N. Longitude: 131° 27.8' W.

Date of Dive: June 21, 1977

Time: 1630 - 1725

Tide Height: 2.47 - 2.86 (m)

Divers: J. B. Foster, E. A. Stewart

Figure 1. Map showing Saunders Island with study site investigated by SCUBA indicated.

This dive was made on the Kaisun Harbour side of Saunders Island as indicated on the map (figure 1). Moving outward from shore there appeared to be at least three recognizable algal 'zones'. Fron the tideline (about 0.1 m above MWL) to a

depth of 3 meters Alaria sp. was the dominant algae with approximately 80% cover. Beneath the Alaria sp. there was a complex of red algae forming an understory association (not sampled). Moving offshore, from a depth of 3 meters to 5 meters, Egregia menziesii, Pterygophora californica and Phyllospadix scouleri made up the bulk of the vegetational biomass. Nereocystis luetkeana was also observed along the lower edge of this 'association' (from 5 to 7 meters). Below 7 meters algal cover was reduced almost entirely to crustose corrallines (i.e., Lithothamnion sp.) and occasional Desmarestiales (Desmarestia ligulata and D. viridis). This area was heavily populated by Stronglyocentrotus fransiscanus and was most likely responsible for the lack of algae. Stronglyocentrotus purpuratus was also observed, however their distribution appeared to be confined to small patches in the upper subtidal. Several individuals of Stronglyocentrotus drobachiensis were also observed.

The narrow channel between the small island off the northeast tip of Saunders Island and Saunders Island itself was investigated and found to be an active area of high current. The steep bedrock walls were covered with a variety of tunicates, sponges, bryozoans, coelenterates (not identified) and at each end of the snort passage there were small Nereocystis luetkeana beds.

The following is a list of species observed on this dive:

Phanerogams

Phyllospadix scouleri

Algae

Chlorophyta

Codium fragile

Enteromorpha sp.

Phaeophyta

Alaria sp.

Desmarestia aculeata

D. ligulata

Egregia menziesii

Laminaria andersonii

Nereocystis luetkeana

Pterygophora californica

Rhodophyta

Callophyllis sp.

Fauchea sp.

Iridaea sp.

Lithothamnion sp.

Smithora naiadum (epiphytic on *Phyllospadix*)

Invertebrates

Astraea sp.

Balanus nubilus

Ballanophyllia elegans

Cucumaria miniata

Dermasterias imbricata

Halichondria permolis

Haliotis kamtstchatkana

Henricia leviuscula

Pisaster brevispinus

Pycnopodia helianthoides

Stronglyocentrotus drobachiensis

S. fransiscanus

S. purpuratus

Tealia crassicornis

Fish

Hemilepidotus hemilepidotus

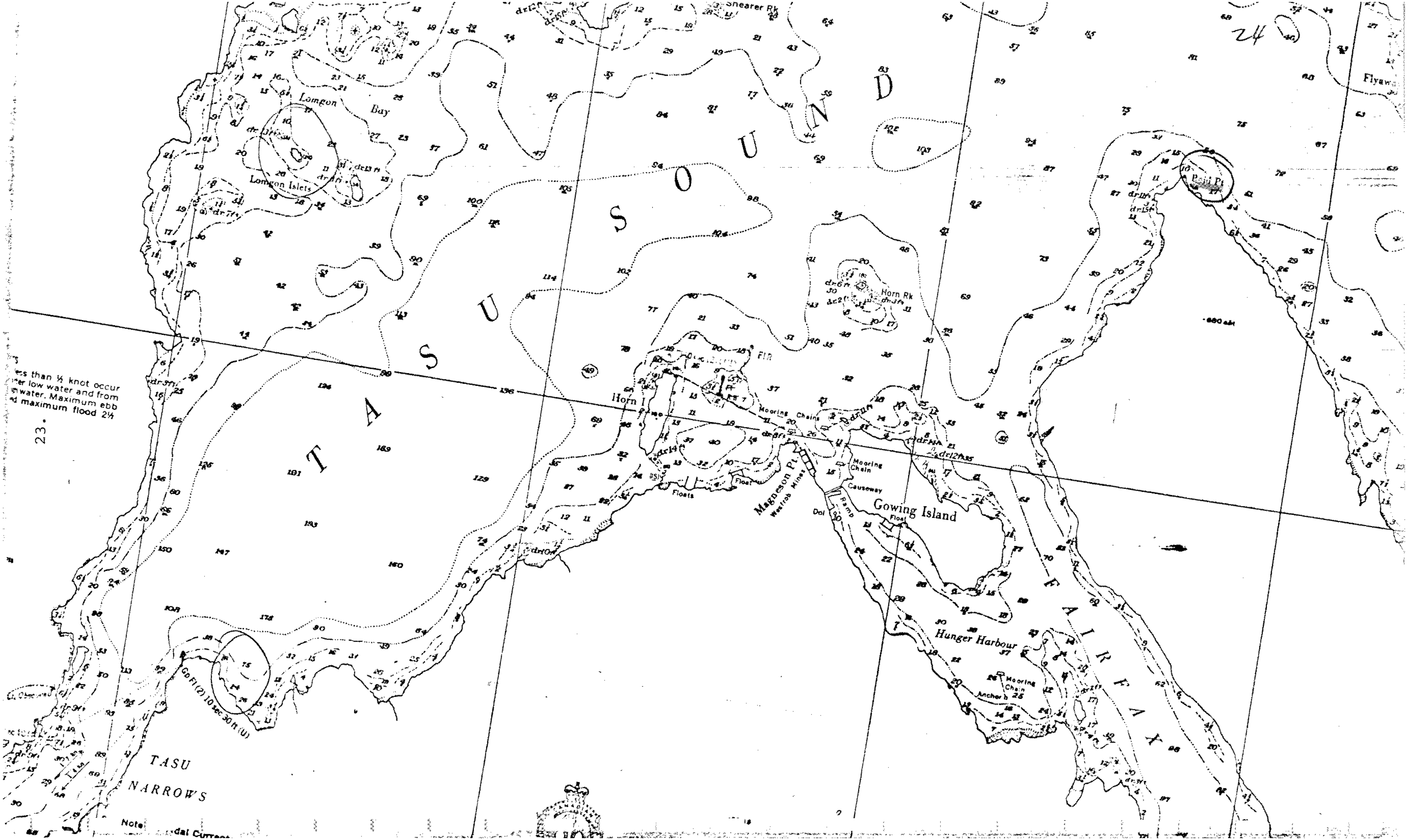
Hexagrammos decagrammos

Nautichthys robustus

Oxylebious pictus

Sebastes caurinus

S. *melanops*



Longon Bay
Longon Islets
TASU SOUND
Shearer Rk
Horn Rk
Horn I
Mooring Chains
Magneson Pt.
Wesfrob Mines
Floats
Float
Mooring Chain
Causeway
Ramp
Dol
Gowing Island
Hunger Harbour
Mooring Chain
FAIRFAX
TASU NARROWS
Gp Fl (2) 10 sec 30 ft (U)
es than ½ knot occur
ter low water and from
water. Maximum ebb
d maximum flood 2½
Note
dal Currents
23.
24

REID POINT

Location: Tasu Sound, West Coast Moresby Island

Latitude: 52° 47.2' N; Longitude: 132° 01.5' W.

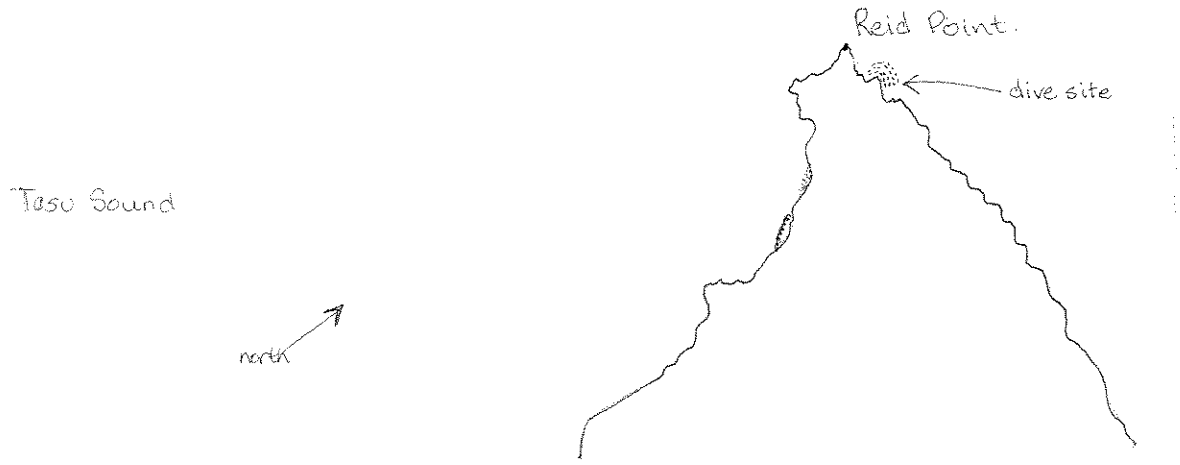
Date of Dive: June 23, 1977

Time: 1240-1325

Tide Height: 1.10 - 1.72 (m)

Divers: J. B. Foster, E. A. Stewart

Figure 1. Map showing dive location at Reid Point, Tasu Sound on the west coast of Morsby Island.



The bottom topography of this site offered three major habitat types: near shore the substrate was largely bedrock making up a steep slope which dropped down to 8 - 12 meters where a more gently sloping bottom composed of cobbles, pebbles and mud was found. A flatter area in shallow depths 1.5 - 3 meters consisted of a small eelgrass bed (Zostera marina).

The entire area below a depth of about 5 meters was devoid

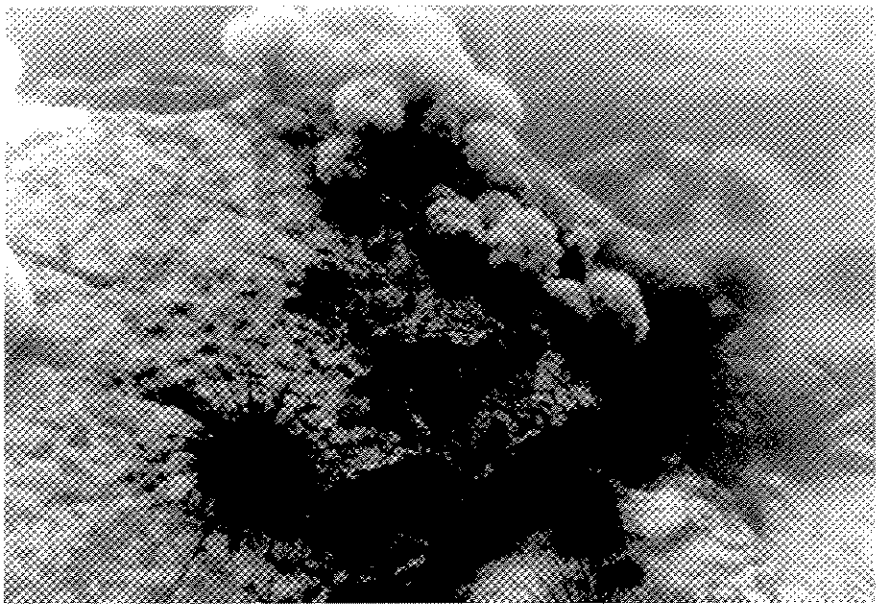
of macroscopic algae excepting crustose corrallines and a very occasional Desmarestia ligulata individual. A large sea urchin (Stronglyocentrotus fransiscanus) population was present where the algae was lacking.

Photographs taken during the dive are presented below with comments on the subjects. A species list for the dive follows the photographs.

1.

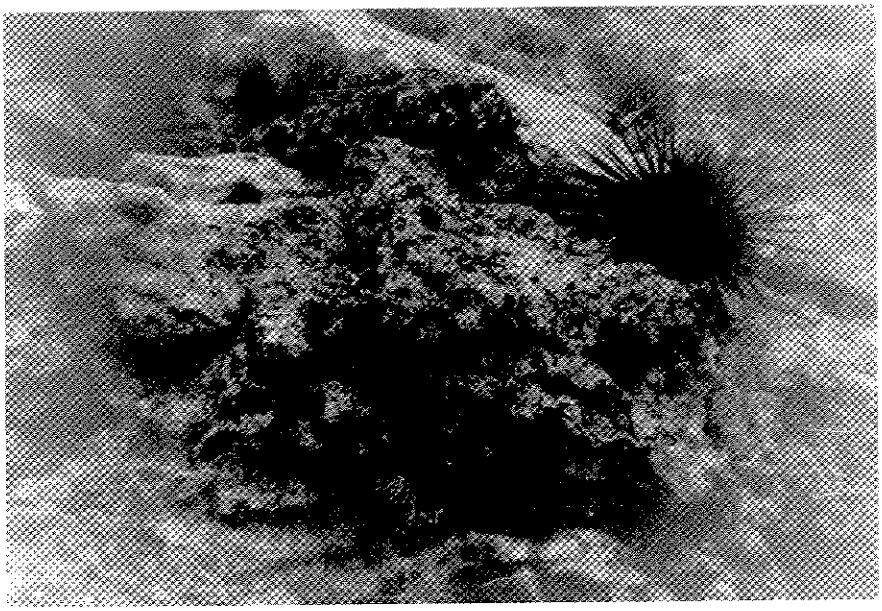
1. This photograph was taken in the eelgrass, (Zostera marina) bed at a depth of 2 - 3 meters. The fish seen on the right, the striped sea-perch (Embiotoca lateralis) was part of a small school of about 6 individuals.

2.



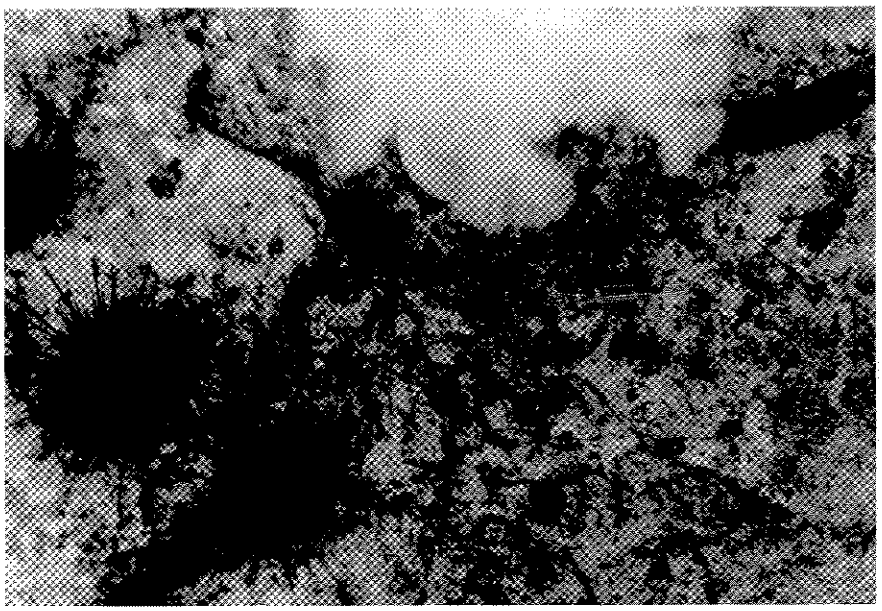
2. View of the steep nearshore bedrock habitat showing numerous red urchins (Stronglyocentrotus fransiscanus), a cluster of orange-phase Metridium senile, limpets and the base of a large white phase M. senile.

3.



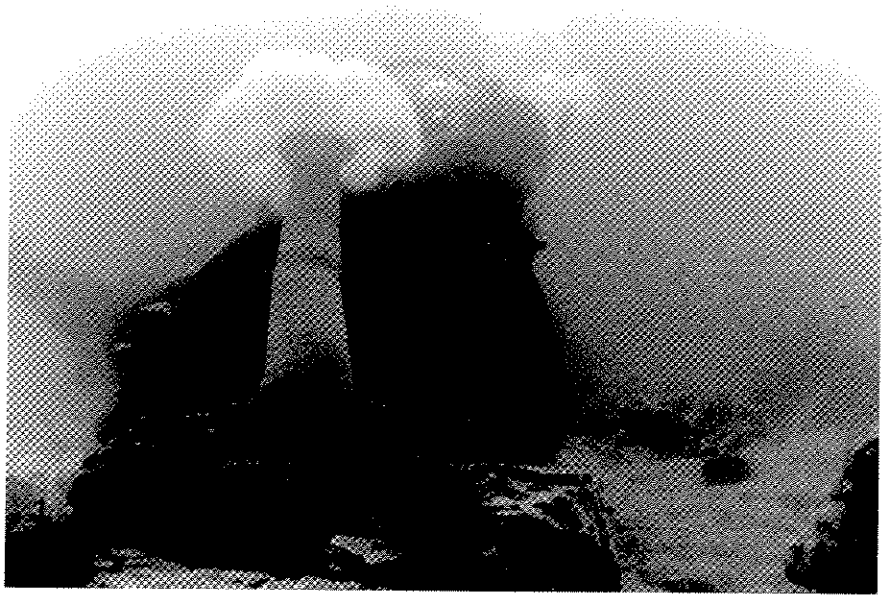
3. A small ling cod (top centre) (Ophiodor elongatus)is shown here 'resting' on the rock bottom.

4.



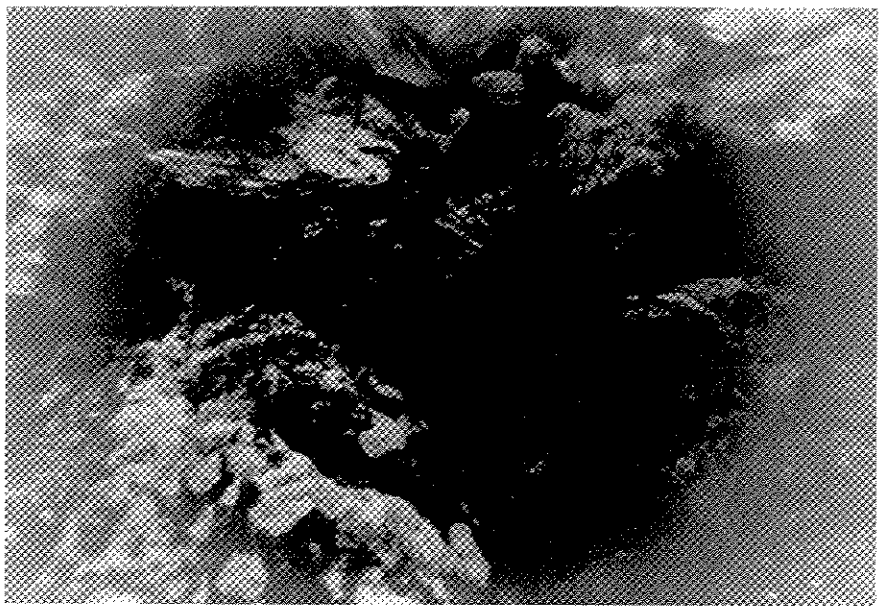
4. Another view of the grazed, nearshore bedrock habitat showing urchins, (S. fransiscanus), limpets (Not persona), chitons (unidentified) and part of a large white phase Metridium senile.

5.



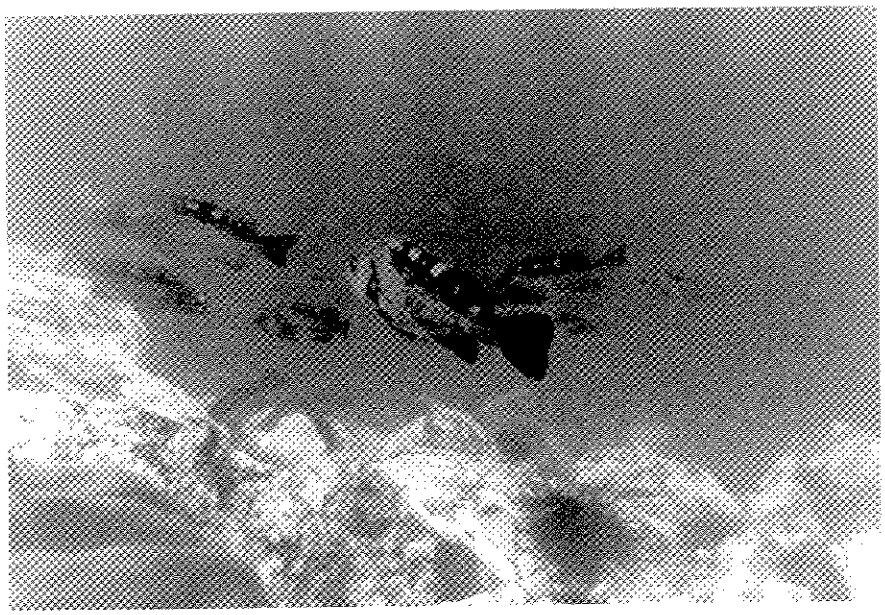
5. This Metridium senile was one of many large individuals ranging from 2 to 3½ ' in height.

6.



6. Copper rock fish (Sebastes caurinus) may be seen in the top centre of this photograph.

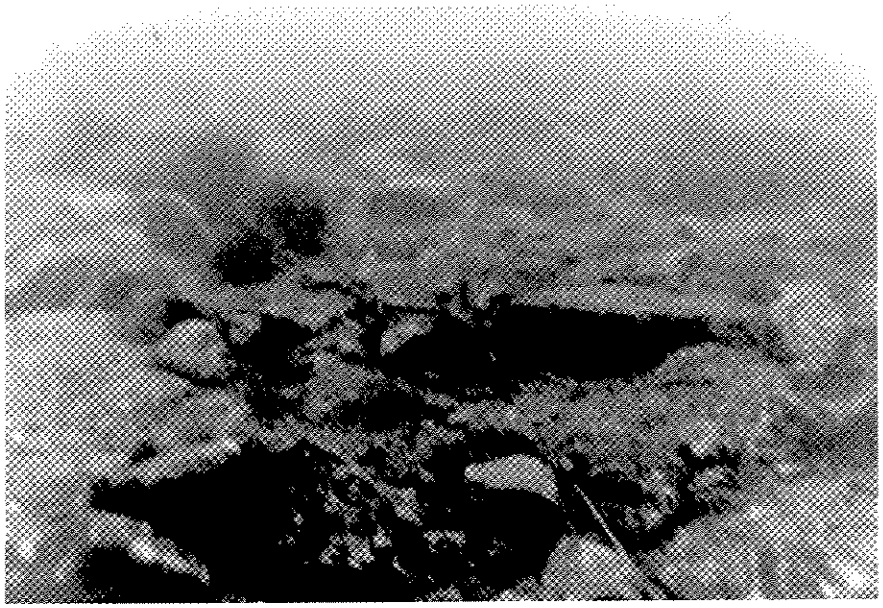
7.



7. A small school of yellowtail rockfish (Sebastes flavilus) hovering in the water column near the bottom at about 30'.

8.

9.



8. and 9. View of the gently sloping area out past the steep rock slope (depth around 36').

Species List (Reid Point)

Phonerogams

Zostera marina

Algae

Lithothamnion sp.

Desmarestia ligulata

Costaria costata

Invertebrates

Metridium senile

Balanophyllia elegans

Notoacmea persona

Diodora aspera

Tonicella lineata

Stronglyocentrotus fransiscanus

Parastichopus californicus (very abundant)

Pycnopodia helianthoides

Crossaster papossa

Henricia leviscula

Mediaster aequalis

Solaster dawsoni

Pisaster brevispinus

Dermasterias imbricata

Fish

Sebastes melanops

S. *caurinus*

S. *flavidus*

S. *maliger*

Cymatogaster aggegata

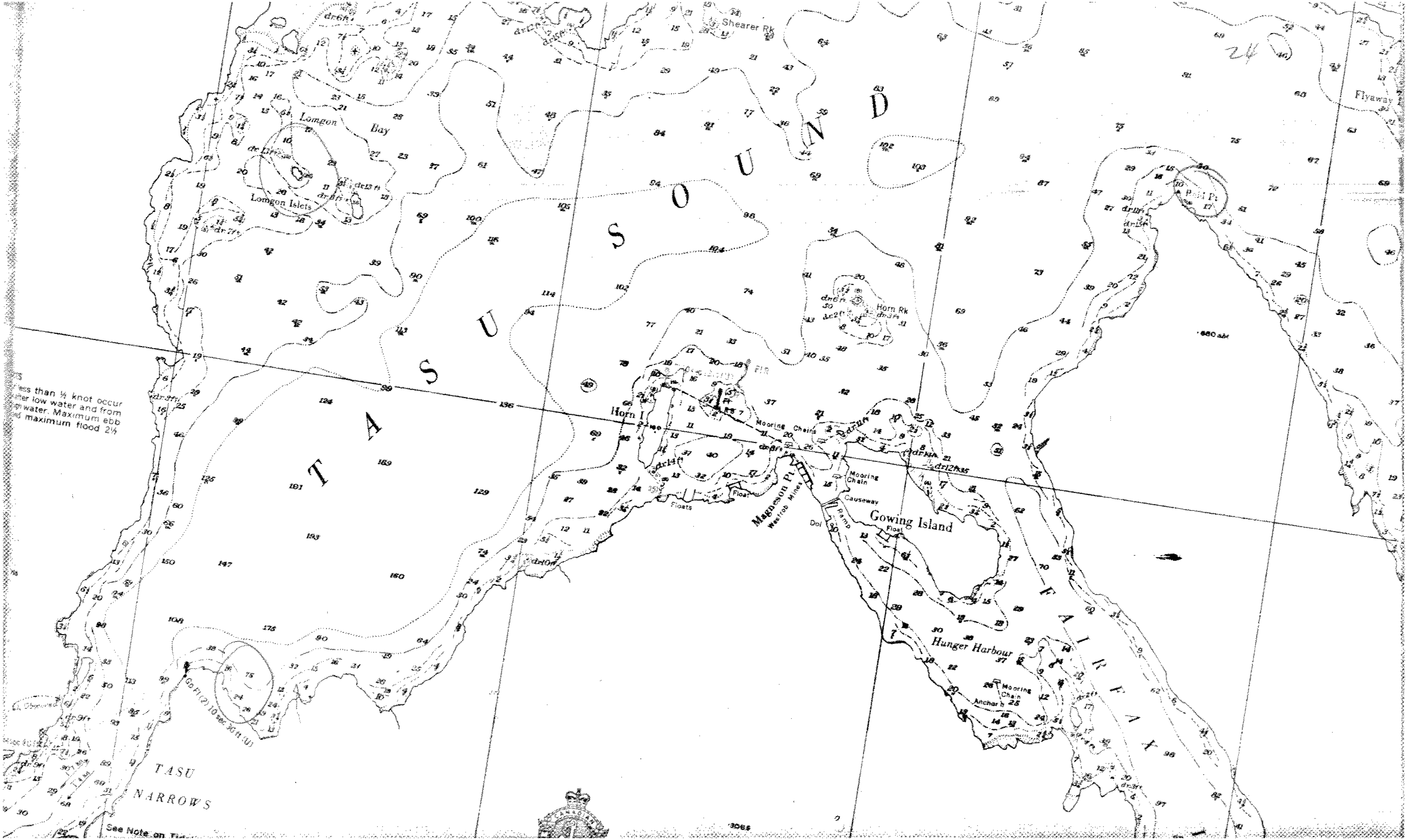
Embiotoca lateralis

Coryphopterus micholosii

Nautichthyes oculofasciatus

Hydrolagus collici

Ophiodon elongatus



TASU SOUND
Shearer Rk
Lomgon Bay
Lomgon Islets
Flyaway
Horn I
Horn Rk
Mooring Chains
Mooring Chain
Magneson Pt
Westfrob Mines
Floats
Float
Causeway
Ramp
Gowing Island
Hunger Harbour
Anchorage
FAIRFAX
TASU NARROWS
maximum flood 2½

LOMGON ISLETS

Location: Tasu Sound

Latitude: 52° 46.8' N. ; Longitude: 132° 01.5' W.

Date of Dive: June 23, 1977

Time: 1425-1515

Tide Height: 1.58 to 2.07 (m)

Divers: J. B. Foster, E. A. Stewart

Figure: Map showing dive location on Lomgon Islets, Tasu Sound.

The bedrock making up the islets themselves above water continues subtidally to at least 30'. Unfortunately the area was not investigated to a greater depth because of air shortage.

Along the periphery of the islets to a depth of 3 - 4 meters the dominant macroflora were Alaria sp. and the surf grass Phyllospadix scouleri. These two species formed the canopy 'association' and made up the bulk of the vegetational biomass. A red turf 'association' under this canopy consisted primarily of jointed coralline algae Bossiella spp., Corallina sp. and Calliarthron sp. Odonthalia flocossa, Iridaea sp. and Gigartina spp. were also present, but in less abundance.

Below 4 - 5 meters the bedrock substrate was entirely devoid of macroalgae except for one isolated clump of Desmarestia ligulata covering an area of approximately one square meter. Numerous large Metridium senile were present in this area devoid of algae, as were many Ballanophyllia elegans.

At the end of this dive we noticed a harbour seal (Phoca vilutina) which did not disappear as they normally do when a diver gets too close. Instead the seal circled the two divers, came up to me and gently tugged on my flippers. I followed it down to around 30' and it looked over its shoulder at me several times before disappearing. I was out of air!

TASU NARROWS

Location: Tasu Sound

Latitude: 52° 44.8' N. Longitude: 132° 05' W.

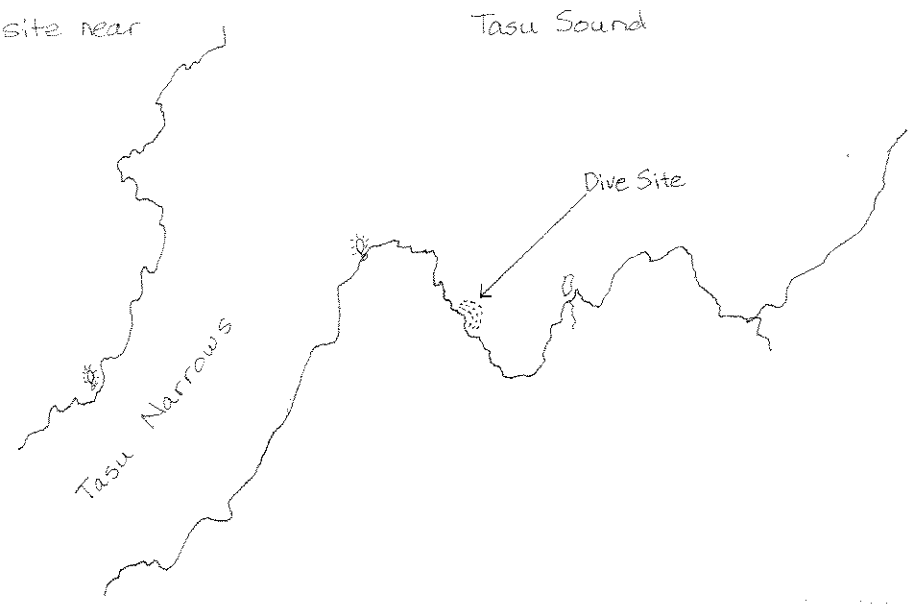
Date of Dive: June 25, 1977

Time: 1420 - 1520

Tide Height: 1.71 to 1.45 (m)

Divers: J. B. Foster, E. Anne Stewart

Figure 1. Map showing location of dive site near Tasu Narrows, Tasu Sound.



Subtidally the terrain in this area was a continuation of that found above water. A steep bedrock slope (around 40°) continued down to at least 28 meters (maximum depth attained). The large crevices in this face, filled with loose rock, were similar to screes found on the steep mountainside. Above 24 meters these 'screes' were filled with cobbles and boulders while below this depth (approximately) they were made up of cobbles, pebbles and shell fragments with some silt. The effects of the oceanic

swell present that day extended down to approximately 14 meters thus restricting most observations to the area deeper than at least 10 meters.

The rock appeared to be heavily grazed and a very large population of Stronglyocentrotus fransiscanus was present. In the surge zone small patches of S. purpuratus were noted, however vegetational cover was much greater there.

Although most macroalgae was excluded from the deeper areas which were inhabited by Stronglyocentrotus fransiscanus, large patches heavily colonized by cup corals Ballanophyllia elegans and orange anemones (see below) appeared to harbour a refuge from grazing pressure for small polysiphonious red algae. Other algae noted in this area consisted of the ubiquitous crostose coralline reds (i.e. Lithothamnion sp.) and several species of Desmarestia: Desmarestia ligulata and Desmarestia viridis, as well as one or two specimens of either Hymenena sp. or Cryptopleura sp. (identification incomplete). It should be noted that the crustose corallines extended to a depth of 28 meters. Algae collected from the upper surge zone are to be listed in the appendix (identifications as yet incomplete).

The point (see figure 1) was covered extensively by a large bed of Metridium senile at a depth between 7 and 15 meters (see photo 3). Moving away from the point on either side smaller patches of the smaller orange colour phase of M. senile seemed to replace the larger white phased incividuals (photo 4). Cup corals Balanophyllia elegans and several other species of Calyptoblastids (unknown identification) were also

very abundant on the rock face. There were numerous asteroids in the area, although no single species or association of a few species seemed to dominate. Dermasterias imbricata, Crossaster papposa and Henricia leviuscula were found to a depth of approximately 13 meters. The bat star, Pteraster tesselatus and Luidia foliolata were present between 18 and 28 meters. A single specimen of what was thought to be Pisaster brevispinus was observed at 15 meters.

Ophiuroids, a large percentage probably Ophiopholis sp. (although proper identification not made) were abundant in the rock skrees to a depth of 28 meters. Basket stars (Gorgonocephalus cucremis) were found in the bedrock areas between 20 and 28 meters in depth.

Other invertebrates noted include Pagurus sp., Fusitriton oregonensis and Hinnites multirugosus. Numerous tunicates, sedentary coelenterates and sponges were also present but unfortunately were neither collected nor identified.

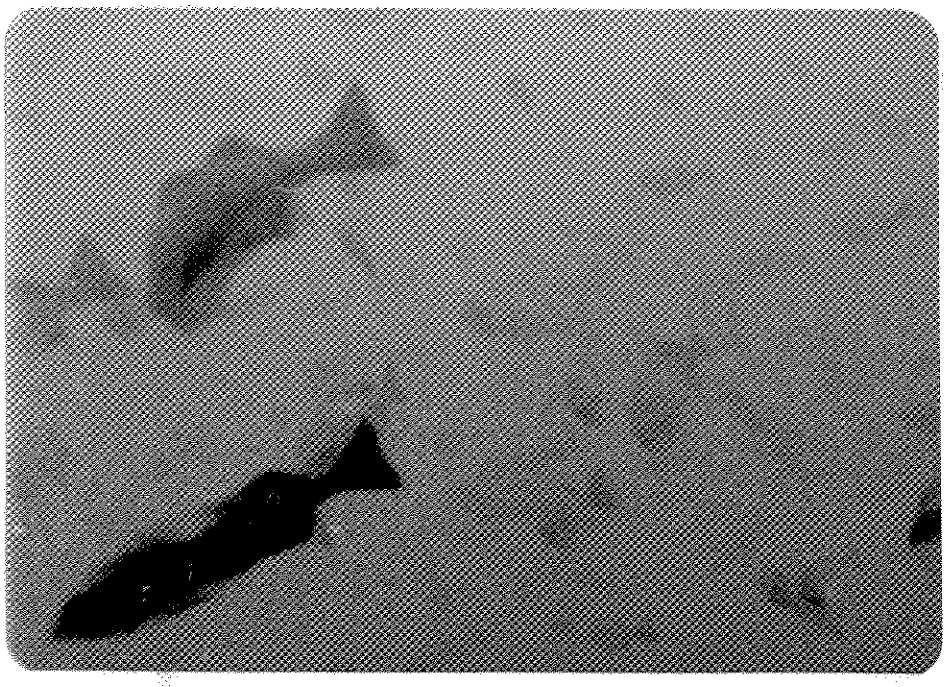
Fish life was very abundant in the dive area. A very large school of rockfish composed of approximately 40% Sebastes flavidus and 60% Sebastes melanops were observed in the water column adjacent to the rock wall between 10 and 20 meters. (See photos 1, 2, 3.) Because of limited visibility it was not possible to determine the precise extent of the school, however from counts made of fish within visible range, it was possible to conservatively estimate that there were at least 1,000

individuals in the school. Sebastes flavidus and S. melanops were the only fish observed utilizing the open water column. All other species observed maintained either a loose association with the bedrock and skree areas or a very close bond with an individual crevice, overhang or spot on the wall. A small school of juvenile rockfish (Sebastes sp.) of approximately 100 individuals was observed in a large crevice at 10 meters. These fish were all approximately 4 to 6 centimeters long and their colouration was a mottled brown and black with gold and tan hints on the lateral surfaces and a light underside. Fish observed which were closely associated with the rock face and its numerous cracks and crannies were the following : Oxylebius picta, Hexagrammos decagrammus, Ophiodon elegens, Sebastes caurinus, S. maliger, S. nebulosus and S. nigrocinctus.

Photos 1, 2 and 3

Photographs of the large rockfish school (Sebastes flavidus and S. melanops) encountered from 20 meters up to 10 meters in depth.

1.



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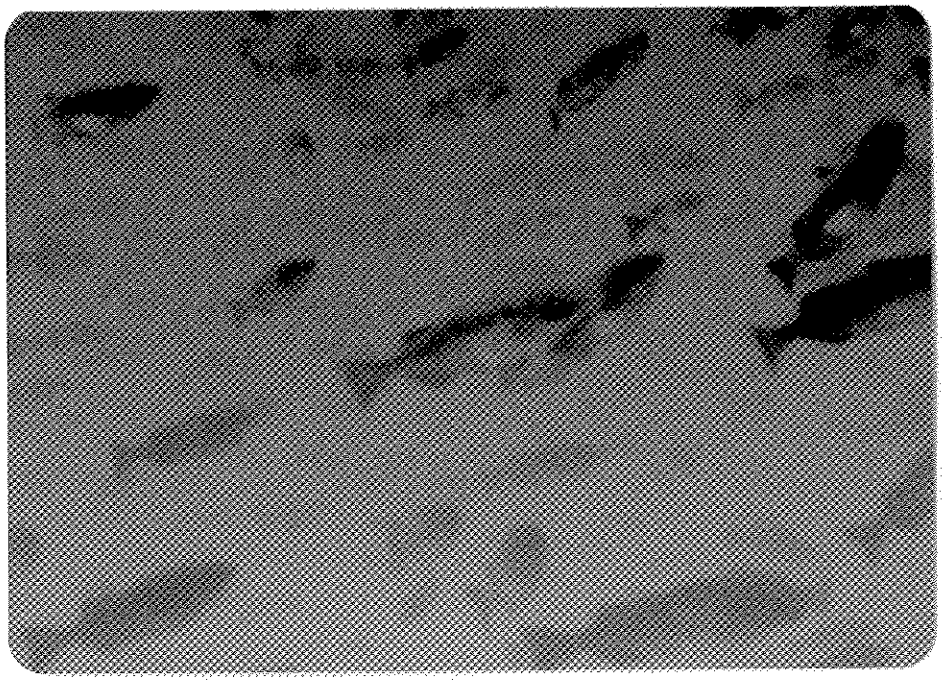
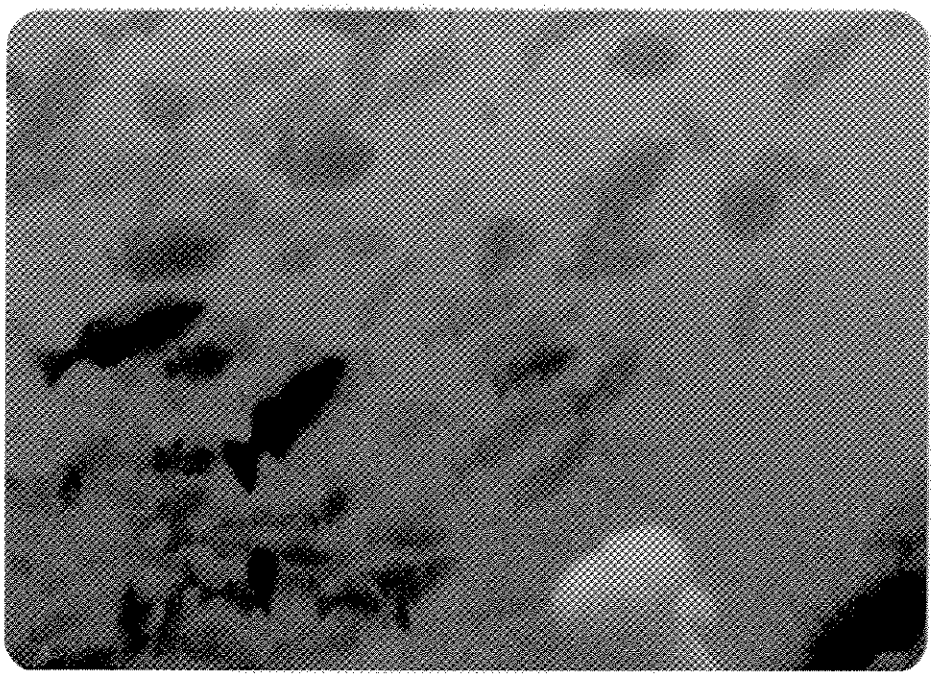


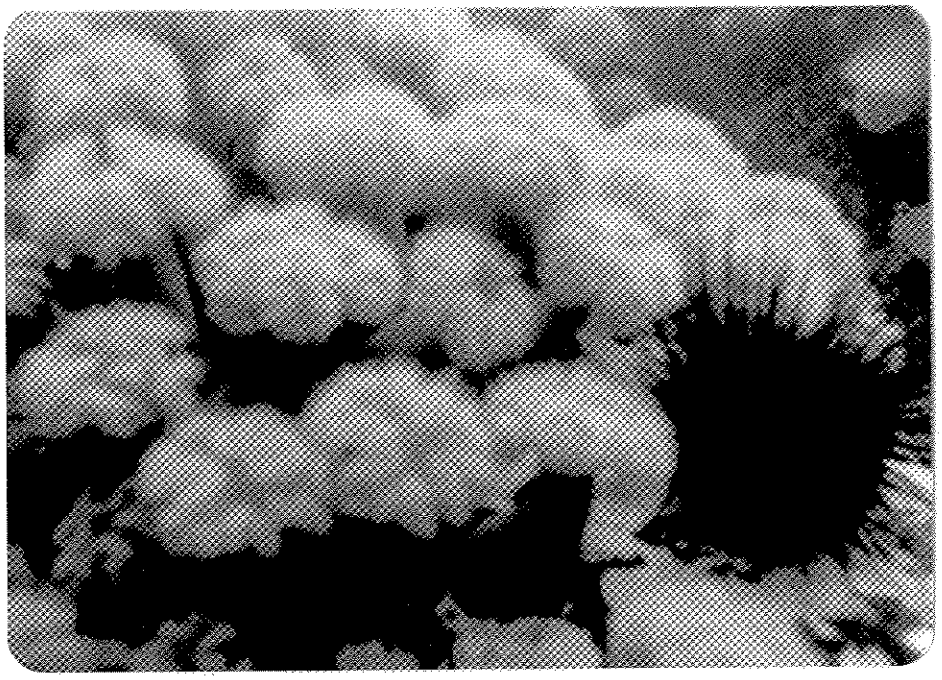
3.



Photograph 4

This photograph gives some idea of the dense beds of the small orange-phase Metridium senile. The urchin in the right lower corner is, of course, the ubiquitous Stronglycentrotus fransiscanus.

4.



ISLET OFF NORTH ANTHONY ISLAND

Location: Southwest coast of Moresby Island.

Latitude: 52° 04.8' N. Longitude: 131° 14.5' W.

Date of Dive: July 2, 1977

Time: 1830 - 1930

Tide Height: 2.26 - 1.65 (m)

Divers: J. B. Foster, E. A. Stewart and tender Gary Edenshaw

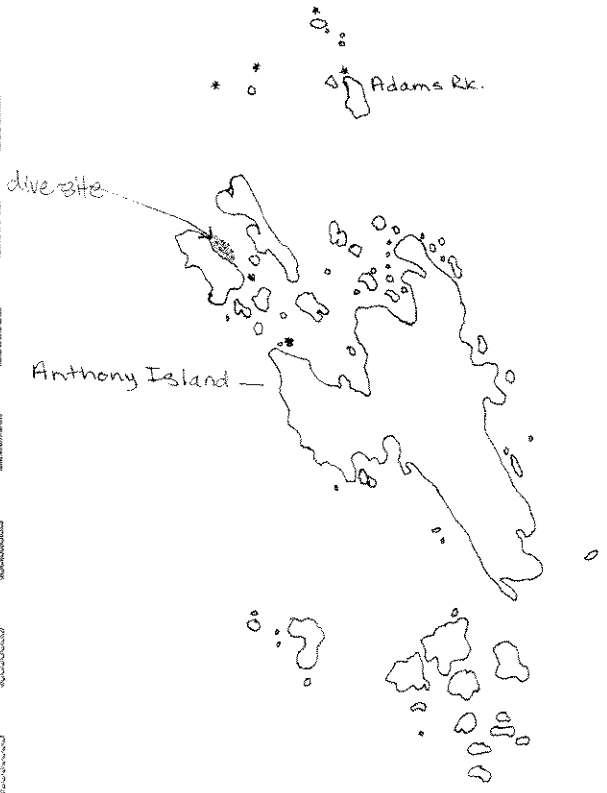


Figure 1. Map of Anthony Island and vicinity showing location of dive off islet to north of Anthony Island.

This dive site although somewhat in the lee of the large islet shown in figure 1 was exposed to large oceanic swells coming from the northwest. The bottom was composed of a bedrock

substrate strewn with enormous boulders (i.e. 8 x 9 x 7 meters). Unfortunately the collection bags were lost overboard after the dive so field identifications must be relied on entirely in this report.

Moving outwards from shore a large bed of Alaria sp. mixed with Phyllospadix sp. was the first encountered canopy association. A red algal turf layer found beneath the canopy was composed of diverse filamentous, foliose and coralline rhodophytes (Iridaea sp. particularly predominant).

Further offshore (3 - 7 meters in depth) the canopy 'association' changed to a kelp mixture of Pterygophora californicus, Lessionopsis (littoralis?) and Nereocystis luetkeana. In this area urchins (mostly Stronglyocentrotus fransiscanus with a few S. purpuratus) were confined to cracks and crevices which presumably have offered shelter from heavy surge. These urchin inhabited patches were devoid of macroalgal life excepting crustose corallines. The outer, deeper edge of this lastly described canopy 'association' was almost entirely dominated by Nereocystis luetkeana. This kelp bed was abruptly terminated at depth about 7 to 9 meters and the area beyond this was devoid of macroalgae and heavily populated with Stronglyocentrotus fransiscanus. This 'barren' area extended at least 50 meters offshore and most likely further. A large boulder found in this area was grazed below 8 meters depth but heavily vegetated above this with Desmarestia ligulata, several species of red algae and small Laminarians.

Sebastes melanops (and perhaps S. mustinus) were abundant at the kelp bed-barren area interface.

Species List (North Anthony Islet)

Fish

Sebastes nebulosus

S. mystinus

S. melanops

Hexagrammos decagrammus

Invertebrates

Pisaster brevispinus — tunicates
Henricia leviscula — sponges
Haliotis kamtschatkana — annelids
Stronglyocentrotus fransiscanus — bryozoons
(all unidentified)

S. purpuratus

S. droebachiensis

Phanerogams

Phyllospadix scouleri

Algae

Alaria sp.

Iridaea sp.

Pteryogophora californica

Lessionopsis (littoralis?)

Nereocystis luetkeana

Desmarestia ligulata

D. viridis

D. aculeata

Macrocystis integrifolia

Costaria costata

Smithora naiadum (epiphytic or P. californica)

Leathsia difformis

Egregia menziesii

Algae (continued)

Laminaria spp.

Codium fragile

C. *setchelli*

Opuntiella californica

Constantinea subilifera

C. *simplex*

Bossiella sp.

Calliarthron sp.

Corallina sp.

Botryoglossum farlowianum

Ptilota sp.

Plocomium coccineum var. *pacificum*

Bonnemaisonia sp.

Lithothamnion sp.

RAMSAY ISLAND

Location: East coast of Moresby Is.

Latitude: 52° 34.4' N Longitude: 130° 23.3' W.

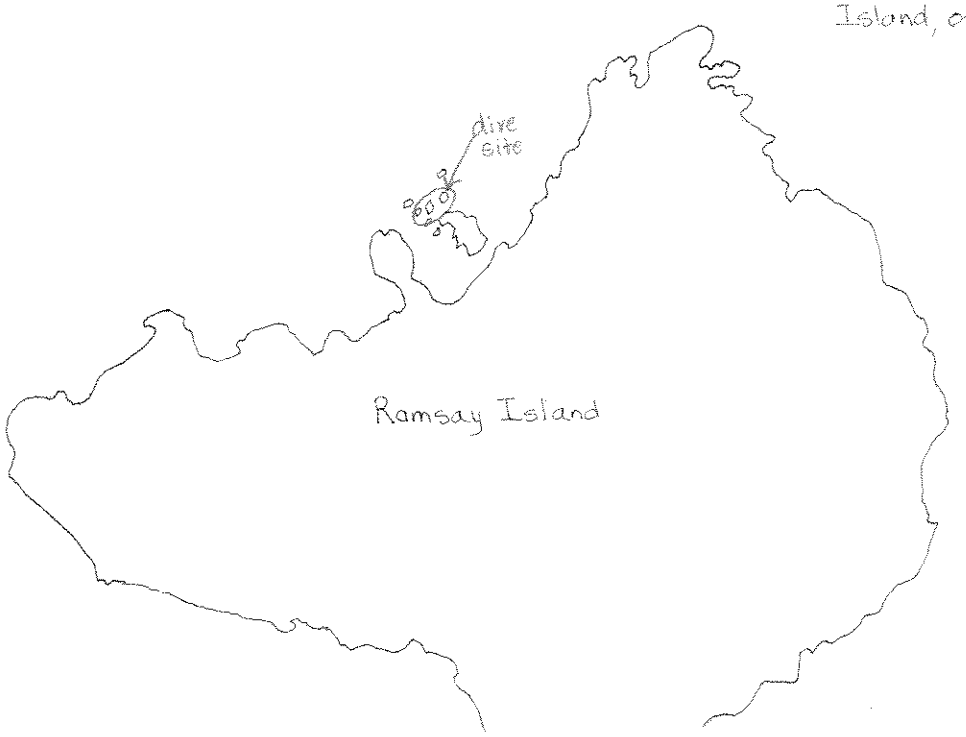
Date of Dive: July 5, 1977

Time: 1520 - 1615

Tide height: 1.40 to 1.68 (m)

Divers: J. B. Foster, E. A. Stewart

Figure 1. Map showing dive location on Ramsay Island, off east coast of Moresby Island.



In the small reefs investigated dense populations of urchins were found below a depth of 5 meters. Corresponding to this heavy urchin population, macroalgae below this depth was limited to encrusting forms. The urchin population was a mixture of the three species, Stronglyocentrotus fransiscanus. S. droebachiensis and S. purpuratus in the following estimated proportions: 60%, 5%, 35%, respectively. S. purpuratus was confined to the low intertidal and upper edge of the heavily grazed area and limited in extent to small patches. S. droebachiensis individuals were scattered throughout the area. S. fransiscanus was the most ubiquitous of the three species but was densest, however, in the deeper areas. Counts of S. fransiscanus were made at 6 meters depth and the average density was found to be from 15 to 20 individuals per meter squared. The average test diameter was found to be 12 centimeters. Several S. fransiscanus individuals were observed feeding on Laminarian scraps including Laminaria sp., Egregia menziesii and Nereocystis luetkeana.

Other invertebrate fauna associated with the grazed area included Parastichopus californicus,Lacuna sp, Haliotis kamstchatkana, Asbrea sp., several species of limpets including Diodora aspera and Acmaea mitra, Dermasterias imbricata (at upper edge of grazed area), Pisaster brevispinus, Pagarus sp. and Hinnites multirugosus (empty shells only, however shells still attached to rock, with either one or both shells present).

An area of approximately 2 x 2 meters in the upper, non-grazed area was also examined in some detail. The basal substrate there was bedrock as in the lower depths and the slope was approximately 20°. Total algal cover was estimated to be 95%, with kelps covering 70%, other browns 5%, greens 15%, non-coralline reds 10% and corallines (including crustose forms) 80%.

The following macroalgae were found in this area.

Alaria marginata
Bossiella spp.
Calliorthion spp.
Codium fragile
C. setchellii
Corallina spp.
Costaria costata
Egregia menziesii
Gigartina (exasperata)
Gigartina (papillata stellata complex)
Hedophyllum sessile
Iridaea sp.
Laminaria setchellii
Leathesia difformis
Lessionopsis littoralis
Nereocystis luetkeana
Plocamium coccinium
Priohitis lanceolata

Detailed information was collected on those species most readily identified in the field.

	% cover	attachment	slope	association	depths (m)
Lessionopsis littoralis	15%	bedrock	$40^{\circ} \rightarrow > 90^{\circ}$	small groups	0 - 1
Alaria (nana?)	10 - 15%	bedrock	$40^{\circ} \rightarrow > 90^{\circ}$	small groups	0 - 1
Laminaria setchellii	5 - 10%	bedrock	$< 45^{\circ}$	small groups	1.5 - 2.5
Hedophyllom sessile	5 - 10%	bedrock	$45^{\circ} \rightarrow > 90^{\circ}$	defined patches	about 1 m
Costaria costata	5%	bedrock	$< 45^{\circ}$	singly or groups	about 1 m
Egregia menziesii	5 - 10%	bedrock	all	pure patches	about 1 m
Codium fragile	5 - 10%	bedrock	$< 45^{\circ}$	single or groups	about 1 m
Prionitis lanceolata	< 2%	bedrock epiphytic	< 45%	single	about 1 m
Gigartina (papillata stellata)	< 2%	bedrock	all	generalist	about 1 m
Plocamium cocinium	< 2%	bedrock	all	singly or groups	< 0.5 m
Gigartina exasperata	< 5%	bedrock	$< 45^{\circ}$	singly or grouped	
Iridaea sp.	< 2%	bedrock	< 45%	grouped	> 1 m