DEPARTMENT OF ENVIRONMENT
ENVIRONMENTAL PROTECTION SERVICE
PACIFIC REGION



# MARINE ENVIRONMENTAL INVESTIGATIONS OF ALICE AND HASTINGS ARMS, B.C. 1976-1978

Regional Program Report: 79-17

by

D.L. Sullivan and D.E. Brothers

June 1979

## ABSTRACT

The Climax Molybdenum Corporation of British Columbia, Limited, is proposing to reopen and expand the Kitsault mine, formerly operated by British Columbia Molybdenum Limited. The Department of the Environment and the Department of Fisheries and Oceans have reviewed the proposed project in detail and directed particular attention to the potential impacts which may result from the proposed method of tailings disposal into Alice Arm.

Between June 1976 and October 1978, the Environmental Protection Service conducted four surveys in Alice and Hastings arms to examine the marine environmental conditions with emphasis on benthic fauna and flora, and to obtain baseline information near the site of the proposed Climax Molybdenum Mine. In June 1976, the subtidal community was examined using SCUBA techniques. In October 1976, the Pisces IV submersible was employed to observe and record environmental conditions in the deep benthic portions of the inlet. In June 1977 and October 1978, the deep benthic communities were sampled by means of bottom trawls and grabs to determine species diversity and heavy metal content. Transmissibility profiles at selected sites in Alice and Hastings arms were completed in June 1977.

The results presented in this report represent baseline data of benthic conditions which will be used for comparative purposes in future surveys. The results of trace metal analysis from intertidal and benthic communities will be presented in a separate report.

# RÉSUMÉ

La Climax Molybdenum Corporation of British Columbia, Limited projette de rouvrir et d'agrandir la mine Kitsault, anciennement exploitée par la British Columbia Molybdenum Limited. Le ministère de l'Environnement et celui des Pêches et des Océans ont examiné ce projet en détail, en mettant surtout l'accent sur les incidences possibles de la méthode projectée d'immersion des stériles dans le bras Alice.

De juin 1976 à octobre 1978, le Service de la protection de l'environnement a procédé, dans les bras Alice et Hastings, à quatre inventaires visant à déterminer les conditions environnementales marines, notamment la faune et la flore benthiques, et de recueillir des données fondamentales près de l'emplacement proposé. En juin 1976, on a étudié la communauté infrâtidale au moyen de méthodes de plongée. En octobre 1976, on a utilisé le submersible Pisces IV afin d'observer les conditions qui caractérisent le benthos profond de l'inlet. En juin 1977 et en octobre 1978, on a procédé à l'échantillonnage des communautés benthiques profondes à l'aide de bennes et de chaluts de fond afin de déterminer la diversité des espèces et la teneur en métaux lourds. Les profils de transmissibilité effectués à des endroits précis dans les bras Alice et Hastings ont été terminés en juin 1977.

Le présent rapport contient des données fondamentales sur les conditions benthiques et ces données serviront de point de comparaison lors d'inventaires ultérieurs. Les résultats des dosages des métaux à l'état de traces dans les communautés intertidales et benthiques feront l'objet d'un rapport séparé.

TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF PLATES

# 1 INTRODUCTION

The Climax Molybdenum Corporation of British Columbia, Limited is proposing to re-open the Kitsault mine, formerly operated by British Columbia Molybdenum Limited. The current proposal includes plans for the disposal of 100,000,000 tons of tailings into Alice Arm, a deep fjord adjacent to the mining property. Alice Arm is located approximately 144 km north of Prince Rupert, B.C. (Figure 1). It is typical of most B.C. glacial inlets, being long, deep, narrow and bordered by high mountains. The Kitsault and Illiance Rivers discharge into the head of Alice Arm. The former mine operated at a through put rate of approximately 6000 tons per day from 1968 - 1972. Tailings from the previous operation were discharged directly, via Lime Creek, to the surface waters of Alice Arm. The current proposal involves piping the tailings into Alice Arm via a submerged outfall located at a depth in excess of 50 metres near the mouth of Lime Creek.

The current owners, Climax Molybdenum Corporation propose to double the through put rate to 12,000 tons per day. Initial capital costs were estimated (based on January, 1978 data) at $135,000,000 with a 500 man workforce for a projected life of approximately 26 years. An additional $25,000,000 has been identified by Climax Molybdenum as the minimal capital expenditure required for the provision of a tailings pond.

Prior to, and in anticipation of the company's intent to reopen the mine, the proposed project received detailed review by the Department of the Environment and the Department of Fisheries and Oceans. Particular attention has been directed to the major issue, namely, the potential impacts resulting from the proposed disposal of tailings into Alice Arm.

Between June 1976 and October 1978, the Marine Surveillance and Compliance Monitoring Group of the Environmental Protection Service conducted a series of surveys in Alice Arm and Hastings Arm, B.C. (The survey in June 1976, was conducted jointly with Fisheries and Marine Service.) The purpose of the surveys was to examine marine environmental conditions in the area with emphasis on benthic fauna and flora, and to obtain baseline information near the site of the proposed Climax Molybdenum Mine.

In June 1976, a number of dives employing SCUBA techniques were carried out near the abandoned mine site at Anyox, B.C. and at the head of Alice Arm. In October 1976, a series of dives using the Pisces IV Submersible were conducted in Alice Arm, Hastings Arm and Observatory Inlet. In June 1977 and October 1978, benthic communities were sampled by means of bottom trawls and grabs for species diversity and trace metal content. The trace metal content of mussels and Fucus sp. from the intertidal zone was also investigated.

An area of secondary interest during the surveys was the abandoned mine site at Anyox, B.C. Although the mine-smelter complex ceased operation in 1935, the slag pile which resulted from the smelting operation is still very much in evidence. The extent of recolonization by marine life on and in the vicinity of the slag pile from the Anyox Smelter was examined.

The results of these surveys, with the exception of the trace metal data, are presented in this report. The trace metal analysis of tissues from intertidal and benthic communities will be presented in a subsequent report.

# 2 MATERIALS AND METHODS

## 2.1 Benthic Trawls

Benthic trawls were conducted at eight locations in Hastings and Alice arms and in Observatory Inlet (Figure 1). The trawling gear consisted of an otter trawl with 3.8 cm mesh body, 1.27 cm mesh cod end liner and a 5.8 metre throat. The trawl was lowered to the bottom with a 3 to 1 scope (three times the amount of hydrographic wire as the depth at the trawl location) and towed on the bottom for an estimated 0.8 kilometres. At each station, replicate trawls were completed. After each tow, the contents of the trawl were washed, sorted, identified, counted, weighed and photographed. Samples of fish tissue and crustacea were frozen and stored for trace metal analysis.

## 2.2 Pisces IV Sumbersible Observations

Six dives were conducted in the Pisces IV submersible during the October 1976 survey. Dive locations are as indicated in Figure 2. During each dive, two observers recorded visual observations of bottom conditions and types of marine life encountered. A photographic record of each dive was taken using a Bolex 16 mm movie camera and a Benthos 70 mm still camera.

## 2.3 SCUBA Survey

Four stations were examined using SCUBA techniques (Figure 3). Near Anyox, dives were completed over the submerged slag pile, and across Granby Bay in an area removed from the influence of the mine. In Alice Arm, dives were completed near the mouth of Lime Creek and on the opposite shore near Pearson Point. At each site, substrate characteristics and invertebrate numbers and types were noted.

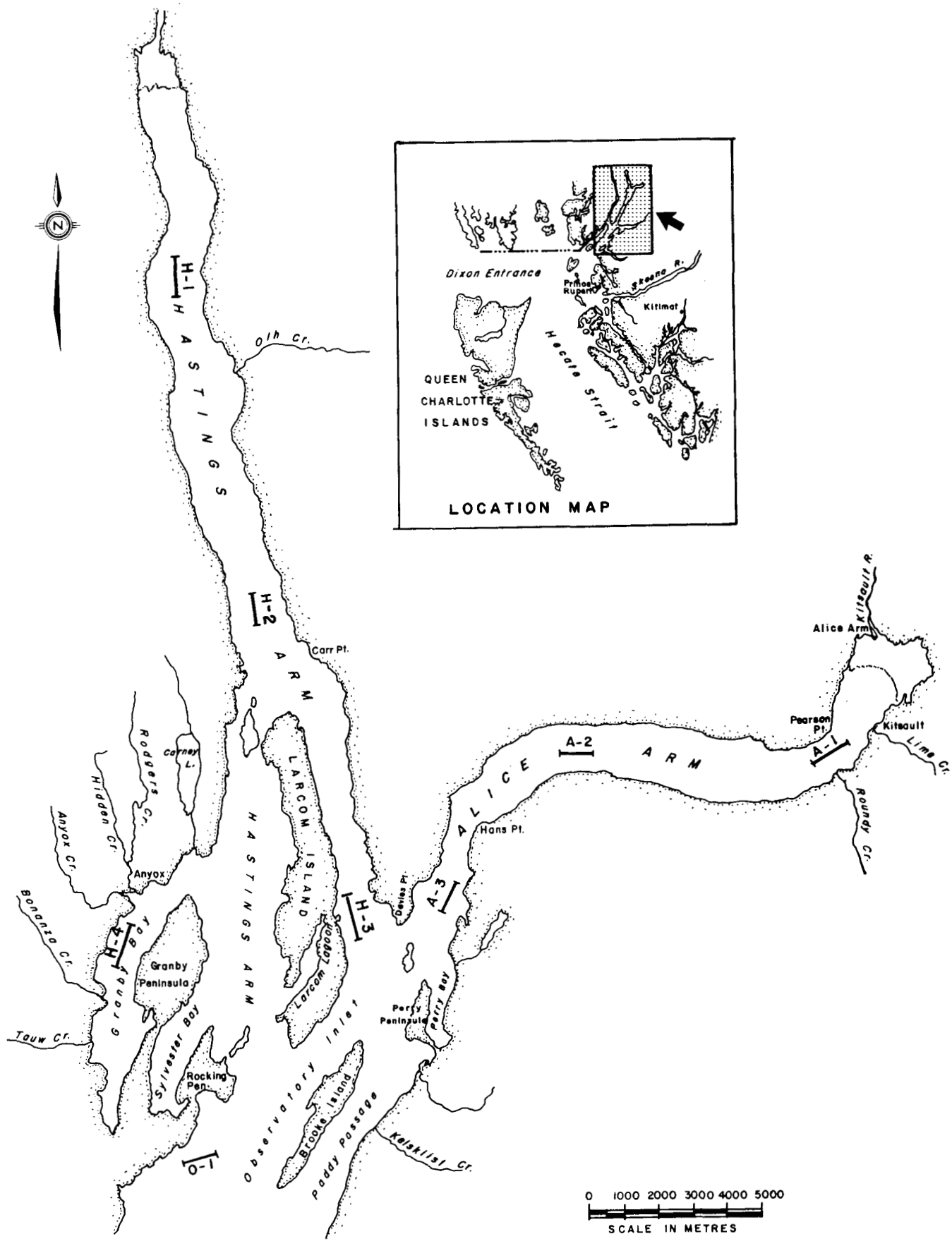


FIGURE 1 TRAWL LOCATIONS AND TRANSMISSOMETER PROFILES June 1977 and October 1978

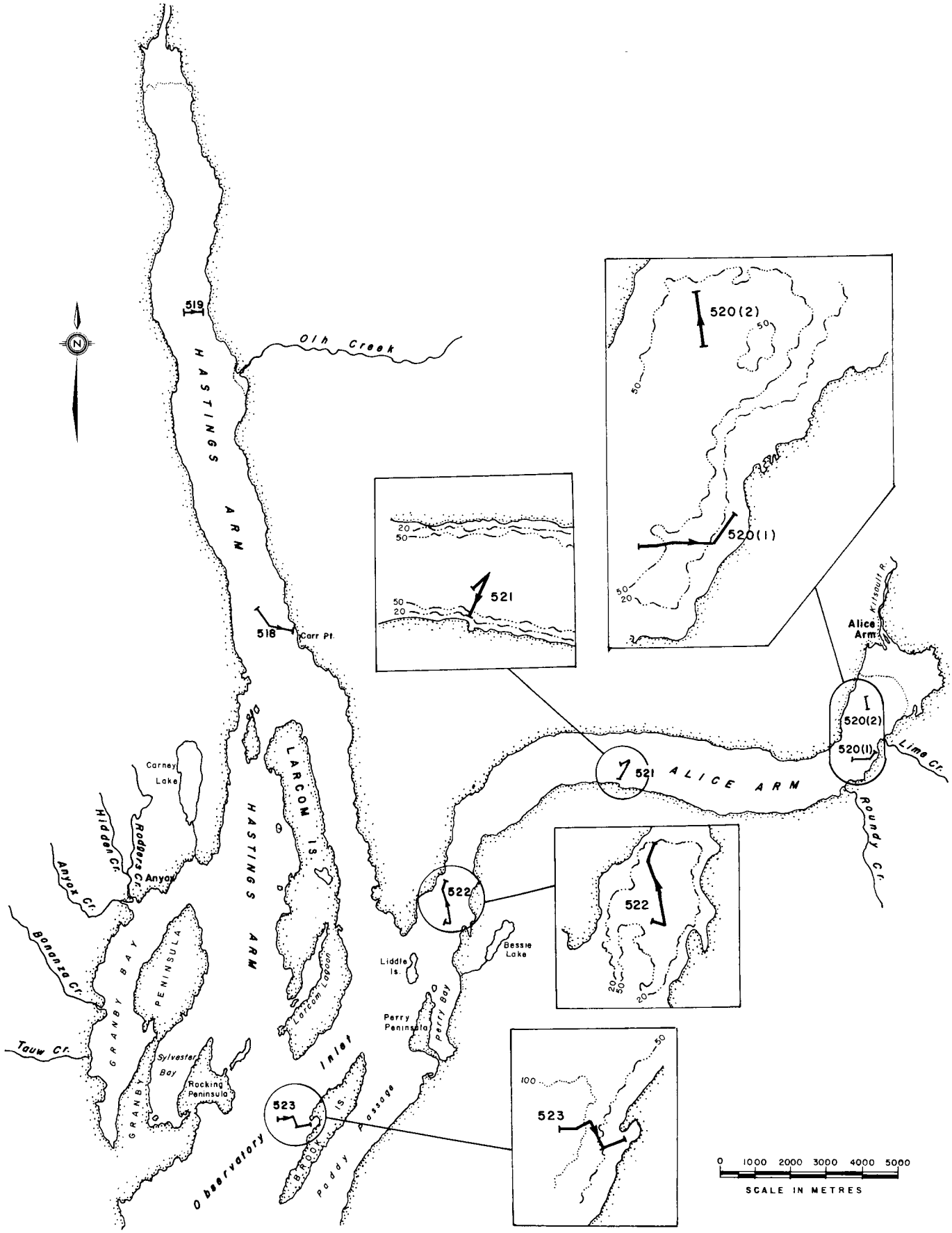


FIGURE 2 PISCES IV SUBMERSIBLE LOCATIONS - October, 1976

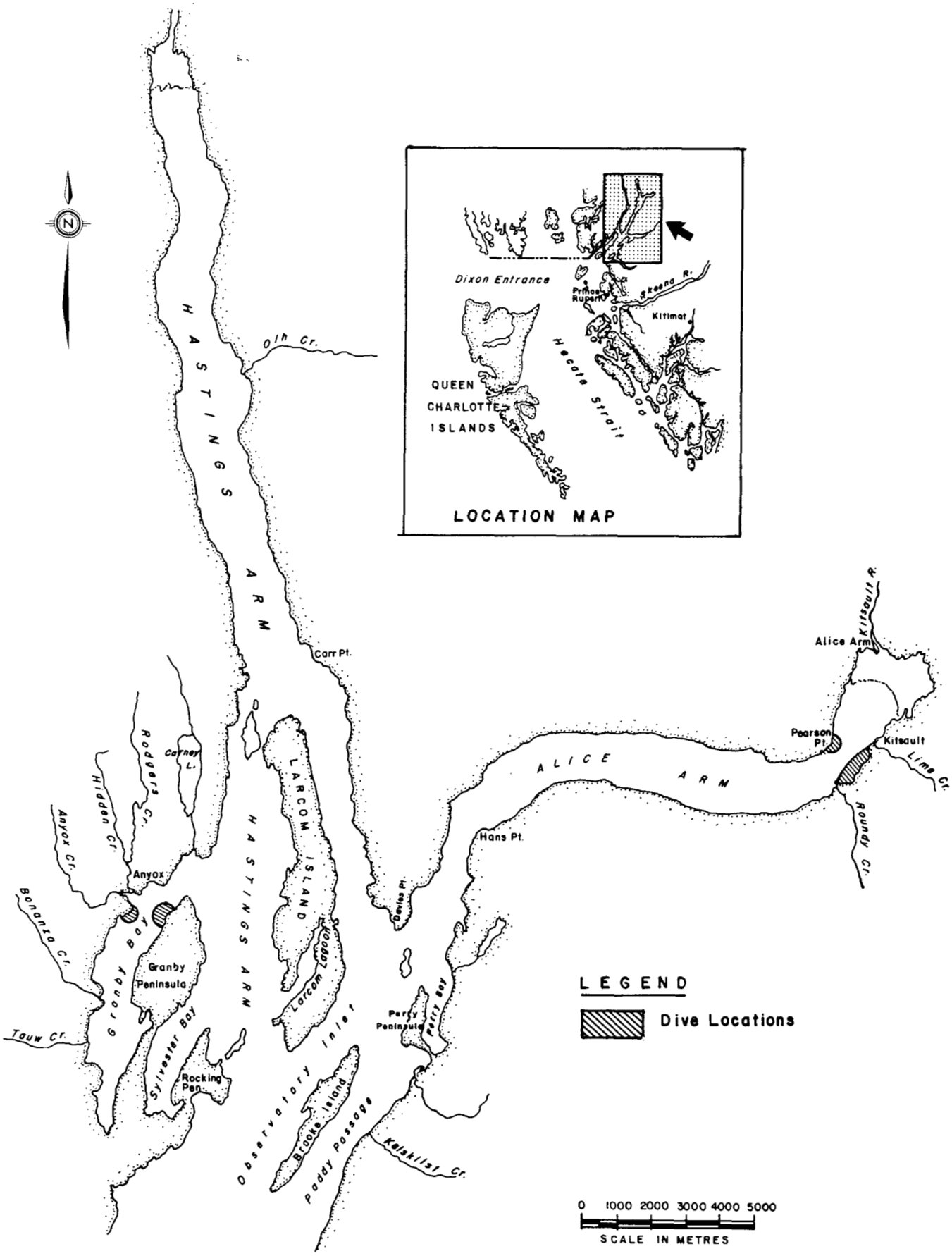


FIGURE 3 SCUBA DIVE LOCATIONS - June 1976

## 2.4 Transmissometer Profiles

Turbidity characteristics of the water column were measured using a Hydro Products 612 S transmissometer on 13 June, 1977 (Figure 1). The instrument, equipped with a one-meter light path length, was lowered using a hydrographic winch and held at five-metre depth intervals for a standardized time interval before obtaining readings. Readings were recorded on descent of the instrument. The transmissometer was cleaned and the calibration checked before each series of profiles.

# 3 RESULTS AND DISCUSSION

## 3.1 Trawl Data (Appendix I) (Plates 1 to 9)

The shrimps, Pandalus borealis and Pandalopsis dispar were noted at all trawl sites. P. dispar was more common in Hastings Arm at Station H-2 and at Station O-1 in Observatory Inlet; however, at the remaining stations, P. borealis was more common.

Brown king crabs, Lithodes aequispina, were captured in the trawls in the centre of both arms and at the head of Alice Arm. A total of 38 brown king crabs were captured during the two trawl surveys. Alaska king crabs, Paralithodes camtschatica, were found only at the mouths of Alice and Hastings arms and only four specimens were captured. Similar distributions were noted during the Pisces IV dives in 1976. The presence of adult male and gravid female king crabs, as well as juvenile individuals suggested that breeding and rearing of the two species of king crab may occur in the area.

The frequency of encounter with king crabs during both the trawl survey and the Pisces IV survey tend to confirm the year round presence of these species.

The species diversity at Station A-3 was considerably greater as compared with that found at other locations in Alice Arm. This was not surprising as the shallow, restricted sill in this area would generate higher current velocities desirable to many species, while keeping the substrate relatively free of sediment, producing another condition which enhances the establishment of diverse benthic conditions. Near the head of Alice Arm, the trawl catches contained fewer organisms and fewer species collected at depths from 110 - 203 metres (1977) as compared with depths of 45 - 100 metres (1978). The largest concentration of brown king crabs (L. aequispina) was found in the center of Alice Arm.

A variety of fish species were collected during the trawls, and although present at most stations, there was no marked abundance at any one site.

3.2 Pisces IV Submersible Dives (Appendix II) (Plates 10 to 20)

3.2.1 Hastings Arm

3.2.1. Dive 518. Pisces IV commenced the dive near center channel as shown in Figure 2. Visibility was very good throughout the water column. Zooplankton were absent in the top 60 meters, but were observed below that depth.

The bottom sediments consisted of a soft, light brown layer overlying a substrate of more compact dark blue-gray material. Numerous burrows were noted. This bottom type was encountered through the dive track until the cliffs or rock faces of the inlet walls were reached. The rock faces were very smooth and covered with a fine layer of sediment.

The macro-invertebrate community in areas with a sediment substrate was dominated by hermit crabs and pandalid shrimp, mainly Pandalopsis dispar and Pandalus borealis. Some fishes, six brown king crabs (Lithodes aequispina) and several other species were catalogued during the dive (refer to Appendix II).

On the rock faces, the macro-invertebrate community was dominated by brachiopods. Other species noted included sea cucumbers, galatheid crabs, sea stars, and some gastropods (refer to Appendix II).

3.2.1.2 Dive 519. Pisces IV commenced the dive near center channel as shown on Figure 2. Visibility and zooplankton distribution were similar to that observed in Dive 518.

Soft brown bottom sediments with numerous burrows were observed throughout the dive track until the rock faces of the inlet sides were reached.

Pandalid shrimp dominated the macro-invertebrate community but were not as numerous as noted in Dive 518. More fishes were observed in this dive track, but fewer numbers of most other species.

Communities on the rock faces were very similar to those observed on Dive 518.

3.2.2 Alice Arm

3.2.2.1 Dive 520 (1). Pisces IV commenced the dive near center channel as shown in Figure 2, and proceeded towards the mouth of Lime Creek. Visibility was very good throughout the water column except near the bottom where it was reduced to about 3 metres. There were greater numbers of zooplankton as compared to Hastings Arm.

Bottom sediments consisted of a light brown layer overlying a lighter colored material. Burrowing activity and numbers of invertebrates were reduced as compared to Hastings Arm, but fishes were more abundant.

The tailings delta was reached at a depth of 125 metres. The number of marine organisms on the delta was less than on the surrounding substrate. The surface of the tailings delta was smooth and compact and there was a noticeable reduction in burrowing activity (i.e. fewer holes were noted).

3.2.2.2 Dive 520 (2). Pisces IV surfaced and was towed to the position shown on Figure 2. Sediment charateristics and marine life were similar to those noted during the first part of Dive 520 (1).

3.2.2.3 Dive 521. Pisces IV commenced the dive near center channel and followed the track as shown on Figure 2. Visibility at the surface was initially very good but became poorer during descent. Zooplankton were absent in the upper 95 meters, but were observed below that depth. The bottom sediments were soft and light brown in color.

The macro-invertebrate community was dominated by pandalid shrimp, mainly Pandalus borealis (pink shrimp), with some Pandalopsis dispar (side stripe shrimp) and Pandalus platyceros (prawns). Numbers were comparable to those found in Hastings Arm. Numbers and species diversity of fishes were limited, as was noted in other parts of the inlet system. Two Lithodes aequispina (brown king crab) were seen near the center channel.

The macro-invertebrate community on the rock faces was dominated by brachiopods and included corals, scallops, urchins, crinoids and sea stars. All rock faces were covered with a thin layer of sediment.

3.2.2.4 Dive 522. Pisces IV submerged near center channel and followed the track shown in Figure 2. Visibility throughout the water column was very good. Zooplankton were observed only near the bottom. The substrate was soft sediment at the start of the dive track changing to gravelly areas and rock faces near the end of the dive.

The macro-invertebrate community was very diverse (refer to Appendix II). This was possibly due to the shallower depth and the resulting increased current velocities. Sediment free rock faces were further evidence of increased currents. Only at this site were Paralithodes camtschatica (Alaska king crab) encountered.

3.2.3 Observatory Inlet

3.2.3.1 Dive 523. Pisces IV commenced the dive near center channel as shown on Figure 2. Visibility was very good throughout the water column except near the bottom where it was reduced to about 3 metres. Zooplankton were absent above 70 metres depth but were observed below that depth.

Bottom sediments consisted of a soft brown layer overlying gray sediments. Burrowing activity was moderate. Brittle stars dominated the macro-invertebrate community. Pandalid shrimp were numerous (mainly pink shrimp) but fewer than were observed in the deeper portions of Alice and Hastings arms. Numbers of fish species were comparable to other parts of the inlet system.

The substrate changed from mud to gravel at 100 metres, and then to rock faces at 95 metres. The rock face communities includedsea cucumbers, sea stars, sponges, crinoids and tubeworms.

3.3 SCUBA Observations

Benthic conditions were examined near the abandoned mine site at Anyox, B.C. and the abandoned Kitsault Mine near the head of Alice Arm.

The first dive was made over the southern submerged portion of the slag pile near the abandoned copper smelter an Anyox. The slag extends for a considerable distance toward the centre of Granby Bay. The

area showed little or no evidence of recolonization by sessile benthic organisms (infauna). Sea urchins (Strongylocentrotus droebachiensis) and pandalid shrimp were common in the shallow sub-tidal zone. Starfish (Evasterias sp), hermit crabs, spider crabs (Hyas lyratus), juvenile flatfish and brachiopods were also observed in the area.

The second dive was made at Granby Peninsula on the shore opposite the slag pile. The bottom substrate was composed of very fine sediment and a few rocks. Macro-benthos at this site was similar to that found during the previous dive; however, the sea urchins, shrimp and spider crabs were not as abundant. Of particular note were the numerous empty shells of the basket cockle, Clinocardium nuttalli.

The third dive was made off the mouth of Lime Creek in Alice Arm. The Kitsault Molybdenum Mine had been discharging mine tailings into Lime Creek between 1967 and 1972. Examination of the creek mouth and adjacent intertidal zone during a low tide revealed areas of tailings accumulation several centimeters thick. An area of the high intertidal zone was found to consist of compacted fine sediment underlying a few centimeters of soft, coarser material. At water depths of 9 - 13 metres tailings deposits were extensive, with deposition of over 60 cm and extending to about 90 meters southwest of the mouth of Lime Creek. Deposits were evident almost as far as Roundy Creek, a distance of about 1000 metres from Lime Creek (Figure 1). The sediment appeared to be inhabited by mud dwelling organisms and althogh macro-benthos were sparse, urchins, spider crabs, and small snails were common. The many clumps of loose mussels noted were probably due to sloughing from the intertidal zone.

A fourth dive was made south of Pearson Point. The substrate type differed from that of the previous dive, being mostly rock shelves, some of which were covered in fine sediment and coarse gravel. The organisms observed were similar to those noted during the dives at Anyox with the addition of sea cucumbers, sea anemones (Metridium sp.) and a single nudibranch. Visibility was poor due to turbid conditions originating at the head of Alice Arm where the Kitsault River enters the inlet. The sediment covering the rock shelves was likely material settling out from turbid river run-off.

In general, the marine life in Granby Bay near the Anyox sit was more abundant than that found at the head of Alice Arm.

3.4 Transmissometer Profiles (Appendix III)

The percent transmissibility (T) profiles obtained were similar at all three stations in Alice Arm. Transmissibility was zero in the top five metres of the water column, increasing to between 70% and 77% at 25 metres depth, and stayed fairly constant throughout the remainder of the water column. Transmissibility values obtained between 45 m and 130 m at Station A-1, the head of Alice Arm, were marginally lower (6% - 18% T) than comparable data for all other stations, indicating a slight increase in turbidity. In general, transmissibility values obtained indicated very clear water below five meters depth at all sites.

REFERENCES

Butler, T.H. and J.F.L. Hart, "The Occurrence of the King Crab, Paralithodes camtschatica (Tilesius) and of Lithodes aequispina Benedict in B.C." Journal of Fisheries Research Board of Canada, 19 (3), 7 pp. (1962).

Hart, J.L., Pacific Fishes of Canada, Fisheries Research Board of Canada, Bulletin 180, 740 pp. (1973).

Keen, M.A., Marine Molluscan Genera of Western North America, Stanford University Press, Stanford, California, 126 pp. (1963).

Kozloff, E.N., Keys to the Marine Invertebrates of Puget Sound, the San Juan Archipelago, and Adjacent Regions, University of Washington Press, Seattle and London, 226 pp. (1974).

Morris, P.A., A Field Guide to Shells of the Pacific Coast and Hawaii, The Riverside Press, Cambridge, 297 pp. (1966).

ACKNOWLEDGEMENTS

The authors would like to acknowledge the assistance of the officers and crew of the KITIMAT II, the PANDORA II, the C.S.S. VECTOR and the PARIZEAU during the field portions of the surveys. The help and co-operation of the pilots of the PISCES IV submersible is also gratefully acknowledged. Thanks to Mr. R.A.W. Hoos, who reviewed the manuscript, D. Goyette, Senior Project Biologist, who directed the surveys and to H. Nelson and D. DeMill for their participation in the field activities. The authors are grateful to T.H. Butler of the Pacific Biological Station, Nanaimo, B.C., for his identification of several invertebrate species.

PLATES

PLATE 1

PLATE 2

PLATE 3

PLATE 4

PLATE 5

PLATE 6

PLATE 7

PLATE 8

PLATE 9

PLATE 10 Pisces Dive 518, Hastings Arm, October 1976; Substrate type at 260 metres; note evidence of benthic fauna activity and large Lithodes aequispina.

PLATE 11 Pisces Dive 518, Hastings Arm, October 1976; Rock face at 110 metres with large numbers of Brachiopods; sponges, cucumber.

PLATE 12 Pisces Dive 519, Hastings Arm, October 1976; Solitary brown king crab, Lithodes aequispina at 170 metres.

PLATE 13 Pisces Dive 519, Hastings Arm, October 1976; Substrate type at 165 metres showing burrowing activity.

PLATE 14 Pisces Dive 520, Alice Arm, October 1976; Clumps of Fucus sp. at 150 metres near the mouth of Lime Creek; note shrimp in bottom left.

PLATE 15 Pisces Dive 520, Alice Arm, October 1976; Basket star (Gorgonocephalus eucnemis), sea whip and small spider crab at 70 metres near mouth of Lime Creek; note moderate burrowing activity.

PLATE 16 Pisces Dive 521, Alice Arm, October 1976; Bottom substrate at 360 metres with numerous pandalid shrimp.

PLATE 17 Pisces Dive 521, Alice Arm, October 1976; Rock outcropping at 275 metres; note the shell debris in the immediate area.

PLATE 18 Pisces Dive 522, Alice Arm, October 1976; Large group of Paralithodes camtschatica at 75 metres. Pisces Dive 522, Alice Arm, October 1976;

PLATE 19 Pisces Dive 522, Alice Arm, October 1976; Substrate type at 65 metres with rock and shell debris; note crab and flatfish in bottom left.

PLATE 20 Pisces Dive 523, Observatory Inlet, October 1976; Bottom at 100 metres covered with Ophiuroids; note Brachiopods on rock in upper left.

PLATE 10

PLATE 11

PLATE 12

PLATE 13

PLATE 14

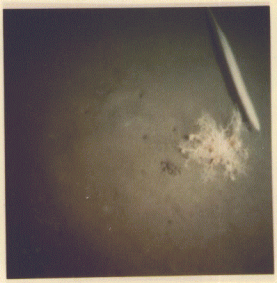

PLATE 15

PLATE 16

PLATE 17

PLATE 18

PLATE 19

PLATE 20

# APPENDIX I

## TRAWL DATA

a) Alice Arm - Station A-1, 1977

b) Alice Arm - Station A-2, 1977

c) Alice Arm - Station A-3, 1977

d) Observatory Inlet - Station U-1, 1977

e) Hastings Arm - Station H-2, 1977

f) Alice Arm - Station A-1, 1978

g) Alice Arm - Station A-2, 1978

h) Alice Arm - Station A-3, 1978

i) Hastings Arm - Station H-1, 1978

j) Hastings Arm - Station H-2, 1978

k) Hastings Arm - Station H-3, 1978

1) Hastings Arm - Station H-4, 1978

APPENDIX I TRAWL DATA

a) Alice Arm - Station A-1

DATE - June 14, 1977

AREA - Off Pearson Point, Alice Arm, B.C. (Chart #3793)

| | Time (PDT) | Depth (m) |
|---|---|---|
| Tow I - Begin Fishing | 0949 | 203 |
| - Stop Fishing | 1004 | 121 |
| Tow II - Begin Fishing | 1051 | 181 |
| - Stop Fishing | 1103 | 110 |
| Tow III - Begin Fishing | 1147 | 194 |
| - Stop Fishing | 1200 | 143 |

*Coordinates for Station A-1 trawls were incorrect. Positions marked on chart indicate general location of trawls.

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow I
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Bivalvia | Yoldia thraciaeformis | 2 | |
| ARTHROPODA | | | |
| Crustacea | Euphausia sp. | present | |
| | Pasiphaea pacifica | 21 | 17 |
| | Pandalopsis dispar | 35 | 703 |
| | Pandalus borealis | 67 | 324 |
| | Crangon sp. | 16 | 21 |
| | Lebbeus sp. | 1 | |
| | Spirontocaris spp. | 43 | 33 |
| | Parapaguridae (unid.) | 1 | |
| | Pagurus sp. | 4 | 11 |
| ECHINODERMATA | | | |
| Ophiuroidea | | present | |
| | Gorgonocephalus eucnemis | 2 | 500 |
| Asteroidea | Ctenodiscus crispatus | 1 | 1 |
| Echinoidea | Strongylocentrotus sp. | 5 | 71 |
| Holothuroidea | Chiridota sp. | present | |
| | Holothuroidea (unid.) | 1 | 4 |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 1 | 4 |
| | Cyclopteridae (unid.) | 3 | 4 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow II
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | present | |
| MOLLUSCA | | | |
| Bivalvia | Yoldia thraciaeformis | 2 | |
| SIPUNCULA | | 1 | |
| ARTHROPODA | | | |
| Crustacea | Euphausia sp. | present | |
| | Pasiphaea pacifica | 71 | 35 |
| | Pandalopsis dispar | 6 | 125 |
| | Pandalus borealis | 23 | 99 |
| | Crangon sp. | 4 | 3 |
| | Lebbeus sp. | 1 | |
| | Spirontocaris spp. | 13 | 13 |
| ECHINODERMATA | | | |
| Ophiuroidea | | present | |
| Holothuroidea | Chiridota sp. | present | |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 4 | 61 |
| | Lycodapus mandibularis | 4 | 13 |
| | Hippoglossoides elassodon | 1 | 115 |
| | Cyclopteridae (unid.) | 1 | |

*Small trawl.

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow III
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CNIDARIA | | | |
| Anthozoa | | present | |
| MOLLUSCA | | | |
| Bivalvia | Yoldia thraciaeformis | 12 | 7 |
| | Y. scissurata | 2 | |
| | Bivalvia (unid.) | 9 | 4 |
| ANNELIDA | | | |
| Polychaeta | | present | |
| ARTHROPODA | | | |
| Crustacea | Amphipoda (unid.) | 2 | |
| | Euphausia sp. | present | |
| | Pasiphaea pacifica | 47 | 27 |
| | Pandalopsis dispar | 15 | 281 |
| | Pandalus borealis | 63 | 271 |
| | Crangon sp. | 10 | 12 |
| | Spirontocaris spp. | 28 | 13 |
| | Parapaguridae (unid.) | 1 | 3 |
| | Pagurus sp. | 1 | 3 |
| ECHINODERMATA | | | |
| Ophiuroidea | | present | |
| Asteroidea | Ctenodiscus crispatus | 1 | 10 |
| Holothuroidea | Molpadia sp. | 7 | 14 |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 4 | 79 |
| | Lycodes brevipes | 1 | 2 |
| | Lycodapus mandibularis | 14 | 46 |
| | Cyclopteridae (unid.) | 2 | |

APPENDIX I TRAWL DATA

b) Alice Arm - Station A-2

DATE - June 13, 1977

AREA - Centre of Alice Arm, B.C. (Chart #3793)

| | Time (PDT) | Depth (m) | Position |
|---|---|---|---|
| Tow I - Begin Fishing | 1658 | 384 | 55° 27.1' N<br>129° 36.8' W |
| - Stop Fishing | 1712 | 384 | 55° 27.1' N<br>129° 36.65'W |
| Tow II - Begin Fishing | 1839 | 384 | 55° 27.04'N<br>129° 35.86'W |
| - Stop Fishing | 1844 | 384 | 55° 27.07 N<br>129° 36.8 W |
| Tow III - Begin Fishing | 2023 | 379 | 55° 27.02'N<br>129° 35.8' W |
| - Stop Fishing | 2045 | 384 | 55° 27.12 N<br>129° 37.18 W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow I
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Colus halli | 19 | 95 |
| | Neptunea sp. | 6 | 220 |
| Bivalvia | Yoldia scissurata | 113 | 238 |
| | Cardiomya sp. | 1 | |
| ARTHROPODA | | | |
| Crustacea | Pasipnaea pacifica | 3 | 4 |
| | Pandalopsis dispar (sm) | 25 | 41 |
| | Pandalopsis dispar (lg) | 64 | 940 |
| | Pandalus borealis | 120 | 460 |
| | Crangonidae (unid.) | 10 | 9 |
| | Spirontocaris spp. | 18 | 20 |
| | Pagurus spp. | 10 | 42 |
| | Lithodes aequispina | 2 | 700 |
| | Chionoecetes bairdi | 2 | 420 |
| | Parapaguridae (unid.) | 2 | 10 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 1840 | 6200 |
| Holothuroidea | | 13 | 700 |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 3 | 20 |
| | Lumpenella longirostris | 20 | 700 |
| | Lycodes palearis | 1 | 280 |
| | L. diapterus | 4 | 420 |
| | Merluccius productus | 1 | 140 |
| | Cyclopteridae (unid.) | 6 | 7 |

sm - small
lg - large

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow II
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Natica sp. | 2 | 8 |
| | Colus sp. | 23 | 136 |
| | Neptunea sp. | 7 | 217 |
| Bivalvia | Yoldia thraciaeformis | 231 | 710 |
| | Y. scissurata | 5 | 34 |
| | Cardiomya sp. | 3 | 15 |
| ANNELIDA | | | |
| Hirudinea | Marsipobdella sacculata (1952) | 2 | 2 |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 78 | 1100 |
| | Pandalus borealis | 118 | 470 |
| | Crangon sp. | 2 | 2 |
| | Spirontocaris sp. | 11 | 12 |
| | Paguridae (unid.) | 19 | 126 |
| | Lithodes aequispina | 2 | 1100 |
| | Chionoecetes bairdi | 2 | 1800 |
| BRACHIPODA | | 1 | 10 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 1610 | 6000 |
| Holothuroidea | Molpadia sp. | 1 | 70 |
| | Holothuroidea (unid.) | 8 | 350 |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 17 | 600 |
| | Lycodes brevipes | 2 | 35 |
| | L. diapterus | 5 | 420 |
| | Theragra chalcogramma | 1 | 300 |
| | Cyclopteridae (unid.) | 1 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow III
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| MOLLUSCA | | | |
| Gastropoda | Natica sp. | 4 | 10 |
| | Colus sp. | 14 | 78 |
| | Neptunea sp. | | |
| Bivalvia | Yoldia thraciaeformis | 150 | 268 |
| | Y. scissurata | 10 | 27 |
| | Cardiomya sp. | 2 | 3 |
| | Bivalvia (unid.) | 7 | 4 |
| Scaphopoda | Dentalium sp. | present | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 1 | |
| | Pandalopsis dispar | 31 | 351 |
| | Pandalus borealis | 44 | 202 |
| | Crangon sp. | 5 | 5 |
| | Spirontocaris sp. | 3 | 2 |
| | Pagurus sp. | 19 | 154 |
| | Chionoecetes bairdi | 1 | 203 |
| | Parapaguridae (unid.) | 1 | 6 |
| BRACHIPODA | | 1 | 2 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 800 | 2730 |
| Holothuroidea | | 2 | 27 |
| CHORDATA | | | |
| Pisces | Myoxocephalus polyacanthocephalus | 1 | 18 |
| | Lumpenella longirostris | 4 | 110 |
| | Lycodes diapterus | 1 | 4 |
| | Cyclopteridae (unid.) | 8 | 40 |

APPENDIX I TRAWL DATA

c) Alice Arm - Station A-3

DATE - June 14, 1977

AREA - Mouth of Alice Arm, B.C. (Chart #3793)

| | Time (PDT) | Depth (m) | Position |
|---|---|---|---|
| Tow I - Begin Fishing | 1335 | 86 | 55° 25.01'N |
| | | | 129° 40.38'W |
| - Stop Fishing | 1350 | 90 | 55° 24.55'N |
| | | | 129° 40.75'W |
| Tow II - Begin Fishing | 1425 | 88 | 55° 24.98'N |
| | | | 129° 40.41'W |
| - Stop Fishing | 1440 | 91 | 55° 24.48 N |
| | | | 129° 40.85'W |
| Tow III - Begin Fishing | 1517 | 86 | 55° 24.85 N |
| | | | 129° 40.55 W |
| - Stop Fishing | 1528 | 93 | 55° 24.39 N |
| | | | 129° 40.85 W |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow I
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| MOLLUSCA | | | |
| Bivalvia | Chlamys sp. | 1 | |
| | Bivalvia (unid.) | 3 | 4 |
| Cephalopoda | Loligo opalescens | 1 | 43 |
| ARTHROPODA | | | |
| Crustacea | Amphipoda (unid.) | 1 | 1 |
| | Pandalopsis dispar | 10 | 65 |
| | Pandalus borealis | 444 | 2000 |
| | P. goniurus | 2 | 7 |
| | P. hypsinotus | 5 | 183 |
| | Crangonidae (unid.) | 115 | 149 |
| | Lebbeus sp. | 38 | 25 |
| | Spirontocaris spp. | 23 | 14 |
| | Pagurus sp. | 1 | 2 |
| | Parapaguridae (unid.) | 4 | 133 |
| | Paralithodes camtschatica | 1 | 1900 |
| ECHINODERMATA | | | |
| Ophiuroidea | Gorgonocephalus eucnemis | 5 | 250 |
| | Ophiura sp. | 3 | 4 |
| Asteroidea | Ctenodiscus crispatus | 14 | 18 |
| | Asteroidea (unid.) | 2 | 25 |
| Echinoidea | Strongylocentrotus sp. | 18 | 107 |
| Holothuroidea | | 24 | 1600 |
| CHORDATA | | | |
| Pisces | Myoxocephalus polyacanthocephalus | 1 | 850 |
| | Eumicrotremus orbis | 1 | 2 |
| | Bathyagonus nigripinnis | 8 | 23 |
| | Dasycottus setiger | 7 | 81 |
| | Dasycottus setiger (sm) | 4 | |
| | Theragra chalcogramma | 1 | 750 |
| | Hippoglossoides elassodon | 2 | 95 |
| | Parophrys vetulus | 2 | 250 |
| | Cyclopteridae (unid.) | 2 | 6 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow II
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| ANNELIDA | | | |
| Hirudinea | Marsipobdella sacculata (1952) | 1 | |
| ARTHROPODA | | | |
| Crustacea | Rocinela sp. | 1 | |
| | Amphipoda (unid.) | 1 | |
| | Pandalopsis dispar | 22 | 138 |
| | Pandalus borealis | 600 | 2400 |
| | P. goniurus | 4 | 10 |
| | P. hysinotus | 7 | 125 |
| | Crangonidae (unid.) | 155 | 183 |
| | Lebbeus spp. | 45 | 40 |
| | Spirontocaris spp. | 8 | 6 |
| | Pagurus spp. | 7 | 26 |
| | Parapaguridae (unid.) | 1 | |
| | Paralithodes camtschatica | 2 | 3600 |
| ECHINODERMATA | | | |
| Ophiuroidea | Gorgonocephalus eucnemis | 15 | 600 |
| | Ophiuroidea (unid.) | present | |
| Asteroidea | Ctenodiscus crispatus | 7 | 7 |
| | Crossaster paposis | 1 | |
| Echinoidea | Strongylocentrotus sp. | 10 | 63 |
| Holothuroidea | | 19 | 1100 |
| CHORDATA | | | |
| Pisces | Myoxocephalus polyacanthocephalus | 2 | 154 |
| | Bathyagonus nigripinnis | 7 | 18 |
| | Dasycottus setiger | 4 | 43 |
| | Dasycottus setiger (sm) | 5 | |
| | Asterotheca alascana | 1 | 5 |
| | Agonus acipenserinus | 1 | 30 |
| | Icelinus borealis | 1 | 6 |
| | Chitonotus pugetensis | 3 | 9 |
| | Theragra chalcogramma | 4 | 800 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow II
14 June 1977

| Species | Count | Wet Wt. (gms) |
|---|---|---|
| CHORDATA (cont'd) | | |
| Hippoglossoides elassodon | 5 | 310 |
| Parophrys vetulus | 1 | 400 |
| Cyclopteridae (unid.) | 4 | 14 |

Paralithodes camtschatica

| | Carapace Width (cm) | Overall Width (cm) | Wet Wt. (gms) |
|---|---|---|---|
| female (gravid) | 18 | 78 | 1900 |
| female (gravid) | 15 | 71 | 1700 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow III
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| MOLLUSCA | | | |
| Gastropoda | Colus halli | 1 | |
| Bivalvia | Yoldia thraciaeformis | 1 | |
| | Cardiomya sp. | 1 | |
| ARTHROPODA | | | |
| Crustacea | Amphipoda (unid.) | 3 | 3 |
| | Euphausia sp. | 4 | 2 |
| | Pasiphaea pacifica | 2 | 2 |
| | Pandalopsis dispar | 40 | 270 |
| | Pandalus borealis | 628 | 2200 |
| | P. goniurus | 18 | 53 |
| | P. hypsinotus | 4 | 120 |
| | Crangonidae (unid.) | 83 | 102 |
| | Lebbeus sp. | 6 | 4 |
| | Spirontocaris spp. | 26 | 15 |
| | Parapaguridae (unid.) | 1 | |
| | Paguridae (unid.) | 7 | 14 |
| ECHINODERMATA | | | |
| Ophiuroidea | Gorgonocephalus eucnemis | 4 | 166 |
| | Ophiura sp. | 4 | 2 |
| Asteroidea | Ctenodiscus crispatus | 12 | 9 |
| Echinoidea | Strongylocentrotus sp. | 6 | 79 |
| Holothuroidea | | 12 | 1750 |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 6 | 8 |
| | Dasycottus setiger | 4 | 46 |
| | Chitonotus pugetensis | 1 | 8 |
| | Agonus acipenserinus | 1 | 40 |
| | Lycodes brevipes | 5 | 168 |
| | Aprodon cortezianus | 2 | 135 |
| | Theragra chalcogramma | 9 | 700 |
| | Hippoglossoides elassodon | 3 | 500 |
| | Parophrys vetulus | 3 | 500 |
| | Lyopsetta exilis | 2 | 125 |

APPENDIX I TRAWL DATA

d) Observatory Inlet - Station O-1

DATE - June 14, 1977

AREA - Near Brooke Island, Observatory Inlet, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1848 | 59 | 55° 20.93'N |
| | | | | 129° 46.94'W |
| | - Stop Fishing | 1859 | 145 - 180 | 55° 20.78'N |
| | | | | 129° 47.78'W |

APPENDIX I TRAWL DATA
Observatory Inlet
Station O-1
Tow I
14 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Neptunea sp. | 1 | |
| Bivalvia | Yoldia thraciaeformis | 4 | 3 |
| | Cardiomya sp. | 1 | |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 1 | 6 |
| ARTHROPODA | | | |
| Crustacea | Amphipoda (unid.) | 1 | |
| | Pasiphaea pacifica | 4 | 4 |
| | Pandalopsis dispar | 84 | 486 |
| | Pandalus borealis | 55 | 159 |
| | Crangon sp. | 7 | 5 |
| | Lebbeus sp. | 1 | 1 |
| | Spirontocaris sp. | 18 | 8 |
| | Parapaguridae (unid.) | 1 | 2 |
| BRACHIOPODA | | 21 | 41 |
| ECHINODERMATA | | | |
| Ophiuroidea | | present | |
| Asteroidea | Ctenodiscus crispatus | 30 | 128 |
| | Pteraster tesselatus (arcuatus) | 2 | 9 |
| Echinoidea | Strongylocentrotus sp. | 3 | 12 |
| | Brisaster sp. | 2 | 58 |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 1 | 15 |
| | Dasycottus setiger | 2 | 2 |
| | Lumpenella longirostris | 1 | 26 |
| | Lycodapus mandibularis | 1 | 2 |
| | Lyopsetta exilis | 1 | 33 |

APPENDIX I TRAWL DATA

e) Hastings Arm - Station H-2

DATE - June 13, 1977

AREA - Off Carr Point, Hastings Arm, B.C. (Chart #3933)

| | Time (PDT) | Depth (m) | Position |
|---|---|---|---|
| Tow I - Begin Fishing | 0843 | 302 | 55° 29.6' N |
| | | | 129° 45.65'W |
| - Stop Fishing | 0900 | 298 | 55° 29.1' N |
| | | | 129° 45.5' W |
| Tow II - Begin Fishing | 1003 | 296 | 55° 29.45'N |
| | | | 129° 45.75'W |
| - Stop Fishing | 1023 | 307 | 55° 29.95'N |
| | | | 129° 45.98'W |
| Tow III - Begin Fishing | 1126 | 307 | 55° 30.1' N |
| | | | 129° 49.98'W |
| - Stop Fishing | 1146 | 309 | 55° 29.56'N |
| | | | 129° 45.7' W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow I
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Bivalve | Yoldia thraciaeformis | 47 | 21 |
| Cephalopoda | Octopus sp. | 1 | 83 |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 5 | 4 |
| | Pandalopsis dispar (sm) | 302 | 3200 |
| | Pandalopsis dispar (lg) | 224 | |
| | Pandalus borealis | 215 | 509 |
| | Crangon sp. | 11 | 11 |
| | Spirontocaris spp. | 26 | 20 |
| | Chionoecetes bairdi | 1 | 347 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 99 | 440 |
| Holothuroidea | Chiridota sp. | present | |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 1 | 3 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow II
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| MOLLUSCA | | | |
| Gastropoda | Colus halli | 15 | 69 |
| | Natica russa | 2 | 4 |
| | Gastropoda (unid.) | 1 | 6 |
| Bivalvia | Yoldia thraciaeformis | 100 | 148 |
| | Y. scissurata | 6 | 8 |
| | Bivalvia (unid.) | 2 | |
| Scaphopoda | Dentalium sp. | present | |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 10 | 51 |
| | Sternapsis fossor | 2 | 1 |
| Hirudinea | Marsipobdella sacculata (1952) | 8 | 8 |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 116 | 800 |
| | Pandalus borealis | 114 | 400 |
| | Crangon sp. | 4 | 7 |
| | Spirontocaris sp. | 1 | 1 |
| | Munida quadrispina | 1 | 2 |
| | Paguridae (unid.) | 32 | 263 |
| | Chionoecetes bairdi | 1 | 350 |
| | Chorilla longipes | 2 | 315 |
| | Lithodes aequispina | 4 | (see next page) |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 2300 | 9000 |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 5 | 30 |
| | Dasycottus setiger | 8 | 96 |
| | Lumpenella longirostris | 1 | 4 |
| | Lycodes palearis | 2 | 400 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow II
13 June 1977

| Species | Count | Wet Wt. (gms) |
|---|---|---|
| CHORDATA (cont'd) | | |
| *Lycodapus mandibularis* | 2 | 10 |
| *Raja kincaidi* | 2 | 1200 |
| Cyclopteridae (unid.) | 1 | 2 |

| *Lithodes aequispina* | Carapace Width (cm) | Overall Width (cm) | Weight (gm) |
|---|---|---|---|
| male | 15 | 75 | 1300 |
| male | 15 | 75 | 1100 |
| female (gravid) | 14 | 70 | 1300 |
| female (gravid) | 14 | 65 | 1000 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow III
13 June 1977

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Natica russa | 1 | |
| | Colus halli | 18 | 129 |
| | Neptunea sp. | 15 | 452 |
| Bivalvia | Yoldia thraciaeformis | 204 | 366 |
| | Y. scissurata | 5 | 13 |
| | Cardiomya sp. | 5 | 6 |
| | Bivalvia (unid.) | 2 | 2 |
| Cephalopoda | Octopus sp. | 1 | 185 |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 5 | 32 |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 108 | 716 |
| | Pandalus borealis | 70 | 195 |
| | Crangon sp. | 2 | 2 |
| | Spirontocaris spp. | 2 | 2 |
| | Pagurus spp. | 20 | 93 |
| | Lithodes aequispina (juvenile) | 1 | |
| BRACHIOPODA | | 2 | 16 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 2070 | 7200 |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 2 | 231 |
| | Dasycottus setiger | 1 | 12 |
| | Lumpenella longirostris | 2 | 250 |
| | Lycodes palearis | 1 | 135 |
| | Lycodapus mandibularis | 1 | |
| | L. parviceps | 1 | |
| | Microstomus pacificus | 1 | 1000 |
| | Cyclopteridae (unid.) | 3 | 3 |

APPENDIX I TRAWL DATA

f) Alice Arm - Station A-1

DATE - 13, 14 October 1978

AREA - Off Pearson Point, Alice Arm, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1450 | 100 | 55° 26.9' N |
| | | | | 129° 30.5' W |
| | - Stop Fishing | 1503 | 45 | 55° 29.75'N |
| | | | | 129° 27.32'W |
| Tow II | - Begin Fishing | 1350 | 65 | 55° 26.75'N |
| | | | | 129° 30.5' W |
| | - Stop Fishing | 1400 | 87 | 55° 27.16'N |
| | | | | 129° 29.2' W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow I
13 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CNIDARIA | | | |
| Anthozoa | Actinaria (unid.) | 1 | |
| | Osteocella septentrionalis | 1 | |
| MOLLUSCA | | | |
| Gastropoda | Colus sp. | 1 | |
| | Yoldia thraciaeformis | 4 | |
| | Y. scissurata | 1 | |
| | Nuculana pernula | 1 | |
| | Clinocardium ciliatum | 4 | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 1 | |
| | Pandalopsis dispar | 70 | 935 |
| | Pandalus borealis | 4259 | 9710 |
| | Pandalus hypsinotus | 4 | 31 |
| | Crangon communis | 77 | 115 |
| | Eualus suckleyi | 90 | 118 |
| | Spirontocaris sp. | 1 | |
| | Lithodes aequispina | 5 | 5784 |
| | Labidochirus splendescens | 36 | 76 |
| | Pagurus aleuticus | | |
| | Hyas lyratus | 21 | 176 |
| | Chionoecetes sp. | 4 | 1780 |
| | Chionoecetes sp. (juvenile) | 14 | 177 |
| BRACHIOPODA | | present | |
| ECHINODERMATA | | | |
| Ophiuroidea | Gorgonocephalus eucnemis | 8 | |
| | Ophiura sp. | present | |
| Asteroidea | Ctenodiscus crispatus | 17 | 75 |
| Echinoidea | Strongylocentrotus droebachiensis | 8 | 92 |
| | S. pallidus | | |
| Holothuroidea | Chiridota sp. | present | |
| | Molpadia intermedia | 3 | |
| | Parastichopus sp. | 19 | |
| | Holothuroidea (unid.) | present | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow I
13 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CHORDATA | | | |
| Pisces | Hemitripterus bolini | 1 | 1610 |
| | Dasycottus setiger | 1 | 195 |
| | Dasycottus setiger (juvenile) | 3 | |
| | Odontypyxis trispinosa | 1 | |
| | Lycodes brevipes | 3 | |
| | Bothrocara molle | 2 | |
| | Bathyagonus nigripinnis | 4 | |
| | Hippoglossoides elassondon | 1 | 121 |
| | Lumpenella longirostris | 13 | 450 |
| | Theragra chalcogramma | 3 | |
| | Cyclopteridae (unid.) | 4 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow II
14 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Colus sp. | 4 | |
| | Neptunea sp. | 8 | |
| | Buccinum plectrum | 2 | |
| Bivalvia | Yoldia thraciaeformis | 152 | 207 |
| | Cardiomya sp. | 1 | |
| | Nuculana pernula | 1 | |
| | Yolandia sp. | 11 | |
| | Natica sp. | 3 | |
| | Chlamys sp. | 2 | |
| | Bivalvia (unid.) | 3 | |
| ANNELIDA | | | |
| Polychaeta | | present | |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 44 | 590 |
| | Pandalus borealis | 2037 | 4070 |
| | P. hypsinotus | 4 | 52 |
| | Crangonidae (unid.) | 28 | 40 |
| | Eualus suckleyi | 1 | |
| | Munida quadrispina | 2 | 16 |
| | Labidochirus splendescens | 135 | |
| | Pagurus aleuticus | 2 | |
| | P. cornutus | 1 | |
| | Hyas lyratus | 4 | 147 |
| | Chionoecetes sp. (juvenile) | 63 | 503 |
| BRACHIOPODA | | present | |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 38 | 295 |
| Echinoidea | Strongylocentrotus droebachiensis | 14 | 470 |
| Holothuroidea | Chiridota sp. | present | |
| | Molpadia intermedia | 12 | |
| | Parastichopus sp. | 4 | |
| | Holothuroidea (unid.) | 5 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-1
Tow II
14 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CHORDATA | | | |
| Pisces | Myoxocephalus polyacanthocephalus | 1 | 1905 |
| | Dasycottus setiger | 2 | 405 |
| | Dasycottus setiger (juvenile) | 1 | |
| | Lycodes brevipes | 1 | |
| | Lycodopsis pacifica | 1 | 92 |
| | Bathyagonus nigripinnis | 5 | 40 |
| | Odontopyxis trispinosa | 1 | |
| | Bothrocara molle | 2 | 10 |
| | Lumpenella longirostris | 4 | 70 |
| | Theragra chalcogramma | 1 | 32 |
| | Cyclopteridae (unid.) | 1 | |

APPENDIX I TRAWL DATA

g) Alice Arm - Station A-2

DATE - 13, 17 October 1978

AREA - Centre of Alice Arm, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 0911 | 206 | 55° 27.2' N |
| | | | | 129° 36.0' W |
| | - Stop Fishing | 0926 | 212 | 55° 27.2' N |
| | | | | 129° 36.86'W |
| Tow II | - Begin Fishing | 1145 | 210 | 55° 26.9' N |
| | | | | 129° 36.75'W |
| | - Stop Fishing | 1157 | 210 | 55° 26.9' N |
| | | | | 129° 37.05'W |
| Tow III | - Begin Fishing | 1400 | 210 | 55° 27.15'N |
| | | | | 129° 35.95'W |
| | - Stop Fishing | 1413 | 208 | 55° 27.1' N |
| | | | | 129° 35.1' W |
| Tow IV | - Begin Fishing | 1510 | 208 | 55° 27.7' N |
| | | | | 129° 35.2' W |
| | - Stop Fishing | 1523 | 210 | 55° 27.1' N |
| | | | | 129° 36.1' W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow I
13 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| NEMERTEA | | present | |
| ANNELIDA | | | |
| Polychaeta | | present | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 17 | 19 |
| | Pandalopsis dispar | 36 | 442 |
| | Pandalus borealis | 29 | 96 |
| | Crangon communis | 2 | 3 |
| | Eualus suckleyi | 10 | 10 |
| | E. macrophthalmus | 11 | 15 |
| | Lithodes aequispina | 1 | 1000 |
| | Labidochirus splendescens | 1 | 17 |
| | Pagurus beringanus | 1 | |
| ECHINODERMATA | | | |
| Holothuroidea | Chiridota sp. | present | |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 1 | |
| | Lumpenella longirostris | 3 | 120 |
| | Theragra chalcogramma | 1 | 650 |
| | Cyclopteridae (unid.) | 3 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow II
17 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Colus sp. | 14 | 68 |
| | Neptunea sp. | 3 | 108 |
| Bivalvia | Yoldia thraciaeformis | 39 | 90 |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 128 | 1848 |
| | Pandalus borealis | 171 | 417 |
| | Crangon communis | 3 | 2 |
| | Eualus suckleyi | 3 | 2 |
| | E. macrophthalmus | 36 | 54 |
| | Lithodes aequispina | 8 | 11 190 |
| | Labidochirus splendescens | 35 | 121 |
| | Chionoecetes sp. | 4 | |
| ECHINODERMATA | | | |
| Asteroidea | | 1 | |
| | Ctenodiscus crispatus | 64 | 270 |
| Holothuroidea | | 3 | |
| CHORDATA | | | |
| Pisces | Raja kincaidi | 1 | 550 |
| | Dasycottus setiger | 1 | 85 |
| | Lycodopsis pacifica | 2 | 145 |
| | Bathyagonus nigripinnis | 5 | 73 |
| | Lumpenella longirostris | 20 | 1000 |
| | Theragra chalcogramma | 1 | 310 |
| | Cyclopteridae (unid.) | 2 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow III
17 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Bivalvia | Yoldia thraciaeformis | 3 | |
| ARTHROPODA | | | |
| Crustacea | Mysidacea (unid.) | present | |
| | Pasiphaea pacifica | 22 | 17 |
| | Pandalopsis dispar | 17 | 175 |
| | Pandalus borealis | 15 | 33 |
| | Crangon communis | 1 | |
| | Eualus suckleyi | 5 | |
| | Labidochirus splendescens | 3 | |
| | Pagurus aleuticus | 1 | |
| ECHINODERMATA | | | |
| Holothuroidea | Chiridota sp. | present | |
| | Holothuroidea (unid.) | present | |
| CHORDATA | | | |
| Pisces | Lumpenella longirostris | 2 | 105 |
| | Leuroglossus stilbius | 3 | |
| | Nectoliparis pelagicus | 2 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-2
Tow IV
17 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Colus sp. | 1 | |
| | Neptunea sp. | 6 | |
| Bivalvia | Yoldia thraciaeformis | 224 | 645 |
| | Nucula sp. | 5 | |
| | Cardiomya sp. | 2 | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 1 | |
| | Pandalopsis dispar | 63 | 780 |
| | Pandalus borealis | 40 | 120 |
| | Eualus macrophthalmus | 1 | |
| | Lithodes aequispina | 12 | 9150* |
| | Labidochirus splendescens | 15 | |
| | Pagurus aleuticus | 5 | |
| | Hyas lyratus | 1 | |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 597 | 2315 |
| | Solaster sp. | 3 | |
| | Asteroidea (unid.) | 1 | |
| Holothuroidea | Parastichopus sp. | 2 | |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 2 | 35 |
| | Lumpenella longirostris | 8 | 390 |
| | Theragra chalcogramma | 1 | |

*Weight of 9 individuals.

APPENDIX I TRAWL DATA

h) Alice Arm - Station A-3

DATE - 14, 15 October 1978

AREA - Mouth of Alice Arm, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1746 | 55 | 55° 24.27'N<br>129° 41.1' W |
| | - Stop Fishing | 1802 | 43 | 55° 24.76'N<br>129° 40.8' W |
| Tow II | - Begin Fishing | 0816 | 45 | 55° 24.2' N<br>129° 40.91'W |
| | - Stop Fishing | 0826 | 40 | 55° 24.83'N<br>129° 40.2' W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow I
14 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Liskeia cidaris | 1 | |
| | Buccinium plectrum | 1 | |
| | Neptunea sp. | 8 | |
| Bivalvia | Chlamys sp. | 2 | |
| Cephalopoda | Octopus sp. | 1 | |
| ANNELIDA | | | |
| Polychaeta | | present | |
| SIPUNCULA | | 1 | |
| ARTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 20 | 325 |
| | Pandalus borealis | 2455 | 6585 |
| | P. hypsinotus | 14 | 395 |
| | Spirontocaris spina | 4 | |
| | Crangon communis | 182 | 345 |
| | Argis dentata | 8 | 70 |
| | Labidochirus splendescens | 42 | |
| | Hyas lyratus | 26 | |
| | Elassochirus cavimanus | 1 | |
| | Chionoecetes sp. | 16 | 30 |
| ECHINODERMATA | | | |
| Ophiuroidea | Ophiura sp. | present | |
| | Gorgonocephalus eucnemis | 3 | |
| Asteroidea | Crossaster sp. | 1 | |
| | Pteraster sp. | 1 | |
| | Henricia sp. | 1 | |
| | Ctenodiscus crispatus | 5 | |
| Echinoidea | Strongylocentrotus sp. | 103 | 2130 |
| Holothuroidea | Chiridota sp. | present | |
| | Parastichopus sp. | 49 | |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow I
14 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CHORDATA | | | |
| Pisces | Dasycottus setiger | 5 | 325 |
| | Malacocottus kincaidi | 1 | |
| | Icelus spiniger | 7 | |
| | Lycodes brevipes | 4 | 195 |
| | Agonus acipenserinus | 2 | 95 |
| | Nautichthys oculofasciatus | 1 | |
| | Lepidopsetta bilineata | 1 | 440 |
| | Hippoglossoides elassodon | 3 | 865 |
| | Parophrys vetulus | 3 | 1260 |
| | Lumpenella longirostris | 1 | 5 |
| | Theragra chalcogramma | 3 | 145 |
| | Odontopyxis trispinosa | 28 | |
| | Agonidae (unid.) | 1 | |
| | Cottidae (unid.) | 1 | |
| | Pleuronectidae (unid.) | 3 | |
| | Anoplopoma fimbria | 2 | 1025 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow II
15 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| CNIDARIA | | | |
| Anthozoa | Tealia sp. | 1 | |
| MOLLUSCA | | | |
| Gastropoda | Trophonopsis lasius | 1 | |
| | Trichotropis cancellata | 1 | |
| | Neptunea sp. | 2 | |
| Bivalvia | Yoldia thraciaeformis | 2 | |
| | Cardiomya sp. | 1 | |
| | Clinocardium sp. | 5 | |
| | Chlamys sp. | 1 | |
| ANNELIDA | | | |
| Polychaeta | | present | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | present | |
| | Pandalopsis dispar | 44 | 550 |
| | Pandalus borealis (lg) | 252 | 1835 |
| | Pandalus borealis (sm) | 1626 | 2480 |
| | P. hypsinotus | 22 | 365 |
| | Crangon communis | 146 | 237 |
| | Argis dentata | 8 | 55 |
| | Sclerocrangon alata | 11 | 30 |
| | Lebbeus groenlandicus | 1 | |
| | Eualus suckleyi | 2 | |
| | Spirontocaris spina | 5 | |
| | Labidochirus splendescens | 11 | |
| | Pagurus aleuticus | 1 | |
| BRACHIOPODA | | present | |
| ECHINODERMATA | | | |
| Ophiuroidea | Gorgonocephalus eucnemis | 8 | |
| | Ophiura sp. | present | |
| Asteroidea | Ctenodiscus crispatus | 14 | 18 |
| | Solaster dawsoni | 1 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station A-3
Tow II
15 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| Asteroidea (cont'd) | | | |
| | Pseudarchaster sp. | 1 | |
| | Henricia sp. | 2 | |
| | Orthasterias sp. | 1 | |
| | Mediaster sp. | 1 | |
| Echinoidea | Strongylocentrotus sp. | 69 | 1210 |
| Holothuroidea | Parastichopus sp. | 20 | |
| | Leptosynapta sp. | 1 | |
| CHORDATA | | | |
| Piseces | Dasycottus setiger | 13 | 530 |
| | Lycodes brevipes | 5 | 150 |
| | Icelus spiniger | 2 | |
| | Parophyrys vetulus | 2 | 795 |
| | Pleuronectidae (unid.) | 9 | |
| | Odontopyxis trispinosa | 8 | |
| | Anoplagonus inermis | 1 | |
| | Theragra chalcogramma | 6 | 325 |
| | Anoplopoma fimbria | 1 | 470 |

APPENDIX I TRAWL DATA

i) Hastings Arm - Station H-1

DATE - 16 October 1978

AREA - Near head of Hastings Arm, B.C. (Chart #3933)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fisning | 1033 | 145 | 55° 34.0' N |
| | | | | 129° 47.45'W |
| | - Stop Fishing | 1046 | 146 | 55° 35.5' N |
| | | | | 129° 47.43'W |
| Tow II | - Begin Fishing | 1139 | 145 | 55° 34.3' N |
| | | | | 129° 47.78'W |
| | - Stop Fishing | 1150 | 147 | 55° 33.8' N |
| | | | | 129° 47.75'W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-1
Tow I
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 7 | |
| | Pandalus borealis | 83 | |
| | Pandalopsis dispar | 73 | |
| | Crangonidae (unid.) | 1 | |
| | Eualus suckleyi | 4 | |
| CHORDATA | | | |
| Pisces | Bathyagonus nigripinnis | 1 | |
| | Leuroglossus stilbius | 9 | |
| | Nectoliparis pelagicus | 2 | |
| | Cyclopteridae (unid.) | 2 | |
| | Myctophidae (unid.) | 2 | |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station H-1
Tow II
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 4 | |
| | Pandalus borealis | 57 | 62 |
| | Pandalopsis dispar | 30 | 92 |
| | Crangonidae (unid.) | 1 | |
| | Eualus macrophthalmus | 2 | |
| CHORDATA | | | |
| Pisces | Leuroglossus stilbius | 6 | |
| | Lycodapus sp. | 2 | |
| | Cyclopteridae (unid.) | 2 | |

APPENDIX I TRAWL DATA

j) Hastings Arm - Station H-2

DATE - 16 October 1978

AREA - Off Carr Point, Hastings Arm, B.C. (Chart #3933)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1328 | 168 | 55° 31.0' N<br>129° 46.4' W |
| | - Stop Fishing | 1348 | 168 | 55° 30.5' N<br>129° 46.2' W |
| Tow II | - Begin Fishing | 1450 | 166 | 55° 32.0' N<br>129° 46.5' W |
| | - Stop Fishing | 1504 | 168 | 55° 30.5' N<br>129° 46.3' W |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow I
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Natica sp. | 6 | 35 |
| | Neptunea sp. | 5 | 225 |
| | Colus sp. | 13 | 75 |
| Bivalvia | Yoldia thraciaeformis | 78 | 115 |
| | Y. scissurata | 4 | 12 |
| | Macoma sp. | 1 | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 1 | |
| | Pandalopsis dispar | 292 | 990 |
| | Pandalus borealis | 98 | 230 |
| | Crangonidae (unid.) | 3 | |
| | Eualus macrophthalmus | 1 | |
| | Lithodes aequispina | 2 | 1415 |
| | Pagurus aleuticus | 27 | |
| | Labidochirus splendescens | 70 | |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 460 | 3475 |
| | Pseudarchaster parelli | 1 | 85 |
| Holothuroidea | Chiridota sp. | present | |
| CHORDATA | | | |
| Pisces | Raja kincaidi | 2 | 191 |
| | Dasycottus setiger | 2 | 58 |
| | Thaleichthys pacificus | 1 | 33 |
| | Lycodapus parviceps | 1 | |
| | Bathyagonus nigripinnis | 3 | 50 |
| | Lumpenella longirostris | 7 | 250 |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-2
Tow II
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Gastropoda | Colus sp. | 35 | 200 |
| | Neptunea sp. | 13 | 580 |
| | Natica sp. | 4 | 12 |
| | Polinices sp. | 1 | 3 |
| | Yoldia thraciaeformis | 96 | 155 |
| | Y. scissurata | 7 | 8 |
| | Nucula sp. | 2 | |
| | Macoma sp. | 2 | |
| Cephalopoda | Octopus sp. | 2 | 300 |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 1 | |
| ARTHORPODA | | | |
| Crustacea | Pasiphaea pacifica | 1 | |
| | Pandalopsis dispar | 300 | 1059 |
| | Pandalus borealis | 163 | 358 |
| | Eualus macrophthalmus | 2 | |
| | Labidochirus splendescens | 138 | |
| | Pagurus aleuticus | 26 | |
| | Chionoecetes sp. | 3 | |
| | Lithodes aequispina | 1 | 1450 |
| ECHINODERMATA | | | |
| Asteroidea | Ctenodiscus crispatus | 1041 | 6770 |
| | Pseudarcaster sp. | 2 | 143 |
| Holothuroidea | Chiridota sp. | present | |
| | Molpadia sp. | 1 | |
| CHORDATA | | | |
| Pisces | Dasycottus setiger | 5 | |
| | Raja kincaidi | 4 | 179 |
| | Lycodapus sp. | 1 | |
| | Bathyagonus nigripinnis | 4 | 53 |
| | Lumpenella longirostris | 3 | 125 |
| | Leuroglossus stilbius | 1 | |

APPENDIX I TRAWL DATA

k) Hastings Arm - Station H-3

DATE - 15, 16 October 1978

AREA - Mouth of Hastings Arm, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1043 | 90 | 55° 24.1' N |
| | | | | 129° 42.8' W |
| | - Stop Fishing | 1056 | 87 | |
| Tow II | - Begin Fishing | 1138 | 93 | 55° 24.9' N |
| | | | | 129° 45.0' W |
| | - Stop Fishing | 1148 | 90 | 55° 24.9' N |
| | | | | 129° 43.0' W |
| Tow III | - Begin Fishing | 1625 | 95 | 55° 24.49'N |
| | | | | 129° 43.0' W |
| | - Stop Fishing | 1647 | 97 | 55° 24.9' N |
| | | | | 129° 43.15'W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-3
Tow I
15 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| CNIDARIA | | | |
| Gorgonacea | Primnoa willeyi | present | |
| MOLLUSCA | | | |
| Bivalvia | Cardita sp. | 1 | |
| | Yoldia thraciaeformis | 5 | |
| Cephalapoda | Octopus sp. | 2 | |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 3 | |
| ARTHROPODA | | | |
| Crustacea | Amphipoda (unid.) | 1 | |
| | Pandalopsis dispar | 188 | 1570 |
| | Pandalus borealis | 1582 | 2490 |
| | Crangonidae (unid.) | 5 | |
| | Labidochirus splendescens | 2 | |
| | Hyas lyratus | 5 | |
| | Chionoecetes sp. | 3 | 1260 |
| BRACHIOPODA | | present | |
| ECHINODERMATA | | | |
| Ophiuroidea | Ophiura sp. | present | |
| Asteroidea | Ctenodiscus crispatus | 12 | 75 |
| Echinoidea | Strongylocentrotus pallidus | 18 | 600 |
| Holothuroidea | Chiridota sp. | present | |
| | Parastichopus sp. | 8 | |
| CHORDATA | Dasycottus setiger | 1 | |
| | Odontopyxis trispinosa | 4 | |
| | Cyclopteridae (unid.) | 1 | |
| | Theragra chalcogramma | 3 | 737 |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station H-3
Tow II
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| MOLLUSCA | | | |
| Gastropoda | Neptunea sp. | 1 | |
| Bivalvia | Yoldia thraciaeformis | 5 | |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 1 | |
| ARTHROPODA | | | |
| Crustacea | Mysidacea (unid.) | present | |
| | Pasiphaea pacifica | 9 | 4 |
| | Pandalopsis dispar | 84 | 716 |
| | Pandalus borealis | 94 | 820 |
| | Crangon communis | 39 | 50 |
| | Sclerocrangon alata | 4 | |
| | Labidochirus splendescens | 1 | |
| ECHINODERMATA | | | |
| Ophiuroidea | Ophiura sp. | present | |
| Asteroidea | Ctenodiscus crispatus | 6 | 23 |
| Echinoidea | Strongylocentrotus pallidus | 1 | |
| Holothuroidea | Chiridota sp. | present | |
| | Parastichopus sp. | 1 | |
| CHORDATA | | | |
| Pisces | Dasycottus setiger | 1 | |
| | Odontopyxis trispinosa | 2 | |
| | Theragra chalcogramma | 3 | 720 |
| | Bothrocara molle | 1 | |
| | Myctophidae (unid.) | 1 | |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-3
Tow III
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| PORIFERA | | | |
| Hyalospongia | Aphrocallistes vastus | present | |
| CNIDARIA | | | |
| Gorgonacea | Primnoa willeyi | present | |
| MOLLUSCA | | | |
| Gastropoda | Nudibrancnia (unid.) | 1 | |
| ANNELIDA | | | |
| Polychaeta | Aphrodita sp. | 2 | |
| ARTHROPODA | | | |
| Crustacea | Pasiphaea pacifica | 2 | |
| | Pandalopsis dispar | 162 | 1540 |
| | Pandalus borealis | 770 | 1490 |
| | Crangon communis | 190 | 408 |
| | Sclerocrangon alta | 21 | |
| | Eualus suckleyi | 3 | |
| | E. macrophthalmus | 1 | |
| | Labidochirus splendescens | 8 | |
| | Hyas lyratus | 3 | |
| | Pagurus aleuticus | 3 | |
| | Chionoecetes sp. | 5 | |
| | Paralithodes camtschatica | 1 | 3747 |
| BRACHIOPODA | | present | |
| ECHINODERMATA | | | |
| Ophiuroidea | Ophiura sp. | present | |
| Asteroidea | Ctenoidiscus crispatus | 9 | |
| | Gephyreaster sp. | 1 | |
| Echinoidea | Strongylocentrotus pallidus | 11 | |
| Holothuroidea | Chiridota sp. | present | |
| | Parastichopus sp. | 10 | |
| CHORDATA | | | |
| Pisces | Lycodes brevipes | 2 | 142 |
| | Lyconectes aleutensis | 1 | 12 |
| | Malacocottus kincaidi | 1 | 72 |
| | Odontopyxis trispinosa | 5 | |
| | Nectoliparis pelagicus | 2 | |

APPENDIX I TRAWL DATA

1) Hastings Arm - Station H-4

DATE - 16, 17 October 1978

AREA - Granby Bay, B.C. (Chart #3793)

| | | Time (PDT) | Depth (m) | Position |
|---|---|---|---|---|
| Tow I | - Begin Fishing | 1055 | 47 | 55° 23.83'N<br>129° 49.3' W |
| | - Stop Fishing | 1107 | 47 | 55° 24.32'N<br>129° 49.0' W |
| Tow II | - Begin Fishing | 1006 | 46 | 55° 23.83'N<br>129° 49.25'W |
| | - Stop Fishing | 1023 | 46 | 55° 24.32'N<br>129° 48.90'W |

APPENDIX I TRAWL DATA
Hastings and Alice Arms
Station H-4
Tow I
16 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| CNIDARIA | | | |
| Anthozoa | Actinaria (unid.) | 1 | |
| MOLLUSCA | | | |
| Bivalvia | Macoma sp. | 1312 | 1425 |
| ANTHROPODA | | | |
| Crustacea | Pandalopsis dispar | 85 | 285 |
| | Pandalus borealis | 710 | 1850 |
| | Eualus suckleyi | 18 | 89 |
| ANNELIDA | | | |
| Polychaeta | | present | |
| ECHINODERMATA | | | |
| Holothuroidea | Parastichopus sp. | 2 | |
| CHORDATA | | | |
| Pisces | Lumpenus sagitta | 1 | |
| | Theragra chalcogramma | 4 | |
| | Osmeridae (unid.) | 1 | |
| | Pleuronectidae (unid.) | 2 | |

APPENDIX I

TRAWL DATA
Hastings and Alice Arms
Station H-4
Tow II
17 October 1978

| Species | | Count | Wet Wt. (gms) |
|---|---|---|---|
| MOLLUSCA | | | |
| Bivalvia | Macoma sp. | 700 | 760 |
| | Chlamys sp. | 1 | |
| ARTHROPODA | | | |
| Crustacea | Pandalus borealis | 4 | |
| | Crangon communis | 1 | |

# APPENDIX II

## PISCES IV SUBMERSIBLE OBSERVATIONS

(a) Hastings Arm - October 23, 1976
(b) Hastings Arm - October 23, 1976
(c) Alice Arm (head) - October 24, 1976
(d) Alice Arm (center) - October 24, 1976
(e) Alice Arm (mouth) - October 25, 1976
(f) Observatory Inlet - October 25, 1976

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV

(a) Hastings Arm - October 23, 1976

---

DIVE : 518

OBSERVERS: D. Goyette, H. Nelson

PILOT : R. Taylor

| POSITION : | Submerge | Turn | Surface |
|---|---|---|---|
| | 55° 29.45 N | 55° 29.13 N | 55° 23.09 N |
| | 129° 45.7 W | 129° 45.23 W | 123° 44.70 W |

DURATION : 3.4 hrs.

TIME : (PDST) 0855

DEPTH : 300 m

---

OBSERVATIONS:

Surface waters - very clear.

Plankton absent in upper 60 metres. White particles suspended in the water column.

60 m - Small euphausids (*Euphausia pacifica*?) - few
- Ctenophores (occasional).

100 m - Appearance of *Bolinopsis* sp. (ctenophore)
- Zooplankton increasing; euphausids, occasional amphipod (Hyperid).

125 m - Siphonophores

150 m - Smelt (few) (*Leuroglossus stilbius*?)
- Amphipod (few)

175 m - Smelt (numbers increasing) (*L. stilbius*?)
- Occasional pelagic shrimp (*Pasiphaea* sp.)

200 m - Numbers of amphipods increasing.
- Ctenophores abundant - *Beroe* sp. and *Bolinopsis* sp.

260 m - (0915) Bottom.
- Visibility greater than 4 metres.
- Sediment soft, light brown colour. Sediment beneath surface dark, bluish grey colour.
- Tidal currents present, velocity sufficient to require small fish (Nectoliparis sp.) to swim actively to maintain position on the bottom.
- Course heading 160°: against current.
- Burrows (numerous).
- Dominant organisms - large hermit crabs occupying Neptunea shells, small hermit crabs, and shrimps, Pandalopsis dispar (side-stripe) - very abundant; Pandalus borealis (pink shrimp) - very common).
- Occasional Theragra chalcogramma (pollock).
- Eelpout (few).
- Small white sea pens (numerous).
- Unidentified (leech like) worm; dorso-ventrally flattened pointed anterior, dark brown - swims in undulations (common).
- Small octopus (?)
- Fish less abundant than at other dive sites; mostly eelpouts, occasional pollock, one sole, occasional sturgeon poacher; no ratfish or dogfish observed. (These were commonly seen during submersible dives in other areas.)
- Nectoliparis sp. - very common.
- (Shrimp appear to occur in groups and in considerable numbers compared to Knight Inlet (pilot observation) and Howe Sound). Bottom free of wood debris.

290 m - Lithodes aequispina (2) (brown king crab).

300 m - (1018) Altered course to 060° - toward shore.
- L. aequispina (1) (brown king crab).

265 m - 1035 hours.

255 m - Sloping, mud bottom.

250 m - L. aequispina (3).

240 m - Numbers of pink shrimps increasing.
- Side stripes - still abundant. Shrimps occurring in groups, approximately 8-10/$m^2$.

225 m - (1053) Numerous eelpouts.

200 m - (1100 hrs.) Base of steep cliff, rock face very smooth, covered by thin layer of sediment. Surface covered with brachiopods, occasional pink sea urchin (Allocentrotus fragilis?), sea cucumber (similar to Parastichopus) (common) - spines long and fleshy.

160 m - Munida quadraspina (few) (squat lobster).

150 m - (1116) Marine life on rock cliff largely brachiopods, few Neptunea sp., Pandalopsis dispar (sidestripes), few Gorgonocephalus sp. (basket stars).
- Numbers M. quadrispina increasing.

125 m - (1126) Occasional crinoid - Florometra sp., Pteraster sp. (cushion star), fewer shrimps, few rock fish.

75 m - 1142 hours.

40 m - (1152) Brachiopods dominant.
- Entering area of calcarious tube worms, occasional Psolus sp. (creeping cucumber).
- Visibility with ambient light in excess of 18 metres.

25 m - (1156) Encrusting algae.
- Occasional cloud sponge.

SUMMARY

Visibility - very good.
Dominant macroinvertebrate species - Pandalopsis dispar (sidestripe) and large hermit crabs.
Lithodes aequispina (6) observed between 250-300 metres.
Eelpouts rare, absence of ratfish and dogfish.
Dominant macroinvertebrate on rock face - brachiopoda.
Very little change in marine life on rock face between 50 and 200 metres.

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV
(b) Hastings Arm - October 23, 1976

---

DIVE : 519
OBSERVERS: D. Goyette, D. Sullivan
PILOT : R. Taylor

| POSITION : | Submerge | Surface |
|---|---|---|
| | 55° 34.00 N | 55° 34.01 N |
| | 129° 47.57 W | 123° 47.13 W |

DURATION : 1.3 hrs.
TIME : (PDST) 1330
DEPTH : 270 m

---

OBSERVATIONS:

Surface waters - very clear.
Plankton absent 0-50 m. Numbers increased below 100 m.
100 m - Amphipods, ctenophores
170 m - Smelt
225 m - Eelpout course 020°.
270 m - (1335) Bottom, course 020°. Sediment similar to 518. Grey coloured sediment beneath surface seen at 518 not observed.
- Burrows more numerous than 518.
- Eelpouts more numerous than 518 but not abundant.
- Fewer shrimp than dive 518, sparse, occasional Pandalopsis dispar (sidestripes).
- Lithodes aequispina (1) (brown king crab).
- Small octopus (5).
- Changed course to 090° (1411 hours) toward shore, bottom sloping.

| | |
|---|---|
| 250 m | - (1417) |
| | - Hermit crab (few). |
| | - Pandalopsis dispar (sidestripe) (occasional). |
| | - Tanner crab (1) (Chionoecetes bairdi). |
| 200 m | - 1435 hours. |
| | - Numbers of P. dispar (sidestripes) increasing and larger size. |
| | - Numerous burrows. |
| | - Numerous snailfish - light brown, transparent outer covering; large head. |
| | - Numbers of pink shrimps increasing. |
| | - L. aequispina (1) (brown king crab). |
| | - Visibility - beyond range of lights. |
| 175 m | - 1443 hours. |
| 150 m | - Shrimp more abundant than 270 m (3-4 sidestripe and pink shrimp/$m^2$). |
| | - Pandalus platyceros (prawn) (1). |
| | - Chionoecetes bairdi (Tanner crab) (2). |
| | - Flounder (1). |
| 125 m | - (1455) Contact with rock cliff, marine life similar to 518.. Occasional Munida quadrispina, rockfish, pink sea urchin, flounder, scallop. |
| 100 m | - (1505) Dive terminated due to leak in ballast system. |

SUMMARY

Visibility - very good.
Dominant macroinvertebrate species - Pandalopsis dispar (sidestripes).
Lithodes aequispina (2) observed between 200-270 metres.
Numbers of eelpouts increased from 518.
Rock face community to 100 metres appeared to be similar to 518.

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV
(c) Alice Arm (Head) - October 24, 1976

---

DIVE : 520 (1)
OBSERVERS: D. Goyette, J. Littlepage
PILOT : R. Taylor

| POSITION : | Submerge | Turn | Surface |
|---|---|---|---|
| (1) | 55° 27.1 N<br>129° 29.8 W | | |
| (0955) | | 55° 27.1 N<br>129° 29.71 W | |
| (1015) | | 55° 27.12 N<br>129° 29.58 W | |
| (1030) | | 55° 27.12 N<br>129° 29.32 W | 55° 27.24 N<br>129° 29.16 W |
| (2) | 55° 27.85 N<br>129° 29.35 W | | 55° 28.05 N<br>129° 29.4 W |

DURATION : 3.3 hrs.
TIME : (PDST) 0900
DEPTH : 150 m

---

OBSERVATIONS:

Surface water - clear.
Zooplankton absent to 75 metres. Number of medusae increase near 95 metres. Bolinopsis sp., Beroe sp. (ctenophores) also abundant.

150 m
- (0916) Visibility - 3 m, sediment light brown surface, lighter sediment beneath surface. Soft and silty, easily disturbed, course heading 070°.
- Small Lithodes aequispina (1) (Brown king crab).
- Fewer shrimps observed than 518 and 519.
- Pink shrimp (Pandalus borealis).

150 m - (0930).
- Numerous Gorgonocephalus sp. (basket stars).
- Clumps of Fucus sp. common throughout dive.
- Anemones (occasional) white base, pink tentacles.
- Fewer burrows than Dive 518.
- Chionoecetes bairdi (Tanner crab) occasional.
- Tadpole snail fish (brown) numerous.
- Sea whips (occasional) - large 1-2" diameter, 1-2 metres in length, white.
- Eelpout.
- Small skate (1).
- Lithodes aequispina (1) (Brown king crab).
- Occasional shrimps, few Pandalopsis dispar (sidestripes).

125 m - (0946) Continued on course 070°. Bottom gradual upward slope.
- Sole (occasional).
- Large sea whips very numerous.
- Gorgonocephalus sp. (basket stars) very common.
- Contact with tailings delta - surface colour similar to earlier portion of dive, obvious reduction in burrowing activity, surface smooth and compact, slope steeper.
- Numerous sea whips at base of delta.

100 m - (0957) Contact with rock cliff.
- Many Gorgonocephalus sp. (basket stars).
- Numerous sea whips.
- Cloud sponge (numerous).
- Boot sponge (few).
- Eelpouts (occasional).
- No shrimps or hermit crabs observed.

90 m - (1011) Changed course to 030°.

70 m - (1019) Changed course to 070°.
- Flatfish more abundant than Dive 518.

60 m - (1022) Changed course to 170°.
- Continue to follow tailings delta.
- Obvious reduction in marine life.
- Shrimp absent.
- Large pink/white sea anemone - numerous.

30 m - (1035) Shrimps absent.
- Visibility greater than 4 metres.
- Sea whips (occasional).
- Sediment grey in colour around burrows.
- Cancer magister (1) - first sighting since start of dives: course 020°.

20 m - (1046) Surfaced.

---

DIVE: 520 (2)

Surfaced and towed to head of Alice Arm, dove to 100 m, course 340° 1105 hours.

- Sediment characteristics similar to early portion of 520 (1). Fewer burrows than Hastings Arm.
- Tanner crab (Chionoecetes sp.) (numerous).
- Small pandalid shrimp (few); pink and humpback shrimp, hermit crab, Hyas sp. (lyre crab) (occasional).
- Flatfish (common).
- Nudibranch (few).
- Current and sediment dispersion - negligible.

100 m - (1149) End of dive.

SUMMARY

Visibility - good.

Dominant macroinvertebrate species - Gorgonocephalus sp., sea whips, and Chionoecetes bairdi.

Noticeable reduction in marine life and burrowing activity on the tailings delta.

Flatfish more abundant than at the head of Hastings Arm.

Bottom sediments at both dive locations similar to Hastings Arm, with exception of the tailings delta.

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV
(d) Alice Arm (Center ) - October 24, 1976

---

DIVE : 521
OBSERVER : D. Goyette, J. Littlepage
PILOT : R. Taylor

| POSITION : | Submerge | Turn | Surface |
|---|---|---|---|
| | 55° 27.08 N | 55° 27.08 N | 55° 26.8 N |
| | 129° 35.78 W | 129° 35.78 W | 129° 36.18 W |

DURATION : 2.9 hrs.
TIME : (PDST) 1457
DEPTH : 380 m

---

OBSERVATIONS:

Surface waters clear.
Zooplankton absent in upper 95 meters; numbers of medusae less than Dive 520. Beroe sp. very abundant near 125 metres.

380 m
- (1520) Bottom, course 070°.
- Sediment light brown, soft. Sediment surrounding burrows light brown colour compared to light grey observed at head of inlet (520).
- Visibility poor; water murky.
- Small hermit crabs (occasional).
- Lithodes aequispina (2) (Brown king crab).
- Shrimp (mostly pinks (Pandalus borealis?), few Pandalopsis dispar (sidestripe); considerably fewer than Hastings Arm but more abundant than head of Alice Arm.
- Pandalus platyceros (prawn) (occasional).
- Eelpouts - common.
- Small skate.
- Theragra chalcogramma (pollock) (common).

- Burrowing anemones (Pachycerianthus sp.) commonly seen in other regions, noticeably absent; ratfish and dogfish also absent.

380 m - (1540) Changed course to 180°.
- Gradual upward slope.
- Shrimp (Pandalus borealis and Pandalopsis dispar) occurring in groups in large numbers (20/$m^2$).
- Chionoecetes bairdi (Tanner crab) (occasional).

340 m - (1620) Mud slope.
- Contact with slide area covered by rock fragments, boulders, shell (cockle) debris - steep slope.
- Brachipoda common on rock fragments.

315 m - (1630) Contacted base of rock cliff.
- Brachiopoda (many).
- Rock covered with thin layer of sediment.
- Hermit crab, scallop, pink sea urchin (Allocentrotus fragilis?) few.
- Pteraster sp. (occasional).
- Fan coral (Paragorgia sp.?) few.

250 m - (1639) Large Lithodes aequispina (Brown king crab) observed on rock ledge.

200 m - (1645) Florometra sp. (crinoid) (few).
- Pteraster sp. - common.
- Pandalid shrimp numerous on rock ledges covered with sediment.

150 m - 1658 hours.

135 m - (1700) Munida quadrispina (occasional).
- Cloud sponges.
- Larger Pandalus platyceros (prawns) (few) - prawns do not appear to be very abundant in either Alice Arm or Hastings Arm.
- Sea anemones (pink/white) common.

75 m - 1705 hours.

25 m - (1710) Surfaced.

SUMMARY

Visibility - poor; water murky.
Dominant macroinvertebrate species - pandalid shrimps (Pandalus borealis(?) and Pandalopsis dispar; Pandalus platyceros occasional).
Eelpouts and Theragra chalcogramma (pollock) common.
Lithodes aequispina (3) observed between 250-380 metres.
Dominant macroinvertebrate on rock face - Brachiopoda; Munida quadrispina and Pandalus platyceros noted; seastars (Pteraster sp.) common.
Greater variety of life on rock faces than observed in Hastings Arm.
Marine life varied little on rock faces between 30-280 metres.

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV
(e) Alice Arm (mouth) - October 25, 1976

---

DIVE : 522
OBSERVERS: D. Goyette, H. Nelson
PILOT : R. Taylor

| POSITION : | Submerge | Turn | Surface |
|---|---|---|---|
| | 55° 24.71 N | | |
| | 129° 40.76 W | | |
| | | 55° 24.64 N | |
| | | 129° 40.60 W | |
| | (0945) | 55° 24.88 N | |
| | | 129° 40.65 W | |
| | (1020) | 55° 25.14 N | 55° 25.30 N |
| | | 129° 40.95 W | 129° 40.72 W |

DURATION : 2.5 hrs.
TIME : (PDST) 0900
DEPTH : 85 m

---

OBSERVATIONS:

Surface waters - clear.
Detrital material suspended in water column. Zooplankton absent except near bottom.

85 m
- (0903) Bottom visibility 5 metres.
- Currents negligible.
- Macroinvertebrates numerous and diverse - abundance similar to Hastings Arm.
- Gorgonocephalus sp. (Basket stars) very numerous. Adults often surrounded by numerous juveniles.
- Crossaster sp. - few.
- Hermit crabs (large) - abundant.
- Tanner crab (Chionoecetes bairdi) (numerous).
- Large sea whips (common).

85 m
- Flounder (common), Theragra chalcogramma (pollock) (common).
- Shrimp - few pinks (Pandalus borealis?), Pandalopsis dispar (sidestripes) absent.
- Humpback shrimp (Pandalus hypsinotus) (common compared to other dives).
- Skate (1).
- Eelpout (common).

75 m
- (0930) Increase in number of shrimp - mostly pinks (P. borealis?) with few Pandalopsis dispar and Pandalus hypsinotus - shrimps occurring in groups.

60 m
- (0935) Paralithodes camtschatica (4)(Alaska king crab).
- Basket stars, sea whips - common.
- P. camtschatica (16) - grouped together, captured smaller crab. (Carapace width 19 cm, legs 102 cm, tip to tip).
- Sea cucumber - common.
- Flatfish, eelpout - numerous.
- One 4-5 lb salmon observed.
- (1005) Course - due North 75 m.

60 m
- (1026) Slope, bottom changing to gravel.
- Numerous small white sea urchins associated with gravel bottom.
- Tanner crab (Chionoecetes bairdi).
- Solitary corals (on rocky areas).
- P. hypsinotus - numerous.
- Sea cucumber - common.
- Flounder, sculpin - few.
- No shrimps seen on gravel.

60 m
- (1035) Contact with rock cliff.
- Few brachiopods.
- Many shrimp on rock face and ledges.
- Pteraster sp., Crossaster sp., Patiria sp. (orange) Henricia sp., Mediaster sp. - common.
- Cloud sponge.
- Rock relatively sediment free.

10 m - (1048) Surfaced due to strong lateral current.

SUMMARY

Visibility - very good.
Macroinvertebrate species very diverse; Gorgonocephalus sp., Chionoecetes bairdi, pandalid shrimp, hermit crabs most common.
Eelpouts, flatfish numerous.
Paralithodes camtschatica (Alaska king crab) (20) encountered at 60 metres; only observed at this location.
Dominant macroinvertebrate species on rock face - seastars.

APPENDIX II SUBMERSIBLE DIVING OBSERVATIONS - PISCES IV
(f) Observatory Inlet - October 25, 1976

---

DIVE : 523
OBSERVERS: D. Goyette, D. Sullivan
PILOT : R. Taylor

| POSITION : | Submerge | | Turn | | Surface |
|---|---|---|---|---|---|
| | 55° 21.60 N | | | | |
| | 129° 45.76 W | | | | |
| | | | 55° 21.65 N | | |
| | | | 129° 45.0 W | | |
| | | (1426) | 55° 21.68 N | | |
| | | | 129° 44.8 W | | |
| | | | 55° 21.48 N | | 55° 21.51 N |
| | | | 129° 44.66 W | | 129° 44.46 W |

DURATION : 2.9 hrs.
TIME : (PDST) 1300
DEPTH : 210 m

---

OBSERVATIONS:

Surface waters - very clear.

Absence of zooplankton above 90 metres. Detritus concentrations similar to previous dives.

90 m - Appearance of ctenophores (Bolinopsis sp.)
- Occasional euphausids; small fish; chaetognaths.

125 m - Numerous hyperid amphipods.
- Numerous ctenophores.

150 m - Numerous smelt (Leuroglossus stilbius?)

200 m - Visibility decreasing.

210 m - (1320) Bottom - soft brown mud, light grey under surface layer, occassional burrows.
- Visibility 3 metres.
- Course 100°.

210 m
- Numerous domeshaped anemones observed - colours varied pink, white to deep red.
- Small sea pens (white) (common).
- Numerous small shrimp (Pandalus borealis?).
- Few Pandalopsis dispar (sidestripe).
- Sculpin (1).
- Eelpouts (few).
- Tanner crab (few) (Chionoecetes sp.).
- Small squid (8).
- Flounder (few).
- Hyas sp. common.
- (1413) Changed course to 120°.

200 m
- (1429) Changed course to 150°.
- Bottom sloping towards shore.
- Shrimps 6-8/$m^2$, occurring in groups.
- Numerous burrows.
- Brittle stars - exceptionally numerous, covered entire bottom throughout most of the dive area.

200 m
- (1425) Bottom becoming steeper (about 45°).
- Brittle stars - dominant.
- Shrimp (Pandalus borealis?) - numerous.
- Occasional Pandalopsis dispar (sidestripe).

180 m
- (1435) Rock outcroping.

175 m
- Return to mud bottom.
- Large numbers of brittle stars
- Shrimp (Pandalus borealis?) (common).
- Small octopus.
- Pteraster sp.

145 m
- 1455 hours.

125 m
- Brittle stars still very abundant.
- Shrimp (occasional).
- Tanner crab (Chionoecetes sp.).
- Parasite seen on king crab observed free living on bottom debris (Marsipobdella sacculata 1952).

- Munida quadrispina (occasional).
- Humpback shrimp (Pandalus hypsinotus) (few).
- Tubeworms.
- Cabezon.

100 m
- (1507) Gravel bottom, occasional boulder.
- Crinoids (few) (Florometra sp.).

95 m
- (1510) Contact with base of cliff.
- Brachiopod, brittle stars, sea cucumbers.
- Light cover of sediment over rocks.
- Crinoids, Pteraster sp. (common).
- Pycnopodia sp. (few).
- Bottom varied from silt to rock and coarse sand to solid rock.
- Cloud sponge, crinoids, Munida quadrispina and tubeworms - common on rock face, occasional flounder.

20 m
- Rock face free from sediment.
- Left bottom 1530 hours.

SUMMARY

Visibility - good.
Dominant macroinvertebrate species - Ophiuroids (brittle stars).
Pandalid shrimp abundant dominated by Pink Shrimp (Pandalus borealis?) - with occasional P. hypsinotus and Pandalopsis dispar.
Flatfish common although less abundant than at the head of Alice Arm.
Rock face community similar to previous dives.
Bottom sediment type varied considerably from centre channel to shoreline.

# APPENDIX III

## TRANSMISSOMETER PROFILES

(a) Hastings Arm - Station H-1

(b) Alice Arm - Station A-2

(c) Alice Arm - Station A-1

APPENDIX III TRANSMISSOMETER PROFILES

(a) Hastings Arm - Station H-2

13 June 1977

| Depth (m) | % Transmission | Depth (m) | % Transmission |
|---|---|---|---|
| 0 | 0 | 90 | 77 |
| 5 | 0 | 95 | 77 |
| 10 | 26 | 100 | 77 |
| 15 | 60 | 105 | 79 |
| 20 | 73 | 110 | 79 |
| 25 | 77 | 115 | 79 |
| 30 | 76 | 120 | 79 |
| 35 | 74 | 125 | 79 |
| 40 | 74 | 130 | 78 |
| 45 | 74 | 135 | 77 |
| 50 | 71 | 140 | 77 |
| 55 | 73 | 145 | 77 |
| 60 | 72 | 150 | 77 |
| 65 | 73 | 155 | 77 |
| 70 | 74 | 160 | 77 |
| 75 | 74 | 165 | 78 |
| 80 | 75 | 170 | 77 |
| 85 | 75 | | |

APPENDIX III TRANSMISSOMETER PROFILES

(D) Alice Arm - Station A-2

13 June 1977

| Depth (m) | % Transmission | Depth (m) | % Transmission |
|---|---|---|---|
| 0 | 0 | 90 | 78 |
| 5 | 1 | 95 | 77 |
| 10 | 20 | 100 | 75 |
| 15 | 58 | 105 | 75 |
| 20 | 69 | 110 | 74 |
| 25 | 73 | 115 | 75 |
| 30 | 74 | 120 | 77 |
| 35 | 74 | 125 | 77 |
| 40 | 73 | 130 | 77 |
| 45 | 73 | 135 | 77 |
| 50 | 74 | 140 | 78 |
| 55 | 76 | 145 | 78 |
| 60 | 76 | 150 | 78.5 |
| 65 | 77 | 155 | 79 |
| 70 | 77 | 160 | 79 |
| 75 | 77 | 165 | 79 |
| 80 | 78 | 170 | 80 |
| 85 | 77 | | |

APPENDIX III TRANSMISSOMETER PROFILES

(c) Alice Arm - Station A-1

13 June 1977

| Depth (m) | % Transmission | Depth (m) | % Transmission |
|---|---|---|---|
| 0 | 0 | 70 | 66 |
| 5 | 0 | 75 | 67 |
| 10 | 43 | 80 | 66 |
| 15 | 64 | 85 | 63 |
| 20 | 67 | 90 | 63 |
| 25 | 70 | 95 | 57 |
| 30 | 72 | 100 | 60 |
| 35 | 73 | 105 | 61 |
| 40 | 75 | 110 | 65 |
| 45 | 67 | 115 | 68 |
| 50 | 67 | 120 | 64 |
| 55 | 69 | 125 | 66 |
| 60 | 70 | 130 | 68 |
| 65 | 68 | | |