DREDGED MATERIAL RESEARCH PROGRAM

TECHNICAL REPORT D-77-30

AQUATIC DISPOSAL FIELD INVESTIGATIONS COLUMBIA RIVER DISPOSAL SITE, OREGON

APPENDIX C: THE EFFECTS OF DREDGED MATERIAL DISPOSAL ON BENTHIC ASSEMBLAGES

by

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December 1977

Final Report

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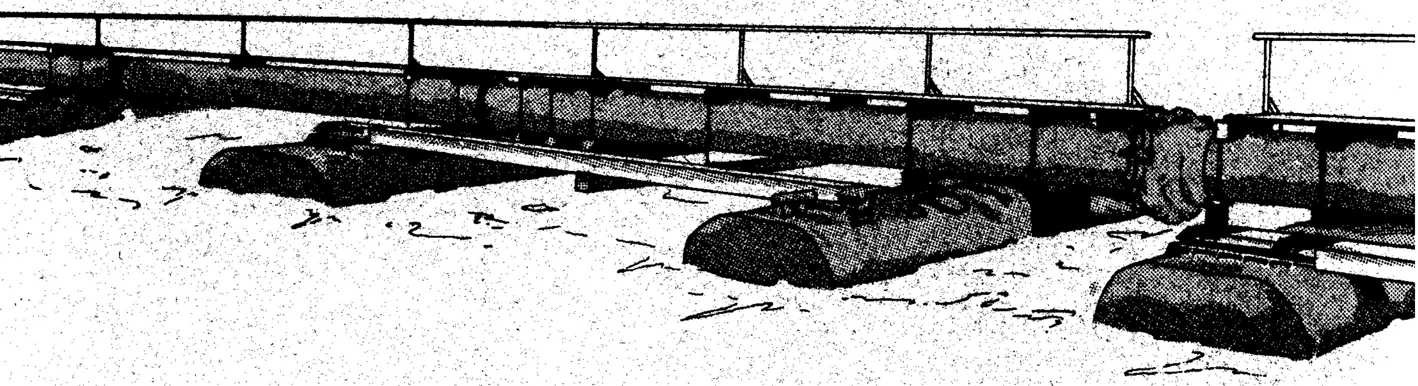

Prepared for Office, Chief of Engineers, U. S. Army
Washington, D. C. 20314

Under Contract No. DACW57-75-C-0137 and DACW57-76-C-0092
(DMRP Work Unit No. 1A07C)

Monitored by Environmental Effects Laboratory
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

AQUATIC DISPOSAL FIELD INVESTIGATIONS
COLUMBIA RIVER DISPOSAL SITE, OREGON

APPENDIX A:	Investigation of the Hydraulic Regime and Physical Nature of Bottom Sedimentation
APPENDIX B:	Water Column, Primary Productivity, and Sediment Studies
APPENDIX C:	The Effects of Dredged Material Disposal on Benthic Assemblages
APPENDIX D:	Zooplankton and Ichthyoplankton Studies
APPENDIX E:	Demersal Fish and Decapod Shellfish Studies

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P. O. BOX 631
VICKSBURG, MISSISSIPPI 39180

IN REPLY REFER TO: WESYV

31 January 1978

SUBJECT: Transmittal of Technical Report D-77-30 (Appendix C)

TO: All Report Recipients

1. The technical report transmitted herewith represents the results of one of several research efforts (Work Units) undertaken as part of Task 1A, Aquatic Disposal Field Investigations (ADFI), of the Corps of Engineers' Dredged Material Research Program (DMRP). Task 1A is a part of the Environmental Impacts and Criteria Development Project (EICDP), which has a general objective of determining the magnitude and extent of effects of disposal sites on organisms and the quality of surrounding water, and the rate, diversity, and extent such sites are recolonized by benthic flora and fauna. The study reported on herein was an integral part of a series of research contracts jointly developed to achieve the EICDP general objective at the Mouth of the Columbia River Disposal Site, one of five sites located in several geographical regions of the United States. Consequently, this report presents results and interpretations of but one of several closely interrelated efforts and should be used only in conjunction with and consideration of the other related reports for this site.

2. This report, Appendix C: The Effects of Dredged Material Disposal on Benthic Assemblages, is one of five contractor-prepared appendices published relative to the Waterways Experiment Station Technical Report D-77-30 entitled: Aquatic Disposal Field Investigations, Columbia River Disposal Site, Oregon. The titles of all appendices of this series are listed on the inside front cover of this report. The main report will provide additional results, interpretations, and conclusions not found in the individual appendices and provide a comprehensive summary and synthesis overview of the entire project.

3. The initial purpose of this study, conducted as Work Unit 1A07C, was to collect baseline information on the benthic community structure of the nearshore zone in the vicinity of the mouth of the Columbia River and to examine the spatial and temporal changes in this community with particular emphasis on historical disposal areas. The final phase of this study was directed toward definition of the effects of dredged

material disposal on the benthic communities. The rate and pattern of recolonization, as well as the factors affecting recolonization, were also determined.

4. A conclusion of this report, based on the data presented, was that areas exposed to direct disposal of dredged material had higher diversity and evenness values and lower density of macrobenthos than unaffected areas. It can also be concluded from this study that there was a significant reduction in the abundance of 11 of the 33 most abundant species at the areas exposed to direct disposal. Recolonization of benthos into the affected area was probably accomplished by organisms burrowing up through the dredged material, by migration into the area, and, to a lesser extent, by reproduction and recruitment from other areas.

5. The results of this study are particularly important in determining the timing and placement of dredged material for open-water disposal. Referenced studies, as well as others summarized in this report, will aid in determining the optimum disposal conditions and site selection for either the dispersion of the material from the dump site or for its retention within the confines of the site, whichever is preferred for maximum environmental protection.

JOHN L. CANNON
Colonel, Corps of Engineers
Commander and Director

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS
BEFORE COMPLETING FORM

1. REPORT NUMBER
Technical Report D-77-30

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE *(and Subtitle)*
AQUATIC DISPOSAL FIELD INVESTIGATIONS, COLUMBIA RIVER DISPOSAL SITE, OREGON; APPENDIX C: THE EFFECTS OF DREDGED MATERIAL DISPOSAL ON BENTHIC ASSEMBLAGES

5. TYPE OF REPORT & PERIOD COVERED
Final report

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
Michael D. Richardson, Andrew G. Carey, Jr., William A. Colgate

8. CONTRACT OR GRANT NUMBER(s)
DACW57-75-C-0137 and
DACW57-76-C-0092

9. PERFORMING ORGANIZATION NAME AND ADDRESS
School of Oceanography
Oregon State University
Corvallis, Oregon 97331

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
DMRP Work Unit No. 1A07C

11. CONTROLLING OFFICE NAME AND ADDRESS
Office, Chief of Engineers, U. S. Army
Washington, D. C. 20314

12. REPORT DATE
December 1977

13. NUMBER OF PAGES
411

14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*
U. S. Army Engineer Waterways Experiment Station
Environmental Effects Laboratory
P. O. Box 631, Vicksburg, Miss. 39180

15. SECURITY CLASS. *(of this report)*
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES
Tables C-IA, C-IB, C-IIB, and C-IIC were reproduced on microfiche and are enclosed in an envelope attached to the inside of the back cover of this report.

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Benthos
Columbia River disposal site
Disposal areas
Dredged material disposal
Field investigations
Sediment

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The objectives of this study were to identify and determine the significance of physical, chemical, and biological factors that govern the rate at which open-water dredged material disposal sites are colonized by benthic assemblages.

In the macrobenthic areal baseline, 5 assemblages and 13 species

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Unclassified
SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. ABSTRACT (Continued).

groups were found. The distribution, community structure, and seasonal constancy of these assemblages were related to the distribution of sediments and organic matter, the stability of sediments, and changes in sediment characteristics due to the deposition of fine-grained material from the Columbia River.

The deposition of dredged material significantly increased diversity and evenness values and reduced the density of macrofauna. Of the 33 most abundant species, 11 species had significantly lower abundances at stations exposed to direct dredged material deposition.

The effects of dredged material disposal on benthos were probably related to direct burial of benthos and changes in sediment characteristics and not increased turbidity from the disposal operation or introduction of pollutants or organic matter. Repopulation of benthos into the affected area was probably accomplished primarily by benthos burrowing up through the dredged material or benthos migrating into the area and, to a lesser extent, reproduction and recruitment of benthos from outside the area. There was very little evidence for transportation of benthos to the experimental disposal site via dredged material.

DISCLAIMER

SUMMARY

The objectives of the Mouth of the Columbia River (MCR) study were to identify and determine the significance of physical, chemical, and biological factors that govern the rate at which open-water dredged material disposal sites are colonized by benthic communities.

The study of benthic assemblages at the MCR site was divided into two phases. Phase I (Contract DACW57-75-C-0137) included collection of baseline information on benthic assemblages, gear evaluation, and planning for the controlled disposal experiment. Phase II (Contract DACW57-76-C-0092) included the controlled disposal experiment and continued collection of seasonal baseline information.

A total of 2,190 samples were obtained from the MCR study site, including 73 metered beam trawls for megafauna, 1,657 0.1-m^2 Smith-McIntyre grabs for macrofauna, 76 samples for meiofauna, five box cores for macrofauna, 369 samples for sediment, and 10 miscellaneous samples. This report includes the results from 1,359 0.1-m^2 Smith-McIntyre grabs for macrofauna (>1.00 mm) and 67 metered beam trawls for megafauna. A total of 339,753 individuals (425 species) were sorted and identified from the Smith-McIntyre grab samples, and 258,501 individuals (141 species) were sorted and identified from the beam trawl samples.

The location of stations for the areal baseline was determined from a pilot survey (1-2 October 1974) and from data on the distribution of sediments provided by the University of Washington. The analysis of within station and between station variability indicated that five replicate 0.1-m^2 Smith-McIntyre grab samples per station were adequate to calculate community structure values and classify benthic assemblages and species groups.

The distribution of assemblages and species groups and the values of community structure parameters for the MCR study region were determined from an areal baseline of 100 stations collected in 4-9 December 1974 and 19-25 January 1975. From the results of the areal baseline, 22 station locations were chosen to determine seasonal changes in benthic com-

munities. These stations were sampled on 18-23 April 1975, 23-27 June 1975, 11-16 September 1975, and 3-10 January 1976.

The distribution and community structure of the 5 assemblages and 12 station groups found in the areal baseline as well as the distribution of the 13 species groups are described in the text. The seasonal changes in benthic communities are also described.

Except for Assemblage C (the southern inshore sand assemblage), the species composition, biomass, and density of benthic assemblages off the mouth of the Columbia River were different than values calculated from other benthic assemblages reported from the Oregon-Washington continental shelf. The influence of the Columbia River (sedimentation patterns and high primary productivity) probably accounts for the difference.

The distribution, community structure, and seasonal constancy of benthic assemblages found off the mouth of the Columbia River were interpreted in part to be the result of the same factors that influenced benthic assemblages along the Oregon-Washington coast. These factors included an increase in silt, clay, and organic content in sediments offshore and a decrease in sediment instability due to sediment stirring by winter storms offshore. Superimposed on this depth gradient were the effects of the deposition of fine-grained sediments from the Columbia River and the high primary productivity of the area.

Diversity and species richness values were related to sediment stability. In general, the values of diversity and species richness increased offshore probably as the result of the increased sediment stability due to reduced sediment stirring by winter storms. The high abundance of tube-dwelling polychaetes at deeper stations also increased sediment stability. The lowest values of diversity and species richness were calculated for stations that had considerable seasonal changes in sediment characteristics as a result of the deposition of fine-grained sediments at high flow of the Columbia River.

Biomass and density of macrofauna were related to the organic content of sediments. The biomass and density of macrofauna and the percentage organic content of sediments generally increased offshore. The highest values of density and biomass were found at areas of high silt deposition because of the high organic content of those sediments.

The seasonal constancy of species composition was highest in areas that had the highest seasonal constancy of sediment characteristics. Benthic assemblages exposed to deposition of fine-grained material by the Columbia River had the highest Czekanowski dissimilarity values (low constancy) between seasons of any stations in the study area. The seasonal constancy of the abundance of dominant species was related to sediment stability. The between-season Bray-Curtis dissimilarity values decreased (higher constancy) with increasing sediment stability offshore (reduced stirring of sediments by storms) and were highest at stations that had the lowest seasonal stability because of deposition by the Columbia River.

From 9 July 1975 to 26 August 1975 approximately 4.6×10^5 m^3 of sand was dredged from the mouth of the Columbia River and deposited at experimental site G (46° 06'N, 124° 11.5'W). The experimental site region was sampled three times prior to disposal (4-9 December 1974, 18-23 April 1975, 23-27 June 1975) and five times after disposal (11-16 September 1975, 20-25 October 1975, 3-10 January 1976, 19-20 April 1976, 7-8 June 1976).

The station groups calculated from intrinsic species abundance values were similar to station groups derived from the extrinsic parameters that define the extent and magnitude of the dredged material disposal. The extrinsic data included U.S. Army Corps of Engineers records on the disposal operations, observations of predisposal and postdisposal bathymetry, and textural analysis of predisposal and postdisposal sediments.

The stations exposed to direct disposal of dredged material had significantly higher diversity and evenness values and significantly lower density of macrofauna when compared to unaffected stations. The significant differences in diversity and evenness persisted for at least eight months after disposal and the significant difference in density of macrofauna persisted for the duration of the sampling program (10 months after disposal). There was also a significant reduction in the abundance of 11 of the 33 most abundant species at stations exposed to dredged material disposal when compared to unaffected stations.

The effects of dredged material disposal on benthos was probably related to direct burial of benthos and changes in sediment chracteristics and not increased turbidity from disposal operations or introduction of pollutants or organic matter.

Repopulation of benthos into the affected area was probably accomplished primarily by benthos burrowing up through the dredged material or migrating into the area and, to a lesser extent, by reproduction and recruitment of benthos from outside the affected area. There was very little evidence for transportation of benthos to the experimental disposal site via dredged material.

PREFACE

This project was part of the Dredged Material Research Program (DMRP) planned and conducted for the Office, Chief of Engineers, and was authorized by Congress as part of the River and Harbor Act of 1970 [Public Law 91-611, Section 123 (i)]. The objective of the DMRP is to "provide through research - definitive information of the environmental impact of dredging and dredged material disposal operations and to develop technically satisfactory, environmentally compatible, and economically feasible dredging and disposal alternatives, including consideration of dredged material as a manageable resource" (U.S. Army Engineer Waterways Experiment Station, 1973).

This is the final report for Contracts DACW57-75-C-0137 (1 October 1974 to 1 September 1975) and DACW57-76-C-0092 (1 September 1975 to 1 January 1977). The two contracts were administered by U.S. Army Engineer District, Portland.

Dr. Andrew G. Carey, Jr., was the principal investigator and Dr. Michael D. Richardson was the project manager for both contracts at Oregon State University. Mr. Charles G. Boone was the site manager; Mr. Stephen P. Cobb was the site coordinator; and Dr. Robert M. Engler was the project manager for both contracts at the Environmental Resources Division of the Environmental Effects Laboratory, Waterways Experiment Station (WES).

The authors wish to acknowledge the help of personnel at the Portland District Office for providing information on previous dredged disposal activity in the Mouth of the Columbia River (MCR) site region and providing the navigation system used during the first contract. Mr. Charles G. Boone and other personnel at WES are also acknowledged for their cooperation during both contract periods.

We would like to thank Captain Anthony R. Loskota and the crew of the R/V CAYUSE for their excellent help in collection of samples. We would also like to thank the following for helping with the field work: Bob Aman, Laura Banks, John Blicksenderfer, Glenn Boone, Kelley Brooks, Bruce Caldwell, Mike Christian, Dick Dash, Bill Glassley, John Hunter, Dave Kravitz, Wayne Laroche, Joe Lee, Larie Myers, Greg Murray, Robin Orans, Dave Plowman, Kenneth Stuart, Herb Tanner, Eugene Ruff, Richard Williams, and Paul Yoskioka.

We acknowledge the following for helping with part-time sorting of benthic samples: Bruce Caldwell, Mike Christian, John Hunter, Wayne Laroche, Chris Marlow, Greg Murray, Brian Oliver, and Barbara Sullivan.

The computer programs were written and run by Cleo Adams and Karla Wald. The sediment samples were analyzed by Richard Roberts at the University of Washington. Discussions with Drs. Joe S. Craeger, William Glassley, and Richard W. Sternberg were invaluable with regard to geological and hydrographic data.

Several taxonomists donated their valuable time to confirm identifications of invertebrates. They included Eric Anderson (California Academy of Science, Ophiuroidea), Thomas Bowman (U.S. National Museum, Isopoda), James Carlton (University of California, Davis, Mollusca) Robert Carney (Oregon State University, Holothuroidea), Kristian Fauchald (Allan Hancock Foundation, Polychaeta), Dale Kisker (University of Washington, Pelecypoda), Louis Kornicker (U.S. National Museum, Ostracoda), Michael Kyte (University of Washington, Ophiuroidea), Gary MacDonald (University California, Santa Cruz, Gastropoda), James McLean (L.A. County Museum, Gastropoda), and James Sutton (California Academy of Science, Pelecypoda).

This report would have been impossible without the excellent work of six full-time Research Assistants. They all participated in field work and sorted benthic samples. Beverly Buchanan was responsible for beam trawl samples and identified the Mysidacea, Euphausiacea, Decapoda, Cirripedia and several other groups. Allan Fukuyama identified the Mollusca. Valerie Hironaka was responsible for biomass determination and identified the Echinodermata. Howard Jones maintained sampling equipment and identified the Polychaeta. Michael Kravitz identified Polychaeta. Gertrude Margules was responsible for meiofaunal work and identified Nematoda, Ostracoda and Isopoda. All six helped with the preparation of this final report.

The Directors of WES during the preparation of this report were COL. G.H. Hilt, CE., and COL. J.L. Cannon, CE. Technical Director at WES was Mr. F.R. Brown.

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COLUMBIA RIVER DISPOSAL SITE, OREGON
APPENDIX C: THE EFFECTS OF DREDGED MATERIAL DISPOSAL ON BENTHIC ASSEMBLAGES

PART I: INTRODUCTION

Background

1. This project was part of the Dredged Material Research Program (DMRP) planned and conducted for the Office, Chief of Engineers, and was authorized by Congress as part of the River and Harbor Act of 1970 [Public Law 91-611, Section 123(i)]. The objective of the DMRP is "to provide - through research - definitive information on the environmental impact of dredging and dredged material disposal operations and to develop technically satisfactory, environmentally compatible, and economically feasible dredging and disposal alternatives, including consideration of dredged material as a manageable resource" (U.S. Army Engineer Waterways Experiment Station, 1973).

2. The mouth of the Columbia River (MCR) was one of five regional study sites, where the effects of open-water disposal of dredged material was studied. These field studies were part of Task 1A (Aquatic Disposal Field Investigations) of the DMRP. Other field studies were conducted in Lake Erie near Ashtabula, Ohio; Eatons Neck in Long Island Sound; in the Gulf of Mexico off Galveston, Texas; and in Elliott Bay, Puget Sound, Washington.

3. This study, designated as work unit 1A07C, was one of five projects being conducted in the MCR study site region. Other work units included studies of bathymetry, bottom sediments, water chemistry, sediment chemistry, phytoplankton, zooplankton, and fisheries. The objectives of the MCR study were to identify and determine the significance of physical, chemical, and biological factors that govern the rate by

which openwater disposal sites are colonized by benthic communities.

4. The study of benthic assemblages in the MCR study site region was divided into two phases. Phase I (Contract DACW57-75-C-0137) included collection of baseline information of benthic assemblages, literature survey, gear evaluation, and planning for the controlled disposal experiment. Phase II (Contract DACW57-76-C-0092) included the controlled disposal experiment and continued collection of seasonal baseline information.

Objectives

5. This contract research was divided into two funding periods with different objectives. The objectives of Phase I "A Study of Benthic Baseline Assemblages in the MCR Disposal Site Area" were as follows:

- a. To conduct a literature survey on existing data relating to benthic community classification and structure and to spatial and temporal distribution of species within the study site area and within the regional area of concern (Oregon-Washington continental shelf).
- b. To compare the different types of sampling gear with respect to sampling efficiency and effectiveness and to estimate the sampling error of the quantitative collection devices along with the number of replicates necessary to ensure statistically valid results.
- c. To collect baseline information on benthic communities in the MCR disposal site region on a spatial and temporal basis. The baseline information included community structure (diversity, biomass, numerical abundance), community classification, and the biology and distribution of numerically dominant species.
- d. To select a site for the dredged material disposal experiment for Phase II.

6. The objects of Phase II "An Investigation of the Effects of Open-Water Dredged Material Disposal on Neritic Benthic Assemblages off the Mouth of the Columbia River," were as follows:

- a. To define the effects of dredged material disposal on benthic communities.

b. To estimate the recolonization rate and pattern of the affected bottom by benthic organisms.

c. To define the important factors affecting benthic recolonization.

7. No attempts have been made by the authors to separate Phases I and Phase II in this final report.

Literature Survey

8. The following is a brief summary of benthic studies of the Oregon-Washington continental shelf. Within the last four years, two excellent publications on this region have been compiled. The first, The Columbia River Estuary and Adjacent Ocean Waters, Bioenvironmental Studies edited by A.T. Pruter and D.L. Alverson (1972) includes 33 articles on the physical, chemical, and biological aspects of this region with an emphasis on radionuclide studies. The second, Oceanography of the Nearshore Coastal Waters of the Pacific Northwest Relating to Possible Pollution, Volumes I and II (1971) written by W.C. Renfro, et al., includes 21 chapters, 8 appendices, and a bibliography of more than 3100 entries. Of particular interest in the second publication is chapter 21, "The Nearshore Coastal Ecosystem: an Overview," and Appendix 8, "Annotated Checklist of Plants and Animals."

9. No effort was made in this literature survey to repeat these works. Also studies of demersal fisheries, unicellular organisms, or papers dealing with taxonomic or autecological problems were not included. Intertidal and estuarine papers were also excluded as well as studies in Puget Sound.

10. Prior to 1960 almost no benthic studies had been conducted on the Oregon-Washington continental shelf. The only exceptions were an occasional trawl or dredge sample collected by an expedition on its way to sample other areas.

11. Since 1960, two groups have been active in studying the macrobenthos of this area, Oregon State University and University of Washington. Several other groups including the National Marine Fisheries Service

and the Oregon Fish Commission have extensive collections of demersal fishes, but their studies were not included in this review.

12. Oregon State University has collected extensive benthic samples on the central Oregon continental shelf since 1962. Initial infaunal studies off the Pacific Northwest concentrated on a transect line of stations west of Newport, Oregon. The sampling encompasses broad environmental gradients across the continental shelf and down the continental slope onto a nearshore upper abyssal plain (Carey, 1965). A semi-quantitative anchor-box dredge obtained large volume samples suitable for deep-sea benthic research from a variety of substrate types (Carey and Hancock, 1965). Ninety-two quantitative samples were collected from twenty-six stations; six stations were located across the continental shelf at depths of 30, 50, 100, 150, 175, and 200 m.

13. Abundance of infauna increased across the shelf; the largest numerical density of 3712 individuals/m^2 and biomass of 46.22 g weight/m^2 occurred at the edge of the continental shelf at a depth of 200 m (Carey, 1972). At the shallowest station 3.1 km from shore, arthropods accounted for over 50 percent of the fauna; while at the edge of the shelf, 43.7 km from shore, polychaete worms increased in relative abundance to become the predominant major taxonomic group at 48 percent. Inshore the sediments were well-sorted fine sands, while at 200-m depth, the sediments included more fines and were silty-sands.

14. Other infaunal studies were undertaken on the central Oregon continental shelf to determine the relative effects of depth and sediment type on the faunal composition and community structure (Bertrand, 1971; Bertrand and Carey, unpublished manuscript). One hundred and sixty 0.1-m^2 Smith-McIntyre grab samples were taken at eight seasonal stations between 75- and 450-m depth. Five replicate grabs at each station were analyzed for macrofauna (>1.0 mm in size) per season per station. No seasonal variation was found in either infaunal composition in total species, numbers, or biomass. Average faunal abundance for all stations were 597 individuals/m^2 and 36.5 g wet weight/m^2. These values were lower than those reported for the Southern Californian continental shelf and for

New England waters. Four species groups were defined by factor analysis; these were correlated with glauconite sand, beach sand, sandy silt, and silty sand.

15. The macro-epifauna (>1.3 cm) were collected at four stations across the central Oregon continental shelf along the Newport transect line at depths of 50, 100, 150, and 200 m (Carey, 1972). The macro-epibenthos changed from a sparse molluscan assemblage on the inner shelf to one dominated by numerous echinoderms and arthropoda at the shelf edge. The greatest abundance of epifauna was at the shelf edge; a continued increase across the shelf was observed.

16. Benthic communities on the Washington continental shelf were studied by Lie (1969), Lie and Kisker (1970), and Lie and Kelley (1970). Lie collected replicate 0.2-m^2 Van Veen grabs from 48 stations (mostly three per station) along the Washington coast and in the Juan de Fuca Strait, in the summers of 1967 and 1968. The samples were sieved through a 1.00-mm screen and the Crustacean, Lammellibranchia, and Echinodermata were identified and counted. Wet weights for all taxonomic groups were determined. The mean ash-free dry weight was 1.92 g/m^2 (Lie, 1969). The inshore sand stations were dominated by small crustaceans with a life span of about one year and had a mean ash-free dry weight of 1.351 g/m^2. Two other groups of stations located further offshore were dominated by polychaetes and echinoderms with life spans of two years or more and had mean ash-free dry weights of 2.272 and 2.335 g/m^2.

17. Lie and Kelley (1970) used classification and ordination techniques to determine the species and station patterns for all 48 stations. Techniques included Kendall's rank correlation coefficient, Fager's recurrent group analysis, and factor analysis (principal component analysis with a varimax rotation). Using these techniques, Lie and Kelley extracted three station groups and six species groups from the data. The factor analysis, which used abundance data to group both species and stations, was preferred by Lie and Kelley to Kendall's rank correlation and Fager's recurrent group analysis, which only used presence and absence data. All techniques yielded similar results. Although the first five eigenvalues accounted for greater than 50 percent of the

total variance in the factor analysis of station groups and species groups, no attempt was made to interpret the resulting patterns.

18. Lie and Kisker (1970) determined the species composition and structure of three benthic communities extracted from Lie's previous paper. Diversity values were calculated only on the Crustacean, Lamellibranchia, and Echinodermata data. The deep water mud-bottom community had a mean H (Brillouin-diversity function - see methods in this paper) value of 2.9 with a range of 1.8 to 4.0. The intermediate depth sand-bottom community had a mean (H) diversity value of 2.6 with a range of 0.9 to 3.6. The shallow water sand-bottom community had a mean (H) diversity value of 2.0 with a range of 0.1 to 3.6. From the data presented in the paper, the diversity values are related to both species richness and evenness components of diversity. The lower diversity values in the shallow water sand-bottom community were attributed by Lie and Kelley to the physical stress of wave action.

PART II. DESCRIPTION OF THE STUDY AREA

Regional Setting

19. The study area is located adjacent to the mouth of the Columbia River on the Oregon-Washington continental shelf (Figure C1). The Atomic Energy Commission (AEC), because of its responsibility for monitoring the effects of radioactive discharge from nine nuclear reactors built 600 km above the mouth of the Columbia River at Richland, Washington, has sponsored extensive research of the Oregon-Washington continental shelf. A comprehensive review of this AEC sponsored research was presented in Pruter and Alverson (1972). The Corps of Engineers has sponsored extensive research on the MCR aquatic disposal site as part of the Dredged Material Research Program. The results of these studies will be published as appendices to a summary site report.

20. The study area is bounded by latitude 46° 19' on the north and 46° 06' on the south and lies between the 10- and 100-m contours. Water depths supplied by the University of Washington are shown in Figure C2.

21. The dominant hydrographic feature in the study area is the Columbia River. The average river discharge is 6.0×10^8 m^3/day with a spring maximum of 2.9×10^9 m^3/day and a fall minimum of 1.6×10^8 m^3/day (Barnes et al., 1972). The Columbia River plume influences an area from 40° to 49° N and 600 km offshore (Barnes et al., 1972). Reduction of salinities near the mouth of the Columbia River are generally restricted to the upper 15 m of the water column. Salinities below 15 m vary little from 33 to 34 $^{\circ}/_{\circ\circ}$ (Duxbury, 1972).

22. Surface current direction and speed in the study site are predominantly controlled by large-scale regional weather systems, the Columbia River flow, and tides. The general current direction is toward the shore during the winter with downwelling occurring along the coast. During the summer the surface currents set offshore and upwelling occurs. The Columbia River plume moves north and inshore under the influence of southerly winds in the winter and moves south and offshore under the influence of northerly winds in the summer (Barnes et al., 1972). Bottom

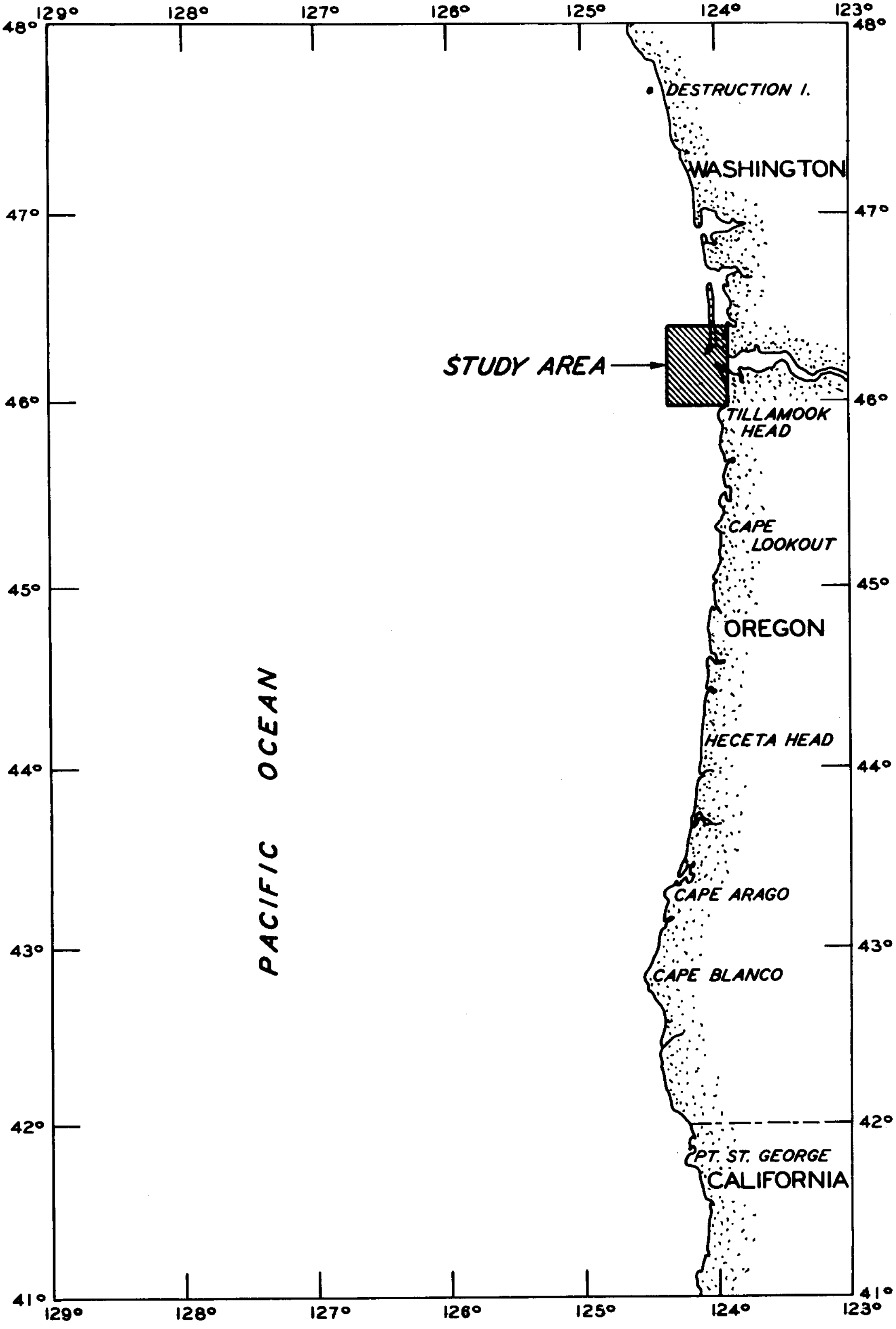


Figure C1. Location of the Study Area at the Mouth of the Columbia River

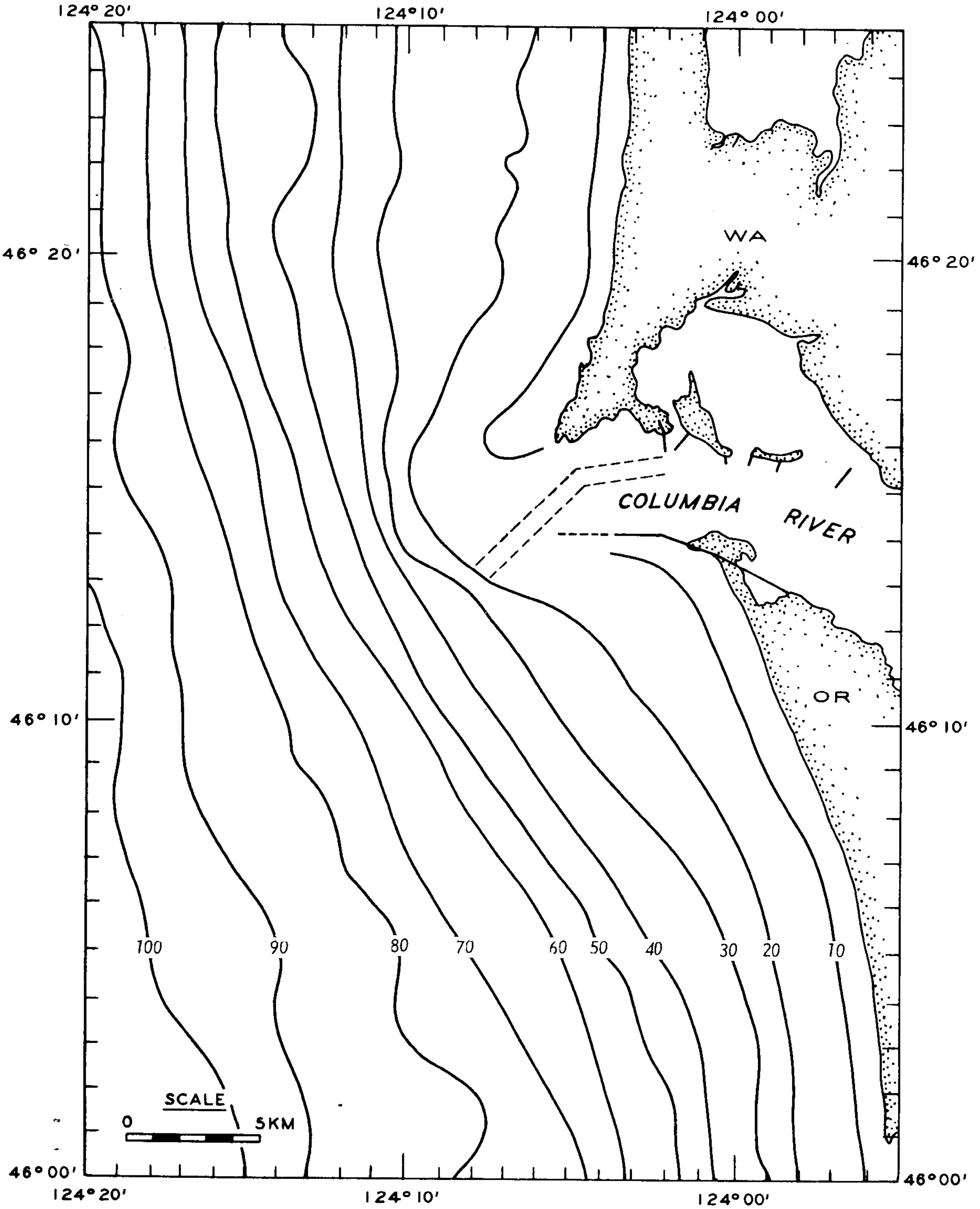


Figure C2. Depth Contours (meters) for MCR Region.

currents flow northward at 1 to 2 km/day in depths of 40-100 m. The bottom currents inshore of 40 m and near the Columbia River are predominately toward the mouth of the Columbia River (Barnes et al., 1972).

23. Tides at the mouth of the Columbia River are mixed semidiurnal with a mean tidal range of 2.0 m. Extreme low water has been estimated at 0.9 m below mean lower low water and extreme high water at 3.5 m above mean lower low water (Neal, 1972).

24. McManus (1972) divided the continental shelf near the Columbia River mouth into six sedimentological units: a nearshore sand deposit north of the Columbia to depths of 55 m; an inshore sand wedge extending south of the Columbia River to depths of 73 m; an outer-shelf band of silty sand both north and south of the Columbia River; a shelf-break band of relict sand; a rough topography of relict sediment southwest of the Columbia River; and a deposit of silty sediment which trends northwesterly along the outer shelf from the mouth of the Columbia River. A more detailed analysis of sediment texture and mineralogy of sediments off the mouth of the Columbia River is presented by Sternberg et al. 1977 in Appendix A of this series.

History of Dredged Material Disposal

25. Maintenance dredging of the Columbia River entrance began in the 1880's to allow large ships to safely enter the river. In 1895 a permanent south jetty (7.2 km long) was built. The south jetty was extended to 10.6 km in 1913, and a north jetty (3.8 km long) was built in 1917. Lockett (1963) reported that 11.5×10^6 m^3 of sediment was dredged from the entrance of the mouth of the Columbia River between 1939 and 1955. In 1956 the Corps of Engineers increased the depth of the entrance channel to 14.6 m and currently maintains this channel depth by annual dredging.

26. Since 1956 the Corps of Engineers have used four open-water areas to deposit material dredged from the channel (Figure C3). In addition disposal area D is used if weather prohibits open-water disposal. The most active disposal site is B where 24.3×10^6 m^3 of dredged material was deposited from 1957 to 1975. In that same period disposal

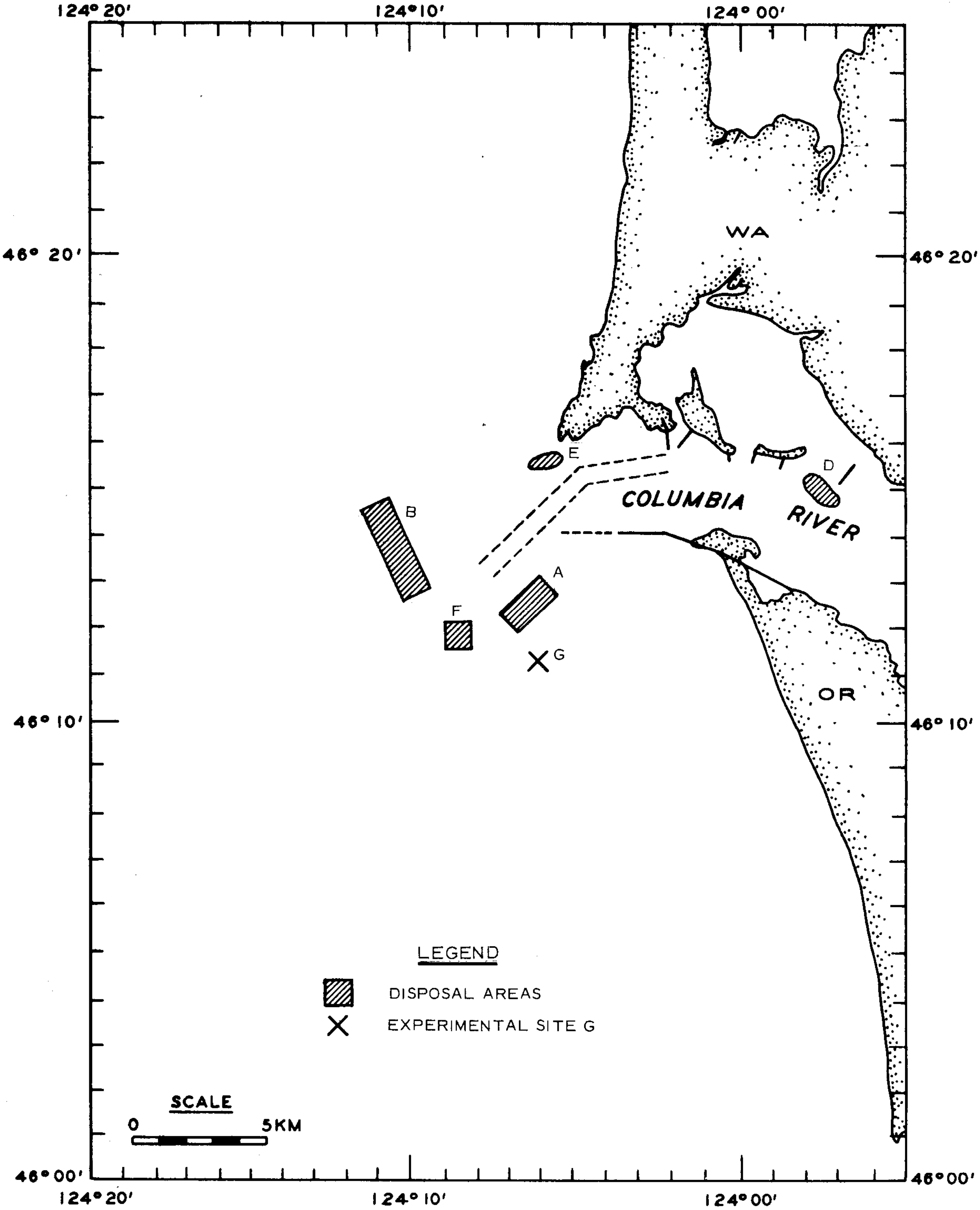


Figure C3. Location of Disposal Sites A, B, D, E, F and Experimental Site G.

site A received 1.3 x 10^6 m^3 of dredged material; disposal site D, 9.6 x 10^6 m^3; disposal site E, 4.5 x 10^6 m^3; and disposal site F, 0.5 x 10^6 m^3. Experimental site G received 0.45 x 10^6 m^3 dredged material between 9 July 1975 and 27 August 1975.

PART III: MATERIALS AND METHODS

Sampling Procedures

27. All samples were collected from the Oregon State research vessel CAYUSE. The 24.4-m (80-ft) long R/V CAYUSE is equipped with a main working winch with a 9.53 mm (3/8-in) wire and a smaller hydrographic winch with 4.76-mm (3/16-in) wire. Samples were collected with a 0.1-m^2 Smith-McIntyre grab, and a 3-m-wide metered beam trawl. The Smith-McIntyre grab and beam trawl were described in Carey and Heyamoto (1972). Station locations were determined by a Del Norte navigation system or Loran-A and radar fixes.

28. The Smith-McIntyre grab, which samples a surface area of 0.1 m^2, was used to obtain samples of macrofauna and sediment. The surface of the sediment was relatively undisturbed and the sediment volumes for replicate grabs within a single station were nearly equal (Appendix CI). Leakage from the Smith-McIntyre grab was negligible because the sampling gear was well maintained. Grabs were taken using the hydrographic winch. Two metal screens (0.42-mm apertures) allowed water to pass through the grab during descent (50 m/min) and reduced the shock wave as it neared the bottom. During ascent (50 m/min), the two flaps closed over the screens to eliminate mixing of the sediment surface.

29. The grab was placed on a specially designed cradle after retrieval. One screen door was removed and the contents of the grab were inspected to determine whether the grab penetrated satisfactorily into the substrate. The depth of penetration was then measured to the nearest millimeter. The sediment type was crudely determined by touch, and any important observations about the sample were noted.

30. The contents of Smith-McIntyre grabs obtained for macrofauna analysis were washed into an open 38-ℓ (10-gal) plastic container underneath the grab cradle. The cradle was so constructed that all the contents of the grab and the water used to wash the grab entered the plastic container without loss. The grab sample was then washed through a metal

screen with 1.00-mm aperture. The material retained on the screen was transferred to plastic ontainers and preserved in 10 percent formalin buffered with NaH_2BO_3.

31. If the grab was to be used for sediment analysis, the upper 1-cm of surface of the grab contents was removed by hand, placed in a labeled plastic bag, and frozen. The remaining contents of the grab were discarded. Frozen sediment samples were sent to the University of Washington, Seattle, for analysis.

32. Meiobenthic samples (>62μ) were obtained with a 0.1-m^2 Smith-McIntyre grab or a multiple cover on the first two cruises. Because of the long sorting time (mean, 45-hr/sample) and problems with identification, the meiobenthic (>62μ) sampling was not continued. One grab per station on subsequent cruises was washed through a 0.50-mm screen in order to capture juvenile macrofauna. The 0.50-mm samples were rescreened in the laboratory into two fractions, the 0.50 to 1.00-mm and the 1.00-mm fraction. The 1.00 mm fractions were treated as macrofauna samples.

33. The 3-m-wide metered beam trawl was used to sample the megafauna. The trawl net was attached to a rigid frame 3-m wide and 1-m high. The net was a 3-m otter trawl with 3.81-cm (1 1/2-in) stretch mesh and a 1.27-cm (1/2-in) stretch mesh liner. The distance covered over the bottom was measured with odometer wheels attached to each side of the frame. The beam trawl was towed with the 9.53-mm (3/8-in) wire of the main working winch on the R/V CAYUSE. After the wheel revolution counters were read, the trawl was lowered at 35 m/min, while the ship steamed forward at 3.7 km/hr (2.0-knots). The trawl was towed across the bottom for 30 min. (scope ratio 4:1) and was retrieved at 35 m/min (Carey and Heyamoto, 1972). The wheel revolution counter was read and the sample was removed from the net. Larger fish and Cancer magister were identified, measured, and returned to the sea. The remainder of the catch was placed in 38-ℓ (10-gal) plastic containers and preserved in 10 percent formalin buffered with NaH_2BO_3.

34. It was convenient to divide the samples obtained during this contract period into six categories: pilot samples, areal baseline

samples, seasonal baseline samples, experimental site G samples, sampling efficiency samples, and megafauna samples. In many cases a sample was included in more than one category. For example, the samples used for control stations for experimental site G are also part of the seasonal baseline.

35. Additional data were obtained at each station on all cruises except the pilot cruise. Surface water temperature was determined with a stem thermometer. The wave height and direction, cloud type, and percent cloud cover were estimated. The wind direction and velocity, air temperature, and barometric pressure were measured. The time, latitude, longitude, and bottom depth were obtained for each sample. The length of tow along with location was determined for each beam trawl.

Sampling Cruises

36. During the contract period (1 October 1974 to 31 December 1977), 12 sampling cruises were attempted. Ten cruises were successful and two were terminated early because of bad weather. The 12 sampling cruises are described in the following paragraphs.

C7409C2 (October 1-2, 1974)

37. The first cruise was a pilot survey. The results of the pilot survey and the data on the distribution of sediments provided by the University of Washington were used to plan subsequent sampling strategies. A total of forty-six 0.1-m^2 Smith-McIntyre grab samples were obtained, one at each station. Twenty-one stations were located in the vicinity of dredged material disposal site B (Figure C4) and 25 stations were located in the surrounding area (Figure C5).

C7411F (November 18-24, 1974)

38. The second sampling cruise was aborted because of storm and gale conditions in the study area.

C7412B (December 4-8, 1974)

39. The third sampling cruise obtained samples for the areal baseline and sampling efficiency study. A total of 305 0.1-m^2 Smith-McIntyre

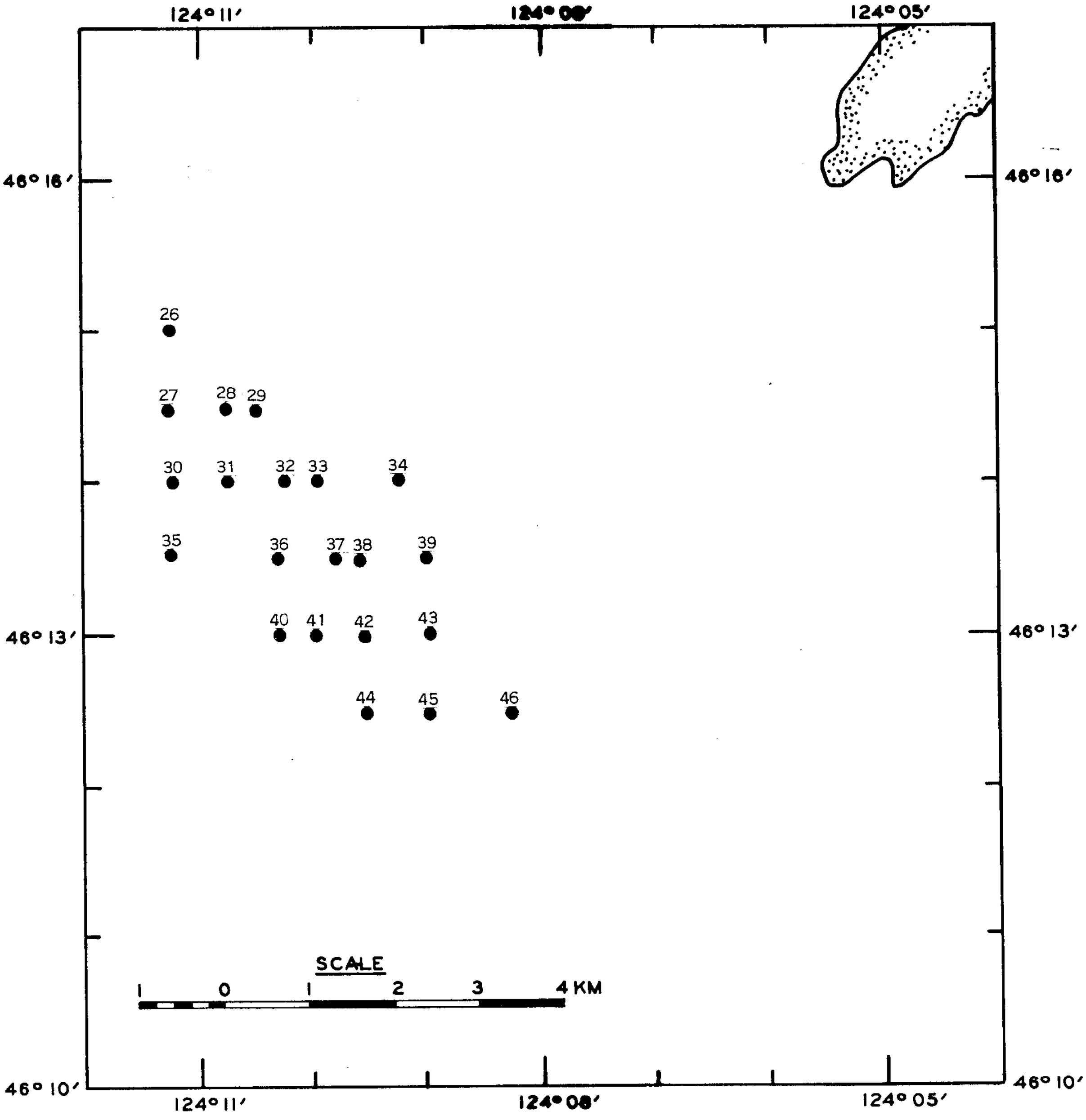


Figure C4. Locations of Macrofaunal Stations for October 1974 (C7409C) I.

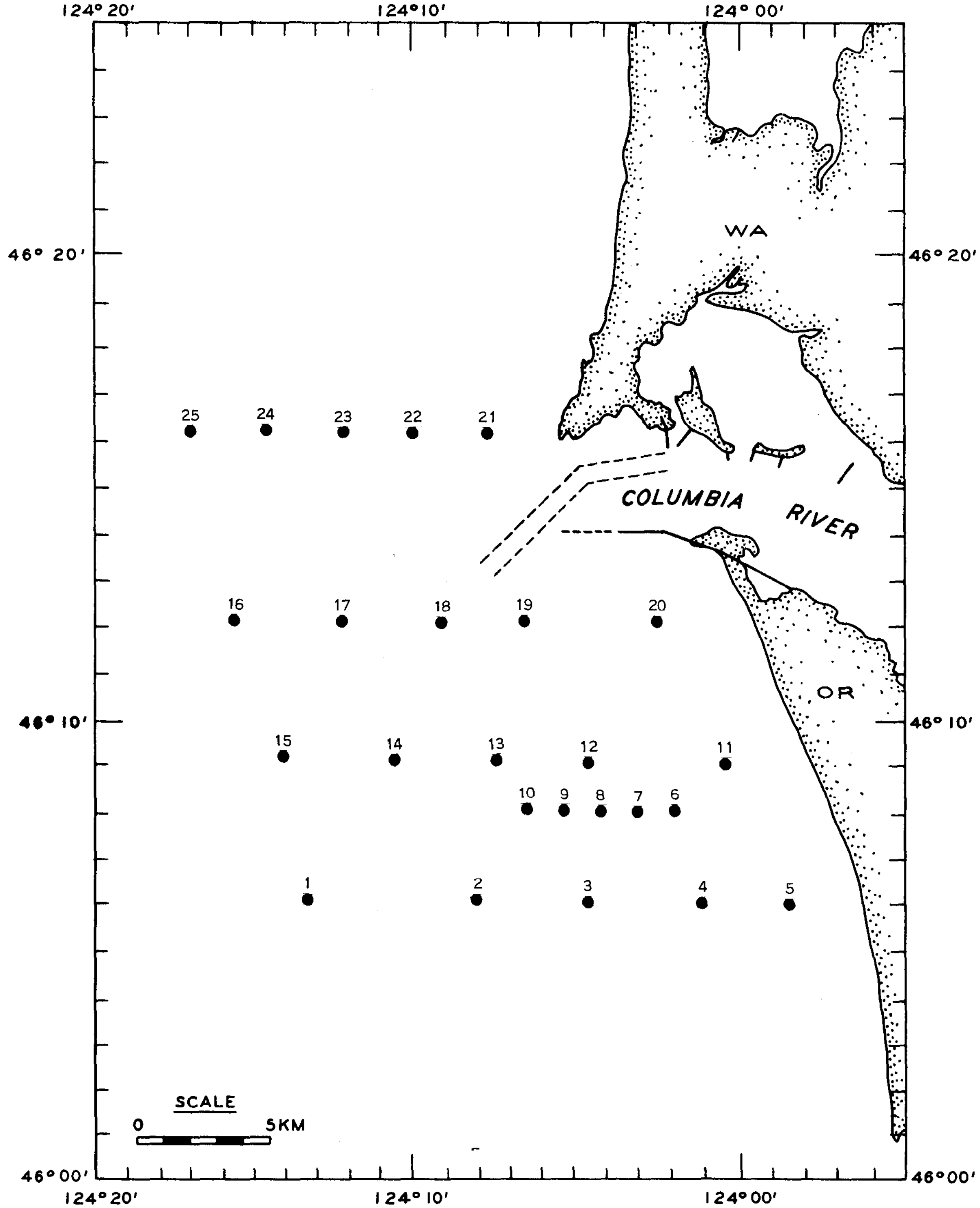


Figure C5. Locations of Macrofaunal Stations for October 1974 (C7409C) II.

grab samples for macrofauna were obtained, 5 per station, at 57 stations and 20 per station at 1 station. Twenty-two of the Smith-McIntyre stations were located in the vicinity of disposal site B and the remaining 35 stations were located in the surrounding areas. The 20 replicate samples taken at one station were located near a site which later became experimental site G. Fifty-eight sediment samples (one per station) were also obtained and sent to the University of Washington. Locations for these samples plus those taken in January 1975 (C7501D) are shown in Figures C6 and C7. Metered beam trawls were obtained at two stations (two per station) located near experimental site G (Figure C8).

C7501D (January 19-25, 1975)

40. The fourth sampling cruise completed the areal baseline. A total of 250 0.1-m^2 Smith-McIntyre grabs were obtained for macrofaunal work, 5 per station at 50 stations. Twelve of the stations were located near disposal site B; 12 stations were located in the surrounding areas; and 15 stations were located in other disposal areas (A, E, and F) or occupied in common with MCR Chemical Baseline Studies. The remaining 11 stations were not sorted because they were located out of the immediate area of interest. Fifty sediment samples were also obtained (one per station) and sent to the University of Washington. Station locations are shown in Figures C6 and C7.

C7504B (April 18-23, 1975)

41. The fifth sampling cruise began the seasonal baseline work. Twenty-six locations were chosen to represent the different assemblages found in the MCR disposal site region. Locations were chosen so that at least two stations were located in each assemblage. The seasonal stations also included all the disposal sites (A, B, E, and F), the experimental site (G), and control stations for the experimental site G (Figure C9). Six replicate Smith-McIntyre grabs were obtained at each of 26 stations: 5 for macrofauna (4 replicates at each station were screened through a 1.00 mm screen and the fifth replicate was screened through a 0.50-mm screen) and one for sediment. Beam trawls were obtained at six stations (two trawls/ station) for larger megafauna. All beam trawl stations were located south of experimental site G (Figure C10). Poor weather conditions prevented collection of beam trawls at eight additional stations.

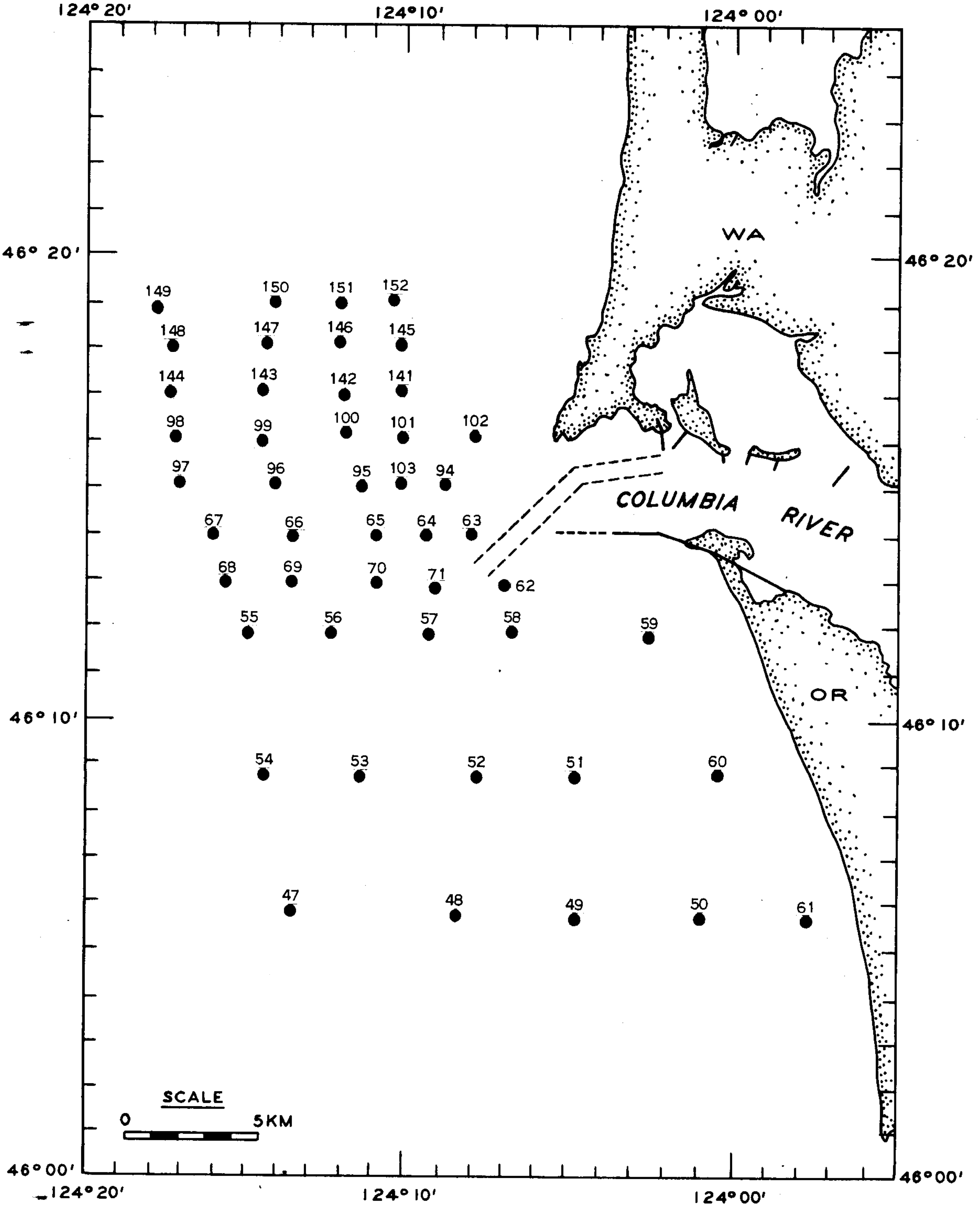


Figure C6. Locations of Macrofaunal Stations for December 1974 (C7412B) and January 1975 (C7501D) I

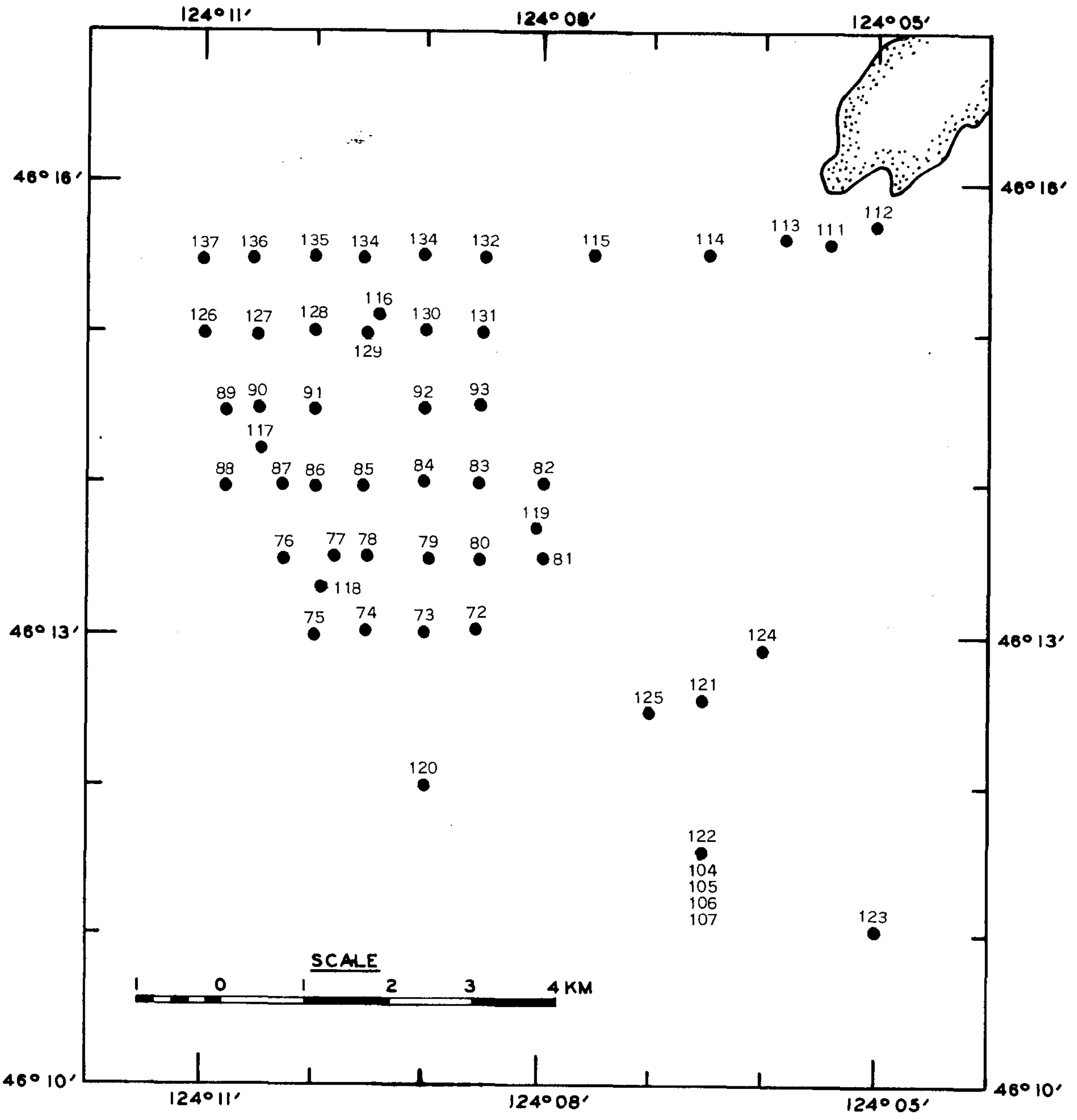


Figure C7. Locations of Macrofaunal Stations for December 1974 (C7412B) and January 1975 (C7501D) II

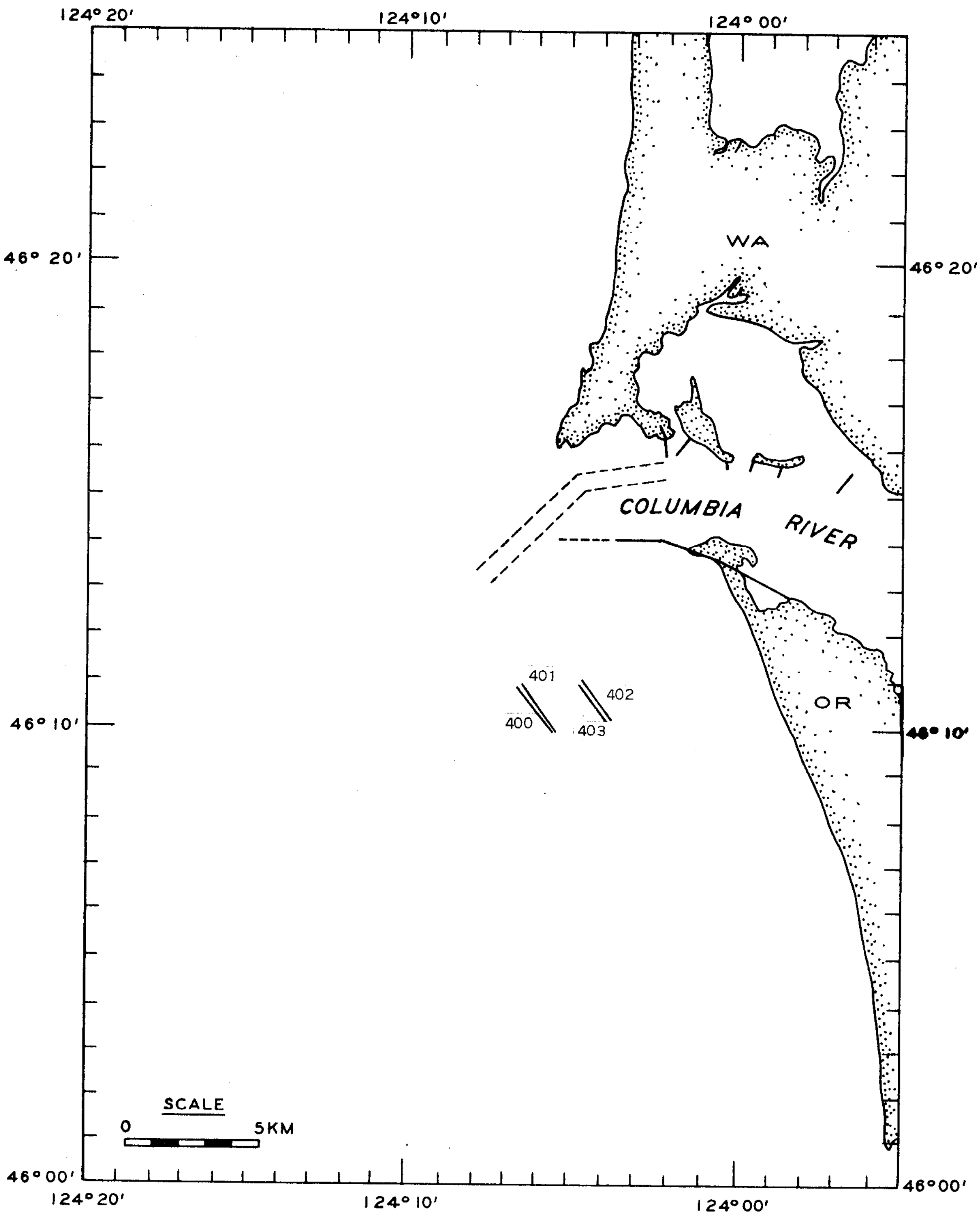


Figure C8. Locations of Megafaunal Stations for December 1974 (C7412B) and January 1975 (C7501D)

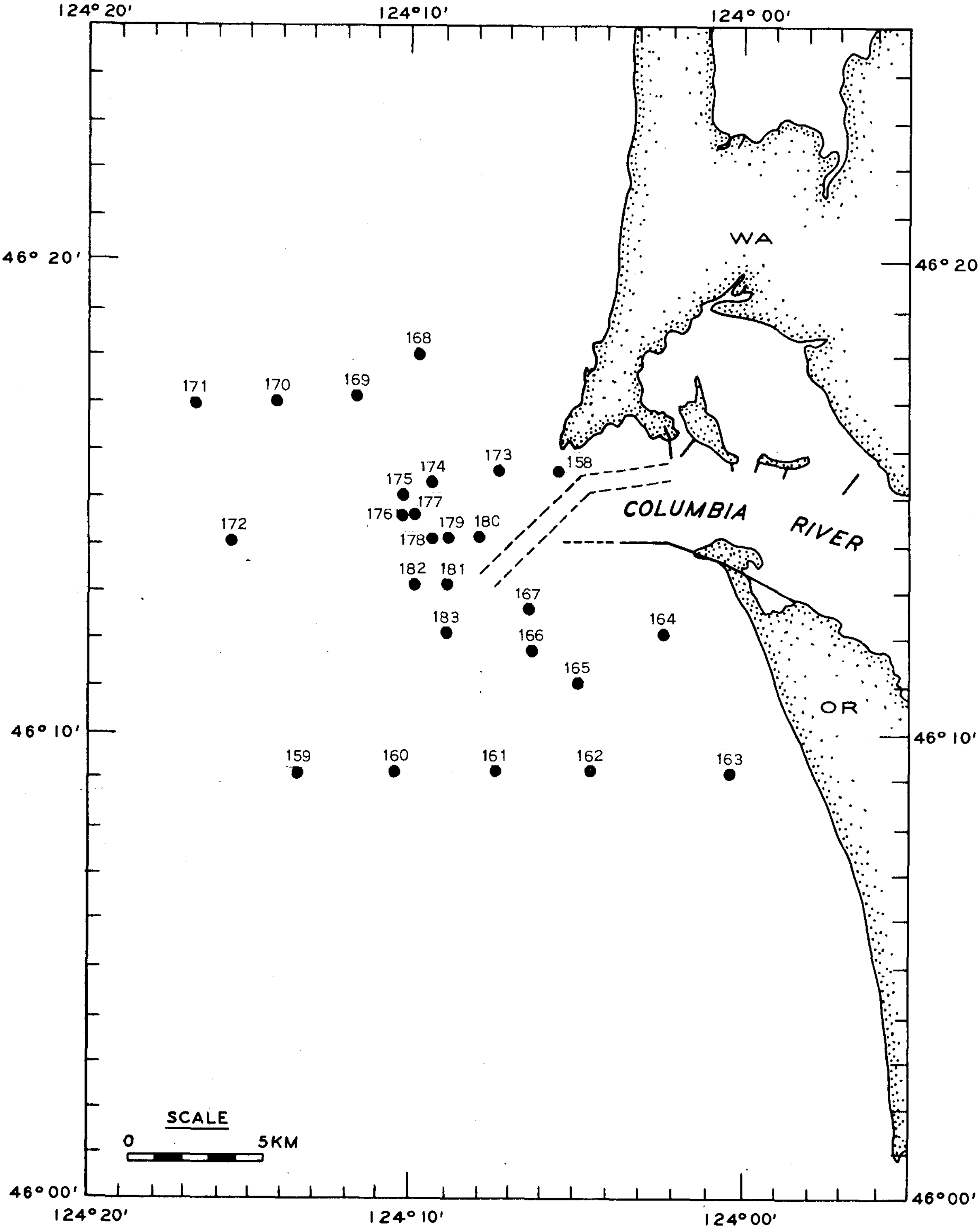


Figure C9. Locations of Macrofaunal Stations for April 1975 (C7504B)

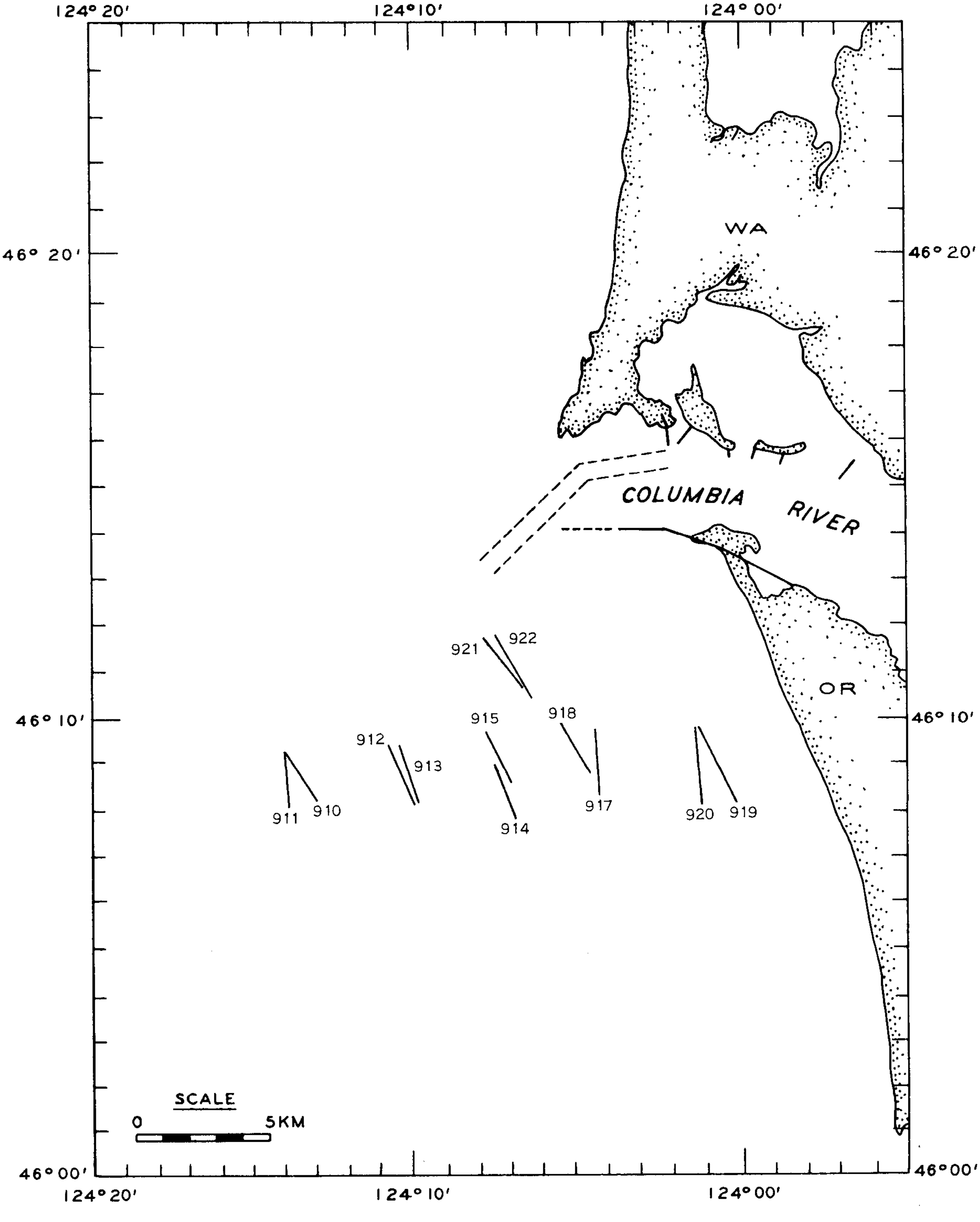


Figure C10. Locations of Megafaunal Stations for April 1975 (C7504B)

C7506C (June 23-27, 1975)

42. On the sixth sampling cruise, the seasonal baseline sampling was continued, experimental site G and the area that was to be dredged were sampled. Five replicate 0.1-m^2 Smith-McIntyre grab samples were obtained at each of 37 stations (185 grabs) for macrofauna (four, 1.00 mm; one, 0.50 mm), and one replicate grab sample for sediment (37 grabs). Locations for 26 seasonal stations were the same as on the April 1975 cruise (C7504B). Five stations including one seasonal station were located in experimental site G. The remaining five stations were located in the Columbia River entrance channel in the area that was to be dredged. Twenty-two metered beam trawls were also obtained (two per station at nine stations, one per station at four stations). Station locations for Smith-McIntyre and beam trawl samples are shown in Figures C11 and C12 respectively.

C7508E (August 25-29, 1975)

43. No biological samples were obtained on this cruise because of bad weather. Twenty-seven sediment samples were collected and sent to the University of Washington, Seattle, for analysis.

C7509E (September 11-16, 1975)

44. On the eighth sampling cruise the seasonal baseline sampling was continued and experimental site G was sampled after the disposal operation. Five replicate 0.1-m^2 Smith-McIntyre grab samples were obtained at each of 50 stations (250 grabs) for macrofauna (four, 1.00 mm; one, 0.50 mm), and one grab sample was obtained for sediment (50 grabs). Locations for the 26 seasonal stations were the same as on the April 1975 cruise (C7504B). An additional 24 stations were located in or near experimental site G. Station locations are shown in Figures C13 and C14. Twenty-seven metered beam trawls were obtained at 14 stations. Of the 27 beam trawls, 10 were located near experimental site G, 4 south of experimental site G, 6 near disposal sites B and E and 6 further offshore as part of the seasonal studies. Beam trawl stations are shown in Figure C15. In addition to the biological samples, 22 sediment samples were obtained in experimental site G at stations not occupied for biological work.

C7510E (October 20-25, 1975)

45. On the ninth sampling sampling cruise, experimental site G and

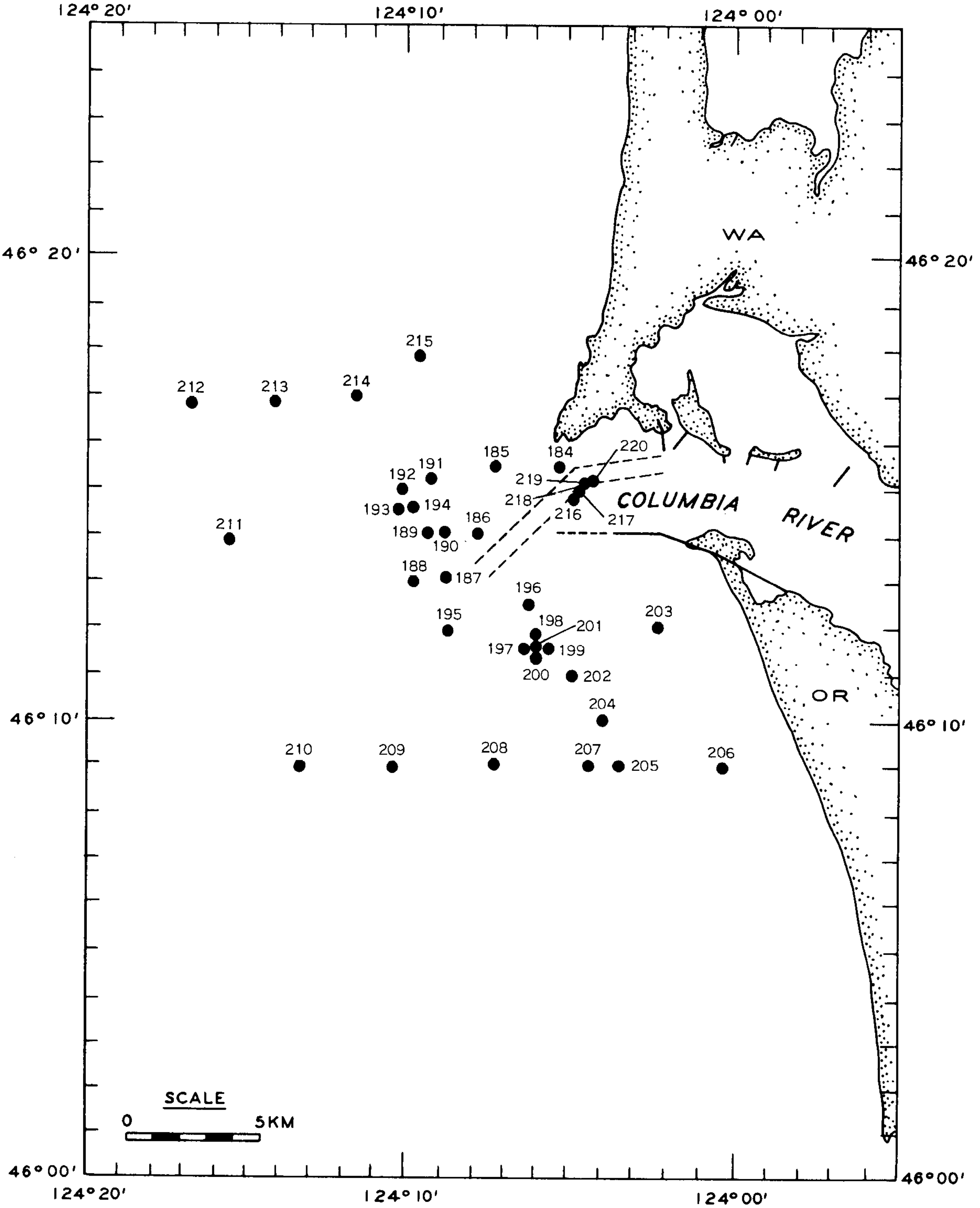


Figure C11. Locations of Macrofauna Stations for June 1975 (C7506C)

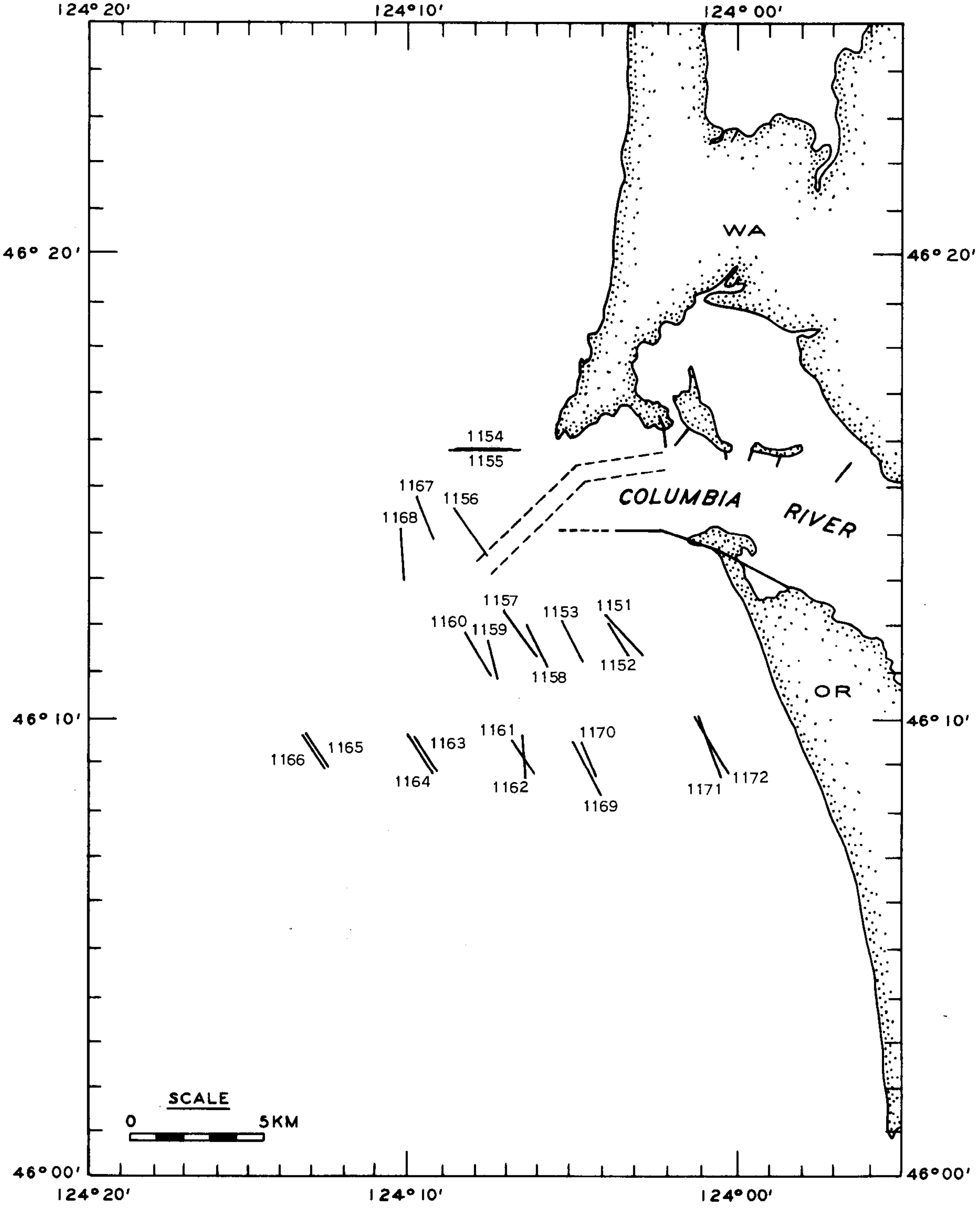


Figure C12. Locations of Megafaunal Stations for June 1975 (C7506C)

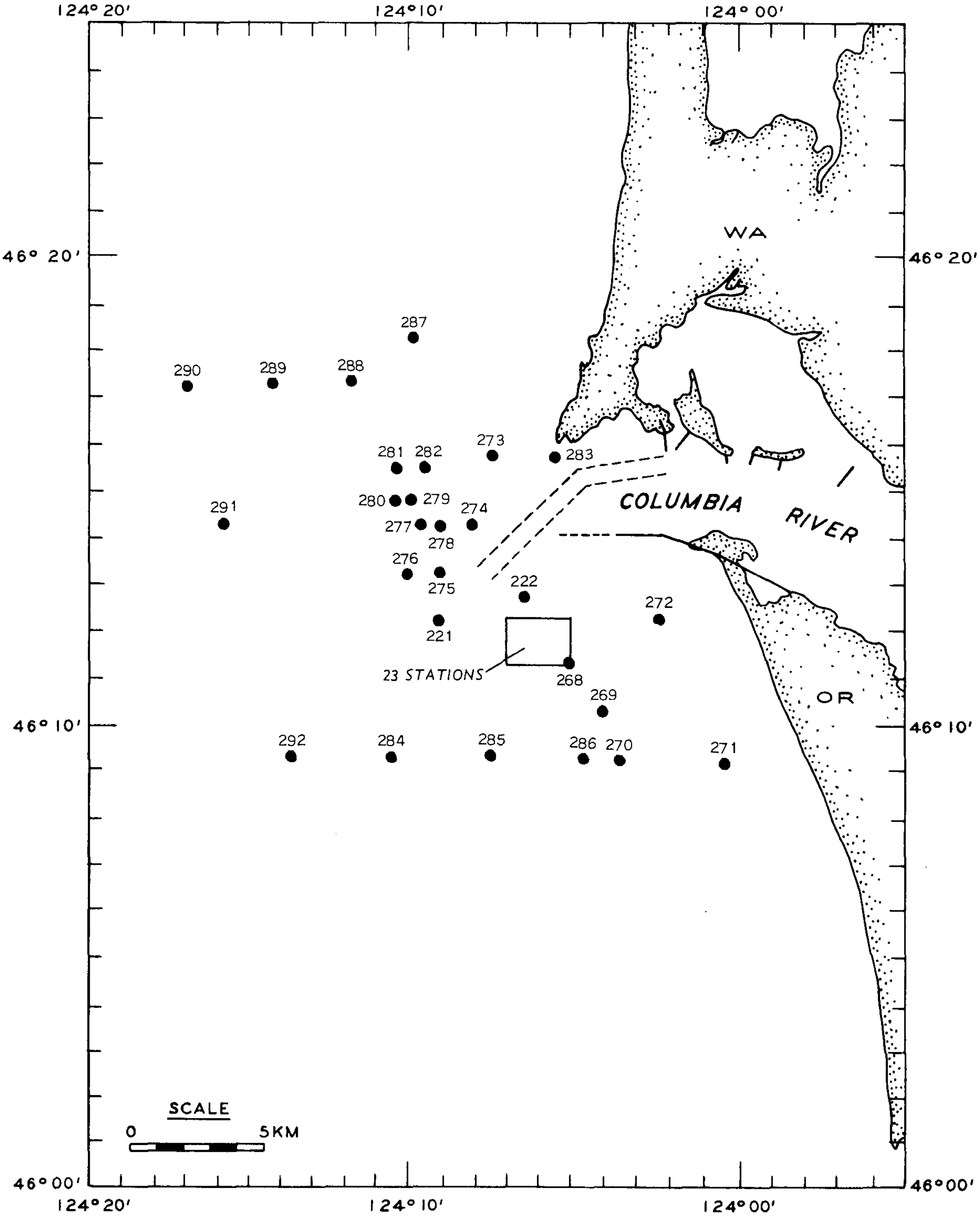


Figure C13. Locations of Macrofaunal Stations for September 1975 (C7509E)

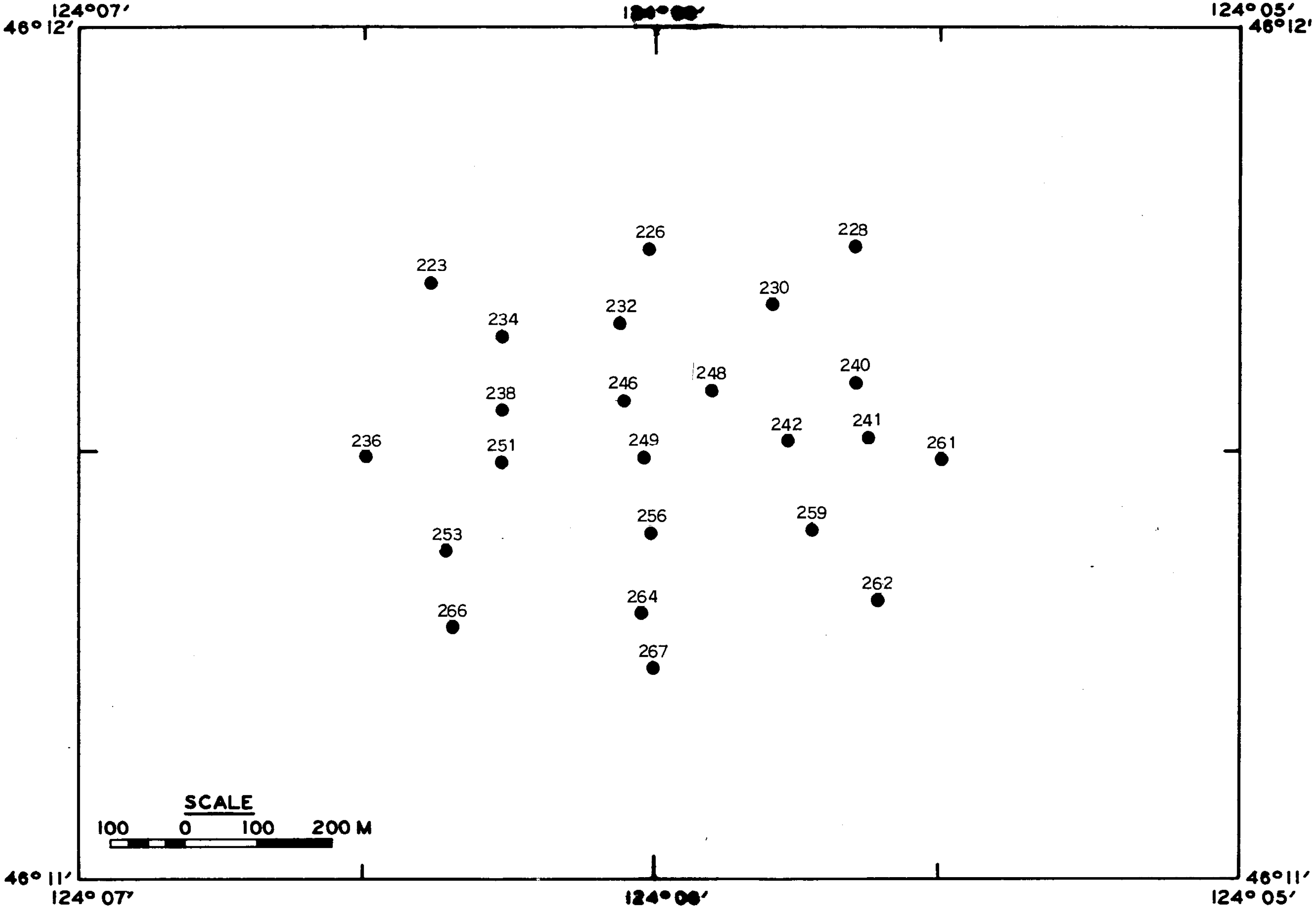


Figure C14. Locations of Macrofaunal Stations Near Experimental Site G for September 1975 (C7509E)

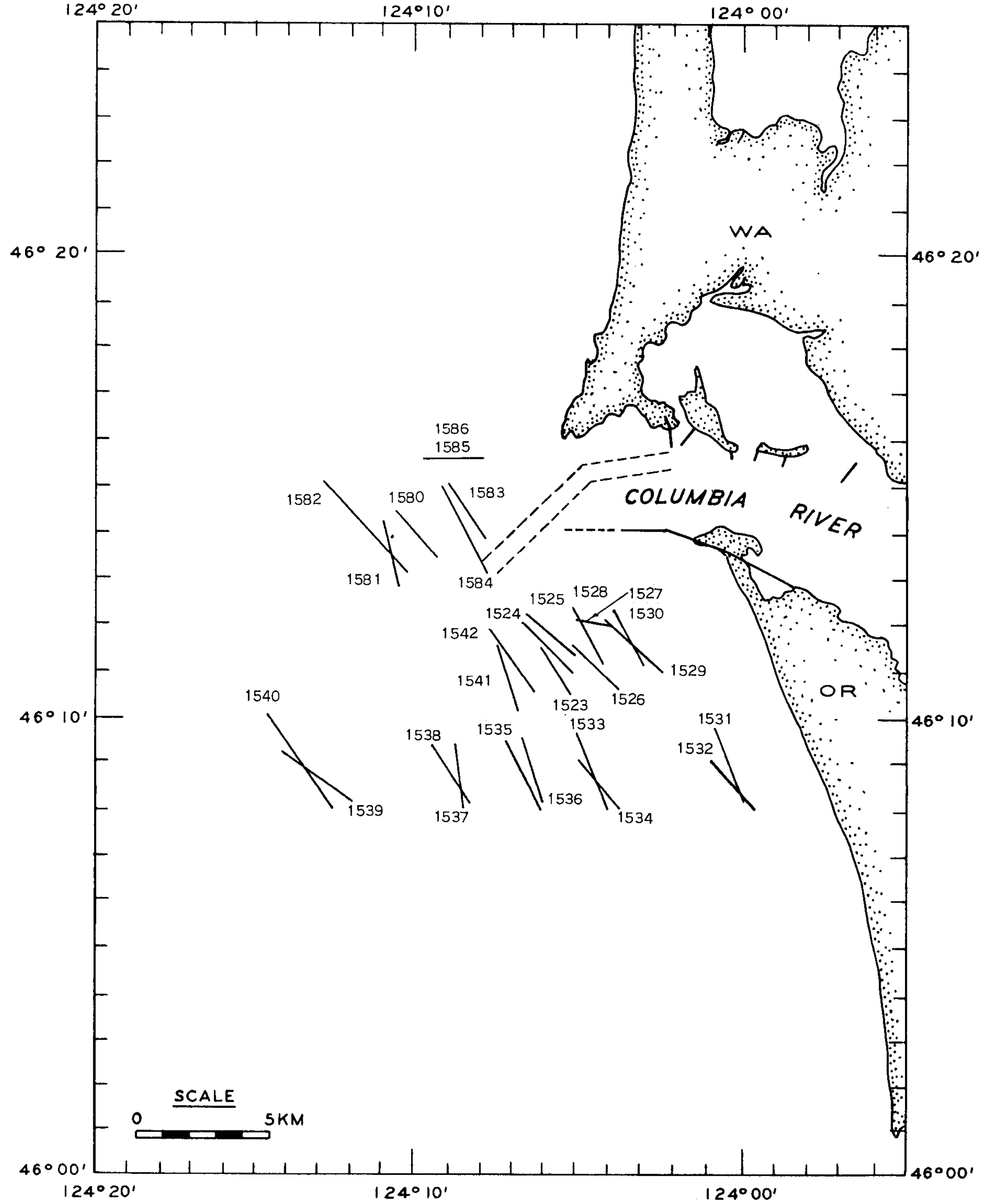


Figure C15. Locations of Megafaunal Stations for September 1975 (C7509E) control stations for experimental site G were sampled. Five replicate 0.1-m^2 Smith-McIntyre grab samples were obtained at each of 31 stations for macrofauna (four, 1.00 mm; one, 0.50 mm), and one sediment sample was obtained from each station. Station locations are shown in Figures C16 and C17. Eight metered beam trawl samples were also obtained in or near experimental site G (Figure C18).

C7601D (January 3-10, 1976)

46. On the tenth sampling cruise, the seasonal baseline sampling was completed and sampling experimental site G was continued. Five replicate 0.1-m^2 Smith-McIntyre grab samples were obtained from 43 stations for macrofauna (four, 1.00 mm; one, 0.50 mm). Locations for these samples were the same as on the September 1975 cruise (C7509E) (Figures C19 and C20). Two stations in the experimental site and five seasonal stations were not sampled because of poor weather conditions. One sediment sample was obtained from each station. No beam trawl samples were obtained because of adverse weather conditions.

C7604B (April 19-20, 1976)

47. On the eleventh sampling cruise, experimental site G and control stations for experimental site G were sampled. Five replicate $0.1\ \text{m}^2$ Smith-McIntyre grab samples were obtained from each of 12 stations for macrofauna (four, 1.00 mm; one, 0.50 mm). One sediment sample was also obtained from each station (Figure C21).

C7606B (June 7-8, 1976)

48. On the twelfth sampling cruise, the same 12 stations occupied on the April 1976 cruise (C7604B) were sampled (Figure C22). Five replicate 0.1-m^2 Smith-McIntyre grab samples were obtained from each of 12 stations for macrofauna (four, 1.00 mm; one, 0.50 mm). One sediment sample was also obtained from each station. This cruise completed the field work for this contract.

General Information

49. Station locations and grab number for every $0.1\ \text{m}^2$ Smith-McIntyre grab sample are presented in Appendix CI. Also included are cruise number, time, water depth, sediment volume for biological samples,

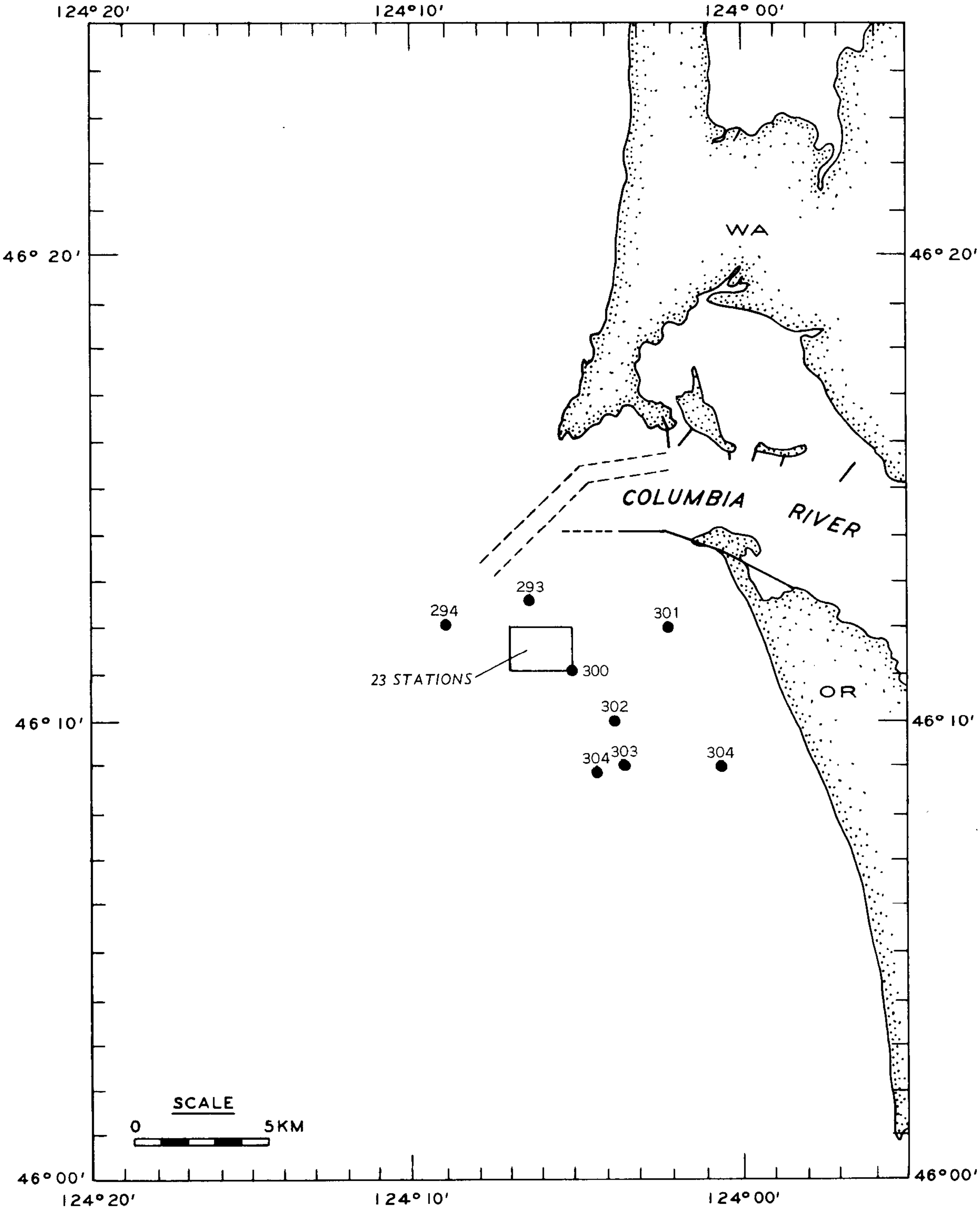


Figure C16. Locations of Macrofaunal Stations for October 1975 (C7510E)

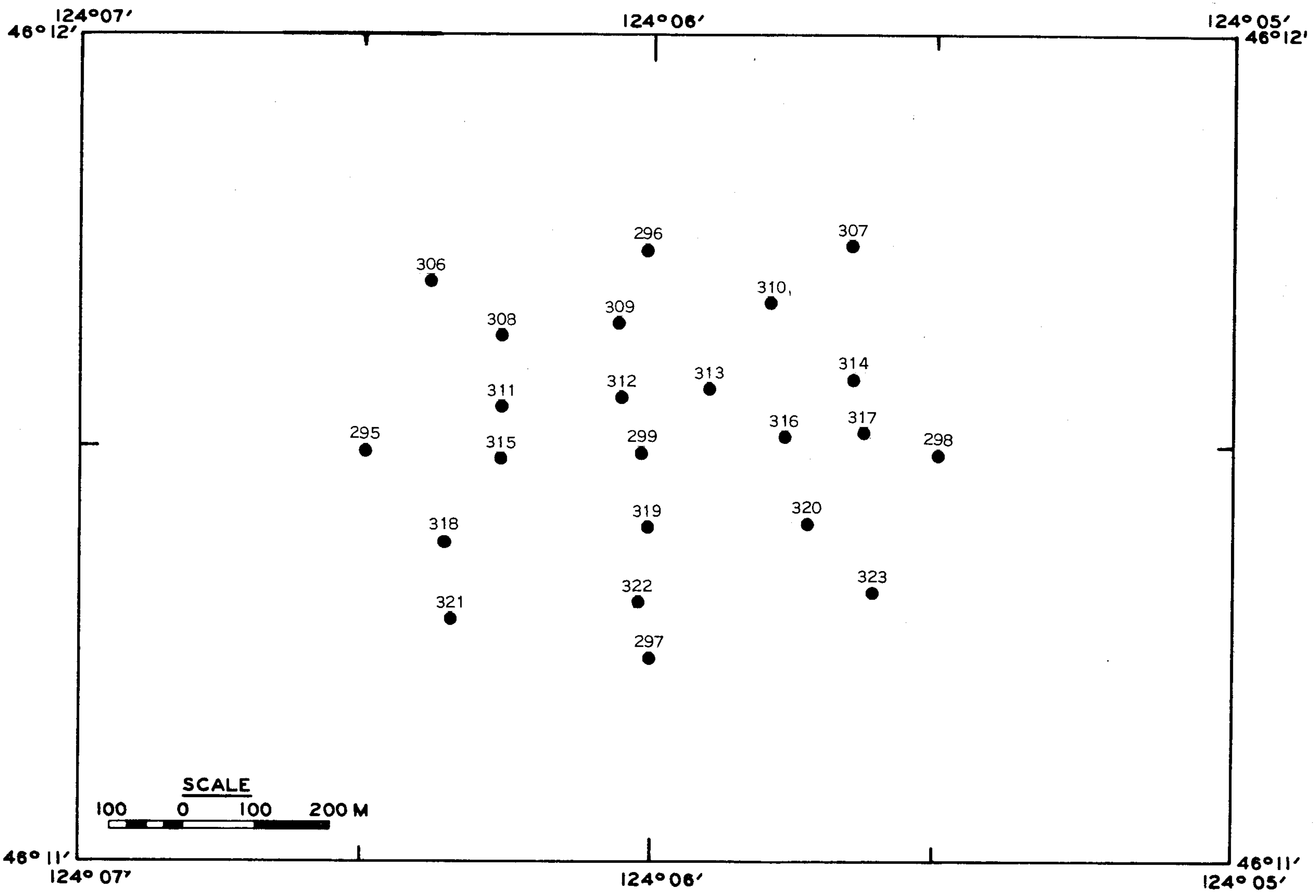


Figure C17. Locations of Macrofaunal Stations Near Experimental Site G for October 1975 (C7510E)

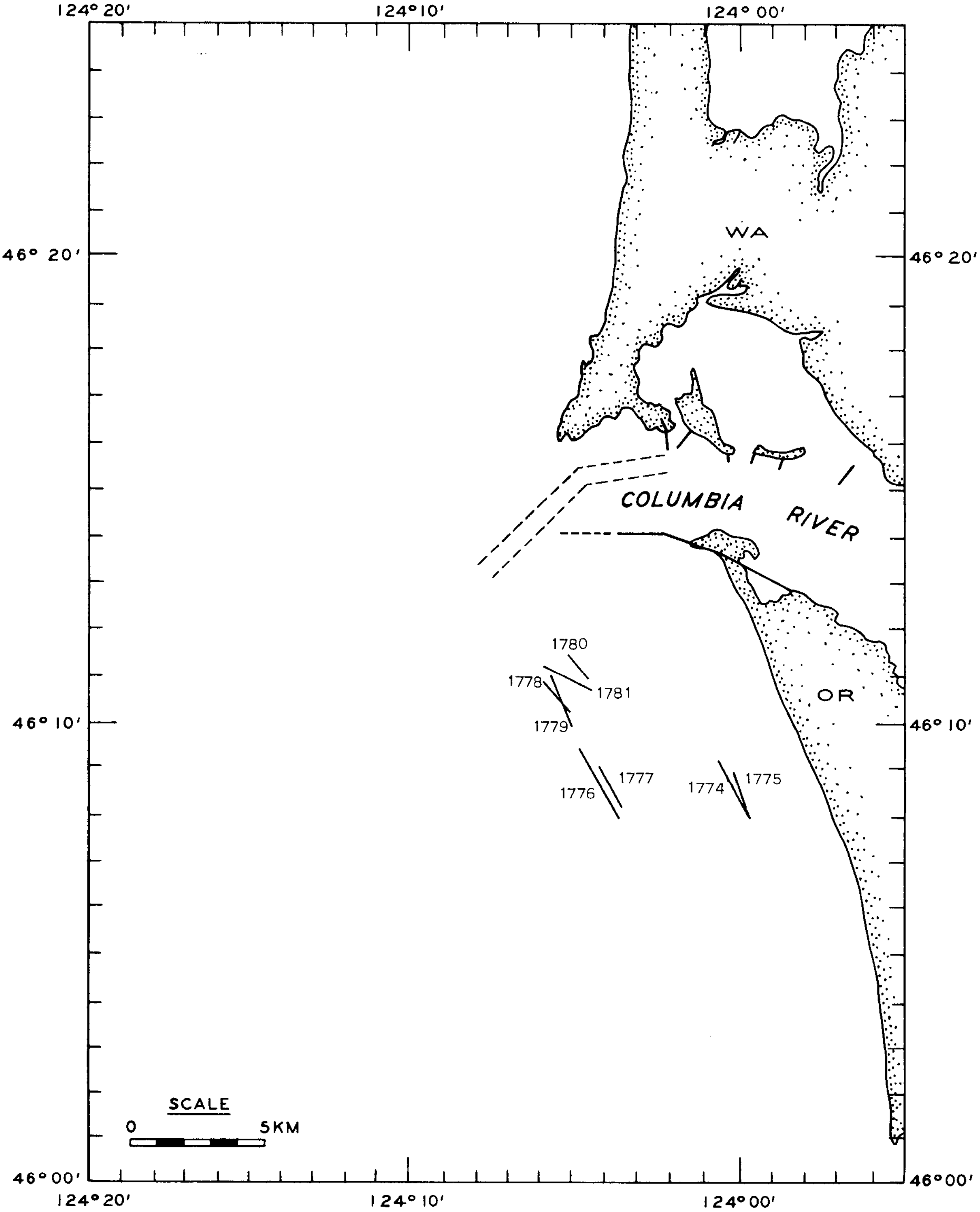


Figure C18. Locations of Megafaunal Stations for October 1975 (C7510E).

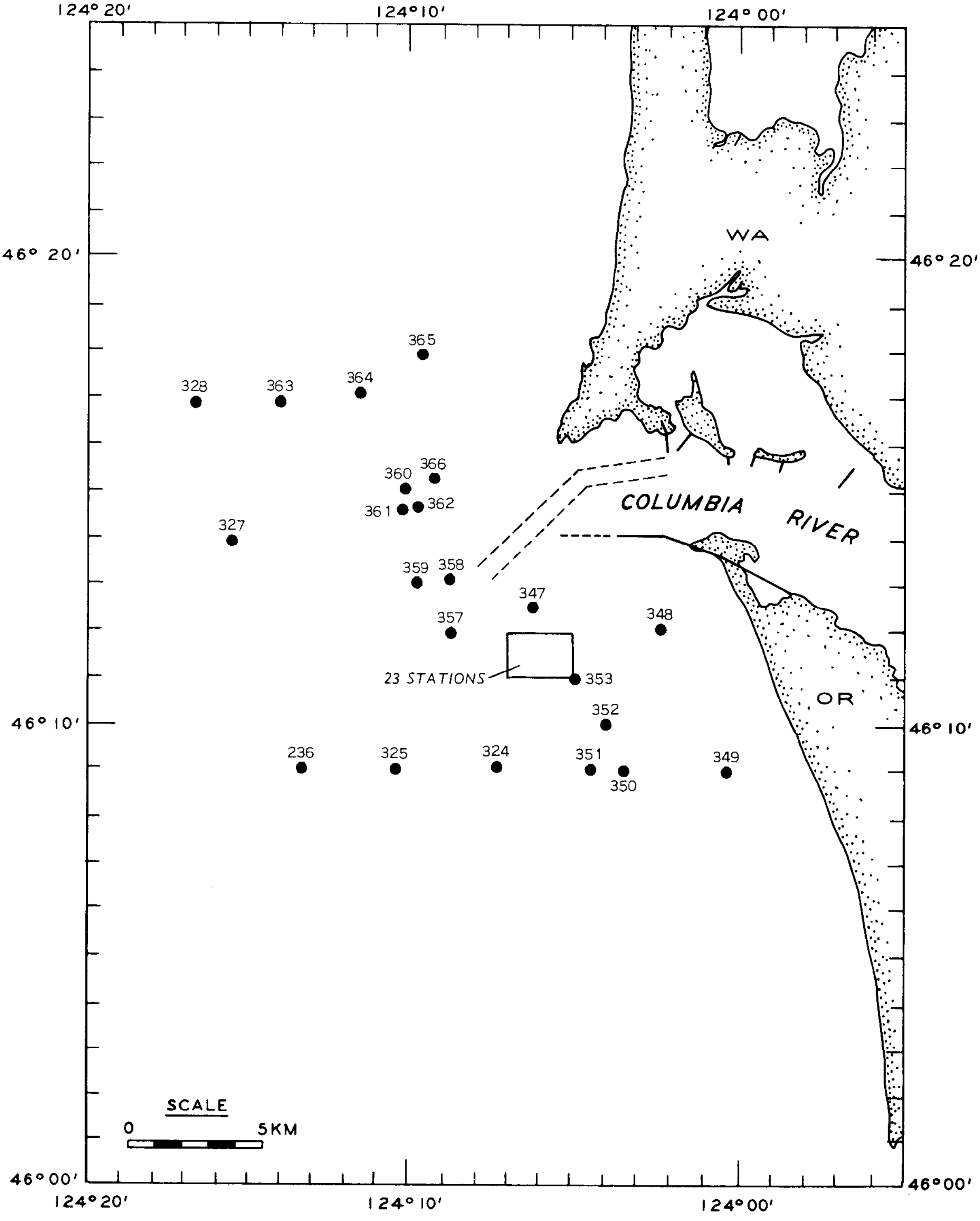


Figure C19. Locations of Macrofaunal Stations for January 1976 (C7601D).

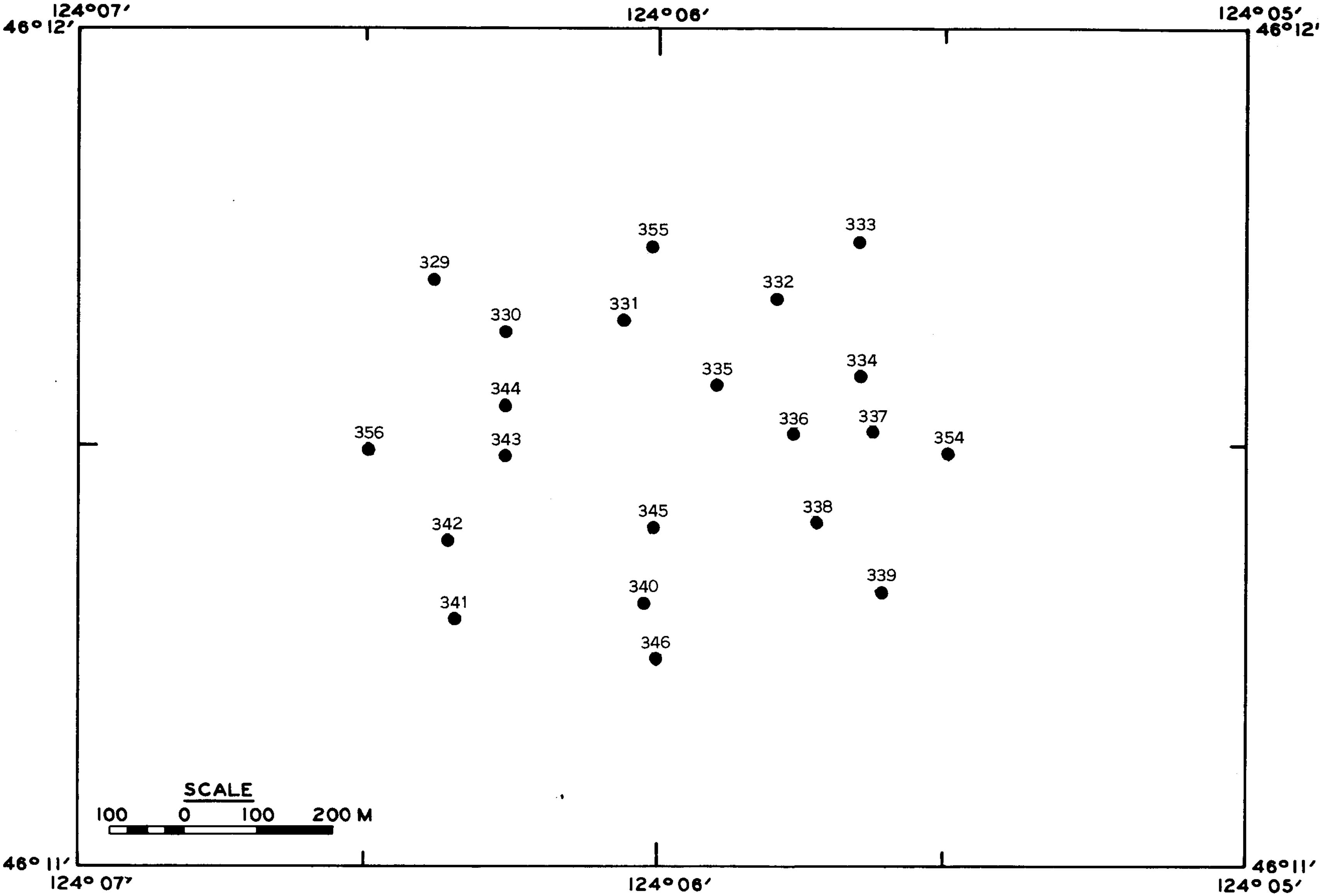


Figure C20. Locations of Macrofaunal Stations Near Experimental Site G for January 1976 (C7601D)

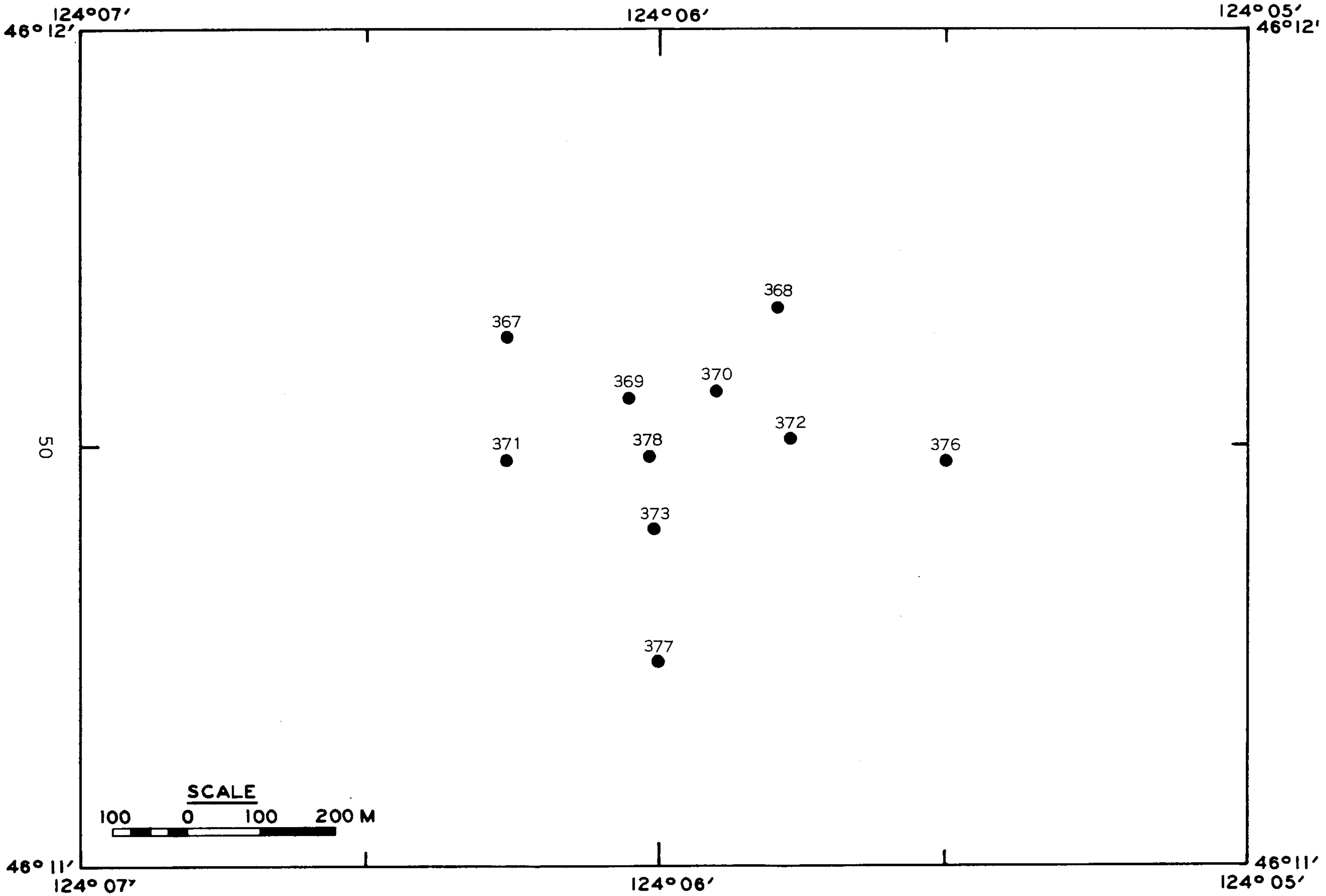


Figure C21. Locations of Macrofaunal Stations Near Experimental Site G for April 1976 (C7601D)

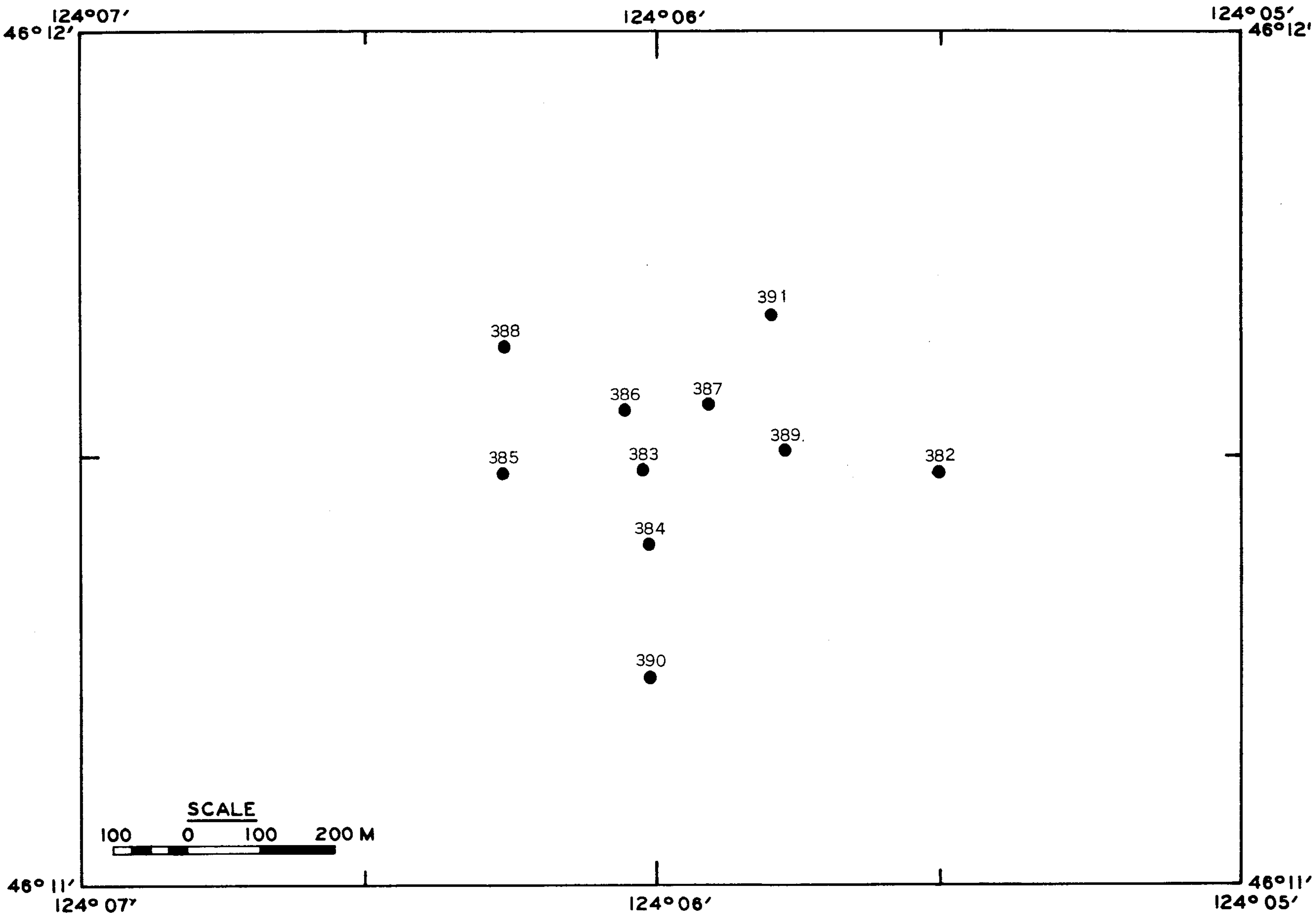


Figure C22. Locations of Macrofaunal Stations Near Experimental Site G for June 1976 (C7606B) sediment type, screen size for biological samples, and comments. Water depths were not corrected for tides. Sediment data was provided by the University of Washington. Sediment volume was calculated using the relationship between depth of penetration and sediment volume. Station locations for metered beam trawl are also present in Appendix CI.

50. Station locations were determined by a Del Norte navigation system where possible. Stations were considered to be circles with a radius of approximately 100 m. The reported accuracy of the Del Norte system is one meter. The Del Norte system was not available on cruises C7409C and C7412B. Loran-A and radar fixes were used to determine locations on these cruises. The accuracy of the Loran A and radar fixes near the mouth of the Columbia River was approximately 250 m. On C7501D, 28 of the 50 stations were located by Del Norte, the remaining 22 stations were located by Loran-A and radar. All stations except those farthest offshore were located by Del Norte on cruises C7504B, C7506C, C7508E, C7601A, C7604B, and C7606B.

51. In order to facilitate the presentation and interpretation of the results of 2,040 samples obtained at 366 stations, a new set of numbers were assigned to stations that were occupied on more than one cruise. The new location numbers designated locations for seasonal baseline stations, and stations located in experimental site G. Station designations for the pilot study and the seasonal baseline remained the same. The 26 seasonal stations were part of the R-series (1-26). The locations are presented in Figure C23 and Table C1. Stations located in experimental site G were part of the K-series (1-40). The number designations are the same as those used by the University of Washington (Figure C24). Station numbers that correspond to these locations are presented in Table C2.

Laboratory Procedures

Megafauna samples (beam trawls)

52. All beam trawl samples were sorted into major taxonomic groups by eye. The fish were identified, measured, and returned to 10 percent

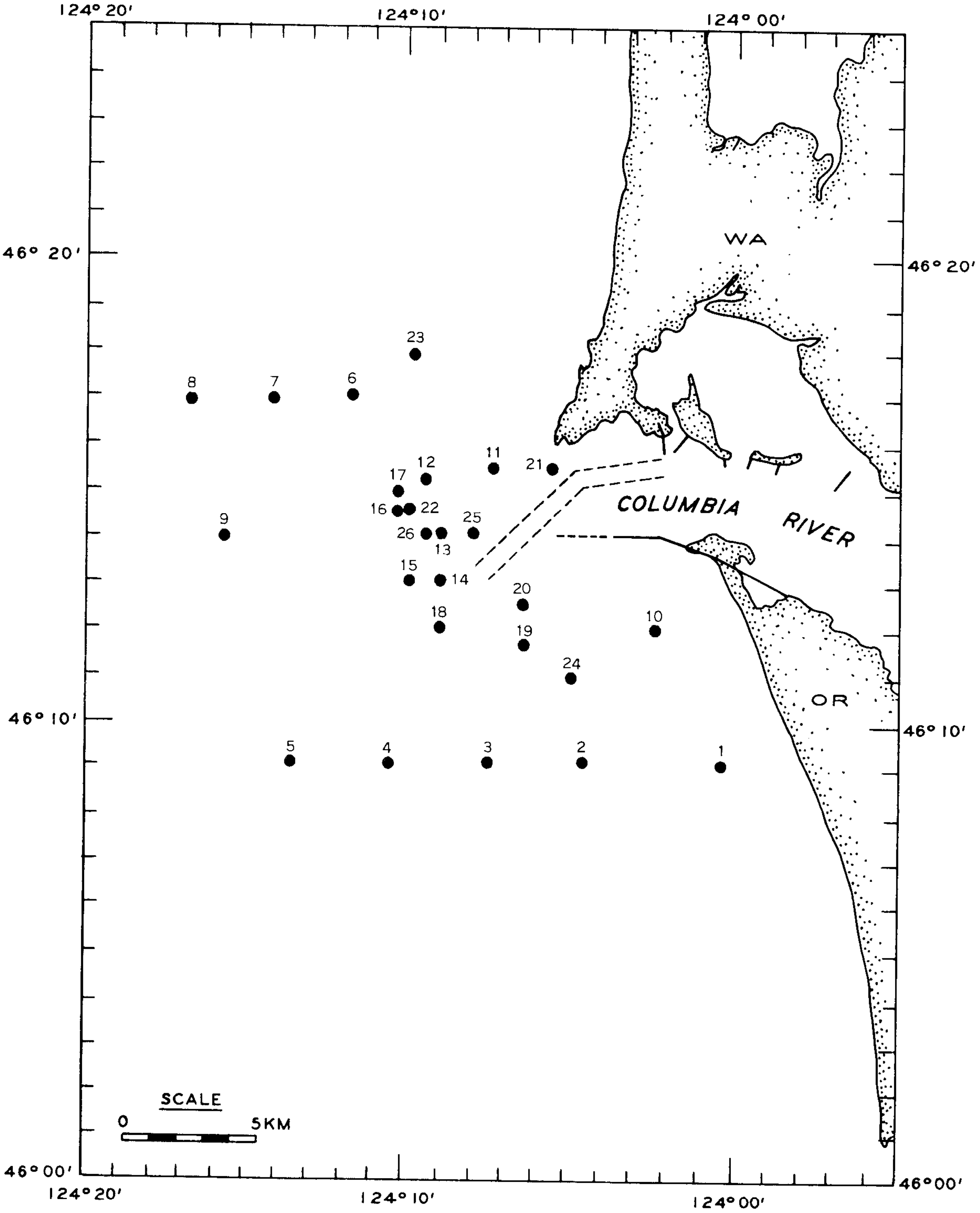


Figure C23. Location of 26 Seasonal Baseline Stations

Table C1

MCR Macrobenthic Station Numbers at Seasonal Baseline Locations.

Location	Latitude (N)	Longitude (W)	Station Number Dec 1974-Jan 1975	April 1975	June 1975	Sept. 1975	Jan 1976
R- 1	46° 09.0'	124° 00.5'	60	163	206	271	349
R- 2	46° 09.0'	124° 04.5'	51	162	207	286	351
R- 3	46° 09.0'	124° 07.5'	52	161	208	285	324
R- 4	46° 09.0'	124° 10.5'	53	160	209	284	325
R- 6	46° 17.0'	124° 12.0'	142	169	214	288	364
R-10	46° 12.0'	124° 02.5'	59	164	203	272	348
R-11	46° 15.5'	124° 07.5'	115	173	185	273	-
R-12	46° 15.2'	124° 09.4'	116	174	191	282	366
R-13	46° 14.0'	124° 09.0'	84	179	190	278	-
R-14	46° 13.0'	124° 09.0'	73	181	187	275	359
R-15	46° 13.0'	124° 10.0'	75	182	188	276	358
R-16	46° 14.5'	124° 10.5'	90	176	193	280	361
R-17	46° 15.0'	124° 10.5'	127	175	192	281	360
R-18	46° 12.0'	124° 09.0'	57	183	195	221	351
R-19	46° 11.7'	124° 06.3'	104, 5, 6, 7	166	197	236	356
R-20	46° 12.5'	124° 06.5'	121	167	196	222	347
R-21	46° 14.5'	124° 05.6'	112	158	184	283	-
R-22	46° 14.5'	124° 10.0'	91	177	194	279	362
R-23	46° 18.0'	124° 10.0'	145	168	215	287	365
R-24	46° 11.0'	124° 05.0'	123	165	202	268	353
R-25	46° 13.9'	124° 08.0'	82	180	186	274	-
R-26	46° 14.0'	124° 09.5'	85	178	189	277	-

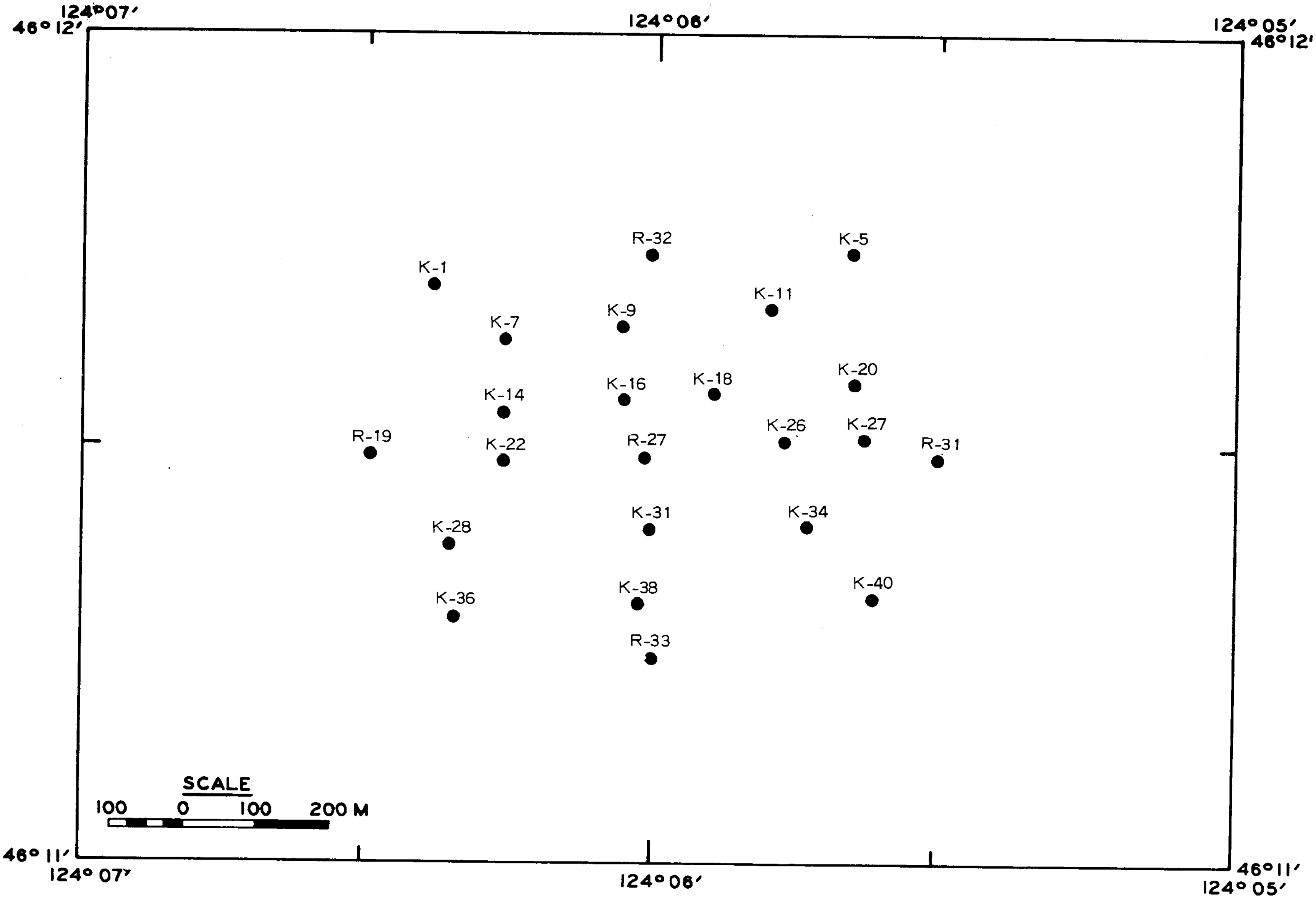


Figure C24. Location of 23 Experimental Site G Stations. Stations R24, R28, and R29 are outside area shown.

Table C2

MCR Macrobenthic Station Numbers at Experimental Site G

Location	Latitude (N)	Longitude (W)	Station Number June 1975	Sept 1975	Oct 1975	Jan 1976	April 1976	June 1976
K- 1	46° 11.25'	124° 06.33'	-	223	-	-	-	-
K- 5	46° 11.77'	124° 05.65'	-	228	-	-	-	-
K- 7	46° 11.64'	124° 06.50'	-	234	308	330	367	388
K- 9	46° 11.67'	124° 05.98'	-	232	-	-	-	-
K-11	46° 11.68'	124° 05.76'	-	230	310	332	368	391
K-14	46° 11.59'	124° 06.22'	-	238	-	-	-	-
K-16	46° 11.56'	124° 06.02'	-	246	312	-	369	386
K-18	46° 11.58'	124° 05.88'	-	248	313	335	370	387
K-20	46° 11.60'	124° 05.58'	-	240	-	-	-	-
K-22	46° 11.47'	124° 06.24'	-	251	315	343	371	385
K-26	46° 11.55'	124° 05.76'	-	242	316	336	372	389
K-27	46° 11.54'	124° 05.62'	-	241	-	-	-	-
K-28	46° 11.43'	124° 06.36'	-	253	-	-	-	-
K-31	46° 11.45'	124° 06.00'	-	256	319	345	373	384
K-34	46° 11.45'	124° 05.77'	-	259	-	-	-	-
K-36	46° 11.33'	124° 06.26'	-	266	-	-	-	-
K-38	46° 11.35'	124° 05.99'	-	264	-	-	-	-
K-40	46° 11.35'	124° 05.66'	-	262	-	-	-	-
R-19	46° 11.70'	124° 06.30'	197	236	-	356	-	-
R-24	46° 11.00'	124° 05.00'	202	268	300	353	374	381
R-27	46° 11.50'	124° 06.00'	199	249	299	-	378	383
R-28	46° 10.00'	124° 04.00'	204	269	302	352	375	380
R-29	46° 09.00'	124° 03.50'	205	270	303	-	-	-
R-31	46° 11.50'	124° 05.50'	201	261	298	354	376	382
R-32	46° 11.70'	124° 06.00'	198	226	-	-	-	-
R-33	46° 11.25'	124° 06.00'	200	267	297	346	377	390

formalin buffered with NaH_2BO_3. Invertebrates were sorted into major taxonomic groups and transferred to 70 percent isopropyl alcohol.

Macrofauna samples (Smith-McIntyre grabs)

53. All Smith-McIntyre grab samples were transferred to a 70 percent isopropyl alcohol within two weeks after being collected. Samples processed on a 0.50-mm screen were rescreened into two fractions (>1.00 and 1.00-0.50 mm) in the laboratory. The grab samples were then sorted under a Wild M-3 stereomicroscope into major taxa.

54. The screen size, sample volume, debris composition, date sorted, sorting person, sorting time, aliquot (always whole), preservation, and any comments were noted. The number of individuals of each taxonomic group were counted and placed in separate vials.

Identification

55. The responsibility for different taxonomic groups was divided among all personnel at the beginning of the project. They were responsible for the proper identification of that group, contacting the appropriate taxonomist for help when needed, and the study of the biology of dominant species within that group.

Biomass

56. Wet weights for each taxonomic group from the Smith-McIntyre grab samples were determined. The samples that were preserved in 70 percent isopropyl alcohol were blotted on paper towels to remove excess surface moisture. Loss of moisture from animals while blotting results from two processes. First there is a rapid loss of moisture from the surface of the animals, then a slow loss of internal moisture through the surface of the animal. Animals were blotted until moisture was no longer picked up by the paper towel (approximately 1-10 min). The length of time depended on the size of the animal, the number of animals weighed, and the taxonomic group. The methods are described in Weinberg (1971). Wet weights were determined on a 45-type Mettler analytical balance. Mollusks were weighed in their shells; most polychaetes were weighed without tubes; and all animals were cleaned of sediment or other debris. The samples were not burned to obtain ash-free dry weights because study

of the biology of the dominant species ashes is impossible and because of the considerable taxonomic value of the collections. Numerous undescribed species were found.

57. Conversion factors from wet weight to ash-free dry weight were calculated for each taxonomic group. Preserved animals were weighed and placed in an aluminum pan. The sample was dried in a drying oven (65°C) and placed in a desiccator overnight. The sample and pan were then weighed. This process was repeated until a constant weight was obtained. The sample was then ashed in a muffle furnace for 24 hr at 525°C. After ashing, the sample was placed in a desiccator for 24 hr and weighed. The conversion factor was calculated by subtraction of the weight of the pan plus ashed remains of the sample from the dry weight of the sample and pan and the division of this difference by the weight of the sample. This process was repeated several times for each taxonomic group. Table C3 presents the conversion factor used to convert wet weights to ash-free dry weights. Also included are the number of values for each taxonomic group and the standard deviation for each mean. All conversion factors except for Decapoda and Isopoda had a standard deviation of less than 20 percent. Decapoda and Isopoda did not contribute significantly to the biomass at any station, therefore ash-free dry weights reported for each station are within 20 percent of the actual values.

Sediment samples

58. All sediment samples in this report were analyzed by the University of Washington. The methods, results, and discussion of these data were included in a final report to the U.S. Army Corps of Engineers (Sternberg et al., 1977). The median diameter (md_{ϕ}), standard deviation or sorting (O_{ϕ}), first skewness (α_{ϕ}), second skewness ($\alpha_{2\phi}$) and kurtosis (β_{ϕ}) were computed using equations given by Inman (1952). Percentages of sand, silt, and clay for each sediment sample were plotted on a tertiary diagram, and the sediment was characterized by nomenclature proposed by Shepard (1954).

Table C3

Conversion Factors for Wet Weight to Ash Free Dry Weight

Taxa	Mean	Standard Deviation	# Values
Ophiuroidea	0.107	0.012 (11%)	15
Holothuroidea			
whole, eviscerated and tails	0.132	0.027 (20%)	9
whole, noneviscerated	0.050	0.008 (17%)	7
Gastropoda	0.077	0.008 (10%)	25
Pelecypoda			
Siliqua patula	0.106	0.007 (6%)	4
Acila castrensis	0.087	0.002 (2%)	4
Others	0.078	0.015 (19%)	10
Polychaeta			
Tubed	0.046	0.008 (17%)	15
Untubed	0.160	0.028 (17%)	15
Decapoda	0.144	0.043 (30%)	29
Cumacea	0.111	0.008 (7%)	17
Mysid	0.184	0.021 (11%)	19
Isopoda	0.140	0.041 (29%)	19
Amphipoda	0.136	0.007 (5%)	17
Nemertea	0.161	0.025 (15%)	5
Sipunculid*	0.160		
Echiurid*	0.160		

* Conversion factor for polychaeta used.

Data Analysis

Baseline (macrofauna)

59. Two different approaches to analysis of benthic data from the areal and seasonal baseline were used. The first approach was classification of species and site groupings (Clifford and Stephenson, 1975). Species were classified according to their patterns of distribution among the sites and sites were classified according to their species content. The second approach was community structure analysis. Each site was characterized by its biotic content (density, biomass, dominant species and diversity). The data were analyzed by programs written for the CDC Cyber-73 computer (Richardson, 1976).

60. The classification analysis consisted of a multioptional set of programs that were used for data reduction and pattern recognition from a species-site data matrix. The programs were divided into four runs. Run I (COORDIN) ordered the original data into a site-species matrix. In the second run (CRUNCH), site-site and species-species resemblance matrices were calculated. Options in CRUNCH included data standardization (none, site, and species), data transformation [none, square root, $\log_{10}$ $(x + 1)$, or presence-absence], and choice of resemblance function (Dominance-affinity similarity, Bray-Curtis, Manhattan metric, and Canberra metric dissimilarity). Run III (CLSTR) consisted of seven clustering strategies that were used to group species or sites in the form of a dendrogram. CLSTR was modified from Anderberg (1973) for use on the CDC Cyber. Run IV (SWITCH) reordered the original site-species data matrix into a two-way coincidence table according to the results of the site and species clustering dendrograms. SWITCH was used to indicate the strength of pattern in the data, reallocate misclassified sites and species, and adopt levels of classification.

61. Subjective decisions were required by the investigator at several points in the classification analysis. Since the goals of classification in this report were data reduction and pattern recognition and not probabilistic interpretation of the data structure, subjective decisions seemed appropriate. The authors agree with Boesch (1973) that

the investigator should remain the ultimate arbiter in the classification of ecological data.

62. The subjective decisions including adoption of levels of classification, reallocation of misclassified sites and species, types of data transformation and standardization, and elimination of rare species are discussed in the following paragraphs and under the appropriate sections in the results. Most decisions are based on the goals of the classification procedures (data reduction and pattern recognition), the results of the within station and between station variability study, SWITCH, and the author's past experience with other data sets.

63. Sites were classified using the Bray-Curtis dissimilarity coefficient and the group average sorting strategy. The data were transformed using a square root transformation with no species reduction or standardization. Species were classified using similar techniques except that the rare species were eliminated from the data matrix and the species values were standardized (proportions) after a square root transformation.

64. The Bray-Curtis dissimilarity coefficient was chosen to classify both species and site groups because of its sensitivity to dominance in the site classification and abundance in the species classification.

$$D_{12} = \frac{\sum_{1}^{n} |X_{1j} - X_{2j}|}{\sum_{1}^{n} (X_{1j} + X_{2j})} \qquad (1)$$

D_{12} is a measure of dissimilarity between site 1 and 2 where X_{1j} and X_{2j} are the importance values for the jth species at each station and n is the total number of species found at the two stations.

65. The transpose of the species-site matrix was used for species classification. The Bray-Curtis dissimilarity coefficient is constrained between 0 and 1 where 0 represents no dissimilarity between species or sites and 1 represents complete dissimilarity. The Bray-Curtis dissimilarity coefficient has been used by numerous benthic ecologists, either

directly, or in its standardized similarity form (Sanders, 1960; Dominance-affinity), its presence-absence similarity form (Czekanowski, 1909, Sorenson, 1948).

66. A square root transformation for site classification was chosen to increase the importance of rarer species in the analysis without unduly reducing the importance of the dominant species. A square root transformation was also used in the species classification to reduce the effects of high values of individual species at certain sites.

67. Data used for species classification were standardized (species values at each site divided by sum of species values at all sites, i.e., proportions) after transformation because of the interest in similar patterns in the relative distribution of species. Without standardization the classification techniques would group species together based on overall abundanced (i.e., rare species together and abundant species together), which provides little ecological information. The data used for site classification were not standardized because the absolute differences in square root abundance values of species between different sites was considered an important criterion for site classification. Several other resemblance functions such as chord distance (Orloci, 1967), percentage similarity (Sanders, 1960), and the Canberra metric (Stephenson et al., 1972) are self-standardizing and were not used since absolute differences were considered to be important.

68. Both species-species and site-site resemblance matrices were clustered using a group-average sorting stretegy. This strategy is an agglomerative, polythetic, hierarchical clustering strategy in which sites or species are successively joined based on the smallest mean dissimilarity value between individual stations or species or groups of stations or groups of species already joined. This strategy was chosen because it is monotonic (no reversals), space conserving, and little prone to misclassification (Lance and Williams, 1967).

69. Classification is a popular method of analysis for multivariate data in many different scientific fields (Anderberg, 1973). Recent reviews by Jardine and Sibson (1971), Sneath and Sokal (1973), Anderberg (1973), Orloci (1975), and Clifford and Stephenson (1975) indicate there

is no general agreement on which is the best method for use with any particular set of data. The classification techniques used in this report have been used successfully by other benthic ecologists in recent years (Field and MacFarlane, 1968; Field, 1969, 1970; Day et al., 1971; Stephenson, 1972; Stephenson et al., 1975; Richardson, 1976; and others).

70. Community structure parameters used to characterize sites included numerical density, biomass, dominant species, and diversity. The five replicates from each site were combined to form a station. The values of numerical density and biomass were multiplied by two to convert those values to individuals/m^2 and ash-free dry weight/m^2 for each site.

71. Dominant species were determined by a ranking procedure (Fager, 1957) where the most abundant species at a station was given a value 10, the next 9, and so on. The ranks were summed for each station considered and divided by the total number of stations summed. The resultant Biological Index (B.I.) included both frequency of occurrence and abundance in determining dominant species.

72. Diversity was calculated for each station from the Shannon and Weaver (1963) information function, the Brillouin (1962) information function, and Simpson's (1949) diversity function. H' is the Shannon-Weaver diversity value,

$$H' = \Sigma p_i \log_x p_i \tag{2}$$

where p_i is the proportion of individuals belonging to the ith species. Logs to the base 2, r, and 10 were used. H is the Brillouin diversity value,

$$H = \frac{1}{N} \log_x \frac{N!}{N_1!N_2!\ldots N_s!} \tag{3}$$

where N_i is the total number of individuals of the ith species and N is the total number of individuals at the station. Logs to the base 2, e, and 10 were used. SD is the Simpson diversity value,

$$SD = 1-\Sigma p_1^{\ 2} \ , \qquad (4)$$

where p_i is the proportion of individuals belonging to the ith species.

73. Lloyd and Ghelardi (1964) have shown that diversity values are sensitive to two components, the number of species in a sample (species richness) and the distribution of individuals among species (evenness). Species richness (SR) was estimated by the Margalef (1958) function,

$$SR = \frac{(S-1)}{\ln(N)} \qquad (5)$$

where S is the number of species at the station and N is the total number of individuals at the station. Evenness was computed by two functions based on Pielou (1966). J' is the evenness value,

$$J' = \frac{H'}{\log_x S} \qquad (6)$$

where H' is the Shannon-Weaver diversity value and S is the number of species. As long as the log base is the same as that used to calculate the Shannon-Weaver diversity value, the value of the base does not change the J' value. J is the evenness value.

$$J = \frac{H}{\log_x S} \qquad (7)$$

where H is the Brillouin diversity value and S is the number of species.

74. Diversity indices have recently been criticized because of their lack of biological meaning, sample size dependence, and questionable mathematical properties (Hurlbert, 1971; Goodman, 1975). It has been shown that by successively pooling replicate samples diversity values reach an asymptotic value that represents the actual diversity of the collection being sampled (Sanders, 1968; Boesch, 1971; Pielou, 1975).

75. Most of the criticism of diversity indices by biologists relates to the lack of biological process implicit in their calculation,

their relationships to ecological theory, and the use of cybernetic or thermodynamic analogies related to information-based diversity values. The relationship between diversity and ecological theory, especially diversity-stability concepts, has been criticized by Goodman (1975). It is probably true that high species diversity does not beget community stability (either persistence or constancy) but the relationships between environmental stability, time, productivity, etc., and diversity still need investigation. As suggested by Hurlbert (1971) and others, a species' importance to community structure may not be related to its abundance, biomass or productivity (see Paine, 1966; Dayton et al., 1974). It is not intended to imply cybernetic or thermodynamic overtones on deriving diversity values, but tather that diversity values be considered as attempts to represent the number of species and the distribution of individuals among species in a given area in a quantitative manner. Biological process is not a necessary attribute of diversity indices when used to quantify these relationships.

Experimental Site G

76. The same methods of classification and community structure analysis that were used for baseline studies were applied to data collected from experimental site G. In addition several nonparametric tests were used to compare control stations and stations on which dredged material was disposed. These tests included the Kruskal-Wallis H test (Tate and Clelland, 1957), and the Mann-Whitney U test (Tate and Clelland, 1957) the Friedman two-way rank test (Hollander and Wolfe, 1973), and the Spearman rank correlation (Tate and Clelland, 1957).

Megafauna

77. The same method of classification that was used for baseline studies were applied to the beam trawl data. Since beam trawl sample sizes (distance covered over the bottom by the beam trawl) were different, proportional values of species abundances at each station were used to calculate Bray-Curtis dissimilarity values between all possible pairs of samples. Proportional values of species abundances over all stations were used to determine species groups (same as macrofaunal baseline).

Prior to analysis, species abundance values were transformed [$\log_{10}$ $(x + 1)$] for both station and species classification. This transformation was used because of the patchy distribution of megafaunal species and the suspect quantitative sampling characteristics of the metered beam trawl.

PART IV: RESULTS

General

78. A total of 2190 samples were obtained from the MCR study site, including 73 metered beam trawls for megafauna, 1657 0.1-m^2 Smith-McIntyre grabs for macrofauna, 76 samples for meiofauna, five box cores for macrofauna, 369 samples for sediment, and 10 miscellaneous samples. This report includes the results of 1359 0.1-m^2 Smith-McIntyre grabs for macrofauna and 67 metered beam trawls for megafauna. Although meiofaunal results were included in the annual interum report, meiofaunal work was later excluded from the contract by mutual agreement between the authors and the Corps of Engineers. The results from the 0.1-m^2 box core samples are not included in this report because weather conditions and time limitations at sea prevented any systematic use of that sampling gear. The sediment samples were sent to the University of Washington. The results of the sediment investigations were reported to the Corps of Engineers by Sternberg et al. (1977).

79. A total of 339,753 individuals were sorted and identified from the 1359 0.1-m^2 Smith McIntyre grab samples for a mean of 250 individuals per sample. The 339,753 individuals were separated into 425 taxa, most of which were identified to the species level.

80. Three species lists are presented in Appendix CII. The species are arranged in phylogentic and alphabetic order in the first two lists and by species code in the third list. Megafaunal species found in the beam trawl samples are also included.

81. Appendix CIII includes the values of diversity, the number of species, individuals/m^2, and biomass values (grams ash-free dry weight/m^2) for each station. The contents of Appendix CIII is included under the appropriate sections in the results and in the discussion.

82. A total of 258,501 invertebrates were collected in the 67 metered beam trawl samples for a mean of 3858 individuals per sample. Of the 141 species identified from the beam trawl samples, only 49 had

the size range and behavior patterns to be adequately sampled and were included in the subsequent analysis.

83. The remainder of the results are divided into six sections. The first section presents the results of the pilot survey followed by the within station and between station variability, the areal baseline, the seasonal baseline, and the study of experimental site G. A macrofauna station may be included in more than one section. The final section includes the results of the megafaunal survey.

Pilot Survey

84. A total of 18,976 individuals were sorted from the forty-six 0.1-m^2 Smith-McIntyre grab samples that comprised the pilot survey. The polychaetes, which accounted for 28.3 percent of the total number of individuals were not identified; therefore, no extensive analyses were performed on the pilot survey data. Two sampling grids were employed in the pilot survey.

85. The first grid samples, stations 1-25 (Figure C4), were used to investigate patterns of distribution of assemblages in the MCR disposal site region. The density of macrofauna ranged from 310 to 18,170 individuals/m^2. The densities increased from 310 to 1380 individuals/m^2 at the inshore sandy stations to 2090 to 4900 individuals/m^2 at the offshore stations that contained greater amounts of silt and clay. Stations 22 and 24 had the highest density of macrofauna, with 18,170 and 9280 individuals/m^2, respectively. Diastylopsis dawsoni, a cumacean, comprised 84.8 percent of the total number of individuals at station 22, accounting for the high densities at that station. Siliqua patula, the razor clam, was also abundant at station 22, accounting for 10 percent of the individuals. Station 24 was dominated by the bivalve Axinopsida serricata (31 percent of the individuals) and polychaetes (50 percent of the individuals). The dominant taxa at the offshore stations (62-88 m) were the bivalves Acila castrensis, Axinopsida serricata, and Nucula tenuis. The dominant taxa at the inshore stations (18-45 m) were the amphipods Eohaustorius sencillus and Ampelisca macrocephala.

86. The second grid samples, stations 26-46 (Figure C5), were used to investigate the benthic assemglages found at disposal site B. The density of macrofauna ranged from 210 to 54,430 individuals/m^2. Nine stations (27, 28, 29, 31, 33, 34, 37, 38, and 39) were dominated by the cumacean *Diastylopsis dawsoni*, which ranged from 510 to 52,400 individuals/m^2. The total density at those nine stations ranged from 1580 to 54,430 individuals/m^2. Station 42 also had a high density value (7,610 individuals/m^2) and was dominated by polychaetes (85.7 percent of individuals). The remaining 11 stations had lower density of macrofauna (range 210 to 2900, mean 937 individuals/m^2). The dominant species near disposal site B included the cumacean *Diastylopsis dawsoni*, the gastropoda *Olivella pycna*, the bivalve *Axinopsida serricata*, the holothurian *Paracaudina chilensis*, and the gastropoda *Olivella baetica*.

Within Station and Between Station Variability

87. Twenty replicate Smith-McIntyre grabs were obtained from one location (46° 11.5'N, 124° 06.5'W) near experimental site G. The depth of water was 29 m and the substrate was a well-sorted sand with a median diameter (Md ϕ) of 2.70 ϕ and a standard deviation (σ ϕ) of 0.39 ϕ.

88. The dominant species were the polychaete *Magelona sacculata*, the amphipoda *Eohaustorius sencillus*, and the polychaete *Spiophanes bombyx* (Table C4). Except for the polychaetes *Magelona sacculata* and *Thalenessa spinosa*, all of the ten most dominant species exhibited a contagious distribution among the twenty samples.

89. The mean Bray-Curtis dissimilarity value between all possible pairs of samples was 0.49 (190 pairs). This high value indicated that single replicates were not a good estimate of the relative proportion of individuals of dominant species in this low density area (11-71 individuals per sample). The contagious distribution among samples of most dominant species contributes to the high dissimilarity values. If the 20 replicates are divided into 4 stations (5 replicates per station, taken in order), the mean Bray-Curtis dissimilarity value is reduced to

Table C4

Dominant species collected at replicate stations (46° 11.5'N, 124° 06.5'W).

Species	Species Code	BI	N	N/m^2	f(20)	$s^2/\bar{x}$	I_g	$I_g(p)$
Magelona sacculata	279	9.75	174	87	20	1.10	1.01	N.S.
Eohaustorius sencillus	155	8.75	133	66.5	18	5.38	1.63	< 0.01
Spiophanes bombyx	344	8.50	117	58.5	20	2.83	1.29	< 0.01
Chaetozone setosa	237	6.63	56	28	18	1.93	1.32	< 0.01
Paraphoxus vigitegus	141	5.88	56	28	17	1.97	1.33	< 0.01
Amphipodia periercta-urtica	425	4.37	45	22.5	16	2.05	1.45	< 0.01
Nemertea sp. #7	471	2.50	29	14.5	14	1.49	1.47	< 0.05
Olivella baetica	7	2.37	31	15.5	14	3.01	2.28	< 0.01
Nephtys caecoides	302	1.75	21	10.5	11	1.44	1.42	< 0.10
Thalenessa spinosa	354	1.63	17	8.5	11	1.01	1.03	N.S.

* Includes Biological Index (BI), total number of individuals (N), individuals/m^2 (N/m^2) frequency of occurrence in 20 samples [f(20)], index of dispersion (S^2/x), Morista's index of dispersion (I_g), and the significance of departure from randomness for Morista's index of dispersion [$I_g(p)$] (Elliott, 1971).

0.25 (Figure C25). The mean dissimilarity value based on presence and absence data (Czekanowski dissimilarity) was 0.26.

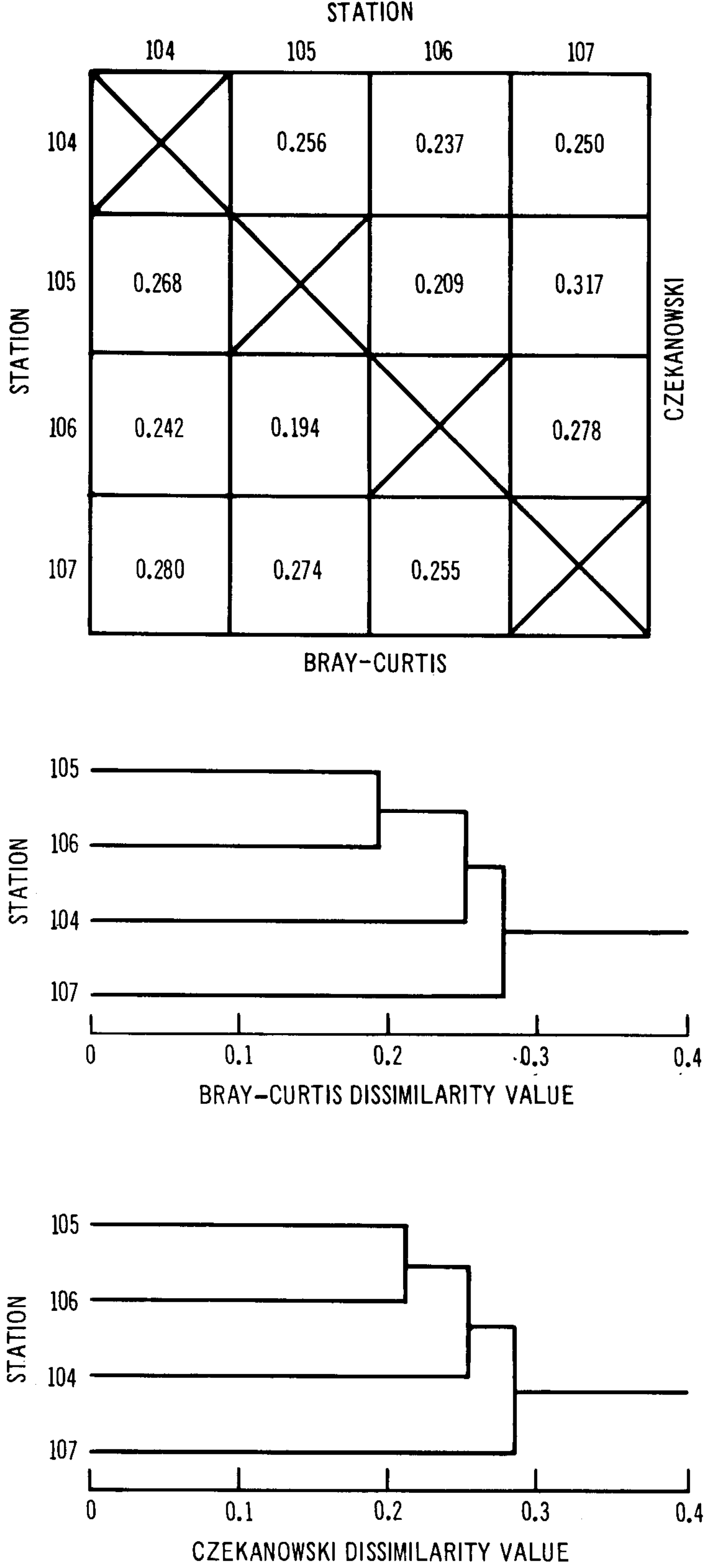
90. Previous studies (Richardson, 1976) have shown that a Bray-Curtis dissimilarity value of 0.25 represents a high degree of similarity between stations; therefore five replicate samples per station was considered an adequate estimate of the number of individuals of dominant species per station for this area.

91. Within station variability was also examined for the 100 station areal baseline. Of the 100 stations, 69 had mean between replicate dissimilarity lower or the same as the 20 replicate series; 21 stations had mean between replicate dissimilarity of 0.50 to 0.60; and 10 stations had mean between replicate dissimilarity higher than 0.60. Five replicates per station therefore appears to be adequate for most stations in the MCR study site region for classification of site groups.

92. The estimates of community structure values at this location were calculated from the summed species values of all replicates combined. Community structure parameters calculated from the twenty replicate samples, the four stations (five replicates), and all replicates combined are compared in Table C5.

93. The number of individuals/m^2 and biomass values are not sample-size dependent. The range of values of individuals/m^2 and biomass were considerable for the twenty replicate samples and were much reduced for the four stations. The number of species is sample-size dependent. A larger sample or more replicates will increase the number of species. Single replicates on the average captured only 30 percent of the total number of species collected in 20 replicates, and 5 replicates captured 67 percent of the total number of species. Neither single samples or stations (five replicates combined) are reliable estimates of the number of species at this location.

94. Diversity (H'), species richness (SR) and evenness (J') are also sample-size dependent. Diversity and species richness values increase with the number of individuals captured (more replicates) until the values approach the asymptotic values that represent the diversity



STATION	104	105	106	107
104		0.256	0.237	0.250
105	0.268		0.209	0.317
106	0.242	0.194		0.278
107	0.280	0.274	0.255	

Figure C25. Dissimilarity Values Between Four Replicate Stations (46°11.5'N, 124°06.5'W)

Table C5

Comparison of Values of Community Structure Parameters for Replicates, Stations (Five Replicates Combined), and for all Replicates Combined (46° 11.5'N, 124° 06.5'W).

Parameter*	Replicates		Replicates		20 Summed Replicates
	Mean	Range	Mean	Range	
# Species	17.8	9-26	39.5	38-48	59.0
Individual/m^2	462.0	110-710	462.0	366-520	462.0
H' (diversity)	3.51	2.37-4.12	4.17	4.13-4.32	4.38
SR (Species Richness)	4.40	2.67-5.91	7.08	6.07-8.45	8.49
J' (evenness)	0.86	0.69-0.97	0.79	0.77-0.88	0.74
Biomass/m^2	1.69	0.17-6.28	1.69	1.40-1.93	1.69

* See text for definition of community structure parameters.

or species richness in a fully censused population. The mean diversity for stations was 95 percent of the diversity for twenty replicates combined while the mean diversity for individual replicates was 80 percent of the combined diversity. The range of diversity values calculated from stations was also much reduced when compared to the range of diversity calculated from replicates. Species richness values calculated from stations were 83 percent of the species richness value for all replicates combined, compared to 53 percent for the replicates. The evenness values decrease with the number of individuals captured (more replicates) until the asymptotic value of a fully censused population is reached. The mean evenness values for stations was 106 percent of the evenness value for all replicates combined while evenness values for the twenty replicate samples was 116 percent of the evenness value for all replicates combined. The range of evenness values was also greatly reduced for the four stations when compared to the twenty replicates.

95. The number of replicates necessary to estimate community structure parameters is dependent on the variability between replicates and the total number of individuals captured. In the areal baseline only 10 percent of the stations had much higher between replicate dissimilarity than the replicates chosen for the within station variability study and only 28 percent of the stations had lower total numbers of individuals captured. Therefore, five replicate samples per station are probably adequate to calculate community structure values for most of the stations in the areal baseline.

Areal Baseline

96. The areal baseline consisted of 500 grabs obtained from 100 stations on cruises C7412B and C7501D. Twenty-four grab samples were excluded from the analyses because they were either collected poorly or were not sorted due to time constraints. The remaining 476 grab samples yielded 99,484 individuals that were identified to the lowest taxonomic level possible.

97. The numerically most abundant species collected from the areal baseline was the cumacean Diastylopsis dawsoni (20,441 individuals). Other numerically abundant species included the polychaetes Heteromastus filobranchus (5979 individuals), Lumbrineris luti (4825), Myriochele oculata (3367), Spiophanes berkeleyorum (2143), Maldane sarsi (2133), and Mediomastus californiensis (2070); the bivalves Axinopsida serricata (15,993) and Acila castrensis (4292); and the gastropoda Olivella pycna (2667). Values of community structure parameters are found in Appendix CIII.

Assemblages and station groups

98. The 100 stations were clustered into five assemblages (Figure C26). The assemblages were defined as groups of stations that fused at between 0.51 and 0.60 Bray-Curtis dissimilarity units. The assemblages were divided into station groups that fused at between 0.36 and 0.49 Bray-Curtis dissimilarity units. The topographic distribution of the benthic assemblages and station groups are shown in Figures C27 and C28. The following paragraphs describe each assemblage and station group in terms of dominant species, community structure, and sediment characteristics. A more complete description of sediments found off the mouth of the Columbia was given by Sternberg et al. (1977).

99. Assemglage A. Assemblage A consisted of 24 stations located in deep water (60-97 m) off the mouth of the Columbia River. Assemblage A was divided into four station groups. Station group A_1 was the deepest (75-97 m) and was found along the entire western part of the study area; station group A_2 was at medium depth (60-68 m) in the central and northern part of the study area; station group A_3 consisted of two stations (70 m) in the southern portion of the study area; and station group A_4 was the shallowest (47-51 m) group.

100. The sediment had greater than 10 percent silt and clay at all but 4 stations. The percentage of clay was greater than 5 percent at all but five of the stations. The percentage of clay and silt increased toward the northernmost stations.

101. The diversity (H') values ranged from 3.45 at station 150 to 5.24 at station 144, except for one lower value at station 53 (2.34).

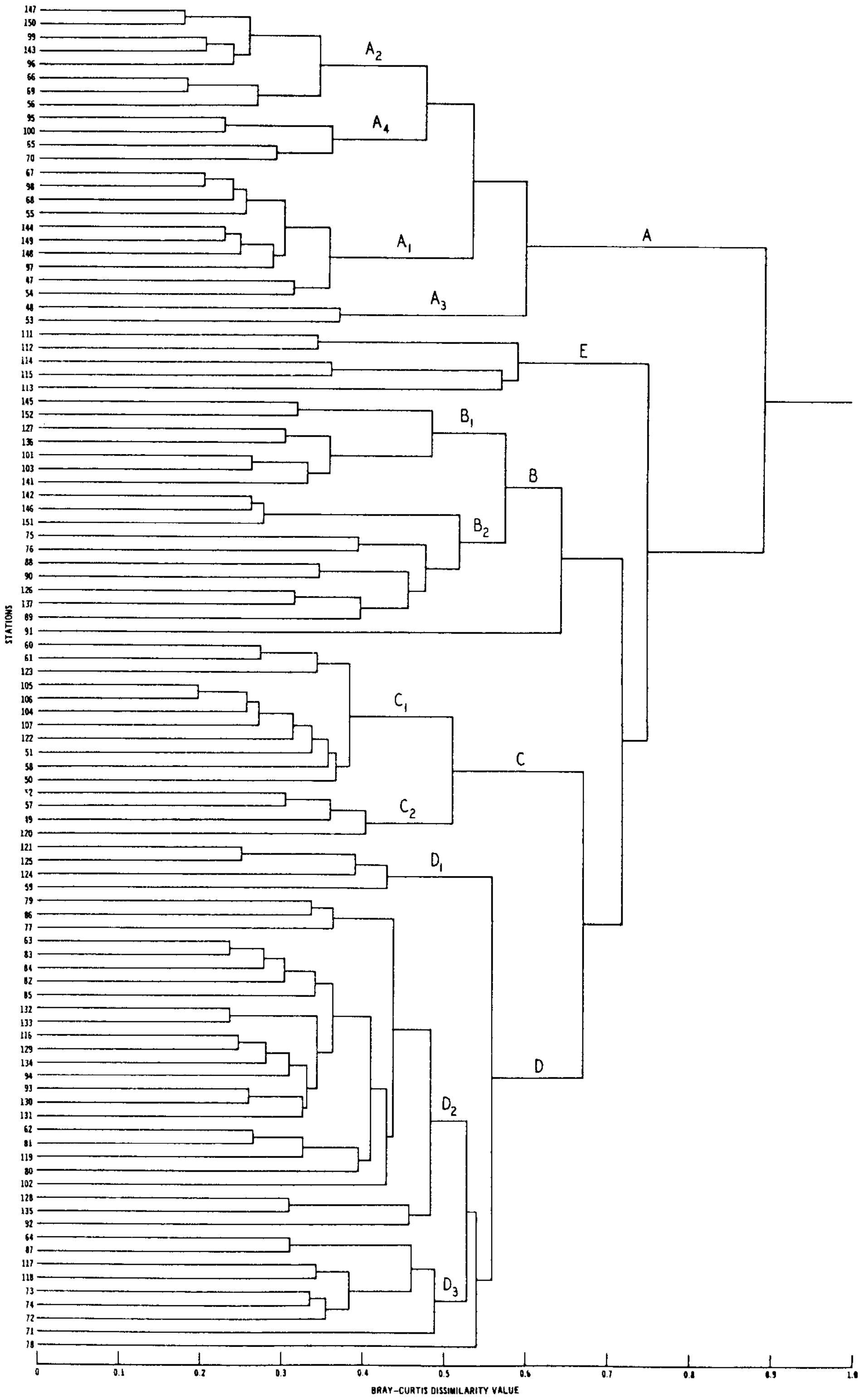


Figure C26. Dendrogram of Dissimilarity Between Macrofaunal Stations-Areal Baseline

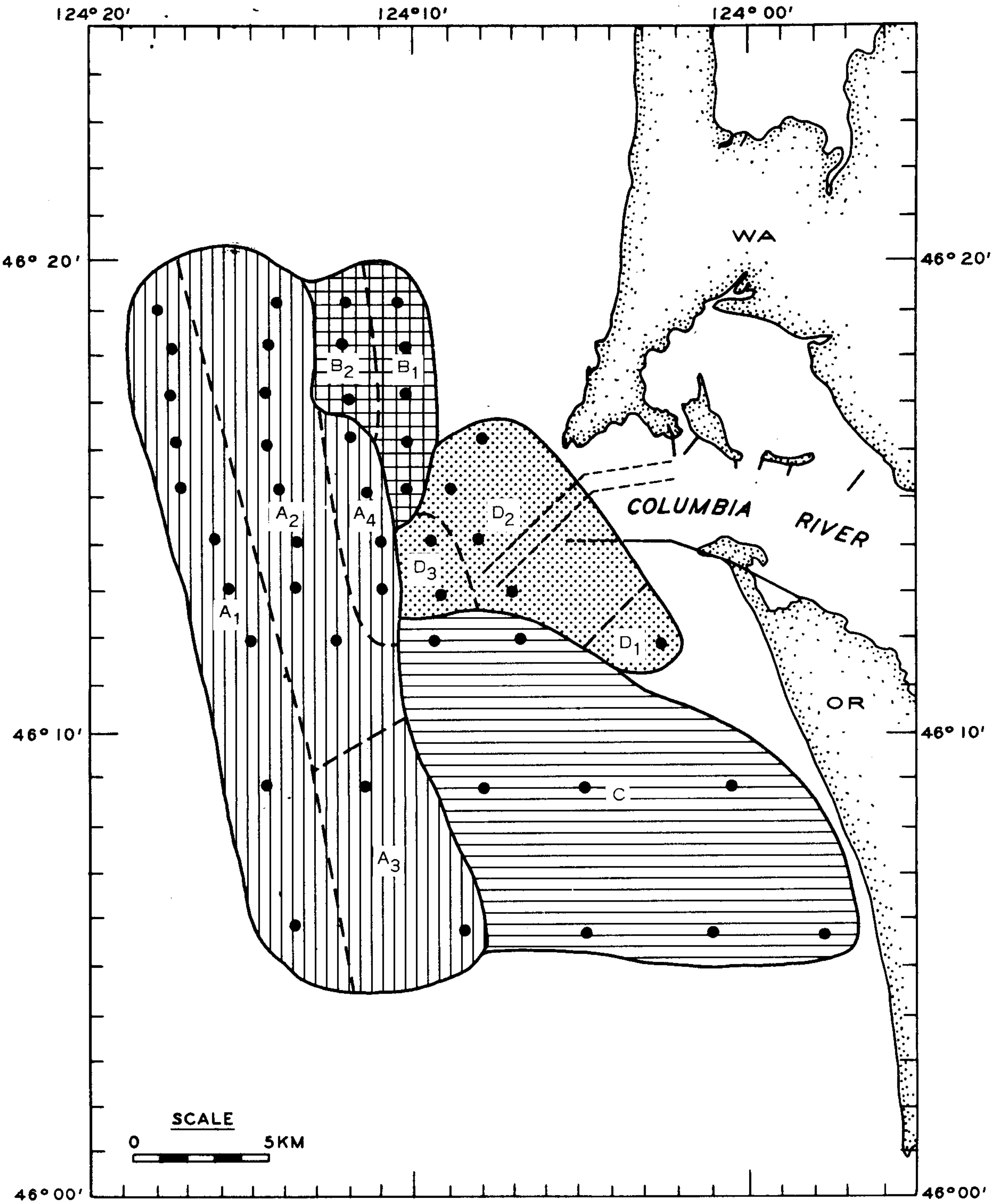


Figure C27. Location of Benthic Assemblages and Station Groups in Areal Baseline I

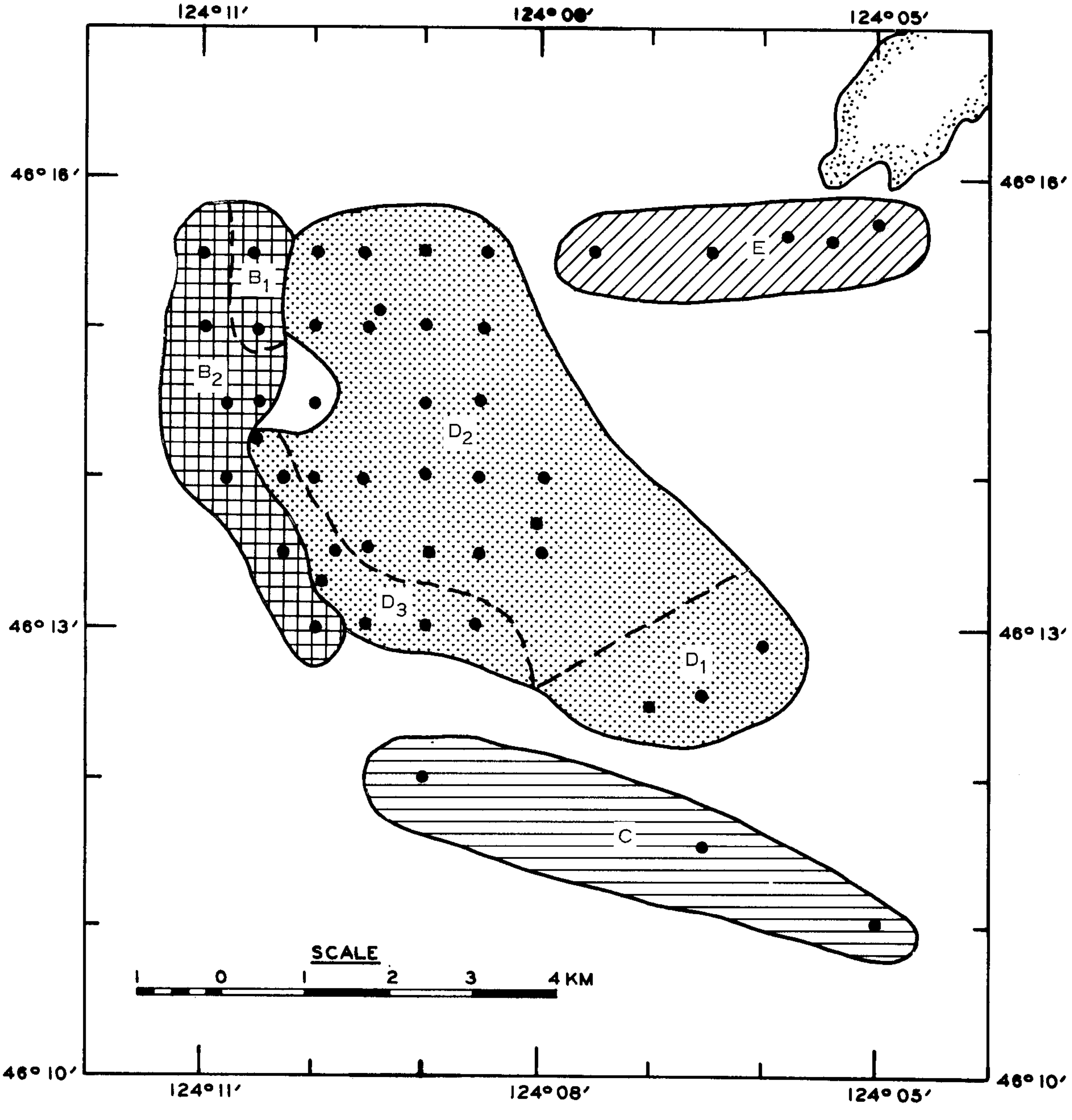


Figure C28. Location of Benthic Assemblages and Station Group in Areal Baseline II

The species richness (SR) values ranged from 8.11 at station 100 to 16.94 at station 149 (station 53 = 7.57). The evenness (J') values ranged from 0.52 at station 150 to 0.78 at station 47 (station 53 = 0.40). In general, the diversity, species richness, and evenness values increased with depth.

102. The density of macrofauna ranged from 2,034 individuals/m^2 at station 48 to 11,918 individuals/m^2 at station 147. The biomass values ranged from 5.15 g ash-free dry weight/m^2 at station 48 to 42.08 g ash-free dry weight/m^2 at station 99. Except for two southern stations, all biomass values were greater than 9.0 g ash-free dry weight/m^2.

103. The dominant species in assemblage A was the pelecypoda *Axinopsida serricata*, which occurred at all 24 stations with a mean density of 1626 individuals/m^2 (Table C6). Other dominant species included the polychaetes *Lumbrineris luti* and *Myriochele oculata*, and the pelecypoda *Acila castrensis*.

104. *Station Group A_1*. Station group A_1 consisted of 10 stations located in 75-97 m of water. These stations were the deepest stations sampled in this study. The 10 stations were joined at 0.36 Bray-Curtis units and joined station groups A_2 and A_3 at 0.53 Bray-Curtis units.

105. All sediment samples contained moderate amounts of silt and clay, ranging from 17.0 percent at station 47 to 39.1 percent at station 149. The silt increased northward from 9.0 percent at station 47 to 25.6 percent at station 149. All grab samples contained over 100 cc of wood chip material collected on the 1.00-mm screen. The median phi-size ranged from 2.68 ∅ at station 67 to 3.15 ∅ at station 149.

106. The diversity (H') values ranged from 4.54 at station 54 to 5.24 at station 144. Species richness (SR) values ranged from 13.49 at station 97 to 16.94 at station 144. The evenness (J') values ranged from 0.65 at station 54 to 0.78 at station 47.

107. The density of macrofauna ranged from 3223 individuals/m^2 at station 47 to 7533 individuals/m^2 at station 148 with a slight increase northward. The biomass ranged from 5.78 g ash-free dry weight/m^2 at station 47 to 17.57 g ash-free dry weight/m^2 at station 54. Polychaetes and pelecypods accounted for most of the biomass.

Table 6

Dominant Species in Assemblage A.*

Species Code	Species	BI	f(24)	$\bar{N}/m^2$
24	Axinopsida serricata	9.16	24	1626
275	Lumbrineris luti	5.54	24	543
300	Myriochele oculata	5.00	24	392
19	Acila castrensis	3.83	23	440
282	Maldane sarsi	3.66	11	222
264	Heteromastus filobranchus	3.42	22	526
352	Spiochaetopterus costarum	3.04	21	154
294	Mediomastus californiensis	2.58	24	208
278	Magelona longicornis	2.50	20	116
345	Spiophanes berkeleyorum	2.42	24	258

* Includes the Biological Index (BI), frequency of occurrence [f(24)], and mean number of individuals/m^2 (N/m^2) for the 10 most dominant species.

108. Dominant species were the polychaete *Maldane sarsi* and the pelecypoda *Axinospida serricata*. The polychaetes *Lumbrineris luti*, *Spiochaetopterus costarum*, *Magelona longicornis*, and *Myriochele oculata* also had biological index values greater than 5 (Table C7).

109. *Station Group A_2*. Station group A_2 consisted of eight stations located in 60-68 m of water off the mouth of the Columbia River. The eight stations were joined at 0.34 Bray-Curtis units.

110. All sediment samples contained moderate percentages of silt and clay. The silt and clay increased northward from 7.14 percent at station 56 to 33.34 percent at station 147. No sediment sample was analyzed from station 150. All grab samples contained over 100 cc of wood chip material collected on the 1.00 mm screen. The median phi-size increased northward from 2.64 ϕ at station 56 to 3.27 ϕ at station 147.

111. The diversity (H') values ranged from 3.45 at station 150 to 3.92 at station 99. The species richness (SR) values ranged from 9.17 at station 96 to 12.39 at station 150 with a tendency to increase northward. The evenness (J') values ranged from 0.52 to 0.61.

112. The density of macrofauna increased northward from 5004 individuals/m^2 at station 56 to 11,918 individuals/m^2 at station 147 and 11,067 individuals/m^2 at station 150. The biomass ranged from 10.56 g ash-free dry weight/m^2 at station 150 to 42.08 g ash-free dry weight/m^2 at station 99. Pelecypods, especially *Acila castrensis*, accounted for the high biomass at southern stations.

113. Dominant species included the pelecypod *Axinopsida serricata* and the polychaetes *Lumbrineris luti* and *Myriochele oculata*. Also dominant were the pelecypoda *Acila castrensis* and the polychaetes *Spiophanes berkeleyorum* and *Heteromastus filobranchus* (Table C8).

114. *Station Group A_3*. Station group A_3 consisted of two stations (70 m) in the southern part of the study area. The two stations joined at 0.37 Bray-Curtis units.

115. The sediment at station 48 was 5.0 percent silt and clay, and the sediment at station 53 was 3.1 percent. The median phi-size was 2.93 ϕ at station 48 and 2.75 ϕ at station 53.

Table C7

Dominant Species at Station Group A_1.*

Species Code	Species	BI	f(10)	$\bar{N}/m^2$
282	Maldane sarsi	9.0	10	533
24	Axinopsida serricata	9.0	10	692
275	Lumbrineris luti	6.5	10	398
352	Spiochaetopterus costarum	6.4	10	284
278	Magelona longicornis	6.0	10	271
300	Myriochele oculata	4.3	10	234
19	Acila castrensis	1.9	10	243
261	Haploscoloplos elongatus	1.7	8	100
242	Decamastus gracilis	1.6	10	124
97	Diastylopsis dawsoni	1.5	10	91
33	Macoma elimata	1.4	10	137
294	Mediomastus californiensis	1.4	10	139
312	Notomastus hemipodus	1.0	10	63

* Includes the Biological Index (BI), frequency of occurrence [f(10)], and mean number of individuals/m^2 ($\bar{N}/m^2$) for the 13 most dominant species.

Table C8

Dominant Species at Station Group A_2.*

Species Code	Species	BI	f(8)	$\bar{N}/m^2$
24	*Axinopsida serricata*	10.00	8	2790
275	*Lumbrineris luti*	8.12	8	1085
300	*Myriochele oculata*	7.62	8	820
19	*Acila castrensis*	6.00	8	555
345	*Spiophanes berkeleyorum*	5.00	8	371
264	*Heteromastus filobranchus*	5.00	8	320
294	*Mediomastus californiensis*	3.25	8	260
20	*Nucula tenuis*	2.37	8	166
242	*Decamastus gracilis*	2.25	8	159
425	*Amphiodia periercta-urtica*	1.50	8	79

* Includes the Biological Index (BI), frequency of occurrence [f(8)], and mean number of individuals/m^2 ($\bar{N}/m^2$) for the 10 most dominant species.

116. The diversity (H') value at station 48 was 4.73; the species richness (SR) value was 12.00; and the evenness (J') value was 0.74. Statoon 53 had lower diversity (H' = 2.34), species richness (SR = 7.57) and evenness (J' = 0.40) values.

117. The density of macrofauna was 2034 individuals/m^2 at station 48 and 2912 individuals/m^2 at station 53. The biomass value was higher at station 53 (23.41 g ash-free dry weight/m^2) than at station 48 (5.15 g ash-free dry weight/m^2).

118. The higher biomass value at station 53 is due to the higher density of the pelecypoda, Acila castrensis (1926 individuals/m^2 at station 53; 426 individuals/m^2 at station 47). The high density of Acila castrensis at station 53 also decreased the evenness component of diversity, thus reducing the diversity at that station.

119. The dominant species were the pelecypods Acila castrensis and Nucula tenuis and the polychaete Myriochele oculata. The polychaetes Haploscoloplos elongatus and Spiochaetopterus costarum, the ophiuroid Amphiodia periercta-urtica, and the pelecypoda Axinospida serricata also had BI values greater than 5 (Table C9).

120. Station Group A_4. Staton group A_4 consisted of 4 stations located in 47 to 51 m of water directly off the mouth of the Columbia River. The four stations were joined at 0.36 Bray-Curtis units and joined with station group A_1 at 0.47 Bray-Curtis units.

121. The three northern stations contained moderate amounts of silt and clay ranging from 13.2 percent at station 65 to 42.8 percent at station 95. Station 70, the southernmost station, contained only 2.5 percent silt and clay. All grab samples contained over 100 cc of wood chip material collected on the 1.00 mm screen. The median phi-size increased northward from 2.64 ∅ at station 70 to 3.30 ∅ at station 100.

122. The diversity (H') values ranged from 3.33 at station 65 to 3.70 at station 95. Species richness (SR) values ranged from 8.11 at station 100 to 8.72 at station 70. The evenness (J') values ranged from 0.53 at station 65 to 0.61 at stations 95 and 100.

123. The density of macrofauna ranged from 4730 at station 100 to 13,523 individuals/m^2 at station 65. The density values at the two

Table C9

Dominant Species at Station Group A_3.*

Species Code	Species	BI	f(2)	$\bar{N}/m^2$
19	*Acila castrensis*	10.0	2	1176
300	*Myriochele oculata*	8.0	2	133
20	*Nucula tenuis*	8.0	2	129
261	*Haploscoloplos elongatus*	5.5	2	103
425	*Amphiodia periercta-urtica*	5.5	2	72
24	*Axinopsida serricata*	5.5	2	62
352	*Spiochaetopterus costarum*	4.0	2	73
193	*Euphilomedes carcharodonta*	2.0	2	38
67	Dentallidae spp.	2.0	2	44
6	*Odostomia* sp. #1	1.5	2	35
275	*Lumbrineris luti*	1.5	2	41
331	*Polycirrus* spp.	1.0	2	34

* Includes the Biological Index (BI), frequency of occurrence [f(2)] and mean number of individuals/m^2 (N/m^2) of the 12 most dominant species.

southern stations were higher than at the two northern stations. Biomass values were also higher at the two southern stations (37.88-49.72 g ash-free dry weight/m^2) and than at the two northern stations (19.21-19.64 g ash-free dry weight/m^2). Polychaetes, pelecypods, and holothuroids were primarily responsible for the very high biomass values.

124. Dominant species at station group A_4 included the pelecypod Axinopsida serricata and the polychaete Heteromastus filobranchus. The polychaetes Mediomastus californiensis, Pholoe minuta, and Spiophanes berkeleyorum; the cumacean Diastylopsis dawsoni; and the ophiuroid Amphiodia periercta-urtica were also dominant (Table C10).

125. Assemblage B. Assemblage B consisted of 17 stations located in the northcentral part of the study area in moderate depths (29-44 m). Assemblage B was divided into two station groups: station group B_1 in shallower water (29-33 m) and station group B_2 in deeper water (37-44 m).

126. The sediment at all but three of the stations contained greater than 10 percent silt with a general increase in percentage silt northward (range 0.6-58.4 percent). The percentage of clay ranged from 1.0 to 5.0 percent. The median phi-size ranged from 2.15 ø at station 76 to 4.23 ø at station 146 with an increase in median phi-size northward.

127. Diversity (H') values ranged from 0.59 at station 103 to 4.34 at station 146. Species richness (SR) values ranged from 3.59 at station 103 to 7.42 at station 146. Evenness (J') values ranged from 0.12 at station 103 to 0.79 at station 151.

128. The density of macrofauna ranged from 944 individuals/m^2 at station 152 to 6962 individuals/m^2 at station 137. The biomass ranged from 1.21 to 6.27 g ash-free dry weight/m^2 except for the high values at stations 90 (10.9 g ash-free dry weight/m^2), and 89 (36.0 g ash-free dry weight/m^2).

129. The diversity (H'), species richness (SR), and evenness (J') values increased offshore and northward. Biomass values and individuals/m^2 were highest in the northwestern part of disposal site B at stations 88, 89, 90, 101, 103, 126, 136, and 137.

Table C10

Dominant Species at Station Group A_4.*

Species Code	Species	BI	f(4)	$\bar{N}/m^2$
24	Axinopsida serricata	9.75	4	2416
264	Heteromastus filobranchus	9.25	4	2317
294	Mediomastus californiensis	5.50	4	375
322	Pholoe minuta	4.75	4	243
345	Spiophanes berkeleyorum	4.50	4	433
97	Diastylopsis dawsoni	4.25	4	236
425	Amphiodia periercta-urtica	4.00	4	170
243	Trochochaeta franciscanum	2.00	3	222
31	Macoma nasuta	2.00	4	124
456	Nemertea sp. #4	1.75	4	112
320	Pectinaria californiensis	1.75	4	223
78	Paracaudina chilensis	1.75	4	64
19	Acila castrensis	1.25	4	90

* Includes Biological Index (BI), frequency of occurrence [f(4)], and mean number of individuals/m^2 (N/m^2) of the 13 most dominant species.

130. The dominant species in Assemblage B was the cumacean *Diastylopsis dawsoni*. Other dominant species included the holothuroid *Paracaudina chilensis*, the polychaete *Haploscoloplos elongatus*, and the pelecypoda *Tellina modesta* (Table C11).

131. *Station Group* B_1. Station group B_1 consisted of seven stations located in 29-30 m of water. The southernmost station (127) was located in the northern part of disposal site B, and the remaining six stations were located north of station 127 along the 30-m depth contour. The seven stations were joined at 0.48 Bray-Curtis units.

132. The percentage silt ranged from 9.4 percent at station 103 to 27.5 percent at station 145. The percentage clay ranged from 1.2 percent to 1.7 percent. The median phi-size ranged from 3.16 ø at station 127 to 3.66 ø at station 145.

133. The diversity (H') values ranged from 0.59 at station 103 to 4.10 at station 145. Species richness (SR) values ranged from 3.59 at station 103 to 7.11 at station 145. Evenness (J') values ranged from 0.12 at station 103 to 0.74 at station 145.

134. The density of macrofauna ranged from 944 individuals/m^2 at station 152 to 4862 individuals/m^2 at station 103. The biomass values ranged from 1.21 g ash-free dry weight/m^2 at station 152 to 3.41 g ash-free dry weight/m^2 at station 101.

135. Station group B_1 can be divided into two subgroups based on the abundance of the cumacean *Diastylopsis dawsoni*. Stations 101, 103, 104, and 136 had high density values of *Diastylopsis dawsoni* (2140-4534 individuals/m^2). The diversity (H') values were low (0.59-1.89); the evenness (J') values were low (0.12-0.36); and the density (2944-4862 individuals/m^2) and biomass values (2.51-3.41 g ash-free dry weight/m^2) were high. At stations 127, 145, and 152 the abundance of *Diastylopsis dawsoni* was lower (330-518 individuals/m^2); the diversity (H') values were higher (2.75-4.10); the evenness (J') values were higher (0.56-0.74); the density values were lower (944-1122 individuals/m^2); and the biomass values were lower (1.21-1.68 g ash-free dry weight/m^2).

136. The cumacean *Diastylopsis dawsoni* was the dominant species accounting for 79 percent of all the individuals found at station group

Table C11

Dominant Species in Assemblage B*

Species Code	Species	BI	f(17)	$\bar{N}/m^2$
97	*Diastylopsis dawsoni*	7.26	17	1278
78	*Paracaudina chilensis*	4.74	16	92
261	*Haploscoloplos elongatus*	4.44	17	69
36	*Tellina modesta*	4.00	17	53
425	*Amphiodia periercta-urtica*	3.44	17	56
316	*Owenia collaris*	3.41	15	72
24	*Axinopsida serricata*	3.02	17	52
264	*Heteromastus filobranchus*	2.76	8	146
237	*Chaetozone setosa*	2.58	16	60
9	*Olivella pycna*	2.12	17	25
143	*Paraphoxus fatigans*	1.94	10	40
322	*Pholoe minuta*	1.62	16	36

* Includes Biological Index (BI), frequency of occurrence [f(17)], and mean number of individuals/m^2 (N/m^2) of the 12 most dominant species.

B_1 (Table C12). Other dominant species included the pelecypoda *Tellina modesta*, the polychaetes *Owenia collaris* and *Haploscoloplos elongatus*, the gastropoda *Olivella pycna*, and the ophiuroid *Amphiodia periercta-urtica*.

137. *Station Group B_2*. Station group B_2 consisted of 10 stations located in 37-44 m of water along the seaward edge of disposal site B and north of disposal site B along the 40-m contour. The 10 stations were joined at 0.48 Bray-Curtis units and joined station group B_1 at 0.57 Bray-Curtis units.

138. The percentage silt in sediments increased northward from less than 1 percent at station 75 to 58 percent at station 146. Samples from stations 88, 89, 90 and 137 contained over 100 cc of wood chip material retained on the 1.00 mm screen. The median phi-size increased northward from 2.15 ϕ at station 76 to 4.23 ϕ at station 146.

139. *Diastylopsis dawsoni* accounted for 75 percent of the individuals at station 137, which lowered the diversity (H') value (1.77) and evenness (J') value (0.32). If station 137 were excluded, diversity (H') values ranged from 2.89 at station 88 to 4.37 at station 151. Species richness (SR) values ranged from 5.60 to 8.35. Evenness (J') values ranged from 0.53 at station 89 to 0.79 at station 151.

140. The density values ranged from 734 individuals/m^2 at station 76 to 2,618 individuals/m^2 at station 90. Biomass values ranged from 1.66 g ash-free dry weight/m^2 at station 151 to 36.03 g ash-free dry weight/m^2 at station 89. The major contributor to the high biomass value at station 89 was the holothuroid *Paracaudina chilensis*.

141. The stations located in central part of station group B_2 (88, 89, and 90) had the lowest diversity and evenness values and highest density and biomass values.

142. The dominant species at station group B_2 were the holothuroid *Paracaudina chilensis*, the cumacean *Diastylopsis dawsoni*, the polychaetes *Haploscoloplos elongatus* and *Heteromastus filobranchus*, and the pelecypoda *Axinopsida serricata* (Table C13).

Table C12

Dominant Species at Station Group B_1.*

Species Code	Species	BI	f(7)	$\bar{N}/m^2$
97	*Diastylopsis dawsoni*	10.00	7	2088
36	*Tellina modesta*	6.64	7	48
316	*Owenia collaris*	5.29	6	88
9	*Olivella pycna*	4.29	7	37
425	*Amphiodia periercta-urtica*	3.21	7	25
261	*Haploscoloplos elongatus*	3.21	7	27
343	*Spio filicornis*	2.36	4	15
78	*Paracaudina chilensis*	2.36	5	21
141	*Paraphoxus vigitengus*	2.14	4	22
137	*Paraphoxus epistomus*	2.14	5	22
127	*Monoculodes spinipes*	2.00	6	14
344	*Spiophanes bombyx*	1.93	2	19

* Includes Biological Index (BI), frequency of occurrence [f(7)], and mean number of individuals/m^2 ($\bar{N}/m^2$) of the 12 most dominant species.

Table C13

Dominant Species at Station Group B_2.*

Species Code	Species	BI	f(10)	$\bar{N}/m^2$
78	Paracaudinia chilensis	6.40	10	142
97	Diastylopsis dawsoni	5.35	10	712
261	Haploscoloplos elongatus	5.30	10	96
24	Axinopsida serricata	4.85	10	85
264	Heteromastus filobranchus	4.70	7	248
237	Chaetozone setosa	4.40	10	100
425	Amphiodia periercta-urtica	3.60	10	77
143	Paraphoxus fatigans	2.90	6	61
322	Pholoe minuta	2.35	10	56
36	Tellina modesta	2.15	10	57
316	Owenia collaris	2.10	8	61
198	Tecticeps convexus	1.45	10	36

* Includes Biological Index (BI), frequency of occurrence [f(10)], and mean number of individuals/m^2 (N/m^2) of the 12 most dominant species.

143. Assemblage C. Assemblage C consisted of 15 stations located in shallow water (18-47 m) in the southern part of the study area. The 15 stations were joined at 0.51 Bray-Curtis units. Two subgroups, the offshore stations (49, 52, 57, and 120) (40-47 m) and the inshore stations (18-29 m), joined at 0.36 and 0.35 Bray-Curtis units, respectively.

144. The percentage silt and clay was less than 2.5 percent at all stations. The median phi-size ranged from 2.65 to 3.14 ∅ with a slight decrease offshore.

145. The diversity values (H') ranged from 3.33 station 123 to 4.51 at station 120 with a slight increase in diversity offshore. The species richness (SR) values ranged from 4.55 at station 61 to 8.56 at station 49 also with a slight increase offshore. Evenness (J') values ranged from 0.69 to 0.82.

146. The density of macrofauna was low at all stations and ranged from 334 individuals/m^2 at station 123 to 888 individuals/m^2 at station 49. Biomass values were also low and ranged from 0.67 g ash-free dry weight/m^2 at station 50 to 2.11 g ash-free dry weight/m^2 at station 51.

147. Dominant species were the polychaete Spiophanes bombyx and the amphipoda Eohaustorius sencillus. Also dominant were the polychaetes Magelona sacculata and Chaetozone setosa along with the ophiuroid Amphiodia periercta-urtica (Table C14).

148. Assemblage D. Assemblage D consisted of 38 stations located in shallow water (13-40 m) off the mouth of the Columbia River. Assemblage D was divided into 3 station groups: station group D_1 was located in the southern portion of assemblage D; station group D_2 was located directly off the mouth of the Columbia River in shallow water (13-27 m); and station group D_3 was located in deeper water (26-40 m) near disposal site B. Station 78 was not placed in a station group but was included in assemblage D.

149. The sediment at all stations was sandy (>94 percent sand) with a maximum of 5.7 percent silt and clay at station 92. The sediment at most stations was greater than 98 percent sand. Median phi-size ranged from 1.96 ∅ to 3.09 ∅.

Table C14

Dominant Species in Assemblage C_1.*

Species Code	Species	BI	f(15)	$\overline{N}/m^2$
344	*Spiophanes bombyx*	8.57	15	75
155	*Eohaustorius sencillus*	8.43	15	74
279	*Magelona sacculata*	6.96	15	61
237	*Chaetozone setosa*	5.80	15	34
425	*Amphiodia periercta-urtica*	4.16	15	24
141	*Paraphoxus vigitegus*	2.66	11	14
7	*Olivella baetica*	2.03	13	22
24	*Axinopsida serricata*	1.50	7	14
137	*Paraphoxus epistomus*	1.53	13	13
354	*Thalenessa spinosa*	1.30	13	7
345	*Spiophanes berkeleyorum*	1.23	9	10
127	*Monoculodes spinipes*	1.17	14	10
193	*Euphilomedes carcharedonta*	1.13	8	11
302	*Nephtys caecoides*	0.93	15	12
29	*Macoma moesta alaskana*	0.93	14	7

* Includes Biological Index (BI), frequency of occurrence [f(15)], and mean number of individuals/m^2 (N/m^2) of the 15 most dominant species.

150. The diversity (H') values ranged from 1.79 to 4.20. The highest values of diversity were found in the southwest and northern portions of assemblage D. The species richness (SR) values ranged from 2.12 to 6.88 and the evenness (J') values ranged from 0.40 to 0.81. The highest species richness and evenness values were generally associated with the high diversity values in the southwest and northern portions of assemblage D.

151. The density of macrofauna was low at all stations ranging from 196 individuals/m^2 to 780 individuals/m^2 with the highest values at the deeper stations. The biomass values ranged from 1.25 g to 5.84 g ash-free dry weight/m^2.

152. The dominant species of assemblage D was the gastropoda *Olivella pycna* (Table C15). *Olivella pycna* occurred at all 38 stations and had a mean of 128 individuals/m^2. *Magelona sacculata*, a polychaete, was also dominant, occurring at all 38 stations with a mean of 49 individuals/m^2. Other dominant species included the cumacean *Diastylopsis dawsoni*, the amphipoda *Monoculodes spinipes*, and the gastropoda *Olivella biplicata*.

153. *Station Group D_1*. Station group D_1 consisted of four stations located in 16-26 m of water south of the mouth of the Columbia River. The four stations joined station groups D_2 and D_3 at 0.56 Bray-Curtis units.

154. The sediment at all stations inlcuded less than 1.5 percent silt and clay. The median phi-size ranged from 1.96 ø at station 125 to 2.59 ø at station 59.

155. Diversity (H') values ranged from 2.70 to 3.36, species richness (SR) from 2.77 to 3.89, and evenness (J') ranged from 0.61 to 0.81.

156. The density of macrofauna was low ranging from 196 individuals /m^2 at station 121 to 340 individuals/m^2 at station 124. The biomass values ranged from 1.25 to 2.00 g ash-free dry weight/m^2.

157. Dominant species were the polychaete *Magelona sacculata* and the gastropoda *Olivella pycna*. Also dominant were the mysid *Archeomysis grebnitzkii* and the amphipods *Hippomedon denticulatus* and *Monoculodes spinipes* (Table C16).

Table C15

Dominant Species in Assemblage D.*

Species Code	Species	BI	f(38)	$\bar{N}/m^2$
9	*Olivella pycna*	9.71	38	128
279	*Magelona sacculata*	7.36	38	49
97	*Diastylopsis dawsoni*	4.26	29	36
127	*Monoculodes spinipes*	4.21	38	11
8	*Olivella biplicata*	3.91	37	16
237	*Chaetozone setosa*	2.47	30	9
110	*Archeomysis grebnitzkii*	2.25	28	8
261	*Haploscoloplos elongatus*	2.23	28	13
169	*Hippomedon denticulatus*	1.78	20	6
153	*Mandibulophoxus unirostratus*	1.71	24	7
7	*Olivella baetica*	1.32	21	4

* Includes Biological Index (BI), frequency of occurrence [f(38)], and mean number of individuals/m^2 (N/m^2) of the 11 most dominant species.

Table C16

Dominant Species at Station Group D_1.*

Species Code	Species	BI	f(4)	$\overline{N}/m^2$
279	*Magelona sacculata*	9.50	4	66
9	*Olivella pycna*	9.00	4	56
110	*Archeomysis grebnitzkii*	6.75	4	25
169	*Hippomedon denticulatus*	6.25	4	13
127	*Monoculodes spinipes*	5.00	4	9
8	*Olivella biplicata*	3.00	4	5
344	*Spiophanes bombyx*	2.50	3	8
7	*Olivella baetica*	2.12	3	4

* Includes Biological Index (BI), frequency of occurrence [f(4)], and mean number of individuals/m^2 (N/m^2) of the 8 most dominant species.

158. Station Group D_2. Station group D_2 consisted of 25 stations (13-27 m) which were located directly off the mouth of the Columbia River. The 25 stations were joined at 0.48 Bray-Curtis units and joined station group D_3 at 0.53 Bray-Curtis units.

159. The percentage of silt and clay ranged from 1 to 5 percent. The median phi ranged from 2.07 ∅ to 3.09 ∅.

160. The diversity (H') values ranged from 1.79 at station 79 to 4.20 at station 135. Species richness (SR) values ranged from 2.12 at station 79 to 6.68 at station 135. Evenness (J') values ranged from 0.40 to 0.81.

161. The density of macrofauna was low with a range of 244 individuals/m^2 at station 86 and 77 to 780 individuals/m^2 at station 92. Biomass values ranged from 1.60 g ash-free dry weight/m^2 at station 119 to 5.84 g ash-free dry weight at station 85. Diversity (H') and species richness (SR) values tended to be highest in the northwestern portion of station group D_2.

162. The dominant species were the gastropoda Olivella pycna and the polychaete Magelona sacculata. Other dominant species included the cumacean Diastylopsis dawsoni, the amphipoda Monoculodes spinipes, and the gastropoda Olivella biplicata (Table C17).

163. Station Group D_3. Station group D_3 consisted of eight stations (26-40 m) located along the southwest portion of disposal site B. The eight stations were joined at 0.49 Bray-Curtis units and joined station group D_2 at 0.53 Bray-Curtis units.

164. The sediment samples all contained less than 2 percent silt and clay. The median phi-size ranged from 2.01 ∅ to 2.43 ∅.

165. The diversity (H') values ranged from 3.27 at station 71 to 4.11 at station 73. Species richness (SR) values from 5.25 to 6.47 and evenness (J') values ranged from 0.70 to 0.80.

166. The density of macrofauna ranged from 198 individuals/m^2 at station 71 to 606 individuals/m^2 at station 87. The biomass values ranged from 1.33 g ash-free dry weight/m^2 at station 71 to 5.65 g ash-free dry weight/m^2 at station 87.

Table C17

Dominant Species at Station Group D_2.*

Species Code	Species	BI	f(25)	$\overline{N}/m^2$
9	*Olivella pycna*	9.80	25	139
279	*Magelona sacculata*	7.62	25	49
97	*Diastylopsis dawsoni*	5.78	24	51
127	*Monoculodes spinipes*	5.16	25	13
8	*Olivella biplicata*	4.54	24	18
153	*Mandibulophoxus uncirostratus*	2.40	20	9
237	*Chaetozone setosa*	2.38	20	7
169	*Hippomedon denticulatus*	1.78	15	6
110	*Archeomysis grebnitzkii*	1.66	17	4
261	*Haploscoloplos elongatus*	1.28	18	5
197	*Bathycopea daltonae*	1.18	19	4
460	Nemertea sp. #4	1.06	17	9

* Included Biological Index (BI), frequency of occurrence [f(25)] and mean number of individuals/m^2 ($\overline{N}/m^2$) of the 12 most dominant species.

167. The dominant species were the gastropoda *Olivella pycna* and the polychaete *Haploscoloplos elongatus*. Other dominant species included the polychaetes *Chaetozone setosa* and *Magelona sacculata*, the gastropoda *Olivella baetica*, and the cumacean *Colurostylis occidentalis* (Table C18).

168. *Assemblage E*. Assemblage E consisted of five stations located in 13-20 m of water on the north side of the main channel of the Columbia River, from inside the north jetty to 3.5 km offshore. The five stations were joined at 0.59 Bray-Curtis units and did not join the other inshore station groups until 0.76 Bray-Curtis units.

169. The sediment at stations 112, 113, and 114 had less than 2 percent silt and clay size particles while station 115 had 3.7 percent and station 111 had 16.4 percent.

170. Diversity (H') values ranged from 1.86 at station 112 to 3.60 at station 114. Species richness (SR) values ranged from 2.86 at station 113 to 4.65 at station 111. Evenness (J') values ranged from 0.42 at station 112 to 0.83 at station 115.

171. The density of macrofauna ranged from 94 individuals/m^2 at station 113 to 866 individuals/m^2 at station 111. The biomass values were very low with a range of 0.28 g ash-free dry weight/m^2 at station 113 to 0.81 g ash-free dry weight/m^2 at station 115.

172. The two stations located in the mouth of the Columbia River (111 and 112) had lower diversity (H') and evenness (J') values and higher density values when compared to the two most offshore stations (114 and 115) in Assemblage E. Station 113 had intermediate in diversity values with lower species richness, density, and biomass values compared to the other four stations.

173. The dominant species at stations 111 and 112 was the polychaete *Spio filicornis* (449 individuals/m^2) that accounted for over 60 percent of the individuals at those stations (Table C19). The dominance of *Spio filicornis* resulted in lower evenness (J') values and thus lower diversity at these stations. The amphipods *Hippomedon denticulatus*, *Mandibulophoxus uncirostratus*, and *Monoculodes spinipes* and the cumacean *Diastylopsis*

Table C18

Dominant Species at Station Group D_3.*

Species Code	Species	BI	f(8)	$\overline{N}/m^2$
9	*Olivella pycna*	9.87	8	117
261	*Haploscoloplos elongatus*	6.50	8	45
237	*Chaetozone setosa*	3.68	8	21
279	*Magelona sacculata*	3.56	8	12
7	*Olivella baetica*	3.06	8	11
104	*Colurostylis occidentalis*	3.06	8	11
8	*Olivella biplicata*	2.81	8	17
316	*Owenia collaris*	2.25	5	11
425	*Amphipodia periercta-urtica*	2.18	7	9
110	*Archeomysis grebnitzkii*	2.12	7	12

* Includes Biological Index (BI), frequency of occurrence [f(8)], and mean number of individuals/m^2 ($\overline{N}/m^2$) of the 10 most dominant species.

Table C19

Dominant Species in Assemblage E.*

Species Code	Species	BI	f(5)	$\bar{N}/m^2$
343	*Spio filicornis*	7.1	5	184
169	*Hippomedon denticulatus*	6.4	5	23
153	*Mandibulophoxus uncirostratus*	4.8	5	20
127	*Monoculodes spinipes*	4.4	5	10
97	*Diastylopsis dawsoni*	4.4	5	20
303	*Nephtys californiensis*	4.0	4	7
27	*Siliqua patula*	3.8	4	18
156	*Eohaustorius washingtonianus*	3.7	3	15
154	*Atylus tridens*	2.8	3	14
279	*Magelona sacculata*	1.8	3	6
344	*Spiophanes bombyx*	1.7	2	5
9	*Olivella pycna*	1.6	3	8
110	*Archeomysis grebnitzkii*	2.2	5	9
460	Nemertea sp. #5	1.3	3	5
94	*Lamprops* sp. #1	1.0	5	4

* Includes Biological Index (BI), frequency of occurrence [f(5)], and mean number of individuals/m^2 ($\bar{N}/m^2$) of the 15 most dominant species.

dawsoni were also dominant species in assemblage E, especially the farthest offshore stations (114 and 115).

Species Groups

174. Classification of 357 species with present techniques was beyond the computational capacity of the CDC CYBER; therefore some form of species reduction was necessary. It has been noted by several authors that rare species carry little classificatory information (Boesch, 1973; Stephenson et al., 1975). In general, species that occurred at less than five stations were excluded from the analysis. The original 357 species were reduced to 158 species. The 199 eliminated species accounted for less than 1 percent of the total number of individuals found in the areal baseline. The species were divided into thirteen species groups (Figure C29). Twenty-five species were not included in any species group. Except for the wide-ranging species groups 10 and 11, all species groups were described by the percent abundance, constancy and fidelity of the constituent species to assemblages or station groups (Fager, 1963; Clifford and Stephenson, 1975). The percent abundance of a species to an assemblage or station group is the percent of the total abundance of that species restricted to an assemblage or station group. The percent constancy of a species to an assemblage or station group is the percent frequency of occurrence of a species within an assemblage or station group. The percent fidelity of a species to an assemblage or station group is the percent occurrence of a species restricted to an assemblage or station group. Species groups 10 and 11 were described by the total number of individuals of a species obtained in the areal baseline and the percent of the stations and assemblages that the species was found. The dominance of a species within as assemblage or station group was defined as the Biological Index (BI) value (see Materials and Methods). Each species group is described in the following paragraphs. Biological index values of 0 are represented by a dash in the tables of species groups for visual clarification.

175. Species Group 1. Species group 1 (Table C20) consisted of 32 species which were found predominately at the most offshore stations

Table C20

Species Group 1.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
25	*Thyasira flexuosa*	100.0	100.0	100.0	-
282	*Maldane sarsi*	99.9	100.0	90.9	8.8
278	*Magelona longicornis*	96.6	100.0	50.0	6.0
125	*Ampelisca brevisimulata*	100.0	100.0	100.0	-
54	*Cyclocardia ventricosa*	100.0	90.0	100.0	-
339	*Rhodine bitorguata*	97.5	100.0	71.4	0.6
347	*Sternaspis fossor*	96.8	100.0	71.4	0.6
56	*Compsomyax subdiaphana*	94.4	90.0	81.8	-
309	*Ninoe gemmea*	96.6	100.0	83.3	-
447	*Terebellides stroemi*	94.9	80.0	80.0	-
442	*Paraonis gracilis oculatus*	100.0	90.0	100.0	-
470	*Brada pluribranchiata*	90.6	90.0	75.0	-
312	*Notomastus hemipodus*	82.8	100.0	50.0	1.0
334	*Praxillella gracilis*	81.8	100.0	62.5	-
328	*Pista cristata*	88.5	100.0	90.9	-
49	Chaetodermatidae sp. #1	80.0	100.0	71.4	-
435	*Parandalia fauveli*	82.9	90.0	69.2	-
50	*Pandora filosa*	80.9	80.0	80.0	-
103	*Eudorellopsis longirostris*	92.3	70.0	87.5	-
134	*Westwoodilla caecula*	70.6	80.0	72.7	-
13	*Oenopota turricula*	81.2	80.0	70.0	-
445	*Praxillella affinis pacifica*	82.2	80.0	88.9	-
335	*Munispio cirrifera*	78.3	80.0	57.1	-
449	*Cossura* nr. *laeviseta*	70.1	90.0	69.2	-
422	Oligochaeta spp.	93.5	80.0	75.0	-
465	*Harmothoe* nr. *lunulata*	75.0	80.0	66.7	-
437	*Myriochele heeri*	80.6	70.0	70.0	-
28	*Musculus laevigata*	96.2	60.0	85.7	-
225	*Apistobranchus ornatus*	98.2	80.0	88.9	-
11	*Turbonilla* sp. #1	96.9	80.0	72.7	0.3
26	*Adontorhina cyclia*	96.2	60.0	85.7	-
444	Maldanidae sp. #14	100.0	80.0	100.0	-

* Includes abundance, constancy, fidelity and Biological Index (BI) for each species in station group A_1.

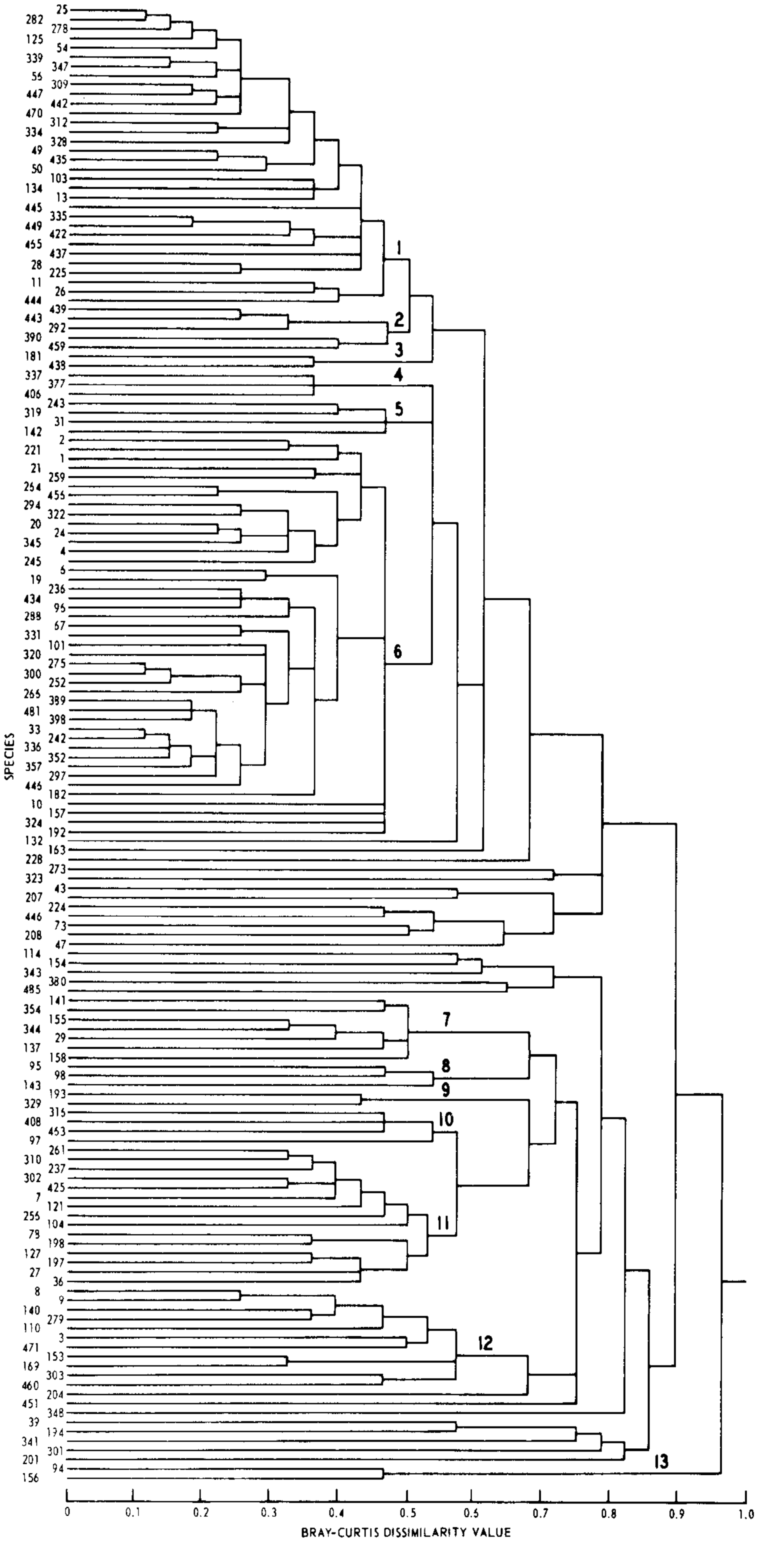


Figure C29. Dendrogram of Dissimilarity Between Species-Areal Baseline (station group A_1, 75-97 m). Only two species in species group 1 were dominant at station group A_1, the polychaetes Maldane sarsi (BI = 8.8) and Magelona longicornis (BI = 6.0). The distribution of Maldane sarsi exemplifies the distribution of species included in species group 1 (Figure C30).

176. The percentage abundance of each species restricted to station group A_1 ranged from 70 to 100 percent with a mean of 89.9 percent. The constancy of species group 1 in station group A_1 ranged from 60 to 100 percent with a mean of 86.9 percent. The fidelity of species in species group 1 to station group A_1 ranged from 50 to 100 percent with a mean of 78.7 percent. Of the 4949 individuals that comprise species group 1, 95 percent were restricted to station group A_1, 5 percent were found in station groups A_2, A_3, or A_4, and only seven individuals were found outside assemblage A.

177. Species Group 2. Species group 2 (Table C21) consisted of five species that were completely restricted to assemblage A with maximum abundance found at station group A_1 and the northernmost stations in station group A_2 (stations 99, 143, 147, and 150). The constancy of species within group 2 to assemblage A ranged from 37 to 51 percent with a mean of 45 percent. The percentage abundance of these species restricted to assemblage A and fidelity to assemblage A was 100 percent. None of the species was dominant.

178. Species Group 3. Species group 3 (Table C22) consisted of two rare species predominately restricted to assemblage A. Only one individual of Nemertea sp. #1 was found outside assemblage A. The constancy of both species to assemblage A was 42 percent.

179. Species Group 4. Species group 4 (Table C23) consisted of three species that were restricted to assemblage A. None of the species were found at station group A_4, and only one individual of Anthozoa sp. #1 was found at station group A_3. The percentage abundance restricted to assemblage A and the fidelity to assemblage A was 100 percent. The constancy of species group 4 to assemblage A ranged from 47 to 54 percent with a mean of 50 percent. None of the species was dominant.

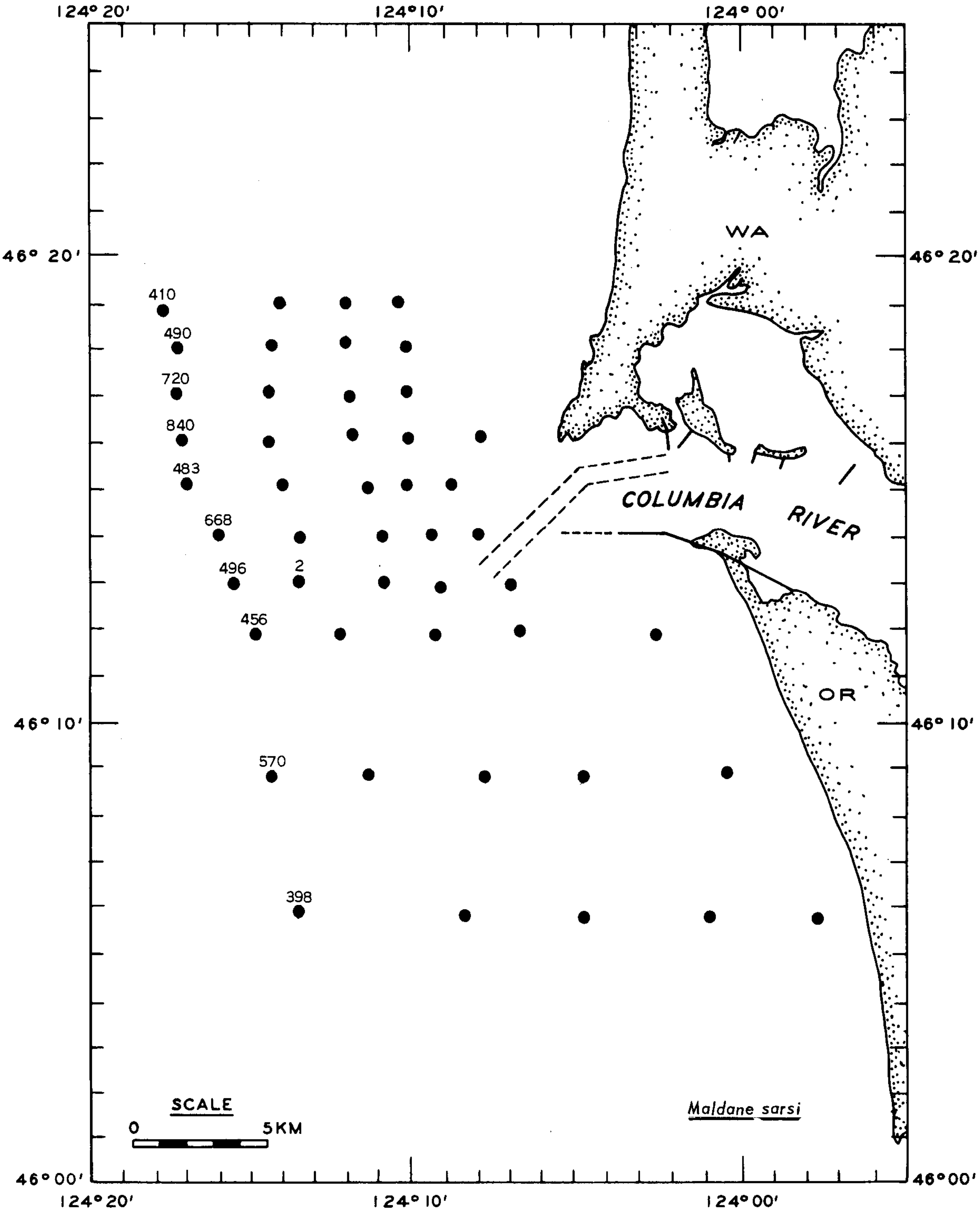


Figure C30. Distribution of Maldane sarsi

Table C21

Species Group 2.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
439	*Ampharete arctica*	100	41.7	100	-
443	*Tharyx* sp. #3	100	51.2	100	-
292	*Polydora* sp. #2	100	50.0	100	-
390	*Nephtys ferruginea*	100	37.5	100	-
459	*Podarkeopsis brevipalpa*	100	45,8	100	-

* Includes abundance, constancy, fidelity, and Biological Index (BI) for each species in assemblage A.

Table C22

Species Group 3.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
181	*Argissa hamatipes*	100.0	41.7	100.0	-
438	Nemertea sp. #1	92.3	41.7	91.7	-

* Includes abundance, constancy, fidelity, and Biological Index (BI) for each species in assemblage A.

180. Species Group 5. Species group 5 (Table C24) consisted of four species primarily restricted to assemblage A. None of the species were dominant. The highest abundance of species group 5 was found at station group A_4. The percentage abundance restricted to station group A_4 ranged from 44 to 82 percent with a mean of 57 percent. The percentage abundance of species group 5 restricted to assemblage A ranged from 94 to 100 percent with a mean of 98 percent. Both *Pectinaria granulata* and *Paraphoxus vigitegus* were restricted to assemblage A. One individual of *Trochachaeta franciscanum* at station 145 and 19 individuals of *Macoma nusuta* were found in assemblage B. The constancy of species group 5 to assemblage A ranged from 58 to 83 percent with a mean of 70 percent.

181. Species Group 6. Species group 6 (Table C25) consisted of 43 species that were primarily restricted to assemblage A (60-97 m). This included 8 of the top 10 numerically dominant species found in assemblage A, including *Axionopsida serricata*, *Lumbrineris luti*, *Myriochele oculata*, *Mediomastus californiensis*, *Acila castrensis*, *Heteromastus filobranchus*, *Spiochaetopterus costarum*, and *Spiophanes berkeleyorum*. The distribution of *Lumbrineris luti* exemplifies the distribution pattern of species group 6 (Figure C31 and C32).

182. The percentage abundance of species restricted to assemblage A ranged from 66 to 100 percent with a mean of 91.6 percent. The constancy of species group 6 to assemblage A ranged from 58 to 100 percent with a mean of 86.7 percent. The fidelity of species in species group 6 to assemblage A ranged from 41 to 100 percent with a mean of 80.8 percent. Of the 50,603 individuals that comprised species group 6, only 5.4 percent were found in assemblage B and less than 1 percent at the remaining assemblages combined.

183. Species Group 7. Species group 7 (Table C26) consisted of seven species that were predominately found in assemblage C and at stations 145, 146, 151, and 152. All of these stations were located in shallow water (18-47 m) away from the mouth of the Columbia River. Two species, the polychaete *Spiophanes bombyx* (BI = 7.76) and the amphipoda

Table C23

Species Group 4.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
337	Paraprionospio pinnata	100.0	54.1	100.0	-
377	Anthozoa sp. #1	100.0	45.8	100.0	-
406	Asychis disparidentata	100.0	50.0	100.0	-

* Includes abundance, constancy, fidelity and Biological Index (BI) of species in assemblage A.

Table C24

Species Group 5.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
243	Trochachaeta fransisconum	99.8	83.3	95.2	0.33
319	Pectinaria granulata	100.0	66.7	100.0	-
31	Macoma nusuta	93.9	58.3	60.8	0.33
142	Paraphoxus vigitegus	100.0	70.8	100.0	0.08

* Includes abundance, constancy, fidelity and Biological Index (BI) of species in assemblage A.

Table C25

Species Group 6.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
2	*Mitrellia gouldii*	74.7	95.8	53.7	-
221	*Ampharete acutifrons*	84.9	95.8	56.1	-
1	*Cylichna attonsa*	81.6	79.2	67.9	-
21	*Yoldia seminuda*	85.0	83.3	76.0	-
259	*Goniada maculata*	73.3	91.7	58.9	-
264	*Heteromastus filobranchus*	77.9	95.8	62.9	3.42
456	Nemertea sp. #4	65.6	83.3	73.1	0.29
294	*Mediomastus californiensis*	91.6	100.0	75.0	2.58
322	*Pholoe minuta*	76.4	100.0	46.2	1.58
20	*Nucula tenuis*	91.3	100.0	52.2	1.46
24	*Axinopsida serricata*	96.4	100.0	41.4	9.17
345	*Spiophanes berkeleyorum*	88.8	100.0	41.4	2.42
4	*Nassarius mendicus*	68.6	95.8	47.9	-
245	*Etone californica*	77.3	97.5	84.0	-
6	*Odostomia* sp. #1	92.4	100.0	75.8	0.12
19	*Epitonium tinctum*	99.5	95.8	67.6	3.83
236	*Barantolla americana*	100.0	75.0	100.0	0.25
434	*Pilargis berkeleyae*	100.0	70.8	100.0	-
96	*Hemilamprops californensis*	82.3	70.8	84.2	-
288	*Polydora caulleryi*	100.0	79.2	100.0	-
67	Dentaliidae spp.	98.9	87.5	91.3	0.17
331	*Polycirrus* spp.	93.0	91.7	78.6	0.08
101	*Diastylis alaskensis*	100.0	79.7	100.0	-
320	*Pectinaria californiensis*	100.0	95.8	100.0	0.45
275	*Lumbrineris luti*	99.9	100.0	82.8	5.54
300	*Myriochele oculata*	99.8	100.0	82.8	5.00
252	*Glycera capitula*	100.0	100.0	100.0	-
266	*Laonice cirrata*	97.9	91.7	88.0	-
389	*Anobothrus gracilis*	100.0	75.0	100.0	-
481	*Chone albocincta*	100.0	70.8	100.0	-
398	*Nereis zonata*	98.8	83.3	95.0	-
33	*Macoma elimata*	100.0	91.7	100.0	0.66
242	*Decamastus gracilis*	99.9	95.8	95.8	1.42
336	*Prionospio malmgreni*	100.0	83.8	100.0	0.13
352	*Spiochaetopterus costarum*	100.0	87.5	100.0	3.04
357	*Tharyx* sp. #1	100.0	83.3	100.0	-
297	*Melinna occulata*	98.3	83.3	95.2	-
446	Nemertea sp. #1	98.2	91.7	88.0	-
182	*Pleusymtes coquilla*	100.0	66.7	100.0	-
10	*Turbonilla aurantia*	90.5	58.3	87.5	-
157	*Photis brevipes*	80.0	70.8	61.5	-
324	*Anaitides mucosa*	92.6	58.3	86.7	-
192	*Nematoda* spp.	81.8	83.3	76.9	0.42

* Includes abundance, constancy, fidelity, and Biological Index (BI) for species in assemblage A.

Table C26

Species Group 7.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
141	*Paraphoxus vigitegus*	86.2	68.4	69.9	2.89
354	*Thalenessa spinosa*	94.7	68.4	76.5	1.02
155	*Eohaustorius sencillus*	95.1	100.0	50.0	7.13
344	*Spiophanes bombyx*	89.6	100.0	38.0	7.76
29	*Macoma moesta alaskana*	69.8	94.7	60.0	1.45
137	*Paraphoxus epistomus*	83.7	89.5	56.7	2.00
158	*Photis lacia*	63.4	78.9	62.5	-

* Includes abundance, constancy, fidelity, and Biological Index (BI) of species in assemblage C and at stations 145, 146, 151, and 152.

Table C27

Species Group 8.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
95	*Mesolamprops* sp. #1	84.0	53.1	74.0	0.11
98	*Diastylopsis tenuis*	90.7	53.1	85.0	-
143	*Paraphoxus fatigans*	87.0	46.9	83.3	1.03

* Includes abundance, constancy, fidelity, and Biological Index (BI) of species in assemblages B and C.

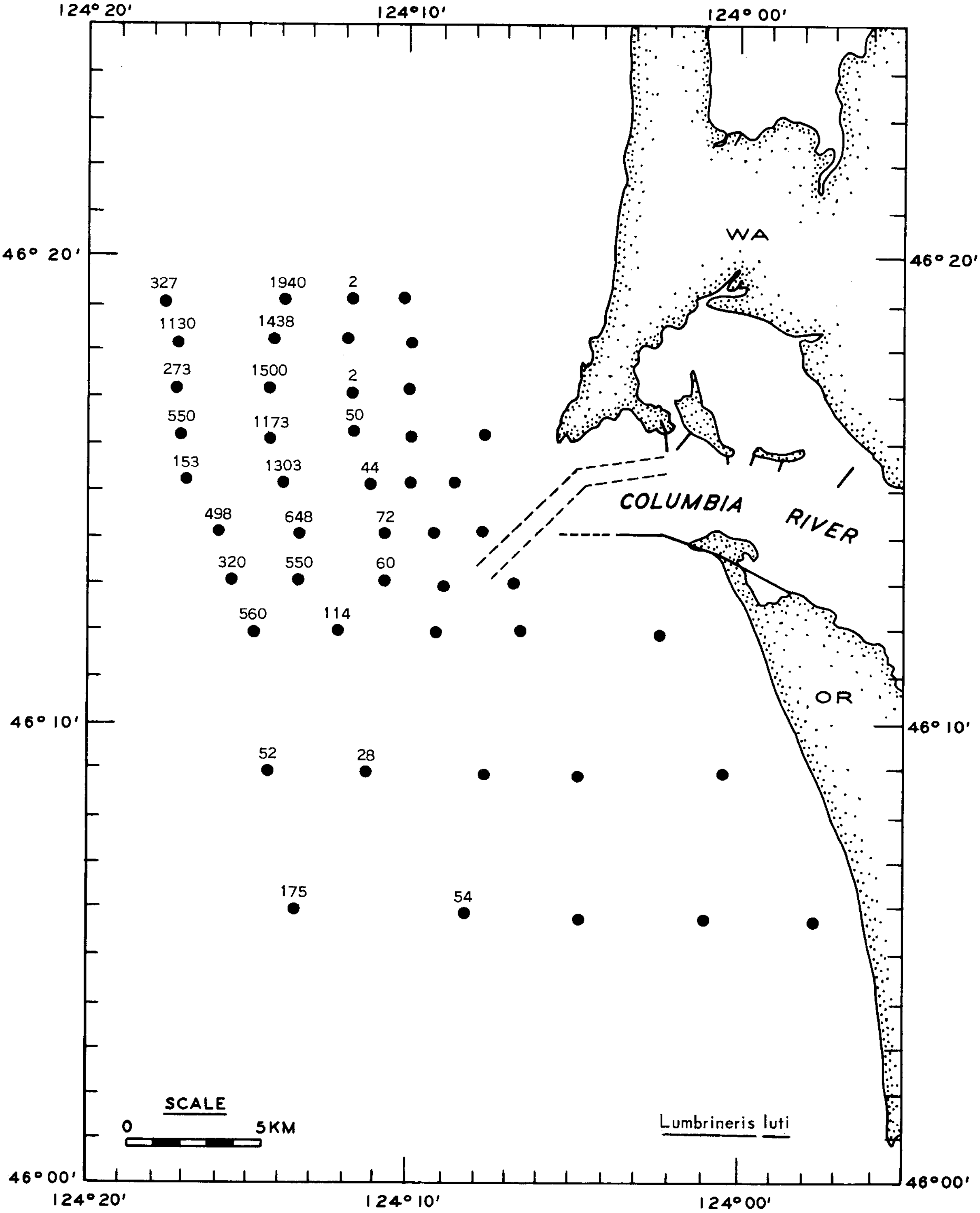


Figure C31. Distribution of Lumbrineris luti I

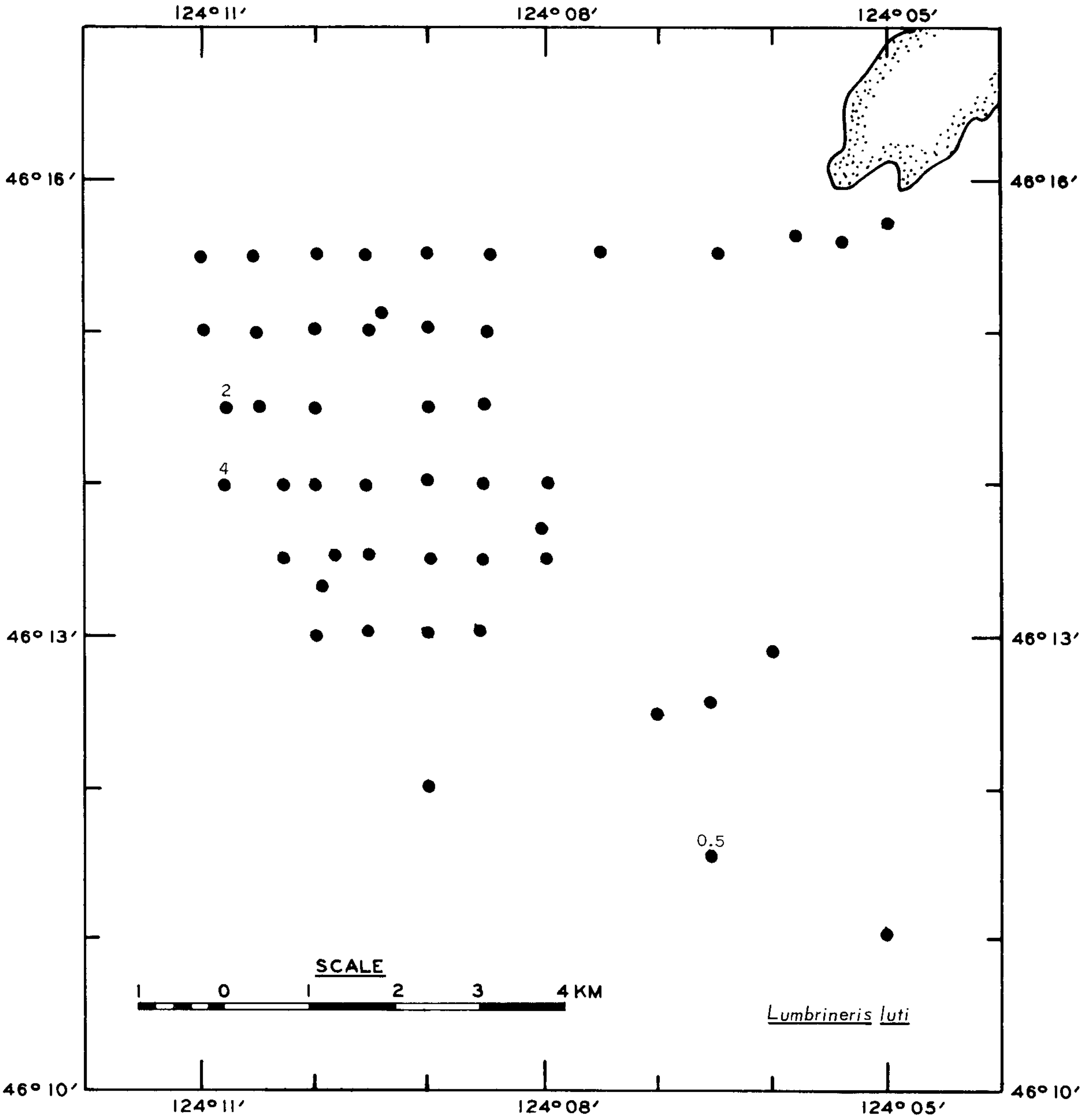


Figure C32. Distribution of <u>Lumberineris</u> <u>luti</u> II

Eohaustorius sencillus (BI = 7.13), were dominant at those stations. Except for the amphipoda *Photis lacia*, the remaining species were moderately dominant.

184. The percentage abundance of species group 7 restricted to these stations ranged from 63 to 95 percent with a mean of 83 percent. The constancy of species group 7 to those stations ranged from 68 to 100 percent with a mean of 86 percent. The fidelity of species group 7 to those stations was low with a range of 38-77 percent and a mean of 59 percent.

185. *Species Group 8*. Species group 8 (Table C27) consisted of three species primarily restricted to assemblages B and C. None of the species were dominant species in assemblages B or C except *Paraphoxus fatigans* at stations 142, 146, and 151. All three species were most abundant at stations 142, 146, and 151 in the northern part of station group B_2.

186. The percentage abundance of each species restricted to assemblages B and C ranged from 84 to 91 percent with a mean 87 percent. The constancy of species to assemblages B and C ranged from 47 to 53 percent with a mean of 51 percent. The fidelity of species to assemblage B and C ranged from 74 to 85 percent with a mean of 81 percent.

187. *Species Group 9*. Species group (Table C28) consisted of two species found in moderate depths in assemblages A, B, and C except station group A_1 (the deepest station group in assemblage A). Neither species was dominant. Both species had a high percentage abundance restricted to those stations ($\overline{97}$ percent) and high fidelity ($\overline{96}$ percent) but low constancy ($\overline{58}$ percent) in those stations.

188. *Species Group 10*. Species group 10 (Table C29) consisted of four species which were wide-spread throughout all assemblages except E. Only *Diastylopsis dawsoni*, a cumacean, was found in assemblage E. *Diastylopsis dawsoni* was the dominant species in the areal baseline (BI = 3.45) with very high abundances in assemblage B.

189. *Species Group 11*. Species group 11 (Table C30) consisted of 15 species which were widespread throughout the study area. The 15 species were found in every assemblage except assemblage E, where seven species were not found. The polychaetes *Haploscoloplos elongatus* (BI = 2.17)

Table C28

Species Group 9.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
193	Euphilomedes carcharodonta	99.0	69.6	96.9	0.45
329	Lumbrineris bicirrata	94.6	45.6	95.5	-

* Includes abundance, constancy, fidelity, and Biological Index (BI) of species in assemblages B and C.

Table C29

Species Group 10.*

Species Code	Species	N	Station (%)	Assemblage (%)	BI
316	Owenia collaris	893	52	80	0.91
408	Glycinda picta	226	45	80	0.24
463	Nemertea sp. #6	73	31	80	0.04
97	Diastylopsis dawsoni	20,441	77	100	3.45

* Includes total number of individuals (N), percentage constancy to stations and assemblages and Biological Index (BI) for each species.

Table C30

Species Group 11.*

Species Code	Species	N	BI	Stations (%)	Assemblage (%)
261	*Haploscoloplos elongatus*	1704	2.17	82	80
310	*Northria iridescens*	163	-	68	100
237	*Chaetozone setosa*	1080	2.32	83	100
302	*Nephtys caecoides*	365	0.38	61	100
425	*Amphiodia periercta-urtica*	1384	1.98	84	100
7	*Olivella baetica*	383	0.75	64	80
121	*Ampelisca macrocephala*	305	0.24	54	100
256	*Glycinde* sp. #2	257	0.38	55	80
104	*Colurostylis occidentalis*	133	0.27	44	80
78	*Paracaudina chilensis*	964	1.02	30	80
198	*Tecticeps convexus*	348	0.34	47	80
127	*Monoculodes spinipes*	457	2.21	79	100
197	*Bathycopea daltonae*	287	0.51	60	100
27	*Siliqua patula*	186	0.33	48	100
36	*Tellina modesta*	527	0.91	42	80

* Includes total number of individuals (N), percent constancy to stations and assemblages, and Biological Index (BI) for each species.

and Chaetozone setosa (BI = 2.32) (Figures C33 and C34); the amphipoda Monoculodes spinipes (BI = 2.21) and the ophiuroid, Amphiodia periercta-urtica (BI = 1.98) were dominant species in most assemblages.

190. Species Group 12. Species group 12 (Table C31) consisted of 11 species which were predominantly found in the shallow-water sand assemblages C, D, and E. A few individuals (5.8 percent) were found in assemblage B, and only three individuals were found in assemblage A (0.05 percent). The gastropoda Olivella pycna (BI = 6.59) and the polychaete Magelona sacculata (BI = 7.41) were dominant species at the shallow-water stations. The distribution of Magelona sacculata exemplifies this distribution pattern (Figure C35 and C36).

191. The percentage abundance of each species restricted to assemblages C, D, and E ranged from 73 to 100 percent with a mean of 92 percent. The constancy of species in assemblages C, D, and E ranged from 74 to 100 percent with a mean of 87 percent. The fidelity of species in species group 12 to assemblages C, D, and E ranged from 43 to 96 percent with a mean of 66 percent.

192. Species Group 13. Species group 13 (Table C32) consisted of two crustacean species, which were restricted to assemblage E and station group D_1 (13-26 m), near the mouth of the Columbia River. Eohaustorius washingtonianus was moderately dominant (BI = 2.61), and Lamprops sp. #1 was not dominant (BI = 0.67). The constancy of Lamprops sp. #1 to assemblage E and station group D_1 was 77.8 percent and Eohaustorius washingtonianus was 55.6 percent.

Comparison of Species and Site Classification

193. A two-way coincidence table derived from the station x species classification is summarized in Figure C37. Cell constancy was calculated as percentage occupancy for each station group, species group cell. A second two-way coincidence table was calculated for the cell constancy of each assemblage group, species group cell. Only species groups which contained more than five species were included in the second coincidence table (Figure C38).

194. The first six species groups (species groups 1-6), including 88 species, were primarily restricted to station groups A_{1-4} and can be con-

Table C31

Species Group 12.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
8	*Olivella biplicata*	97.3	77.6	88.2	2.41
9	*Olivella pycna*	92.2	86.3	73.9	6.59
140	*Paraphoxus obtusidens major*	93.0	84.5	89.1	0.88
279	*Magelona sacculata*	98.0	96.6	84.8	7.41
110	*Archeomysis grebnitzkii*	93.5	74.1	87.8	1.81
3	*Nassarius fossatus*	84.2	51.7	83.3	0.15
471	Nemertea sp. #7	97.5	60.3	92.1	0.70
153	*Mandibulophoxus uncirostratus*	100.0	53.4	100.0	1.61
169	*Hippomedon denticulatus*	100.0	43.1	100.0	1.76
303	*Nephtys californiensis*	73.2	50.0	78.4	0.56
460	Nemertea sp. #5	86.8	43.1	78.1	0.55

* Includes abundance, constancy, fidelity, and Biological Index (BI) of species in assemblage C, D, and E.

Table C32

Species Group 13.*

Species Code	Species	Abundance (%)	Constancy (%)	Fidelity (%)	BI
94	*Lamprops* sp. #1	100.0	77.8	100.0	0.67
156	*Eohaustorius washingtonianus*	100.0	55.6	100.0	2.61

* Includes abundance, constancy, fidelity, and Biological Index (BI) of species in assemblage E and at station group D_3.

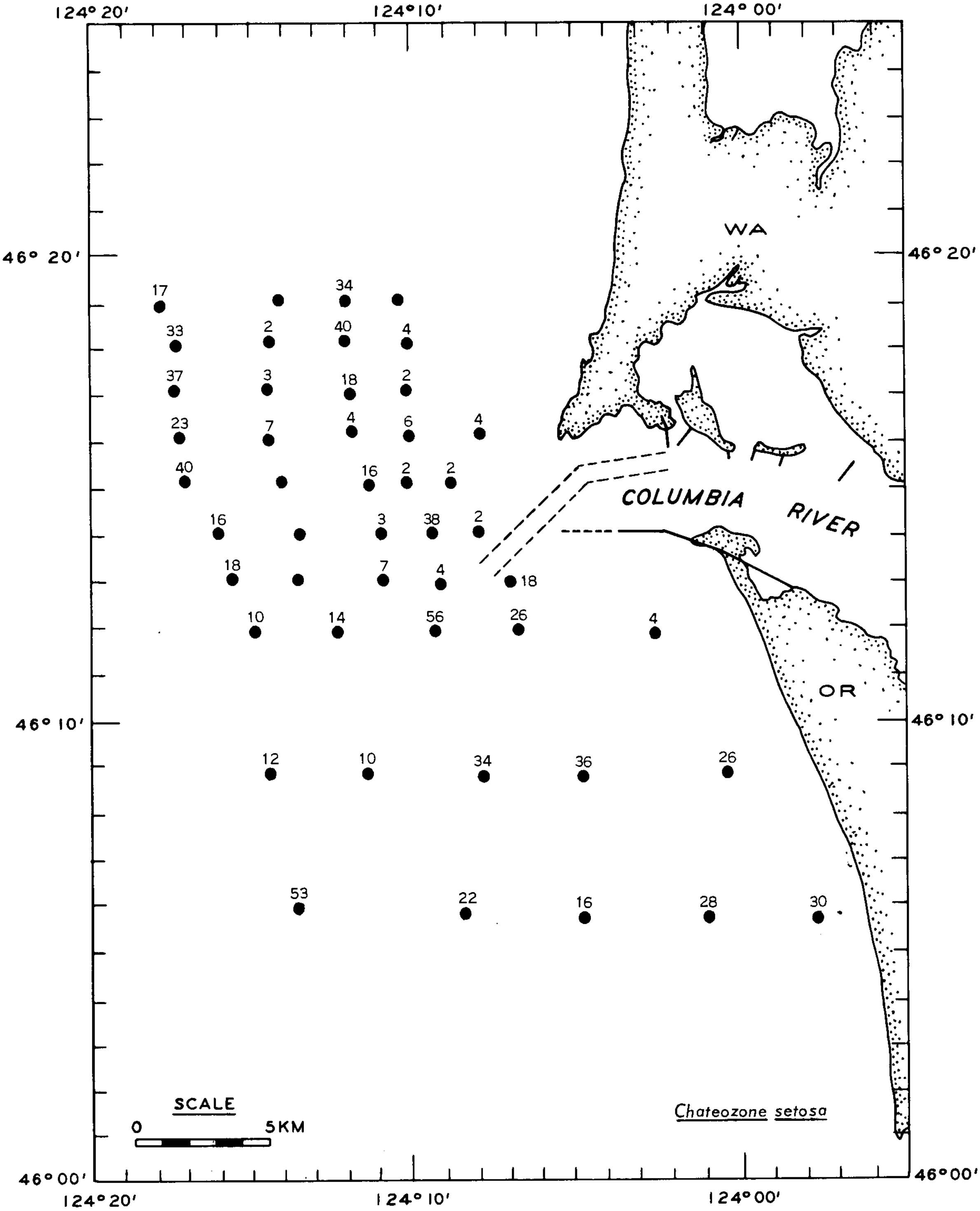


Figure C33. Distribution of Chaetozone setosa I

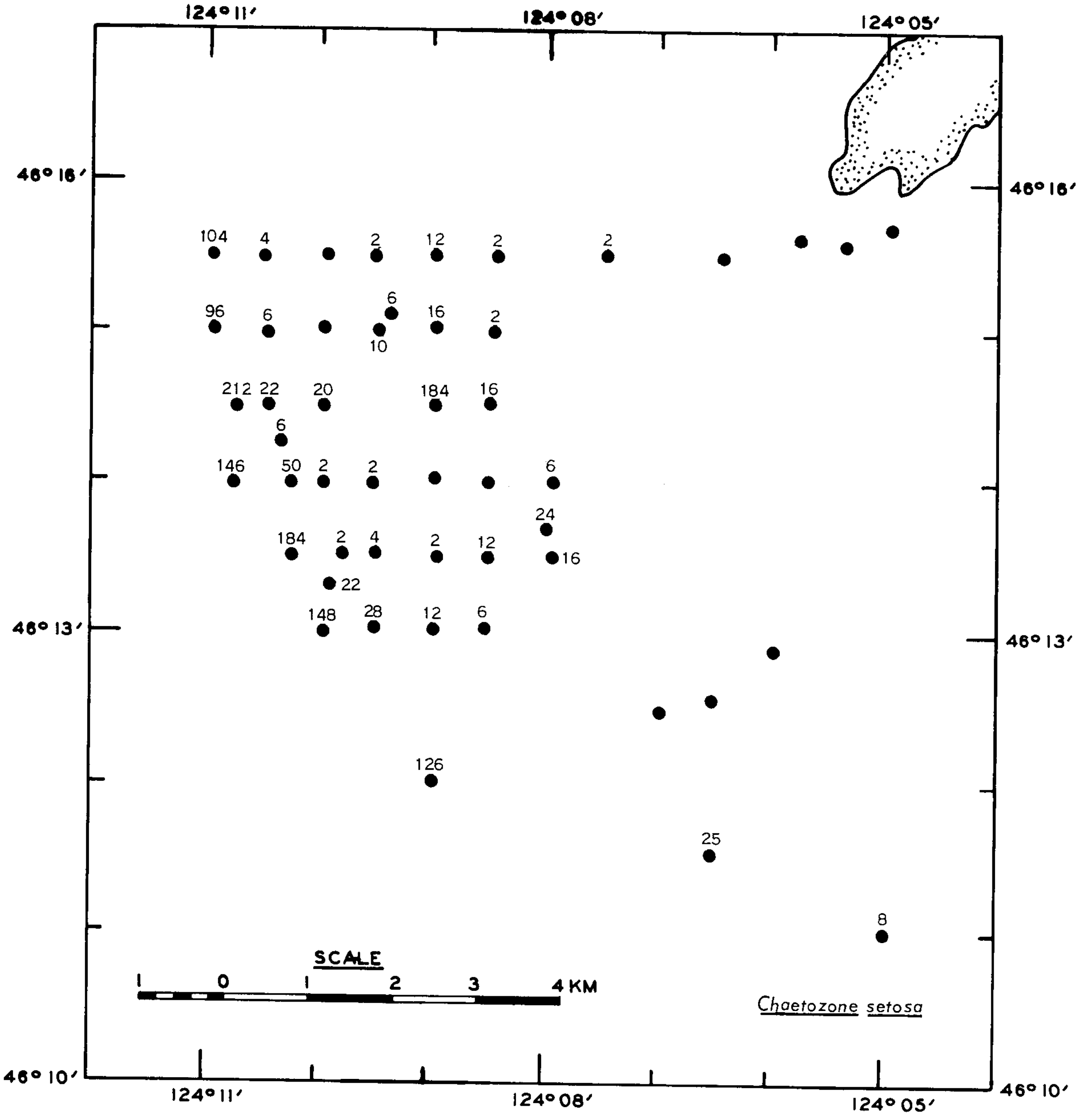


Figure C34. Distribution of Chaetozone setosa II

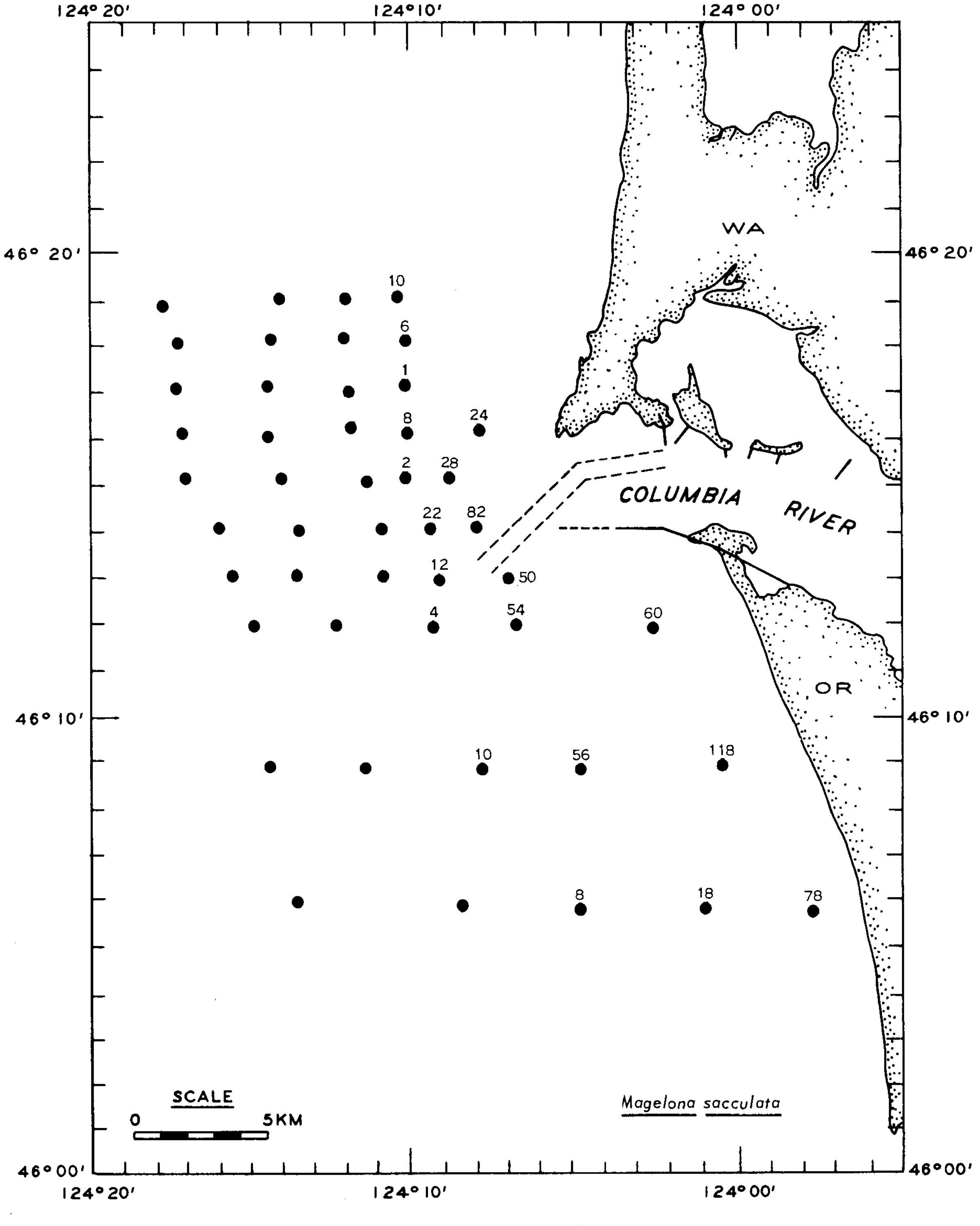


Figure C35. Distribution of Magelona sacculata I

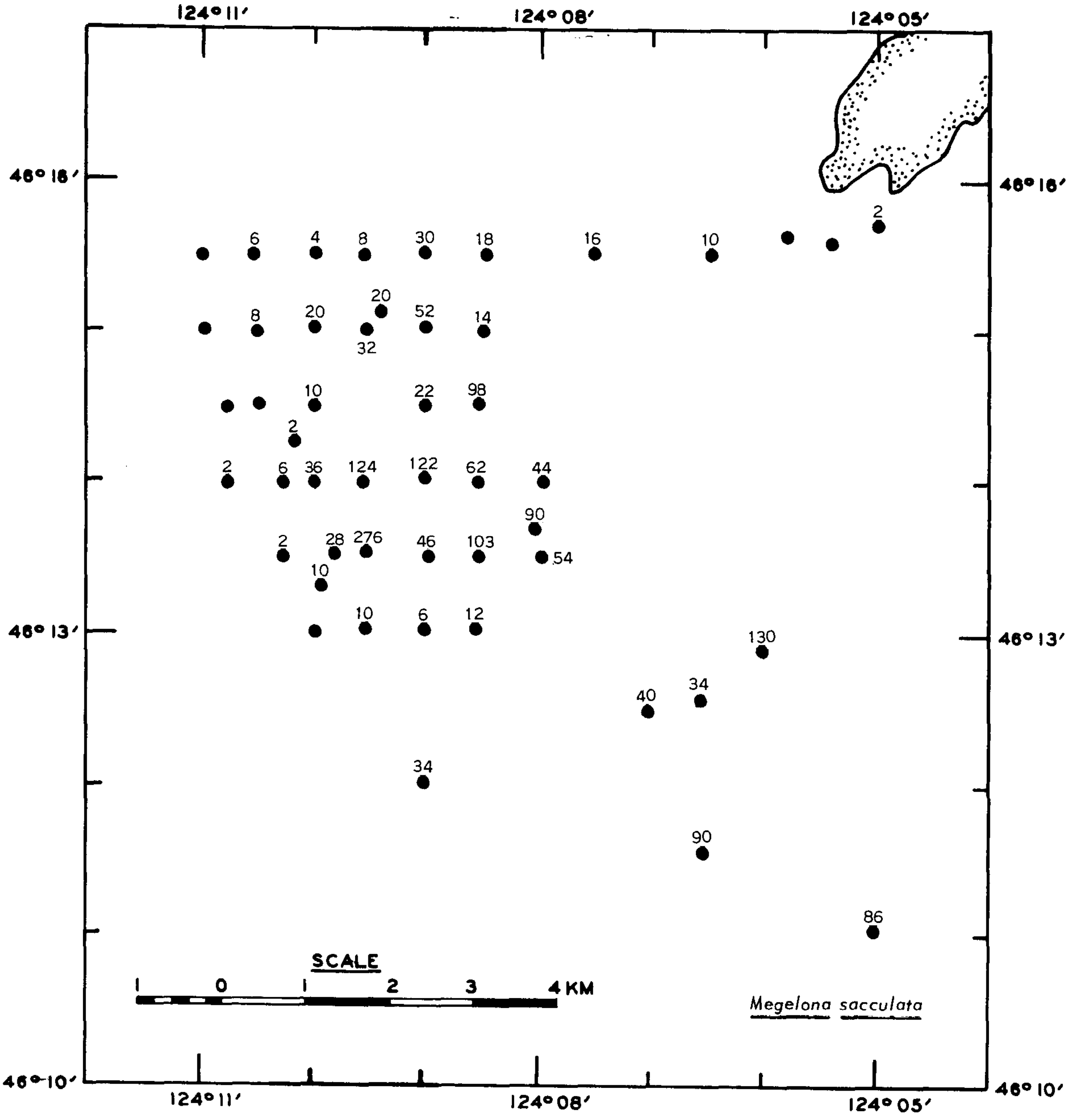


Figure C36. Distribution of Magelona sacculata II

	STATION GROUP										
SPECIES GROUP	A_1	A_2	A_3	A_4	B_1	B_2	C	D_1	D_2	D_3	E
1	85.9	27.0	3.9	17.2	1.2	–	0.6	–	0.4	–	–
2	64.0	50.0	15.0	–	–	–	–	–	–	–	–
3	55.0	50.0	12.5	–	–	–	3.6	–	–	–	–
4	53.3	70.1	8.3	16.7	–	–	–	–	–	–	–
5	60.0	78.1	87.5	62.5	12.5	14.3	–	–	–	–	–
6	91.6	90.9	63.9	69.7	25.6	10.6	13.7	1.8	11.3	–	0.9
7	2.8	3.5	–	35.7	32.8	46.9	92.3	17.1	25.0	28.5	11.4
8	–	–	25.0	16.7	60.0	33.3	46.6	1.3	25.0	8.3	–
9	6.6	87.5	75.0	100.0	50.0	50.0	33.3	–	6.2	–	–
10	62.2	71.8	100.0	37.5	90.0	85.7	30.0	41.0	34.4	–	20.0
11	36.6	45.8	86.7	56.6	91.3	82.9	62.6	52.2	82.5	28.3	21.3
12	1.0	1.5	2.2	–	23.4	49.4	57.0	76.7	63.6	68.1	61.8
13	–	–	–	–	–	–	–	–	–	50.0	80.0

Figure C37. Species Group Constancy at Station Groups (i.e. "Cell Density") Based on Station-Species Classification

	ASSEMBLAGE				
SPECIES GROUP	A	B	C	D	E
1	H_{57}	VL_{1}	VL_{1}	VL_{0}	-
6	VH_{85}	L_{20}	L_{13}	VL_{4}	VL_{1}
7	VL_{5}	M_{39}	VH_{92}	L_{20}	L_{11}
11	M_{50}	VH_{88}	H_{63}	H_{56}	L_{21}
12	VL_{1}	M_{34}	H_{57}	H_{73}	H_{62}

Figure C38. Species Group Constancy in Assemblages (i.e. "Cell Density") Based on Station-Species Classification sidered deeper water species. Species group 7 was found in the southern shallow water assemblage C and to a lesser degree at moderate depths in assemblage B and at station group A_4. Species group 8 was found at the same locations as species group 7 but with a higher constancy to assemblage B. Species group 9 was found at moderate depths in assemblages A, B, and C. Species groups 11 and 12 were found at all station groups with species group 11 having higher constancy to deeper station groups. Species group 12 was primarily restricted to shallow-water station groups and species group 13 was restricted to the shallowest station group D_3 and assemblage E.

195. Assemblage A contained moderate to very high constancy of three of the five most specious species groups (Figure C38). Assemblage B was characterized by very high constancy of species groups 7 and 12. Assemblage C was characterized by very high constancy of species group 7, which was primarily restricted to assemblage C and high constancy of the two widespread species groups 11 and 12. Assemblage D had high constancy of the widespread species groups 11 and 12, and assemblage E only had a high constancy of the widespread species group 12.

196. In summary, only assemblages A and C contained major species groups that were restricted to those assemblages. Assemblage B, C, and E contained primarily species groups which were found throughout the study area.

Seasonal Baseline

197. Twenty-two station locations were chosen for the seasonal baseline (Figure C23). The station numbers for the twenty-two locations are presented in Table C1. The seasonal sediment data for each location are presented in Table C33, and the community structure values are found in Table C34.

198. Bray-Curtis dissimilarity values were calculated between all seasons at each location for cruises C7412B-C7501D, C7504B, C7506C, C7509E and C7601A. Bray-Curtis dissimilarity values for presence and absence data were also calculated. The resultant index is the complement

Table C33

Sediment Characteristics at the 22 Seasonal Baseline Stations.

Station 1	Mdϕ	$\sigma\phi$	$\alpha\phi$	$\alpha^2\phi$	$\beta\phi$	% Sand	% Silt	% Clay
Dec 74-Jan 75	3.04	0.47	-0.08	-0.12	0.64	97.97	1.06	0.97
April 1975	3.01	0.52	-0.07	-0.07	0.60	97.16	2.04	0.80
June 1975	2.98	0.47	-0.07	-0.08	0.65	98.22	0.99	0.79
Sept. 1975	3.00	0.48	-0.10	-0.15	0.64	98.76	0.52	0.72
Jan. 1976	2.96	0.50	-0.02	-0.10	0.71	96.29	1.39	0.92
Station 2								
Dec 74-Jan 75	2.94	0.42	-0.01	0.03	0.65	98.80	0.47	0.74
April 1975	2.87	0.40	0.02	0.09	0.69	98.71	0.54	0.75
June 1975	2.90	0.43	0.01	0.01	0.67	98.27	0.74	0.99
Sept. 1975	2.91	0.42	0.02	0.20	0.79	98.47	0.69	0.84
Jan. 1976	2.93	0.43	0.02	-0.03	0.63	98.36	0.75	0.82
Station 3								
Dec 74-Jan 75	2.75	0.32	0.10	0.17	0.74	98.32	0.57	1.11
April 1975	2.77	0.32	0.06	0.20	0.78	97.81	1.00	1.20
June 1975	2.77	0.32	0.02	0.15	0.80	97.90	0.77	1.33
Sept. 1975	2.77	0.31	0.05	0.34	0.97	96.84	1.33	1.83
Jan. 1976	2.80	0.32	0.06	0.13	0.73	98.07	0.68	1.25
Station 4								
Dec 74-Jan 75	2.75	0.28	0.06	0.32	1.08	96.87	1.20	1.93
April 1975	2.75	0.30	0.07	1.70	2.37	94.40	2.90	2.70
June 1975	2.77	0.30	0.04	1.98	2.72	94.00	2.79	3.21
Sept. 1975	2.77	0.30	0.04	1.51	2.22	94.41	2.74	2.84
Jan. 1976	2.79	0.31	0.09	1.84	2.56	93.61	3.15	3.08
Station 6								
Dec 74-Jan 75	3.40	0.57	0.38	0.57	0.73	76.57	21.55	1.87
April 1975	3.38	0.51	0.37	0.52	0.76	80.47	17.46	1.89
June 1975	3.39	0.54	0.36	1.69	1.93	76.33	20.41	3.26
Sept. 1975	3.40	0.54	0.31	0.99	1.27	78.04	19.30	2.66
Jan.. 1976	3.44	0.57	0.31	0.39	0.59	73.10	24.93	1.97
Station 10								
Dec 74-Jan 75	2.59	0.51	0.03	0.07	0.62	98.79	0.38	0.83
April 1975	No sample							
June 1975	2.56	0.59	0.05	0.09	0.60	98.89	0.46	0.66
Sept. 1975	2.54	0.53	0.03	0.10	0.64	98.85	0.39	0.76
Jan. 1976	2.62	0.57	0.05	0.02	0.57	98.60	0.69	0.54

Table C33 (Continued)

Station 11	Mdϕ	σϕ	αϕ	$\alpha^2\phi$	βϕ	% Sand	% Silt	% Clay
Dec 74-Jan 75	2.76	0.42	-0.13	0.17	1.10	96.35	2.51	1.14
April 1975	2.68	0.43	-0.05	0.09	0.64	98.79	0.45	0.76
June 1975	2.74	0.42	-0.08	0.58	1.54	94.74	4.22	1.05
Sept. 1975	2.68	0.38	-0.00	0.09	0.82	98.67	0.46	0.87
Jan. 1976	No sample							
Station 12								
Dec 74-Jan 1975	2.57	0.49	0.03	0.10	0.66	98.26	0.78	0.95
April 1975	2.61	0.54	0.04	0.12	0.64	97.85	1.25	0.90
June 1975	2.67	0.67	0.14	0.53	0.82	91.88	6.92	1.21
Sept. 1975	2.85	0.55	-0.12	0.01	0.75	95.88	2.98	1.15
Jan. 1976	2.69	0.60	-0.01	0.00	0.52	97.88	1.13	0.99
Station 13								
Dec 74-Jan 75	2.87	0.58	-0.09	-0.02	0.66	96.5[illegible]	2.55	0.91
April 1975	2.99	0.94	-0.00	0.04	0.37	85.10	13.41	1.50
June 1975	5.05	1.89	0.57	1.53	1.50	12.25	71.44	16.31
Sept. 1975	3.54	1.27	0.58	2.27	1.98	60.73	30.34	8.94
Jan. 1976	No sample							
Station 14								
Dec 74-Jan 75	2.27	0.39	0.01	0.21	0.82	98.90	0.24	0.87
April 1975	2.74	0.63	0.02	0.36	0.82	93.73	5.26	1.01
June 1975	2.12	0.43	0.17	1.57	1.91	94.84	3.93	1.23
Sept. 1975	2.55	1.77	0.65	1.83	1.31	70.13	21.78	8.09
Jan. 1976	2.09	0.40	0.12	0.29	0.78	98.60	0.33	1.06
Station 15								
Dec 74-Jan 75	2.56	0.47	-0.04	-0.07	0.66	98.40	0.57	1.02
April 1975	2.48	1.29	0.56	0.85	0.49	79.00	18.41	2.59
June 1975	4.29	1.91	0.01	1.10	1.40	36.69	53.85	9.46
Sept. 1975	2.60	1.22	0.54	1.93	1.63	76.74	18.09	5.17
Jan. 1976	2.50	0.50	0.05	0.77	1.26	74.95	2.91	2.13
Station 16								
Dec 74-Jan 75	3.37	1.11	0.15	1.41	1.71	62.94	31.13	4.93
April 1975	3.15	1.18	0.14	0.79	0.95	65.80	30.65	3.55
June 1975	5.48	2.50	0.35			17.07	62.80	20.14
Sept. 1975	5.60	2.14	0.44	0.70	0.81	10.82	71.29	17.89
Jan. 1976	2.83	0.66	0.11	0.22	0.63	91.41	7.33	1.26
Station 17								
Dec 74-Jan 75	3.16	0.60	0.26	0.27	0.51	85.56	12.88	1.57
April 1975	3.31	0.72	0.32	0.58	0.70	73.33	24.85	1.83
June 1975	3.58					67.02	11.18	21.80
Sept. 1975	4.42	1.77	0.58	1.71	1.46	21.85	64.98	13.17
Jan. 1976	3.22	0.66	0.22	0.82	1.21	75.98	21.30	2.72

Table C33 (Continued)

Station 18	$Md\phi$	$\sigma\phi$	$\alpha\phi$	$\alpha^2\phi$	$\beta\phi$	% Sand	% Silt	% Clay
Dec 74-Jan 75	2.70	0.37	0.17	0.22	0.73	98.53	0.52	0.95
April 1975	2.66	0.53	0.23	1.47	1.81	89.18	9.30	1.51
June 1975	2.69	0.43	0.17	0.80	1.30	94.94	3.92	1.14
Sept. 1975	2.73	0.56	0.28	3.00	3.29	87.94	8.33	3.73
Jan. 1976	2.70	0.42	0.10	0.05	0.76	97.02	1.18	1.02
Station 19								
Dec 74-Jan 75	2.70	0.39	0.17	0.28	0.76	98.49	0.69	0.82
April 1975	2.88	0.44	0.07	0.14	0.63	97.98	1.25	0.78
June 1975	2.81	0.38	0.05	0.24	0.81	98.26	0.01	0.73
Sept. 1975	2.13	0.45	-0.05	-0.10	0.86	98.75	0.38	0.87
Jan. 1976	2.72	0.47	0.09	0.05	0.68	98.51	0.51	0.88
Station 20								
Dec 74-Jan 75	2.20	0.42	0.06	0.27	0.80	98.94	0.19	0.87
April 1975	2.44	0.55	0.08	0.13	0.57	98.98	0.41	0.61
June 1975	2.56	0.51	0.05	0.71	1.21	94.83	4.44	0.72
Sept. 1975	2.21	0.47	0.00	0.08	0.86	98.87	0.40	0.74
Jan. 1976	2.20	0.43	-0.00	0.05	0.76	99.03	0.34	0.63
Station 21								
Dec 74-Jan 75	2.63	0.35	0.05	-0.04	0.80	98.37	0.75	0.88
April 1975	2.60	0.64	0.01	-0.03	0.59	98.68	0.50	0.82
June 1975	2.47	1.02	0.67	2.28	1.82	83.09	12.45	4.46
Sept. 1975	2.00	0.47	0.11	2.43	3.07	93.05	4.44	2.51
Jan. 1976	No sample							
Station 22								
Dec 74-Jan 75	2.84	0.73	0.14	0.27	0.57	89.17	9.48	1.34
April 1975	2.85	0.76	0.07	0.19	0.59	88.31	10.55	1.14
June 1975	4.76	2.40	0.48			23.31	59.36	17.33
Sept. 1975	3.64	0.56	0.17	2.56	3.35	72.60	22.89	4.51
Jan. 1976	3.00	0.81	0.01	0.65	1.09	85.99	11.69	2.32
Station 23								
Dec 74-Jan 75	3.66	0.53	-0.14	-0.16	0.58	70.77	27.53	1.70
April 1975	3.38	0.58	0.17	0.18	0.55	80.61	17.84	1.55
June 1975	3.38	0.55	0.17	0.21	0.60	82.95	15.54	1.52
Sept. 1975	3.49	0.68	0.19	2.19	2.48	73.01	22.47	4.52
Jan. 1976	3.19	0.52	0.05	0.20	0.60	89.88	8.84	1.29
Station 24								
Dec 74-Jan 75	2.88	0.44	0.06	0.16	0.71	98.24	0.78	0.97
April 1975	2.89	0.46	0.04	0.08	0.64	98.49	0.87	0.64
June 1975	2.91	0.46	0.01	0.09	0.61	98.32	1.04	0.64
Sept. 1975	2.92	0.47	0.01	0.06	0.63	98.32	0.98	0.70
Jan. 1976	2.97	0.48	-0.00	-0.10	0.66	95.99	0.93	0.80

Table C33 (Concluded)

Station 25	$Md\phi$	$\sigma\phi$	$\alpha\phi$	$\alpha^2\phi$	$\beta\phi$	% Sand	% Silt	% Clay
Dec 74-Jan 75	2.61	0.54	0.04	0.14	0.60	98.34	0.85	0.81
April 1975	2.10	0.48	0.33	0.13	1.21	96.46	2.71	0.83
June 1975	3.44	0.83	0.08	1.11	1.77	71.78	24.52	3.70
Sept. 1975	3.38	1.26	0.44	1.68	1.70	61.78	31.86	6.36
Jan. 1976	No sample							
Station 26								
Dec 74-Jan 75	2.30	0.39	0.05	0.27	0.87	98.65	0.23	1.11
April 1975	2.43	1.02	0.55	2.32	2.01	83.91	11.38	4.72
June 1975	3.76	2.26	0.23	1.12	1.02	51.91	38.33	6.76
Sept. 1975	4.08	1.43	0.32	1.75	1.70	47.63	43.18	9.19
Jan. 1976	No sample							

* Sediments described by median phi size ($Md\phi$), sorting coefficient ($\sigma\phi$), first skewness ($\alpha\phi$), second skewness ($\alpha^2\phi$), kurtosis ($\beta\phi$), and percentage sand, silt and clay.

Table C34

Values of Community Structure Parameters at the 22 Seasonal Baseline Stations.*

Station 1	H'	J'	SR	S	N/m^2	B/m^2
Dec 74-Jan 75	3.768	0.741	5.887	34	544	1.3540
April 1975	3.728	0.793	4.412	26	578	0.9414
June 1975	4.120	0.779	6.342	39	800	3.0786
Sept. 1975	1.934	0.366	5.169	39	3118	1.7682
Jan 1976	2.858	0.632	3.850	23	606	0.6378
Station 2						
Dec 74-Jan 75	4.155	0.804	6.348	36	496	2.1110
April 1975	4.186	0.792	6.882	39	578	1.0354
June 1975	4.034	0.689	8.837	58	1266	2.2130
Sept. 1975	1.995	0.334	7.902	63	5114	2.0210
Jan. 1976	1.633	0.470	6.392	47	2670	1.4116
Station 3						
Dec 74-Jan 75	4.682	0.830	8.561	50	612	1.1184
April 1975	4.928	0.845	9.492	57	730	1.2896
June 1975	4.726	0.776	10.294	68	1342	2.4654
Sept. 1975	2.816	0.442	10.401	83	5310	2.0558
Jan. 1976	2.412	0.425	7.091	51	2308	1.7382
Station 4						
Dec 74-Jan 75	2.339	0.678	7.572	56	2856	23.4144
April 1975	2.817	0.470	8.903	64	2960	23.9885
June 1975	3.563	0.562	11.000	81	2880	18.5452
Sept. 1975	3.877	0.591	12.178	94	4146	22.6546
Jan. 1976	3.091	0.504	9.660	70	2530	24.8204
Station 6						
Dec 74-Jan 75	4.333	0.772	7.351	49	1370	2.5250
April 1975	4.409	0.743	8.487	66	2352	13.7906
June 1975	1.993	0.336	6.965	61	11018	35.1914
Sept. 1975	0.946	0.163	6.134	56	15670	25.1282
Jan 1976	3.804	0.667	7.367	52	2030	8.7600
Station 10						
Dec 74-Jan 75	3.363	0.792	3.794	19	230	1.2574
April 1975	4.062	0.875	5.040	25	234	0.7436
June 1975	3.968	0.809	5.295	30	478	1.0848
Sept. 1975	2.676	0.514	5.901	37	892	1.8036
Jan. 1976	3.560	0.798	4.080	22	344	1.6654
Station 11						
Dec 74-Jan 75	3.452	0.828	3.660	18	208	0.8110
April 1975	3.647	0.818	4.014	22	374	2.6316
June 1975	3.028	0.590	5.315	35	1500	4.2178
Sept. 1975	1.900	0.367	4.835	36	2786	7.1870
Jan. 1976	No sample					
Station 12						
Dec 74-Jan 75	2.789	0.625	4.410	22	234	2.0396
April 1975	3.159	0.672	4.329	26	644	3.6262
June 1975	2.880	0.536	5.883	42	2128	9.7246
Sept. 1975	2.110	0.411	4.672	35	2896	9.5252
Jan. 1976	3.677	0.792	5.116	25	218	3.1920
Station 13						
Dec 74-Jan 75	2.729	0.631	3.589	20	398	2.7778
April 1975	1.273	0.245	4.044	35	8968	6.8374
June 1975	1.388	0.265	4.473	38	7826	13.3060
Sept. 1975	2.448	0.521	3.747	26	1580	30.5072
Jan. 1976	No sample					

Table C34 (Continued)

Station 14	H'	J'	SR	S	N/m^2	B/m^2
Dec 74-Jan 75	4.110	0.795	6.411	36	470	3.6486
April 1975	1.059	0.189	5.511	49	12124	5.9090
June 1975	1.760	0.319	6.041	46	3436	5.1860
Sept. 1975	2.181	0.459	4.009	27	1310	32.7444
Jan. 1976	2.745	0.658	3.411	18	292	2.0092
Station 15						
Dec 74-Jan 75	3.846	0.728	5.924	39	1222	3.4662
April 1975	2.649	0.449	7.236	60	6956	8.4408
June 1975	2.388	0.398	7.637	64	7654	52.2932
Sept. 1975	3.469	0.656	5.533	39	1922	45.0134
Jan 1976	3.751	0.720	6.052	37	766	11.2380
Station 16						
Dec 74-Jan 75	3.657	0.655	6.669	48	2300	10.9624
April 1975	0.393	0.070	5.137	50	27782	12.9752
June 1975	2.378	0.438	5.337	43	5234	118.2954
Sept. 1975	2.173	0.447	4.153	34	4326	73.0873
Jan. 1976	1.226	0.243	4.427	33	2754	4.3550
Station 17						
Dec 74-Jan 75	2.977	0.556	6.490	41	950	1.6794
April 1975	0.332	0.059	4.955	48	26320	1.5858
June 1975	1.747	0.322	5.036	43	8370	23.9742
Sept. 1975	2.173	0.447	4.153	29	2118	29.7808
Jan. 1976	0.726	0.145	3.973	32	4890	5.1258
Station 18						
Dec 74-Jan 75	4.505	0.820	7.451	45	734	1.2338
April 1975	4.752	0.830	8.478	53	922	1.5952
June 1975	4.727	0.777	9.977	68	1650	1.9506
Sept. 1975	3.861	0.612	10.445	79	3502	2.9180
Jan. 1976	3.523	0.645	6.904	44	1014	2.5274
Station 19						
Dec 74-Jan 75	4.221	0.789	9.074	40	462	1.6928
April 1975	4.243	0.849	5.792	32	422	1.0586
June 1975	4.513	0.792	8.477	52	820	1.9728
Sept. 1975	1.532	0.279	6.100	45	2714	2.2974
Jan. 1976	3.071	0.632	4.724	29	750	1.1032
Station 20						
Dec 74-Jan 75	3.232	0.808	3.272	16	196	1.8456
April 1975	4.345	0.885	6.339	30	194	1.3140
June 1975	3.731	0.727	6.042	35	556	3.1810
Sept. 1975	1.952	0.378	5.197	36	1682	2.4902
Jan. 1976	2.560	0.673	2.875	14	184	1.3558
Station 21						
Dec 74-Jan 75	1.855	0.416	3.704	22	580	0.5182
April 1975	3.739	0.827	4.391	23	300	0.5476
June 1975	2.355	0.589	2.487	16	832	1.1374
Sept. 1975	3.611	0.948	3.901	14	56	0.1612
Jan. 1976	No sample					
Station 22						
Dec 74-Jan 75	0.518	0.097	4.328	40	20.488	22.3042
April 1975	0.172	0.031	4.403	45	43.802	11.9920
June 1975	2.378	0.438	4.498	41	14.566	23.1216
Sept. 1975	1.593	0.352	3.128	23	2.666	62.0158
Jan. 1976	2.618	0.545	4.591	28	716	4.3700
Station 23						
Dec 74-Jan 75	4.104	0.743	7.105	46	1126	1.7278
April 1975	4.328	0.767	7.781	50	1086	2.9556
June 1975	3.428	0.601	7.039	52	2802	5.7724
Sept. 1975	2.222	0.410	5.459	43	4392	13.6666
Jan. 1976	3.759	0.727	5.719	36	910	6.0460

Table C34 (Concluded)

Station 24	H'	J'	SR	S	N/m^2	B/m^2
Dec 74-Jan 75	3.334	0.906	5.471	29	334	1.4008
April 1975	4.335	0.859	6.203	33	348	1.4096
June 1975	4.215	0.782	7.104	42	801	1.8898
Sept. 1975	2.075	0.376	6.246	46	2692	1.4866
Jan. 1976	2.033	0.403	5.168	33	978	1.5402
Station 25						
Dec 74-Jan 75	2.702	0.606	4.186	22	302	3.3174
April 1975	3.362	0.617	5.670	37	1144	3.2452
June 1975	1.267	0.235	4.846	42	9454	10.9960
Sept. 1975	2.750	0.532	4.759	36	3126	17.3958
Jan. 1976	No sample					
Station 26						
Dec 74-Jan 75	2.862	0.602	4.611	27	562	5.8410
April 1975	1.383	0.284	3.533	26	2368	4.2732
June 1975	1.895	0.372	4.669	34	2346	4.9940
Sept. 1975	1.761	0.370	3.573	27	2894	53.9304
Jan. 1976	No sample					

* Parameters include diversity (H'), evenness (J'), species richness (SR), number of species (S), density (N/m^2-individuals/m^2), and biomass (B/m^2-grams ash-free dry weight/m^2).

of the Czekanowski similarity index or, as referred to in the text, the Czekanowski dissimilarity index. Values for both dissimilarity indices at all 22 locations are shown in Figure C39. Mean dissimilarity values less than 0.40 between seasons at the same station were considered low, indicating little seasonal change in the abundance of most dominant species and little seasonal change in species composition. Mean dissimilarity values greater than 0.50 between seasons at the same station were considered high, indicating considerable seasonal change in the abundance of most dominant species and considerable seasonal change in species composition. Dissimilarity values between 0.40 and 0.50 were considered moderate indicating some seasonal change. These values were chosen because station groups formed at approximately 0.40 Bray-Curtis units and assemblages formed at approximately 0.50 Bray-Curtis units. As indicated by the between station variability study, 0.25 Bray-Curtis units represent no detectable seasonal change in the abundance of dominant species or species composition. Seasonal changes in dominant species, community structure values, and sediment for each location are described in the following paragraphs.

Station 1

199. Station 1 was located in 17-20 m of water and was part of assemblage C in the areal baseline study. The sediment was well-sorted sand and did not vary with season. The mean Bray-Curtis dissimilarity value between seasons (0.390) was low, indicating little seasonal change in the abundance of most macrofaunal species with season. The mean Czekanowski dissimilarity value (0.340) was also low, indicating little change in species composition with season.

200. The density of macrofauna ranged from 544 to 3118 individuals/m^2 with the highest values in June and September. Diversity (H') values were high from December 1974 to June 1975 and were much lower in September 1975 than January 1976. Evenness (J') values also were lower in September 1975 than January 1976. Species richness (SR) values ranged from 3.85 to 6.34 with the highest value in June 1975. Biomass values ranged from 0.94 to 3.08 g ash-free dry weight with the highest value in June 1975.

201. The major seasonal change in dominant species was an increase in

STATION 1

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.333	0.370	0.315	0.474
APR	0.302	☒	0.323	0.262	0.347
JUN	0.342	0.322	☒	0.231	0.355
SEP	0.410	0.427	0.370	☒	0.387
JAN	0.423	0.413	0.388	0.502	☒

STATION 2

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.413	0.447	0.455	0.373
APR	0.392	☒	0.320	0.353	0.372
JUN	0.466	0.395	☒	0.256	0.390
SEP	0.561	0.515	0.369	☒	0.382
JAN	0.460	0.505	0.387	0.370	☒

STATION 3

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.439	0.390	0.444	0.307
APR	0.427	☒	0.360	0.371	0.370
JUN	0.460	0.376	☒	0.311	0.395
SEP	0.552	0.503	0.414	☒	0.433
JAN	0.394	0.458	0.409	0.417	☒

STATION 4

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.350	0.372	0.440	0.349
APR	0.317	☒	0.379	0.380	0.388
JUN	0.353	0.293	☒	0.371	0.391
SEP	0.423	0.375	0.314	☒	0.390
JAN	0.344	0.350	0.335	0.368	☒

STATION 6

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.291	0.364	0.238	0.347
APR	0.327	☒	0.311	0.316	0.292
JUN	0.496	0.344	☒	0.248	0.363
SEP	0.471	0.407	0.255	☒	0.259
JAN	0.392	0.291	0.417	0.362	☒

STATION 10

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.364	0.429	0.500	0.415
APR	0.374	☒	0.236	0.355	0.277
JUN	0.477	0.373	☒	0.403	0.346
SEP	0.517	0.453	0.407	☒	0.458
JAN	0.361	0.361	0.355	0.402	☒

STATION 11

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.400	0.472	0.519	NS
APR	0.432	☒	0.404	0.448	NS
JUN	0.648	0.540	☒	0.324	NS
SEP	0.693	0.617	0.481	☒	NS
JAN	NS	NS	NS	NS	☒

STATION 12

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.333	0.438	0.404	0.404
APR	0.442	☒	0.471	0.508	0.412
JUN	0.618	0.561	☒	0.403	0.552
SEP	0.622	0.669	0.433	☒	0.467
JAN	0.472	0.526	0.658	0.651	☒

STATION 13

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.600	0.690	0.696	NS
APR	0.703	☒	0.425	0.607	NS
JUN	0.771	0.489	☒	0.438	NS
SEP	0.733	0.733	0.485	☒	NS
JAN	NS	NS	NS	NS	☒

STATION 14

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.529	0.537	0.524	0.593
APR	0.659	☒	0.411	0.421	0.582
JUN	0.686	0.492	☒	0.452	0.688
SEP	0.654	0.700	0.509	☒	0.422
JAN	0.581	0.763	0.750	0.532	☒

STATION 15

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.414	0.533	0.538	0.368
APR	0.550	☒	0.387	0.495	0.423
JUN	0.603	0.364	☒	0.437	0.564
SEP	0.558	0.500	0.455	☒	0.474
JAN	0.434	0.594	0.641	0.493	☒

STATION 16

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.361	0.489	0.556	0.400
APR	0.673	☒	0.462	0.548	0.398
JUN	0.674	0.594	☒	0.455	0.421
SEP	0.743	0.639	0.378	☒	0.463
JAN	0.628	0.516	0.467	0.474	☒

STATION 17

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.326	0.524	0.600	0.315
APR	0.558	☒	0.385	0.558	0.450
JUN	0.636	0.479	☒	0.472	0.493
SEP	0.625	0.672	0.480	☒	0.508
JAN	0.430	0.497	0.453	0.586	☒

STATION 18

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.347	0.416	0.516	0.393
APR	0.396	☒	0.322	0.424	0.485
JUN	0.508	0.447	☒	0.333	0.446
SEP	0.596	0.562	0.330	☒	0.561
JAN	0.399	0.504	0.485	0.561	☒

STATION 19

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.341	0.404	0.336	0.355
APR	0.355	☒	0.310	0.273	0.410
JUN	0.429	0.351	☒	0.278	0.481
SEP	0.462	0.410	0.364	☒	0.324
JAN	0.381	0.440	0.432	0.415	☒

STATION 20

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.391	0.490	0.500	0.467
APR	0.386	☒	0.385	0.424	0.500
JUN	0.563	0.503	☒	0.380	0.551
SEP	0.622	0.601	0.433	☒	0.600
JAN	0.493	0.565	0.566	0.658	☒

STATION 21

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.333	0.421	0.611	NS
APR	0.480	☒	0.231	0.514	NS
JUN	0.465	0.454	☒	0.467	NS
SEP	0.708	0.662	0.757	☒	NS
JAN	NS	NS	NS	NS	☒

STATION 22

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.435	0.432	0.587	0.559
APR	0.405	☒	0.419	0.588	0.425
JUN	0.450	0.450	☒	0.375	0.536
SEP	0.755	0.755	0.468	☒	0.490
JAN	0.744	0.687	0.700	0.582	☒

STATION 23

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.250	0.224	0.258	0.244
APR	0.335	☒	0.235	0.312	0.302
JUN	0.346	0.312	☒	0.305	0.318
SEP	0.395	0.486	0.330	☒	0.291
JAN	0.361	0.408	0.402	0.410	☒

STATION 24

	JAN	APR	JUN	SEP	JAN
JAN	☒	0.226	0.352	0.387	0.323
APR	0.340	☒	0.280	0.291	0.333
JUN	0.465	0.372	☒	0.341	0.360
SEP	0.552	0.487	0.393	☒	0.418
JAN	0.433	0.458	0.405	0.425	☒

STATION 25

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.458	0.594	0.552	NS
APR	0.532	☒	0.418	0.397	NS
JUN	0.786	0.614	☒	0.385	NS
SEP	0.712	0.478	0.482	☒	NS
JAN	NS	NS	NS	NS	☒

STATION 26

	DEC	APR	JUN	SEP	JAN
DEC	☒	0.396	0.410	0.481	NS
APR	0.586	☒	0.533	0.585	NS
JUN	0.637	0.504	☒	0.344	NS
SEP	0.693	0.538	0.252	☒	NS
JAN	NS	NS	NS	NS	☒

Figure C39. Bray-Curtis and Czekanowski Dissimilarity Between Seasons for 22 Seasonal Stations the abundance of the polychaetes Spiophanes bombyx and Magelona sacculata in September 1975.

Station 2

202. Station 2 was located in 29-35 m of water and was part of assemblage C in the areal baseline study. The sediment was well-sorted sand and did not vary with season. The mean Bray-Curtis dissimilarity value between seasons (0.440) was moderate, indicating some seasonal change in the abundance of most macrofaunal species with season. The mean Czekanowski dissimilarity value (0.377) was low, indicating little change in species composition with season.

203. The density of macrofauna ranged from 496 to 5114 individuals /m^2 with the higher values found in June 1975, September 1975, and January 1976. Diversity (H') values were high from December 1974 to June 1975 with much lower values in September 1975 and January 1976. Evenness (J') values were also lower in September 1975 and January 1976. Species richness (SR) values ranged from 6.35 to 7.90 with the highest values in June 1975 and September 1975. Biomass values ranged from 1.03 to 2.21 g ash-free dry weight/m^2 with the highest values in December 1974, June 1975, and September 1975.

204. The major seasonal change in dominant species was an increase in the abundance of Spiophanes bombyx in June 1975 through January 1976.

Station 3

205. Station 3 was located in 45-53 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted sand and did not vary with season. The mean Bray-Curtis dissimilarity value between seasons (0.441) was moderate, indicating some seasonal change in the abundance of most macrofaunal species with season. The mean Czekanowski dissimilarity value (0.382) was low, indicating little change in species composition with season.

206. The density of macrofauna ranged from 612 to 5310 individuals/m^2 with higher values found in June 1975, September 1975, and January 1976. Diversity (H') values were high from December 1974 to June 1975 and were much lower in September 1975 and January 1976. Evenness (J') values were also low in September 1975 and January 1976. Species richness (SR) values

ranged from 7.09 to 10.40 with the highest values found in June 1975 and September 1975. Biomass values ranged from 1.12 to 2.47 g ash-free dry weight with the highest values in June 1975 and September 1975.

207. The major seasonal change in dominant species was an increase in the abundance of the polychaete *Spiophanes bombyx* in September 1975 and January 1976.

Station 4

208. Station 4 was located in 66-70 m of water and was part of assemblage A in the areal baseline study. The sediment was a well-sorted sand with 5.6 to 6.2 percent silt and clay, except for December 1974 when only 3.1 percent silt and clay were found. The sediments varied little between seasons except for the low values of silt and clay found in December 1974. The mean Bray-Curtis dissimilarity value between seasons (0.347) was low, indicating little seasonal change in the abundance of dominant macrofaunal species with season. The mean Czekanowski dissimilarity value (0.381) was also low, indicating little change in species composition with season.

209. The density of macrofauna ranged from 2530 to 4146 individuals/m^2 with the highest value in September 1975. The diversity (H') values were moderately high from June 1975 to January 1976 with lower values in December 1974 and April 1975. Evenness (J') values ranged from 0.47 to 0.59. Species richness (SR) values ranged from 7.57 to 12.18 with highest values in June 1975 and September 1975. Biomass values were consistently high with a range of 18.55 to 24.82 g ash-free dry weight/m^2.

210. The major seasonal changes in dominant species were a slight decrease in abundance of the bivalve *Acila castrensis* in June 1975, September 1975, and January 1976 and an increase in the abundance of the polychaete *Spiophanes berkeleyorum* in September 1975.

Station 6

211. Station 6 was located in 37-45 m of water and was part of assemblage B in the areal baseline study. The sediment was well-sorted sand with 17.6-24.9 percent silt. The sediment varied little seasonably except for a slight increase in percent of clay in June 1975 and September

1975. The mean Bray-Curtis dissimilarity value between seasons (0.376) was low, indicating little seasonal change in the abundance of dominant macrofaunal species with season. The mean Czekanowski dissimilarity value (0.303) was also low, indicating little change in species composition with season.

212. The density of macrofauna ranged from 1,370 to 15,670 individuals/m^2 with the highest values in June 1975 and September 1975. Diversity (H') values were high in January 1975, April 1975, and January 1976 and were very low in June 1975 and September 1975. The evenness (J') values were also very low in June 1975 and September 1975. Species richness (SR) values ranged from 6.13 to 8.49. Biomass values ranged from 2.53 to 25.13 g ash-free dry weight/m^2 and were highest from April 1975 to September 1975.

213. The major seasonal change in dominant species was the high abundance values of the cumacean *Diastylopsis dawsoni* in June 1975 and September 1975.

Station 10

214. Station 10 was located in 15-17 m of water and was part of assemblage D in the areal baseline study. The sediment was well-sorted sand and did not vary with season. Sediment phi-size data were not available for April 1975 at station 10. The mean Bray-Curtis dissimilarity value between seasons (0.410) was moderate, indicating some seasonal change in the abundance of most macrofaunal species with season. The mean Czekanowski dissimilarity value (0.378) was low, indicating little change in species composition with season.

215. The density of macrofauna ranged from 230 to 892 individuals/m^2 with the highest value in September 1975. Diversity (H') values ranged from 2.68 to 4.06 with the lowest value found in September 1975. The lowest evenness (J') value was also found in September 1975. Species richness (SR) values ranged from 3.79 to 5.90 with the lowest values in December 1974 and January 1975. Biomass values ranged from 0.74 to 1.80 g ash-free dry weight/m^2 with the highest values found in September 1975 and January 1976.

216. The major seasonal change in dominant species was an increase

in the abundance of the polychaetes *Spiophanes bombyx* and *Magelona sacculata* in September 1975.

Station 11

217. Station 11 was located in 11-13 m of water and was part of assemblage E in the areal baseline study. The sediment was a well-sorted sand. January 1975 and June 1975 sediment samples contained 3.7 percent and 5.3 percent silt and clay, while April 1975 and September 1975 contained 1.2-1.3 percent silt and clay. Station 11 was not sampled in January 1976. The mean Bray-Curtis dissimilarity value between seasons (0.561) was high, indicating considerable seasonal change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.428) was moderate indicating some change in species composition with season.

218. The density of macrofauna ranged from 208 to 2786 individuals/m^2 with the highest values in June 1975 and September 1975. Diversity (H') values were moderately high from January 1975 through June 1975 and low in September 1975. Evenness (J') values were high in January 1975 and April 1975, moderate in June 1975 and low in September 1975. Species richness (SR) values ranged from 3.66 to 5.32 with the highest value in June 1975. Biomass values ranged from 0.81 to 7.18 g ash-free dry weight/m^2 with the highest values in June 1975 and September 1975.

219. The major seasonal changes in dominant species were an increase in the abundance of the cumacean *Diastylopsis dawsoni* and the amphipoda *Anisogammarus confervicolus* in June 1975; the gastropoda *Olivella biplicata* in September 1975 and an increase in the polychaetes *Spio filicornis* and *Nephtys californiensis* and the amphipoda *Monoculodes spinipes* in June 1975 and September 1975.

Station 12

220. Station 12 was located in 15-16 m of water and was part of assemblage D in the areal baseline study. The sediment was well-sorted sand and varied little with season. The mean Bray-Curtis dissimilarity value between seasons (0.565) was high, indicating considerable seasonal

change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.439) was moderate, indicating some change in species composition with season.

221. The density of macrofauna ranged from 218 to 2896 individuals/m^2 with the highest values in June 1975 and September 1975. Diversity (H') values ranged from 2.11 to 3.68 with the lower values in June 1975 and September 1975. Evenness (J') values followed the same pattern with the lowest values in June 1975 and September 1975. Species richness (SR) ranged from 4.67 to 5.88 with the highest value in June 1975. Biomass values ranged from 2.04 to 9.72 g ash-free dry weight/m^2 with the highest values in June 1975 and September 1975.

222. The major seasonal changes in dominant species were an increase in the abundance of the cumacean *Diastylopsis dawsoni* in June 1975 and an increase in the abundance of the polychaete *Spio filicornis* and the bivalve *Siliqua patula* in June 1975 and September 1975.

Station 13

223. Station 13 was located in 18-20 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted sand in December 1974 with 3.5 percent silt and clay. In April 1975 the sediment was a less well-sorted sand with 15.0 percent silt and clay. In June 1975 the sediment was a poorly sorted clayey silt with 87.8 percent silt and clay. In September 1975 the sediment was a poorly sorted silty sand with 39.3 percent silt and clay. No sample was obtained in January 1976.

224. The mean Bray-Curtis dissimilarity value between seasons (0.652) was high, indicating considerable seasonal change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.576) was also high, indicating considerable change in species composition with season.

225. The density of macrofauna ranged from 398 individuals/m^2 in December 1975 to 8,968 individuals/m^2 in April 1975 and 7,826 individuals/m^2 in June 1975. The density (H') values were low (1.27-2.73) with the lowest values in April 1975 and June 1975. Evenness (J') values were

also very low in April 1975 and June 1975. Species richness (SR) values ranged from 3.59 to 4.48. The biomass values increased from 2.78 g ash-free dry weight/m^2 in December 1975 to 30.51 g ash-free dry weight/m^2 in September 1975.

226. The major seasonal changes in dominant species were higher abundance values of the bivalve *Siliqua patula* in June 1975 and September 1975, the cumacean *Lamprops* sp. #1 in April 1975, the cumacean *Diastylopsis dawsoni* in April 1975 and June 1975; the amphipoda *Monoculodes spinipes* in April 1975; the amphipoda *Paraphoxus milleri* in June 1975, the polychaete *Magelona sacculata* in December 1974, and the polychaete *Spio filicornis* in April 1975.

Station 14

227. Station 14 was located in 31-33 m of water and was part of assemblage D in the areal baseline. The sediment was a well-sorted sand with 1.1 percent silt and clay in December 1974. The percentage silt and clay increased to 5.2 percent in April 1975 and 5.1 percent in June 1975. In September the sediment was a poorly sorted silty sand with 29.9 percent silt and clay. In January 1976 the sediment was again a well-sorted sand with 1.4 percent silt and clay.

228. The mean Bray-Curtis dissimilarity value between seasons (0.633) was high, indicating considerable seasonal change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.516) was also high indicating considerable change in species composition between seasons.

229. The density of macrofauna ranged from 292 to 12,124 individuals/m^2 with the highest values in April 1975 and June 1975. The density (H') values were low except for the 4.11 value from December 1974. The lowest values of diversity were in April 1975 and June 1975. The evenness (J') values followed a similar pattern to diversity with the lowest values in April 1975 and June 1975. Species richness (SR) values ranged from 3.41 to 6.41. Biomass values ranged from 2.01 to 32.74 g ash-free dry weight/m^2 with the highest value in September 1975.

230. The major seasonal changes in dominant species were an increased abundance of the bivalve Siliqua patula in June 1975 and September 1975; a very high abundance of the cumacean Diastylopsis dawsoni in April 1975 and June 1975, and the high abundance of the amphipoda Atylus tridens in April 1975.

Station 15

231. Station 15 was located in 42-46 m of water and part of assemblage B in the areal baseline study. The sediment was well-sorted sand in December 1975 and January 1976 with 1.6 percent silt and clay in December 1974 and 5.0 percent silt and clay in January 1976. The sediments in April 1975 and September 1975 were poorly sorted silty sands with 21.0-23.3 percent silt and clay. The sediment in June 1975 was poorly sorted sandy silt with 63.3 percent silt and clay.

232. The mean Bray-Curtis dissimilarity value between seasons (0.519) was high, indicating considerable change in the abundance of most dominant macrofaunal species. The mean Czekanowski dissimilarity value (0.465) was moderate, indicating some change in species composition with season.

233. The density of macrofauna ranged from 766 to 7654 individuals/m^2 with higher values in April 1975 and June 1975. Diversity (H') values were moderate with lower values (2.4-2.7) in April 1975 and June 1975 and higher values (3.5-3.8) in other seasons. Evenness (J') values were also lower in April 1975 and June 1975. Species richness (SR) values ranged from 5.53 to 7.64 with higher values in April and June 1975. Biomass values ranged from 3.46 to 52.29 g ash-free dry weight/m^2 with June 1975 and September 1975 having values higher than 45 g ash-free dry weight/m^2.

234. The major seasonal changes in dominant species were an increase in the abundance of the cumacean Diastylopsis dawsoni in April 1975 and June 1975, an increase in the abundance of the bivalve Siliqua patula in April 1975 through September 1975, and the high abundance of the amphipoda Atylus tridens in April 1975.

Station 16

235. Station 16 was located in 31-37 m of water and was part of

assemblage B in the areal baseline study. The sediment was a poorly sorted silty sand in December 1974 and April 1975 with 34.2-37.1 percent silt and clay. The percentage silt and clay increased to 82.9 to 89.2 percent in the poorly sorted sandy silt sediment found in June 1975 and September 1975. The sediment was a well-sorted sand with 8.6 percent silt and clay in January 1976.

236. The mean Bray-Curtis dissimilarity value between seasons (0.579) was high, indicating considerable change in the abundance of dominant species with season. The mean Czekanowski dissimilarity value between seasons (0.455) was moderate, indicating some change in species composition with season.

237. The density of macrofauna ranged from 2300 to 27,782 individuals/m^2 with the highest value in April 1975. The diversity (H') values were low (0.39-2.38) except in January 1975 when the diversity was 3.66. The evenness (J') values were also low (0.07-0.45) except in January 1975. Species richness (SR) values ranged from 4.15 to 6.67. The biomass values ranged from 4.36 to 118.30 g ash-free dry weight/m^2 with very high values in June 1975 and September 1975.

238. The major seasonal changes in dominant species were the low abundance of the cumacean *Diastylopsis dawsoni* in December 1974 and high abundance of the bivalve *Siliqua patula* in June 1975 and September 1975.

Station 17

239. Station 17 was located in 31-33 m of water and was part of assemblage B in the areal baseline. The sediment changed considerably with season with a range of 14.5 to 78.2 percent silt and clay. In January 1975, April 1975, and January 1976 the sediment was a well sorted silty sand with 14.5-26.7 percent silt and clay of which 1.6-2.7 percent was clay. In June 1975 the sediment was a poorly sorted clayey sand with 21.8 percent clay and in September 1975 the sediment was a poorly sorted sandy silt with 78.2 percent silt and clay.

240. The mean Bray-Curtis dissimilarity value between seasons (0.542) was high, indicating considerable seasonal change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.463) was moderate, indicating some seasonal change in species composition.

241. The density of macrofauna ranged from 950 to 26,320 individuals/m^2 with the highest value in April 1975. Diversity (H') values were low with the highest value in January 1975 (3.00) and the values for other seasons ranging from 0.33 to 2.17. Evenness (J') values were also low with the highest values in January 1975 and September 1975. Species richness (SR) values ranged from 3.97 to 6.49. Biomass values were high in June 1975 and September 1975 with 23.97 and 29.78 g ash-free dry weight/m^2, respectively. The range of biomass values for January 1975, April 1975 and January 1976 was 1.68-5.13 g ash-free dry weight/m^2.

242. The major seasonal changes in dominant species were an increase in the abundance of the bivalve *Siliqua patula* in June 1975 and September 1975, and the very high abundance of the cumacean *Diastylopsis dawsoni* in April 1975 and high abundance in June 1975 and January 1976.

Station 18

243. Station 18 was located in 40-46 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted sand during all seasons. The percentage silt and clay was low (1.5-2.1 percent) in December 1974 and January 1976 and was higher April 1975 through September 1975 (5.1-12.1 percent).

244. The mean Bray-Curtis dissimilarity values between seasons (0.479) was moderate, indicating some change in the abundance of dominant species with season. The mean Czekanowski dissimilarity value between seasons (0.424) was moderate, indicating some change in species composition with season.

245. The density of macrofauna ranged from 734 to 3502 individuals/m^2 with the highest value in September 1975. The diversity (H') values were high in December 1974 through June 1975 with a slight decrease in September 1975 and January 1976. The evenness (J') values followed the same pattern as diversity. The species richness (SR) values ranged from 6.90 to 10.45 with the highest values found in June 1975 and September 1975. The biomass values were low with a range of 1.24-2.92 g ash-free dry weight/m^2.

246. The major seasonal change in dominant species was an increase

in the abundance of the polychaetes Spiophanes bombyx and Spiophanes berkeleyorum in September 1975.

Station 19

247. Station 19 was located in 29-31 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted sand and did not vary with season. The mean Bray-Curtis dissimilarity value between seasons (0.404) was moderate, indicating some change in the abundance of most dominant macrofauna species with season. The mean Czekanowski dissimilarity values between seasons (0.351) was low, indicating little change in species composition with season.

248. The density of macrofauna ranged from 442 to 2714 individuals/m^2 with the highest value in September 1975. The diversity (H') values were high December 1974 through June 1975 and lower in September 1975. The evenness (J') values followed the same pattern with the lowest value in September 1975. The species richness (SR) values ranged from 4.72 to 8.48. The biomass values ranged from 1.06 to 2.30 g ash-free dry weight/m^2 with the highest values in June 1975 and September 1975.

249. The major seasonal change in dominant species was an increase in the abundance of the polychaete Spiophanes bombyx in September 1975.

Station 20

250. Station 20 was located in 22-24 m of water and was part of assemblage D in the areal baseline study. The sediment was a well sorted sand, which varied little with season (1.0-1.1 percent silt and clay) except in June 1975 when 5.2 percent silt and clay were present.

251. The mean Bray-Curtis dissimilarity value between seasons (0.539) was high, indicating considerable seasonal change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.469) was moderate, indicating some seasonal change in species composition.

252. The density of macrofauna ranged from 184 to 1682 individuals/m^2 with the highest value in September 1975. Diversity (H') values were moderately high from January 1975 to June 1975 and lower in September 1975 and January 1976. The evenness (J') values were also lowest in September 1975 and January 1976. The species richness (SR)

values ranged from 2.88 to 6.34 with the highest values from April 1975 to September 1975. Biomass values ranged from 1.31 to 3.18 g ash-free dry weight/m^2 with the highest values in June 1975 and September 1975.

253. The major seasonal change in dominant species was an increase in the abundance of the polychaete Spiophanes bombyx in June 1975 and September 1975.

Station 21

254. Station 21 was located in 17-21 m of water and was part of assemblage E in the areal baseline study. The sediment was a well-sorted sand in December 1974 and April 1975 with 1.3-1.6 percent silt and clay. The percentage silt and clay was 16.9 percent in June 1975 and 7.0 percent in September 1975. No sample was obtained in January 1976.

255. The mean Bray-Curtis dissimilarity between seasons (0.588) was high, indicating considerable change in the abundance of dominant species with season. The mean Czekanowski dissimilarity value between seasons (0.430) was moderate, indicating some seasonal change in species composition.

256. The density of macrofauna ranged from 56 to 832 individuals/m^2. The diversity (H') was moderately high in April 1975 and September 1975 and low in January 1975 and June 1975. Evenness (J') values followed the same pattern as diversity. Species richness (SR) ranged from 2.49 to 4.39. Biomass ranged from 0.16 to 1.14 with the highest values in June 1975.

257. The major seasonal changes in dominant species were the high abundance of the polychaete Spio filicornis in January 1975 and June 1975; the increased abundance of the mysid Archeomysis grebnitzkii in April 1975 and June 1975, and the single high values of the amphipoda Paraphoxus obtusidens major in April 1975, the polychaetes Eteone sp. #6 and Capitellidae sp. #1 and Nemertea sp. #5 in June 1975.

Station 22

258. Station 22 was located in 22-33 m of water and was not part of any assemblage in the areal baseline study. Station 22 had the highest affinity with assemblage B. The sediment at station 22 varied considerably with season and was often layered. In December 1974, a well-

sorted sand layer with 10.8 percent silt and clay covered a poorly sorted sandy silt layer with 79.3 percent silt and clay. In April 1975 the same well-sorted sand layer with 11.7 percent silt and clay was found with no other layers. In June 1975 a poorly sorted sandy silt layer with 76.7 percent silt and clay covered a well-sorted silty sand layer with 20.8 percent silt and clay. In September 1975, the sediment was a well-sorted silty sand with 27.4 percent silt and clay. In January 1976 the sediment was a well-sorted sand with 14 percent silt and clay.

259. The mean Bray-Curtis dissimilarity value between seasons (0.600) was high, indicating considerable change in the abundance of dominant species with season. The mean Czekancwski dissimilarity value between seasons (0.485) was moderate, indicating some change in species composition with season.

260. The density of macrofauna ranged from 716 to 43,802 individuals/m^2 with the highest values in January 1975 through June 1975. The diversity (H') values were low and ranged from 0.17 to 2.62. The lowest diversity values were found in January 1975 and April 1975. The evenness (J') values followed the same pattern with very low values in January 1975 and April 1975. Species richness (SR) values ranged from 3.13 to 4.59. Biomass values ranged from 4.37 to 62.02 g ash-free dry weight/m^2 with the highest value in September 1975.

261. The major seasonal changes in dominant species were a decrease in the abundance of the cumacean Diastylopsis dawsoni in September 1975 and January 1975 and the high abundance of the bivalve Siliqua patula in June 1975 and September 1975.

Station 23

262. Station 23 was located in 27-31 m of water and was part of assemblage B in the areal baseline study. The sediment was a well-sorted sand and silty-sand with 10.1 to 29.3 percent silt and clay.

263. The mean Bray-Curtis dissimilarity value between seasons (0.379) was low, indicating little change in the abundance of dominant species. The mean Czekanowski dissimilarity value between seasons (0.273) was also low, indicating little change in species composition with season.

264. The density of macrofauna ranged from 910 to 4392 individuals/m^2 with the highest values in June 1975 and September 1975. The diversity (H') values were high (3.42 to 4.33) except for the 2.22 diversity value for September 1975. Evenness (J') values were also high except for September 1975. The species richness (SR) values ranged from 5.46 to 7.78 with higher values from January 1975 through June 1975. The biomass values ranged from 1.73 to 13.67 g ash-free dry weight/m^2 with the highest values from June 1975 through January 1976.

265. The major seasonal changes in dominant species were an increase in the abundance of the cumacean *Diastylopsis dawsoni* in June 1975 and September 1975 and an increase in the abundance of the polychaete *Spiophanes bombyx* from June 1975 through January 1976.

Station 24

266. Station 24 was located in 24-27 m of water and was part of assemblage C in the areal baseline study. The sediment was a very well-sorted sand and did not vary with season. The mean Bray-Curtis dissimilarity value between seasons (0.433) was moderate, indicating some change in the abundance of dominant species with season. The mean Czekanowski dissimilarity values between seasons (0.331) was low, indicating little change in species composition with season.

267. The density of macrofauna ranged from 334 to 2692 individuals/m^2 with the highest value in September 1975. The diversity (H') values were high January 1975 through June 1975 (range 3.33 to 4.33) and lower in September 1975 and January 1976. The evenness (J') values were also low in September 1975 and January 1976. The species richness (SR) values ranged from 5.16 to 7.10 with the highest values April 1975 through September 1975. The biomass values ranged from 1.41 to 1.89 g ash-free dry weight/m^2.

268. The major seasonal change in dominant species was an increase in the abundance of the polychaete *Spiophanes bombyx* in June 1975 through January 1976.

Station 25

269. Station 25 was located in 15-18 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted

sand with 1.7 percent silt and clay in January 1975. In April 1975 the percentage silt and clay increased to 3.5 percent. In June 1975 the sediment was a silty sand with 28.2 percent silt and clay. In September 1975 the sediment was a poorly sorted silty clay with 38.2 percent silt and clay.

270. The mean Bray-Curtis dissimilarity value between seasons (0.601) was high, indicating considerable change in the abundance of dominant macrofaunal species with season. The mean Czekanowski dissimilarity values between seasons (0.467) were moderate, indicating some change in species composition with time.

271. The density of macrofauna ranged from 302 to 9454 individuals/m^2 with the highest value in June 1975. Diversity (H') values ranged from 1.27 to 3.36 with the lowest value in June 1975. The evenness (J') values followed the same pattern as diversity with the lowest value in June 1975. Species richness (SR) values ranged from 4.19 to 5.67. Biomass values ranged from 3.24 to 17.40 g ash-free dry weight/m^2 with the highest values in June 1975 and September 1975.

272. The major seasonal changes in dominant species were an increase in abundance of the bivalve Siliqua patula in June 1975 and September 1975, an increase in the abundance of the cumacean Diastylopsis dawsoni in June 1975, and high abundance of the polychaete Spio filicornis in September 1975.

Station 26

273. Station 26 was located in 20-22 m of water and was part of assemblage C in the areal baseline study. The sediment was a well-sorted sand in January 1976 with 1.2 percent silt and clay. In April 1975 the sediment was a poorly sorted sand with 16.1 percent silt and clay. In June 1975 and September 1975, the sediment was a poorly sorted silty sand with 48.1 to 52.4 percent silt and clay. Station 26 was not sampled in January 1976.

274. The mean Bray-Curtis dissimilarity value between seasons (0.535) was high, indicating considerable change in the abundance of dominant species with season. The mean Czekanowski dissimilarity values between seasons (0.458) was moderate, indicating some change in species composition with time.

275. The density of macrofauna ranged from 562 to 2894 individuals/m^2 with the highest values from April 1975 through September 1975. Diversity (H') values were low (1.38-1.90) except for the moderate value from January 1975 (2.86). Evenness (J') values were also low except for a moderate value in January 1975. Species richness values ranged from 3.56 to 4.67. Biomass values ranged from 4.27 to 53.93 g ash-free dry weight/m^2 with the highest value in September 1975.

276. The major seasonal changes in dominant species were an increase in the abundance of the bivalve *Siliqua patula* in June 1975 and September 1975 and the low abundance of the cumacean *Diastylopsis dawsoni* in January 1975.

Experimental Site G

277. The experimental site was located in 25-30 m of water south of the mouth of the Columbia River (46° 11.5'N, 124° 6.0'W). The substrate prior to disposal of dredged material was a well-sorted sand (Md ø ≃ 3.0 ø). Between 9 July and 27 August 1975, approximately 460,000 m^3 of dredged material was deposited on experimental site G. The material was dredged from the mouth of the Columbia River and was a coarser sand than the ambient substrate with a high percentage of 2.0-2.5 ø size particles. The dredged material formed a circular deposit with a radius of 456 m and a maximum elevation of 1.5 m (Sternberg et al., 1977).

278. The experimental site was sampled on three cruises prior to disposal and on five cruises after the disposal of dredged material. The stations which were located in the experimental site or nearby for control (Figure C24) are listed in Table C2. The following sections describe the structure of benthic communities and distribution of station groups for each sampling period.

December 1974-January 1975

279. The six stations located near experimental site G were part of assemblage C in the areal baseline study. The six stations fused at 0.33 Bray-Curtis units to form one station group (Figure C26). The dominant species were the polychaete *Magelona sacculata* (BI = 9.50),

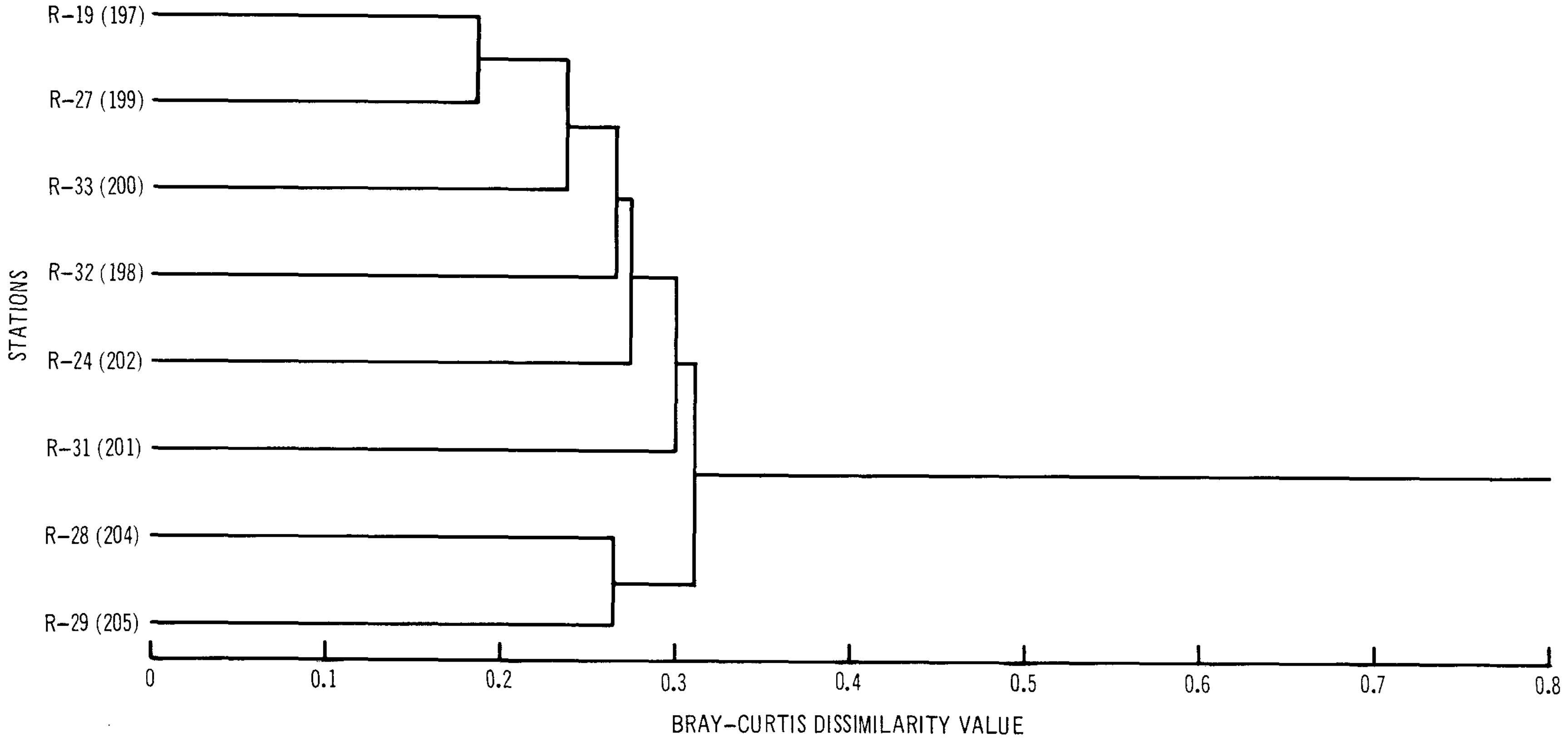


Figure C40. Dendrogram of Dissimilarity Between Stations-Experimental Site G (C7506C) the amphipoda Eohaustorius sencillus (8.83), the polychaete Spiophanes bombyx (8.51), the polychaete Chaetozone setosa (5.42), and the ophuroid Amphiodia periercta-urtica (5.08).

280. The diversity (H') values were high (3.33-4.32) with moderate species richness (SR) values (5.47-8.45) and high evenness (J') values (0.68 to 0.80). The density of macrofauna (334-560 individuals/m^2) and the biomass (0.61-1.93 g ash-free dry weight/m^2) were low.

April 1975

281. In April 1975 two stations were located in the experimental site G region (R-19, R-24). The two stations fused at 0.28 Bray-Curtis units. Dominant species were the amphipoda Eohaustorius sencillus (BI = 9.00), the polychaate Magelona sacculata (7.75), the amphipoda Monoculodes spinipes (7.25), and the polychaete Spiophanes bombyx (6.50). The diversity (H') values were high (4.24 and 4.34) with moderate species richness (SR) values (5.79 and 6.02) and high evenness (J') values (0.85 and 0.86). The density of macrofauna (348 and 422 individuals/m^2) and biomass (1.05 and 1.41 g ash-free dry weight/m^2) were low.

June 1975

282. In June 1975 eight stations were located in the experimental site region. The eight stations fused at 0.31 Bray-Curtis units to form one station group (Figure C40). Dominant species included the polychaete Spiophanes bombyx (BI = 10.0), the amphipoda Paraphoxus obtusidens major (8.37), the polychaete Magelona sacculata (8.13), and the amphipoda Eohaustorius sencillus (5.88).

283. The diversity (H') values ranged from 2.75 to 4.51 with the highest evenness (J') values (0.52-0.79) corresponding to the highest diversity values. Species richness (SR) values (6.30-8.48) were moderate. The density of macrofauna ranged from 629 to 920 individuals/m^2. Biomass values were slightly higher than in April 1975 with a range of 1.05-2.58 g ash-free dry weight/m^2.

September 1975

284. In September 1975, 26 stations were sampled at or near the experimental site. The location, description, and fate of the dredged material deposited on experimental site G were described by Sternberg

et al. (1977). The twenty-six stations formed three station groups (Figure C41). Stations K-16, K-31, and R-27, all near the center of the disposal area formed one station group (F_1) and were fused at 0.25 Bray-Curtis units. Stations K-9, K-14, K-18, K-22, and K-38, located in a circle around station group F_1, formed the second station group (G_1) and were fused at 0.27 Bray-Curtis units. The remaining 18 stations formed the third station group (H_1) and fused at 0.27 Bray-Curtis units. Station group G_1 and H_1 were closely related and fused at 0.29 Bray-Curtis units. Station group F_1 fused with station groups G_1 and H_1 at 0.40 Bray-Curtis units.

285. The rank order of the nine most dominant species in station groups G_1 and H_1 was the same (Table C35). Station group F_1 had higher dominance of the cumacean Hemilamprops californiensis and the amphipoda Synchelidium rectipalmumi and a lower dominance of the amphipods Paraphoxus obtusidens major and Eohaustorius sencillus when compared to station groups G_1 and H_1. The overall dominant species were the polychaete Spiophanes bombyx (BI = 9.92), the polychaete Magelona sacculata (8.39), the cumacean Diastylopsis dawsoni (7.19), the amphipoda Paraphoxus obtusidens major (5.41), the polychaete Haploscoloplos elongatus (5.43), and the amphipoda Eohaustorius sencillus (4.16).

286. The density of macrofauna was highest (2308-6950 individuals/m^2) at station group H_1, lower at station group G_1 (1196-2350 individuals/m^2), and much lower at station group F_1 (572-752 individuals/m^2). If the polychaete Spiophanes bombyx were excluded, station group H_1 would still have a higher density (range 500-1070; mean, 736 individuals/m^2) followed by station group G_1 (range 500-798; mean, 638 individuals/m^2) and station group F_1 (range 486-534; mean, 512 individuals/m^2). The range of biomass values was 1.35-4.15 g ash-free dry weight/m^2. Station group H_1 had a mean biomass value of 2.72, followed by station group F_1 (2.48) and station group G_1 (2.04).

287. The diversity (H') values were higher at station group F_1 (range 3.75-4.07) than station group G_1 (range 2.41-3.19) and much higher than station group H_1 (range 1.42-2.07). Evenness (J') values followed the same pattern with the highest values in station group F_1

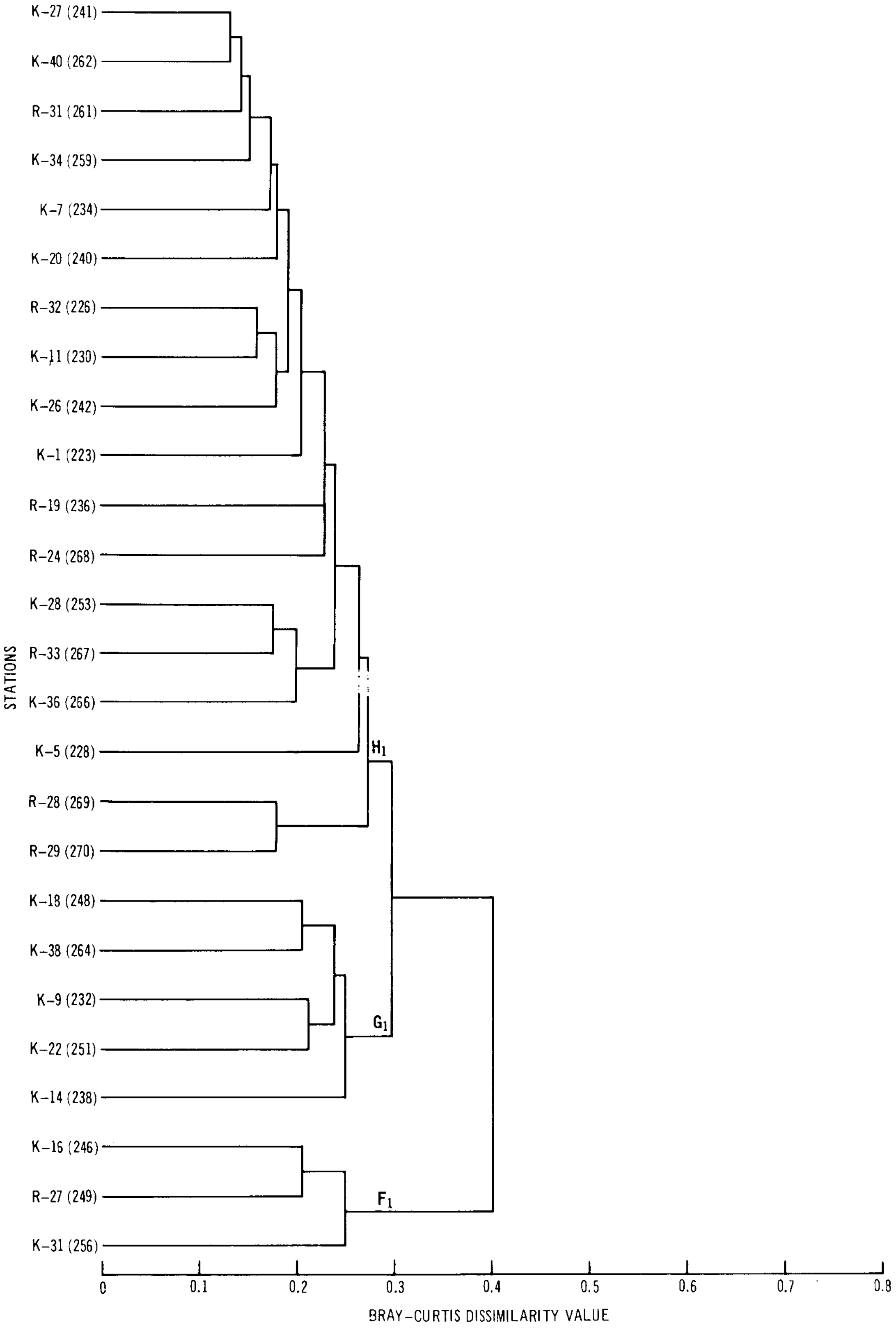


Figure C41. Dendrogram of Dissimilarity Between Stations-Experimental Site G (C7509E)

Table C35

Dominant Species (BI) Near Experimental Site G September 1975.

Species Code	Species	STATION GROUPS H_1	G_1	F_1
344	*Spiophanes bombyx*	10.00	10.00	9.33
279	*Magelona sacculata*	8.11	8.60	9.67
97	*Diastylopsis dawsoni*	6.97	7.50	8.00
140	*Paraphoxus obtusidens major*	5.56	6.30	3.00
261	*Haploscoloplos elongatus*	4.92	6.30	7.00
155	*Eohaustorius sencillus*	4.28	4.30	2.67
237	*Chaetozone setosa*	2.77	4.00	3.50
7	*Olivella baetica*	2.11	2.40	1.17
127	*Monoculodes spinipes*	1.97	0.20	1.33
302	*Nephtys caecoides*	1.72	0.06	-
121	*Ampelisca macrocephala*	1.39	0.80	-
256	*Glycinde* sp. #2	1.30	-	-
425	*Amphiodia periercta-urtica*	1.25	0.40	-
96	*Hemilamprops californiensis*	1.28	1.20	2.30
133	*Synchelidium rectiphmumi*	-	0.20	4.50

(range 0.70-0.77) followed by station group G_1 (range 0.45-0.59) and station group H_1 (range 0.26-0.40). The species richness (SR) values ranged from 5.11 to 7.43 with a mean value of 6.73 in station group F_1, 6.58 in station group G_1, and 6.26 in station group H_1.

October 1975

288. In October 1975, 13 stations were sampled at or near the experimental site. The 13 stations formed three station groups (Figure C42). Stations that were part of station groups F_1 and G_1 in September 1975 were all joined in October 1975 to form one station group (F_2) that included stations K-16, K-18, K-22, K-31, and R-27. These five stations joined at 0.36 Bray-Curtis units. Stations that were part of station group H_1 in September 1975 fused at 0.31 Bray-Curtis units in October 1975. These stations were further divided into station group I_2 that included stations R-24, R-28, R-29 and R-31 and fused at 0.24 Bray-Curtis units, and station group G_2 that included stations K-7, K-11, K-26, and R-33 and fused at 0.28 Bray-Curtis units. All stations fused at 0.48 Bray-Curtis units.

289. The rank order of the four most dominant species was the same at all station groups (Table C36). Station group G_2 had a higher dominance value for the gastropoda Olivella baetica than station group I_2 and a higher dominance value for the amphipoda Paraphoxus obtusidens major than either station group F_2 or I_2. Station group F_2 also had a higher dominance value for the gastropoda Olivella baetica than station group I_2 and had higher dominance values for the gastropoda Olivella pycna and the polychaete Spio filicornis than either station group I_2 or G_2. The overall dominant species were the polychaete Spiophanes bombyx (BI = 9.79), the polychaete Magelona sacculata (8.77), the amphipoda Eohaustorius sencillus (7.62), and the polychaete Chaetozone setosa (6.31).

290. The density of macrofauna was highest (2242-4202 individuals/m^2) at station group I_2, followed by station group G_2 (932-1406 individuals/m^2), and station group F_2 (242-422 individuals/m^2). If the polychaete Spiophanes bombyx were excluded, the same pattern of density

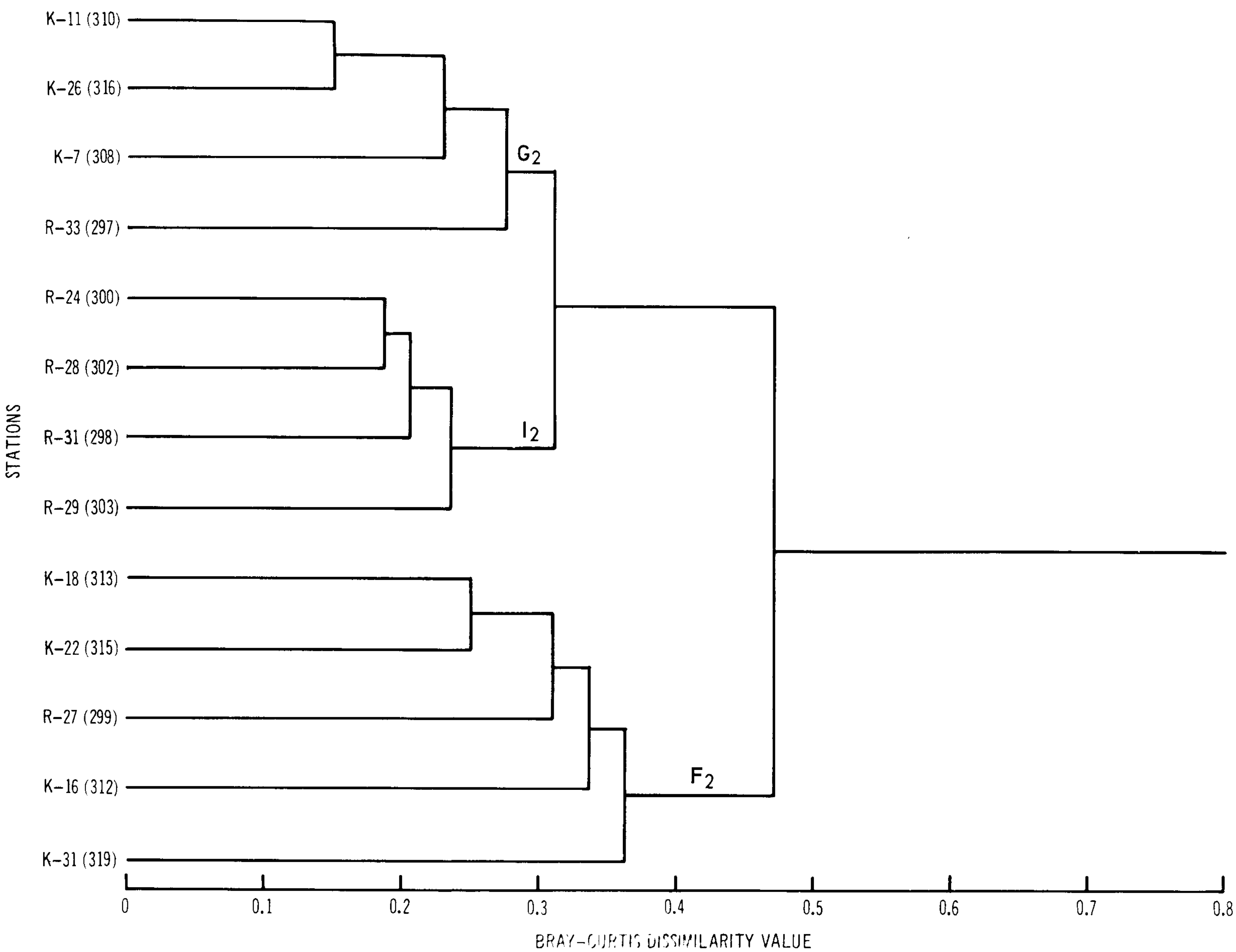


Figure C42. Dendrogram of Dissimilarity Between Stations-Experimental Site G (C7510E)

Table C36

Dominant Species (BI) Near Experimental Site G October 1975.

Species Code	Species	STATION GROUPS I_2	G_2	F_2
344	Spiophanes bombyx	10.00	10.00	9.46
279	Magelona sacculata	8.50	8.50	9.20
155	Eohaustorius sencillus	8.50	8.00	6.60
237	Chaetozone setosa	5.00	6.50	7.20
302	Nephtys caecoides	4.12	4.38	2.90
261	Haploscoloplos elongatus	3.00	2.25	1.50
256	Glycinde sp. #2	2.63	-	0.20
471	Nemertea sp. #7	2.25	1.00	0.20
341	Scoloplos armiger	1.88	-	-
7	Olivella baetica	1.75	4.88	4.00
121	Ampelisca macrocephala	1.75	-	-
140	Paraphoxus obtusidens major	1.63	4.50	1.10
408	Glycinde picta	1.63	-	-
9	Olivella pycna	-	1.38	4.50
343	Spio filicornis	-	-	3.20
425	Amphiodia periercta-urtica	0.25	1.75	1.10

would be found with the highest density of macrofauna at station group I_2 (range 456-638; mean, 544 individuals/m^2), followed by station group G_2 (range 366-448; mean, 405 individuals/m^2), and station group F_2 (range 188-308; mean, 246 individuals/m^2). The range of biomass values was 0.41-2.88 g ash-free dry weight/m^2 with station groups G_2 (mean, 1.82 g ash-free dry weight/m^2) and I_2 (mean, 2.21 g ash-free dry weight/m^2) having the highest biomass values. Station group F_2 (range 0.41-1.29; mean, 1.020 g ash-free dry weight/m^2) had lower biomass values.

291. The diversity (H') values were highest at station group F_2 (3.08-3.58), followed by lower values at station group G_2 (1.89-2.59) and the lowest values at station group I_2 (1.29-1.60). Evenness (J') values followed the same pattern with highest values in station group F_2 (0.60 to 0.80) followed by station group G_2 (0.40-0.51) and the lowest values in station group I_2 (0.25-0.34). The species richness (SR) values ranged from 3.99 to 5.63 with slightly lower values found in station group F_2 (mean, 4.58) when compared to station group G_2 (mean, 4.96) and station group I_2 (mean, 5.15).

January 1976

292. In January 1976, 11 stations were sampled at or near the experimental site. The 11 stations formed three station groups (Figure C43). Three stations (K-18, K-22, and K-31) that are part of station Group F_2 in October 1975 and one station (K-7) from station group G_2 joined at 0.39 Bray-Curtis units to form station group F_3. Three stations (R-24, R-28, and R-31) that were part of station group I_2 in October 1975 and station R-19 (not sampled in October 1975) fused at 0.32 Bray-Curtis units to form station group I_3. Three stations (K-11, K-26, and R-33) that were part of station group G_2 in October 1975 fused at 0.31 Bray-Curtis units to form station group G_3. Station groups G_3 and I_3 fused at 0.39 Bray-Curtis units and then fused with station group F_3 at 0.50 Bray-Curtis units.

293. The rank order of the three most dominant species was the same in station groups G_3 and I_3 (Table C37). Station group I_3 had a higher dominance of the amphipoda *Ampelisca macrocephala* than the other

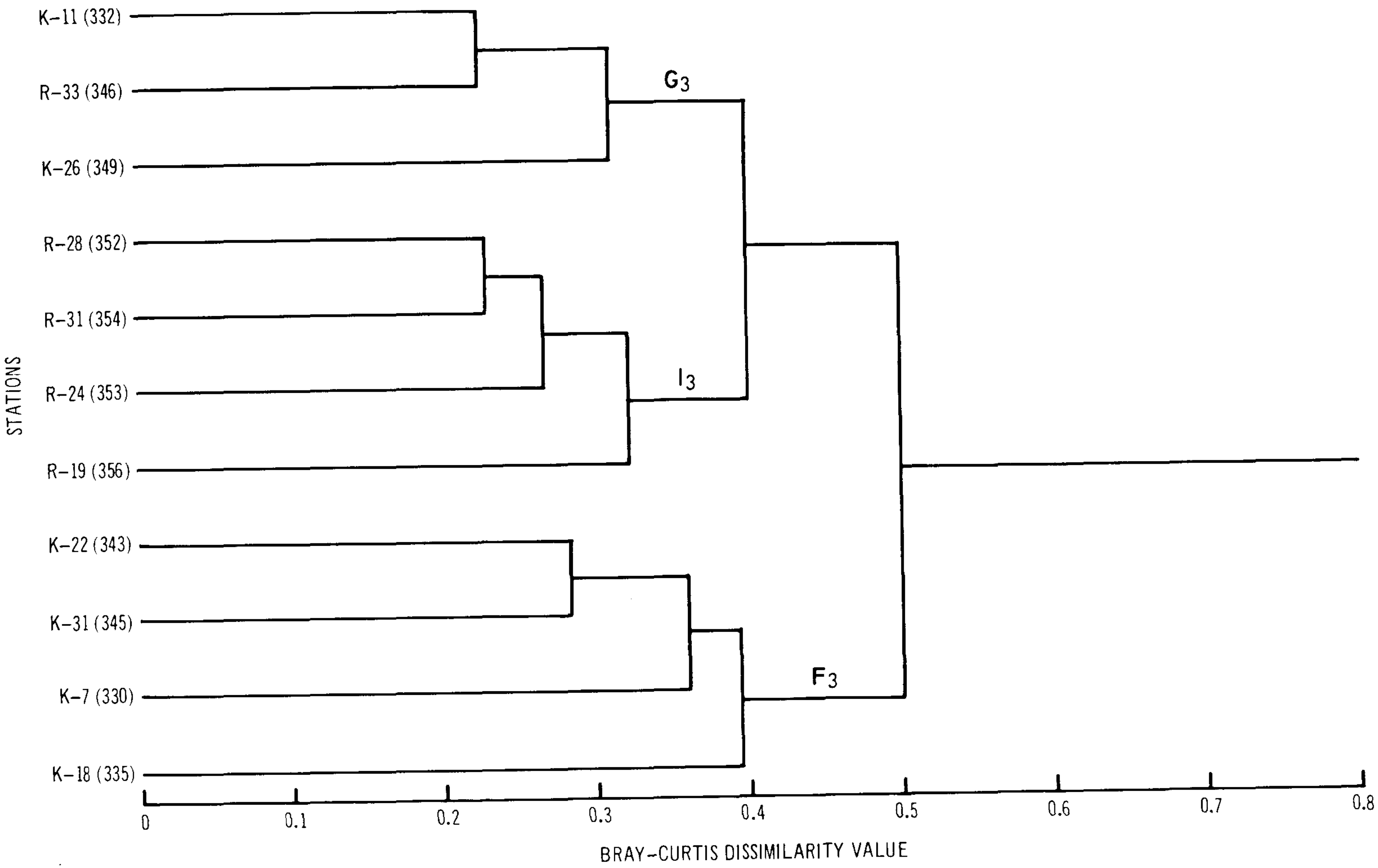


Figure C43. Dendrogram of Dissimilarity Between Stations-Experimental Site (C7601D)

Table C37

Dominant Species (BI) Near Experimental Site G January 1976.

Species Code	Species	STATION GROUPS I_3	G_3	F_3
344	Spiophanes bombyx	10.00	10.00	5.75
279	Magelona sacculata	8.00	8.67	9.75
155	Eohaustorius sencillus	7.75	8.33	5.12
302	Nephtys caecoides	5.25	4.83	2.38
237	Chaetozone setosa	4.75	7.00	8.00
121	Ampelisca macrocephala	4.25	-	-
7	Olivella baetica	2.63	3.50	2.00
140	Paraphoxus obtusidens major	2.25	3.00	6.00
141	Paraphoxus vigitegus	2.25	0.33	-
471	Nemertea sp. #7	1.75	1.16	0.25
310	Northria iridescens	1.00	2.50	-
425	Amphiodia periercta-urtica	1.00	1.83	0.88
9	Olivella pycna	0.75	2.13	3.25
8	Olivella biplicata	-	-	3.88
110	Archeomysis grebnitzkii	-	-	1.50

station groups. Station group G_3 had a greater dominance of the polychaete Chaetozone setosa than station group I_3. The polychaetes Spiophanes bombyx and Nephtys caecoides and the amphipoda Eohaustorius sencillus were less dominant in station group F_3 than the other station groups. The polychaete Chaetozone setosa and the gastropoda Olivella pycna were more dominant in station group F_3 than station group I_3 and the gastropod Olivella biplicata was more dominant in station group F_3 than other station groups. The overall dominant species were the polychaete Spiophanes bombyx (BI = 8.45), the polychaete Magelona sacculata (8.82), the amphipoda Eohaustorius sencillus (6.95), the polychaete Chaetozone setosa (6.55), and the polychaete Nephtys caecoides (4.09).

294. The density of macrofauna was highest in station group I_3 (range 750-1618; mean, 1234 individuals/m^2), followed by station group G_3 (range 338-554; mean 473 individuals/m^2), and lowest at station group F_3 (range 148-350; mean, 230 individuals/m^2). If Spiophanes bombyx was not included, the density values would follow the same pattern with highest density values at station group I_3 (mean, 380 individuals/m^2), followed by station group G_3 (mean, 300 individuals/m^2), and the lowest values at station group F_3 (mean, 207 individuals/m^2). The biomass values ranged from 1.10 to 2.79 g ash-free dry weight/m^2 with slightly higher values at station group G_3 (mean, 1.91) than at station groups I_3 (mean, 1.39) and F_3 (mean, 1.45).

295. The diversity (H') values were highest at station group F_3 (range 2.97-3.74; mean, 3.25) and station group G_3 (range 3.07-3.46; mean, 3.25), and lowest at station group I_3 (range 1.80-3.07; mean, 2.24). The evenness (J') values followed the same pattern with high values at station groups F_3 (mean, 0.74) and G_3 (mean, 0.68) and lower values at station group I_3 (mean, 0.45). Species richness (SR) values ranged from 3.64 to 5.69 with slightly higher values at station groups G_3 (mean, 4.94) and I_3 (mean, 4.95) than station group F_3 (mean, 4.29).

April 1976

296. In April 1976, 12 stations were sampled at or near experimental site G. The 12 stations formed two station groups (Figure C44).

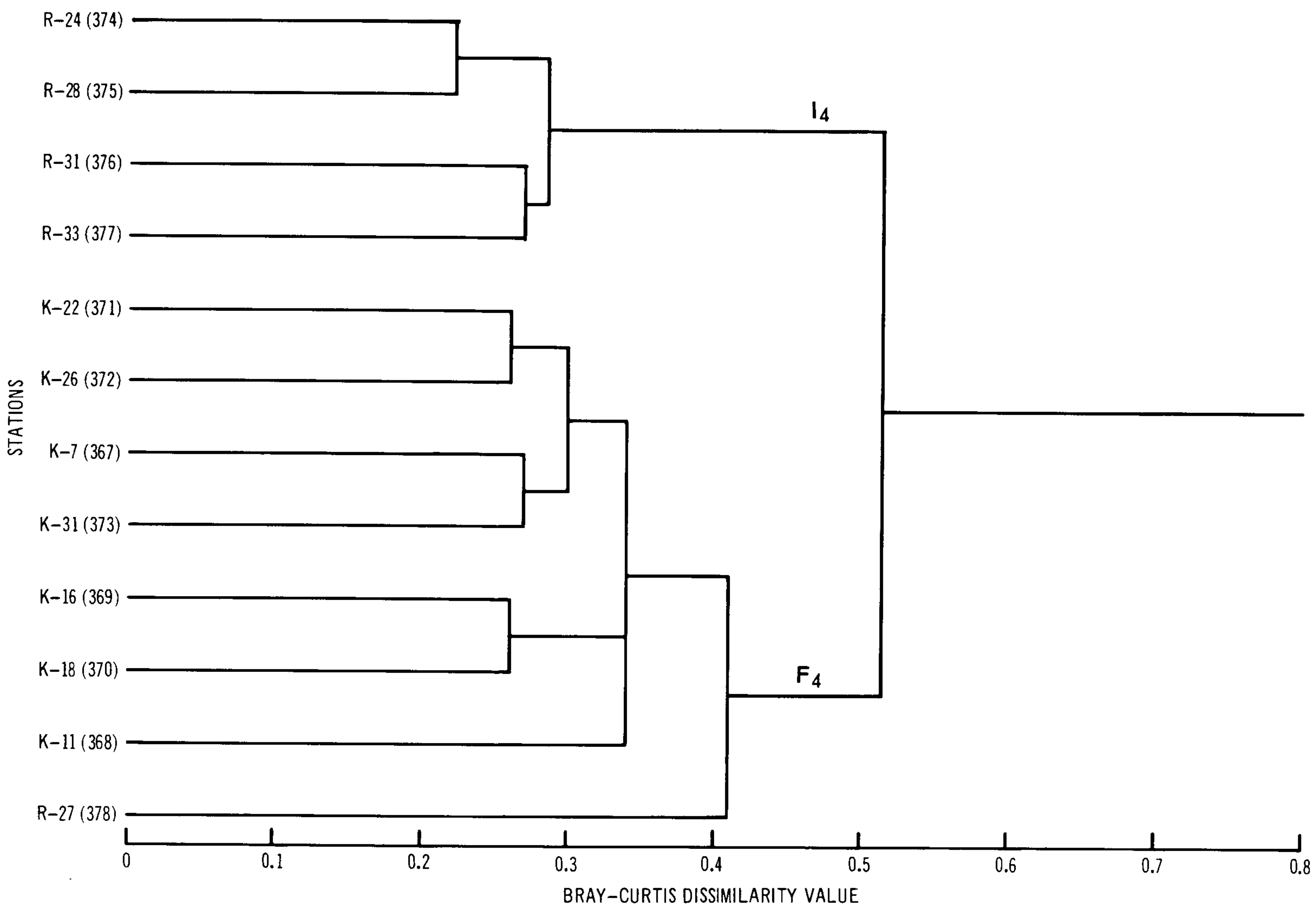


Figure C44. Dendrogram of Dissimilarity Between Stations-Experimental Site G (C7604B)

Stations (R-24, R-28, and R-31) that were part of station groups I_2 in October and I_3 in January 1976 together with station R-33 that was part of station group G_2 in October 1975 and G_3 in January 1976 fused at 0.29 Bray-Curtis units to form station group I_4. The remaining eight stations that were part of station groups F_1 and G_1 in September 1975, F_2 and G_2 in October 1975 and F_3 and G_3 in January 1976, fused at 0.42 Bray-Curtis units to form station group F_4. Station groups F_4 and I_4 fused at 0.52 Bray-Curtis units.

297. The polychaete Spiophanes bombyx, which was the dominant species at station group I_4, was not dominant at Station group F_4 (Table C38). The amphipoda Ampelisca macrocephala and the polychaete Glycinde sp. #2 had lower dominance values in station group F_4 when compared to station group I_4. The following species had higher dominance values at station group F_4: the polychaete Spio filicornis, the mysid Archeomysis grebnitzkii, and the gastropoda Olivella pycna. The overall dominant species were the polychaete Magelona sacculata (BI = 8.84), the amphipoda Paraphoxus obtusidens major (7.86), the polychaete Chaetozone setosa (6.83), and the amphipoda Eohaustorius sencillus (5.38).

298. The density of macrofauna was higher at station group I_4 (range 746-2088; mean, 1349 individuals/m^2) than at station group F_4 (range 172-308; mean, 248 individuals/m^2). If Spiophanes bombyx were excluded, the density of macrofauna would still be higher at station group I_4 (mean, 528 individuals/m^2) than station group F_4 (mean, 241 individuals/m^2). The biomass values ranged from 0.44 to 2.72 g ash-free dry weight/m^2, with slightly higher values at station group I_4 (mean, 1.66) compared to station group F_4 (mean, 1.23).

299. The diversity (H') values were higher at station group F_4 (range 3.71-4.15; mean, 3.99) than at station group I_4 (range 2.21-3.84; mean, 2.96). Evenness (J') values were also higher at station group F_4 (mean, 0.84) than station group I_4 (mean, 0.55). Species richness (SR) values were higher at station group I_4 (range 6.33-7.14; mean, 6.65) than station group F_4 (range 4.97-6.12; mean, 5.45).

Table C38

Dominant Species (BI) Near Experimental Site G April 1976.

Species Code	Species	STATION GROUPS	
		I_4	F_4
344	*Spiophanes bombyx*	10.00	1.13
279	*Magelona sacculata*	7.75	9.38
155	*Eohaustorius sencillus*	6.88	4.63
140	*Paraphoxus obtusidens major*	6.25	8.67
237	*Chaetozone setosa*	5.38	7.56
302	*Nephtys caecoides*	3.88	3.13
310	*Northria iridescens*	3.75	2.38
261	*Haploscoloplos elongatus*	3.13	0.31
121	*Ampelisca macrocephala*	3.00	-
256	*Glycinde* sp. #2	2.13	-
341	*Scoloplos armiger*	1.38	-
8	*Olivella pycna*	-	1.81
127	*Monoculodes spinipes*	0.25	2.00
303	*Nephtys californiensis*	-	1.50
343	*Spio filicornis*	-	3.13
110	*Archeomysis grebnitzkii*	-	3.63
9	*Olivella pycna*	-	2.69

June 1976

300. In June 1976, 12 stations were sampled at or near experimental site G. The 12 stations formed two station groups as in April 1976 (Figure C45). Stations (R-24, R-28, R-31, and R-33) that were part of station group I_4 and station K-11 fused at 0.27 Bray-Curtis units to form station group I_5. The remaining seven stations fused at 0.28 Bray-Curtis units to form station group F_5. Station groups I_5 and F_5 fused at 0.35 Bray-Curtis units.

301. The polychaete Spiophanes bombyx was not as dominant at station group F_5 as I_5 (Table C39). The cumacean Hemilamprops californiensis and the amphipoda Photis lacia were also more dominant at station group I_5. The amphipoda Paraphoxus obtusidens major was more dominant at station group F_5 than I_5. The overall dominant species were the polychaete Spiophanes bombyx (BI = 9.41), the amphipoda Paraphoxus obtusidens major (8.37), the polychaete Magelona sacculata (7.25), the polychaete Haploscoloplos elongatus (5.67), and the polychaete Chaetozone setosa (5.45).

302. The density of macrofauna was higher in station group I_5 (range 896-1446; mean, 1156 individuals/m^2) than station group F_5 (488-748; mean, 656 individuals/m^2). It the polychaete Spiophanes bombyx were excluded, the density of macrofauna would still be higher in station group I_5 (mean, 744 individuals/m^2) than station group F_5 (mean, 656 individuals/m^2). The biomass values were slightly higher in station group I_5 (range 1.37-2.53; mean, 2.14 g ash-free dry weight/m^2) than station group F_5 (range 0.99-2.28; mean, 1.42 g ash-free dry weight/m^2).

303. The diversity (H') values were the same in station group I_5 (mean, 3.95) as station group F_5 (mean, 3.85). Evenness (J') values were also the same in both station groups. The species richness (SR) values were slightly higher in station group I_5 (range 6.79-8.31; mean, 7.40) when compared to station group F_5 (range 5.99-7.15; mean, 6.59).

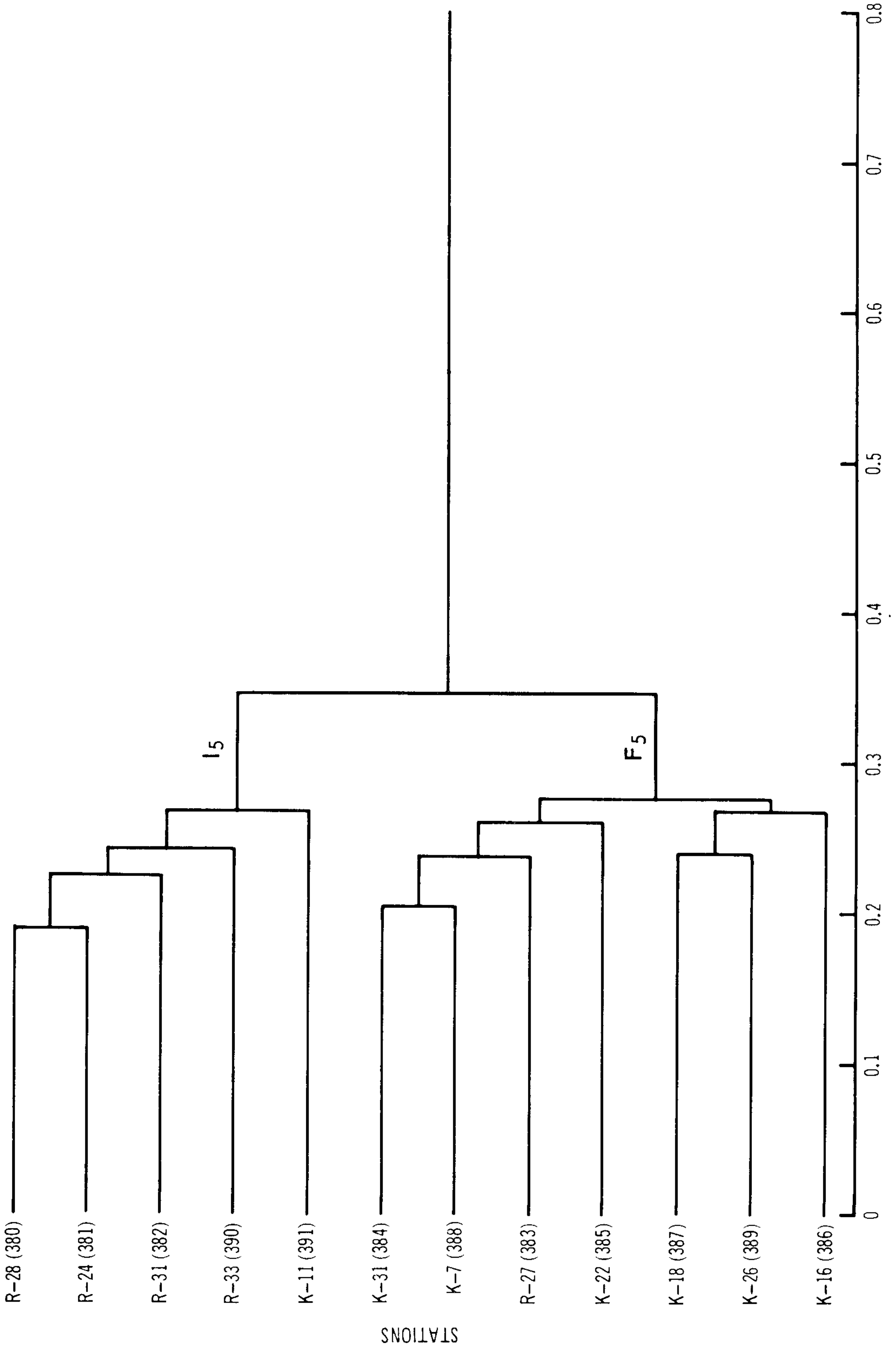


Figure C45. Dendrogram of Dissimilarity Between Stations-Experimental Site G (C7606B)

Table C39

Dominant Species (BI) Near Experimental Site G June 1976.

Species Code	Species	STATION GROUPS I_5	F_5
344	Spiophanes bombyx	10.00	9.00
279	Magelona sacculata	6.50	7.79
140	Paraphoxus obtusidens major	6.30	9.85
261	Haploscoloplos elongatus	5.70	5.64
237	Chaetozone setosa	5.50	5.42
96	Hemilamprops californiensis	4.60	0.80
158	Photis lacia	3.80	-
110	Archeomysis grebnitzkii	3.40	2.07
155	Eohaustorius sencillus	2.30	3.14
95	Mesolamprops sp. #1	2.00	4.50
345	Spiophanes berkeleyorum	1.20	0.29
310	Northria iridescens	0.80	-
121	Ampelisca macrocephala	0.80	0.14
302	Nephtys caecoides	0.60	-
127	Monoculodes spinipes	0.20	1.71
425	Amphiodia periercta-urtica	-	1.85
341	Scoloplos armiger	-	1.21
9	Olivella pycna	-	0.50
298	Notomastus lineatus	-	0.36
303	Nephtys californiensis	-	0.28
7	Olivella baetica	-	0.28

Megafaunal Survey

304. The 67 metered beam trawls were separated into four site groups using group-average sorting of Bray-Curtis dissimilarity between all possible pairs of stations (Figure C46). One sample was not included in any site group. Twenty-three species were separated into five species groups by group-average sorting of Bray-Curtis dissimilarity values between all species pairs (Figure C47). Seven species were not included in any species group.

305. Site group A included 35 samples that were obtained from inshore locations on all cruises. The samples were dominated by the decapods *Crangon alaskensis elongata* (BI = 3.11, 5 maximum value), *Crangon stylirostris* (2.94), *Crangon franciscorum* (2.57), *Cancer magister* (2.34), and the mysid *Neomysis kadiakensis* (1.69). Site group B included four samples obtained near experimental site G during October 1975 and December 1974. All samples had low abundance of individuals and few species. The dominant species was the decapoda *Crangon stylirostris*. Site group C included 19 samples that were located at intermediate depths (35-73 m) in the southern portion of the study area. The dominant species was the decapoda *Crangon alaskensis elongata* (BI = 5.00). The decapods *Pagurus ochotensis* (1.37), *Nectocrangon alaskensis* (1.31), the mysid *Neomysis kadiakensis* (1.26), and the ophiuroid *Ophiura lutkeni* (1.10) were common. Site group D consisted of eight samples, six of which came from the same location (~46° 9'N, 124° 13'W) in 80-90 m of water and two samples in 57 m of water north of that site. Dominant species included the ophiuroid *Ophiura lutkeni* (BI = 3.75), the decapods *Pandalus jordani* (2.87), *Crangon alaskensis elongata* (2.37), *Crangon communis* (1.62), followed by the ophiuroid *Ophiura sarsii* (1.25), the mysid *Neomysis kadiakensis*, and the decapods *Spirotocaris avina* (0.63), and *Thysanoessa spinifera* (0.63).

306. The 30 species were divided into 5 species groups (Table C40). Species group 1 consisted of nine species that were found at site group D and the deeper locations in site group C. The depth range for most of

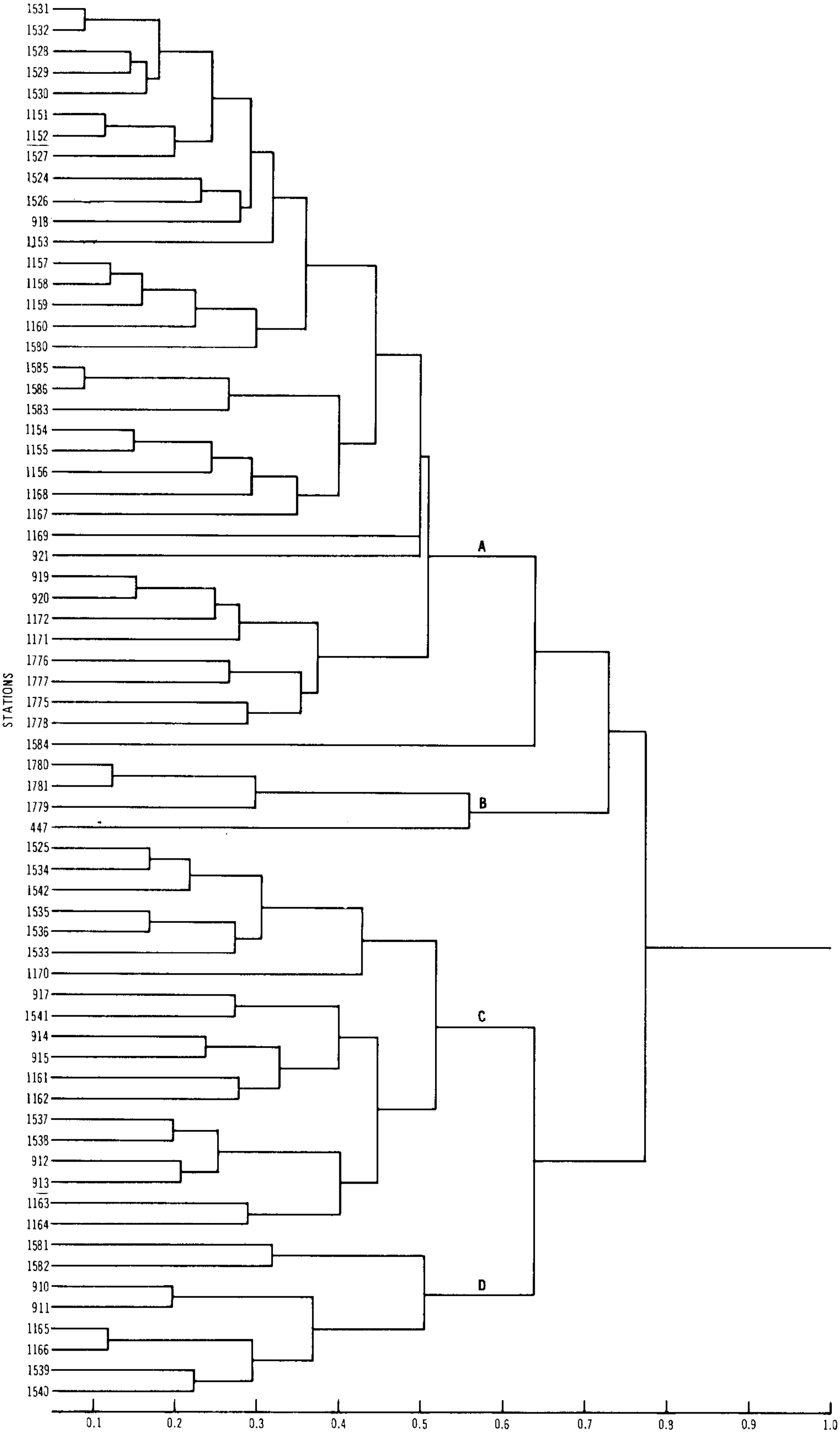


Figure C46. Dendrogram of Dissimilarity Between Megafaunal Stations. C46

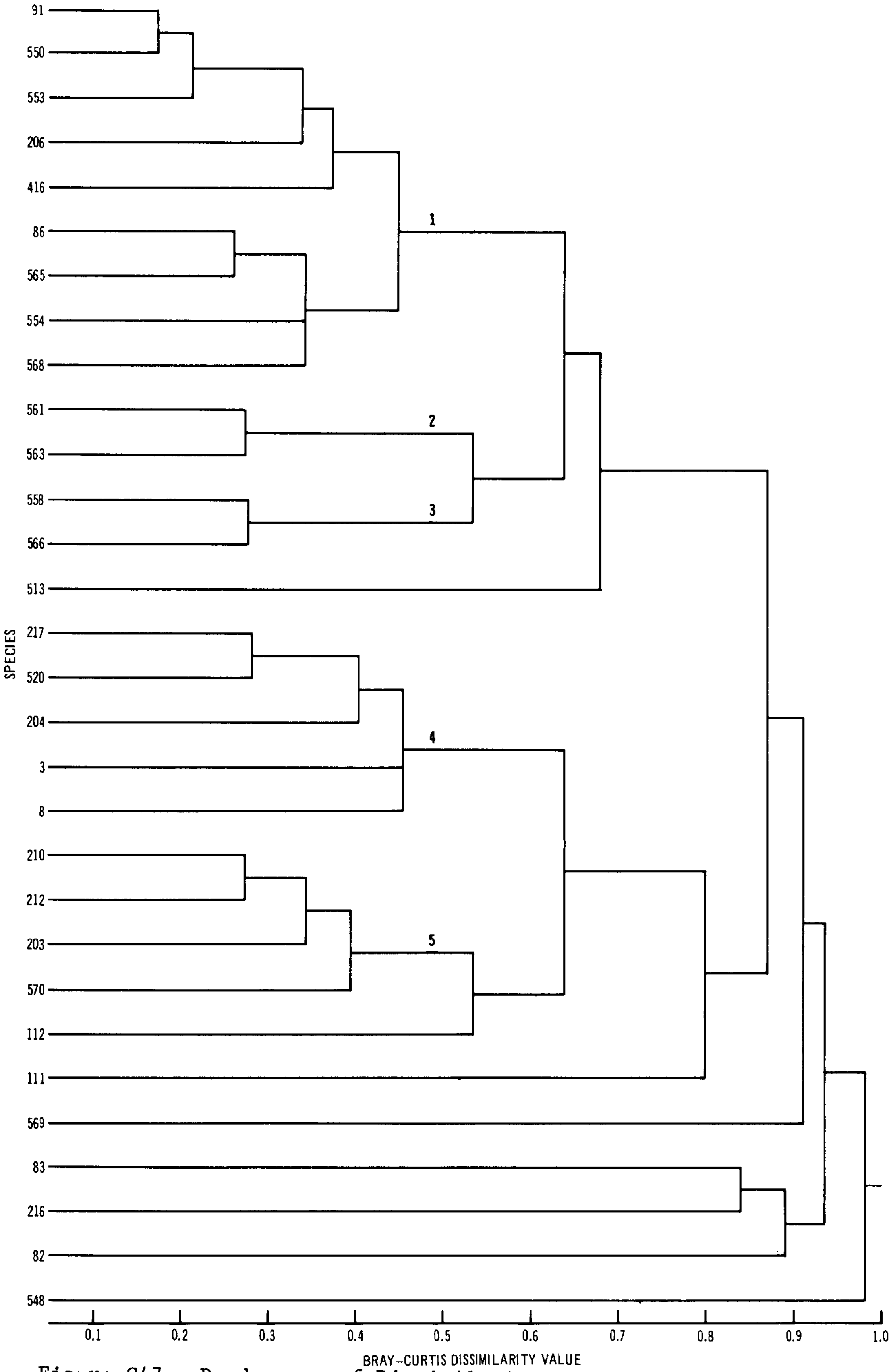


Figure C47. Dendrogram of Dissimilarity Between Megafaunal Species

Table C40

Megabenthic Species Groups.

Species Group 1

91	*Ophiura sarsi*
550	*Crangon communis*
553	*Crangon* sp. #1
206	*Spirotocaris gracilis*
416	*Armina californica*
86	*Ophiura lutkeni*
565	*Spirontocaris lamellicornis*
554	*Nectocrangon alaskensis*
568	*Thysanoessa spinifera*

Species Group 2

561	*Spirotocaris avina*
563	*Spirotocaris bispinosa*

Species Group 3

558	*Pandalus jordani*
566	*Spirontocaris pusiola*

Species Group 4

217	*Cancer magister*
520	*Crangon franciscorum*
204	*Crangon stylirostris*
3	*Nassarius fossatus*
8	*Olivella biplicata*

Species Group 5

210	*Pagurus ochotensis*
212	*Pagurus quayleyi*
203	*Crangon alaskensis elongatus*
570	*Luidia foliolata*
112	*Neomysis kadiakensis*

Species not grouped

513	*Pagurus caurinus*
111	*Neomysis franciscorum*
569	*Euphausia pacifica*
83	*Amphiodia periercta*
216	*Cancer gracilis*
82	*Dendraster excentricus*
548	*Cancer oregonensis*

the individuals of this species group was 57-86 m. Species group 2 consisted of two species of *Spirotocaris* that were restricted to one location (49° 9'N, 124° 13'W) in 80-86 m of water. Most of the individuals of these two species were found in April 1975. Species group 3 consisted of two species restricted to site group D (57-86 m). The two species were most abundant in April 1975 and September 1975, and few individuals were found in June 1975. Species group 4 consisted of three species of *Crangon* and two gastropods that were most abundant in site group A, the shallowest site group. Species group 5 consisted of 5 species that were found in most samples. The frequency of occurrence ranged from 49-87 percent.

PART V: DISCUSSION

Baseline Studies

307. Five benthic assemblages and 12 station groups were found off the mouth of the Columbia River in December 1974-January 1975. Except for assemblage C (the southern inshore assemblage), there was little in common between assemblages found in this area and benthic assemblages reported from other parts of the Oregon-Washington continental shelf by Carey (1965, 1972), Bertrand (1971), Lie (1969), Lie and Kisker (1970), and Lie and Kelley (1970). The range of values of community structure parameters, such as diversity, density, and biomass, was greater in the study region than the range of values reported from the entire Oregon-Washington continental shelf. The influence of the Columbia River, primarily sediment deposition, probably accounts for the difference between benthic assemblages in the study site and the rest of the Oregon-Washington coast.

308. Seasonal variations of benthic community structure and species composition were considerable, especially at inshore locations exposed to sediment movement due to winter storms and at locations affected by sedimentation from the Columbia River. The fluctuations of benthic communities, although related to seasonal environmental changes, were not completely yearly in periodicity. Comparison of benthic assemblages in January 1975 and January 1976 showed considerable yearly differences. The results from control locations sampled for experimental site G in April and June 1976, compared to April and June 1975, support this conclusion. Yearly variations in benthic communities are probably related to yearly fluctuations in the intensity of winter storms and in the output of water from the Columbia River. The instability of populations of several species, such as *Diastylopsis dawsoni*, *Atylus tridens*, *Spio filicornis*, *Spiophanes bombyx*, and *Siliqua patula*, also contributes to yearly variations in community structure.

309. The structure and distribution of benthic assemblages were

related to depth. Depth is probably a composite of several environmental factors, including a reduced intensity of winter storms with depth, increased organic content of sediment with depth, and an increase in finer grained sediment with depth. Superimposed on the depth gradient was the influence of the Columbia River. Fine-grained sediment ($\cong 4.5\ \phi$) was deposited near disposal site B during high river flow in spring. The substrate near disposal site B therefore changed from sand during the winter months to silt after the spring deposition. The fine grained sediment was resuspended during winter storms and was transported in a northwesterly direction by bottom currents. Benthic communities located in this northwesterly direction experience increased amounts of silts and clays from the winter pulses of fine-grained material. All locations in the study site region were influenced by the Columbia River, directly by sedimentation and organic enrichment, or indirectly by increased primary productivity due to localized Columbia River induced upwelling (Anderson, 1972).

310. Most stations located directly off the mouth of the Columbia River (15-47 m water depth) were exposed to considerable seasonal changes in sediment type due to deposition of silt from the Columbia River. Benthic assemblages in this area had considerable seasonal changes and spatial differences in species composition and values of community structure parameters. In winter most stations (R-13, R-14, R-15, R-25, and R-26) in this area had a sandy substrate. Benthic assemblages had moderate diversity values and low density and biomass values. Inshore, these assemblages were dominated by the gastropoda *Olivella biplicata* and the polychaete *Magelona sacculata*; offshore, by the holothuroid *Paracaudina chilensis*, the polychaetes *Haploscoloplos elongatus*, *Heteromastus filobranchus*, and *Chaetozone setosa*, and the bivalve *Axinopsida serricata*. After deposition of fine-grained sediment with presumably high organic content, the assemblages had much higher density and biomass values and lower diversity values. The dominant species after deposition were the cumacean *Diastylopsis dawsoni*, the bivalve *Siliqua patula*, and sometimes the polychaete *Spio filicornis* and the amphipoda *Atylus tridens*.

311. Stations located in the northern part of disposal site B (25-40 m depth) had sediments with high percentages of silt and clay during all sampling periods. The spring deposition increased the percentage of silt, but winter storms and currents did not transport all of the fine-grained material out of this region. Sediments in this region often had horizontal layers of silty and sandy sediments. Benthic assemblages in this region (R-16, R-17, and R-22) had the lowest diversity values and the highest density and biomass values of any assemblage in the study area. The cumacean *Diastylopsis dawsoni* was always a dominant species.

312. The sediments at areas located north of disposal site B (25-70 m depth) had a higher percentage of silt and clay than sediments at the same depth south of the Columbia River. The fine grained sediment was transported north-northwesterly from near disposal site B by winter storms and bottom currents. The diversity of benthic assemblages increased northward and with increased depth. The biomass and density of macrofauna decreased northward and increased with increased depth. The mean Bray-Curtis and Czekanowski dissimilarity values between seasons (R-6, R-23, and one station R-7 that was not included in the results) were low, indicating little change in the abundance of most dominant macrofaunal species and species composition with season. The density and biomass of macrofauna was higher north of the Columbia River than south of the Columbia River at similar depths.

313. The sediment at stations located inshore and south of the Columbia River (R-1, R-2, R-3, R-10, R-18, R-19, and R-24) was a well-sorted sand and did not vary with season. The mean Bray-Curtis and Czekanowski dissimilarity values between seasons were low, indicating little change in species composition with season. The most apparent seasonal change in this benthic assemblage was the introduction of the large numbers of juvenile *Spiophanes bombyx* into the population in June and September 1975 (Figure C48). The increase in dominance of *Spiophanes bombyx* beginning in June 1975 decreased diversity and increased density at all stations (Figure C49). Station 24 was the only station occupied on all cruises. The abundance of *Spiophanes bombyx* did not decrease

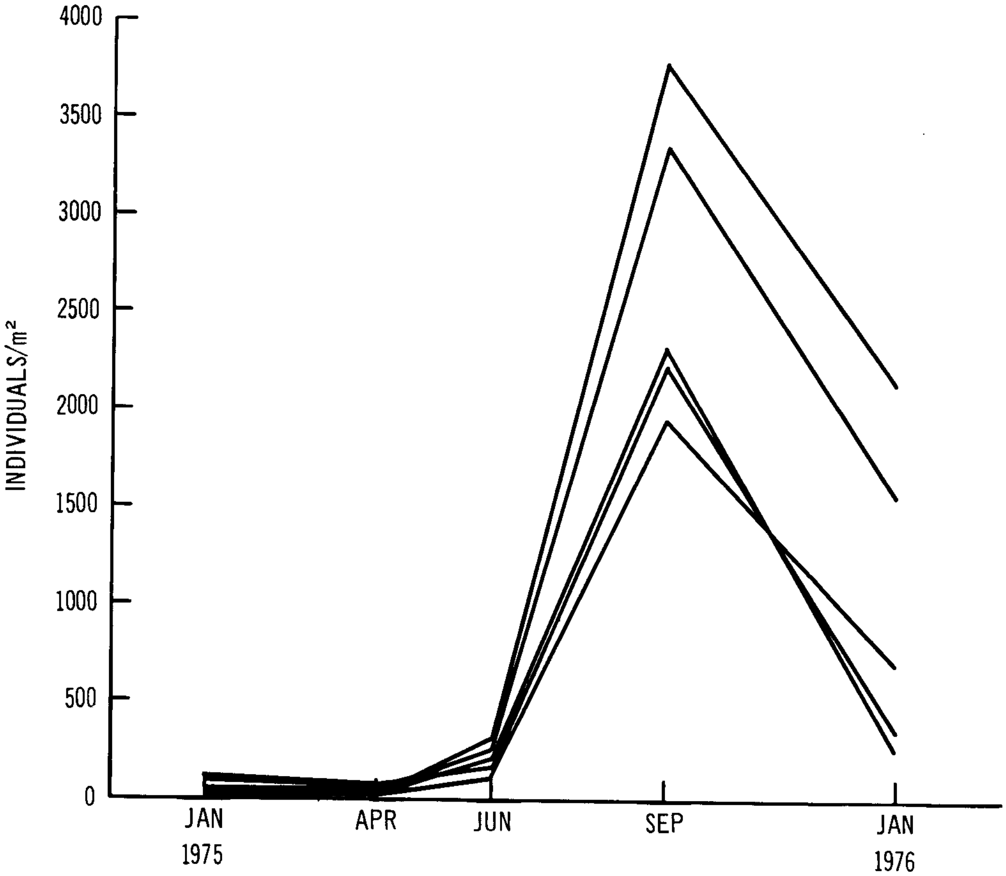


Figure C48. Seasonal Abundance of Spiophanes bombyx in Assemblage C

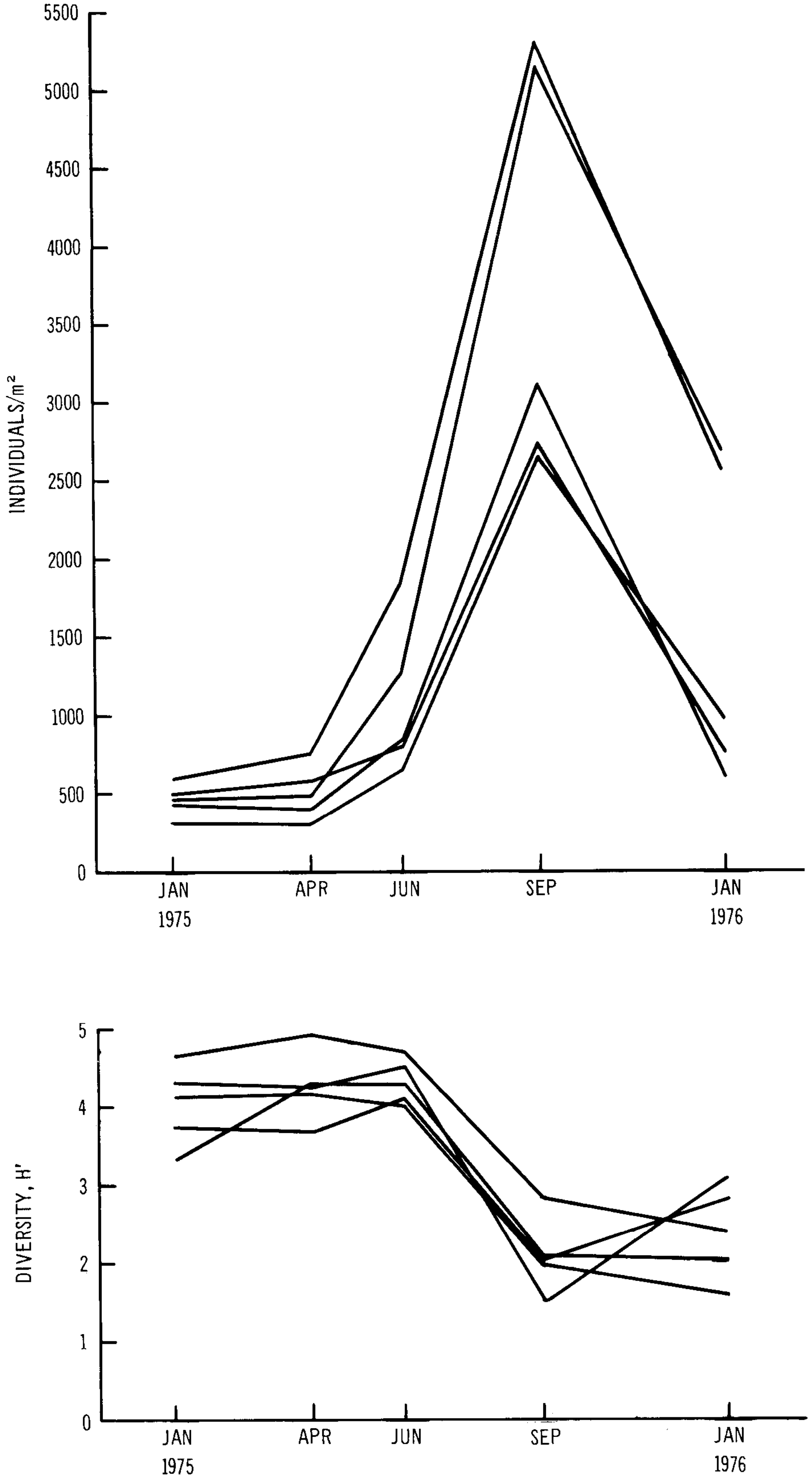


Figure C49. Seasonal Changes of Values of Community Structure Parameters in Assemblage G greatly at this station between January 1976 and June 1976. Results from three other control stations confirm the continued high abundance of *Spiophanes bombyx* in this area. Station R-20 on the Columbia River delta and station R-23 north of the Columbia River also had an increase in the abundance of *Spiophanes bombyx* in June 1975 and September 1975.

314. The sediment at stations located near the mouth of the Columbia River (10-25 m depth) was sand, which varied little with season. The mean Bray-Curtis and Czekanowski dissimilarity were high(R-11, R-12, and R-21), indicating change in the abundance of dominant macrofauna and species composition with season. Diversity and species richness values and density were lower than for stations located on a sandy substrate at the same depths south of the Columbia River. Seasonal changes in species composition were also greater than at the southern stations. Dominant species at the deeper stations were the polychaete *Magelona sacculata* and the gastropoda *Olivella biplicata* in the winter; and inshore, the amphipods *Hippomedon denticulatus*, *Mandibulophoxus uncirostratus*, and *Monoculodes spinipes*, and the polychaete *Spio filicornis*. The most apparent seasonal change was an increase in the abundnace of *Spio filicornis* in June 1975 and September 1975. *Spio filicornis* also increased in abundance at stations R-13 and R-25, which were near the mouth of the Columbia River.

315. Seasonal results for the benthic assemblage located farthest offshore (80-100 m depth, silty sand subtrate) were not presented in this report but were included in the discussion in order to relate depth to the structure of benthic assemblages off the mouth of the Columbia River. Station group A had the highest values of diversity and species richness in the areal baseline. The biomass and density of macrofauna, except in this study, were higher than any assemblage reported for the Oregon-Washington coast. The seasonal variation in sediment, species composition and community structure was minimal. This seasonal stability, high diversity, density, and biomass is probably related to three factors. First, the impact of winter storms is decreased with depth resulting in increased sediment stability. Second, several species of

tube dwelling polychaetes including Maldane sarsi, Spiochaetopterus costarum, and Myriochele oculata also increase sediment stability. Third, the sediments have high organic content (Gross et al., 1972) probably resulting from the Columbia River sediment deposition and the high primary productivity of this area.

Experimental Site G

Effects of dredge material disposal on benthic communities

316. The samples obtained from Experimental site G were clustered using intrinsic attributes (species abundance values). The intrinsic and magnitude of dredged material deposition. Three types of data are available to describe the extent and magnitude of dredged material disposal: first, U.S. Army Corps of Engineers records on the disposal operations; second, observations of predisposal and postdisposal bathymetry; and third, textural analysis of predisposal and postdisposal sediments.

317. The hopper dredges HARDING and BIDDLE deposited sediments dredged from the mouth of the Columbia River an average distance of 213 m from the experimental site marker buoy (Charles Galloway, Army Engineers, Portland District, personal communication, in Sternberg et al., 1977). Approximately 80 percent of the sediments were deposited on the south and southwest side of the marker buoy, and 20 percent of the sediment was deposited on the northern side of the buoy.

318. According to bathymetric records (Sternberg et al., 1977), the greatest accumulation of dredged material was on the south and southwest side of the experimental site marker buoy. A relatively flat deposit with a radius of about 228 m was found around the buoy with the base of the steeper depositional slope found up to 456 m from the buoy. Comparing Figure A123 in Sternberg et al. (1977) and Figure C24 in this study, stations R-27, K-14, K-16, and K-18 were located on the flat top of the dredged material deposit; stations K-7, K-9, K-22, and K-31 were located

on the slope of the dredged material deposit; and stations R-32, K-11, and K-26 were located near the base of the slope. The following stations were outside the area of deposition: R-24, R-28, R-29, R-31, K-5, K-20, K-27, K-28, K-36, and K-40. The remaining stations (R-19, R-33, K-1, K-34, and K-38) were at the edge of the depositional area. The stations located on the flat top of the deposit received direct deposition of dredged material which accumulated to a maximum depth of 1.5 m. Benthic assemblages at those stations probably were exposed to immediate burial by the dredged material. Benthic assemblages found along the slope of the dredged material deposit may have been exposed to immediate burial by dredged material or covered by the dredged material that was moved by currents generated by the fall and impact of disposed sediment (Sternberg et al., 1977). The depth of disposal material on the slope of the flat top dredged deposit was 0.3-0.6 m. The benthic assemblages located near the base of the slope were probably not exposed to direct burial, but to a layer of dredged material less than 0.3-m deep that was moved into this area by natural currents and currents created by the disposal operation (Sternberg et al., 1977). Benthic assemblages outside the disposal area were probably not directly affected by the disposal operation.

319. Predisposal sediments near experimental site G were characterized by high factor loadings on the 2.75 ø and 3.25 ø grain size fractions (Sternberg et al., 1977). The sediments were well-sorted sand with a median phi-size of 2.75-3.10 ø. The dredged sediment from the mouth of the Columbia River was also sand but had high factor loadings on the 2.00 and 2.50 ø grain size fractions.

320. Postdisposal sediments collected from experimental site G in September 1975 were characterized by high factor loadings on the 2.00 and 2.50 ø phi sizes. Sediments at stations K-11, K-14, K-16, K-26, K-31, K-34, and R-37 had high factor loadings on the 2.00 ø size fraction. Sediments at stations K-7, K-9, K-18, K-22, K-38, and R-32 had high factor loadings on the 2.50 ø size fraction. Sediments at stations K-20, K-27, K-40, R-24, R-28, R-29, and R-31 were characterized by high factor loadings on the 2.75 ø and 3.25 ø size class and were probably not affected by dredged disposal. Stations K-5 and R-33 had high factor loading on the 2.75 ø size fraction.

321. In summary, it appears that all but stations K-20, K-27, K-40, R-24, R-28, R-29, and R-31 were affected by dredged material. Stations R-27, K-7, K-9, K-14, K-16, K-18, K-22, and K-31 were located in the area of greatest deposition. Benthic assemblages located in this area were probably exposed to rapid burial.

322. The samples obtained on the September 1975 cruise were therefore separated into three groups extrinsically and compared to the intrinsically derived clusters. The stations that were exposed to direct burial by dredged material were intrinsically clustered together in station groups F_1 and G_1. The remaining stations that were not affected by dredged and material and those affected by dredged material but not direct burial were intrinsically clustered together in station group H_1. Two stations did not correspond to this pattern. Station K-7, which was affected by direct burial, was part of station H_1, and Station K-38 clustered with station group G_1.

323. In order to estimate the effects of dredged material disposal on benthic community structure at site G, the values of community structure parameters among the three groups of extrinsically derived stations were analyzed with the Kruskal-Wallis H-test (Table C41). All community structure parameter values had significant differences among the three station groups. A multi-comparison based on Kruskal-Wallis rank sums using Dunn's (1964) large-sample approximation for unequal sample sizes with a 0.10 experiment-wise error rate was used to determine the station groups that had significant differences in community structure values. The stations exposed to direct burial had a significantly higher diversity (H') and evenness (J') values and significantly lower density of macrofauna, when compared to the less affected station groups. The biomass and the species richness (SR) values were significantly higher at the stations exposed to direct burial when compared to the unaffected stations. No significant difference was found between the unaffected and intermediate stations.

324. In October 1975, 13 benthic stations were resampled. The sediments at stations unaffected by dredged material in September (R-24, R-28, R-29, and R-31) still had high factor loadings on the 2.75 ϕ and

Table C41

Comparison of Values of Community Structure Parameters Between the Three Extrinsically Derived Station Groups Using a Kruskal-Wallis H-Test, Experimental Site G (September 1975).

	Station groups (mean value)			
Parameter	Unaffected	Intermediate	Direct Burial	P
H' (diversity)	1.67	1.86	3.15	<0.005
J' (evenness)	0.30	0.34	0.58	<0.005
SR (species richness)	6.05	6.32	6.74	<0.005
$\overline{N}/m^2$ (density)	3948	2997	1300	<0.001
$\overline{B}/m^2$ (biomass)	2.02	2.59	3.23	<0.025

3.25 ø sediment size classes. The sediments at stations exposed to direct burial (R-27, K-7, K-16, K-18, K-22, and K-31) still had high factor loadings on the 2.00 ø and 2.50 ø sediment size class. Compared to September 1975, there was a reduction of the factor loadings on the 2.00 ø sediment size class at some stations and an increase in the factor loadings on the 2.75 ø sediment size class. The intermediate stations (R-33, K-11, and K-26) had the highest factor loadings on the 2.75 ø sediment size class with a decrease in the factor loadings on the 3.25 ø sediment size class when compared to September 1975.

325. The three station groups defined by sediment characteristics correspond with the intrinsically derived station groups except for Station K-7. The four stations unaffected by dredged disposal clustered together in station group I_2. The three stations that were intermediate together with station K-7 formed station group G_2, and the stations that were exposed to direct burial formed station group F_2.

326. The same techniques (Kruskal-Wallis H-test with multiple comparison) that were used for the September experimental site data were used to estimate the effects of dredged material disposal on benthic community structures. All community structure parameter values had significant differences between station groups, except for species richness (SR) values. The stations exposed to direct burial had significantly higher diversity (H') and evenness (J') values when compared to unaffected stations. The density and biomass of macrofauna was significantly lower at stations exposed to direct burial when compared to unaffected stations. The difference between intermediate stations and those exposed to direct burial or to the unaffected stations with respect to diversity (H') and evenness (J') values and density of macrofauna could not be tested because the station groups did not contain an adequate number of samples. There was no overlap in the range of values of these parameters or rank values of these parameters between the three station groups.

327. In January 1975, 12 benthic stations were resampled. The sediments at stations unaffected by dredged material in September (R-24, R-28, and R-31) still had high factor loadings on the 2.75 ø and 3.25 ø sediment size classes. The stations exposed to direct burial (K-7, K-18, K-22, and K-31) all had high factor loading on the 2.50 ø and 2.75 ø

Table C42

Comparison of Values of Community Structure Parameters Between the Three Extrinsically Derived Station Groups Using a Kruskal-Wallis H-Test, Experimental Site G (October 1975).

	Station groups (mean value)			
Parameter	Unaffected	Intermediate	Direct Burial	P
H' (diversity)	1.45	2.15	3.19	<0.01
J' (evenness)	0.30	0.43	0.68	<0.01
SR (species richness)	5.15	4.87	4.70	N.S.
$\bar{N}/m^2$ (density)	3130	1334	438	<0.01
$\bar{B}/m^2$ (biomass)	2.21	1.81	1.15	<0.025

Table C43

Comparison of Values of Community Structure Parameters Between the Two Extrinsically Derived Station Groups Using a Mann-Whitney U-Test, Experimental Site G (January, 1976).

	Station Groups (mean Value)		
Parameter	Unaffected	Affected	P
H' (diversity)	2.44	3.26	<0.10
J' (evenness)	0.49	0.73	<0.01
SR (species richness)	5.09	4.44	N.S.
$\bar{N}/m^2$ (density)	1098	236	<0.01
$\bar{B}/m^2$ (biomass)	1.42	1.66	N.S.

sediment size classes with moderate factor loadings on the 2.00 ø sediment size class and no factor loadings on the 3.25 ø sediment size class. The intermediate stations (K-11 and K-26) had high factor loadings on the 2.75 ø size class as in October 1975. Station R-19 and R-33 had high factor loadings on the 2.75 ø and 3.25 ø sediment size class. Both stations had been intermediate stations as defined by sediment characteristics but were now considered to be unaffected stations because sediment characteristics had returned to that of the ambient substrate.

328. The three station groups defined by sediment characteristics corresponded with intrinsically derived station groups except for station R-33. Four of the five stations unaffected by dredged material disposal clustered together in station group I_3. The four stations exposed to direct burial clustered together in station group F_3. The two intermediate stations plus R-33 clustered together to form station group G_3.

329. The sediment characteristics of the stations exposed to direct burial by dredged material and the intermediate stations had nearly identical sediment characteristics in January 1975. Therefore, the differences in community structure value between these groups of stations and the unaffected stations was compared with the use of the Mann-Whitney U-test (Table C43). The diversity (H') and evenness (J') values were significantly higher at the stations affected by dredged material disposal and the density of macrofauna was significantly higher at the unaffected stations. No significant difference was found in the species richness (SR) values or the biomass of macrofauna.

330. In April 1976, 12 benthic stations were resampled. The sediments at stations unaffected by dredged material in January 1976 (R-24, R-28, R-31, and R-33) still had high factor loadings on the 2.75 ø and 3.25 ø sediment size classes. The sediment at stations exposed to direct burial by dredged material (R-27, K-7, K-16, K-18, K-22, and K-31) all had high factor loadings on the 2.50 ø sediment size class and all but R-27 had a high factor loading on the 2.75 ø sediment size class. All the sediments at those stations had moderate factor loadings on the 2.00 ø sediment size class and no factor loading on the 3.25 ø sediment size class. The sediments at the intermediate stations had high factor load-

ings on the 2.75 ø sediment size class and moderate to low factor loading on all other sediment size classes.

331. The two station groups defined by sediment characteristics corresponded to the intrinsically derived station groups. Stations unaffected by dredged material disposal were station group I_4. Stations that were exposed to direct dredged material disposal or that were affected by dredged disposal formed station group F_4.

332. The differences in community structure values between those stations affected by dredged material and those unaffected were compared with the Mann-Whitney U-test (Table C44). Diversity (H') and evenness (J') values were significantly higher at the stations affected by dredged material disposal ($p < 0.01$). The species richness (SR) values and density of macrofauna were significantly higher at the unaffected stations ($p < 0.01$). The biomass values were somewhat higher at the unaffected stations ($p < 0.20$).

333. In June 1976, the same 12 stations as in April 1976 were sampled. The sediments at stations unaffected by dredged material in January 1976 (R-24, R-28, R-31, and R-33) still had high factor loadings on the 2.75 ø and 3.25 ø sediment size classes. The sediments at stations that were exposed to direct burial by dredged material (R-27, K-7, K-16, K-18, K-22, and K-31) had high factor loadings on the 2.50 ø and 2.75 ø sediment size classes, moderate factor loadings on the 2.00 ø sediment size class, and no factor loadings on the 3.25 ø sediment size class. The sediments at intermediate stations (K-11 and K-26) had high factor loadings on the 2.75 ø sediment size class and moderate factor loadings on the 2.00 ø and 2.50 ø sediment size class.

334. The two station groups defined by sediment characteristics corresponded with the intrinsically derived station groups except for station K-11. Stations unaffected by dredged material disposal plus intermediate station K-11 were clustered in station group I_5. The remaining stations that were affected by dredged material disposal clustered into station group F_5.

335. The difference in community structure values between those stations affected by dredged disposal and those unaffected were compared

Table C44

Comparison of Values of Community Structure Parameters Between the Two Extrinsically Derived Station Groups Using a Mann-Whitney U-test, Experimental Site G (April, 1976).

	Station groups (mean value)		
Parameter	Unaffected	Affected	P
H' (diversity)	2.96	3.99	<0.01
J' (evenness)	0.55	0.84	<0.01
SR (species richness)	6.65	5.45	<0.01
$\overline{N}/m^2$ (density)	1349	248	<0.01
$\overline{B}/m^2$ (biomass)	1.66	1.23	<0.20

Table C45

Comparison of Values of Community Structure Parameters Between the Two Extrinsically Derived Station Groups Using a Mann-Whitney U-test, Experimental Site G (June, 1976).

	Station groups (mean value)		
Parameter	Unaffected	Affected	P
H' (diversity)	3.95	3.85	N.S.
J' (evenness)	0.70	0.72	N.S.
SR (species richness)	7.49	6.64	<0.20
$\overline{N}/m^2$ (density)	1220	730	<0.01
$\overline{B}/m^2$ (biomass)	2.06	1.53	<0.10

with the Mann-Whitney U-test (Table C45). The density and biomass of macrofauna were significantly higher at the unaffected stations ($p < 0.01$). The species richness (SR) values were somewhat higher at the unaffected stations ($p < 0.20$). There was no significant difference between values of diversity (H') and evenness (J') at the two sets of stations.

Effects of dredged material disposal on dominant species

336. The effects of dredged material disposal on the abundance of the 33 most dominant species at or near experimental site G was estimated by the Friedman's two-way rank test (Tate and Clelland, 1957). Seasonal changes in abundance were also estimated by Friedman's two-way rank test. A total of ten stations (R-24, R-27, R-28, R-31, R-33, K-7, K-16, K-18, K-22, and K-31) and four sampling periods (September 1975, October 1975, April 1976, and June 1976) were included in the analyses. The remaining stations and sampling periods were not fully sampled, and therefore, could not be included.

337. There were significant seasonal differences in the abundance of 14 species ($p < 0.01$) and significant differences in abundance between stations for 12 species ($p < 0.01$). Table C46 is a summary of the results of the Friedman two-way rank test. A distribution-free multiple comparison test based on Friedman's rank sums for species abundances was used to determine which seasons and what stations were significantly different ($p < 0.06$) (Hollander and Wolfe, 1973).

338. Of the 12 species that had significant differences in abundance values between stations, 10 species had consistently (no overlap) higher abundances (mean rank/station) at the unaffected stations, when compared to stations that were affected by dredged material disposal. In all cases where the difference in abundances (rank sums) were significant (multiple comparison test), the station with the higher abundance value was an unaffected station and the station with the lower abundance value was an affected station. The species that had significantly higher abundances at control stations included the polychaetes *Spiophanes bombyx*, *Nephtys caecoides*, *Glycinde* sp #2, *Scoloplos armiger*, and *Northria iridescens*, and the amphipods *Eohaustorius sencillus*, *Ampelisca macrocephala*, *Paraphoxus vigitegus*, *Photis lacia*, and *Paraphoxus epistomius*. The ophiuroid

Table C46

A Summary of Significant Seasonal or Station Differences in Abundance of 33 Species In or Near Experimental Site G, Based on Friedman's Two-way Rank Test.

Species Code	Species	Seasons	Stations
7	*Olivella baetica*	p<.01	N.S.
344	*Spiophanes bombyx*	p<.01	p<.01
140	*Paraphoxus obtusidens major*	p<.01	N.S.
279	*Magelona sacculata*	p<.01	N.S.
155	*Eohaustorius sencillus*	p<.05	p<.01
302	*Nephtys caecoides*	p<.10	p<.01
261	*Haploscoloplos elongatus*	p<.01	N.S.
237	*Chaetozone setosa*	N.S.	p<.05
425	*Amphiodia periercta-urtica*	N.S.	p<.01
97	*Diastylopsis dawsoni*	p<.01	N.S.
121	*Ampelisca macrocephala*	p<.01	p<.01
9	*Olivella pycna*	N.S.	P<.01
110	*Archeomysis grebnitzkii*	p<.01	N.S.
471	Nemertea #7	N.S.	N.S.
96	*Hemilamprops californiensis*	p<.01	N.S.
343	*Spio filicornis*	p<.10	p<.10
95	*Mesolamprops* sp. #1	p<.01	N.S.
141	*Paraphoxus vigitegus*	N.S.	p<.01
127	*Monoculodes spinipes*	p<.01	p<.05
256	*Glycinde* sp #2	N.S.	p<.01
29	*Macoma modesta alaskana*	p<.01	N.S.
303	*Nephtys californiensis*	N.S.	p<.05
341	*Scoloplos armiger*	p<.10	p<.01
104	*Colurostylis occidentalis*	p<.01	N.S.
8	*Olivella biplicata*	N.S.	N.S.
354	*Thalenessa spinosa*	N.S.	N.S.
310	*Northria iridescens*	p<.05	p<.01
158	*Photis lacia*	p<.10	p<.01
137	*Paraphoxus epistomus*	N.S.	p<.01
27	*Siliqua patula*	N.S.	p<.10
460	Nemertea sp #5	p<.01	p<.10

Amphiodia periercta-urtica was also more abundant at control stations and station K-7. The gastropoda Olivella pycna was most abundant at stations that were affected by dredged material disposal, except for station K-31. Eighteen of the remaining 19 species had approximately the same rank abundance at control and affected stations or had higher rank abundances at the control stations. The polychaete Spio filicornis had lower rank abundance at the control stations.

339. Significant differences in rank seasonal abundance were found in 14 species. The polychaete Haploscoloplos elongatus, the amphipods Ampelisca macrocephala and Monoculodes spinipes, the cumacean Mesolamprops sp #1 and Hemilamprops californiensis, and Nemertea sp #5 all had lower rank abundance in October 1975 and April 1976. The cumacean Colurostylis occidentalis and the amphipoda Paraphoxus obtusidens major had lower rank abundance in October 1975. The highest rank abundance of the gastropoda Olivella baetica and the polychaetes Spiophanes bombyx and Magelona sacculata was in September and October 1975, while the cumacean Diastylopsis dawsoni and the bivalve Macoma modesta alaskana were most abundant only in September 1975. The mysid Archeomysis grebnitzkii was most abundant in June 1976. No relationship between seasonal abundance and differences in abundance between stations was evident.

Transportation of macrofauna to experimental site G via dredged material disposal.

340. There is very little evidence that transportation of species to the experimental disposal site via disposal activities was an important mechanism for the change in abundance of dominant species at experimental site G. The dominant species found at the area to be dredged are shown in Table C47. Diastylopsis dawsoni, Crangon stylirostris, Eohaustorius sencillus, Monoculodes spinipes, Nemertea sp #5, and Nephtys californiensis were found at most inshore sand stations in both the areal and seasonal baseline. There was no increase in abundance of these species at stations affected by dredged material disposal compared to control stations.

341. *Paraphoxus milleri*, *Eohaustorius washingtonianus*, and *Anisogammarus confervicolus* were restricted to the mouth of the Columbia River and to areas near the mouth of the Columbia River both in the areal and seasonal baseline. Only a single specimen of *Paraphoxus milleri* was found (Station K-31) at any of the affected or control stations in the disposal experiment. No specimens of *Eohaustorius washingtonianus* or *Anisogammarus confervicolus* were found at the affected or control stations.

342. *Archeomysis grebnitzkii* was also found at most inshore sand stations in both the areal and seasonal baseline with the highest abundances found in or near the mouth of the Columbia River. The abundance of *Archeomysis grebnitzkii* was higher at the stations affected by disposal in January 1976 and April 1976. The abundance values for *Archeomysis grebnitzkii* were higher at control stations in September 1975 and June 1976. The abundance values were the same in October 1975.

343. *Spio filicornis* was found at most inshore sandy stations in both the areal and seasonal baseline with the highest abundance near the mouth of the Columbia River. The abundance of *Spio filicornis* was higher at control stations September 1975 and was higher at stations that received dredged disposal material in October 1975, April 1976, and June 1976. The abundance values were the same in January 1976.

Table C47

Dominant Species Found in the Dredged Area.*

Species Code	Species	BI	f(5)	$\overline{N}/m^2$
110	*Archeomysis grebnitzkii*	9.6	5	195.6
145	*Paraphoxus milleri*	8.8	5	107.6
156	*Eohaustorius washingtonianus*	6.4	5	22.4
343	*Spio filicornis*	5.8	5	24.0
460	Nemertea sp #5	5.6	5	16.0
127	*Monoculodes spinipes*	4.9	5	12.0
155	*Eohaustorius sencillus*	3.9	5	11.2
97	*Diastylopsis dawsoni*	2.5	5	11.2
488	*Anisogammarus confervicolus*	2.0	5	6.4
204	*Crangon stylirostris*	1.9	3	3.6
303	*Nephtys californiensis*	0	4	2.0

* Includes Biological Index (BI), frequency of occurrence [f(5)] and mean number of individuals/m^2 ($\overline{N}/m^2$) for each species.

PART VI: CONCLUSIONS AND SPECULATIONS

Baseline

344. The distribution and community structure of macrobenthic assemblages along the Oregon-Washington continental shelf have been related to depth and substrate type (Carey 1965, 1972; Bertrand, 1971; Lie, 1969; Lie and Kelley, 1969; Lie and Kisker, 1970; and Kulm et al., 1975). In general, the density and biomass of macrofauna increases offshore to a maximum at the outer edge of the continental shelf. The diversity and evenness values of benthic assemblages as well as the number of species (species richness) also increases offshore. The above authors have reported three benthic assemblages, which occur in roughly parallel bands along the Oregon-Washington continental shelf, an inshore shallow-water sand assemblage (0-90 m depth), an intermediate silty-sand assemblage (50-164 m), and a deep-water mud assemblage (80 m to slope). Kulm et al. (1975) also postulated a fourth assemblage associated with relict sand patches on the outer continental shelf. Preliminary information from samples collected by the authors on the outer continental shelf, south of Astoria Canyon tend to support Kulm et al. (1975).

345. Except for assemblage C, the species composition, biomass, and density of benthic assemblages off the mouth of the Columbia River was not similar to that reported from other benthic assemblages found on the Oregon-Washington continental shelf. Assemblage C (the southern inshore sand assemblage) may correspond to the shallow water sand-bottom assemblage reported from the Washington coast (Lie, 1969; Lie and Kisker, 1970; and Lie and Kelley, 1970) and the inshore assemblage on the central Oregon coast (Carey, 1972). Of the 21 most abundant species found in the shallow water sand-bottom assemblage along the Washington coast, 11 were also abundant at assemblage C and 5 were present but rare. The remaining four species reported by Lie and Kisker (1970) may represent a difference in taxonomic opinion and may also be present in assemblage C.

346. Most of the dominant species of polychaetes and amphipods from assemblage C were abundant at shallow sandy stations off the central

Oregon coast (Carey, 1972; Barnard, 1971). The density and biomass of macrofauna were similar among assemblage C, the shallow water sand-bottom community along the Washington coast, and the inshore sand assemblage off the central Oregon coast.

347. The distribution, community structure, and seasonal constancy of benthic assemblages found off the mouth of the Columbia River were interpreted in part to be the result of the same factors that influence benthic assemblages along the Oregon-Washington coast. These factors included an increase in silt, clay, and organic content in sediments offshore and an increase in sediment stability due to reduced sediment stirring by winter storms with depth. Superimposed on this depth gradient were the effects of the deposition of fine-grained sediments from the Columbia River and the high primary productivity of the area.

348. Diversity and species richness values were considered to be related primarily to sediment stability. The values of diversity and species richness increased offshore (Spearman rank correlation $p < 0.001$), probably the result of the increased sediment stability due to decreased sediment stirring by winter storms. The high abundance of tube-dwelling polychaetes at deeper stations also increased sediment stability. The lowest values of diversity and species richness were calculated for stations that had considerable seasonal changes in sediment characteristics as a result of the deposition of fine-grained sediments at high flow of the Columbia River.

349. Biomass and density of macrofauna may be related to the organic content of sediments. The biomass and density of macrofauna were correlated with the percentage silt and clay of sediments (Spearman rank $p < 0.001$). The highest values of density and biomass were found at areas of high silt deposition. In this region, organic content of sediments is probably related to the percentage silt and clay in sediments.

350. The seasonal constancy of species composition was highest in areas that had little seasonal change in sediment grain-size distribution. Benthic assemblages exposed to deposition of fine-grained material by the Columbia River had the highest Czekanowski dissimilarity values (low constancy) between seasons of any stations in the study area. The seasonal

constancy of the abundance of dominant species was related with sediment stability. The between season Bray-Curtis dissimilarity values decreased with increasing sediment stability offshore (reduced stirring of sediments by storms) and were highest at stations that had the lowest seasonal stability because of deposition by the Columbia River.

Experimental Site G

351. From 9 July 1975 to 26 August 1975, approximately 4.6×10^5 m^3 of sediment was dredged from the mouth of the Columbia River and deposited at experimental site G (Figure C3). The sedimentary deposit had a circular shape approximately 750 m in radius and 1.5 m in elevation. Calculations based on grain size and transport mechanisms suggested that the dredged material deposit was stable with time (Sternberg et al., 1977).

352. The station groups calculated from intrinsic species abundance values (Bray-Curtis dissimilarity, group average sorting strategy) were similar to station groups defined extrinsic data. The extrinsic data included U.S. Army Corps of Engineers records on the disposal operations, observations of predisposal and postdisposal bathymetry, and textural analysis of predisposal and postdisposal sediments.

353. Nonparametric tests on postdisposal (September 1975) data showed a significant increase in diversity (H') and evenness (J') values and a significant decrease in density of macrofauna at stations exposed to direct burial by dredged material compared to stations not affected by dredged material. The biomass of macrofauna and species richness (SR) values were also significantly higher at stations exposed to direct burial. The values of community structure parameters at stations that were not exposed to direct burial but affected by dredged material disposal were intermediate between affected and unaffected stations. The community structure values at intermediate stations were significantly different from values calculated from affected stations but not significantly different from unaffected stations.

354. Two months (October 1975) and five months (January 1976) after disposal, stations exposed to direct burial still had significantly

higher values of diversity (H') and evenness (J') and significantly lower density of macrofauna than unaffected stations. The species richness (SR) values were not significantly different, while the biomass of macrofauna was significantly higher at unaffected stations in October 1975 but not in January 1976.

355. Eight months (April 1976) after disposal, diversity (H') and evenness (J') values were still significantly higher at stations exposed to direct burial and species richness (SR) values and the density and biomass of macrofauna were significantly lower than unaffected stations. Ten months (June 1976) after disposal, diversity (H') and evenness (J') values were the same at stations exposed to direct burial and unaffected stations, while species richness (SR) values and the density and biomass of macrofauna were still significantly higher at unaffected stations.

356. There was a significant reduction of the abundance of 11 species at stations exposed to direct dredged material disposal when compared to unaffected stations. The affected species included the polychaetes Spiophanes bombyx, Nephtys caecoides, Glycinde sp #2, Scoloplos armiger, and Northria iridescens; the amphipods Eohaustorius sencillus, Ampelisca macrocephala, Paraphoxus vigitegus, Photis lacia and Paraphoxus vigitegus; and the ophiuroid Amphiodia periercta-urtica. The bivalve Olivella pycna was significantly more abundant at stations exposed to direct disposal than at unaffected stations. The higher abundance of most of the eleven species at unaffected stations persisted 10 months after disposal operations. The abundance of 13 species was not significantly different between affected and unaffected stations. These species included the gastropods Olivella baetica and Olivella biplicata; the bivalve Macoma modesta alaskana; the cumacean Diastylopsis dawsoni, Mesolamprops sp #1, Hemilamprops californiensis, and Colurostylis occidentalis; the polychaetes Magelona sacculata, Haploscoloplos elongatus, and Thalenessa spinosa; the mysid Archeomysis grebnitzkii; the amphipoda Paraphoxus obtusidens major; and Nemertea sp #7.

357. The principal short-term effects of offshore dredged material disposal on benthic assemblages include: (a) direct burial of the benthos by dredged material; (b) increased turbidity from the disposal

operations or resuspension of dredged material by waves and currents; (c) introduction of pollutants and organic matter; and (d) changes in sediment characteristics (Saila et al. 1972).

358. All the sediments collected from the entrance channel (dredged area) contained a low percentage of silt and clay (0.95-1.26 percent by weight). Sediments at experimental site G after disposal contained less than 2 percent silt and clay and the dredged material was a coarser sand than the ambient sediment. Turbidity levels at experimental site G after disposal were low (Sternberg et al., 1977). The turbidity levels at experimental site G during disposal and after disposal were the same as prior to disposal (Sternberg et al., 1977). It is therefore concluded that turbidity caused by the disposal operation or subsequent resuspension of sediment had no significant effect on macrobenthic assemblages.

359. The sediments at the entrance channel (dredged area) and the sediments at experimental site G after disposal contained the same amount of several possible contaminates as ambient sediment at experimental site G (Robert Holton, Oregon State University, 1977, personal communication). Possible comtaminates measured included total sulfide, ammonia, oil and grease, and the metals cadmium, copper, iron, lead, magnesium, mercury, nickel, and zinc. In all cases the values of these contaminates were the same as would be expected from uncontaminated sediments (Robert Holton, Oregon State University, 1977, personal communication). The values of total organic carbon and nitrogen were low in the sediment dredged from the Columbia River and in the sediments at experimental site G after disposal and were not significantly different from the values reported from the ambient sediment prior to disposal operations (Robert Holton, Oregon State University, 1977, personal communication). It is therefore concluded that benthic assemblages were not affected by the introduction of pollutants or conditions created by organic enrichment.

360. The stress from direct deposition of dredged material and burial of the benthos was probably the most important short-term factor affecting benthos at experimental site G. Assuming a capacity of approximately 2.3×10^3 m^3 of dredged material for the hopper dredges

BIDDLE and HARDING, the 4.6×10^5 m^3 of dredged material was deposited in 200 loads over a two month period.

361. The second possible short-term stress on the benthic assemblages at experimental site G could be the change in sediment textural characteristics resulting from disposal. The sediments were changed from a well-sorted sand (Md $\phi = 2.75$ to 3.00 ϕ) to a coarser less well-sorted sand (Md $\phi = 2.00$ to 2.25 ϕ).

362. The most apparent effect of dredged material disposal on benthic assemblages at experimental site G was the significantly lower abundance of 11 of the 33 most abundant species. The higher diversity (H') and evenness (J') values at stations exposed to direct dredged material disposal primarily reflect the lower abundance of *Spiophanes bombyx* (the overwhelming dominant species in the study area) at affected stations. The disproportionate reduction in abundance of *Spiophanes bombyx* compared to other species at affected stations increased the equability (evenness J') of species abundances thus increasing diversity (H') values. The species richness (SR) values and the number of species were lower (except September 1975) at stations exposed to direct dredged material disposal, indicating that some species were eliminated from the affected area.

363. It was evident that the reduction in abundance of *Spiophanes bombyx* at stations exposed to direct deposition of dredged material was primarily responsible for the lower density of macrofauna at those stations. If *Spiophanes bombyx* were excluded from density comparisons the stations exposed to direct dredged material disposal would still have a significant lower density of macrofauna compared to unaffected stations. The reduction of abundance of other species at affected stations also contributed to the lower density of macrofauna at those stations.

364. Ten of the 11 species that had significantly lower abundance at stations affected by dredged material disposal were part of species groups 7 and 11 in the areal baseline. The polychaete, *Scoloplos armiger* was not included in a species group. Species group 7 was primarily restricted to assemblage C on the sandy substrate south of the Columbia River. Species group 11 was a widespread species group, especially

abundant in assemblage B, and much less abundant in the assemblages near the mouth of the Columbia River (assemblages D and E).

365. Thirteen species had no significant difference in abundance between stations exposed to direct dredged material disposal and unaffected stations. One species from species groups 5, 8, and 10 and two species from species group 7 were represented. Also represented were three species from species group 11 (the widespread species group) and five species from species group 12, an inshore species group, especially abundant near the mouth of the Columbia River in assemblages D and E.

366. It would therefore appear that species primarily restricted to the sandy inshore assemblage C (species group 7) south of the Columbia River were most affected by dredged material disposal. Species in species group 12 (assemblage D and E), which were found near the mouth of the Columbia River, were least affected by dredged material disposal.

367. Repopulation of benthos in an area exposed to direct burial by dredged material can be accomplished by benthos burrowing up through the dredged material, benthos migrating into the area, reproduction and recruitment of benthos from outside the affected area, and introduction of new species as part of the dredged material (Saila et al., 1972).

368. There was very little evidence for transportation of benthos to the experimental disposal site via dredged material. Most of the dominant species at the dredged area were found in low numbers at experimental site G prior to disposal. With the possible exception of the mysid Archeomysis grebnitzkii and the polychaete Spio filicornis, species dominant in the dredged area were either missing from the experimental site after disposal or had higher abundance at unaffected stations compared to stations exposed to direct dredged material disposal.

369. Although adequate information on recruitment on benthos from outside the affected area is not available it appears that the change in substrate resulting from disposal operations had little effect on the repopulation of benthos at experimental site G. Macrofauna retained on a 0.5 mm screen after disposal (September 1975) indicate a lower abundance of juveniles at stations exposed to direct disposal of dredged material compared to unaffected stations. The lower abundance of

juveniles at affected stations was probably the result of the disposal operation and not a reduced recruitment due to a change of substrate. The abundance of macrofauna retained on a 0.5 mm screen after disposal in October 1975, January 1976, and April 1976 was low with approximately equal abundances for most species at the stations exposed to direct dredged material disposal and unaffected stations. Spiophanes bombyx juveniles were more abundant at unaffected stations. In June 1976 the abundance of macrofauna retained on a 0.5 mm screen was higher than in October 1975, January 1976, and April 1976. There was little difference in abundance of juveniles at stations affected by dredged material and unaffected stations in June 1976.

370. Since the short-term repopulation of benthos into areas exposed to dredged material disposal was not primarily a result of the introduction of new species as part of the dredged material or recruitment via reproduction of species outside the area, most of the repopulation may have been accomplished by benthos burrowing up through the dredged material or benthos migrating into the area.

371. Although the sediment characteristics of the natural substrate at experimental site G did not vary with season, the sediment surface was unstable due to stirring of the bottom by both winter and summer storms. The instability of the substrate was observed by Sternberg et al. (1977) during both winter and summer conditions. Sternberg et al. (1977) estimated that sediment movement as a result of bottom currents generated by winds occurred 0-11 percent of the time during summer months and 66 percent of the time during winter months at experimental site G. These results agree with the conclusions by Komar et al. (1972) that short-period summer waves stir the bottom to depths of 90 m and long-period winter waves stir the bottom to depths of 125 m and possibly 200 m. During one winter storm, the sediment depth decreased approximately 0.5 m during a two-day period (Sternberg, University of Washington, 1976, personal communication). Macrobenthic species that exist on these conditions of sediment instability are probably adapted to burial by sediment and sediment movement.

372. The abundance of 13 species was not significantly affected by dredged material disposal. One species, *Olivella pycna*, had significantly higher abundance at affected stations. The three gastropods *Olivella baetica*, *Olivella biplicata*, and *Olivella pycna* have hard shells capable of withstanding dredged material disposal. All three species also burrow in sand, and judging from photographs (Sternberg, University of Washington, 1976) of tracks made by *Olivella* spp., they can migrate considerable distances on the sediment surface. The bivalve *Macoma modesta alaskana* also has a hard shell and borrows into the sand. Four cumacea, *Diastylopsis dawsoni*, *Mesolamprops* sp #1, *Hemilamprops californiensis*, and *Colurostylis occidentalis* were also not significantly affected by dredged material disposal. Adults of three cumacea were found in the plankton (Robert Holton, Oregon State University, 1977, personal communication) and are therefore capable of considerable horizontal migration. Most species of cumacea also burrow into the substrate. The three species of polychaetes *Magelona sacculata*, *Haploscoloplos elongatus*, and *Thalenessa spinosa* that were unaffected by dredged material disposal are nontube-dwelling, active species capable of considerable migration over the sediment surface and rapid burrowing through the sediment. The mysid *Archeomysis grebnitzkii* is commonly found on open sandy beaches in the surf zone and is capable of swimming considerable distances. The borrower *Paraphoxus obtusidens major* was the only amphipoda not significantly affected by dredged material disposal. Nothing is known about the biology of Nemertea sp #7, but many nemerteans are active burrowers in the substrate. Thus, most of the species that were not significantly affected by dredged material disposal are active, motile species capable of borrowing up through the dredged material and also capable of rapid recolonization of dredged material by horizontal migration.

373. The abundance of five polychaetes, five amphipods, and one ophiuriod were significantly reduced by dredged material disposal. Two of the polychaetes, *Nothria iridescens* and *Spiophanes bombyx*, are tube dwelling and may not be capable of migrating up through the dredged material. The remaining three polychaetes *Nephtys caecoides*, *Glycinde* sp #2, and *Scoloplos armiger*, are active nontube-dwelling species that

burrow through the sediment. Two amphipods, *Paraphoxus vigitegus* and *Paraphoxus epistomis*, are infauna species capable of limited burrowing. *Eohaustorius sencillus*, *Ampelisca macrocephala*, and *Photis lacia* live in tubes partially inserted in the sediment. The *Amphiodia periercta-urtica* complex were mostly juveniles. Adults were generally found in deeper water. Both *Amphiodia periercta* and *A. urtica* are primarily surface feeders and do not burrow deep into the sediment.

374. In general the species affected by dredged material disposal were tube-dwelling polychaetes and amphipods and species that have limited ability to borrow through the sediment. Many of these species were primarily restricted to the inshore sand sediments south of the mouth of the Columbia River. The species not affected by dredged material disposal were shelled gastropods and mollusks, nontube-dwelling polychaetes, and cumacea. All of these species were active burrowers and migrate considerable distances over the sediment. These species generally had a wide distribution and were abundant on the Columbia River delta as well as south of the River.

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APPENDIX C-I

STATION DATA

Table C-IA.* Station Data for Smith-McIntyre Grab Samples (pages 209-307).

Table C-IB.* Station Data for Metered Beam Trawl Samples (pages 308-312).

* Reproduced on microfiche and enclosed in envelope attached to the inside of the back cover of this report.

APPENDIX C-II

Species Lists

* Reproduced on microfiche and enclosed in envelope attached to the inside of the back cover of this report.

Table C-IIA

Phylogenetic Species List

Group/Species (MCR Code No.)	DMRP Code No.
Coelenterata (Cnidaria)	
Hydrozoa	
Hydrozoa spp. (367)	11501
Anthozoa	
Anthozoa sp. #1 (377)	40252
Anthozoa sp. #2 (378)	40253
Anthozoa sp. #3 (379)	40254
Anthozoa sp. #4 (428)	40255
Anthozoa sp. #5 (429)	40256
Anthozoa sp. #6 (430)	40257
Anthozoa spp. (328)	12000
Nematoda	
Nematoda spp. (192)	14000
Platyhelminthes	
Turbellaria	
Turbellaria sp. #1 (522)	40258
Turbellaria spp. (365)	14201
Echinodermata	
Echinoidea	
Dendrasteridae	
Dendraster excentricus (82)	16107
Schizasteridae	
Brisaster latifrons (81)	16108
Holothuroidea	
Cucumaridae	
Pentamera sp. #1 (80)	16603
Molpadidae	
Paracaudina chilensis (78)	16601
Molpadia intermedia? (79)	16604
Ophiuroidea	
Ophiurida	
Ophiurida spp. (88)	17611
Amphiuridae	
Amphiuridae spp. (85)	17602
Amphiodia urtica (84)	17606
Amphiodia periercta (83)	17607
Amphiodia sp. #1 (89)	17608
Amphiodia spp. (87)	17603
Amphioplus hexacanthus (93)	17613
Amphiura sp. #1 (90)	17618
Amphiodia periercta-urtica complex (425)	40489

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Ophiuroidea (cont.)	
Ophiuridae	
Ophiura lutkeni (86)	17610
Ophiura sarsii (91)	17614
Ophiura spp. (92)	17612
Gorgonocephalidae	
Gorgonocephalus caryi (572)	17615
Ophiolepidinae	
Ophiomusium jolliensis (573)	17616
Asteroidea	
Luidiidae	
Luidia foliolata (570)	40265
Asteriidae	
Pisaster brevispinus (571)	40266
Nemertea	
Nemertea sp. #1 (438)	40267
Nemertea sp. #2 (466)	40268
Nemertea sp. #3 (451)	40269
Nemertea sp. #4 (456)	40270
Nemertea sp. #5 (460)	40271
Nemertea sp. #6 (463)	40272
Nemertea sp. #7 (471)	40273
Nemertea sp. #8 (472)	40274
Nemertea sp. #9 (473)	40275
Nemertea sp. #11 (475)	40277
Nemertea sp. #12 (485)	40278
Nemertea sp. #13 (510)	40279
Nemertea sp. #14 (536)	40280
Nemertea spp. (361)	18700
Annelida	
Polychaeta	
Polychaeta spp. (369)	19001
Polynoidae	
Polynoidae spp. (333)	19020
Antinoella macrolepida? (395)	40281
Harmothoe nr. *lunulata* (465)	19027
Hesperonoe sp. #1 (466)	40282
Lepidasthenia berkelayae (480)	40100
Lepidasthenia longicirrata (474)	40603
Eunoe sp. #1 (372)	40196
Gattyana coliata (545)	40283
Polynoe sp. #1 (546)	40284
Lepidonotus sp. #1 (268)	19034
Tenonia kitsapensis (476)	40102

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Annelida (cont.)	
Sigalionidae	
Pholoe minuta (322)	19061
Sthenelais tertiaglabra (348)	19068
Thalenessa spinosa (354)	40118
Sigalionidae spp. (484)	19055
Paraonidae	
Aricidea ramosa (226)	19113
Aricidea sp. #1 (227)	19114
Aedicira sp. #1 (392)	40285
Aricidea neosuecica (448)	40094
Aricidea spp. (355)	19111
Paraonella platybranchia (317)	40154
Paraonis gracilis oculatus (442)	40095
Paraonidae spp. (291)	19110
Hesionidae	
Hesiospina sp. #1 (265)	40286
Podarkeopsis brevipalpa (459)	40287
Hesionidae spp. (263)	19120
Hesionidae sp. #1 (414)	40288
Hesionidae sp. #2 (420)	40289
Cossuridae	
Cossura nr. *laeviseta* (449)	40290
Cossura spp. (262)	19131
Phyllodicidae	
Eteone californica (245)	19137
Anaitides mucosa (324)	40291
Anaitides groenlandica (323)	40292
Anaitides longipes (544)	40293
Eumida sanguinea (250)	19149
Eteone sp. #1 (393)	40294
Eteone sp. #2 (224)	40295
Eteone (*Mysta*) *barbata* (231)	40296
Eteone longa (307)	19160
Eteone sp. #5 (314)	40297
Eteone sp. #6 (244)	40298
Eteone sp. #7 (271)	40299
Eteone spp. (246)	19155
Eumida spp. (285)	40492
Anaitides sp. #3 (383)	40300
Anaitides sp. #4 (272)	40301
Anaitides spp. (340)	19143
Phyllodocidae sp. #1 (248)	40302
Phyllodocidae sp. #2 (257)	40303
Phyllodocidae spp. (325)	19136
Paranaitis polynoides (551)	19153
Eulalia leavicornuta (587)	40304

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Annelida-Polychaeta (cont.)	
Syllidae	
Autolytus cornutus (269)	19212
Autolytus spp. (388)	19202
Exogone lourei (478)	40110
Exogone spp. (432)	19217
Langerhansia heterochaeta (479)	40305
Typosyllis alternata (477)	40306
Typosyllis hyalina (254)	40307
Typosyllis nr. *hyalina* (255)	40491
Syllidae spp. (350)	19200
Nereidae	
Nereis zonata (398)	19231
Nereis spp (308)	19232
Nereidae spp. (306)	19220
Nephtyidae	
Nephtys caeca (301)	19241
Nephtys caecoides (302)	19242
Nephtys californiensis (303)	19243
Nephtys ferruginea (390)	19244
Nephtys glabra (304)	19251
Nephtys cornuta (284)	40308
Nephtys cornuta franciscanum (464)	40309
Nephtys rickettsi (440)	40310
Nephtys spp. (373)	19247
Nephtyidae spp. (295)	19240
Glyceridae	
Glycera capitata (252)	19262
Glycera convoluta (385)	40311
Glycera sp. #1 (426)	40312
Glycera spp. (253)	19265
Goniadidae	
Goniada maculata (259)	19287
Glycinde picta (408)	40149
Glycinde sp. #2 (256)	40313
Glycinde spp. (258)	19284
Goniadidae spp. (407)	19280
Onuphidae	
Nothria iridescens (310)	19304
Nothria geophiliformis? (311)	40314
Nothria spp. (235)	19306
Lumbrineridae	
Lumbrineris bicirrata (329)	19341
Lumbrineris zonata (436)	19345

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Polychaeta-Lumbrineridae (cont.)	
Lumbrineris latreilli (273)	19349
Lumbrineris luti (275)	19350
Lumbrineris simalibris (276)	19351
Lumbrineris minima (454)	40315
Lumbrineris cf. *longensis* (274)	19359
Lumbrineris spp. (277)	19347
Ninoe gemmea (309)	19346
Arabellidae	
Arabella spp. (283)	19382
Notocirrus californiensis (238)	40316
Arabellidae sp. #1 (455)	40317
Arabellidae sp. #3 (433)	40318
Arabellidae sp. #4 (270)	40319
Arabellidae spp. (387)	19380
Dorvilleidae	
Schistomaringos annulata (458)	40320
Dorvilleidae spp. (287)	19400
Orbiniidae	
Haploscoloplos elongatus (261)	19421
Scoloplos armiger (341)	19427
Scoloplos spp. (305)	19429
Phylo felix (326)	40321
Orbinia sp. #1 (467)	40092
Orbiniidae spp. (315)	19420
Spionidae	
Polydora caulleryi (288)	19445
Polydora sp. #2 (292)	40322
Polydora spp. (332)	19451
Laonice cirrata (266)	19442
Spiophanes bombyx (344)	19453
Spiophanes berkeleyorum (345)	40155
Prionospio malmgreni (336)	19457
Prionospio spp. (338)	19459
Boccardia basilaria? (289)	40323
Munispio cirrifera (355)	40324
Paraprionospio pinnata (337)	19456
Scolelepsis cirratulus (384)	40325
Spio filicornis (343)	40037
Spionidae spp. (370)	19430
Magelonidae	
Magelona longicornis (278)	19467
Magelona pitelkai (280)	40326
Magelona sacculata (279)	40150
Magelona spp. (281)	19463

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Polychaeta (cont.)	
Chaetopteridae	
Mesochaetopterus sp. #1 (399)	40327
Spiochaetopterus costarum (352)	40328
Chaetopteridae spp. (403)	19480
Cirratulidae	
Tharyx tesselata (356)	19512
Tharyx multifilis (358)	40329
Tharyx sp. #1 (357)	40119
Tharyx sp. #3 (433)	40330
Tharyx spp. (359)	19510
Chaetozone setosa (237)	19515
Chaetozone nr. *berkeleyorum* (239)	40331
Cirratulidae spp. (240)	19500
Flabelligeridae	
Brada pluribranchiata (470)	40332
Pherusa papillata (468)	40333
Flabelligeridae spp. (251)	19520
Opheliidae	
Armandia bioculata (288)	19541
Travisia brevis (482)	19546
Travisia gigas (360)	19550
Ophelia sp. #1 (313)	40151
Ophelina acuminata (220)	40334
Ophelina sp. #1 (541)	40335
Opheliidae spp. (342)	19540
Maldanidae	
Maldane sarsi (282)	19562
Asychis disparidentata (406)	40336
Asychis sp. #2 (457)	40337
Asychis spp. (462)	19566
Isocirrus sp. #1 (453)	40338
Praxillella affinis pacifica (445)	40339
Prixillella gracilis (334)	40340
Rhodine bitorguata (339)	40341
Maldanidae sp. #4 (286)	40342
Maldanidae sp. #14 (444)	40343
Maldanidae sp. #19 (299)	40344
Maldanidae sp. #20 (241)	40345
Maldinidae sp. #21 (241)	40346
Maldinidae spp. (293)	19560
Oweniidae	
Myriochele heeri (437)	19581
Myriochele oculata (300)	40347
Myriochele spp. (483)	19583
Owenia collaris (316)	40157
Oweniidae spp. (397)	19580

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Polychaeta (cont.)	
Sternaspidae	
Sternaspis fossor (347)	40116
Arenicolidae	
Abarenicola sp. #1 (219)	40348
Arenicolidae spp. (386)	19620
Capitellidae	
Capitella capitata (232)	19641
Capitella capitata oculata (233)	19649
Capitella spp. (540)	19654
Mediomastus californiensis (294)	19643
Notomastus hemipodus (312)	19644
Notomastus lineatus (298)	40349
Heteromastus filobranchus (264)	19651
Heteromastus sp. #1 (296)	40350
Heteromastus spp. (394)	19653
Barantolla americana (236)	40351
Decamastus gracilis (242)	40352
Capitellidae spp. (368)	19640
Capitellidae sp. #1 (346)	40353
Pectinariidae	
Pectinaria californiensis (320)	19661
Pectinaria sp. #1 (418)	19664
Pectinaria (*Cistenides*) *granulata* (319)	40354
Pectinaria spp. (321)	19663
Ampharetidae	
Anobothrus gracilis? (389)	19702
Melinna oculata (297)	19708
Mellina spp. (396)	19706
Ampharete acutifrons (221)	19710
Ampharete arctica (439)	19713
Ampharete spp. (233)	19709
Ampharete sp. #1 (452)	40123
Ampharetidae spp. (290)	19700
Terebellidae	
Artacama coniferi (260)	19722
Polycirrus spp. (331)	19729
Terebellides stroemi (447)	19731
Pista cristata (328)	19735
Pista moorei (330)	19736
Pista spp. (441)	19734
Artacamella hancocki (229)	40355
Neoamphitrite robusta (267)	40356
Thelepus setosus (318)	40357
Lanassa sp. #1 (349)	40358
Terebellidae spp. (353)	19720

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Polychaeta (cont.)	
Sabellidae	
Chone albocincta (481)	40103
Sabellidae spp. (405)	19740
Pilargidae	
Sigambra tentaculata (450)	19867
Parandalia fauveli (435)	40359
Pilargis berkeleyae (434)	40360
Pilargidae spp. (327)	19860
Apistobranchidae	
Apistobranchus ornatus (225)	40362
Disomidae	
Trochochaeta franciscanum (243)	40364
Scalibregmidae	
Scalibregma inflatum (409)	19803
Sphaerodoridae	
Sphaeordoropsis sphaerulifer (469)	40104
Sphaerodoridae spp. (461)	40105
Oligochaeta	
Oligochaeta spp. (422)	19900
Hirudinea	
Hirudinea spp. (543)	20271
Mollusca	
Gastropoda	
Gastropoda spp. (34)	21100
Gastropoda sp. #1 (578)	40365
Archaeogastropoda	
Acmaeidae	
Collisella digitalis? (521)	40366
Opisthobranchiata	
Aglajidae	
Aglaja diomedea (30)	40146
Gastropteridae	
Gastropteron pacificum (509)	40369
Scaphandridae	
Cylichna attonsa (1)	21233
Acteocina? sp. #1 (518)	40370
Pyramidellidae	
Turbonilla aurantia (10)	21267
Turbonilla sp. #1 (11)	21268
Turbonilla sp. #2 (12)	21269
Odostomia sp. #1 (6)	21270
Odostomia spp. (539)	21265

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Mollusca-Opisthobranchiata (cont.)	
Opistobranchia sp. #1 (234)	40371
Opistobranchia sp. #2 (249)	40372
Nudibranchiata	
Doridacea sp. #1 (18)	40373
Arminidae	
Armina californca (416)	40375
Prosobranchia	
Epitoniidae	
Epitonium tinctum (16)	40376
Naticidae	
Polinices pallidus (17)	21545
Muricidae	
Trachypollia? sp. #1 (538)	40377
Columbellidae	
Mitrella gouldii (2)	21596
Neptuneidae	
Neptuneidae sp. #1 (14)	40379
Nassariidae	
Nassarius fossatus (3)	21626
Nassarius mendicus (4)	21627
Nassarius spp. (5)	21625
Olividae	
Olivella baetica (7)	21655
Olivella biplicata (8)	21656
Olivella pycna (9)	21657
Olivella spp. (514)	21654
Turridae	
Oenopota turricula? (13)	40380
Ophiodermella cancellata (15)	40381
Ophiodermella sp. #1 (351)	40382
Pelecypoda	
Pectinidae	
Pectinidae sp. #1 (577)	40383
Propeamussium davidsoni (579)	40395
Nuculidae	
Acila castrensis (19)	21931
Nucula tenuis (20)	21933
Nuculanidae	
Yoldia seminuda (21)	21968
Yoldia spp. (22)	21966
Nuculana hamata (23)	40384
Nuculanidae spp. (477)	21960

Table -IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Mollusca-Pelecypoda (cont.)	
Nucinellidae	
Huxleyia munita (59)	21991
Mytilidae	
Musculus sp. #1 (43)	22039
Musculus sp. #2 (75)	40385
Musculus laevigata (28)	22040
Crenella decussata (44)	22041
Carditidae	
Cyclocardia ventricosa (54)	40086
Thyasiridae	
Axinopsida serricata (24)	22203
Thyasira flexuosa (25)	22205
Adontorhina cyclia (26)	40038
Veneridae	
Compsomyax subdiaphana (56)	40041
Psephidia lordi (58)	40088
Transennella tantilla? (46)	40084
Tellinidae	
Macoma moesta alaskana (29)	22302
Macoma calcera (124)	22322
Macoma carlottensis (32)	22304
Macoma elimata? (33)	40386
Macoma nasuta (31)	22323
Macoma balthica? (391)	22324
Macoma sp. #2 (164)	22306
Macoma spp. (431)	22326
Tellina modesta (36)	22307
Tellina carpenteri (37)	22346
Tellina sp. #5 (525)	40387
Tellina spp. (38)	22329
Tellinidae sp. #1 (35)	40388
Tellinidae sp. #3 (48)	40389
Solenidae	
Siliqua patula (27)	22351
Lyonsiidae	
Lyonsia californica (39)	40390
Lyonsia inflata? (40)	40391
Lyonsia sp. #2 (41)	22506
Thracia sp. #1 (65)	40392
Lucinidae	
Lucinoma annulata (55)	40087
Montacutidae	
Mysella tumida (57)	22574
Orobitella rugifera (47)	40395
Tomburchus sp. #1 (531)	40394

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Mollusca (cont.)	
Pandoridae	
Pandora filosa (50)	22603
Pandora grandis (51)	22604
Pandora bilirata? (53)	22605
Pandora punctata (52)	22609
Cuspidariidae	
Cardiomya oldroydi (42)	22621
Pelecypoda sp. #1 (60)	40396
Pelecypoda sp. #2 (61)	40397
Pelecypoda sp. #3 (62)	40398
Pelecypoda sp. #4 (415)	40399
Pelecypoda sp. #7 (63)	40400
Pelecypoda sp. #9 (526)	40401
Pelecypoda sp. #10 (374)	40402
Pelecypoda sp. #11 (64)	40403
Pelecypoda sp. #15 (66)	40404
Pelecypoda sp. #20 (519)	40405
Pelecypoda spp. (45)	21900
Aplacophora (=Amphineura)	
Neomeniida sp. #1 (534)	40406
Chaetodermatidae sp. #1 (49)	40407
Chaetodermatidae spp. (530)	40408
Scaphopoda	
Dentaliidae	
Dentalium rectius (68)	22732
Denteliidae spp. (67)	22726
Cephalopoda	
Sepiolidae	
Rossia pacifica (576)	22811
Octopodidae	
Octopus sp. #1 (575)	40409
Arthropoda	
Crustacea	
Ostracoda	
Cylindroleberididae	
Bathyleberis sp. #1 (194)	40411
Cyprininidae	
Euphilomedes carcharodonta (193)	23299
Euphilomedes producta (574)	40412
Sclerodoncha trituberculata (195)	23301
Rutidermatidae	
Rutiderma sp. #1 (424)	40414

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No
Arthropoda (cont.)	
Cirripedia	
Balanus hesperius (201)	23720
Pycnogonida	
Pycnogonida sp. #1 (381)	40415
Nebaliacea	
Nebalia bipes (76)	40090
Mysidacea	
Mysidae	
Archeomysis grebnitzkii (100)	23855
Acanthomysis macropsis (113)	23856
Acanthomysis davisi (114)	23879
Acanthomysis nephrothalma (115)	23880
Acanthomysis alaskensis (527)	40416
Acanthomysis spp. (119)	23874
Neomysis kadiakensis (112)	23865
Neomysis franciscorum (111)	23885
Neomysis sp. #1 (116)	23877
Neomysis spp. (118)	23875
Mysini spp. (117)	23881
Mysidacea spp. (120)	23840
Cumacea	
Diastylidae	
Diastylopsis dawsoni (97)	23899
Diastylopsis tenuis (98)	23900
Diastylis umatillensis (99)	23901
Diastylis bidentata (100)	23902
Diastylis alaskensis (101)	23903
Diastylis pellucida (586)	40417
Diastylis parapinulosa (584)	40418
Diastylis sp. #1 (102)	23904
Colurostylis occidentalis (104)	23906
Lampropidae	
Mesolamprops sp. #1 (95)	23897
Hemilamprops californiensis (96)	23898
Lamprops sp. #1 (94)	23916
Lamprops sp. #2 (105)	40420
Campylaspis rubromaculata (400)	23907
Campylaspis sp. #1 (106)	23908
Campylaspis sp. #2 (107)	23909
Campylaspis sp. #3 (108)	23910
Campylaspis sp. #4 (582)	40422
Leuconidae	
Leucon sp. #1 (528)	40424
Eudorellopsis longirostris (103)	23905
Eudorella pacifica (109)	23914
Cumacea spp. (223)	23889

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Cumacea (cont.)	
Tanaidacea	
Leptognatha cf. *longiremis* (77)	40042
Isopoda	
Sphaeromatidae	
Gnorisphaeroma oregonensis (502)	23921
Tecticeps convexus (198)	23933
Bathycopea daltonae (197)	40427
Idoteidae	
Synidotea angulata (196)	23925
Synidotea bicuspida (380)	40429
Synidotea sp. #2 (496)	40430
Synidotea sp. #3 (497)	40431
Edotea sublittoralis (500)	40432
Idotea fewksei (511)	40433
Pentidotea oculata (501)	40434
Saduria etomon (508)	40435
Munnidae	
Pleurogonium rubicundum? (199)	40437
Limnoridae	
Limnoria lognorum? (503)	23924
Bopyridae	
Argeia pugettensis (200)	23929
Argeia spp. (505)	40440
Bopyrella? sp. #1 (404)	23960
Hemiarthrus abdominalis (506)	40441
Anthuridae	
Pananthura? sp. #1 (504)	40443
Paraselloidea sp. #1 (499)	40444
Cymothoidae	
Cymothoidae sp. #1 (507)	40446
Amphipoda	
Ampeliscidae	
Ampelisca agassizi (123)	24004
Ampelisca hancocki (122)	24005
Ampelisca macrocephala (121)	24006
Ampelisca brevisimulata (125)	40447
Byblis veleronis (126)	40044
Byblis sp. #1 (410)	40448
Aoridae (=Corophiidae)	
Aoroides columbiae? (167)	24029
Aoridae sp. #1 (168)	40449
Corophiidae	
Corophium brevis (492)	24047
Corophium salmonis (230)	24051
Corophium spinicorne (495)	24053
Corophium sp. #1 (188)	24056
Corophium sp. #2 (535)	40450

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Crustacea-Amphipoda (cont.)	
Gammaridae	
Anisogammarus confervicolus (488)	24067
Anisogammarus pugettensis (489)	24069
Melita desdichada? (179)	24084
Melita oregonensis (180)	24086
Haustoriidae	
Eohaustorius sencillus (155)	24096
Eohaustorius washingtonianus (156)	24097
Eohaustorius brevicuspis (494)	40451
Ischyroceridae	
Ischyrocerus pelagops (162)	24108
Jassa? sp. #1 (493)	40452
Liljeborgiidae	
Listriella spp. (183)	24119
Lysianassidae	
Hippomedon denticulatus (169)	24123
Hippomedon wecomus (170)	24124
Hippomedon sp. #1 (178)	40453
Opisa tridentata (173)	24126
Orchomene pacifica (172)	40454
Orchomene sp. #2 (486)	40455
Pachynus barnardi? (174)	24129
Pachynus chelatum? (171)	40456
Nicippe tumida (175)	40457
Anonyx adoxus (176)	40045
Lysianassidae sp. #1 (177)	40458
Lysianassidae sp. #2 (585)	40459
Lysianassidae spp. (371)	24122
Oedicerotidae	
Bathymedon? sp. #1 (131)	24134
Bathymedon? sp. #2 (411)	40460
Monoculodes spinipes (127)	24136
Monoculodes sp. #1 (128)	24137
Monoculodes sp. #2 (129)	24138
Monoculodes zernovi (130)	24141
Synchelidium shoemakeri (132)	24139
Synchelidium rectipalmum (133)	24142
Westwoodilla caecula (134)	24140
Phoxocephalidae	
Paraphoxus abronius? (135)	24146
Paraphoxus epistomus? (137)	24148
Paraphoxus heterocuspidatus (138)	24149
Paraphoxus lucubrans? (146)	24150
Paraphoxus milleri (145)	24151
Paraphoxus obtusidens obstusidens? (139)	24152
Pharaphoxus obtusidens major (140)	24153

Table C-IIA (continued)

Group/Species (MCR Code No.)	DMRP Code No.
Crustacea (cont.)	
Isaeidae (Corophiidae) sp. #1 (527)	40470
Pardaliscidae	
Pardaliscella sp. #1 (186)	40472
Eusiridae	
Rhachotropis oculata (402)	40474
Accedomoera sp. #1 (187)	40475
Gammaridea sp. #2 (366)	40476
Caprelloidea	
Aeginneliidae	
Mayerella banskia? (190)	40479
Tritella pilimana (191)	24342
Caprellidae	
Caprella sp. #1 (532)	40481
Caprella mendax (581)	40482
Hyperiidea	
Hyperiidea sp. #1 (529)	24206
Euphausiacea	
Euphausiidae	
Euphausia pacifica (569)	24360
Thysanoessa spinifera (568)	24374
Decapoda	
Pandalidae	
Pandalus danae (557)	24417
Pandalus jordani (558)	24420
Hippolytidae	
Spirontocaris gracilis (206)	24432
Spirontocaris avina (561)	24433
Spirontocaris barbata (562)	40046
Spirontocaris bispinosa (563)	24434
Spirontocaris cristata (564)	24430
Spirontocaris lamellicornis (565)	40047
Spirontocaris pusiola? (566)	40048
Spirontocaris suckleyi (567)	40050
Spirontocaris spp. (583)	40049
Crangonidae	
Crangon alaskensis elongata (203)	24436
Crangon franciscorum (520)	24439
Crangon stylirostris (204)	24448
Crangon spp. (205)	24446
Crangon communis (550)	24450
Crangon munita (552)	24440
Crangon sp. #1 (553)	24452
Nectocrangon alakensis (544)	24451
Sergestidae	
Sergestes similis (560)	24462
Callianassidae	
Callianassa californiensis (547)	24614

Table C-IIA (concluded)

Group/Species (MCR Code No.)	DMRP Code No.
Decapoda (cont.)	
Galatheidae	
Munida quadrispina (218)	24646
Paguridae	
Pagurus armatus (212)	24657
Pagurus ochotensis (210)	24671
Pagurus quayleyi (211)	24672
Pagurus aleuticus (556)	40483
Paguristes turgidis (555)	24654
Pagurus caurinus (513)	40484
Pagurus spp . (213)	24678
Paguridae spp. (214)	24650
Majidae	
Chorilia longipes (549)	24909
Cancridae	
Cancer gracilis? (216)	24929
Cancer magister (217)	24930
Cancer oregonensis (548)	24931
Pinnotheridae	
Pinnixa occidentalis (559)	24967
Pinnixa sp. #1 (207)	24961
Pinnixa sp. #2 (208)	24962
Pinnixa sp. #3 (209)	24963
Pinnixa littoralis (542)	24966
Pinnixa spp. (215)	24970
Sipunculida	
Golfingia macginitiei (69)	25352
Golfingia sp. #1 (70)	25353
Sipunculida spp. (71)	25350
Echiurida	
Echiurus echiurus alaskansus (73)	25402
Archynchite pugettensis (74)	25403
Echiura sp. #3 (421)	40485
Echiura sp. #4 (427)	40486
Echiura sp. #5 (533)	40487
Echiurida spp. (423)	25400
Priapulida	
Priapulus caudata (72)	25454
Proronida	
Phoronis psammophila? (419)	40488
Miscellaneous	
Miscellaneous #1 (362)	
Miscellaneous #2 (363)	
Miscellaneous #3 (364)	
Miscellaneous #4 (375)	
Miscellaneous #5 (376)	
Miscellaneous #6 (580)	

APPENDIX C-III

Community Structure

Table C-IIIA. Species Richness (SR), Simpson Diversity (SD), Shannon Diversity [H(2), H(E), H(10)], and Evenness [JPR(2), J(2)] Values for Each Macrofauna Station (pages 383-399).

Table C-IIIB. Density, Number of Species and Biomass for Each Macrofauna Station (pages 400-411).

Table C-IIIA

Species Richness (SR), Simpson Diversity (SD), Shannon Diversity [HPR(2), HPR(E), HPR(10)], Brillouin Diversity [H(2), H(E), H(10)], and evenness (JPR(2), J(2)] values for each macrofauna station.

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
47	13.643	0.950	5.134	3.558	1.545	4.946	3.429	1.489	0.776	0.748
48	12.008	0.920	4.727	3.276	1.423	4.524	3.136	1.362	0.741	0.710
49	8.056	0.910	4.277	2.964	1.287	4.030	2.794	1.213	0.758	0.714
50	8.336	0.935	4.628	3.208	1.393	4.184	2.900	1.259	0.843	0.762
51	6.348	0.913	4.155	2.880	1.251	3.849	2.668	1.159	0.804	0.745
52	8.561	0.943	4.682	3.245	1.409	4.344	3.011	1.308	0.830	0.770
53	7.572	0.536	2.339	1.621	0.704	2.252	1.561	0.678	0.403	0.338
54	15.832	0.887	4.544	3.150	1.368	4.425	3.067	1.332	0.652	0.635
55	14.807	0.924	4.632	3.210	1.394	4.519	3.133	1.360	0.674	0.658
56	10.025	0.811	3.565	2.471	1.073	3.483	2.414	1.049	0.566	0.553
57	7.451	0.935	4.505	3.123	1.356	4.234	2.935	1.275	0.820	0.771
58	5.963	0.907	4.037	2.798	1.215	3.685	2.555	1.109	0.807	0.737
59	3.794	0.862	3.363	2.331	1.012	3.039	2.107	0.915	0.792	0.715
60	5.887	0.879	3.768	2.612	1.134	3.510	2.433	1.057	0.741	0.690

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
61	4.554	0.888	3.721	2.579	1.120	3.514	2.436	1.058	0.783	0.739
62	3.779	0.643	2.576	1.786	0.775	2.393	1.659	0.720	0.578	0.537
63	4.118	0.798	2.945	2.041	0.886	2.694	1.867	0.811	0.660	0.604
64	6.436	0.886	3.917	2.715	1.179	3.606	2.499	1.085	0.758	0.697
65	8.616	0.807	3.326	2.305	1.001	3.288	2.279	0.990	0.534	0.528
66	10.114	0.845	3.637	2.521	1.095	3.571	2.475	1.075	0.572	0.562
67	13.041	0.910	4.506	3.123	1.356	4.407	3.055	1.327	0.673	0.658
68	14.652	0.928	4.717	3.270	1.420	4.576	3.172	1.378	0.694	0.673
69	10.548	0.848	3.683	2.553	1.109	3.608	2.501	1.086	0.576	0.564
70	8.717	0.795	3.344	2.318	1.007	3.272	2.268	0.985	0.547	0.536
71	5.246	0.767	3.277	2.272	0.987	2.837	1.966	0.854	0.706	0.611
72	6.466	0.857	3.885	2.693	1.169	3.452	2.393	1.039	0.770	0.684
73	6.411	0.887	4.110	2.849	1.237	3.786	2.624	1.140	0.795	0.723
74	5.162	0.827	3.442	2.386	1.036	3.109	2.155	0.936	0.724	0.654
75	5.924	0.888	3.846	2.666	1.158	3.693	2.560	1.112	0.728	0.699
76	5.599	0.852	3.410	2.363	1.026	3.219	2.231	0.969	0.670	0.633

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
77	3.191	0.678	2.453	1.700	0.738	2.196	1.522	0.661	0.613	0.549
78	4.768	0.739	2.947	2.042	0.887	2.751	1.907	0.828	0.613	0.572
79	2.118	0.547	1.793	1.243	0.540	1.567	1.156	0.052	0.500	0.465
80	4.923	0.762	2.991	2.073	0.900	2.659	1.843	0.800	0.644	0.573
81	3.877	0.633	2.392	1.658	0.720	2.172	1.506	0.654	0.545	0.495
82	4.186	0.710	2.702	1.873	0.813	2.442	1.693	0.735	0.606	0.548
83	3.687	0.772	2.835	1.965	0.853	2.610	1.809	0.786	0.656	0.604
84	3.589	0.773	2.729	1.891	0.821	2.533	1.756	0.762	0.631	0.586
85	4.611	0.741	2.862	1.984	0.861	2.667	1.848	0.803	0.602	0.561
86	3.955	0.648	2.428	1.683	0.731	2.153	1.492	0.648	0.562	0.498
87	5.251	0.861	3.617	2.507	1.089	3.393	2.352	1.021	0.730	0.685
88	6.117	0.683	2.886	2.001	0.869	2.793	1.936	0.841	0.529	0.512
89	6.003	0.764	3.050	2.114	0.918	2.968	2.057	0.893	0.559	0.544
90	6.669	0.855	3.657	2.535	1.101	3.554	2.463	1.070	0.655	0.636
91	4.328	0.110	0.518	0.359	0.156	0.507	0.351	0.153	0.097	0.095
92	4.023	0.526	1.872	1.298	0.564	1.752	1.215	0.527	0.403	0.377

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
93	5.111	0.862	3.634	2.519	1.094	3.339	2.315	1.005	0.756	0.695
94	4.915	0.865	3.619	2.508	1.089	3.254	2.256	0.980	0.779	0.701
95	8.269	0.839	3.704	2.567	1.115	3.634	2.519	1.094	0.613	0.601
96	9.172	0.857	3.724	2.581	1.121	3.654	2.533	1.100	0.602	0.590
97	13.493	0.945	5.065	3.511	1.525	4.889	3.389	1.472	0.766	0.739
98	13.924	0.937	4.966	3.442	1.495	4.825	3.345	1.453	0.738	0.717
99	11.127	0.870	3.918	2.716	1.179	3.834	2.657	1.154	0.607	0.594
100	8.114	0.828	3.660	2.537	1.102	3.586	2.48	1.079	0.610	0.598
101	4.979	0.235	1.069	0.741	0.322	1.027	0.712	0.309	0.202	0.194
102	3.927	0.840	3.189	2.211	0.960	3.007	2.084	0.905	0.705	0.655
103	3.592	0.129	0.588	0.407	0.177	0.565	0.391	0.170	0.121	0.116
104	7.102	0.906	4.208	2.917	1.267	2.807	2.639	1.146	0.802	0.725
105	8.452	0.909	4.324	2.997	1.302	3.965	2.748	1.194	0.774	0.710
106	6.691	0.910	4.133	2.865	1.244	3.823	2.650	1.151	0.788	0.728
107	6.073	0.903	4.017	2.784	1.209	3.710	2.571	1.117	0.790	0.729
111	4.649	0.656	2.678	1.856	0.806	2.526	1.751	0.760	0.551	0.520

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
112	3.704	0.454	1.855	1.286	0.558	1.708	1.184	0.514	0.416	0.383
113	2.857	0.830	2.938	2.037	0.885	2.506	1.737	0.754	0.820	0.699
114	4.047	0.886	3.595	2.492	1.082	3.285	2.277	0.989	0.818	0.748
115	3.660	0.877	3.452	2.393	1.039	3.108	2.154	0.936	0.828	0.745
116	4.410	0.691	2.789	1.933	0.839	2.461	1.706	0.741	0.625	0.522
117	6.620	0.872	3.989	2.765	1.201	3.595	2.492	1.082	0.778	0.701
118	5.870	0.885	3.891	2.697	1.171	3.597	2.493	1.083	0.771	0.713
119	4.250	0.817	3.173	2.199	0.955	2.876	1.993	0.866	0.711	0.645
120	8.019	0.918	4.296	2.978	1.293	4.017	2.784	1.209	0.769	0.719
121	3.272	0.852	3.232	2.240	0.973	2.906	2.014	0.875	0.808	0.726
122	6.034	0.832	3.488	2.418	1.050	3.240	2.246	0.975	0.680	0.632
123	5.471	0.808	3.334	2.311	1.004	3.010	2.087	0.906	0.686	0.620
124	3.894	0.744	2.702	1.873	0.813	2.471	1.713	0.744	0.615	0.563
125	2.771	0.847	3.026	2.098	0.911	2.767	1.918	0.833	0.795	0.727
126	8.351	0.916	4.327	2.999	1.302	4.149	2.876	1.249	0.745	0.714
127	6.490	0.686	2.977	2.064	0.896	2.798	1.939	0.842	0.556	0.522

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
128	6.670	0.880	3.983	2.761	1.199	3.615	2.506	1.088	0.770	0.699
129	4.542	0.793	3.245	2.249	0.977	2.903	2.012	0.874	0.717	0.642
130	4.250	0.806	3.180	2.204	0.957	2.880	1.997	0.867	0.713	0.646
131	3.728	0.812	3.156	2.188	0.950	2.857	1.980	0.860	0.743	0.673
132	4.141	0.759	2.914	2.020	0.877	2.692	1.866	0.816	0.644	0.595
133	3.990	0.605	2.272	1.575	0.684	2.096	1.453	0.631	0.502	0.463
134	4.780	0.729	3.062	2.122	0.922	2.708	1.877	0.815	0.668	0.591
135	6.879	0.891	4.198	2.910	1.264	3.766	2.611	1.134	0.812	0.728
136	5.073	0.460	1.886	1.307	0.568	1.824	1.264	0.549	0.359	0.348
137	5.887	0.421	1.773	1.229	0.534	1.739	1.206	0.524	0.316	0.310
141	4.555	0.269	1.218	0.844	0.367	1.172	0.812	0.353	0.237	0.228
142	7.351	0.922	4.333	3.004	1.304	4.159	2.883	1.252	0.772	0.741
143	10.750	0.838	3.717	2.577	1.119	3.636	2.520	1.095	0.580	0.567
144	16.943	0.953	5.240	3.632	1.577	5.094	3.531	1.533	0.745	0.724
145	7.105	0.885	4.104	2.845	1.236	3.915	2.713	1.178	0.743	0.709
146	7.423	0.926	4.344	3.011	1.308	4.180	2.897	1.258	0.770	0.741

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
147	12.340	0.802	3.536	2.451	1.065	3.488	2.418	1.050	0.524	0.516
148	14.421	0.937	4.913	3.405	1.479	4.788	3.319	1.441	0.722	0.703
149	15.046	0.947	5.135	3.560	1.546	4.951	3.432	1.491	0.757	0.730
150	12.391	0.790	3.454	2.394	1.040	3.380	2.343	1.017	0.519	0.508
151	7.044	0.926	4.372	3.030	1.316	4.184	2.900	1.259	0.791	0.757
152	4.548	0.680	2.745	1.903	0.826	2.607	1.807	0.785	0.565	0.537
158	4.391	0.892	3.739	2.592	1.126	3.417	2.369	1.029	0.827	0.755
160	8.903	0.611	2.817	1.953	0.848	2.700	1.871	0.813	0.470	0.450
161	9.492	0.951	4.928	3.416	1.483	4.593	3.184	1.383	0.845	0.787
162	6.882	0.909	4.186	2.901	1.260	3.867	2.680	1.164	0.792	0.732
163	4.412	0.888	3.728	2.584	1.122	3.517	2.438	1.059	0.793	0.748
164	5.040	0.919	4.062	2.816	1.223	3.634	2.519	1.094	0.875	0.783
165	6.203	0.930	4.335	3.005	1.305	3.943	2.733	1.187	0.859	0.782
166	5.792	0.929	4.243	2.941	1.277	3.917	2.715	1.179	0.849	0.783
167	6.339	0.934	4.343	3.010	1.307	3.782	2.622	1.139	0.885	0.771
168	7.781	0.906	4.328	3.000	1.303	4.116	2.853	1.239	0.767	0.729

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
188	7.637	0.593	2.388	1.655	0.719	2.346	1.626	0.706	0.398	0.391
189	4.669	0.611	1.895	1.314	0.570	1.835	1.272	0.553	0.372	0.361
190	4.473	0.502	1.388	0.962	0.418	1.367	0.948	0.412	0.265	0.260
191	5.883	0.793	2.888	2.002	0.869	2.802	1.942	0.844	0.536	0.520
192	5.036	0.559	1.747	1.211	0.526	1.722	1.194	0.518	0.322	0.317
193	5.337	0.683	2.378	1.648	0.716	2.336	1.619	0.703	0.438	0.430
194	4.498	0.401	1.119	0.775	0.337	1.106	0.766	0.333	0.209	0.206
195	9.977	0.937	4.727	3.277	1.423	4.533	3.142	1.365	0.777	0.745
196	6.042	0.861	3.731	2.586	1.123	3.469	2.404	1.044	0.727	0.676
197	8.477	0.914	4.513	3.128	1.359	4.235	2.935	1.275	0.792	0.743
198	7.401	0.841	3.815	2.644	1.148	3.588	2.487	1.080	0.691	0.650
199	7.474	0.897	4.232	2.934	1.274	4.004	2.775	1.205	0.762	0.721
200	7.563	0.871	4.079	2.827	1.228	3.843	2.664	1.157	0.734	0.692
201	6.265	0.866	3.818	2.846	1.149	3.565	2.471	1.073	0.733	0.684
202	7.104	0.901	4.215	2.921	1.269	3.931	2.725	1.183	0.782	0.729
203	5.295	0.901	3.968	2.750	1.194	3.689	2.557	1.111	0.809	0.752

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
204	5.306	0.697	3.068	2.126	0.923	2.890	2.004	0.870	0.576	0.543
205	6.328	0.621	2.753	1.908	0.829	2.578	1.787	0.776	0.517	0.484
206	6.342	0.910	4.120	2.855	1.240	3.898	2.702	1.173	0.779	0.737
207	8.837	0.838	4.034	2.796	1.214	3.828	2.653	1.152	0.689	0.653
208	10.294	0.927	4.726	3.276	1.423	4.494	3.115	1.353	0.776	0.738
209	11.000	0.756	3.563	2.470	1.073	3.435	2.381	1.034	0.562	0.542
214	6.965	0.455	1.993	1.382	0.600	1.964	1.361	0.591	0.336	0.331
215	7.039	0.778	3.428	2.376	1.032	3.331	2.309	1.003	0.601	0.584
216	3.464	0.665	2.501	1.734	0.753	2.332	1.616	0.702	0.579	0.540
217	2.175	0.477	1.742	1.207	0.524	1.630	1.130	0.491	0.471	0.440
218	2.602	0.701	2.344	1.624	0.705	2.199	1.524	0.662	0.600	0.563
219	2.421	0.787	2.724	1.888	0.820	2.530	1.753	0.761	0.736	0.684
220	2.054	0.560	1.764	1.223	0.531	1.653	1.146	1.498	0.492	0.461
221	10.445	0.844	3.861	2.676	1.162	3.755	2.603	1.130	0.612	0.596
222	5.197	0.457	1.952	1.353	0.588	1.859	1.288	0.560	0.378	0.360
223	5.888	0.409	1.803	1.250	1.543	1.736	1.203	0.523	0.330	0.318

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
226	5.862	0.353	1.581	1.096	0.476	1.510	1.047	0.455	0.291	0.278
228	5.106	0.394	1.692	1.172	0.509	1.621	1.123	0.488	0.325	0.311
230	5.765	0.375	1.653	1.146	0.498	1.587	1.100	0.478	0.305	0.293
232	6.413	0.737	3.188	2.210	0.960	3.032	2.102	0.913	0.591	0.562
234	6.795	0.445	2.002	1.388	0.603	1.919	1.330	0.578	0.355	0.340
236	6.100	0.322	1.532	1.062	0.461	1.460	1.012	0.440	0.279	0.266
238	6.119	0.584	2.559	1.773	0.770	2.428	1.683	0.731	0.478	0.453
240	5.477	0.340	1.543	1.069	0.464	1.473	1.021	0.444	0.290	0.277
241	5.546	0.347	1.567	1.086	0.472	1.514	1.050	0.456	0.289	0.279
242	6.162	0.424	1.883	1.305	0.567	1.811	1.256	0.545	0.341	0.323
246	6.577	0.853	3.749	2.598	1.128	3.520	2.440	1.060	0.704	0.661
248	7.271	0.695	3.030	2.100	0.912	2.885	1.999	0.868	0.504	0.514
249	6.719	0.907	4.067	2.819	1.224	3.787	2.625	1.140	0.769	0.717
251	7.126	0.631	2.738	1.898	0.824	2.600	1.802	0.783	0.490	0.466
253	6.952	0.502	2.252	1.561	0.678	2.172	1.506	0.654	0.395	0.381
256	6.898	0.875	3.844	2.655	1.157	3.589	2.488	1.080	0.718	0.670

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
278	3.747	0.691	2.448	1.697	0.737	2.371	1.644	0.714	0.521	0.504
279	3.128	0.479	1.593	1.104	0.479	1.547	1.072	0.466	0.352	0.342
280	4.426	0.719	2.443	1.693	0.735	2.397	1.661	0.722	0.480	0.471
281	4.153	0.631	2.173	1.506	0.654	2.099	1.455	0.632	0.447	0.432
282	4.672	0.506	2.110	1.462	0.653	2.049	1.420	0.617	0.411	0.399
283	3.901	0.908	3.611	2.503	1.087	2.843	1.971	0.856	0.948	0.747
284	12.178	0.840	3.877	2.687	1.167	3.769	2.613	1.135	0.591	0.575
285	10.401	0.597	2.816	1.952	0.848	2.739	1.899	0.825	0.442	0.430
286	7.902	0.446	1.995	1.383	0.600	1.937	1.343	0.583	0.334	0.324
287	5.459	0.609	2.222	1.540	0.669	2.175	1.508	0.655	0.410	0.401
288	6.134	0.206	0.946	0.656	0.285	0.929	0.644	0.280	0.163	0.160
293	4.147	0.656	2.390	1.657	0.720	2.265	1.570	0.682	0.509	0.482
297	5.439	0.581	2.517	1.745	0.758	2.387	1.655	0.719	0.487	0.462
298	4.632	0.364	1.599	1.108	0.481	1.527	1.058	0.460	0.298	0.285
299	4.689	0.863	3.544	2.456	1.067	3.201	2.219	0.964	0.773	0.698
300	4.700	0.362	1.587	1.100	0.478	1.518	1.052	0.457	0.312	0.298

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
302	4.661	0.292	1.313	0.910	0.395	1.266	0.877	0.381	0.254	0.245
303	5.621	0.279	1.292	0.896	0.389	1.245	0.863	0.375	0.237	0.228
308	5.208	0.618	2.591	1.796	0.780	2.441	1.692	0.735	0.514	0.484
310	4.271	0.462	1.890	1.310	0.569	1.800	1.248	0.542	0.389	0.370
312	4.379	0.882	3.578	2.480	1.077	3.228	2.237	0.972	0.802	0.724
313	3.990	0.808	3.078	2.133	0.926	2.849	1.975	0.858	0.690	0.639
315	5.232	0.801	3.189	2.211	0.960	2.928	2.030	0.882	0.657	0.603
316	4.913	0.514	2.049	1.420	0.617	1.947	1.349	0.586	0.406	0.386
319	4.597	0.820	3.168	2.196	0.954	2.910	2.017	0.876	0.682	0.627
324	7.091	0.541	2.412	1.672	0.726	2.315	1.605	0.697	0.425	0.408
325	9.660	0.694	3.091	2.143	0.931	2.971	2.059	0.894	0.504	0.485
330	3.643	0.803	2.966	2.056	0.893	2.707	1.876	0.815	0.698	0.637
332	4.846	0.782	3.073	2.130	0.925	2.859	1.982	0.861	0.639	0.595
335	3.822	0.826	3.155	2.187	0.950	2.834	1.965	0.853	0.743	0.667
336	4.289	0.862	3.464	2.401	1.043	3.182	2.206	0.958	0.766	0.704
343	5.200	0.882	3.735	2.589	1.124	3.289	2.279	0.990	0.804	0.708

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
345	4.879	0.782	3.165	2.194	0.953	2.690	1.865	0.810	0.710	0.603
346	5.690	0.787	3.241	2.246	0.976	3.004	2.082	0.904	0.642	0.596
347	2.875	0.714	2.560	1.775	0.771	2.285	1.584	0.688	0.673	0.600
348	4.080	0.883	3.560	2.468	1.072	3.291	2.281	0.991	0.798	0.738
349	3.850	0.767	2.858	1.981	0.860	2.696	1.869	0.812	9.632	0.596
350	4.455	0.340	1.493	1.035	0.449	1.435	0.995	0.432	0.296	0.284
351	6.392	0.361	1.633	1.132	0.492	1.560	1.082	0.470	0.294	0.281
352	5.113	0.473	2.038	1.413	0.614	1.924	1.334	0.579	0.401	0.378
353	5.168	0.492	2.033	1.409	0.612	1.902	1.318	0.573	0.403	0.377
354	4.779	0.421	1.802	1.249	0.542	1.713	1.188	0.516	0.357	0.340
356	4.724	0.752	3.071	2.128	0.924	2.901	2.011	0.873	0.632	0.597
357	6.904	0.826	3.523	2.442	1.061	3.340	2.315	1.005	0.645	0.612
358	6.052	0.865	3.751	2.600	1.129	3.539	2.453	1.065	0.720	0.679
359	3.411	0.757	2.745	1.903	0.826	2.508	1.739	0.755	0.658	0.602
360	3.973	0.165	0.726	0.503	0.219	0.700	0.485	0.211	0.145	0.140
361	4.427	0.270	1.226	0.850	0.369	1.172	0.812	0.353	0.243	0.232

Table C-IIIA (Continued)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
362	4.591	0.697	2.618	1.815	0.788	2.459	1.704	0.740	0.545	0.512
364	7.367	0.884	3.804	2.637	1.145	3.684	2.554	1.109	0.667	0.646
365	5.719	0.851	3.759	2.606	1.132	3.573	2.477	1.076	0.727	0.691
366	5.116	0.858	3.677	2.548	1.107	3.251	2.253	0.979	0.792	0.700
367	5.414	0.920	4.070	2.821	1.225	3.473	2.407	1.046	0.888	0.758
368	5.757	0.922	4.140	2.870	1.246	3.754	2.602	1.130	0.844	0.765
369	5.278	0.886	3.874	2.685	1.166	3.439	2.384	1.035	0.824	0.732
370	5.223	0.873	3.709	2.571	1.116	3.254	2.255	0.979	0.799	0.701
371	5.381	0.915	4.078	2.826	1.227	3.698	2.563	1.113	0.848	0.769
372	5.472	0.921	4.149	2.876	1.249	3.740	2.592	1.126	0.863	0.778
373	6.123	0.887	3.901	2.704	1.174	3.435	2.381	1.034	0.795	0.700
374	7.145	0.609	2.730	1.893	0.822	2.601	1.803	0.783	0.486	0.453
375	6.330	0.491	2.211	1.533	0.666	2.114	1.465	0.636	0.403	0.385
376	6.701	0.675	3.056	2.118	0.920	2.860	1.982	0.861	0.567	0.530
377	6.417	0.846	3.844	2.664	1.157	3.613	2.504	1.088	0.727	0.684
378	4.965	0.922	4.017	2.784	1.209	3.509	2.432	1.056	0.888	0.776

Table C-IIIA (Concluded)

Station	SR	SD	HPR(2)	HPR(E)	HPR(10)	H(2)	H(E)	H(10)	JPR(2)	J(2)
380	6.794	0.854	3.970	2.752	1.195	3.764	2.609	1.133	0.732	0.694
381	6.987	0.732	3.382	2.344	1.018	3.228	2.237	0.972	0.609	0.581
382	7.887	0.863	4.108	2.848	1.237	3.918	2.716	1.179	0.721	0.687
383	6.842	0.854	3.694	2.560	1.112	3.429	2.377	1.032	0.694	0.644
384	6.757	0.849	3.708	2.571	1.116	3.454	2.394	1.040	0.697	0.649
385	6.069	0.835	3.698	2.564	1.113	3.480	2.412	1.048	0.710	0.668
386	6.913	0.853	3.785	2.624	1.139	3.473	2.407	1.045	0.716	0.657
387	5.985	0.891	3.933	2.726	1.184	3.644	2.526	1.097	0.773	0.716
388	6.411	0.861	3.847	2.666	1.158	3.615	2.505	1.088	0.728	0.684
389	7.149	0.891	4.105	2.845	1.236	3.842	2.663	1.157	0.756	0.708
390	8.305	0.907	4.304	2.984	1.296	4.097	2.840	1.233	0.748	0.712
391	7.044	0.878	3.997	2.771	1.203	3.779	2.619	1.138	0.732	0.692

Table C-IIIB

Density, number of species, and Biomass/m^2 for each macrofauna station.

Station	Indiv./m^2	Species	Biomass/m^2
47	3076	98	5.7758
48	1848	83	5.1538
49	876	50	1.2168
50	392	45	0.6674
51	496	36	2.1110
52	612	50	1.1184
53	2856	56	23.4144
54	5040	125	17.5742
55	5050	117	9.5480
56	4788	79	34.4360
57	734	45	1.2338
58	362	32	1.1116
59	230	19	1.2574
60	544	34	1.3540
61	604	27	0.7912
62	518	22	4.0970
63	328	22	2.1262
64	460	36	4.2198
65	13420	75	49.7243
66	6016	82	31.4980
67	5386	104	10.0856

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
68	3644	111	10.5004
69	5228	84	27.0502
70	8156	69	37.8773
71	194	25	1.3332
72	282	33	2.1374
73	470	36	3.6486
74	308	27	1.8482
75	1222	39	3.4662
76	726	34	3.7990
77	220	16	1.9128
78	576	28	3.4388
79	360	12	3.6200
80	262	25	1.7970
81	348	21	3.5076
82	302	22	3.4174
83	346	20	3.5292
84	398	20	2.7778
85	562	27	5.8410
86	244	20	2.0442
87	606	31	5.6492
88	2260	44	6.2638
89	2582	44	36.0316
90	2300	48	10.9624
91	20488	40	22.3042

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
92	780	25	3.7028
93	394	28	1.9204
94	264	25	1.9808
95	5188	66	19.2084
96	8570	73	39.6350
97	4426	98	9.3643
98	6292	106	10.9820
99	8306	88	42.0925
100	4712	64	19.6396
101	4124	39	3.4114
102	678	23	3.7268
103	4860	29	2.8828
104	366	38	1.3976
105	520	48	1.6470
106	504	38	1.7966
107	458	34	1.9298
111	826	29	0.6476
112	580	22	0.5182
113	94	12	0.2824
114	280	21	0.6632
115	108	18	0.8110
116	234	22	2.0396
117	340	35	1.9650
118	466	33	3.3754

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
119	280	22	1.5960
120	702	48	1.7716
121	196	16	1.8456
122	560	35	1.6922
123	334	29	1.4008
124	340	21	1.7602
125	218	14	1.9994
126	1450	56	4.2782
127	950	41	1.6794
128	380	36	1.3540
129	254	23	2.3270
130	280	22	1.9118
131	250	19	1.7148
132	406	23	4.1502
133	496	23	4.5220
134	246	24	2.1006
135	324	36	2.2148
136	2942	38	2.5162
137	6950	49	4.4848
141	3488	35	2.9864
142	1370	49	2.5250
143	8264	85	15.9813
144	7178	131	10.9714
145	1126	46	1.7278

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m2
146	1472	50	2.2604
147	11660	108	10.7238
148	7354	112	14.6613
149	4676	100	9.8605
150	10682	101	10.5598
151	1190	46	1.6640
152	944	29	1.2118
158	300	23	0.5476
160	2960	64	23.9885
161	730	57	1.2896
162	500	39	1.0354
163	578	26	0.9414
164	234	25	0.7436
165	348	33	1.4096
166	422	32	1.0586
167	194	30	1.3140
168	1086	50	2.9556
169	2352	61	13.7906
173	374	22	2.6316
174	644	26	3.6262
175	26320	48	1.5858
176	27782	50	12.9752
177	43802	45	11.9920
178	2368	26	4.2732

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
179	8968	35	6.8374
180	1144	37	3.2452
181	12124	49	5.9090
182	6956	60	8.4408
182	922	53	1.5952
184	832	16	1.1374
185	1500	35	4.2178
186	9454	42	10.9960
187	3436	46	5.1860
188	7654	64	52.2932
189	2346	34	4.9940
190	7826	38	13.3060
191	2128	42	9.7246
192	8370	43	23.9742
193	5234	43	118.2954
194	14556	41	23.1216
195	1650	68	1.9506
196	556	35	3.1810
197	820	52	1.9728
198	874	46	1.3334
199	942	47	2.4080
200	876	47	2.5800
201	626	37	1.7180
202	802	42	1.8898

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
203	478	30	1.0848
204	970	40	1.9394
205	1188	40	1.0548
206	800	39	3.0786
207	1266	58	2.2134
208	1342	68	2.4654
209	2880	81	18.5452
214	11018	61	35.1914
215	2802	52	5.7724
216	482	20	1.1456
217	498	13	0.6968
218	434	15	0.7142
219	284	13	0.4108
220	424	12	0.9504
221	3502	79	2.9180
222	1682	36	2.4902
223	2968	44	2.2998
226	2586	43	2.4572
228	2308	37	4.1524
230	2918	43	3.6720
232	1196	42	1.5784
234	2708	50	2.6904
236	2714	45	2.2974
238	1380	41	1.8392

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
240	3092	40	2.1084
241	3892	43	1.9948
242	2970	46	4.1384
246	752	40	3.3912
248	1472	49	3.2412
249	572	39	1.8780
251	1464	48	1.5018
253	3070	52	3.2844
256	660	41	2.1844
259	3378	52	2.9692
261	3306	50	3.4034
262	3338	49	2.5380
264	2350	42	2.0454
266	3950	57	2.4444
267	3736	57	3.5886
268	2692	46	1.4866
269	4362	46	1.3510
270	6950	51	2.1540
271	3118	39	1.7682
272	892	37	1.8036
273	2786	36	7.1870
274	3126	36	17.3958
275	1310	27	32.7444
276	1922	39	45.0134

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
277	2894	27	53.9304
278	1580	26	30.5072
279	2266	23	62.0158
280	4322	34	73.0873
281	2118	29	29.7808
282	2896	35	9.5252
283	56	14	0.1612
284	4146	94	22.6546
285	5310	83	2.0558
286	5114	63	2.0210
287	4392	43	13.6666
288	15670	56	25.1282
293	830	26	2.0946
297	1246	36	1.8320
298	2428	41	2.8772
299	270	24	1.2906
300	2242	34	1.4676
302	3648	36	2.4482
303	4202	44	2.0492
308	932	33	1.8282
310	1406	29	1.4542
312	242	22	0.9440
313	396	22	1.2776
315	422	29	1.1746

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
316	1348	33	2.1440
319	370	25	1.0062
324	2308	51	1.7382
325	2530	70	24.8204
330	350	19	1.4008
332	526	28	2.7948
335	222	19	1.5616
336	338	23	1.4060
343	202	25	1.2062
345	148	22	1.6104
346	554	33	1.5344
347	184	14	1.3558
348	344	22	1.6654
349	606	23	0.6378
350	2634	33	2.8448
351	2670	47	1.4116
352	1588	34	1.2284
353	978	33	1.5402
354	1618	33	1.7022
356	750	29	1.1032
357	1014	44	3.5274
358	766	37	11.2380
359	292	18	2.0092
360	4890	32	5.1258

Table C-IIIB (Continued)

Station	Indiv./m^2	Species	Biomass/m^2
361	2754	33	4.3550
362	716	28	4.3700
364	2030	52	8.7600
365	910	36	6.0460
366	218	25	3.1920
367	176	24	0.4388
368	308	30	1.6104
369	286	26	1.3112
370	198	25	1.0784
371	302	28	2.7152
372	278	28	1.3738
373	228	30	0.5786
374	1654	49	1.8262
375	2088	45	2.0020
376	908	42	1.6968
377	746	39	1.1582
378	168	23	0.7684
380	968	43	2.0358
381	1446	47	2.5378
382	1286	52	2.2990
383	748	40	20.0198
384	642	40	1.2362
385	754	37	1.0252
386	488	39	0.9384

Table C-IIIB (concluded)

Station	Indiv./m^2	Species	Biomass/m^2
387	496	34	1.4614
388	750	39	0.9964
389	712	43	2.2810
390	1182	54	1.3676
391	896	44	2.2886

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411 p. : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; D-77-30, Appendix C)

Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Contract No. DACW57-75-C-0137 and DACW57-76-C-0092 (DMRP Work Unit No. 1A07C)

Tables C-IA, C-IB, C-IIB, and C-IIC on microfiche in pocket.

References: p. 203-208.

1. Benthos. 2. Columbia River disposal site. 3. Disposal areas. 4. Dredged material disposal. 5. Field investigations.

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6. Sediment. I. Carey, Andrew G., joint author. II. Colgate, William A., joint author. III. United States. Army. Corps of Engineers. IV. Oregon. State University, Corvallis. School of Oceanography. V. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; D-77-30, Appendix C.

TA7.W34 no.D-77-30 Appendix C

☆U.S. GOVERNMENT PRINTING OFFICE: 1978-740-307 3807REGION NO. 4

TO TIC FOR MICROFICHING 24 Jan 1978

REPORT TITLE Aquatic Disposal Field Investigations, Columbia River Disposal Site, Oregon; The Effects of Dredged Material Disposal on Benthic Assemblages

Tables C-1A, C-1B, C-11B, and C-11C

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Table C-IA. Station Data for Smith-McIntyre Grab Samples

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
1	1	C7409A	46° 06.0'	124° 13.0'	1 Oct 74	07:15	88	--	--	1.0	
2	2	"	46° 06.0'	124° 08.0'	"	07:46	70	--	--	"	
3	3	"	46° 06.0'	124° 04.5'	"	08:10	49	--	--	"	
4	4	"	46° 06.0'	124° 01.0'	"	08:35	30	--	--	"	
5	5	"	46° 06.0'	123° 58.5'	"	08:54	15	--	--	"	
6	6	"	46° 08.0'	124° 02.0'	"	09:15	26	--	--	"	
7	7	"	46° 08.0'	124° 03.0'	"	09:28	31	--	--	"	
8	8	"	46° 08.0'	124° 04.0'	"	09:42	36	--	--	"	
9	9	"	46° 08.0'	124° 05.0'	"	09:57	42	--	--	"	
10	10	"	46° 08.0'	124° 06.0'	"	10:08	48	--	--	"	
11	11	"	46° 09.0'	124° 00.5'	"	10:39	18	--	--	"	
12	12	"	46° 09.0'	124° 04.5'	"	11:02	35	--	--	"	
13	13	"	46° 09.0'	124° 07.5'	"	11:21	51	--	--	"	
14	14	"	46° 09.0'	124° 10.5'	"	11:41	70	--	--	"	
15	15	"	46° 09.0'	124° 14.0'	"	12:17	81	--	--	"	
16	16	"	46° 12.0'	124° 14.5'	"	12:41	77	--	--	"	
17	17	"	46° 12.0'	124° 12.0'	"	13:01	62	--	--	"	
18	18	"	46° 12.0'	124° 09.0'	"	13:21	40	--	--	"	
19	19	"	46° 12.0'	124° 06.5'	"	13:36	26	--	--	"	
20	20	"	46° 12.0'	124° 02.5'	"	14:03	15	--	--	"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
21	21	C7409A	46° 16.0'	124° 08.0'	1 Oct 74	15:01	12	--	--	1.0	
22	22	"	46° 16.0'	124° 10.0'	"	15:14	26	--	--	"	
23	23	"	46° 16.0'	124° 12.0'	"	15:25	45	--	--	"	
24	24	"	46° 16.0'	124° 14.5'	"	13:46	63	--	--	"	
25	25	"	46° 16.0'	124° 17.0'	"	16:16	88	--	--	"	
26	26	"	46° 15.0'	124° 11.25'	2 Oct 74	12:58	46	--	--	"	
27	27	"	46° 14.5'	124° 11.25'	"	13:23	48	--	--	"	
28	28	"	46° 14.5'	124° 10.75'	"	13:35	48	--	--	"	
29	29	"	46° 14.5'	124° 10.5'	"	13:43	39	--	--	"	
30	30	"	46° 14.0'	124° 11.25'	"	14:05	50	--	--	"	
31	31	"	46° 14.0'	124° 10.75'	"	14:17	44	--	--	"	
32	32	"	46° 14.0'	124° 10.25'	"	14:27	28	--	--	"	
33	33	"	46° 14.0'	124° 10.0'	"	14:37	27	--	--	"	
34	34	"	46° 14.0'	124° 09.25'	"	14:47	25	--	--	"	
35	35	"	46° 13.5'	124° 11.25'	"	15:13	55	--	--	"	
36	36	"	46° 13.5'	124° 10.25'	"	15:40	39	--	--	"	
37	37	"	46° 13.5'	124° 09.75'	"	15:46	33	--	--	"	
38	38	"	46° 13.5'	124° 09.5'	"	16:05	29	--	--	"	
39	39	"	46° 13.5'	124° 09.0'	"	16:15	27	--	--	"	
40	40	"	46° 13.0'	124° 10.25'	"	16:34	49	--	--	"	

tation No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
41	41	C7409A	46° 13.0'	124° 10.0'	2 Oct 74	16:50	41	--	--	1.0	
42	42	"	46° 13.0'	124° 09.5'	"	17:00	38	--	--	"	
43	43	"	46° 13.0'	124° 09.0'	"	17:10	33	--	--	"	
44	44	"	46° 12.5'	124° 09.5'	"	17:25	38	--	--	"	
45	45	"	46° 12.5'	124° 09.0'	"	17:30	37	--	--	"	
46	46	"	46° 12.5'	124° 08.25'	"	17:40	32	--	--	"	
47	47	C7412B	46° 06.0'	124° 12.9'	4 Dec 74	18:57	91	3,900		"	
	48	"	"	"	"	19:29	"	5,800		"	
	49	"	"	"	"	19:57	88	6,700		"	
	50	"	"	"	"	20:09	"	8,000		"	
	51	"	"	"	"	20:20	"	7,500		"	
	52	"	"		"	20:50	"	--	sand	--	Geological
48	53	"	46° 06.0'	124° 08.0'	"	21:28	70	5,600		1.0	
	54	"	"	"	"	21:36	"	2,500		"	
	55	"	"	"	"	21:45	"	2,500		"	
	56	"	"	"	"	21:53	"	3,100		"	
	57	"	"	"	"	22:00	"	3,100		"	
	58	"	"	"	"	22:08	"	--	sand	--	Geological
49	59	"	46° 06.0'	124° 04.5'	"	22:36	46	3,500		1.0	
	60	"	"	"	"	22:44	"	2,600		"	

Station No.	S-N Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
49	61	C7412B	46° 06.0'	124° 04.5'	4 Dec 74	22:49	46	3,600		1.0	
	62	"	"	"	"	23:02	"	3,600		"	
	63	"	"	"	"	23:09	"	2,900		"	
	64	"	"	"	"	23:14	"	--	sand	--	Geological
50	65	"	46° 06.0'	124° 01.0'	"	23:40	29	1,500		1.0	
	66	"	"	"	"	23:48	"	1,800		"	
	67	"	"	"	"	23:54	"	1,800		"	
	68	"	"	"	5 Dec 74	00:18	"	5,500		"	
	69	"	"	"	"	00:26	"	4,000		"	
	70	"	"	"	"	00:34	"	--	sand	--	Geological
51	71	"	46° 09.0'	124° 04.5'	"	01:11	31	6,100		1.0	
	72	"	"	"	"	01:21	"	5,000		"	
	73	"	"	"	"	01:30	"	5,500		"	
	74	"	"	"	"	01:37	"	5,500		"	
	75	"	"	"	"	01:45	"	5,300		"	
	76	"	"	"	"	01:52	"	--	sand	--	Geological
52	77	"	46° 09.0'	124° 07.5'	"	03:08	47	6,000		1.0	
	78	"	"	"	"	03:16	"	3,000		"	
	79	"	"	"	"	03:32	"	7,400		"	
	80	"	"	"	"	03:40	"	4,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
52	81	C7412B	46° 09.0'	124° 07.5'	5 Dec 74	03:49	47	5,300		1.0	
	82	"	"	"	"	03:59	"	--	sand	--	Geological
53	83	"	46° 09.0'	124° 10.5'	"	04:35	70	7,400		1.0	
	84	"	"	"	"	04:54	"	4,600		"	
	85	"	"	"	"	05:19	"	4,000		"	
	86	"	"	"	"	05:29	"	6,300		"	
	87	"	"	"	"	05:49	"	6,000		"	
	88	"	"	"	"	05:58	"	--	sand	--	Geological
54	89	"	46°09.0'	124° 13.9'	"	06:43	86	11,900		1.0	
	90	"	"	"	"	06:51	"	11,900		"	
	91	"	"	"	"	07:02	"	11,900		"	
	92	"	"	"	"	07:12	"	7,400		"	
	93	"	"	"	"	07:26	"	11,400		"	
	94	"	"	"	"	07:35	"	--	silty-sand	--	Geological
55	95	"	46° 12.0'	124° 14.6'	"	08:03	77	5,000		1.0	
	96	"	"	"	"	08:14	"	3,600		"	
	97	"	"	"	"	08:22	"	5,000		"	
	98	"	"	"	"	08:29	"	5,500		"	
	99	"	"	"	"	08:36	"	2,600		"	
	100	"	"	"	"	08:44	"	--	sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
56	101	C7412B	46° 12.0'	124° 12.0'	5 Dec 74	09:09	62	5,300		1.0	
	102	"	"	"	"	09:16	"	1,700		"	
	103	"	"	"	"	09:25	"	6,000		"	
	104	"	"	"	"	09:32	"	5,500		"	
	105	"	"	"	"	09:40	"	3,600		"	
	106	"	"	"	"	09:48	"	--	sand	--	Geological
57	107	"	46° 12.0'	124° 09.0'	"	10:09	40	1,700		1.0	
	108	"	"	"	"	10:16	"	1,700		"	
	109	"	"	"	"	10:23	"	6,700		"	
	110	"	"	"	"	10:28	"	4,200		"	
	111	"	"	"	"	10:38	"	3,400		"	
	112	"	"	"	"	10:46	"	--	sand	--	Geological
58	113	"	46° 12.0'	124° 06.5'	"	11:08	27	2,600		1.0	
	114	"	"	"	"	11:13	"	1,700		"	
	115	"	"	"	"	11:18	"	3,200		"	
	116	"	"	"	"	11:23	"	3,400		"	
	117	"	"	"	"	11:28	"	3,000		"	
	118	"	"	"	"	11:33	"	--	sand	--	Geological
59	119	"	46° 12.0'	124° 02.5'	"	12:02	16	2,300		1.0	
	120	"	"	"	"	12:08	"	5,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
59	121	C7412B	46° 12.0'	124° 02.5'	5 Dec 74	12:13	16	3,400		1.0	
	122	"	"	"	"	12:20	"	3,000		"	
	123	"	"	"	"	12:24	"	3,600		"	
	124	"	"	"	"	12:28	"	--	sand	--	Geological
60	125	"	46° 09.0'	124° 00.5'	"	12:58	20	3,000		1.0	
	126	"	"	"	"	13:02	"	3,000		"	
	127	"	"	"	"	13:06	"	4,400		"	
	128	"	"	"	"	13:10	"	5,000		"	
	129	"	"	"	"	13:14	"	2,000		"	
	130	"	"	"	"	13:19	"	--	sand	--	Geological
61	131	"	46° 06.0'	123° 58.5'	"	13:53	18	3,200		1.0	
	132	"	"	"	"	13:58	"	3,600		"	
	133	"	"	"	"	14:05	"	3,200		"	
	134	"	"	"	"	14:09	"	3,400		"	
	135	"	"	"	"	14:13	"	4,000		"	
	136	"	"	"	"	14:18	"	--	sand	--	Geological
62	137	"	46° 13.0'	124° 07.0'	"	15:20	24	3,200		1.0	
	138	"	"	"	"	15:30	"	5,000		"	
	139	"	"	"	"	15:35	"	4,000		"	
	140	"	"	"	"	15:39	"	3,400		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
62	141	C7412B	46° 13.0'	124° 07.0'	5 Dec 74	15:42	24	4,600		1.0	
	142	"	"	"	"	15:46	"	--	sand	--	Geological
63	143	"	46° 13.9'	124° 08.0'	"	16:02	17	6,700		1.0	
	144	"	"	"	"	16:13	"	4,600		"	
	145	"	"	"	"	16:20	"	6,500		"	
	146		"	"	"	16:24	"	6,700		"	
	147		"	"	"	16:29	"	7,000		"	
	148			"	"	16:37	"	--	sand	--	Geological
64	149		46° 14.0'	124° 09.5'	"	16:52	29	8,400		1.0	
	150		"	"	"	16:58	"	6,300		"	
	151	"	"	"	"	17:04	"	8,400		"	
	152	"	"	"	"	17:11	"	10,300		"	
	153	"	"	"	"	17:17	35	6,700		"	
	154	"	"	"	"	17:25	"	--	sand	--	Geological
65	155	"	46° 14.0'	124° 11.0'	"	17:39	49	12,700		1.0	
	156	"	"	"	"	17:47	"	13,800		"	
	157	"	"	"	"	17:53	"	13,600		"	
	158	"	"	"	"	18:16	"	12,700		"	
	159	"	"	"	"	18:25	"	9,300		"	
	160	"	"	"	"	18:37	"	--	sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
66	161	C7412B	46° 14.0'	124° 13.5'	5 Dec 74	18:58	66	9,300		1.0	
	162	"	"	"	"	19:05	"	9,700		"	
	163	"	"	"	"	19:13	"	9,300		"	
	164	"	"	"	"	19:21	"	10,000		"	
	165	"	"	"	"	19:29	"	7,600		"	
	166	"	"	"	"	19:39	"	--	sand	--	Geological
67	[illegible]	"	46° 14.0'	124° 16.0'	"	20:44	81	11,600		1.0	
	[illegible]	"	"	"	"	20:51	"	12,700		"	
	[illegible]	"	"	"	"	21:00	"	11,400		"	
	[illegible]	"	"	"	"	21:07	"	10,500		"	
	[illegible]	"	"	"	"	21:15	"	11,900		"	
	[illegible]	"	"	"	"	21:24	"	--	sand	--	Geological
68	173	"	46° 13.0'	124° 15.5'	"	21:46	82	11,400		1.0	
	174	"	"	"	"	21:54	"	8,800		"	
	175	"	"	"	"	22 02	"	8,800		"	
	176	"	"	"	"	22:10	"	9,700		"	
	177	"	"	"	"	22:18	"	13,000		"	
	178	"	"	"	"	22:26	"	--	silty-sand	--	Geological
69	179	"	46° 13.0'	124° 13.5'	"	23:00	68	10,000		1.0	
	180	"	"	"	"	23:07	"	8,800		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
69	181	C7412B	46° 13.0'	124° 13.5'	5 Dec 74	23:17	68	6,300		1.0	
	182	"	"	"	"	23:25	"	7,000		"	
	183	"	"	"	"	23:31	"	8,800		"	
	164	"	"	"	"	23:44	"	--	sand	--	Geological
70	185	"	46° 13.0'	124° 11.0'	6 Dec 74	00:31	51	9,700		1.0	
	186	"	"	"	"	00:40	"	7,600		"	
	187	"	"	"	7 Dec 74	08:11	48	8,400		"	
	186	"	"	"	"	08:18	50	8,600		"	
	189	"	"	"	"	09:27	49	9,500		"	
	190	"	"	"	"	08:32	"	--	sand	--	Geological
71	191	"	46° 13.0'	124° 09.0'	"	08:57	31	5,500		1.0	
	192	"	"	"	"	09:00	"	4,400		"	
	193	"	"	"	"	09:04	"	6,700		"	
	194	"	"	"	"	09:09	"	4,000		"	
	195	"	"	"	"	09:15	"	5,300		"	
	196	"	"	"	"	09:19	"	--	sand	--	Geological
72	197	"	46° 13.0'	124° 08.5'	"	09:52	26	3,200		1.0	
	198	"	"	"	"	09:56	"	5,300		"	
	199	"	"	"	"	10:06	"	4,000		"	
	200	"	"	"	"	10:08	"	5,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
72	201	C7412B	46° 13.0'	124° 08.5'	7 Dec 74	10:13	26	5,600		1.0	
	202	"	"	"	"	10:17	"	--	sand	--	Geological
73	203	"	46° 13.0'	124° 09.0'	"	10:26	33	5,300		1.0	
	204	"	"	"	"	10:32	"	4,000		"	
	205	"	"	"	"	10:38	"	7,400		"	
	206	"	"	"	"	10:42	"	6,200		"	
	207	"	"	"	"	10:46	"	6,700		"	
	208	"	"	"	"	10:53	"	--	sand	--	Geological
74	209	"	46° 13.0'	124° 09.5	"	11:02	35	5,300		1.0	
	210	"	"	"	"	11:07	"	6,500		"	
	211	"	"	"	"	11:15	"	6,000		"	
	212	"	"	"	"	11:20	"	5,600		"	
	213	"	"	"	"	11:24	"	3,400		"	
	214	"	"	"	"	11:32	"	--	sand	--	Geological
75	215	"	46° 13.0'	124° 10.0'	"	11:40	42	10,300		1.0	
	216	"	"	"	"	11:49	"	6,500		"	
	217	"	"	"	"	11:56	"	6,000		"	
	218	"	"	"	"	12:00	"	5,500		"	
	219	"	"	"	"	12:08	"	6,700		"	
	220	"	"	"	"	12:14	"	--	sand	--	Geological

tation No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
76	221	C7412B	46° 13.5'	124° 10.25'	7 Dec 74	12:30	37	5,600		1.0	
	222	"	"	"	"	12:39	"	6,000		"	
	223	"	"	"	"	12:50	"	6,000		"	
	224	"	"	"	"	12:58	"	6,000		"	
	225	"	"	"	"	13:05	"	8,600		"	
	226	"	"	"	"	13:15	"	--	sand	--	Geological
77	227	"	46° 13.5'	124° 09.75'	"	13:34	27	7 [illegible]		1.0	
	228	"	"	"	"	13:40	"	5 [illegible]		"	
	229	"	"	"	"	13:48	"	5 [illegible]		"	
	230	"	"	"	"	13:52	"	5, [illegible]			
	231	"	"	"	"	13:57	-	7, [illegible]			
	232	"	"	"	"	14:02	"	--	sand	--	Geological
78	233	"	46° 13.5'	124° 09.5'	"	14:18	22	5,500		1.0	
	234	"	"	"	"	14:22	"	7,900		"	
	235	"	"	"	"	14:36	"	7,400		"	
	236	"	"	"	"	14:58	"	10,000		"	
	237	"	"	"	"	15:03	"	4,200			
	238	"	"		"	15:09	"	--	sand	--	Geological
79	239	"	46° 13.5'	124° 09.0'	"	15:23	20	2,000		1.0	
	240	"	"	"	"	15:27	"	5,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
79	241	C7412B	46° 13.5'	124° 09.0'	7 Dec 74	15:32	20	3,000		1.0	
	242	"	"	"	"	15:41	"	6,300		"	
	243	"	"	"	"	15:45	"	5,300		"	
	244	"	"	"	"	15:49	"	--	sand	--	Geological
80	245	"	46° 13.5'	124° 08.5'	"	15:59	20	7,900		1.0	
	246	"	"	"	"	16:06	"	5,300		"	
	247	"	"	"	"	16:17	"	5,500		"	
	248	"	"	"	"	16:22	"	4,400		"	
	249	"	"	"	"	16:25	"	6,000		"	
	250	"	"	"	"	16:29	"	--	sand	--	Geolological
81	251	"	46° 13.5'	124° 08.0'	"	16:41	18	5,000		1.0	
	252	"	"	"	"	16:45	"	6,300		"	
	253	"	"	"	"	16:50	"	5,000		"	
	254	"	"	"	"	16:54	"	7,600		"	
	255	"	"	"	"	16:59	"	5,300		"	
	256	"	"	"	"	17:02	"	--	sand	--	Geological
82	257	"	46° 14.0'	124° 08.0'	"	17:16	18	5,600		1.0	
	258	"	"	"	"	17:20	"	3,000		"	
	259	"	"	"	"	17:26	"	4,000		"	
	260	"	"	"	"	17:30	"	3,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
82	261	C7412B	46° 14.0'	124° 08.0'	7 Dec 74	17:35	18	4,000		1.0	
	262	"	"	"	"	17:40	"	--	sand	--	
83	263	"	46° 14.0'	124° 08.5'	"	17:51	18	4,600		1.0	
	264	"	"	"	"	17:56	"	3,600		"	
	265	"	"	"	"	18:04	"	4,000		"	
	266	"	"	"	"	18:07	"	4,600		"	
	267	"	"	"	"	18:11	"	5,300		"	
	268	"	"	"	"	18:18	"	--	sand	--	Geological
84	269	"	46° 14.0'	124° 09.0'	"	18:26	20	4,000		1.0	
	270	"	"	"	"	18:30	"	4,400		"	
	271	"	"	"	"	18:34	"	5,600		"	
	272	"	"	"	"	18:37	"	4,600		"	
	273	"	"	"	"	18:42	"	5,500		"	
	274	"	"	"	"	18:47	"	--	sand	--	Geological
85	275	"	46° 14.0'	124° 09.5'	"	18:55	21	10,500		1.0	
	276	"	"	"	"	19:00	"	5,000		"	
	277	"	"	"	"	19:05	"	4,600		"	
	278	"	"	"	"	19:12	"	7,900		"	
	279	"	"	"	"	19:16	"	4,200		"	
	280	"	"	"	"	19:30	"	--	sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
86	281	C7412B	46°14.0'	124° 10.0'	7 Dec 74	19:37	26	6,300		1.0	
	282	"	"	"	"	19:43	"	7,000		"	
	283	"	"	"	"	19:47	"	6,500		"	
	284	"	"	"	"	19:50	"	7,400		"	
	285	"	"	"	"	19:55	"	4,600		"	
	286	"	"	"	"	20:07	"	--	sand	--	Geological
87	287	"	46° 14.0'	124° 10.25'	"	20:16	40	6,500		1.0	
	288	"	"	"	"	20:21	"	7,400		"	
	289	"	"	"	"	20:25	"	8,600		"	
	290	"	"	"	"	20:29	"	5,600		"	
	291	"	"	"	"	20:33	"	9,300		"	
	292	"	"	"	"	20:38	"	--	sand	--	Geological
88	293	"	46° 14.0	124° 10.75'	"	20:45	44	6,000		1.0	
	294	"	"	"	"	20:49	"	5,500		"	
	295	"	"	"	"	20:54	"	7,000		"	
	296	"	"	"	"	21:02	"	10,500		"	
	297	"	"	"	"	21:08	"	6,700		"	
	298	"	"	"	"	21:12	"	--	sand	--	Geological
89	299	"	46° 14.5'	124° 10.75'	"	21:24	40	11,400		1.0	
	300	"	"	"	"	21:28	"	8,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
89	301	C7412B	46° 14.5'	124° 10.75'	7 Dec 75	21:35	40	10,800		1.0	
	302	"	"	"	"	21:40	"	9,500		"	
	303	"	"	"	"	21:46	"	9,700		"	
	304	"	"	"	"	21:51	"	--	sand	--	Geological
90	305	"	46° 14.5'	124° 10.5'	"	22:04	37	10,800		1.0	
	306	"	"	"	"	22:09	"	8,400		"	
	307	"	"	"	"	22:14	"	10,800		"	
	308	"	"	"	"	22:19	"	8,800		"	
	309	"	"	"	"	22:24	"	12,000		"	
	310	"	"	"	"	22:30	"	--	silty-sand	--	Geological
91	311	"	46° 14.5'	124° 10.0'	"	22:50	33	8,400		1.0	
	312	"	"	"	"	22:59	"	12,500		"	
	313	"	"	"	"	23:04	"	10,000		"	
	314	"	"	"	"	23:11	"	12,500		"	
	315	"	"	"	"	23:18	"	10,500		"	
	316	"	"	"	"	23:27	"	--	sand over sandy -silt	--	Geological
92	317	"	46° 14.5'	124° 09.0'	"	23:49	20	5,600		1.0	
	318	"	"	"	"	23:53	"	3,400		"	
	319	"	"	"	8 Dec 74	00:00	"	3,200		"	
	320	"	"	"	"	00:06	"	3,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
92	321	C7412B	46° 14.5'	124° 09.0'	8 Dec 74	00:10	20	1,700		1.0	
	322	"	"	"	"	00:15	"	--	sand	--	Geological
93	323	"	46° 14.5'	124° 08.5'	"	00:37	15	2,600		1.0	
	324	"	"	"	"	00:42	"	2,600		"	
	325	"	"	"	"	00:45	"	3,600		"	
	326	"	"	"	"	00:57	"	2,300		"	
	327	"	"	"	"	00:53	"	4,200		"	
	328	"	"	"	"	01:03	"	--	sand	--	Geological
94	329	"	46° 15.0'	124° 09.0'	"	01:14	16	3,000		1.0	
	330	"	"	"	"	01:24	"	3,000		"	
	331	"	"	"	"	01:27	"	3,600		"	
	332	"	"	"	"	01:30	"	2,000		"	
	333	"	"	"	"	01:33	"	3,400		"	
	334	"	"	"	"	01:36	"	--	sand	--	Geological
95	335	"	46° 15.0'	124° 11.5'	"	01:55	47	3,000		1.0	
	336	"	"	"	"	01:59	"	8,800		"	
	337	"	"	"	"	02:04	"	6,500		"	
	338	"	"	"	"	02:10	"	8,600		"	
	339	"	"	"	"	02:24	"	8,400		"	
	340	"	"	"	"	02:31	"	--	silty-sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
96	341	C7412B	46° 15.0'	124° 14.0'	8 Dec 74	02:47	67	9,300		1.0	
	342	"	"	"	"	02:53	"	7,600		"	
	343	"	"	"	"	03:01	"	8,200		"	
	344	"	"	"	"	03:08	"	8,800		"	
	345	"	"	"	"	03:14	"	8,200		"	
	346	"	"	"	"	03:20	"	--	sand	--	Geological
97	347	"	46° 15.0'	124° 17.0'	"	03:57	97	11,600		1.0	
	348	"	"	"	"	04:12	"	12,500		"	
	349	"	"	"	"	04:19	"	11,600		"	
	350	"	"	"	"	04:31	"	12,700		"	
	351	"	"	"	"	04:41	"	11,600		"	
	352	"	"	"	"	04:48	"	--	silty-sand	--	Geological
98	353	"	46° 16.0'	124° 17.0'	"	05:05	86	11,400		1.0	
	354	"	"	"	"	05:16	"	12,000		"	
	355	"	"	"	"	05:23	"	11,600		"	
	356	"	"	"	"	05:32	"	11,400		"	
	357	"	"	"	"	05:40	"	9,700		"	
	358	"	"	"	"	05:46	"	--	silty-sand	--	Geological
99	359	"	46° 16.0'	124° 14.5'	"	06:19	68	7,400		1.0	
	360	"	"	"	"	06:32	"	7,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
99	361	C7412B	46° 16.0'	124° 14.5'	8 Dec 74	06:40	68	7,400		1.0	
	362	"	"	"	"	06:49	"	7,900		"	
	363	"	"	"	"	07:09	"	9,500		"	
	364	"	"	"	"	07:15	"	--	sand	--	Geological
100	365	"	46° 16.0'	124° 12.0'	"	07:38	48	6,700		1.0	
	366	"	"	"	"	07:44	"	5,600		"	
	367	"	"	"	"	07:51	"	8,600		"	
	368	"	"	"	"	07:56	"	10,800		"	
	369	"	"	"	"	08:29	"	8,600		"	
	370	"	"	"	"	08:37	"	--	silty-sand	--	Geological
101	371	"	46° 16.0'	124° 10.0'	"	08:59	29	3,600		1.0	
	372	"	"	"	"	09:12	"	5,000		"	
	373	"	"	"	"	09:17	"	6,000		"	
	374	"	"	"	"	09:21	"	5,000		"	
	375	"	"	"	"	09:25	"	4,600		"	
	376	"	"	"	"	09:30	"	--	sand	--	Geological
102	377	"	46° 16.0'	124° 08.0'	"	09:49	13	3,400		1.0	
	378	"	"	"	"	09:52	"	3,400		"	
	379	"	"	"	"	09:55	"	2,600		"	
	380	"	"	"	"	09:57	"	5,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
102	381	C7412B	46° 16.0'	124° 08.0'	8 Dec 74	09:59	13	4,200		1.0	
	382	"	"	"	"	10:02	"	--	sand	--	Geological
103	383	"	46° 15.0'	124° 10.0'	"	10:25	31	2,600		1.0	
	384	"	"	"	"	10:29	"	5,300		"	
	385	"	"	"	"	10:33	"	5,300		"	
	386	"	"	"	"	10:37	"	6,500		"	
	387	"	"	"	"	10:40	"	5,300		"	
	388	"	"	"	"	10:47	"	--	sand	--	Geological
104	389	"	46° 11.5'	124° 06.5'	"	11:41	29	5,000		1.0	
	390	"	"	"	"	11:47	"	4,600		"	
	391	"	"	"	"	11:51	"	5,500		"	
	392	"	"	"	"	11:55	"	5,500		"	
	393	"	"	"	"	11:59	"	7,400		"	
105	394	"	"	"	"	12:04	"	5,300		"	
	395	"	"	"	"	12:10	"	4,400		"	
	396	"	"	"	"	12:15	"	8,200		"	
	397	"	"	"	"	12:19	"	5,000		"	
	398	"	"	"	"	12:24	"	4,400		"	
106	399	"	"	"	"	12:37	"	5,500		"	
	404	"	"	"	"	17:33	"	5,300		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
106	405	C7412B	46° 11.5'	124° 06.5'	8 Dec 74	17:37	29	5,300		1.0	
	406	"	"	"	"	17:41	"	6,500		"	
	407	"	"	"	"	17:45	"	5,300		"	
107	408	"	"	"	"	17:48	"	5,000		"	
	409	"	"	"	"	17:52	"	4,600		"	
	410	"	"	"	"	17:56	"	5,500		"	
	411	"	"	"	"	18:00	"	5,500		"	
	412	"	"	"	"	18:04	"	5,500		"	
	413	"	"	"	"	18:07	"	--	sand	--	Geological
108	414	C7501D	46° 06.[illegible]'	124° 33.0'	19 Jan 75	23:11	141	13,300		1.0	
	415	"	"	"	"	23:28	"	13,400		"	
	416	"	"	"	"	23:37	"	14,500		"	
	417	"	"	"	20 Jan 75	00:01	"	8,500		"	
	418	"	"	"	"	00:25	"	11,800		"	
	419	"	"	"	"	00:36	"	--	silty-sand	--	Geological
109	420	"	46° 06.0'	124' 25.0'	"	01:15	124	12,500		1.0	
	421	"	"	"	"	01:28	"	13,000		"	
	422	"	"	"	"	01:41	"	12,200		"	
	423	"	"	"	"	02:02	"	12,000		"	
	424	"	"	"	"	02:15	"	12,500		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
109	425	C7501D	46° 06.0'	124° 25.0'	20 Jan 75	02:27	124	--	silty-sand	--	Geological
110	426	"	46° 06.0'	124° 18.0'	"	03:17	100	10,500		1.0	
	427	"	"	"	"	03:28	"	11,400		"	
	428	"	"	"	"	03:37	"	9,000		"	
	429	"	"	"	"	03:52	"	--	sand	--	Geological
	430	"	"	"	"	04:06	"	10,000		1.0	
	431	"	"	"	"	04:15	"	10,600		"	
111	432	"	46° 15.55'	124° 05.4'	21 Jan 75	15:28	18	4,600		"	
	433	"	"	"	"	15:37	"	3,500		"	
	434	"	"	"	"	15:43	"	5,500		"	
	435	"	"	"	"	16:02	20	5,300		"	
	436	"	"	"	"	16:13	18	3,000		"	
	437	"	"	"	"	16:20	20	--	sand	--	Geological
112	438	"	46° 15.7'	124° 05.0'	"	16:42	"	5,500		"	
	439	"	"	"	"	16:55	"	[illegible],000		"	
	440	"	"	"	"	17:01	"	3,000		"	
	441	"	"	"	"	17:05	"	3,500		"	
	442	"	"	"	"	17:08	"	5,000		"	
	443	"	"	"	"	17:12	"	--	sand	--	Geological
113	444	"	46° 15.5'	124° 05.8'	"	17:47	"	5,000		"	

ation No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
113	445	C7501D	46° 15.5'	124° 05.8'	21 Jan 75	17:51	20	10,000		1.0	
	446	"	"	"	"	17:58	"	7,500		"	
	447	"	"	"	"	18:03	"	6,000		"	
	448	"	"	"	"	18:07	"	10,500		"	
	449	"	"	"	"	18:18	"	--	sand	--	Geological
114	450	"	46° 15.5'	124° 06.5'	"	18:30	13	5,500		1.0	
	451	"	"	"	"	18:37	"	4,500		"	
	452	"	"	"	"	18:43	"	5,500		"	
	453	"	"	"	"	18:48	"	5,000		"	
	454	"	"	"	"	18:50	"	5,500		"	
	455	"	"	"	"	18:56	"	--	sand	--	Geologic
115	456	"	46° 15.5'	124° 07.5'	"	19:12	"	6,200		1.0	
	457	"	"	"	"	19:19	"	3,900		"	
	458	"	"	"	"	19:25	"	3,600		"	
	459	"	"	"	"	19:27	"	5,000		"	
	460	"	"	"	"	19:56	"	4,300		"	
	461	"	"	"	"	19:59	"	--	sand	--	Geological
116	462	"	46° 15.2'	124° 09.4'	"	20:19	16	4,500		1.0	
	463	"	"	"	"	20:22	"	3,600		"	
	464	"	"	"	"	20:30	"	4,900		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
116	465	C7501D	46° 15.2'	124° 09.4'	21 Jan 75	20:33	16	4,000		1.0	
	466	"	"	"	"	20:36	"	6,300		"	
	467	"	"	"	"	20:40	"	--	sand	--	Geological
117	468	"	46° 14.25'	124° 10.66'	"	20:55	31	7,200		1.0	
	469	"	"	"	"	21:05	"	5,800		"	
	470	"	"	"	"	21:09	"	5,800		"	
	471	"	"	"	"	21:16	"	6,300		"	
	472	"	"	"		21:18	"	4,500		"	
	473	"	"	"		21:24	"	--	sand	--	Geological
118	474	"	46° 13.3'	124° 09.9'		21:40	37	5,900		1.0	
	475	"	"	"		12:47	"	6,200		"	
	476	"	"	"	"	21:56	"	7,500		"	
	477	"	"	"	"	22:02	"	10,300		"	
	478	"	"	"	"	22:07	"	6,300		"	
	479	"	"	"	"	22:11	"	--	sand	--	Geological
119	480	"	46° 13.7'	124° 08.1'	"	23:05	18	6,100		1.0	
	481	"	"	"	"	23:11	"	5,300		"	
	482	"	"	"	"	23:15	"	4,200		"	
	483	"	"	"	"	23:17	"	4,800		"	
	484	"	"	"	"	23:25	"	4,300		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
119	485	C7501D	46° 13.7'	124° 08.1'	21 Jan 75	23:27	18	--	sand	--	Geological
120	486	"	46° 12.0'	124° 09.0'	"	23:46	40	5,300		1.0	
	487	"	"	"	"	23:51	"	7,300		"	
	488	"	"	"	"	23:58	"	6,700		"	
	489	"	"	"	22 Jan 75	00:04	"	6,700		"	
	490	"	"	"	"	00:11	"	4,500		"	
	491	"	"	"	"	00:16	"	--	sand	--	Geological
121	492	"	46° 12.5	124° 06.5'	"	00:52	23	3,800		1.0	
	493	"	"	"	"	00:59	"	4,000		"	
	494	"	"	"	"	01:04	"	4,900		"	
	495	"	"	"	"	01:09	"	5,000		"	
	496	"	"	"	"	01:14	"	5,500		"	
	497	"	"	"	"	01:22	"	--	sand	--	Geological
122	498	"	46° 11.5'	124° 06.5'	"	01:36	29	5,000		1.0	
	499	"	"	"	"	01:42	"	4,000		"	
	500	"	"	"	"	01:45	"	5,100		"	
	501	"	"	"	"	01:49	"	2,200		"	
	502	"	"	"	"	01:55	"	4,800		"	
	503	"	"	"	"	01:57	"	--	sand	--	Geological
123	504	"	46° 11.0'	124° 05.0'	"	02:23	26	4,700		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
123	505	C7501D	46° 11.0'	124° 05.0'	22 Jan 75	02:23	26	3,800		1.0	
	506	"	"	"	"	02:32	"	3,900		"	
	507	"	"	"	"	02:34	"	3,900		"	
	508	"	"	"	"	02:39	"	4,500		"	
	509	"	"	"	"	02:42	"	--	sand	--	Geological
124	510	"	46° 12.75'	124° 06.0'	"	03:01	20	3,800		1.0	
	511	"	"	"	"	03:06	"	3,900		"	
	512	"	"	"	"	03:14	"	3,900		"	
	513	"	"	"	"	03:17	"	4,000		"	
	514	"	"	"	"	03:25	"	4,500		"	
	515	"	"	"	"	03:29	"	--	sand	--	Geological
125	516	"	46° 12.5'	124° 07.0'	"	03:41	26	4,200		1.0	
	517	"	"	"	"	03:48	"	4,700		"	
	518	"	"	"	"	03:50	"	6,300		"	
	519	"	"	"	"	03:55	27	3,500		"	
	520	"	"	"	"	04:04	"	6,200		"	
	521	"	"	"	"	04:09	"	--	sand	--	Geological
126	522	"	46° 15.0'	124° 11.0'	"	04:55	40	6,400		1.0	
	523	"	"	"	"	04:59	"	5,100		"	
	524	"	"	"	"	05:04	"	5,300		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
126	525	C7501D	46° 15.0'	124° 11.0'	22 Jan 75	05:07	40	9,000		1.0	
	526	"	"	"	"	05:10	"	5,000		"	
	527	"	"	"	"	05:17	"	--	sand	--	Geological
127	528	"	46° 15.0'	124° 10.5'	"	05:25	33	2,900		1.0	
	529	"	"	"	"	05:28	"	4,500		"	
	530	"	"	"	"	05:34	"	3,700		"	
	531	"	"	"	"	05:37	"	2,800		"	
	532	"	"	"	"	05:41	"	4,100		"	
	533	"	"	"	"	05:46	"	--	sand	--	Geological
128	534	"	46° 15.0'	124° 10.0'	"	06:10	24	3,100		1.0	
	535	"	"	"	"	06:17	"	3,600		"	
	536	"	"	"	"	06:22	"	5,100		"	
	537	"	"	"	"	06:25	"	4,100		"	
	538	"	"	"	"	06:28	"	5,100		"	
	539	"	"	"	"	06:31	"	--	sand	--	Geological
129	540	"	46° 15.0'	124° 09.5'	"	06:40	18	7,500		1.0	
	541	"	"	"	"	06:43	19	5,700		"	
	542	"	"	"	"	06:46	"	4,400		"	
	543	"	"	"	"	06:50	"	12,800?		"	
	544	"	"	"	"	06:55	"	2,800		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
129	545	C7501D	46° 15.0'	124° 09.5'	22 Jan 75	07:04	19	--	sand	--	Geological
130	546	"	46° 15.0'	124° 09.0'	"	07:14	17	6,700		1.0	
	547	"	"	"	"	07:18	"	5,700		"	
	548	"	"	"	"	07:23	"	6,700		"	
	549	"	"	"	"	07:29	"	8,700		"	
	550	"	"	"	"	07:32	"	6,500		"	
	551	"	"	"	"	07:37	"	--	sand	--	Geological
131	552	"	46° 15.0'	124° 08.5'	"	08:28	15	5,400		1.0	
	553	"	"	"	"	08:37	"	4,600		"	
	554	"	"	"	"	09:14	"	5,900		"	
	555	"	"	"	"	09:19	"	4,200		"	
	556	"	"	"	"	09:25	"	6,700		"	
	557	"	"	"	"	09:31	"	--	sand	--	Geological
132	558	"	46° 15.5'	124° 08.5'	"	09:41	15	4,700		1.0	
	559	"	"	"	"	09:44	"	5,000		"	
	560	"	"	"	"	09:47	"	5,000		"	
	561	"	"	"	"	09:49	"	6,900		"	
	562	"	"	"	"	09:51	"	6,300		"	
	563	"	"	"	"	09:54	"	--	sand	--	Geological
133	564	"	46° 15.5'	124° 09.0'	"	10:04	15	6,400		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
133	565	C7501D	46° 15.5'	124° 09.0'	22 Jan 75	10:07	15	5,900		1.0	
	566	"	"	"	"	10:10	"	5,000		"	
	567	"	"	"	"	10:12	"	5,500		"	
	568	"	"	"	"	10:15	"	5,100		"	
	569	"	"	"	"	10:18	"	--	sand	--	Geological
134	570	"	46° 15.5'	124° 09.5'	"	10:31	17	5,400		1.0	
	571	"	"	"	"	10:32	"	4,500		"	
	572	"	"	"	"	10:36	"	5,900		"	
	573	"	"	"	"	10:38	"	5,500		"	
	574	"	"	"	"	10:40	"	5,700		"	
	575	"	"	"	"	10:43	"	--	sand	--	Geological
135	576	"	46° 15.5'	124° 10.0'	"	10:52	22	3,900		1.0	
	577	"	"	"	"	10:54	"	3,600		"	
	578	"	"	"	"	10:56	"	6,700		"	
	579	"	"	"	"	10:59	"	5,000		"	
	580	"	"	"	"	11:01	"	6,500		"	
	581	"	"	"	"	11:04	"	--	sand	--	Geological
136	582	"	46° 15.5'	124° 10.5'	"	11:23	31	3,700		1.0	
	583	"	"	"	"	11:26	"	4,100		"	
	584	"	"	"	"	11:30	"	5,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
136	585	C7501D	46° 15.5'	124° 10.5'	22 Jan 75	11:32	31	5,400		1.0	
	586	"	"	"	"	11:35	"	4,700		"	
	587	"	"	"	"	11:37	"	--	sand	--	Geological
137	588	"	46° 15.5'	124° 11.0'	"	11:47	37	8,500		1.0	
	589	"	"	"	"	11:48	"	4,900		"	
	590	"	"	"	"	11:53	"	6,700		"	
	591	"	"	"	"	11:56	"	7,700		"	
	592	"	"	"	"	12:00	"	6,000		"	
	593	"	"	"	"	12:06	"	--	silty-sand	--	Geological
138	594	"	46° 20.0'	124° 31.0'	"	15:02	132	10,000		1.0	
	595	"	"	"	"	15:14	"	10,300		"	
	596	"	"	"	"	15:22	"	?		"	
	597	"	"	"	"	15:33	"	11,000		"	
	598	"	"	"	"	15:43	"	?		"	
	599	"	"	"	"	15:54	"	--	sand	--	Geological
139	600	"	40° 20.0'	124° 25.0'	"	16:34	128	10,500		1.0	
	601	"	"	"	"	16:51	"	14,500		"	
	602	"	"	"	"	17:04	"	14,500		"	
	603	"	"	"	"	17:29	"	14,500		"	
	604	"	"	"	"	17:41	"	14,500		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
139	605	C7501D	46° 20.0'	124° 25.0'	22 Jan 75	17:54	128	--	silty-sand	--	Geological
140	606	"	46° 20.0'	124° 15.0'	"	18:54	64	10,800		1.0	
	607	"	"	"	"	19:06	"	10,300		"	
	608	"	"	"	"	19:34	"	7,300		"	
	609	"	"	"	"	19:42	"	9,500		"	
	610	"	"	"	"	19:49	"	11,400		"	
	611	"	"	"	"	20:00	"	--	silty-sand	--	Geological
141	612	"	46° 17.0'	124° 10.0'	24 Jan 75	09:19	33	5,400		1.0	
	613	"	"	"	"	09:25	"	3,400		"	
	614	"	"	"	"	09:29	"	4,100		"	
	615	"	"	"	"	09:35	"	5,200		"	
	616	"	"	"	"	09:38	"	6,700		"	
	617	"	"	"	"	09:50	"	--	sand	--	Geological
142	618		46° 17.0'	124° 12.0'	"	10:05	44	1,700		1.0	
	619		"	"	"	10:15	"	6,300		"	
	620	"	"	"	"	10:22	"	5,500		"	
	621	"	"	"	"	10:27	"	7,700		"	
	622	"	"	"	"	10:31	"	2,000		"	
	623	"	"	"	"	10:37	"	--	sand	--	Geological
143	624	"	46° 17.0'	124° 14.5'	"	11:07	66	7,900		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
143	625	C7501D	46° 17.0'	124° 14.5'	24 Jan 75	11:14	66	4,300	sand silty-sand	1.0	
	626	"	"	"	"	11:20	"	10,000		"	
	627	"	"	"	"	11:27	"	8,500		"	
	628	"	"	"	"	11:33	"	10,500		"	
	629	"	"	"	"	11:48	"	--	sand silty-sand	--	Geological
144	630	"	46° 17.0'	124° 17.0'	"	12:16	80	10,300		1.0	
	631	"	"	"	"	12:23	"	10,100		"	
	632	"	"	"	"	12:34	"	11,500		"	
	633	"	"	"	"	12:42	"	10,700		"	
	634	"	"	"	"	12:51	"	10,300		"	
	635	"	"	"	"	13:00	"	--	silty-sand	--	Geological
145	636	"	46° 18.0'	124° 10.0'	"	14:16	29	3,300		1.0	
	637	"	"	"	"	14:20	"	2,300		"	
	638	"	"	"	"	14:23	"	2,700		"	
	639	"	"	"	"	14:31	"	4,500		"	
	640	"	"	"	"	14:35	"	4,500		"	
	641	"	"	"	"	14:38	"	--	silty-sand	--	Geological
146	642	"	46° 18.0'	124° 12.0'	"	14:54	40	3,700		1.0	
	643	"	"	"	"	15:00	"	1,600		"	
	644	"	"	"	"	15:04	"	3,500		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
146	645	C7501D	46° 18.0'	124° 12.0'	24 Jan 75	15:09	40	4,500		1.0	
	646	"	"	"	"	15:13	"	4,800		"	
	647	"	"	"	"	15:18	"	--	sandy-silt	--	Geological
147	648	"	46° 18.0'	124° 14.5'	"	15:49	60	7,200		1.0	
	649	"	"	"	"	16:04	"	7,900		"	
	650	"	"	"	"	16:11	"	8,000		"	
	651	"	"	"	"	16:17	"	7,900		"	
	652	"	"	"	"	16:23	"	7,500		"	
	653	"	"	"	"	16:29	"	--	silty-sand	--	Geological
148	654	"	46° 18.0'	124° 17.0'	"	16:48	75	7,300		1.0	
	655	"	"	"	"	16:55	"	9,500		"	
	656	"	"	"	"	17:03	"	8,500		"	
	657	"	"	"	"	17:09	"	9,000		"	
	658	"	"	"	"	17:16	"	--	silty-sand	--	Geological
	659	"	"	"	"	17:42	"	9,100		1.0	
149	660	"	46° 19.0'	124° 18.0'	"	18:16	84	12,300		"	
	661	"	"	"	"	18:29	"	12,000		"	
	662	"	"	"	"	18:38	"	11,500		"	
	663	"	"	"	"	18:47	"	14,300		"	
	664	"	"	"	"	19:03	"	--	silty-sand	--	Geological
	665	"	"	"	"	19:10	"	11,000		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
150	666	C7501D	46° 19.0'	124° 15.0'	24 Jan 75	19:41	64	7,500		1.0	
	667	"	"	"	"	19:47	"	6,800		"	
	668	"	"	"	"	19:51	"	8,500		"	
	669	"	"	"	"	19:56	"	8,300		"	
	670	"	"	"	"	20:02	"	8,000		"	
	671	"	"	"	"	20:08	"	--	?	--	Geological
151	672	"	46° 19.0'	124° 12.0'	"	20:30	40	5,600		1.0	
	673	"	"	"	"	20:34	"	3,400		"	
	674	"	"	"	"	20:38	"	4,800		"	
	675	"	"	"	"	20:41	"	3,700		"	
	676	"	"	"	"	20:45	"	4,600		"	
	677	"	"	"	"	20:49	"	--	sand	--	Geological
152	678	"	46° 19.0'	124° 10.0'	"	21:02	29	3,100		1.0	
	679	"	"	"	"	21:06	"	5,200		"	
	680	"	"	"	"	21:09	"	3,300		"	
	681	"	"	"	"	21:12	"	2,700		"	
	682	"	"	"	"	21:26	"	4,100		"	
	683	"	"	"	"	21:28	"	--	sand	--	Geological
153	684	"	46° 20.0'	124° 08.0'	"	21:49	22	2,700		1.0	
	685	"	"	"	"	21:51	"	2,500		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
153	686	C7501D	46° 20.0'	124° 08.0'	24 Jan 75	21:55	22	4,600		1.0	
	687	"	"	"	"	21:58	"	2,500		"	
	688	"	"	"	"	22:02	"	4,500		"	
	689	"	"	"	"	22:07	"	--	sand	--	Geological
154	690	"	46° 20.0'	124° 10.0'	"	22:24	29	3,100		1.0	
	691	"	"	"	"	22:30	"	2,800		"	
	692	"	"	"	"	22:33	"	3,900		"	
	693	"	"	"	"	22:36	"	2,800		"	
	694	"	"	"	"	22:40	"	6,500		"	
	695	"	"	"	"	22:44	"	--	sand	--	Geological
155	696	"	46° 20.0'	124° 11.0'	"	22:59	35	4,700		1.0	
	697	"	"	"	"	23:04	"	3,500		"	
	698	"	"	"	"	23:11	"	5,000		"	
	699	"	"	"	"	23:16	"	4,000		"	
	700	"	"	"	"	23:20	"	4,300		"	
	701	"	"	"	"	23:24	"	--	sand	--	Geological
156	702	"	46° 20.0'	124° 13.0'	"	23:43	48	3,500		1.0	
	703	"	"	"	"	23:48	"	9,300		"	
	704	"	"	"	"	23:53	"	6,300		"	
	705	"	"	"	"	23:58	"	4,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
156	706	C7501D	46° 20.0'	124° 13.0'	25 Jan 75	00:02	48	4,000		1.0	
	707	"	"	"	"	00:10	"	--	sand	--	Geological
157	708	"	46° 20.0'	124° 18.0'	"	00:48	80	10,200		"	
	709	"	"	"	"	00:54	"	6,000		"	
	710	"	"	"	"	01:01	"	10,400		"	
	711	"	"	"	"	01:08	"	10,600		"	
	712	"	"	"	"	01:15	"	11,500		"	
	713	"	"	"	"	01:23	"	--	silty-sand	--	Geological
158	727	C7504B	46° 15.45	124° 05.6'	19 Apr 75	09:26	18	6,200		1.0	
	728	"	"	"	"	09:44	"	4,000		"	
	729	"	"	"	20 Apr 75	09:53	"	5,600		"	
	730	"	"	"	"	09:59	"	5,100		"	
	731	"	"	"	"	10:06	"	5,600		0.5	
	732	"	"	"	"	10:10	"	--	sand	--	Geological
159	734	"	46° 09.0'	124° 14.0'	"	11:41	86	10,700		1.0	
	735	"	"	"	"	11:49	"	9,700		"	
	736	"	"	"	"	11:57	"	12,200		"	
	737	"	"	"	"	12:17	"	11,400		"	
	738	"	"	"	"	12:26	"	11,000		0.5	
	739	"	"	"	"	12:35	"	--	sandy-silt	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
160	741	C7504B	46° 09.0'	124° 10.5'	20 Apr 75	13:11	66	4,700		1.0	
	742	"	"	"	"	13:18	"	5,200		"	
	743	"	"	"	"	13:25	"	4,800		"	
	744	"	"	"	"	13:33	"	5,300		"	
	745	"	"	"	"	13:42	"	5,300		0.5	
	746	"	"	"	"	13:49	"	--	silty-sand	--	Geological
161	748	"	46° 09.0'	124° 07.5'	"	14:16	45	6,100		1.0	
	749	"	"	"	"	14:27	"	4,000		"	
	750	"	"	"	"	14:35	"	6,200		"	
	751	"	"	"	"	14:42	"	6,100		"	
	752	"	"	"	"	14:49	"	4,300		0.5	
	753	"	"	"	"	14:56	"	--	sand	--	Geological
162	755	"	46° 09.0'	124° 04.5'	"	15:25	29	4,000		1.0	
	756	"	"	"	"	15:35	"	4,700		"	
	757	"	"	"	"	15:41	"	4,000		"	
	758	"	"	"	"	15:46	"	6,200		"	
	759	"	"	"	"	15:52	"	3,500		0.5	
	760	"	"	"	"	15:57	"	--	sand	--	Geological
163	762	"	46° 09.0'	124° 00.5'	"	17:14	17	5,500		1.0	
	763	"	"	"	"	17:19	"	4,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
163	764	C7504B	46° 09.0'	124° 00.5'	20 Apr 75	17:23	17	4,700		1.0	
	765	"	"	"	"	17:28	"	3,700		"	
	766	"	"	"	"	17:33	"	5,500		0.5	
	767	"	"	"	"	17:38	"	--	sand	--	Geological
164	769	"	46° 12.0'	124° 02.5'	"	18:22	17	4,800		1.0	
	770	"	"	"	"	18:26	"	4,900		"	
	771	"	"	"	"	18:35	"	4,800		"	
	772	"	"	"	"	18:41	"	4,700		"	
	773	"	"	"	"	18:52	"	5,200		0.5	
	774	"	"	"	"	19:00	"	--	sand	--	Geological
165	776	"	46° 11.0'	124° 05.0'	"	19:33	26	5,600		1.0	
	777	"	"	"	"	20:00	"	3,100		"	
	778	"	"	"	"	20:06	"	4,400		"	
	779	"	"	"	"	20:14	"	3,900		"	
	780	"	"	"	"	20:22	"	4,800		0.5	
	781	"	"	"	"	20:27	"	--	sand	--	Geological
166	783	"	46° 11.7'	124° 06.3'	"	21:51	31	4,600		1.0	
	784	"	"	"	"	22:06	"	4,700		"	
	785	"	"	"	"	22:15	"	5,000		"	
	786	"	"	"	"	22:22	"	6,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
166	787	C7504B	46° 11.7'	124° 06.3'	20 Apr 75	22:29	31	4,700		0.5	
	788	"	"	"	"	22:36	"	--	sand	--	Geological
167	790	"	46° 12.5'	124° 06.5'	21 Apr 75	00:27	22	5,300		1.0	
	791	"	"	"	"	00:40	"	7,600		"	
	792	"	"	"	"	00:45	"	5,200		"	
	793	"	"	"	"	00:49	"	5,300		"	
	794	"	"	"	"	00:54	"	5,500		0.5	
	795	"	"	"	"	00:58	"	--	sand	--	Geological
168	797	"	46° 18.0'	124° 10.0'	"	02:12	27	4,300		1.0	
	798	"	"	"	"	02:17	"	4,300		"	
	799	"	"	"	"	02:24	"	4,700		"	
	800	"	"	"	"	02:30	"	3,000		"	
	801	"	"	"	"	02:35	"	4,300		0.5	
	802	"	"	"	"	02:40	"	--	silty-sand	--	Geological
169	804	"	46° 17.0'	124° 12.0'	"	03:15	42	6,000		1.0	
	805	"	"	"	"	03:21	"	6,200		"	
	806	"	"	"	"	03:27	"	6,200		"	
	807	"	"	"	"	03:32	"	5,500		"	
	808	"	"	"	"	03:39	"	5,500		0.5	
	809	"	"	"	"	03:44	"	--	silty-sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
170	811	C7504B	46° 17.0'	124° 14.5'	21 Apr 75	04:15	57	8,300		1.0	
	812	"	"	"	"	04:22	"	9,800		"	
	813	"	"	"	"	04:36	"	9,600		"	
	814	"	"	"	"	04:43	"	9,500		"	
	815	"	"	"	"	04:54	"	10,700		0.5	
	816	"	"	"	"	05:03	"	--	sandy-silt	--	Geological
171	818	"	46° 17.0'	124° 17.0'	"	05:37	82	11,500		1.0	
	819	"	"	"	"	05:44	"	12,200		"	
	820	"	"	"	"	05:51	"	12,000		"	
	821	"	"	"	"	05:58	"	11,400		"	
	822	"	"	"	"	06:18	"	10,600		0.5	
	823	"	"	"	"	06:28	"	--	sandy-silt	--	Geological
172	825	"	46° 14.0'	124° 16.0'	"	08:08	83	7,600		1.0	
	826	"	"	"	"	08:32	81	6,600		"	
	827	"	"	"	"	08:40	"	9,600		"	
	828	"	"	"	"	08:47	"	6,600		"	
	829	"	"	"	"	08:55	"	5,500		0.5	
	830	"	"	"	"	09:03	"	--	sandy-silt	--	Geological
173	832	"	46° 15.5'	124° 07.5'	"	10:08	11	6,200		1.0	
	833	"	"	"	"	10:10	"	3,800		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
173	834	C7504B	46° 15.5'	124° 07.5'	21 Apr 75	10:13	11	5,400		1.0	
	835	"	"	"	"	10:15	"	7,600		"	
	836	"	"	"	"	10:21	"	5,200		0.5	
	837	"	"	"	"	10:24	"	--	sand	--	Geological
174	839	"	46° 15.2'	124° 09.4'	"	10:46	15	5,400		1.0	
	840	"	"	"	"	10:50	"	6,200		"	
	841	"	"	"	"	10:53	"	5,500		"	
	842	"	"	"	"	10:57	"	5,200		"	
	843	"	"	"	"	11:00	"	7,200		0.5	
	844	"	"	"	"	11:04	"	--	sand	--	Geological
175	846	"	46° 15.0'	124° 10.5'	"	11:22	31	4,000		1.0	
	847	"	"	"	"	11:26	"	4,300		"	
	848	"	"	"	"	11:31	"	4,000		"	
	849	"	"	"	"	11:37	"	4,700		"	
	850	"	"	"	"	11:42	"	4,700		0.5	
	851	"	"	"	"	11:46	"	--	silty-sand	--	Geological
176	853	"	46° 14.5'	124° 10.5'	"	12:27	33	12,700		1.0	
	854	"	"	"	"	12:38	"	4,300		"	
	855	"	"	"	"	12:44	"	5,300		"	
	856	"	"	"	"	12:49	"	4,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
176	857	C7504B	46° 14.5'	124° 10.5'	21 Apr 75	12:56	33	4,700		0.5	
	858	"	"	"	"	13:02	"	--	silty-sand	--	Geological
177	860	"	46° 14.5'	124° 10.0'	"	13:44	26	3,000		1.0	
	861	"	"	"	"	13:56	"	3,500		"	
	862	"	"	"	"	14:01	"	4,000		"	
	863	"	"	"	"	14:07	"	4,000		"	
	864	"	"	"	"	14:12	"	4,300		0.5	sample lost
	865	"	"	"	"	14:17	"	--	silty-sand	--	Geological
	866	"	"	"	"	14:23	"	4,300		0.5	
178	868	"	46° 14.0'	124° 09.5'	"	15:36	22	5,500		1.0	
	869	"	"	"	"	15:40	"	4,700		"	
	870	"	"	"	"	15:43	"	4,300		"	
	871	"	"	"	"	15:46	"	4,000		"	
	872	"	"	"	"	15:51	"	3,500		0.5	
	873	"	"	"	"	15:56	"	--	sand	--	Geological
179	875	"	46° 14.0'	124° 09.0'	"	16:40	18	3,500		1.0	
	876	"	"		"	16:44	"	4,700		"	
	877	"	"		"	16:46	"	4,700		"	
	878	"	"		"	16:50	"	4,700		"	
	879	"	"		"	16:53	"	4,000		0.5	
	880	"	"		"	16:56	"	--	sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
180	882	C7504B	46° 14.0'	124° 08.0'	21 Apr 75	17:15	15	5,200		1.0	
	883	"	"	"	"	17:18	"	4,300		"	
	884	"	"	"	"	17:21	"	4,000		"	
	885	"	"	"	"	17:25	"	4,000		0.5	
	886	"	"	"	"	17:30	"	5,200		1.0	
	887	"	"	"	"	17:37	"	--	sand	--	Geological
181	889	"	46° 13.0'	124° 09.0'	"	17:58	31	4,700		1.0	
	890	"	"	"	"	18:03	"	4,300		"	
	891	"	"	"	"	18:12	"	5,500		"	
	892	"	"	"	"	18:16	"	4,900		"	
	893	"	"	"	"	18:20	"	5,200		0.5	
	894	"	"	"	"	18:25	"	--	sand	--	Geological
182	896	"	46° 13.0'	124° 10.0'	"	18:48	42	6,800		"	
	897	"	"	"	"	19:01	"	6,600		"	
	898	"	"	"	"	19:05	"	6,600		"	
	899	"	"	"	"	19:13	"	6,600		"	
	900	"	"	"	"	19:17	"	10,100		0.5	
	901	"	"	"	"	19:22	"	--	silty-sand	--	Geological
183	903	"	46° 12.0'	124° 09.0'	"	20:07	40	5,200		"	
	904	"	"	"	"	20:11	"	5,100		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
183	905	C7504B	46° 12.0'	124° 09.0'	21 Apr 75	20:15	40	5,200		1.0	
	906	"	"	"	"	20:30	"	5,400		"	
	907	"	"	"	"	20:34	"	5,400		0.5	
	908	"	"	"	"	20:40	"	--	sand	--	Geological
184	928	C7506C	46° 15.45'	124° 05.6'	23 Jun 75	09:43	17	7,600		1.0	
	929	"	"	"	"	09:49	"	5,300		"	
	930	"	"	"	"	09:57	"	6,600		"	
	931	"	"	"	"	10:09	"	4,700		"	
	932	"	"	"	"	10:15	"	6,600		0.5	
	934	"	"	"	"	10:42	"	--	sand	--	Geological
185	935	"	46° 15.5'	124° 07.5'	"	11:09	11	5,400		1.0	
	936	"	"	"	"	11:13	"	5,200		"	
	937	"	"	"	"	11:22	"	5,200		"	
	938	"	"	"	"	11:27	"	6,200		"	
	939	"	"	"	"	11:33	"	6,200		0.5	
	941	"	"	"	"	11:47	"	--	sand	--	Geological
186	942	"	46° 14.0'	124° 08.0'	"	12:06	17	7,600		1.0	
	943	"	"	"	"	12:18	"	7,600		"	
	944	"	"	"	"	12:35	"	10,600		"	
	945	"	"	"	"	12:41	"	10,100		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
186	946	C7506C	46° 14.0'	124° 08.0'	23 Jun 75	12:53	17	9,100		0.5	
	948	"	"	"	"	13:18	"	--	silty-sand	--	Geological
187	949	"	46° 13.0'	124° 09.0'	"	13:30	32	6,200		1.0	
	950	"	"	"	"	13:36	"	11,500		"	
	951	"	"	"	"	13:44	"	10,500		"	
	952	"	"	"	"	13:55	"	6,600		"	
	953	"	"	"	"	14:00	"	11,000		0.5	
	955	"	"	"	"	14:17	"	--	silty-sand	--	Geological
188	956	"	46° 13.0'	124° 10.0'	"	14:59	44	11,400		.0	
	957	"	"	"	"	15:10	"	8,200		"	
	958	"	"	"	"	15:18	"	9,300		"	
	959	"	"	"	"	15:23	"	13,300		"	
	960	"	"	"	"	15:32	"	10,900		0.5	
	962	"	"	"	"	15:44	"	--	silty-sand	--	Geological
189	963	"	46° 14.0'	124° 09.5'	"	16:36	22	14,200		1.0	
	964	"	"	"	"	16:43	"	13,300		"	
	965	"	"	"	"	16:55	"	14,000		"	
	966	"	"	"	"	17:01	"	14,600		"	
	967	"	"	"	"	17:05	"	13,800		0.5	
	969	"	"	"	"	17:37	"	--	silty-sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
190	970	C7506C	46° 14.0'	124° 09.0'	23 Jun 75	18:18	20	14,600		1.0	
	971	"	"	"	"	18:37	"	14,600		"	
	972	"	"	"	"	18:44	"	14,600		"	
	973	"	"	"	"	19:00	"	14,600		"	
	974	"	"	"	"	19:06	"	14,600		0.5	
	975	"	"	"	"	19:11	"	--	silty-sand	--	Geological
185	976	"	46° 15.5'	124° 07.5'	"	19:46	11	5,200		1.0	
191	977	"	46° 15.35'	124° 09.4'	"	20:06	15	4,700		"	
	978	"	"	"	"	20:12	"	6,200		"	
	979	"	"	"	"	20:15	"	6,200		"	
	980	"	"	"	"	20:19	"	5,300		"	
	981	"	"	"	"	20:23	"	4,000		0.5	
	983	"	"	"	"	20:35	"	--	sand	--	Geological
192	984	"	46° 15.0'	124° 10.5'	"	20:52	31	14,600		1.0	
	985	"	"	"	"	20:57	"	14,600		"	
	986	"	"	"	"	21:06	"	13,700		"	
	987	"	"	"	"	21:15	"	14,000		"	
	988	"	"	"	"	21:22	"	10,600		0.5	
	990	"	"	"	"	21:44	"	--	sand	--	Geological
193	991	"	46° 14.52'	124° 10.5'	"	22:09	33	14,600		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
193	992	C7506C	46° 14.52'	124° 10.5'	23 Jun 75	22:20	33	14,600		1.0	
	993	"	"	"	"	22:26	"	14,600		"	
	994	"	"	"	"	22:47	"	13,600		"	
	995	"	"	"	"	22:53	"	14,200		0.5	
	996	"	"	"	"	22:58	"	--	sand	--	Geological
194	997	"	46° 14.5'	124° 10.0'	"	23:40	26	12,900		1.0	
	998	"	"	"	"	23:44	"	14,600		"	
	999	"	"	"	"	23:49	"	14,600		"	
	1000	"	"	"	"	23:54	"	10,600		"	
	1001	"	"	"	24 Jun 75	00:02	"	2,200		0.5	
	1003	"	"	"	"	00:37	"	--	sand	--	Geological
195	1004	"	46° 12.0'	124° 09.0'	"	01:15	44	4,000		1.0	
	1005	"	"	"	"	01:42	"	4,700		"	
	1006	"	"	"	"	01:48	"	3,000		"	
	1007	"	"	"	"	01:54	"	4,500		"	
	1008	"	"	"	"	02:00	"	6,300		0.5	
	1010	"	"	"	"	02:27	"	--	sand	--	Geological
196	1011	"	46° 12.5'	124° 06.5'	"	03:05	24	5,700		1.0	
	1012	"	"	"	"	03:12	"	4,900		"	
	1013	"	"	"	"	03:28	"	6,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
196	1014	C7506C	46° 12.5'	124° 06.5'	24 Jun	03:32	24	4,000		1.0	
	1015	"	"	"	"	03:52	"	6,200		0.5	
	1017	"	"	"	"	04:08	"	--	sand	--	Geological
197	1018	"	46° 11.7'	124° 06.3'	"	04:31	29	6,000		1.0	
	1019	"	"	"	"	04:47	"	5,500		"	
	1020	"	"	"	"	05:00	"	8,700		"	
	1021	"	"	"	"	05:07	"	4,700		"	
	1022	"	"	"	"	05:13	"	6,000		0.5	
	1024	"	"	"	"	05:32	"	--	sand	--	Geological
198	1025	"	46° 11.7'	124° 06.0'	"	06:36	24	4,700		1.0	
	1026	"	"	"	"	06:41	"	4,500		"	
	1027	"	"	"	"	06:46	"	4,900		"	
	1028	"	"	"	"	06:49	"	4,900		"	
	1029	"	"	"	"	06:53	"	4,700		0.5	
	1031	"	"	"	"	07:04	"	--	sand	--	Geological
199	1032	"	46° 11.5'	124° 06.0'	"	07:15	26	4,700		1.0	
	1033	"	"	"	"	07:18	"	4,300		"	
	1034	"	"	"	"	07:23	"	5,300		"	
	1035	"	"	"	"	07:59	"	6,000		"	
	1036	"	"	"	"	08:02	"	5,500		0.5	
	1038	"	"	"	"	08:16	"	--	sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
200	1039	C7506C	46° 11.25'	124° 06.0°	24 Jun 75	08:26	26	6,000		1.0	
	1040	"	"	"	"	08:41	"	6,200		"	
	1041	"	"	"	"	08:42	"	6,200		"	
	1042	"	"	"	"	08:46	"	5,500		"	
	1043	"	"	"	"	08:52	"	5,000		0.5	
	1045	"	"	"	"	09:00	"	--	sand	--	Geological
201	1046	"	46° 11.5'	124° 05.5'	"	09:15	24	5,500		1.0	
	1047	"	"	"	"	09:19	"	5,500		"	
	1048	"	"	"	"	09:23	"	4,400		"	
	1049	"	"	"	"	09:28	"	6,600		"	
	1050	"	"	"	"	09:34	"	6,600		0.5	
	1052	"	"	"	"	09:46	"	--	sand	--	Geological
202	1053	"	46° 11.0'	124° 05.0'	"	09:55	"	4,300		1.0	
	1054	"	"	"	"	09:59	"	4,700		"	
	1055	"	"	"	"	10:02	"	6,200		"	
	1056	"	"	"	"	10:06	"	5,200		"	
	1057	"	"	"	"	10:09	"	5,200		0.5	
	1059	"	"	"	"	10:25	"	--	sand	--	Geological
203	1060	"	46° 12.0'	124° 02.5'	"	10:50	15	6,000		1.0	
	1061	"	"	"	"	10:53	"	5,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
203	1062	C7506C	46° 12.0'	124° 02.5'	24 Jun 75	10:56	15	5,200		1.0	
	1063	"	"	"	"	11:00	"	4,700		"	
	1064	"	"	"	"	11:03	"	4,300		0.5	
	1066	"	"	"	"	11:11	"	--	sand	--	Geological
204	1067	"	46° 10.0'	124° 04.0'	"	11:35	26	6,200		1.0	
	1068	"	"	"	"	11:44	"	4,700		"	
	1069	"	"	"	"	11:47	"	6,200		"	
	1070	"	"	"	"	11:52	"	4,800		"	
	1071	"	"	"	"	11:56	"	4,700		0.5	
	1073	"	"	"	"	12:08	"	--	sand	--	Geological
205	1074	"	46° 09.0'	124° 03.5'	"	13:34	30	3,900		1.0	
	1075	"	"	"	"	13:45	"	4,300		"	
	1076	"	"	"	"	13:50	"	5,600		"	
	1077	"	"	"	"	13:54	"	4,300		"	
	1078	"	"	"	"	14:02	"	4,100		0.5	
	1080	"	"	"	"	14:12	"	--	sand	--	Geological
206	1081	"	46° 09.0'	124° 00.5'	"	14:57	18	5,600		1.0	
	1082	"	"	"	"	15:01	"	5,500		"	
	1083	"	"	"	"	15:08	"	2,700		"	
	1084	"	"	"	"	15:11	"	4,700		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
206	1085	C7506C	46° 09.0'	124° 00.5'	24 Jun 75	15:15	18	5,200		0.5	
	1087	"	"	"	"	15:26	"	--	sand	--	Geological
207	1088	"	46° 09.0'	124° 04.5'	"	16:04	35	5,000		1.0	
	1089	"	"	"	"	16:09	"	4,700		"	
	1090	"	"	"	"	16:14	"	4,300		"	
	1091	"	"	"	"	16:18	"	6,200		"	
	1092	"	"	"	"	16:21	"	7,200		0.5	
	1094	"	"	"	"	16:35	"	--	sand	--	Geological
208	1095	"	46° 09.0'	124° 07.5'	"	16:57	53	4,700		1.0	
	1096	"	"	"	"	17:02	"	5,400		"	
	1097	"	"	"	"	17:07	"	5,200		"	
	1098	"	"	"	"	17:12	"	4,700		"	
	1099	"	"	"	"	17:19	"	6,200		0.5	
	1101	"	"	"	"	17:33	"	--	sand	--	Geological
209	1102	"	46° 09.0'	124° 10.5'	"	18:10	70	5,500		1.0	
	1103	"	"	"	"	18:16	"	7,800		"	
	1104	"	"	"	"	18:22	"	7,600		"	
	1105	"	"	"	"	20:25	"	6,600		"	
	1106	"	"	"	"	20:31	"	6,600		0.5	
	1108	"	"	"	"	20:47	"	--	silty-sand	--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
210	1109	C7506C	46° 09.0'	124° 14.0'	24 Jun 75	21:11	88	10,600		1.0	
	1110	"	"	"	"	21:20	"	12,700		"	
	1111	"	"	"	"	21:27	"	11,000		"	
	1112	"	"	"	"	21:32	"	10,600		"	
	1113	"	"	"	"	21:39	"	12,200		0.5	
	1115	"	"	"	"	21:54	"	--	sandy-silt	--	Geological
211	1116	"	46° 14.0'	124° 16.0'	"	22:50	86	12,600		1.0	
	1117	"	"	"	"	22:59	"	11,200		"	
	1118	"	"	"	"	23:06	"	11,300		"	
	1119	"	"	"	"	23:14	"	10,800		"	
	1120	"	"	"	"	23:23	"	11,500		0.5	
	1122	"	"	"	"	23:41	"	--	sandy-silt	--	Geological
212	1123	"	46° 17.0'	124° 17.0'	25 Jun 75	00:16	84	11,000		1.0	
	1124	"	"	"	"	00:24	"	10,600		"	
	1125	"	"	"	"	00:31	"	11,000		"	
	1126	"	"	"	"	00:38	"	11,000		"	
	1127	"	"	"	"	00:46	"	12,600		0.5	
	1129	"	"	"	"	01:03	"	--	sandy-silt	--	Geological
213	1130	"	46° 17.0'	124° 14.5'	"	01:47	66	8,500		1.0	
	1131	"	"	"	"	01:53	"	9,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
213	1132	C7506C	46° 17.0'	124° 14.5'	25 Jun 75	02:00	66	10,800		1.0	
	1133	"	"	"	"	02:11	"	9,200		"	
	1134	"	"	"	"	02:18	"	11,000		0.5	
	1136	"	"	"	"	02:35	"	--	sandy-silt	--	Geological
214	1137	"	46° 17.0'	124° 12.0'	"	03:03	45	9,200		1.0	
	1138	"	"	"	"	03:08	"	5,500		"	
	1139	"	"	"	"	03:14	"	6,600		"	
	1140	"	"	"	"	03:19	"	6,500		"	
	1141	"	"	"	"	03:24	"	5,200		0.5	
	1143	"	"	"	"	03:42	"	--	silty-sand	--	Geological
215	1144	"	46° 18.0'	124° 10.0'	"	04:10	31	5,500		1.0	
	1145	"	"	"	"	04:14	"	5,200		"	
	1146	"	"	"	"	04:20	"	5,200		"	
	1147	"	"	"	"	04:26	"	5,400		"	
	1148	"	"	"	"	04:35	"	3,000		0.5	
	1150	"	"	"	"	04:53	"	--	sand	--	Geological
216	1173	"	46° 14.9'	124° 04.95'	26 Jun 75	22:33	14	7,600		1.0	
	1174	"	"	"	"	22:36	"	9,200		"	
	1175	"	"	"	"	22:39	"	6,300		"	
	1176	"	"	"	"	22:44	"	6,400		"	

Station No.	S-N Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
	1177	C7506C	46° 14.9'	124° 04.95'	26 Jun 75	22:48	14	5,200		0.5	
	1178	"	"	"	"	22:53	"	--	sand	--	Geological
217	1180	"	46° 14.98'	124° 04.83'	"	23:13	"	6,600		1.0	
	1181	"	"	"	"	23:16	"	6,700		"	
	1182	"	"	"	"	23:20	"	6,000		"	
	1183	"	"	"	"	23:24	"	8,000		"	
	1184	"	"	"	"	23:28	"	7,000		0.5	
	1185	"	"	"	"	23:31	"	--	sand	--	Geological
218	1187	"	46° 15.04'	124° 04.75'	"	23:52	13	7,400		1.0	
	1188	"	"	"	"	23:56	"	6,400		"	
	1189	"	"	"	"	23:59	"	5,500		"	
	1190	"	"	"	27 Jun 75	00:02	"	5,200		"	
	1191	"	"	"	"	00:05	"	5,500		0.5	
	1192	"	"	"	"	00:08	"	--	sand	--	Geological
219	1194	"	46° 15.07'	124° 04.6'	"	00:22	14	5,400		1.0	
	1195	"	"	"	"	00:26	"	4,700		"	
	1196	"	"	"	"	00:29	"	6,800		"	
	1197	"	"	"	"	00:32	"	6,600		"	
	1198	"	"	"	"	00:35	"	8,900		0.5	
	1199	"	"	"	"	00:39	"	--	sand	--	Geological

Station No.	S-N Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
220	1201	C7506C	46° 15.13'	124° 14.5'	27 Jun 75	00:50	15	7,200		1.0	
	1202	"	"	"	"	00:54	"	7,000		"	
	1203	"	"	"	"	00:58	"	8,200		"	
	1204	"	"	"	"	01:01	"	12,000		"	
	1205	"	"	"	"	01:05	"	8,500		0.5	
	1206	"	"	"	"	01:08	"	--	sand	--	Geological
221	1236	C7509E	46° 12.0'	124° 09.0'	12 Sep 75	17:09	46	5,200		1.0	
	1237	"	"	"	"	17:33	"	5,200		"	
	1238	"	"	"	"	17:38	"	6,000		"	
	1239	"	"	"	"	17:51	"	6,200		"	
	1240	"	"	"	"	18:02	"	5,500		0.5	
	1241	"	"	"	"	18:10	"	--		--	Geological
222	1242	"	46° 12.5'	124° 06.5	"	18:28	24	5,500		1.0	
	1243	"	"	"	"	18:33	"	2,700		"	
	1244	"	"	"	"	18:38	"	2,800		"	
	1245	"	"	"	"	18:50	"	4,300		"	
	1246	"	"	"	"	18:54	"	4,700		0.5	
	1247	"	"	"	"	18:59	"	--		--	Geological
223	1248	"	46° 11.25'	124° 06.33'	"	19:20	29	5,400		1.0	
224	1249	"	46° 11.75'	124° 06.20'	"	19:28	"	--		--	Geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
223	1250	C7509E	46°11.25'	124°06.33	12 Sep 75	19:37	29	6,600		1.0	
	1251	"	"	"	"	19:41	"	6,600		"	
	1252	"	"	"	"	19:47	"	5,200			
	1253	"	"	"	"	19:56	"	5,200		0.5	
	1254	"	"	"	"	20:07	"	--	sand	--	geological
225	1255	"	46°11.76'	124°06.00'	"	20:15	29	--	sand	--	geological
226	1256	"	46°11.7'	124°06.0'	"	20:19	24	5,200		1.0	
	1257	"	"	"	"	20:30	"	4,000		"	
	1258	"	"	"	"	20:36	"	4,200		"	
	1259	"	"	"	"	20:41	"	4,300		"	
	1260	"	"	"	"	20:45	"	8,200		0.5	
	1261	"	"	"	"	20:51	"	--	sand	--	geological
227	1262	"	46°11.77'	124°05.85'	"	21:00	22	--	sand	--	geological
228	1263	"	46°11.77'	124°05.65'	"	21:10	22	6,600		1.0	
	1264	"	"	"	"	21:16	"	6,200		"	
	1265	"	"	"	"	21:20	"	3,400		"	
	1266	"	"	"	"	21:26	"	4,800		"	
	1267	"	"	"	"	21:31	"	4,200		0.5	
	1268	"	"	"	"	21:36	"	--	sand	--	geological
229	1269	"	46°11.67'	124°05.57'	"	21:42	22	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
230	1270	C7509E	46°11.68'	124°05.76'	12 Sep 75	22:02	22	6,600		1.0	
	1271	"	"	"	"	22:05	"	5,500		"	
	1272	"	"	"	"	22:10	"	4,700		"	
	1273	"	"	"	"	22:14	"	6,100		"	
	1274	"	"	"	"	22:18	"	6,600		0.5	
	1275	"	"	"	"	22:22	"	--	sand	--	geological
231	1276	"	46°11.70'	124°05.86'	"	22:30	"	--	sand	--	geological
232	1277	"	46°11.67'	124°05.98'	"	22:36	"	7,100		1.0	
	1278	"	"	"	"	22:41	"	5,200		"	
	1279	"	"	"	"	22:47	"	5,200		"	
	1280	"	"	"	"	22:51	"	6,200		"	
	1281	"	"	"	"	22:55	"	5,500		0.5	
	1282	"	"	"	"	22:59	"	--	sand	--	geological
233	1283	"	46°11.66'	124°06.15'	"	23:18	"	--	sand	--	geological
234	1284	"	46°11.64'	124°06.50'	"	23:24	"	5,500		1.0	
	1285	"	"	"	"	23:28	"	4,900		"	
	1286	"	"	"	"	23:38	"	4,200		"	
	1287	"	"	"	"	23:44	"	4,700		"	
	1288	"	"	"	"	23:50	"	6,100		0.5	
	1289	"	"	"	13 Sep 75	00:00	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
235	1290	C7509E	46°11.64'	124°06.35'	13 Sep 75	00:30	27	--	sand	--	geological
236	1291	"	46°11.7'	124°06.3'	"	00:45	29	5,500		1.0	
	1292	"	"	"	"	00:50	"	6,400		"	
	1293	"	"	"	"	00:59	"	6,600		"	
	1294	"	"	"	"	01:04	"	5,500		"	
	1295	"	"	"	"	01:11	"	5,200		"	
	1296	"	"	"	"	01:17	"	--	sand	--	geological
237	1297	"	46°11.58'	124°06.36'	"	01:30	?	--	sand	--	geological
238	1298	"	46°11.59'	124°06.22'	"	01:43	26	6,800		1.0	
	1299	"	"	"	"	02:03	"	8,500		"	
	1300	"	"	"	"	02:06	"	7,600		"	
	1301	"	"	"	"	02:26	"	7,600		"	
	1302	"	"	"	"	02:30	"	7,200		0.5	
	1303	"	"	"	"	02:34	"	--	sand	--	geological
239	1304	"	46°11.62'	124°05.79'	"	03:27	24	--	sand	--	geological
240	1305	"	46°11.60'	124°05.58'	"	03:34	"	5,400		1.0	
	1306	"	"	"	"	03:40	"	4,300		"	
	1307	"	"	"	"	03:46	"	3,800		"	
	1308	"	"	"	"	03:52	"	5,300		"	
	1309	"	"	"	"	04:14	"	4,100		0.5	
	1310	"	"	"	"	04:22	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
241	1311	C7509E	46°11.54'	124°05.62'	13 Sep 75	04:34	24	6,600		1.0	
	1312	"	"	"	"	05:36	"	4,000		"	
	1313	"	"	"	"	05:46	"	4,700		"	
	1314	"	"	"	"	05:49	"	6,600		"	
	1315	"	"	"	"	06:29	"	4,300		0.5	
	1316	"	"	"	"	07:16	"	--	sand	--	geological
242	1317	"	46°11.55'	124°05.76'	"	07:24	"	6,200		1.0	
	1318	"	"	"	"	08:11	"	5,200		"	
	1319	"	"	"	"	08:18	"	5,500		"	
	1320	"	"	"	"	08:25	"	6,600		"	
	1321	"	"	"	"	08:29	"	6,600		0.5	
	1322	"	"	"	"	08:38	"	--	sand	--	geological
243	1323	"	46°11.54'	124°05.89'	"	08:42	"	--	sand	--	geological
244	1324	"	46°11.53'	124°06.02'	"	08:48	"	--	sand	--	geological
245	1325	"	46°11.60'	124°06.14'	"	08:53	"	--	sand	--	geological
246	1326	"	46°11.56'	124°06.02'	"	08:58	26	4,500		1.0	
	1327	"	"	"	"	09:03	"	7,000		"	
	1328	"	"	"	"	09:07	"	9,000		"	
	1329	"	"	"	"	09:23	"	6,400		"	
	1330	"	"	"	"	09:33	"	6,200		0.5	
	1311	"	"	"	"	09:39	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
247	1332	C7509E	46°11.60'	124°05.93'	13 Sep 75	09:44	26	--	sand	--	geological
248	1333	"	46°11.58'	124°05.88'	"	09:53	"	6,000		1.0	
	1334	"	"	"	"	09:56	"	7,200		"	
	1335	"	"	"	"	09:59	"	6,600		"	
	1336	"	"	"	"	10:03	"	4,700		"	
	1337	"	"	"	"	10:29	"	4,600		0.5	
	1338	"	"	"	"	10:36	"	--	sand	--	geological
249	1339	"	46°11.5'	124°06.0'	"	10:42	"	7,400		1.0	
	1340	"	"	"	"	10:45	"	6,200		"	
	1341	"	"	"	"	10:49	"	8,100		"	
	1342	"	"	"	"	11:01	"	7,600		"	
	1343	"	"	"	"	11:04	"	6,600		0.5	
	1344	"	"	"	"	11:08	"	--	sand	--	geological
250	1345	"	46°11.52'	124°06.14'	"	11:22	"	--	sand	--	geological
251	1346	"	46°11.47'	124°06.24'	"	11:28	"	6,200		1.0	
	1347	"	"	"	"	11:41	"	7,000		"	
	1348	"	"	"	"	11:45	"	7,600		"	
	1349	"	"	"	"	11:49	"	6,600		"	
	1350	"	"	"	"	11:54	"	5,200		0.5	
	1351	"	"	"	"	12:09	"	--	sand	--	geological

Station No.	S-N Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
252	1352	C7509E	46°11.51'	124°06.37'	13 Sep 75	12:23	28	--	sand	--	geological
253	1353	"	46°11.43'	124°06.36'	"	12:32	29	6,400		1.0	
	1354	"	"	"	"	12:37	"	7,200		"	
	1355	"	"	"	"	12:43	"	5,500		"	
	1356	"	"	"	"	12:47	"	5,500		"	
	1357	"	"	"	"	12:52	"	6,600		0.5	
	1358	"	"	"	"	12:58	"	--	sand	--	geological
254	1359	"	46°11.44'	124°06.23'	"	13:06	"	--	sand	--	geological
255	1360	"	46°11.45'	124°06.30'	"	13:13	28	--	sand	--	geological
256	1361	"	46°11.45'	124°06.00'	"	13:20	28	8,400		1.0	
	1362	"	"	"	"	13:26	"	6,000		"	
	1363	"	"	"	"	13:30	"	7,000		"	
	1364	"	"	"	"	13:33	"	7,000		"	
	1365	"	"	"	"	13:37	"	6,200		0.5	
	1366	"	"	"	"	13:40	"	--	sand	--	geological
257	1367	"	46°11.49'	124°05.93'	"	13:47	27	--	sand	--	geological
258	1368	"	46°11.43'	124°05.90'	"	13:53	"	--	sand	--	geological
259	1369	"	46°11,45'	124°05,77'	"	14:00	"	8,000		1.0	
	1370	"	"	"	"	14:05	"	7,600		"	
	1371	"	"	"	"	14:09	"	10,000		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
259	1372	C7509E	46°11.45'	124°05.77'	13 Sep 75	14:14	27	7,400		1.0	
	1373	"	"	"	"	14:17	"	8,200		0.5	
	1374	"	"	"	"	14:24	"	--	sand	--	geological
260	1375	"	46°11.43'	124°05.61'	"	14:30	26	--	sand	--	geological
261	1376	"	46°11.5'	124°05.5'	"	14:37	"	4,700		1.0	
	1377	"	"	"	"	14:46	"	6,600		"	
	1378	"	"	"	"	14:49	"	5,200		"	
	1379	"	"	"	"	14:53	"	7,200		"	
	1380	"	"	"	"	14:56	"	4,900		0.5	
	1381	"	"	"	"	15:00	"	--	sand	--	geological
262	1382	"	46°11.35'	124°05.66'	"	15:11	27	6,200		1.0	
	1383	"	"	"	"	15:19	"	5,500		"	
	1384	"	"	"	"	15:25	"	6,200		"	
	1385	"	"	"	"	15:30	"	4,900		"	
	1386	"	"	"	"	15:37	"	6,600		0.5	
	1387	"	"	"	"	15:41	"	--	sand	--	geological
263	1388	"	46°11.32'	124°05.78'	"	15:48	"	--	sand	--	geological
264	1389	"	46°11.35'	124°05.99'	"	16:20	"	6,200		1.0	
	1390	"	"	"	"	16:24	"	8,300		"	
	1391	"	"	"	"	16:28	"	6,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
264	1392	C7509E	46°11.35'	124°05.99'	13 Sep 75	16:32	27	6,100		1.0	
	1393	"	"	"	"	16:38	"	8,200		0.5	
	1394	"	"	"	"	16:41	"	--	sand	--	geological
265	1395	"	46°11.34'	124°06.18'	"	16:53	27	--	sand	--	geological
266	1396	"	46°11.33'	124°06.26'	"	17:00	"	6,600		1.0	
	1397	"	"	"	"	17:11	"	5,200		"	
	1398	"	"	"	"	17:16	"	6,400		"	
	1399	"	"	"	"	17:19	"	7,000		"	
	1400	"	"	"	"	17:23	"	4,900		0.5	
	1401	"	"	"	"	17:29	"	--	sand	--	geological
267	1402	"	46°11.25'	124°06.0'	"	17:35	30	5,500		1.0	
	1403	"	"	"	"	17:38	"	6,400		"	
	1404	"	"	"	"	17:42	"	7,400		"	
	1405	"	"	"	"	17:46	"	7,600		"	
	1406	"	"	"	"	17:50	"	6,300		0.5	
	1407	"	"	"	"	17:56	"	--	sand	--	geological
268	1408	"	46°11.0'	124°05.0'	"	18:09	27	4,700		1.0	
	1409	"	"	"	"	18:12	"	4,100		"	
	1410	"	"	"	"	18:15	"	4,300		"	
	1411	"	"	"	"	18:20	"	4,700		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
268	1412	C7509E	46°11.0'	124°05.0'	13 Sep 75	18:24	27	3,600		0.5	
	1413	"	"	"	"	18:28	"	--	sand	--	geological
269	1414	"	46°10.0'	124°04.0'	"	18:40	"	3,100		1.0	
	1415	"	"	"	"	18:47	"	4,300		"	
	1416	"	"	"	"	18:51	"	4,000		"	
	1417	"	"	"	"	18:56	"	3,500		"	
	1418	"	"	"	"	19:04	"	4,700		0.5	
	1419	"	"	"	"	19:08	"	--	sand	--	geological
270	1420	"	46°09.0'	124°03.5'	"	19:20	"	3,800		1.0	
	1421	"	"	"	"	19:26	"	5,100		"	
	1422	"	"	"	"	19:30	"	4,600		"	
	1423	"	"	"	"	19:33	"	4,300		"	
	1424	"	"	"	"	19:38	"	7,200		0.5	
	1425	"	"	"	"	19:42	"	--	sand	--	geological
271	1426	"	46°09.0'	124°00.5'	"	20:04	18	5,200		1.0	
	1427	"	"	"	"	20:08	"	4,900		"	
	1428	"	"	"	"	20:11	"	4,000		"	
	1429	"	"	"	"	20:14	"	3,600		"	
	1430	"	"	"	"	20:17	"	3,500		0.5	
	1431	"	"	"	"	20:22	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
272	1432	C7509E	46°12.0'	124°02.5'	13 Sep 75	20:50	17	5,200		1.0	
	1433	"	"	"	"	20:55	"	4,000		"	
	1434	"	"	"	"	20:58	"	4,300		"	
	1435	"	"	"	"	21:02	"	3,000		"	
	1436	"	"	"	"	21:05	"	5,200		0.5	
	1437	"	"	"	"	21:08	"	--	sand	--	geological
273	1438	"	46°15.5'	124°07.5'	"	22:10	11	5,200		1.0	
	1439	"	"	"	"	22:17	"	5,300		"	
	1440	"	"	"	"	22:28	"	5,500		"	
	1441	"	"	"	"	22:30	"	4,700		"	
	1442	"	"	"	"	22:32	"	6,300		0.5	
	1443	"	"	"	"	22:33	"	--	sand	--	geological
274	1444	"	46°14.0'	124°08.0'	"	22:52	15	5,400		1.0	
	1445	"	"	"	"	22:55	"	9,200		"	
	1446	"	"	"	"	22:57	"	9,200		"	
	1447	"	"	"	"	23:01	"	9,200		"	
	1448	"	"	"	"	23:05	"	6,600		0.5	
	1449	"	"	"	"	23:08	"	--	silty-sand	--	geological
275	1450	"	46°13.0'	124°09.0'	"	23:21	31	5,200		1.0	
	1451	"	"	"	"	23:31	"	5,400		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
275	1452	C7509E	46°13.0'	124°09.0'	13 Sep 75	23:37	31	7,200		1.0	
	1453	"	"	"	"	23:44	"	9,200		"	
	1454	"	"	"	"	23:49	"	10,100		0.5	
	1455	"	"	"	"	23:56	"	--	silty-sand	--	geological
276	1456	"	46°13.0'	124°10.0'	14 Sep 75	00:23	42	10,700		1.0	
	1457	"	"	"	"	00:29	"	10,600		"	
	1458	"	"	"	"	00:35	"	12,300		"	
	1459	"	"	"	"	00:41	"	11,000		"	
	1460	"	"	"	"	00:47	"	10,700		0.5	
	1461	"	"	"	"	00:51	"	--	sand	--	geological
277	1462	"	46°14.0'	124°09.5'	"	01:35	20	11,000		1.0	
	1463	"	"	"	"	01:43	"	12,700		"	
	1464	"	"	"	"	01:50	"	9,800		"	
	1465	"	"	"	"	01:55	"	12,200		"	
	1466	"	"	"	"	02:06	"	11,000		0.5	
	1467	"	"	"	"	02:17	"	--	silty-sand	--	geological
278	1468	"	46°14.0'	124°09.0'	"	02:36	18	11,900		1.0	
	1469	"	"	"	"	02:50	"	11,000		"	
	1470	"	"	"	"	02:55	"	10,100		"	
	1471	"	"	"	"	03:01	"	11,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
278	1472	C7509E	46°14.0'	124°09.0'	14 Sep 75	03:09	18	12,200		0.5	
	1473	"	"	"	"	03:18	"	--	silty-sand	--	geological
279	1474	"	46°14.5'	124°10.0'	"	04:17	22	5,300		1.0	
	1475	"	"	"	"	04:23	"	5,200		"	
	1476	"	"	"	"	04:36	"	6,000		"	
	1477	"	"	"	"	04:41	"	9,800		"	
	1478	"	"	"	"	04:48	"	4,700		0.5	
	1479	"	"	"	"	04:54	"	--	silty-sand	--	geological
280	1480	"	46°14.5'	124°10.5'	"	05:32	31	14,600		1.0	
	1481	"	"	"	"	05:48	"	14,600		"	
	1482	"	"	"	"	06:06	"	14,600		"	
	1483	"	"	"	"	06:10	"	14,600		0.5	
	1484	"	"	"	"	06:15	"	--	clayey-silt	--	geological
	1485	"	"	"	"	06:23	"	14,600		1.0	
281	1486	"	46°15.0'	124°10.5	"	06:49	"	9,600		"	
	1487	"	"	"	"	06:54	"	12,700		"	
	1488	"	"	"	"	06:58	"	12,700		"	
	1489	"	"	"	"	07:32	"	12,700		"	
	1490	"	"	"	"	07:40	"	14,000		0.5	
	1491	"	"	"	"	07:44	"	--	sandy-silt	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
282	1492	C7509E	46°15.2'	124°09.4'	14 Sep 75	08:21	15	5,500		1.0	
	1493	"	"	"	"	08:26	"	4,000		"	
	1494	"	"	"	"	08:29	"	3,900		"	
	1495	"	"	"	"	08:33	"	6,000		"	
	1496	"	"	"	"	08:35	"	6,200		0.5	
	1497	"	"	"	"	08:38	"	--	sand	--	geological
283	1498	"	46°15.45'	124°05.6'	"	09:04	18	8,200		--	sample lost
	1499	"	"	"	"	09:07	"	6,200		1.0	
	1500	"	"	"	"	09:30	19	4,100		"	
	1501	"	"	"	"	09:34	18	6,600		"	
	1502	"	"	"	"	09:37	"	7,600		"	
	1503	"	"	"	"	09:40	"	10,700		0.5	
	1504	"	"	"	"	09:45	"	--	sand	--	geological
284	1505	"	46°09.0'	124°10.5'	"	10:44	66	5,500		1.0	
	1506	"	"	"	"	10:48	"	7,000		"	
	1507	"	"	"	"	10:54	"	8,500		"	
	1508	"	"	"	"	10:59	"	7,200		"	
	1509	"	"	"	"	11:05	"	5.500		0.5	
	1510	"	"	"	"	11:10	"	--	sand	--	geological
285	1511	"	46°09.0'	124°07.5'	"	11:27	51	7,600		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
285	1512	C7509E	46°09.0'	124°07.5'	14 Sep 75	11:32	51	4,300		1.0	
	1513	"	"	"	"	11:37	"	5,000		"	
	1514	"	"	"	"	11:46	"	4,100		"	
	1515	"	"	"	"	11:52	"	4,900		0.5	
	1516	"	"	"	"	11:57	"	--	sand	--	geological
286	1517	"	46°09.0'	124°04.5'	"	12:17	33	4,600		1.0	
	1518	"	"	"	"	12:25	"	5,700		"	
	1519	"	"	"	"	12:31	"	5,500		"	
	1520	"	"	"	"	12:35	"	4,600		"	
	1521	"	"	"	"	12:40	"	6,800		0.5	
	1522	"	"	"	"	12:50	"	--	sand	--	geological
287	1544	"	46°18.0'	124°10.0'	15 Sep 75	10:56	29	8,500		1.0	
	1545	"	"	"	"	11:00	"	5,700		"	
	1546	"	"	"	"	11:04	"	7,000		"	
	1547	"	"	"	"	11:08	"	6,000		"	
	1548	"	"	"	"	11:11	"	6,000		0.5	
	1549	"	"	"	"	11:15	"	--	silty-sand	--	geological
288	1550	"	46°17.0'	124°12.0'	"	11:37	44	5,500		1.0	
	1551	"	"	"	"	11:42	"	3,000		"	
	1552	"	"	"	"	11:48	"	7,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
288	1553	C7509E	46°17.0'	124°12.0'	15 Sep 75	11:57	44	5,200		1.0	
	1554	"	"	"	"	12:08	"	6,400		0.5	
	1555	"	"	"	"	12:15	"	--	sand	--	geological
289	1556	"	46°17.0'	124°14.5'	"	12:40	55	9,200		1.0	
	1557	"	"	"	"	12:47	"	8,500		"	
	1558	"	"	"	"	12:55	"	10,300		"	
	1559	"	"	"	"	13:05	"	11,000		"	
	1560	"	"	"	"	13:10	"	11,500		0.5	
	1561	"	"	"	"	13:17	"	--	silty-sand	--	geological
290	1562	"	46°17.0'	124°17.0'	"	13:42	85	11,000		1.0	
	1563	"	"	"	"	13:51	"	13,500		"	
	1564	"	"	"	"	13:58	"	13,500		"	
	1565	"	"	"	"	14:09	"	11,000		"	
	1566	"	"	"	"	14:23	"	11,000		0.5	
	1567	"	"	"	"	14:33	"	--	silty-sand	--	geological
291	1568	"	46°14.0'	124°16.0'	"	15:08	85	8,600		1.0	
	1569	"	"	"	"	15:15	"	10,800		"	
	1570	"	"	"	"	15:22	"	8,700		"	
	1571	"	"	"	"	15:31	"	9,900		"	
	1572	"	"	"	"	15:36	"	12,700		0.5	
	1573	"	"	"	"	15:43	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
292	1574	C7509E	46°09.0'	124°14.0'	15 Sep 75	16:25	88	12,200		1.0	
	1575	"	"	"	"	16:34	"	11,700		"	
	1576	"	"	"	"	16:41	"	12,400		"	
	1577	"	"	"	"	16:48	"	12,900		"	
	1578	"	"	"	"	16:53	"	12,600		0.5	
	1579	"	"	"	"	17:00	"	--	silty-sand	--	geological
293	1587	C7510E	46°12.5'	124°06.5'	21 Oct 75	11:14	22	6,600		1.0	
	1588	"	"	"	"	11:19	"	6,500		"	
	1589	"	"	"	"	11:32	"	6,600		"	
	1590	"	"	"	"	11:37	"	6,600		"	
	1591	"	"	"	"	11:42	"	8,300		"	
	1592	"	"	"	"	11:47	"	5,300		0.5	
	1593	"	"	"	"	11:58	"	--	sand	--	geological
294	1594	"	46°12.0'	124°09.0'	"	12:35	42	8,400		1.0	
	1595	"	"	"	"	12:37	"	5,600		"	
	1596	"	"	"	"	12:48	"	5,600		"	
	1597	"	"	"	"	12:53	"	6,700		"	
	1598	"	"	"	"	13:00	"	5,400		0.5	
	1599	"	"	"	"	13:07	"	--	sand	--	geological
295	1600	"	46°11.7'	124°06.3'	"	13:34	31	5,500		1.0	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
295	1601	C7510E	46°11.7'	124°06.3'	21 Oct 75	13:42	31	5,300		1.0	
	1602	"	"	"	"	13:59	"	5,200		"	
	1603	"	"	"	"	14:06	"	6,100		"	
	1604	"	"	"	"	14:11	"	5,600		0.5	
	1605	"	"	"	"	14:18	"	--	sand	--	geological
296	1606	"	46°11.7'	124°06.0'	"	14:28	28	9,600		1.0	
	1607	"	"	"	"	14:34	"	8,300		"	
	1608	"	"	"	"	14:40	"	4,800		"	
	1609	"	"	"	"	14:49	"	3,900		"	
	1610	"	"	"	"	14:56	"	4,300		0.5	
	1611	"	"	"	"	15:02	"	--	sand	--	geological
297	1612	"	46°11.25'	124°06.0'	"	15:17	29	5,600		1.0	
	1613	"	"	"	"	15:30	"	5,500		"	
	1614	"	"	"	"	15:35	"	5,500		"	
	1615	"	"	"	"	15:45	"	3,600		"	
	1616	"	"	"	"	15:50	"	6,600		0.5	
	1617	"	"	"	"	15:54	"	--	sand	--	geological
298	1618	"	46°11.5'	124°05.5'	"	16:48	26	4,800		1.0	
	1619	"	"	"	"	16:55	"	6,700		"	
	1620	"	"	"	"	16:59	"	5,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
298	1621	C7510E	46°11.5'	124°05.5'	21 Oct 75	17:04	26	5,000		1.0	
	1622	"	"	"	"	17:08	"	5,400		0.5	
	1623	"	"	"	"	17:12	"	--	sand	--	geological
299	1624	"	46°11.5'	124°06.0'	"	17:24	26	7,200		1.0	
	1625	"	"	"	"	17:28	"	7,700		"	
	1626	"	"	"	"	17:34	"	7,500		"	
	1627	"	"	"	"	17:37	"	8,100		"	
	1628	"	"	"	"	17:41	"	--		0.5	
	1629	"	"	"	"	17:45	"	--	sand	--	geological
300	1630	"	46°11.0'	124°05.0'	"	18:04	26	5,200		1.0	
	1631	"	"	"	"	18:08	"	5,300		"	
	1632	"	"	"	"	18:14	"	5,000		"	
	1633	"	"	"	"	18:19	"	5,500		"	
	1634	"	"	"	"	18:24	"	6,600		0.5	
	1635	"	"	"	"	18:27	"	--	sand	--	geological
	1637	"	"	"	"	18:51	"	5,500		"	
	1638	"	"	"	"	18:55	"	6,200		"	
	1639	"	"	"	"	18:59	"	6,200		"	
	1640	"	"	"	"	19:03	"	--		0.5	
	1641	"	"	"	"	19:07	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
302	1642	C7510E	46°10.0'	124°040,'	21 Oct 75	19:30	26	5,200		1.0	
	1643	"	"	"	"	19:39	"	5,500		"	
	1644	"	"	"	"	19:45	"	6,000		"	
	1645	"	"	"	"	19:51	"	4,300		"	
	1646	"	"	"	"	19:59	"	5,500		0.5	
	1647	"	"	"	"	20:03	"	--	sand	--	geological
303	1648	"	46°09.0'	124°03.5'	"	20:23	27	5,400		1.0	
	1649	"	"	"	"	20:29	"	6,000		"	
	1650	"	"	"	"	20:33	"	5,500		"	
	1651	"	"	"	"	20:36	"	--		"	
	1652	"	"	"	"	20:41	"	4,700		0.5	
	1653	"	"	"	"	20:44	"	--	sand	--	geological
304	1654	"	46°09.0'	124°04.5'	"	20:57	31	4,700		1.0	
	1655	"	"	"	"	21:01	"	5,500		"	
	1656	"	"	"	"	21:08	"	4,700		"	
	1657	"	"	"	"	21:11	"	4,800		"	
	1658	"	"	"	"	21:15	"	--		0.5	
	1659	"	"	"	"	21:20	"	--		--	geological
305	1660	"	46°09.0'	124°00.5'	"	21:45	18	3,500		1.0	
	1661	"	"	"	"	21:49	"	3,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
305	1662	C7510E	46°09.0'	124°00.5'	21 Oct 75	21:51	18	3,000		1.0	
	1663	"	"	"	"	21:58	"	3,500		"	
	1664	"	"	"	"	22:03	"	3,500		0.5	
	1665	"	"	"	"	22:13	"	--		--	geological
306	1666	"	46°11.25'	124°06.23'	"	23:13	27	4,700		1.0	
	1667	"	"	"	"	23:17	"	4,000		"	
	1668	"	"	"	"	23:23	"	5,500		"	
	1669	"	"	"	"	23:25	"	5,500		"	
	1670	"	"	"	"	23:31	"	--		0.5	
	1671	"	"	"	"	23:36	"	--	sand	--	geological
307	1672	"	46°11.77'	124°05.65'	"	23:55	24	6,200		1.0	
	1673	"	"	"	22 Oct 75	00:08	"	8,000		"	
	1674	"	"	"	"	00:12	"	6,200		"	
	1675	"	"	"	"	00:17	"	5,200		0.5	
	1676	"	"	"	"	00:30	"	--	sand	--	geological
	1677	"	"	"	"	00:43	"	6,600		1.0	
308	1678	"	46°11.64'	124°06.5'	"	00:59	28	5,400		"	
	1679	"	"	"	"	01:06	"	6,600		"	
	1680	"	"	"	"	01:13	"	7,200		"	
	1681	"	"	"	"	01:17	"	7,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
308	1682	C7510E	46°11.64'	124°06.5'	22 Oct 75	01:25	28	4,800		0.5	
	1683	"	"	"	"	01:29	"	--	sand	--	geological
309	1684	"	46°11.67'	124°05.98'	"	01:45	28	8,400		1.0	
	1685	"	"	"	"	01:50	"	5,500		"	
	1686	"	"	"	"	01:55	"	5,600		"	
	1687	"	"	"	"	02:00	"	9,900		"	
	1688	"	"	"	"	02:05	"	7,800		0.5	
	1689	"	"	"	"	02:10	"	--	sand	--	geological
310	1690	"	46°11.68'	124°05.76'	"	02:23	27	6,200		1.0	
	1691	"	"	"	"	02:35	"	7,200		"	
	1692	"	"	"	"	02:40	"	8,300		"	
	1693	"	"	"	"	02:44	"	6,200		"	
	1694	"	"	"	"	02:49	"	6,000		0.5	
	1695	"	"	"	"	02:53	"	--	sand	--	geological
311	1696	"	46°11.59'	124°06.22'	"	03:02	27	5,600		1.0	
	1697	"	"	"	"	03:09	"	7,800		"	
	1698	"	"	"	"	03:16	"	8,500		"	
	1699	"	"	"	"	03:21	"	7,600		"	
	1700	"	"	"	"	03:25	"	3,100		0.5	
	1701	"	"	"	"	03:31	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
312	1702	C7510E	46°11.56'	124°06.02'	22 Oct 75	03:52	26	8,200		1.0	
	1703	"	"	"	"	04:00	"	3,800		"	
	1704	"	"	"	"	04:05	"	6,600		"	
	1705	"	"	"	"	04:10	"	6,400		"	
	1706	"	"	"	"	04:20	"	6,600		0.5	
	1707	"	"	"	"	04:27	"	--	sand	--	geological
313	1708	"	46°11.58'	124°05.88'	"	04:47	26	7,200		1.0	
	1709	"	"	"	"	04:54	"	4,000		"	
	1710	"	"	"	"	04:58	"	6,200		"	
	1711	"	"	"	"	05:03	"	6,500		"	
	1712	"	"	"	"	05:07	"	--		0.5	
	1713	"	"	"	"	05:11	"	--	sand	--	geological
314	1714	"	46°11.60'	124°05.58'	"	05:30	26	5,400		1.0	
	1715	"	"	"	"	05:36	"	5,400		"	
	1716	"	"	"	"	05:41	"	6,400		"	
	1717	"	"	"	"	05:47	"	5,500		"	
	1718	"	"	"	"	05:52	"	5,400		0.5	
	1719	"	"	"	"	06:04	"	--	sand	--	geological
315	1720	"	46°11.47'	124°06.24'	"	06:14	26	6,400		1.0	
	1721	"	"	"	"	06:24	"	6,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
315	1722	C7510E	46°11.47'	124°06.24'	22 Oct 75	06:24	26	4,700		1.0	
	1723	"	"	"	"	06:28	"	7,200		"	
	1724	"	"	"	"	06:34	"	6,200		0.5	
	1725	"	"	"	"	06:41	"	--	sand	--	geological
316	1726	"	46°11.55'	124°05.76'	"	06:51	26	3,200		1.0	
	1727	"	"	"	"	06:54	"	6,600		"	
	1728	"	"	"	"	06:58	"	6,600		"	
	1729	"	"	"	"	07:01	"	4,100		"	
	1730	"	"	"	"	07:04	"	5,500		0.5	
	1731	"	"	"	"	07:07	"	--	sand	--	geological
317	1732	"	46°11.54'	124°05.62	"	07:13	26	6,800		1.0	
	1733	"	"	"	"	07:17	"	5,500		"	
	1734	"	"	"	"	07:20	"	5,300		"	
	1735	"	"	"	"	07:23	"	6,000		"	
	1736	"	"	"	"	07:27	"	5,300		0.5	
	1737	"	"	"	"	07:30	"	--	sand	--	geological
318	1738	"	46°11.43'	124°06.36'	"	08:05	27	6,200		1.0	
	1739	"	"	"	"	08:09	"	5,200		"	
	1740	"	"	"	"	08:12	"	4,700		"	
	1741	"	"	"	"	08:14	"	6,600		"	

tation No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
318	1742	C7510E	46°11.43'	124°06.36'	22 Oct 75	08:18	27	6,600		0.5	
	1743	"	"	"	"	08:21	"	--	sand	--	geological
319	1744	"	46°11.45'	124°06.00'	"	08:28	26	9,200		1.0	
	1745	"	"	"	"	08:31	"	8,600		"	
	1746	"	"	"	"	08:34	"	6,200		"	
	1747	"	"	"	"	08:37	"	6,700		"	
	1748	"	"	"	"	08:41	"	9,200		0.5	
	1749	"	"	"	"	08:43	"	--	sand	--	geological
320	1750	"	46°11.45'	124°05.77'	"	08:51	26	7,600		1.0	
	1751	"	"	"	"	08:55	"	9,200		"	
	1752	"	"	"	"	08:57	"	5,600		"	
	1753	"	"	"	"	09:01	"	9,200		"	
	1754	"	"	"	"	09:03	"	6,200		0.5	
	1755	"	"	"	"	09:08	"	--	sand	--	geological
321	1756	"	46°11.33'	124°06.26'	"	09:21	29	5,500		1.0	
	1757	"	"	"	"	09:23	"	5,400		"	
	1758	"	"	"	"	09:26	"	5,500		"	
	1759	"	"	"	"	09:28	"	6,400		"	
	1760	"	"	"	"	09:31	"	6,000		0.5	
	1761	"	"	"	"	09:34	"	--	sand	--	geological

tation No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
322	1762	C7510E	46°11.35'	124°05.99'	22 Oct 75	09:42	27	8,700		1.0	
	1763	"	"	"	"	09:54	"	7,200		"	
	1764	"	"	"	"	09:57	"	7,200		"	
	1765	"	"	"	"	10:00	"	7,600		"	
	1766	"	"	"	"	10:05	"	7,200		0.5	
	1767	"	"	"	"	10:09	"	--	sand	--	geological
323	1768	"	46°11.35'	124°05.66'	"	10:17	26	5,200		1.0	
	1769	"	"	"	"	10:20	"	5,200		"	
	1770	"	"	"	"	10:25	"	5,500		"	
	1771	"	"	"	"	10:27	"	5,200		"	
	1772	"	"	"	"	10:30	"	5,500		0.5	
	1773	"	"	"	"	10:36	"	--	sand	--	geological
324	1782	C7601A	46°09.0'	124°07.5'	5 Jan 76	16:58	50	4,700		1.0	
	1783	"	"	"	"	17:20	"	4,400		"	
	1784	"	"	"	"	17:30	"	6,600		"	
	1785	"	"	"	"	17:36	"	5,400		"	
	1786	"	"	"	"	17:43	"	5,400		0.5	
	1787	"	"	"	"	17:50	"	--	sand	--	geological
325	1788	"	46°09.0'	124°10.5'	"	18:15	68	5,000		1.0	
	1789	"	"	"	"	18:27	"	4,600		"	
	1790	"	"	"	"	18:38	"	6,700		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
325	1791	C7601A	46°09.0'	124°10.5'	5 Jan 76	18:54	68	1,500		1.0	
	1792	"	"	"	"	19:05	"	4,600		0.5	
	1793	"	"	"	"	19:13	"	--	sand	--	geological
	1794	"	"	"	"	19:20	"	5,400		1.0	
326	1795	"	46°09.0'	124°14.0'	"	19:49	82	8,200		"	
	1796	"	"	"	"	19:55	"	9,100		"	
	1797	"	"	"	"	20:11	"	8,350		"	
	1798	"	"	"	"	20:21	"	8,500		"	
	1799	"	"	"	"	20:36	"	9,100		0.5	
	1800	"	"	"	"	20:47	"	--	sand	--	geological
327	1801	"	46°14.0'	124°16.0'	"	21:48	82	9,000		1.0	
	1802	"	"	"	"	22:00	"	10,600		"	
	1803	"	"	"	"	22:12	"	8,400		"	
	1804	"	"	"	"	22:22	"	7,200		"	
	1805	"	"	"	"	22:32	"	10,100		0.5	
	1806	"	"	"	"	22:40	"	--	sand	--	geological
328	1807	"	46°17.0'	124°17.0'	"	23:21	84	10,450		1.0	
	1808	"	"	"	"	23:37	"	6,800		"	
329	1809	"	46°11.25'	124°06.33'	6 Jan 76	08:59	27	6,800		"	
	1810	"	"	"	"	09:04	"	4,900		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
329	1812	C7601A	46°11.25'	124°06.33'	6 Jan 76	09:12	27	5,300		1.0	
	1813	"	"	"	"	09:16	"	6,800		0.5	
	1814	"	"	"	"	09:20	"	--	sand	--	geological
330	1815	"	46°11.64'	124°06.50'	"	09:26	27	8,700		1.0	
	1816	"	"	"	"	09:30	"	5,200		"	
	1817	"	"	"	"	09:34	"	4,700		"	
	1818	"	"	"	"	09:37	"	7,200		"	
	1819	"	"	"	"	09:41	"	?		0.5	
	1820	"	"	"	"	09:44	"	--	sand	--	geological
331	1821	"	46°11.67'	124°05.98'	"	09:50	26	6,300		1.0	
	1822	"	"	"	"	09:55	"	7,600		"	
	1823	"	"	"	"	10:00	"	5,750		"	
	1824	"	"	"	"	10:04	"	5,200		"	
	1825	"	"	"	"	10:07	"	4,900		0.5	
	1826	"	"	"	"	10:11	"	--	sand	--	geological
332	1827	"	46°11.68'	124°05.76'	"	10:18	26	5,200		1.0	
	1828	"	"	"	"	10:21	"	4,800		"	
	182	"	"	"	"	10:35	"	5,500		"	
	1830	"	"	"	"	10:39	"	5,350		"	
	1831	"	"	"	"	10:54	"	4,900		0.5	
	1832	"	"	"	"	10:58	"	--	sand	--	geological

Station No.	S-1 Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
333	1833	C7601A	46°11.77'	124°05.65'	6 Jan 76	11:04	24	5,200		1.0	
	1834	"	"	"	"	11:08	"	4,700		"	
	1835	"	"	"	"	11:12	"	4,500		"	
	1836	"	"	"	"	11:15	"	4,800		"	
	1837	"	"	"	"	11:19	"	?		0.5	
	1838	"	"	"	"	11:24	"	--	sand	--	geological
334	1839	"	46°11.60'	124°05.58'	"	12:03	26	4,500		1.0	
	1840	"	"	"	"	12:07	"	4,900		"	
	1841	"	"	"	"	12:17	"	4,000		"	
	1842	"	"	"	"	12:22	"	4,400		"	
	1843	"	"	"	"	12:27	"	5,300		0.5	
	1844	"	"	"	"	12:31	"	--	sand	--	geological
335	1845	"	46°11.58'	124°05.88'	"	12:41	26	8,200		1.0	
	1846	"	"	"	"	12:45	"	5,000		"	
	1847	"	"	"	"	12:50	"	6,100		"	
	1848	"	"	"	"	12:54	"	8,300		"	
	1849	"	"	"	"	13:00	"	6,600		0.5	
	1850	"	"	"	"	13:04	"	--	sand	--	geological
336	1851	"	46°11.55'	124°05.76'	"	13:17	27	5,350		1.0	
	1852	"	"	"	"	13:23	"	5,600		"	
	1853	"	"	"	"	13:34	"	6,100		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
336	1854	C7601A	46°11.55'	124°05.76'	6 Jan 76	13:39	27	4,150		1.0	
	1855	"	"	"	"	13:45	"	4,900		0.5	
	1856	"	"	"	"	13:49	"	--	sand	--	geological
337	1857	"	46°11.54'	124°05.62'	"	14:05	27	4,900		1.0	
	1858	"	"	"	"	14:10	"	5,300		"	
	1859	"	"	"	"	14:16	"	6,000		"	
	1860	"	"	"	"	14:22	"	4,800		"	
	1861	"	"	"	"	14:27	"	6,100		0.5	
	1862	"	"	"	"	14:32	"	--	sand	--	geological
338	1863	"	46°11.45'	124°05.77'	"	14:40	28	9,000		1.0	
	1864	"	"	"	"	14:58	"	5,100		"	
	1865	"	"	"	"	15:06	"	5,300		"	
	1866	"	"	"	"	15:13	"	4,600		"	
	1867	"	"	"	"	15:24	"	6,450		0.5	
	1868	"	"	"	"	15:27	"	--	sand	--	geological
339	1869	"	46°11.35'	124°05.66'	"	15:37	27	5,100		1.0	
	1870	"	"	"	"	15:45	"	4,400		"	
	1871	"	"	"	"	15:51	"	5,000		"	
	1872	"	"	"	"	16:00	"	4,800		"	
	1873	"	"	"	"	16:15	"	4,900		0.5	
	1874	"	"	"	"	16:22	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
340	1875	C7601A	46°11.35'	124°05.99'	6 Jan 76	16:37	29	4,250		1.0	
	1876	"	"	"	"	16:44	"	7,800		"	
	1877	"	"	"	"	16:48	"	4,500		"	
	1878	"	"	"	"	16:53	"	6,000		"	
	1879	"	"	"	"	17:07	"	4,150		0.5	
	1880	"	"	"	"	17:18	"	--	sand	--	geological
341	1881	"	46°11.33'	124°06.26'	"	17:36	29	4,150		1.0	
	1882	"	"	"	"	17:47	"	4,500		"	
	1883	"	"	"	"	17:53	"	4,150		"	
	1884	"	"	"	"	18:19	"	4,600		"	
	1885	"	"	"	"	18:25	"	4,150		0.5	
	1886	"	"	"	"	18:30	"	--	sand	--	geological
342	1887	"	46°11.43'	124°06.36'	"	18:36	29	5,300		1.0	
	1888	"	"	"	"	18:41	"	5,350		"	
	1889	"	"	"	"	18:44	"	3,000		"	
	1890	"	"	"	"	18:49	"	4,500		"	
	1891	"	"	"	"	18:54	"	6,400		0.5	
	1892	"	"	"	"	18:58	"	--	sand	--	geological
343	1893	"	46°11.47'	124°06.24'	"	19:08	29	6,200		1.0	
	1894	"	"	"	"	19:17	"	4,600		"	
	1895	"	"	"	"	19:21	"	4,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
343	1896	C7601A	46°11.47'	124°06.24'	6 Jan 76	19:25	29	6,500		1.0	
	1897	"	"	"	"	19:29	"	6,200		0.5	
	1898	"	"	"	"	19:32	"	--	sand	--	geological
344	1899	"	46°11.59'	124°06.22'	"	19:37	29	6,200		1.0	
	1900	"	"	"	"	19:43	"	6,600		"	
	1901	"	"	"	"	19:50	"	6,600		"	
	1902	"	"	"	"	20:00	"	6,200		"	
	1903	"	"	"	"	20:05	"	?		0.5	
	1904	"	"	"	"	20:10	"	--	sand	--	geological
345	1905	"	46°11.45'	124°06.00'	"	20:46	26	5,300		1.0	
	1906	"	"	"	"	20:53	"	4,500		"	
	1907	"	"	"	"	20:59	"	6,200		"	
	1908	"	"	"	"	21:03	"	5,100		"	
	1909	"	"	"	"	21:08	"	6,800		0.5	
	1910	"	"	"	"	21:13	"	--	sand	--	geological
346	1911	"	46°11.25'	124°06.00'	"	21:33	27	6,200		1.0	
	1912	"	"	"	"	21:39	"	5,600		"	
	1913	"	"	"	"	21:43	"	4,500		"	
	1914	"	"	"	"	21:47	"	4,200		"	
	1915	"	"	"	"	21:52	"	5,000		0.5	
	1916	"	"	"	"	21:57	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
347	1917	C7601A	46°12.5'	124°06.5'	8 Jan 76	18:49	23	5,100		1.0	
	1918	"	"	"	"	18:55	"	4,400		"	
	1919	"	"	"	"	19:08	"	6,000		"	
	1920	"	"	"	"	19:13	"	6,900		"	
	1921	"	"	"	"	19:18	"	6,200		0.5	
	1922	"	"	"	"	19:24	"	--	sand	--	geological
348	1923	"	46°12.0'	124°02.5'	"	19:59	16	3,800		1.0	
	1924	"	"	"	"	20:03	"	5,200		"	
	1925	"	"	"	"	20:07	"	4,300		"	
	1926	"	"	"	"	20:10	"	4,150		"	
	1927	"	"	"	"	20:18	"	5,300		0.5	
	1928	"	"	"	"	20:24	"	--	sand	--	geological
349	1929	"	46°09.0'	124°00.5'	"	20:57	18	4,150		1.0	
	1930	"	"	"	"	21:01	"	4,150		"	
	1931	"	"	"	"	21:05	"	3,600		"	
	1932	"	"	"	"	21:09	"	3,600		"	
	1933	"	"	"	"	21:19	"	?		0.5	
	1934	"	"	"	"	21:22	"	--	sand	--	geological
350	1935	"	46°09.0'	124°03.5'	"	21:47	27	5,300		1.0	
	1936	"	"	"	"	21:51	"	5,300		"	
	1937	"	"	"	"	21:56	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
350	1938	C7601A	46°09.0'	124°03.5'	8 Jan 76	22:02	27	4,700		1.0	
	1939	"	"	"	"	22:11	"	5,200		"	
	1940	"	"	"	"	22:16	"	5,200		0.5	
351	1941	"	46°09.0'	124°04.5'	"	22:31	33	4,700		1.0	
	1942	"	"	"	"	22:43	"	4,300		"	
	1943	"	"	"	"	22:47	"	5,400		"	
	1944	"	"	"	"	22:51	"	4,300		"	
	1945	"	"	"	"	23:00	"	?		0.5	
	1946	"	"	"	"	23:08	"	--	sand	--	geological
352	1947	"	46°10.0'	124°04.0'	"	23:26	29	4,600		1.0	
	1948	"	"	"	"	23:38	"	5,300		"	
	1949	"	"	"	"	23:43	"	4,700		"	
	1950	"	"	"	"	23:48	"	?		"	
	1951	"	"	"	9 Jan 76	00:02	"	5,100		0.5	
	1952	"	"	"	"	00:09	"	--	sand	--	geological
353	1953	"	46°11.0'	124°05.0'	"	00:28	27	4,800		1.0	
	1954	"	"	"	"	00:33	"	4,800		"	
	1955	"	"	"	"	00:38	"	6,200		"	
	1956	"	"	"	"	00:43	"	5,400		"	
	1957	"	"	"	"	00:54	"	4,700		0.5	
	1958	"	"	"	"	00:59	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
354	1938	C7601A	46°11.5'	124°05.5'	8 Jan 76	01:23	26	7,200		1.0	
	1960	"	"	"	"	01:32	"	4,800		"	
	1961	"	"	"	"	01:38	"	4,700		"	
	1962	"	"	"	"	01:42	"	6,400		"	
	1963	"	"	"	"	01:52	"	5,100		0.5	
	1964	"	"	"	"	01:56	"	--	sand	--	geological
355	1965	"	46°11.7'	124°06.0'	"	02:08	26	6,600		1.0	
	1966	"	"	"	"	02:15	"	7,200		"	
	1967	"	"	"	"	02:20	"	6,000		"	
	1968	"	"	"	"	02:28	"	5,700		"	
	1969	"	"	"	"	02:32	"	5,600		0.5	
	1970	"	"	"	"	02:37	"	--	sand	--	geological
356	1971	"	46°11.7'	124°06.3'	"	02:55	31	4,700		1.0	
	1972	"	"	"	"	03:01	"	5,400		"	
	1973	"	"	"	"	03:10	"	4,300		"	
	1974	"	"	"	"	03:15	"	5,700		"	
	1975	"	"	"	"	03:22	"	4,300		0.5	
	1976	"	"	"	"	03:28	"	--	sand	--	geological
357	1977	"	46°12.0'	124°09.0'	"	04:01	42	4,200		1.0	
	1978	"	"	"	"	04:10	"	3,500		"	
	1979	"	"	"	"	04:21	"	5,600		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
357	1980	C7601A	46°12.0'	124°09.0'	9 Jan 76	06:54	42	5,500		1.0	
	1981	"	"	"	"	07:00	"	4,000		0.5	
	1982	"	"	"	"	07:25	"	--	sand	--	geological
358	1983	"	46°13.0'	124°10.0'	"	04:59	46	4,300		1.0	
	1984	"	"	"	"	05:48	"	5,600		"	
	1985	"	"	"	"	06:04	"	5,200		"	
	1986	"	"	"	"	06:25	"	6,200		"	
	1987	"	"	"	"	06:30	"	?		0.5	
	1988	"	"	"	"	06:35	"	--	sand	--	geological
359	1989	"	46°13.0'	124°09.0'	"	08:12	31	5,600		1.0	
	1990	"	"	"	"	08:23	"	7,400		"	
	1991	"	"	"	"	08:27	"	9,100		"	
	1992	"	"	"	"	08:36	"	4,200		"	
	1993	"	"	"	"	08:41	"	7,300		0.5	
	1994	"	"	"	"	08:48	"	--	sand	--	geological
360	1995	"	46°15.0'	124°10.5'	"	09:25	33	6,200		1.0	
	1996	"	"	"	"	09:58	"	5,500		"	
	1997	"	"	"	"	10:07	"	2,200		"	
	1998	"	"	"	"	10:18	"	5,400		"	
	1999	"	"	"	"	10:46	"	5,400		"	
	2000	"	"	"	"	11:37	"	--	silty-sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
361	2001	C7601A	46°14.5'	124°10.5'	9 Jan 76	13:07	33	3,600		1.0	
	2002	"	"	"	"	13:23	"	6,700		"	
	2003	"	"	"	"	13:28	"	5,100		"	
	2004	"	"	"	"	13:34	"	5,350		"	
	2005	"	"	"	"	13:41	"	5,300		0.5	
	2006	"	"	"	"	13:47	"	--	silty-sand	--	geological
362	2007	"	46°14.5'	124°10.0'	"	13:57	26	4,700		1.0	
	2008	"	"	"	"	14:03	"	5,350		"	
	2009	"	"	"	"	14:07	"	4,600		"	
	2010	"	"	"	"	14:12	"	4,800		"	
	2011	"	"	"	"	14:17	"	5,100		0.5	
	2012	"	"	"	"	14:22	"	--	sand	--	geological
328(cont)	2013	"	46°17.0'	124°17.0'	"	16:52	82	11,50		1.0	
	2014	"	"	"	"	17:07	"	10,800		"	
	2015	"	"	"	"	17:18	"	11,200		0.5	
	2016	"	"	"	"	17:27	"	--	silty-sand	--	geological
363	2017	"	46°17.0'	124°14.5	"	17:56	64	7,600		1.0	
	2018	"	"	"	"	18:09	"	6,600		"	
	2019	"	"	"	"	18:19	"	8,200		"	
	2020	"	"	"	"	18:30	"	11,000		"	
	2021	"	"	"	"	18:43	"	11,000		0.5	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
363	2022	C7601A	46°17.0'	124°14.5'	9 Jan 76	18:54	64	--	silty-sand	--	geological
364	2023	"	46°17.0'	124°12.0'	"	19:29	37	4,300		1.0	
	2024	"	"	"	"	19:35	"	4,800		"	
	2025	"	"	"	"	19:42	"	7,400		"	
	2026	"	"	"	"	19:51	"	4,000		"	
	2027	"	"	"	"	19:57	"	5,200		0.5	
	2028	"	"	"	"	20:05	"	--	sand	--	geological
365	2029	"	46°18.0'	124°10.0'	"	20:29	31	7,600		1.0	
	2030	"	"	"	"	20:34	"	3,500		"	
	2031	"	"	"	"	20:39	"	4,500		"	
	2032	"	"	"	"	20:43	"	4,500		"	
	2033	"	"	"	"	20:48	"	5,400		0.5	
	2034	"	"	"	"	20:51	"	--	sand	--	geological
366	2035	"	46°15.2'	124°09.4'	"	21:30	15	5,400		1.0	
	2036	"	"	"	"	21:34	"	4,600		"	
	2037	"	"	"	"	21:42	"	5,300		"	
	2038	"	"	"	"	21:45	"	4,700		"	
	2039	"	"	"	"	21:49	"	4,700		0.5	
	2040	"	"	"	"	21:53	"	--	sand	--	geological
367	2041	C7604B	46°11.64'	124°06.5'	19 Apr 76	19:30	29	3,700		1.0	
	2042	"	"	"	"	19:56	"	3,500		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
367	2043	C7604B	46°11.64'	124°06.5'	19 Apr 76	20:00	29	7,200		1.0	
	2044	"	"	"	"	20:04	"	5,350		"	
	2045	"	"	"	"	20:09	"	5,200		0.5	
	2046	"	"	"	"	20:18	"	--	sand	--	geological
368	2047	"	46°11.66'	124°05.76'	"	20:33	26	5,600		1.0	
	2048	"	"	"	"	20:41	"	5,300		"	
	2049	"	"	"	"	20:48	"	5,500		"	
	2050	"	"	"	"	20:52	"	5,600		"	
	2051	"	"	"	"	20:55	"	5,600		--	
	2052	"	"	"	"	20:59	"	--	sand	--	geological
369	2053	"	46°11.56'	124°06.02'	"	21:35	25	8,400		1.0	
	2054	"	"	"	"	21:40	"	3,500		"	
	2055	"	"	"	"	21:43	"	6,200		"	
	2056	"	"	"	"	21:59	"	7,400		"	
	2057	"	"	"	"	22:02	"	4,900		0.5	
	2058	"	"	"	"	22:11	"	--	sand	--	geological
370	2059	"	46°11.58'	124°05.88'	"	22:42	25	5,500		1.0	
	2060	"	"	"	"	22:46	"	5,500		"	
	2061	"	"	"	"	22:51	"	8,200		"	
	2062	"	"	"	"	23:05	"	4,000		"	
	2063	"	"	"	"	23:17	"	7,600		0.5	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
370	2064	C7604B	46°11.58'	124°05.88'	19 Apr 76	23:22	25	--	sand	--	geological
371	2065	"	46°11.47'	124°06.24'	"	23:36	29	5,500		1.0	
	2066	"	"	"	"	23:40	"	6,300		"	
	2067	"	"	"	"	23:53	"	8,200		"	
	2068	"	"	"	20 Apr 76	00:01	"	5,700		"	
	2069	"	"	"	"	00:06	"	6,200		0.5	
	2070	"	"	"	"	00:10	"	--	sand	--	geological
372	2071	"	46°11.55'	124°05.76'	"	00:21	26	6,400		1.0	
	2072	"	"	"	"	00:42	"	5,300		"	
	2073	"	"	"	"	00:45	"	5,350		"	
	2074	"	"	"	"	00:49	"	5,400		"	
	2075	"	"	"	"	00:59	"	5,200		0.5	
	2076	"	"	"	"	01:03	"	--	sand	--	geological
373	2077	"	46°11.45'	124°06.00'	"	01:13	28	6,800		1.0	
	2078	"	"	"	"	01:31	"	7,400		"	
	2079	"	"	"	"	01:35	"	5,400		"	
	2080	"	"	"	"	01:38	"	7,500		"	
	2081	"	"	"	"	01:45	"	6,800		0.5	
	2082	"	"	"	"	01:49	"	--	sand	--	geological
374	2083	"	46°11.0'	124°05.0'	"	02:09	26	6,200		1.0	
	2084	"	"	"	"	02:15	"	5,350		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
374	2085	C7604B	46°11.0'	124°05.0'	20 Apr 76	02:20	26	6,400		1.0	
	2086	"	"	"	"	02:25	"	5,400		"	
	2087	"	"	"	"	02:32	"	5,200		0.5	
	2088	"	"	"	"	02:36	"	--	sand	--	geological
375	2089	"	46°10.0'	124°04.0'	"	02:55	28	5,300		1.0	
	2090	"	"	"	"	03:07	"	6,200		"	
	2091	"	"	"	"	03:12	"	6,800		"	
	2092	"	"	"	"	03:28	"	5,700		"	
	2093	"	"	"	"	03:34	"	5,200		0.5	
	0294	"	"	"	"	03:49	"	--	sand	--	geological
376	0295	"	46°11.5'	124°05.5'	"	04:23	27	6,300		1.0	
	2096	"	"	"	"	04:28	"	4,800		"	
	2097	"	"	"	"	04:35	"	4,400		"	
	2098	"	"	"	"	04:40	"	6,600		"	
	2099	"	"	"	"	04:47	"	7,350		0.5	
	2100	"	"	"	"	04:50	"	--	sand	--	geological
377	2101	"	46°11.25'	124°06.0'	"	05:19	29	5,350		1.0	
	2102	"	"	"	"	05:24	"	5,700		"	
	2103	"	"	"	"	05:31	"	6,600		"	
	2104	"	"	"	"	05:36	"	6,100		"	
	2105	"	"	"	"	05:40	"	5,100		0.5	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
377	2106	C7604B	46°11.25'	124°06.0'	20 Apr 76	05:44	29	--	sand	--	geological
378	2107	"	46°11.5'	124°06.0'	"	05:57	29	3,500		1.0	
	2108	"	"	"	"	06:14	"	6,700		"	
	2109	"	"	"	"	06:22	"	5,500		"	
	2110	"	"	"	"	06:27	"	5,100		"	
	2111	"	"	"	"	06:35	"	5,700		0.5	
	2112	"	"	"	"	06:41	"	--	sand	--	geological
379	2113	"	46°09.0'	124°14.0'	"	09:05	86	--	mud	1.0	polychaeta only
	2114	"	"	"	"	09:33	"	--	mud	"	" "
380	2115	C7606A	46°10.0'	124°04.0'	7 Jun 76	20:14	26	6,400		"	
	2116	"	"	"	"	20:18	"	5,400		"	
	2117	"	"	"	"	20:29	"	6,700		"	
	2118	"	"	"	"	20:33	"	5,300		"	
	2119	"	"	"	"	20:38	"	5,400		0.5	
	2120	"	"	"	"	20:43	"	--	sand	--	geological
381	2121	"	46°11.0'	124°05.0'	"	21:04	26	5,600		1.0	
	2122	"	"	"	"	21:07	"	5,300		"	
	2123	"	"	"	"	21:12	"	6,200		"	
	2124	"	"	"	"	21:17	"	?		"	
	2125	"	"	"	"	21:20	"	6,300		0.5	
	2126	"	"	"	"	21:25	"	--	sand	--	geological

Station No.	rab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
382	2127	C7606A	46°11.5'	124°05.5'	7 Jun 76	21:39	26	6,300		1.0	
	2128	"	"	"	"	21:43	"	5,400		"	
	2129	"	"	"	"	21:46	"	6,500		"	
	2130	"	"	"	"	21:50	"	5,500		"	
	2131	"	"	"	"	21:53	"	5,400		0.5	
	2132	"	"	"	"	21:58	"	--	sand	--	geological
383	2133	"	46°11.5'	124°06.0'	"	22:21	27	6,800		1.0	
	2134	"	"	"	"	22:25	"	8,500		"	
	2135	"	"	"	"	22:28	"	8,500		"	
	2136	"	"	"	"	22:32	"	6,400		"	
	2137	"	"	"	"	22:35	"	7,500		0.5	
	2138	"	"	"	"	22:39	"	--	sand	--	geological
384	2139	"	46°11.45'	124°06.00'	"	22:56	27	6,300		1.0	
	2140	"	"	"	"	22:59	"	8,200		"	
	2141	"	"	"	"	23:03	"	7,200		"	
	2142	"	"	"	"	23:07	"	6,600		"	
	2143	"	"	"	"	23:10	"	8,200		0.5	
	2144	"	"	"	"	23:14	"	--	sand	--	geological
385	2145	"	46°11.47'	124°06.24'	"	23:25	27	6,200		1.0	
	2146	"	"	"	"	23:28	"	6,200		"	
	2147	"	"	"	"	23:31	"	7,200		"	

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
385	2148	C7606A	46°11.47'	124°06.24'	7 Jun 76	23:37	27	8,200		1.0	
	2149	"	"	"	"	23:40	"	7,700		0.5	
	2150	"	"	"	"	23:44	"	--	sand	--	geological
386	2151	"	46°11.56'	124°06.02'	8 Jun 76	00:03	27	7,600		1.0	
	2153	"	"	"	"	00:18	"	6,200		"	
	2154	"	"	"	"	00:30	"	6,000		"	
	2155	"	"	"	"	00:34	"	6,700		0.5	
	2156	"	"	"	"	00:38	"	--	sand	--	geological
387	2157	"	46°11.58'	124°05.88'	"	00:46	25	6,300		1.0	
	2158	"	"	"	"	00:52	"	6,800		"	
	2159	"	"	"	"	00:56	"	7,200		"	
	2160	"	"	"	"	01:00	"	7,600		"	
	2161	"	"	"	"	01:04	"	6,800		0.5	
	2162	"	"	"	"	01:10	"	--	sand	--	geological
388	2163	"	46°11.64'	124°06.5'	"	01:31	25	8,300		1.0	
	2164	"	"	"	"	01:35	"	6,600		"	
	2165	"	"	"	"	01:39	"	6,900		"	
	2166	"	"	"	"	01:43	"	8,400		"	
	2167	"	"	"	"	01:49	"	7,400		0.5	
	2168	"	"	"	"	01:55	"	--	sand	--	geological

Station No.	S-M Grab No.	Cruise No.	Latitude	Longitude	Date	Bottom Time	Depth (m)	Sediment Volume (cc)	Sediment Type	Screen Size (mm)	Comments
389	2169	C7606A	46°11.55'	124°05.76'	8 Jun 76	02:07	25	7,800		1.0	
	2170	"	"	"	"	02:11	"	5,400		"	
	2171	"	"	"	"	02:15	"	6,600		"	
	2172	"	"	"	"	02:19	"	6,300		"	
	2173	"	"	"	"	02:22	"	8,000		0.5	
	2174	"	"	"	"	02:28	"	--	sand	--	geological
390	2175	"	46°11.25'	124°06.0'	"	05:16	27	6,300		1.0	
	2176	"	"	"	"	05:20	"	6,700		"	
	2177	"	"	"	"	05:23	"	5,500		"	
	2178	"	"	"	"	05:27	"	5,700		"	
	2179	"	"	"	"	05:31	"	4,900		0.5	
	2180	"	"	"	"	05:35	"	--	sand	--	geological
391	2181	"	46°11.68'	124°05.76'	"	05:44	26	7,100		1.0	
	2182	"	"	"	"	05:48	"	6,600		"	
	2183	"	"	"	"	05:53	"	6,600		"	
	2184	"	"	"	"	05:57	"	6,800		"	
	2185	"	"	"	"	06:01	"	4,900		0.5	
	2186	"	"	"	"	06:04	"	--	sand	--	geological

Table C-IB

Station Data for Metered Beam Trawl Samples

Station No.	Cruise No.	Date	Depth (m)	Start Tow			Finish Tow		
				Latitude N	Longitude W	Time	Latitude N	Longitude W	Time
4[illegible] *	C7412B	12/8/75	30	46°11.1'	124°06.5'	1257	46°10.2'	124°05.4'	1327
4[illegible] *	"	"	30	46°11.2'	124°06.5'	1352	46°10.2'	124°05.4'	1422
4[illegible] *	"	"	20	46°11.3'	124°04.7'	1449	46°10.3'	124°03.5'	1519
4[illegible]	"	"	20	46°11.3'	124°04.7'	1537	46°10.4'	124°03.5'	1507
910	C7504B	4/21/75	86	46°08.3'	124°13.1'	2140	46°09.3'	124°14.0'	2218
911	"	"	86	46°09.1'	124°13.8'	2310	46°09.4'	124°14.2'	2340
912	"	4/22/75	73	46°08.1'	124°09.7'	0038	46°09.5'	124°10.7'	0108
913	"	"	73	46°08.1'	124°09.7'	0156	46°09.5'	124°10.5'	0226
914	"	"	53	46°07.8'	124°06.8'	0316	46°09.3'	124°07.6'	0346
915	"	"	53	46°08.6'	124°07.1'	0430	46°09.7'	124°07.8'	0500
917	"	"	37	46°08.2'	124°04.2'	0719	46°09.6'	124°04.4'	0749
918	"	"	24	46°10.1'	124°05.5'	0809	46°08.8'	124°04.3'	0839

Table C-IB (continued)

Station No.	Cruise No.	Date	Depth (m)	Start Tow			Finish Tow		
				Latitude N	Longitude W	Time	Latitude N	Longitude W	Time
919	C7504B	4/22/75	18	46°09.8'	124°01.5'	0911	46°08.2'	124°00.2'	0940
920	"	"	18	46°10.0'	124°01.3'	1002	46°08.3'	124°01.1'	1032
921	"	"	37	46°11.8'	124°08.1'	1129	46°10.7'	124°06.5'	1159
922*	"	"	37	46°11.7'	124°07.6'	1238	46°10.4'	124°06.0'	1308
1151	C7506C	6/25/75	18	46°12.2'	124°04.0'	1933	46°11.3'	124°02.9'	2003
1152	"	"	17	46°12.3'	124°04.0'	2024	46°11.4'	124°03.3'	2053
1153	"	"	20	46°12.1'	124°05.3'	2117	46°11.1'	124°04.3'	2146
1154	"	"	9	46°15.6'	124°06.8'	2242	46°15.6'	124°08.9'	2310
1155	"	6/25-26/75	9	46°15.6'	124°06.7'	2340	46°15.6'	124°08.5'	0010
1156	"	6/26/75	18	46°14.4'	124°08.7'	0102	46°13.3'	124°07.6'	0132
1157	"	"	28	46°12.3'	124°07.0'	0220	46°11.3'	124°06.0'	0250
1158	"	"	26	46°12.0'	124°06.3'	0330	46°11.0'	124°05.7'	0400
1159	"	"	37	46°11.5'	124°07.6'	0443	46°10.5'	124°07.1'	0513
1160	"	"	37	46°11.7'	124°08.2'	0556	46°10.8'	124°07.5'	0626
1161	"	"	40	46°09.5'	124°06.3'	0659	46°08.6'	124°06.2'	0730

Table C-IB (continued)

Station No.	Cruise No.	Date	Depth (m)	Start Tow			Finish Tow		
				Latitude N	Longitude W	Time	Latitude N	Longitude W	Time
1162	C7506C	6/26/75	40	46°09.5'	124°06.9'	0823	46°08.7'	124°06.1'	0848
1163	"	"	59	46°09.5'	124°09.9'	0924	46°08.7'	124°09.2'	0954
1164	"	"	58	46°09.7'	124°10.0'	1020	46°08.8'	124°09.2'	1050
1165	"	"	80	46°09.6'	124°13.3'	1128	46°08.8'	124°12.5'	1158
1166	"	"	80	46°09.6'	124°13.2'	1244	46°08.8'	124°12.4'	1314
1167	"	"	22	46°14.5'	124°09.7'	1417	46°13.8'	124°09.4'	1447
1168	"	"	37	46°13.7'	124°10.4'	1630	46°12.7'	124°10.1'	1700
1169	"	"	35	46°09.5'	124°04.9'	1752	46°08.3'	124°03.9'	1822
1170	"	"	35	46°09.5'	124°04.7'	1845	46°08.6'	124°04.2'	1915
1171	"	"	17	46°10.1'	124°01.0'	1945	46°08.8'	124°00.4'	2015
1172	"	"	17	46°10.1'	124°01.3'	2039	46°08.8'	124°00.2'	2109
1524	C7509E	9/14/75	27	46°11.8'	124°06.7'	1522	46°10.8'	124°05.2'	1552
1525	"	"	29	46°10.4'	124°05.3'	1611	46°11.4'	124°06.2'	1641
1526	"	"	26	46°11.4'	124°05.3'	1658	46°10.4'	124°03.8'	1728
1527	"	"	22	46°11.0'	124°04.1'	1747	46°11.7'	124°05.2'	1817

Table C-IB (continued)

Station No.	Cruise No.	Date	Depth (m)	Start Tow			Finish Tow		
				Latitude N	Longitude W	Time	Latitude N	Longitude W	Time
1528	C7509E	9/14/75	20	46°12.2'	124°05.2'	1839	46°10.9'	124°04.1'	1909
1529	"	"	20	46°10.7'	124°02.5'	1935	46°11.7'	124°04.1'	2005
1530	"	"	18	46°12.1'	124°04.0'	2024	46°11.0'	124°03.0'	2054
1531	"	"	19	46°09.7'	124°00.9'	2130	46°08.0'	123°59.8'	2200
1532	"	"	19	46°08.1'	123°59.9'	2214	46°09.1'	124°00.8'	2244
1533	"	"	34	46°09.5'	124°05.0'	2327	46°07.8'	124°04.0'	2357
1534	"	15/75	36	46°08.0'	124°03.8'	0017	46°09.0'	124°05.0'	0047
1535	"	"	44	46°09.4'	124°07.2'	0118	46°07.9'	124°06.2'	0148
1536	"	"	48	46°08.1'	124°06.2'	0207	46°09.3'	124°06.7'	0237
1537	"	"	56	46°09.3'	124°08.8'	0307	46°08.0'	124°08.4'	0337
1538	"	"	62	46°08.2'	124°08.4'	0400	46°09.3'	124°09.5'	0430
1539	"	"	82	46°09.2'	124°13.0'	0510	46°08.1'	124°12.0'	0540
1540	"	"	82	46°08.2'	124°12.5'	0620	46°10.0'	124°13.6'	0650
1541	"	"	37	46°11.4'	124°07.6'	0740	46°10.2'	124°06.8'	0810
1542	"	"	37	46°10.5'	124°06.5'	0825	46°11.7'	124°07.8'	0855

Table C-IB (Concluded)

Station No.	Cruise No.	Date	Depth (m)	Start Tow Latitude N	Start Tow Longitude W	Start Tow Time	Finish Tow Latitude N	Finish Tow Longitude W	Finish Tow Time
1580	C7509E	9/16/75	34	46°13.3'	124°09.3'	1750	46°14.3'	124°10.4'	1820
1581	"	"	57	46°14.1'	124°10.7'	1853	46°12.7'	124°10.7'	1923
1582	"	"	57	46°13.0'	124°10.3'	1955	46°14.8'	124°12.7'	2025
1583	"	"	18	46°13.7'	124°07.8'	2205	46°14.7'	124°08.8'	2235
1584	"	"	18	46°14.7'	124°09.1'	2255	46°13.0'	124°07.8'	2325
1585	"	9/16/75	20	46°15.5'	124°09.5'	0008	46°15.5'	124°07.9'	0040
1586	"	"	20	46°15.5'	124°09.5'	0104	46°15.5'	124°08.2'	0134
1774*	C7510E	10/22/75	18	46°09.3'	124°00.5'	1223	46°07.9'	123°59.7'	1253
1775	"	"	18	46°07.9'	123°59.7'	1304	46°48.9'	124°00.2'	1334
1776	"	"	33	46°09.4'	124°04.7'	1415	46°07.9'	124°03.6'	1445
1777	"	"	35	46°08.0'	124°03.3'	1503	46°09.0'	124°04.2'	1533
1778	"	"	31	46°10.5'	124°05.3'	1603	46°11.1'	124°06.0'	1633
1779	"	"	31	46°11.0'	124°05.7'	1650	46°10.0'	124°05.0'	1720
1780	"	"	24	46°10.9'	124°04.5'	1742	46°11.5'	124°05.3'	1812
1781	"	"	24	46°11.2'	124°05.8'	1830	46°10.6'	124°04.3'	1900

*Beam trawl sample not included in results.

Table C-IIB

Alphabetical Species List

Species (MCR Code)	DMRP Code
Abarenicola sp. #1 (219)	40348
Acanthomysis alaskensis? (537)	40416
Acanthomysis davisi (114)	23879
Acanthomysis macropsis (113)	23856
Acanthomysis nephrothalma (115)	23880
Acanthomysis spp. (119)	23874
Accedomoera sp. #1 (187)	40475
Acila castrensis (19)	21931
Acteocina? sp. #1 (518)	40370
Adontorhina cyclia (26)	40083
Aedicira sp. #1 (392)	40285
Aglaja diomedea (30)	40146
Allorchestes sp. #1 (490)	24197
Ampelisca agassizi (123)	24004
Ampelisca brevisimulata (125)	40447
Ampelisca hancocki (122)	24005
Ampelisca macrocephala (121)	24006
Ampharete acutifrons (221)	19710
Ampharete arctica (439)	19713
Ampharete spp. (223)	19709
Ampharetidae spp. (290)	19700
Amphicteis sp. #1 (452)	40123

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Amphiodia periercta-urtica complex (425)	40489
Amphiodia periercta (83)	17607
Amphiodia sp. #1 (89)	17608
Amphiodia spp. (87)	17603
Amphiodia urtica (84)	17606
Amphioplus hexacanthus (93)	17613
Amphiura sp. #1 (90)	17618
Amphiuridae spp. (85)	17602
Anaitides groenlandica (323)	40292
Anaitides longipes (544)	40293
Anaitides mucosa (324)	40291
Anaitides sp. #3 (383)	40300
Anaitides sp. #4 (272)	40301
Anitides spp. (340)	19143
Anisogammarus confervicolus (488)	24607
Anisogammarus pugettensis (489)	24069
Anobothrus gracilis? (389)	19702
Anonyx adoxus (176)	40045
Anthozoa sp. #1 (377)	40252
Anthozoa sp. #2 (378)	40253
Anthozoa sp. #3 (379)	40254
Anthozoa sp. #4 (428)	40255
Anthozoa sp. #5 (429)	40256
Anthozoa sp. #6 (430)	40257

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Anthozoa spp. (382)	12000
Antinoella *macrolepida*? (395)	40281
Aoridae sp. #1 (168)	40449
Aoroides *columbiae* (167)	24029
Apistobranchus *ornatus* (225)	40362
Arabella spp. (283)	19382
Arabillidae sp. #1 (455)	40317
Arabellidaesp. #3 (433)	40318
Arabellidae sp. #4 (270)	40319
Arabellidae spp. (387)	19380
Archeomysis *grebnitzkii* (110)	23855
Archynchite *pugettensis* (74)	25403
Arenicolidae spp. (386)	19620
Argeia *pugettensis* (200)	23929
Argeia spp. (505)	40440
Argissa *hamatipes* (181)	24245
Aricidea *neosuecica* (448)	40094
Aricidea *ramosa* (226)	19113
Aricidea sp. #1 (227)	19114
Aricidea spp. (355)	19111
Armandia *bioculata* (228)	19541
Armina *californica* (416)	40375
Artacama *coniferi* (260)	19722
Artacamella *hancocki* (229)	40355

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Asychis disparidentata (406)	40336
Asychis sp. #2 (457)	40337
Asychis spp. (462)	19566
Atylus tridens (154)	24239
Autolytus cornutus (269)	19212
Autolytus spp. (388)	19202
Axinopsida serricata (24)	22203
Balanus hesperius (201)	23730
Barantolla americana (236)	40351
Bathycopea daltonae (197)	40427
Bathyleberis sp. #1 (194)	40411
Bathymedon? sp. #1 (131)	24134
Bathymedon? sp. #2 (411)	40460
Boccardia basilaria (289)	40323
Bopyrella? sp. #1 (404)	23960
Brada pluribranchiata (470)	40332
Brisaster latifrons (81)	16108
Byblis sp. #1 (410)	40448
Byblis veleronis (126)	40044
Callianassa californiensis (547)	24614
Campylaspis rubromaculata (400)	23907
Campylaspis sp. #1 (106)	23908

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Campylaspis sp. #2 (107)	23909
Campylaspis sp. #3 (108)	23910
Campylaspis sp. #4 (582)	40422
Cancer gracilis? (216)	24929
Cancer magister (217)	24930
Cancer oregonensis (548)	24931
Capitella capitata (232)	19641
Capitella capitata oculata (233)	19649
Capitella spp. (540)	19654
Capitellidae sp. #1 (346)	40353
Capitellidae spp. (368)	19640
Caprella mendax (581)	40482
Caprella sp. #1 (532)	40481
Cardiomya oldroydi (42)	22244
Chaetodermatidae sp. #1 (49)	40407
Chaetodermatidae spp. (530)	40408
Chaetopteridae spp. (403)	19480
Chaetozone nr. *berkeleyorum* (239)	40331
Chaetozone setosa (237)	19515
Chone albocincta (481)	40103
Chorilia longipes (549)	24909
Cirratulidae spp. (240)	19500
Collisella digitalis? (521)	40366
Colurostylis occidentalis (104)	23906

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Compsomyax subdiaphana (56)	40041
Corophium brevis (492)	24047
Corophium sp. #1 (188)	24056
Corophium sp. #2 (535)	40450
Corophium salmonis (230)	24051
Corophium spinicorne (495)	24053
Cossura nr. laeviseta (449)	40290
Cossura spp. (262)	19131
Crangon alaskensis elongata (203)	24436
Crangon communis (550)	24450
Crangon franciscorum (520)	24439
Crangon munita (552)	24440
Crangon sp. #1 (553)	24452
Crangon spp. (205)	24446
Crangon stylirostris (204)	24448
Crenella decussata (44)	22041
Cumacea spp. (523)	23889
Cyclocardia ventricosa (54)	40086
Cylichna attonsa (1)	21233
Cymothoidae spp. #1 (507)	40446
Decamastus gracilis? (242)	40352
Dendraster excentricus (82)	16107
Dentalium rectius (68)	22732

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Dentaliidae spp. (67)	22726
Diastylis alaskensis (101)	23903
Diastylis bidentata (100)	23902
Diastylis parapinulosa (584)	40418
Diastylis pellucida (586)	40417
Diastylis umatillensis (99)	23901
Diastylis sp. #1 (102)	23904
Diastylopsis dawsoni (97)	23899
Diastylopsis tenuis (98)	23900
Doridacea sp. #1 (18)	40373
Dorvilleidae spp. (287)	19400
Dulichia sp. #1 (189)	24251
Echiura sp. #3 (421)	40485
Echiura sp. #4 (427)	40486
Echiura sp. #5 (533)	40487
Echiurida spp. (423)	25400
Echiurus echiurus alaskanus (73)	25402
Edotea sublittoralis (500)	40432
Eohaustorius brevicuspis (494)	40451
Eohaustorius sencillus (155)	24096
Eohaustorius washingtonianus (156)	24097
Epitonium tinctum (16)	40376
Eteone californica? (245)	19137

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Eteone longa (307)	19160
Eteone (*Mysta*) *barbata* (231)	40296
Eteone sp. #1 (393)	40294
Eteone sp. #2 (224)	40295
Eteone sp. #5 (314)	40297
Eteone sp. #6 (244)	40298
Eteone sp. #7 (271)	40299
Eteone spp. (246)	19155
Eudorella pacifica (109)	23914
Eudorellopsis longirostris (103)	23905
Eulalia leavicornuta (587)	40468
Eumida sanguinea (250)	19149
Eumida spp. (285)	40492
Eunoe sp. #1 (372)	40196
Euphausia pacifica (569)	24360
Euphilomedes carcharodonta (193)	23299
Euphilomedes producta (574)	40412
Exogone lourei (478)	40110
Exogone spp. (432)	19217
Flabelligeridae spp. (251)	19520
Gammaridea sp. #2 (366)	40476
Gastropoda sp. #1 (578)	40365

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Gastropoda spp. (34)	21100
Gastropteron pacificum (509)	40369
Grattyana ciliata (545)	40283
Glycera capitata (252)	19263
Glycera convoluta (385)	40311
Glycera sp. #1 (426)	40312
Glycera spp. (253)	19365
Glycinde picta (408)	40149
Glycinde sp. #2 (256)	40313
Glycinde spp. (258)	19284
Gnorimosphaeroma oregonensis (502)	23921
Golfingia macginitiei (69)	25352
Golfingia sp. #1 (70)	25353
Goniada maculata (259)	19287
Goniadidae spp. (407)	19280
Gorgonocephalus caryi (572)	17615
Guernea? sp. #1 (413)	40469
Haploscoloplos elongatus (261)	19421
Harmothoe nr. *lunulata* (465)	19027
Hemiarthrus abdominalis (506)	40441
Hemilamprops californensis (96)	23898
Hesionidae sp. #1 (414)	40288
Hesionidae spp. (263)	19120

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Hesionidae sp. #2 (420)	40289
Hesperonoe sp. #1 (466)	40282
Hesiospina sp. #1 (265)	40286
Heteromastus filobranchus (264)	19651
Heteromastus sp. #1 (296)	40350
Heteromastus spp. (394)	19653
Heterophoxus oculatus? (152)	24158
Hippomedon denticulatus (169)	24123
Hippomedon sp. #1 (178)	40453
Hippomedon wecomus (170)	24124
Hirudinea spp. (543)	20271
Huxleyia munita (59)	21991
Hydrozoa spp. (367)	11501
Hyperiidea sp. #1 (529)	
Idotea fewksei (511)	40433
Isaeidae sp. #1 (527)	40470
Ischyrocerus pelagops (162)	24108
Isocirrus sp. #1 (453)	40338
Jassa? sp. #1 (493)	40452
Lamprops sp. #1 (94)	23916
Lamprops sp. #2 (105)	40420

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Lanassa sp. #1 (349)	40358
Langerhansia heterochaeta (479)	40305
Laonice cirrata (266)	19442
Lepidasthenia berkeleyae (480)	40100
Lepidasthenia longicirrata (474)	40603
Lepidonotus sp. #1 (268)	19034
Leptognatha nr. *longiremis* (77)	40042
Leucon sp. #1 (528)	40424
Limnoria lignorum? (503)	23924
Listriella spp. (183)	24119
Lucinoma annulata (55)	40087
Luidia foliolata (570)	40265
Lumbrineris bicirrata (329)	19341
Lumbrineris latreilli (273)	19349
Lumbrineris luti (275)	19350
Lumbrineris cf. *longensis* (274)	19359
Lumbrineris similabris (276)	19351
Lumbrineris minima (454)	40315
Lumbrineris sp. (277)	19347
Lumbrineris zonata (436)	19345
Lyonsia californica (39)	40390
Lyonsia inflata? (40)	40391
Lyonsia sp. #2 (41)	22506
Lysianassidae sp. #1 (177)	40458

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Lysianassidae sp. #2 (585)	40459
Lysianassidae spp. (371)	24122
Macoma balthica? (391)	22324
Macoma calcera (124)	22322
Macoma carlottensis (32)	22304
Macoma moesta alaskana (29)	22302
Macoma nasuta (31)	22323
Macoma elimata? (33)	40386
Macoma sp. #2 (164)	22306
Macoma spp. (431)	22326
Magelona longicornis (278)	19467
Magelona pitelkai (280)	40326
Magelona sacculata (279)	40150
Megelona spp. (281)	19463
Maldane sarsi (282)	19562
Maldanidae sp. #4 (286)	40342
Maldanidae sp. #14 (444)	40343
Maldanidae sp. #19 (299)	40344
Maldanidae sp. #20 (241)	40345
Maldanidae sp. #21 (247)	40346
Maldanidae spp. (293)	19560
Mandibulophoxus uncirostratus (153)	24159

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Mayerella banskia? (190)	40479
Mediomastus californiensis (294)	19643
Melinna spp. (396)	19706
Melinna oculata (297)	19708
Melita desdichada? (179)	24084
Melita oregonensis (180)	24086
Mesochaetopterus sp. #1 (399)	40327
Mesolamprops sp. #1 (95)	23897
Metopa sp. #1 (184)	40463
Metopa sp. #2 (159)	40464
Metopella sp. #1 (517)	40466
Misc.-unknown #1 (362)	
Misc.-unknown #2 (363)	
Misc.-unknown #3 (364)	
Misc.-unknown #4 (375)	
Misc.-unknown #5 (376)	
Misc.-unknown #6 (580)	
Mitrella gouldii (2)	21596
Molpadia intermedia? (79)	16604
Monoculodes sp. #1 (128)	24137
Monoculodes sp. #2 (129)	24138
Monoculodes spinipes (127)	24136
Monoculodes zernovi? (130)	24141
Munida quadrispina (218)	24626

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Munispio cirrifera (335)	40324
Musculus laevigata (28)	22040
Musculus sp. #1 (43)	22039
Musculus sp. #2 (75)	40385
Myriochele heeri (437)	19581
Myriochele oculata (300)	40347
Myriochele spp. (483)	19583
Mysella tumida (57)	22574
Mysidacea spp. (120)	23840
Mysini spp. (117)	23881
Nassarius fossatus (3)	21626
Nassarius mendicus (4)	21627
Nassarius spp. (5)	21625
Nebalia bipes (76)	40090
Nectocrangon alaskensis (554)	24451
Nematoda spp. (192)	14000
Nemertea sp. #1 (438)	40267
Nemertea sp. #2 (446)	40268
Nemertea sp. #3 (451)	40269
Nemertea sp. #4 (456)	40270
Nemertea sp. #5 (460)	40271
Nemertea sp. #6 (463)	40272
Nemertea sp. #7 (471)	40273

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Nemertea sp. #8 (472)	40274
Nemertea sp. #9 (473)	40275
Nemertea sp. #11 (475)	40277
Nemertea sp. #12 (485)	40278
Nemertea sp. #13) (510)	40279
Nemertea sp. #14 (536)	40280
Nemertea spp. (361)	18700
Neoamphitrite robusta (267)	40356
Neomeniida sp. #1 (534)	40406
Neomysis franciscorum (111)	23885
Neomysis kadiakensis (112)	23865
Neomysis sp. #1 (116)	23877
Neomysis sp. (118)	23875
Nephtyidae spp. (295)	19240
Nephytys caeca (301)	19241
Nephtys caecoides (302)	19242
Nephtys californiensis (303)	19243
Nephtys cornuta (284)	40308
Nephtys cornuta franciscanum (464)	40309
Nephtys ferruginea (390)	19244
Nephtys glabra (304)	19251
Nephtys rickettsi (440)	40310
Nephtys spp. (373)	19247
Neptuneidae sp. #1 (14)	40379
Nereidae spp. (306)	19220

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Opheliidae spp. (342)	19540
Ophelina acuminata (220)	40334
Ophelina sp. #1 (541)	40335
Ophiodermella cancellata (15)	40381
Ophiodermella sp. #1 (351)	40382
Ophiomusium jolliensis (573)	17616
Ophiura lutkeni (86)	17610
Ophiura sarsii (91)	17614
Ophiura spp. (92)	17612
Ophiurida spp. (88)	17611
Opisa tridentata (173)	24126
Opistobranchia sp. #1 (234)	40371
Opistobranchia sp. #2 (249)	40372
Orbinia sp. #1 (467)	40092
Orbiniidae spp. (315)	19420
Orchomene pacifica (172)	40454
Orchomene sp. #2 (486)	40455
Orobitella rugifera (47)	40393
Owenia collaris (316)	40157
Oweniidae spp. (397)	19580
Pachynus barnardi? (174)	24129
Pachynus chelatum? (171)	40456
Paguridae spp. (214)	24650

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Nereis zonata (398)	19231
Nereis? spp. (308)	19232
Nicippe tumida (175)	40457
Ninoe gemmea (309)	19346
Nothria geophiliformis (311)	40314
Nothria iridescens (310)	19304
Nothria spp. (235)	19306
Notocirrus californiensis (238)	40316
Notomastus hemipodus? (312)	19644
Notomastus lineatus (298)	40349
Nucula tenuis (20)	21933
Nuculana hamata (23)	40384
Nuculanidae spp. (417)	21960
Octopus sp. #1 (575)	40409
Odostomia sp. #1 (6)	21270
Odostomia spp. (539)	21265
Oenoptota tirrucula? (13)	40380
Oligochaeta spp. (422)	19900
Olivella baetica (7)	21655
Olivella biplicata (8)	21656
Olivella pycna (9)	21657
Olivella spp. (514)	21654
Ophelia sp. #1 (313)	40151

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Paguristes turgidis (555)	24654
Pagurus aleutieus? (556)	40483
Pagurus armatus (212)	24657
Pagurus caurinus (513)	40484
Pagurus ochotensis (210)	24671
Pagurus quayleyi (211)	24672
Pagurus spp. (213)	24678
Pananthura? sp. #1 (504)	40443
Pandalus danae (557)	24417
Pandalus jordani (558)	24420
Pandora bilirata? (53)	22605
Pandora filosa (50)	22603
Pandora grandis (51)	22604
Pandora punctata (52)	22609
Paracaudina chilensis (78)	16601
Paranaitis polynoides (551)	19153
Parandalia fauveli (435)	40359
Paraonella playtbranchia (317)	40154
Paronidae spp. (291)	19110
Paraonis gracilis oculatus (442)	40095
Paraphoxus abronius? (135)	24146
Paraphoxus epistomus (137)	24148
Paraphoxus fatigans (143)	24163
Paraphoxus heterocuspidatus (138)	24149

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Paraphoxus lucubrans? (146)	24150
Paraphoxus milleri (145)	24151
Paraphoxus obtusidens (139)	24152
Paraphoxus obtusidens major (140)	24153
Paraphoxus sp. #1 (147)	24155
Paraphoxus sp. #2 (148)	24156
Paraphoxus sp. #3 (149)	24167
Paraphoxus sp. #4 (150)	40043
Paraphoxus sp. #5 (362)	40499
Paraphoxus spp. (151)	24157
Paraphoxus stenodes? (144)	24164
Paraphoxus tridentatus (487)	40461
Paraphoxus variatus (142)	24154
Paraphoxus vigitegus (141)	24162
Parapleutes pugettensis (491)	24173
Paraprionospio pinnata (337)	19456
Paraselloidea sp. #1 (499)	40444
Pardaliscella sp. #1 (186)	40472
Pectinaria (*Cistenides*) *granulata* (319)	40354
Pectinaria californiensis (320)	19661
Pectinaria sp. #1 (418)	19664
Pectinaria spp. (321)	19663
Pectinidae sp. #1 (577)	40383
Pelecypoda sp. #1 (60)	40396

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Pelecypoda sp. #2 (61)	40397
Pelecypoda sp. #3 (62)	40398
Pelecypoda sp. #4 (415)	40399
Pelecypoda sp. #7 (63)	40400
Pelecypoda sp. #9 (526)	40401
Pelecypoda sp. #10 (374)	40402
Pelecypoda sp. #11 (64)	40403
Pelecypoda sp. #15 (66)	40404
Pelecypoda sp. #20 (519)	40405
Pelecypoda sp. (45)	21900
Pentamera sp. #1 (80)	16603
Pentidotea oculata (501)	40434
Pherusa papillata (468)	40333
Pholoe minuta (322)	19601
Phoronis psammophila? (419)	40488
Photis brevipes (157)	24325
Photis californica? (160)	24326
Photis lacia (158)	24328
Photis spp. (161)	24344
Phoxocephalus homilis (515)	40462
Phylo felix (326)	40321
Phyllodicidae sp. #1 (248)	40302
Phyllodicidae sp. #2 (257)	40303
Phyllodocidae spp. (325)	19136

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Pilargidae spp. (327)	19860
Pilargis berkeleyae (434)	40360
Pinnixa littoralis (542)	24966
Pinnixa occidentalis (559)	24967
Pinnixa sp. #1 (207)	24961
Pinnixa sp. #2 (208)	24962
Pinnixa sp. #3 (209)	24963
Pinnixa spp. (215)	24970
Pisaster brevispinus (571)	40266
Pista cristata (328)	19735
Pista moorei (330)	19736
Pista spp. (441)	19734
Pleurogonium rubicundum? (199)	40437
Pleusymtes coquilla (182)	24169
Podarkeopsis brevipalpa (459)	40287
Polinices pallidus (17)	21545
Polychaeta spp. (369)	19001
Polycirrus spp. (331)	19729
Polydora caulleryi (288)	19445
Polydora sp. #2 (292)	40322
Polydora app. (332)	19451
Polynoe sp. #1 (546)	40284
Polynoidae spp. (333)	19020
Praxillella affinis pacifica (445)	40339

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Praxillella gracilis (334)	40340
Priapulus caudata (72)	25454
Prionospio malmgreni (336)	19457
Prionospio spp. (338)	19459
Proboloides sp. #1 (412)	40465
Propeamussium davidsoni (579)	40395
Protomedeia sp. #1 (163)	24330
Protomedeia sp. #2 (165)	24331
Protomedeia zotea (166)	24332
Psephidia lordi (58)	40088
Pycnogonida sp. #1 (381)	40415
Rhachotropis oculata (402)	40474
Rhodine bitorquata (339)	40341
Rossia pacifica (576)	22811
Rutiderma sp. #1 (424)	40414
Sabellidae spp. (405)	19740
Saduria entomon (508)	40435
Scalibregma inflatum (409)	19803
Schistomaringos annulata (458)	40320
Sclerodoncha trituberculata (195)	23301
Scolelepsis cirratulus (384)	40325
Scoloplos armiger (341)	19427

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Scoloplos spp. (305)	19429
Sergestes similis (560)	24462
Sigalionidae spp. (484)	19055
Sigambra tentaculata (450)	19867
Siliqua patula (27)	22351
Sipunculida spp. (71)	25350
Sphaerodoropsis sphaerulifer (469)	40104
Sphaerodoridae spp. (461)	40105
Spio filicornis (343)	40037
Spiochaetopterus costarum (352)	40328
Spionidae spp. (370)	19430
Spiophanes berkeleyorum (345)	40155
Spiophanes bombyx (344)	19453
Spirontocaris avina (561)	24433
Spirontocaris barbata (562)	40046
Spirontocaris cristata (564)	24430
Spirontocaris gracilis (206)	24432
Spirontocaris lamellicornis (565)	40047
Spirontocaris pusiola? (567)	40048
Spirontocaris suckleyi (568)	40050
Spirontocaris spp. (583)	40049
Stenothoe? sp. #1 (498)	24182
Stenothoidae sp. #1 (185)	40467
Stenothoidae spp. (516)	24178

Species (MCR Code)	DMRP Code
Stenothoides *angusta* (588)	40468
Sternaspis *fossor* (347)	40116
Sthenelais *tertiaglabra* (348)	19068
Syllidae spp. (350)	19200
Synchelidium *rectipalmumi* (133)	24142
Synchelidium *shoemakeri* (132)	24139
Synidotea *angulata* (196)	23925
Synidotea *bicuspida* (380)	40429
Synidotea sp. #2 (496)	40430
Synidotea sp. #3 (497)	40431
Tecticeps *convexus* (198)	23933
Tellina *carpenteri* (37)	22346
Tellina *modesta* (36)	22307
Tellina sp. #5 (525)	40387
Tellina spp. (38)	22329
Tellinidae sp. #1 (35)	40388
Tellinidae sp. #3 (48)	40389
Tenonia *kitsapensis* (476)	40102
Terebellidae spp. (353)	19720
Terebellides *stroemi* (447)	19731
Thalenessa *spinosa* (354)	40118
Tharyx *multifilis* (358)	40329
Tharyx sp. #1 (357)	40119

Table C-IIB (continued)

Species (MCR Code)	DMRP Code
Tharyx sp. #3 (443)	40330
Tharyx spp. (359)	19510
Tharyx tesselata (356)	19512
Thelepus setosus (318)	40357
Thracia sp. #1 (65)	40392
Thyasira flexuosa (25)	22205
Thysanoessa spinifera (568)	24374
Tomburchus? sp. #1 (531)	40394
Trachypollia? sp. #1 (538)	40377
Transennela tantilla? (46)	40084
Travisia brevis (482)	19546
Travisia gigas (360)	19550
Tritella pilimana (191)	24342
Trochochaeta franciscanum (243)	40364
Turbellaria sp. #1 (522)	40258
Turbellaria spp. (365)	14201
Turbonilla aurantia (10)	21267
Turbonilla sp. #1 (11)	21268
Turbonilla sp. #2 (12)	21269
Typosyllis alternata (477)	40306
Typosyllis hyalina (254)	40307
Typosyllis nr. hyalina (255)	40491
Westwoodilla caecula (134)	24140

Table C-IIB (concluded)

Species (MCR Code)	DMRP Code
Yoldia seminuda (21)	21968
Yoldia spp. (22)	21966

Table C-IIC

Numerical Species List

MCR Code	Species	DMRP Code
1	*Cylicha attonsa*	21233
2	*Mitrella gouldii*	21596
3	*Nassarius fossatus*	21626
4	*Nassarius mendicus*	21627
5	*Nassarius* spp.	21625
6	*Odostomia* sp. #1	21270
7	*Olivella baetica*	21655
8	*Olivella biplicata*	21656
9	*Olivella pycna*	21657
10	*Turbonilla aurantia*	21267
11	*Turbonilla* sp. #1	21268
12	*Turbonilla* sp. #2	21269
13	*Oenopota turnicula*?	40380
14	Neptuneidae sp. #1	40379
15	*Ophiodermella cancellata*	40381
16	*Epitonium tinctum*	40376
17	*Polinices pallidus*	21545
18	Doridacea sp. #1	40373
19	*Acilia castrensis*	21931
20	*Nucula tenuis*	21933
21	*Yoldia seminuda*	21968
22	*Yoldia* spp.	21966

Table C-IIC (continued)

MCR Code	Species	DMRP Code
23	*Nuculana hamata*	40381
24	*Axinopsid serricata*	22203
25	*Thyasira flexuosa*	22205
26	*Adontorhina cyclia*	40083
27	*Siliqua patula*	22351
28	*Musculus laevigata*	22040
29	*Macoma moesta alaskana*	22302
30	*Aglaja diomedea*	40146
31	*Macoma nasuta*	22323
32	*Macoma carlottensis*	22304
33	*Macoma elimata*?	40386
34	Gastropoda spp.	21100
35	Tellinidae sp. #1	40388
36	*Tellina modesta*	22307
37	*Tellina carpenteri*	22346
38	*Tellina* spp.	22329
39	*Lyonsia californica*	40390
40	*Lyonsia inflata*?	40391
41	*Lyonsia* sp. #2	22506
42	*Cardiomya oldroydi*	22621
43	*Musculus* sp. #1	22039
44	*Crenella decussata*	22041
45	Pelecypoda spp.	21900
46	*Transennella tantilla*?	40084

Table C-IIC (continued)

MCR Code	Species	DMRP Code
47	*Orobitella rugifera*	40393
48	Tellinidae sp. #3	40389
49	Chaetodermatidae sp. #1	40407
50	*Pandora filosa*	22603
51	*Pandora grandis*	22604
52	*Pandora punctata*	22609
53	*Pandora bilirata*?	22605
54	*Cyclocardia ventricosa*	40086
55	*Lucinoma annulata*	40087
56	*Compsomyax subdiaphana*	40041
57	*Mysella tumida*	22574
58	*Psephidia lordi*	40088
59	*Huxleyia munita*	21991
60	Pelecypoda sp. #1	40396
61	Pelecypoda sp. #2	40397
62	Pelecypoda sp. #3	40398
63	Pelecypoda sp. #7	40400
64	Pelecypoda sp. #11	40403
65	*Thracia* sp. #1	40392
66	Pelecypoda sp. 15	40404
67	Dentaliidae spp.	22726
68	*Dentalium rectius*	22732
69	*Golfingia margaritacea*	25352
70	*Golfingia* sp. #1	25353

Table C-11C (continued)

MCR Code	Species	DRMP Code
71	Sipunculida spp.	25350
72	*Priapulus caudata*	25454
73	*Echiurus echiurus alaskanus*	25402
74	*Archynchite pugettensis*	25403
75	*Musculus* sp. #2	40385
76	*Nebalia bipes*	40090
77	*Leptognatha nr. longiremis*	40042
78	*Paracaudina chilensis*	16601
79	*Molpadia intermedia*?	16604
80	*Pentamera* sp. #1	16603
81	*Brisaster latifrons*	16108
82	*Dendraster excentricus*	16107
83	*Amphiodia periercta*	17607
84	*Amphiodia urtica*	17606
85	Amphiuridae spp.	17602
86	*Ophiura lutkeni*	17610
87	*Amphiodia* spp.	17603
88	Ophiurida spp.	17611
89	*Amphiodia* sp. #1	17608
90	*Amphiura* sp. #1	17618
91	*Ophiura sarsii*	17614
92	*Ophiura* spp.	17612
93	*Amphioplus hexacanthus*	17613
94	*Lamprops* sp. #1	23916

Table C-IIC (continued)

MCR Code	Species	DMRP Code
95	*Mesolamprops* sp. #1	23897
96	*Hemilamprops californensis*	23898
97	*Diastylopsis dawsoni*	23899
98	*Diastylopsis tenuis*	23900
99	*Diastylis umatillensis*	23901
100	*Diastylis bidentata*	23902
101	*Diastylis alaskensis*	23903
102	*Diastylis* sp. #1	23904
103	*Eudorellopsis longirostris*	23905
104	*Colurostylis occidentalis*	23906
105	*Lamprops* sp. #2	40420
106	*Campylaspis* sp. #1	23908
107	*Campylaspis* sp. #2	23909
108	*Campylaspis* sp. #3	23910
109	*Eudorella pacifica*	23914
110	*Archeomysis grebnitzkii*	23855
111	*Neomysis franciscorum*	23885
112	*Neomysis kadiakensis*	23865
113	*Acanthomysis macropsis*	23856
114	*Acanthomysis davisi*	23879
115	*Acanthomysis nephrothalma*	23880
116	*Neomysis* sp. #1	23877
117	Mysini spp.	23881
118	*Neomysis* spp.	23875

Table C-IIC (continued)

MCR Code	Species	DMRP Code
119	Acanthomysis spp.	23874
120	Mysidacea spp.	23840
121	Ampelisca macrocephala	24006
122	Ampelisca hancocki	24005
123	Ampelisca agassizi	24004
124	Macoma calcarea	22322
125	Ampelisca brevisimulata	40447
126	Byblis veleronis	40044
127	Monoculodes spinipes	24136
128	Monoculodes sp. #1	24137
129	Monoculodes sp. #2	24138
130	Monoculodes zernovi?	24141
131	Bathymedon? sp. #1	24134
132	Synchelidium shoemakeri	24139
133	Synchelidium rectipalmumi?	24142
134	Westwoodilla caecula	24140
135	Paraphoxus abronius?	24146
136	Paraphoxus sp. #5	40499
137	Paraphoxus epistomus?	24148
138	Paraphoxus hetercuspidatus	24149
139	Paraphoxus obtusidens	24152
140	Paraphoxus obtusidens major	24153
141	Paraphoxus vigitegus	24162
142	Paraphoxus variatus	24154

Table C-IIC (continued)

MCR Code	Species	DMRP Code
143	*Paraphoxus fatigans*	24163
144	*Paraphoxus stenodes*?	24164
145	*Paraphoxus milleri*	24151
146	*Paraphoxus lucubrans*?	24150
147	*Paraphoxus* sp. #1	24155
148	*Paraphoxus* sp. #2	24156
149	*Paraphoxus* sp. #3	24167
150	*Paraphoxus* sp. #4	40043
151	*Paraphoxus* spp.	24157
152	*Heterophoxus*	24158
153	*Mandibulophoxus uncirostratus*	24159
154	*Atylus tridens*	24239
155	*Eohaustorius sencillus*	24096
156	*Eohaustorius washingtonianus*	24097
157	*Photis brevipes*	24325
158	*Photis lacia*	24328
159	*Metopa* sp. #2	40464
160	*Photis californica*?	24326
161	*Photis* spp.	24324
162	*Ischyrocerus pelagops*	24108
163	*Protomedeia* sp. #1	24330
164	*Macoma* sp. #2	22306
165	*Protomedeia* sp. #2	24331
166	*Protomedeia zotea*	24332

[illegible] (Continued)

MCR Code	Species	DMRP Code
167	*Aoroides columbiae?*	24029
168	Aoridae sp. #1	40449
169	*Hippomedon denticulatus*	24123
170	*Hoppomedon wecomus*	24124
171	*Pachynus chelatum*	40456
172	*Orchomene pacifica*	40454
173	*Opisa tridentata*	24126
174	*Pachynus barnardi?*	24129
175	*Nicippe tumida*	40457
176	*Anonyx adoxus*	40045
177	Lysianassidae sp. #1	40458
178	*Hippomedon* sp. #1	40453
179	*Melita desdichada?*	24084
180	*Melita oregonensis*	24086
181	[illegible]	24245
182	*Pleusymtes coquilla*	24169
183	*Listriella* spp.	24119
184	*Metopa* sp. #1	40463
185	*Stenothoidae* sp. #1	40467
186	*Pardaliscella* sp. #1	40472
187	*Accedomoera* sp. #1	40475
188	*Corophium* sp. #1	24056
189	*Dulichia* sp. #1	24251
190	Mayerella banksia?	40479

Table C-IIC (continued)

MCR Code	Species	DMRP Code
191	*Tritella pilimana*	24342
192	Nematoda spp.	14000
193	[illegible] *carcharodonta*	23299
194	*Bathyleberis* sp. #1	40411
195	*Sclerodoncha tribuberculata*	23301
196	*Synidotea angulata*	23925
197	*Bathycopea daltonae*	40427
198	*Tecticeps convexus*	23933
199	*Pleurogonium rubicundum*	40437
200	*Argeia pugettensis*	23929
201	*Balanus hesperius*	23730
202		
203	*Crangon alaskensis elongata*	24436
204	*Crangon stylirostris*	24448
205	*Crangon* spp.	24446
206	*Spirontocaris gracilis*	24432
207	*Pinnixa* sp. #1	24961
208	*Pinnixa* sp. #2	24962
209	*Pinnixa* sp. #3	24963
210	*Pagurus ochotensis*	24671
211	*Pagurus quayleyi*	24672
212	*Pagurus armatus*	24657
213	*Pagurus* spp.	24678
214	Paguridae spp.	24650

Table -11C (Continued)

MCR Code	Species	DMRP Code
215	*Pinnixa* spp.	24970
216	*Cancer gracilis*?	24929
217	*Cancer magister*	24930
218	*Munida quadrispina*	24626
219	*Abarenicola* sp. #1	40348
220	*Ophelina acuminata*	40334
221	*Ampharete acutifrons*	19710
222		
223	*Ampharete* spp.	19709
224	*Eteone* sp. #2	40295
225	*Apistobranchus ornatus*	40362
226	*Aricidea ramosa*	19113
227	*Aricidea* sp. #1	19114
228	*Armandia bioculata*	19541
229	*Artcamella hancocki*	40355
230	*Corophium salmonis*	24051
231	*Eteone barbata*	40296
232	*Capitella capitata*	19641
233	*Capitella capitata oculata*	19649
234	Opistobranchia sp. #1	40371
235	*Nothria* spp.	19306
236	*Barantolla americana*	40351
237	Chaetozone setosa	19515
238	*Mediomastus californiensis*	40116

Table C-IIC (continued)

MCR Code	Species	DMRP Code
239	*Chaetozona* nr. *berkeleyorum*	40331
240	Cirratulidae spp.	19500
241	Maldanidae sp. #20	40345
242	*Decamastus gracilis*?	40352
243	*Trochachaeta franciscanum*	40364
244	*Eteone* sp. #6	40298
245	*Eteone californica*?	19137
246	*Eteone* spp.	19155
247	Maldanidae sp. #21	40346
248	Phyllodocidae sp. #1	40302
249	Opistobranchia sp. #2	40372
250	*Eumida sanguinea*	19149
251	Flabelligeridae spp.	19520
252	*Glycera capitata*	19262
253	*Glycera* spp.	19265
254	*Typosyllis hyalina*	40307
255	*Typosyllis* nr. *hyalina*	40491
256	*Glycinde* sp. #2	40313
257	Phyllodocidae sp. #2	40303
258	*Glycinde* spp.	19284
259	*Goniada maculata*	19287
260	*Artacama conifera*	19722
261	*Haploscoloplus elongatus*	19421
262	*Cossura* spp.	19131

Table C-IIC (continued)

MCR Code	Species	DMRP Code
263	Hesionidae spp.	19120
264	Heteromastus filobranchus	19651
265	Hesiospina sp. #1	40286
266	Laonice cirrata	19442
267	Neoamphitrite robusta	40356
268	Lepidonotus sp. #1	19034
269	Autolytus cornutus	19212
270	Arabellidae sp. #4	40319
271	Eteone sp. #7	40299
272	Anaitides sp. #4	40301
273	Lumbrineris latreilli	19349
274	Lumbrineris cf. longensis	19359
275	Lumbrineris luti	19350
276	Lumbrineris similabris	19351
277	Lumbrineris spp.	19347
278	Magelona longicornis	19467
279	Magelona sacculata	40150
280	Magelona pitelkai	40326
281	Magelona spp.	19463
282	Maldane sarsi	19562
283	Arabella spp.	19382
284	Nephtys cornuta	40308
285	Eumida spp.	40492
286	Maldanidae sp. #4	40342

Table 5-11c (continued)

MCR Code	Species	DMRP Code
287	Dorvilleidae spp.	19400
288	*Polydora caulleryi*	19445
289	*Boccardia basilaria*	40323
290	Ampharetidae spp.	19700
291	Paraonidae spp.	19110
292	*Polydora* sp. #2	40322
293	Maldanidae spp.	19560
294	*Mediomostus californiensis*	19643
295	Nephtyidae spp.	19240
296	*Heteromastus* sp. #1	40350
297	*Melinna oculata*	19708
298	*Notomastus lineatus*	40349
299	Maldanidae sp. #19	40344
300	*Myriochele oculata*	40347
301	*Nephtys caeca*	19241
302	*Nephtys caecoides*	19242
303	*Nephtys californiensis*	19243
304	*Nephtys glabra*	19251
305	*Scoloplos* spp.	19429
306	Nereidae spp.	19220
307	*Eteone longa*	19160
308	*Nereis* spp.	19232
309	*Ninoe gemmea*	19346
310	*Nothria iridescens*	19304

Table C-IIC (continued)

MCR Code	Species	DMRP Code
311	*Northia geophiliformis*	40314
312	*Notomastus hemipodus*?	19644
313	*Ophelia* sp. #1	40151
314	*Eteone* sp. #5	40297
315	Orbiniidae spp.	19420
316	*Owenia collaris*	40157
317	*Paraonella platybranchia*	40154
318	*Thelepus setosus*	40357
319	*Pectinaria granulata*	40354
320	*Pectinaria californiensis*	19661
321	*Pectinaria* spp.	19663
322	*Pholoe minuta*	19061
323	*Anaitides groenlandica*	40292
324	*Anaitides mucosa*	40291
325	Phyllodocidae spp.	19136
326	*Phylo felix*	40321
327	Pilargidae spp.	19860
328	*Pista cristata*	19735
329	*Lumbrineris bicirrata*	19341
330	*Pista morrei*	19736
331	*Polycirrus* spp.	19729
332	*Polydora* spp.	19451
333	Polynoidae spp.	19020
334	*Praxillella gracilis*	40340

Table C-IIC (continued)

MCR Code	Species	DMRP Code
335	*Munispio cirrifera*	40324
336	*Prionospio malmagreni*	19457
337	*Paraprionospio pinnata*	19456
338	*Prionsopio* spp.	19459
339	*Rhodine bitorquata*	40341
340	*Anaitides* spp.	19143
341	*Scoloplos armiger*	19427
342	Opheliidae spp.	19540
343	*Spio filicornis*	40037
344	*Spiophanes bombyx*	19453
345	*Spiophanes berkeleyorum*	40155
346	Capitellidae sp. #1	40353
347	*Sternaspis fossor*	40116
348	*Sthenelais tertiaglabra*	19068
349	*Lanassa* sp. #1	40358
350	Syllidae spp.	19200
351	*Ophiodermella* sp. #1	40382
352	*Spiochaetopterus costarum*	40328
353	Terebellidae spp.	19720
354	*Thalenessa spinosa*	40118
355	*Aricidea* spp.	19111
356	*Tharyx tesselata*	19512
357	Tharyx sp. #1	40119
358	*Tharyx multifilis*	40329

Table C-11C (continued)

MCR Code	Species	DMRP Code
359	Tharyx spp.	19510
360	*Travisia gigas*	19550
361	Nemertea spp.	18700
362	Miscellaneous #1	
363	Miscellaneous #2	
364	Miscellaneous #3	
365	Turbellaria spp.	14201
366	Gammaridea sp. #2	40476
367	Hydrozoa spp.	11501
368	Capitellidae spp.	19640
369	Polychaeta spp.	19001
370	Spionidae spp.	19430
371	Lysianassidae spp.	24122
372	*Eunoe* sp. #1	40196
373	*Nephtys* spp.	19247
374	Pelecypoda sp. #10	40402
375	Miscellaneous #4	
376	Miscellaneous #5	
377	Anthozoa sp. #1	40252
378	Anthozoa sp. #2	40253
379	Anthozoa sp. #3	40254
380	*Synidotea bicuspida*	40429
381	Pycnogonida sp. #1	40415
382	Anthozoa spp.	12000

Table C-IIC (continued)

MCR Code	Species	DMRP Code
383	*Anaitides* sp. #3	40300
384	*Scolelepsis* *cirratulus*	40325
385	*Glycera* *convoluta*	40311
386	Arenicolidae spp.	19620
387	Arabellidae spp.	19380
388	*Autolytus* spp.	19202
389	*Anobothrus* *gracilis*?	19702
390	*Nephtys* *ferruginea*	19244
391	*Macoma* *balthica*?	22324
392	*Aedicira* sp. #1	40285
393	*Eteone* sp. #1	40294
394	*Heteromastus* spp.	19653
395	*Antinoella* *macrolepida*?	40281
396	*Melinna* spp.	19706
397	Ouveniidae spp.	19580
398	*Nereis* *zonata*	19231
399	*Mesochaetopterus* #1	40327
400	*Campylaspis* *rubromoculata*	23907
401		
402	*Rhachotropis* *oculata*	40474
403	Chaetopteridae spp.	19480
404	Bopyrella? sp.	23960
405	Sabellidae spp.	19740
406	*Asychis* *disparidentata*	40336

Table C-IIC (continued)

MCR Code	Species	DMRP Code
407	Goniadidae spp.	19380
408	*Glycinde picta*	40149
409	*Scalibregma inflatum*	19803
410	*Byblis* sp. #1	40448
411	*Bathymedon*? sp. #2	40460
412	*Proboloides* sp. #1	40465
413	*Guernea*? sp. #1	40469
414	Hesionidae sp. #1	40288
415	Pelecypoda sp. #4	40399
416	*Armina californica*	40375
417	Nuculanidae spp.	21960
418	*Pectinaria* sp. #1	19664
419	*Phoronis spammophila*?	40488
420	Hesionidae sp. #2	40289
421	Echiura sp. #3	40485
422	Oligochaeta spp.	19900
423	Echiurida spp.	25400
424	*Rutiderma* sp. #1	40414
425	*Amphiodia periercta-urtica*	40489
426	*Glycera* sp. #1	40312
427	Echiura sp. #1	40486
428	Anthozoa sp. #4	40255
429	Anthozoa sp. #5	40256
430	Anthozoa sp. #6	40257

Table C-IIC (continued)

MCR Code	Species	DMRP Code
431	*Macoma* spp.	22326
423	*Exogone* spp.	19217
433	Arabellidae sp. #3	40318
434	*Pilargis berkeleyae*	40360
435	*Parandalia fauveli*	40359
436	*Lumbrineris zonata*	19345
437	*Myriochele heeri*	19581
438	Nemertea sp. #1	40267
439	*Ampharete arctica*	19713
440	*Nephtys rickettsi*	40310
441	*Pista* spp.	19734
442	*Paraonis gracilis oculatus*	40095
443	*Tharyx* sp. #3	40330
444	Maldanidae sp. #14	40343
445	*Praxillella affinis pacifica*	40339
446	Nemertea sp. #2	40268
447	*Terebellides stroemi*	19731
448	*Aricidea neosuecica*	40094
449	*Cossura* nr. *laeviseta*	40290
450	*Sigambra tentaculata*	19867
451	Nemertea sp. #3	40269
452	*Amplicteis* sp. #1	40123
453	*Isocirrus* sp. #1	40338
454	*Lumbrineris minima*	40315

Table C-IIC (continued)

MCR Code	Species	DMRP Code
455	Arabellidae sp. #1	40317
456	Nemertea sp. #4	40270
457	*Asychis* sp. #2	40337
458	*Schistomaringos annulata*	40320
459	*Podarkeopsis brevipalpa*	40287
460	Nemertea sp. #5	40271
461	Sphaerodoridae spp.	40105
462	*Asychis* spp.	19566
463	Nemertea sp. #6	40272
464	*Nephtys cornuta franciscanum*	40309
465	*Harmothoe* nr. *lunulata*	19027
466	*Hesperonoe* sp. #1	40282
467	*Orbinia* sp. #1	40092
468	*Pherusa papillata*	40333
469	*Sphaerodoropsis sphaerulifer*	40104
470	*Brada pluribranchiata*	40332
471	Nemertea sp. #7	40273
472	Nemertea sp. #8	40274
473	Nemertea sp. #9	40275
474	*Lepidasthenia longicurrata*	40603
475	Nemertea sp. #11	40277
476	*Tenonia kitsapensis*	40102
477	*Typosyllis alternata*	40306
478	*Exogone lourei*	40110

Table C-IIC (continued)

MCR Code	Species	DMRP Code
479	*Langerhansia heteorchaeta*	40305
480	*Lepidasthenia berkelyae*	40100
481	*Chone albocincta*	40103
482	*Travisia brevis*	19546
483	*Myriochele* spp.	19583
484	Sigalionidae spp.	19055
485	Nemertea sp. #12	40278
486	*Orchomene* sp. #2	40455
487	*Paraphorus tridentatus*	40461
488	*Anisogammarus confervicolus*	24067
489	*Anisogammarus pugettensis*	24069
490	*Allorchestes* sp. #1	21497
491	*Parapleustes pugettensis*	24173
492	*Corophium brevis*	24047
493	*Jassa?* sp. #1	40452
494	*Eohaustorius brevicuspis*	40451
495	*Corophium spinicorne*	24053
496	*Synidotea* sp. #2	40430
497	*Synidotea* sp. #3	40431
498	*Stenothoe* sp. #1	24182
499	Paraselloidea sp. #1	40444
500	*Edotea sublittoralis*	40432
501	*Pentidotea oculata*	40434
502	*Gnorimosphaeroma oregonensis*	23921

Table C-IIC (continued)

MCR Code	Species	DMRP Code
503	*Limnoria lignorum*?	23924
504	*Pananthura*? sp. #1	40443
505	*Argeia* spp.	40440
506	*Hemiarthrus abdominalis*	40441
507	Cymothoidae sp. #1	40446
508	*Saduria entomon*	40435
509	*Gastropteron pacificum*	40369
510	Nemertea sp. #13	40279
511	*Idotea fewksei*	40433
512		
513	*Pagurus caurinus*	40484
514	*Olivella* spp.	21654
515	*Phoxocephalus homilis*	40462
516	Stenothoidae spp.	24178
517	*Metopella* sp. #1	40466
518	*Acteocina*? sp. #1	40370
519	Pelecypoda sp. #20	40405
520	*Crangon franciscorum*	24439
521	*Collisella digitalis*?	40366
522	Turbellaria sp. #1	40258
523	Cumacea spp.	23889
524		
525	*Tellina* sp. #5	40387
526	Pelecypoda sp. #9	40401

Table C-IIC (continued)

MCR Code	Species	DMRP Code
527	Isaeidae sp. #1	40470
528	*Leucon* sp. #1	40424
529	Hyperiidea sp. #1	24206
530	Chaetodermatidae spp.	40408
531	*Tomburchus*? sp. #1	40394
532	*Caprella* sp. #1	40481
533	Echiura sp. #5	40487
534	Neomeniida sp. #1	40406
535	*Corophium* sp. #1	40450
536	Nemertea sp. #14	40280
537	*Acanthomysis alaskensis*?	40416
538	*Trachypollia*? sp. #1	40377
539	*Odostomia* spp.	21265
540	*Capitella* spp.	19654
541	*Ophelina* sp. #1	40335
542	*Pinnixa littoralis*	24966
543	Hirudinea spp.	20271
544	*Anaitides longipes*	40293
545	*Gattyana ciliata*	40283
546	*Polynoe* sp. #1	40284
547	*Callianassa californiensis*	24614
548	*Cancer oregonensis*	24931
549	*Chorilia longipes*	24909
550	*Crangon communis*	24450

Table C-IIC (continued)

MCR Code	Species	DMRP Code
551	*Paranaitis polynoides*	19153
552	*Crangon munita*	24440
553	*Crangon* sp. #1	24452
554	*Nectocrangon alaskensis*	24451
555	*Paguristes turgidis*	24654
556	*Pagurus aleuticus?*	40483
557	*Pandalus danae*	24417
558	*Pandalus jordani*	24420
559	*Pinnixa occidentalis*	24967
560	*Sergestes similis*	24462
561	*Spirontocaris avina*	24433
562	*Spirontocaris barbata*	40046
563	*Spirontocaris bispinosa*	24434
564	*Spirontocaris cristata*	24430
565	*Spirontocaris lamellicormis*	40047
566	*Spirontocaris pusiola?*	40048
567	*Spirontocaris suckleyi*	40050
568	*Thysanoessa spinifera*	24374
569	*Euphausia pacifica*	24360
570	*Luidia foliolata*	40265
571	*Pisastar brevispinus*	40266
572	*Gorgonocephalus caryi*	17615
573	*Ophiomusium jolliensis*	17616
574	*Euphilomedes producta*	40412

Table C-IIC (concluded)

MCR Code	Species	DMRP Code
575	*Octopus* sp. #1	40409
576	*Rossia pacifica*	22811
577	Pectinidae sp. #1	40383
578	Gastropoda sp. #1	40365
579	*Propeamussium davidsoni*	40395
580	Miscellaneous #6	
581	*Caprella mendax*	40482
582	*Campylaspis* sp. #4	40422
583	*Spirontocaris* spp.	40049
584	*Diastylis parapinulosa*	40418
585	Lysianassidae sp. #2	40459
586	*Diastylis pellucida*	40417
587	*Eulalia leavicornuta*	40304
588	*Stenothoides angusta*	40468