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HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

APPENDIX B: INVENTORY AND ASSESSMENT OF PREDISPOSAL AND POSTDISPOSAL AQUATIC HABITATS

by

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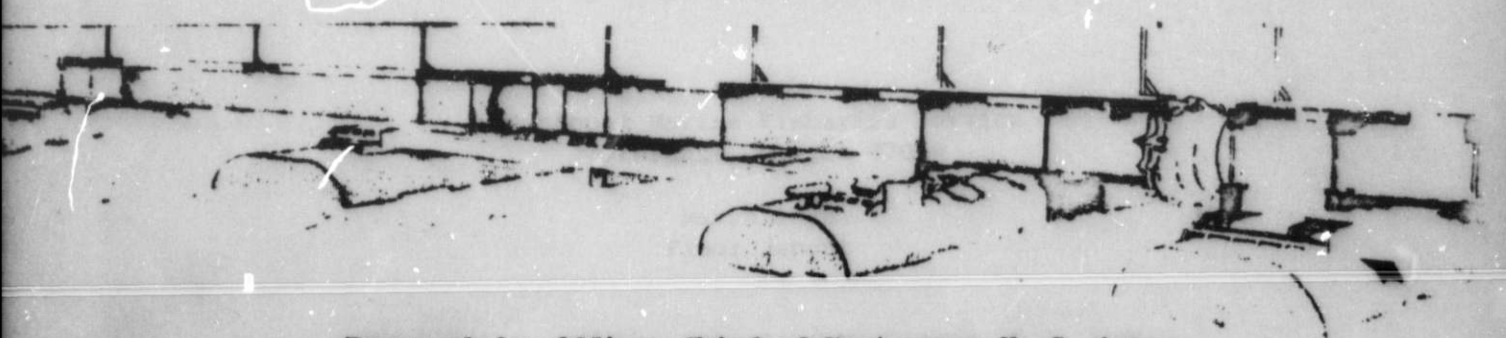

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HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

Appendix A: Inventory and Assessment of Predisposal Physical and Chemical Conditions

Appendix B: Inventory and Assessment of Predisposal and Postdisposal Aquatic Habitats

Appendix C: Inventory and Assessment of Prepropagation Terrestrial Resources on Dredged Material

Appendix D: Propagation of Vascular Plants on Dredged Material in Wetland and Upland Habitats

Appendix E: Postpropagation Assessment of Botanical and Soil Resources on Dredged Material

Appendix F: Postpropagation Assessment of Wildlife Resources on Dredged Material

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Miller Sands, an island-lagoon complex located in the Columbia River Estuary at River Kilometre 39 (River Mile 24) was one of five research projects where the feasibility of using dredged material for beneficial habitat development was studied. The study was conducted during predisposal, disposal, and postdisposal phases from March 1975 to July 1977. The National Marine Fisheries Service was part of a five-agency team charged with the investigation

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of various physical, chemical, and biological parameters during the marsh development program. The National Marine Fisheries Service research findings describe changes in sediments, macroinvertebrates, various water quality parameters, zooplankton, nekton, and nekton food utilization.

Twenty species of finfish totaling 13,755 organisms were captured with beach seines and fyke nets during the day and night at 13 different sites during the study. Four species dominated the catch during fifteen bimonthly surveys and accounted for 93 percent of the total catch i.e. juvenile chinook salmon, peamouth chub, starry flounder, and threespine stickleback. A change occurred in fish abundance during the postoperational phase, but this change was attributed to behavioral reactions by anadromous and nonanadromous fish to a 100-year record low-flow condition experienced in the Columbia River during the winter, spring, and summer of 1977. Statistical analysis of age, weight, length, and abundance of nekton captured failed to reveal any significant changes as a result of disposal or as a benefit of habitat development at Miller Sands.

Over 54,000 prey organisms representing 36 taxa were consumed by nekton sampled during food utilization studies at Miller Sands. Four main species of prey items made up 95 percent of the total numbers of items consumed by all fish at all sampling stations. These were Daphnia, Eurytemora, Corophium, and chironomid larvae and pupae. The sizes of fish did not significantly affect the food habits of most fish. While the large fish were able to consume greater quantities of food, the species composition was similar for all sizes. There were few differences between day and night samples, between cove and intertidal areas, and among stations within the cove area. With few exceptions, nekton species contained food during the entire study and were feeding in the Miller Sands area.

Results of sediment analysis indicated that sediment size and types were fairly uniform throughout the area. Fine sand and silty sand comprised the main sediment types at all stations. Organic matter was between 3 and 8 percent and there was no significant seasonal change. The average number of benthic organisms per square metre was highest the first year, and declined monotonically to the end of the study. A clam, an amphipod, a flatworm, and an important mysid (Neomysis) were not found in 1976-1977. Oligochaetes, Corophium, and chironomids constituted from 92-94 percent of the total organisms captured at Miller Sands. Over 209,000 benthic organisms representing 22 taxa were captured during the study.

Zooplankton were dominated by two Cladocerans, Daphnia and Bosmina, and one copepod, Cyclops. These three organisms represented 96 percent of the zooplankton collected and were present at all sampling stations during the first year of the study. However, sampling of zooplankton was excluded from the postoperational surveys.

Water flow conditions in the Columbia River were high in 1975, average in 1976, and were exceedingly low during the winter of 1976 and the spring-summer of 1977. Water quality parameters that were manifested as a result of these changes in flow probably overpowered subtle changes that could have developed as a result of the habitat improvement project at Miller Sands. Water quality parameters monitored were water temperature, pH, salinity, dissolved oxygen, turbidity, ammonia, total alkalinity, and nitrogen gas.

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PREFACE

The work described in this report was performed under Interagency Agreement Numbers WESRF 75-88, WESRF 76-39, and WESRF 76-178, between the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi, and the National Marine Fisheries Service (NMFS), Prescott, Oregon. The research was sponsored by the Office, Chief of Engineers, U. S. Army, under the Dredged Material Research Program (DMRP). The study, which was part of the Habitat Development Research Program was conducted in the lower Columbia River at Miller Sands during the period May 1975 through July 1977.

We would like to express our appreciation to Mr. George Snyder, Assistant Director, Field Research Programs, NMFS, Seattle; and Mr. Theodore Blahm, Station Chief, Prescott Field Station; and to the following members of the Prescott and Hammond Station staffs: Larry Davis for the collection and analysis of water chemistry, and collection of benthic organisms; Maurice Laird and Edward Koller for collection of nekton; Suzie Valder and John McNair for the sorting and identification of benthic organisms; Nancy Knox and Mary Lee Brown for preparation of graphics, compilation of data, and overall report preparation; Norm Kujala for analysis of the 1975-1976 benthic data; and Linda Jennings and Tracy Brown for help in recording and tabulation.

The report was prepared for the Habitat Development Project (HDP), (Dr. Hanley K. Smith, Manager) as part of Task 4B: Terrestrial Habitat Development. Specific Sub-Tasks assigned to the NMFS included 4B05C, Baseline Biological Inventory and Assessment of the Aquatic Environs of the Miller Sands Habitat Development Site; 4B05J, Aquatic Biology Investigations at Miller Sands Habitat Development Site, Columbia River, Oregon, and 4B05L, Post Operational Aquatic Biology at Miller Sands Habitat Development Site. The contracts were managed by Dr. Dave Parsons, Dr. John Bryne and Mr. Ellis J. Clairain, under the general supervision of Dr. John Harrison, Chief, Environmental Laboratory. Mr. John D. Lunz prepared the Scope of Work for the project in March 1976.

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

TABLE OF CONTENTS

HABITAT DEVELOPMENT FIELD INVESTIGATIONS,

MILLER SANDS MARSH AND UPLAND HABITAT

DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

APPENDIX B: INVENTORY AND ASSESSMENT OF PREDISPOSAL AND POSTDISPOSAL AQUATIC HABITATS

PART I: INTRODUCTION

Background

1. Miller Sands, an island-lagoon complex located in the lower Columbia River, is one of five research projects where the feasibility of using dredged material for beneficial habitat development is being studied. The objective of these studies is to provide information on the environmental impact of dredging and dredged material disposal and to develop economically feasible dredging and disposal alternatives which are environmentally compatible.

2. The U.S. Army Corps of Engineers (CE) Environmental Laboratory (EL) of the Waterways Experiment Station (WES) at Vicksburg, Mississippi has the overall responsibility for the Habitat Development Research Project (HDRP) at Miller Sands.

3. Principal investigators at the Miller Sands project were Portland District Corps of Engineers, Oregon State University, Washington University, Wave Beach Grass Nursery, and the National Marine Fisheries Service.

4. In 1975 the Environmental Conservation Division, National Marine

Fisheries Service (NMFS) contracted with the WES to provide a baseline biological inventory of the aquatic biota at Miller Sands. The baseline inventory encompasses two phases of the study, (1) preoperational phase: March, May and early July of 1975. (2) Operational phase: August 1975 through May 1976 during which time the recently deposited material was graded to provide for marsh development within the intertidal zone at the upper end of the lagoon. During the spring of 1976 National Marine Fisheries again contracted with WES to perform the research for the postoperational phase of the Miller Sands Habitat and Marsh Development Project, (July 1976-July 1977).

Site Description

5. Miller Sands is a horseshoe shaped island located approximately 39 kilometers (24 miles) from the mouth of the Columbia River (Figure B1). This large, dredged material, island marsh complex of approximately 96 hectare (240 acres) is part of the Lewis and Clark National Wildlife Refuge.

6. The main vegetated island was formed during the 1930's from sediments dredged from the navigation channel of the Columbia River. A 101 hectare (250 acre) cove was created during the 1950's by placing dredged material partially parallel and almost connecting with the main island at the upriver end. This sand spit has remained unstable and unvegetated. The results of these events formed the horseshoe shaped island-lagoon-sand spit complex that we find today (Figure B2).

7. The variable freshwater discharge of the Columbia River basin

Figure B1. Location of the Miller Sands Marsh Development Site in Relation to the Columbia River Estuary.

combined with large tidal variations strongly influences the aquatic ecology of Miller Sands.

8. Freshwater discharge into the estuary is characterized by peak flows generally occurring during late spring (May-June), then decreasing to a low flow from August to October. Variable winter floods (December-January) may cause periods of high river flows which exceed the spring maximum.

9. Mean annual discharge for the fifteen year period 1961-1975 was 7,603 cubic meters per second (cms). During the 29 month study period at Miller Sands flows ranged from a monthly average high of 18,856 cms in May 1976 to a low of 2,432 cms in January 1977; these flows were 137% and 34% of their respective 15 year monthly averages.

10. Tidal variations at Miller Sands are of the mixed semidiurnal type characteristic of the Pacific Coast. Normally, the two high and two low tides are of unequal duration and height (average tidal cycle is 12 hours, 25 minutes). The mean tidal range from lower low water to higher high water is 2.59 meters (8.5 ft.) with extreme ranges approaching 3.6 meters (12 ft.).

11. Salinity intrusion, the distance saline water intrudes upstream, is constantly changing depending on tidal stage, fresh water runoff, and weather conditions. Maximum salinity intrusion occurs during high tide low runoff periods in the late fall. In October 1977, salinity of 8 ppt was measured at the bottom of the ship channel at river kilometer 42 (river mile 26). Minimum intrusion occurs with low tides and high river flow and may be less than 8 kilometers (5 miles), (Neal, 1965).

Figure B2. Photograph of Miller Sands showing the Cove, Island Complex and Development Site Adjacent to the Navigation Channel of the Columbia River.

12. The Columbia River estuary, because of its volume of freshwater discharge and large tidal variation, is extremely well-flushed. Neal (1965) calculated flushing time to be between 5 and 10 days. The cove at Miller Sands is also well flushed due to the channel at the upstream end of the island and the open end of the horseshoe downstream (Figure 2).

13. Water quality in the lower Columbia River and at Miller Sands is good compared with other large river systems in the United States. Dissolved chemicals generally have values less than the concentration standards set by Oregon's Department of Environmental Quality. Water quality problems do exist and are mainly associated with water temperatures during the late summer and fall, turbidity and dissolved atmospheric gases (nitrogen) during periods of high freshwater flow.

14. One of the major problems in the Columbia River Estuary is the continuing loss of productive aquatic habitat through dredge disposal and industrial or commercial land fills.

15. Two broad classes of sediments, organic and inorganic, form the substrate of an aquatic ecosystem. Inorganic sediments, sand, silt, and clay, are the major components of the sediments in the Columbia River, and are introduced into the estuary from the ocean, from river runoff or from local tributaries. Organic material which consists of dead plant and animal matter, chemical and industrial waste form a small fraction of estuarine sediments.

16. Substrate material collected and analyzed by the U. S. Geological Survey (Hubbell and Glenn, 1972) show an "average" sediment sample

from the estuary contains 15% gravel, 84% sand, 13% silt and 2% clay. This is a generalization and sediment texture varies widely throughout the estuary.

17. Water velocity and particle size are the important factors which determine if and how a sediment particle will be transported or deposited. Sand generally moves along the bottom with the flow of current while the fine material (silt and clay) remains suspended until water flow is reduced over shallow flats or stopped by tidal action.

18. The texture of a substrate is a controlling factor which determines the biological community which may be found at a given location. Sediments found in the channels and deep water areas are generally coarse (gravel and sand) and of little biological significance. Fine sediments (silt and clay) tend to settle out over low energy flat areas of the estuary and generally support an abundance and diversity of plant and animal life.

19. The tidally influenced, primarily freshwater, 101 hectare (250 acre) lagoon at Miller Sands is a protected, potentially productive aquatic animal habitat. Miller Sands and the shallow lagoon were formed from sand, dredged from the nearby navigation channel of the Columbia River. Theoretically, with reduced flows and the establishment of marshland vegetation in the lagoon, fine sediments (silt, clay) should settle out, changing the character of the substrate and increasing fertility.

20. Located at the upstream end of the Columbia River estuary, Miller Sands is rarely subjected to salinity intrusion, therefore the

planktonic and benthic invertebrates found in this area are limnetic (Haertel and Osterberg, 1966) (Misitano, 1974). These invertebrate organisms provide an important food source for the freshwater and brackish water fish species of the Columbia River estuary.

21. Chinook salmon (*Oncorhynchus tshawytscha*) are the most economically important fish originating in the Columbia River. This anadromous species provides a multi-million dollar income annually to fishermen in the Pacific Northwest. Juvenile chinook generally migrate during the spring of their first (fall chinook) or second (spring chinook) year of life. Numbers of fall chinook remain and feed in the lower Columbia River until the spring following their initial migration (Durkin and McConnell, 1973) (McConnell and Blahm, 1974).

22. Migration routes for all adult and juvenile anadromous fish are in close proximity to Miller Sands. These species include Chinook, Coho, Sockeye and Chum salmon, Steelhead trout, Eulachon, American Shad, and the largest of the freshwater fishes found in the Columbia River, the White Sturgeon.

Study Site Development

23. Miller Sands was originally constructed in 1932 from material dredged from the navigation channel of the Columbia River. In the early 1970's dredge material was deposited parallel to and almost connecting with the main island at the upstream end. This created a protected intertidal lagoon between the main island and the sand spit (Figure B3). Development of the marsh habitat at the upper end of the cove consisted

A. May 1975

B. April 1976

C. July 1977

Figure B3. Photographs of Miller Sands During Various Phases of the Habitat Improvement Project.

of grading material from the sandspit into a smooth sloping surface which covers approximately 4 hectares. This site was divided into 270 plots (10 by 14m) and during the spring and summer of 1976 these plots were planted in a factiorial design to test various species of marsh plants and fertilizer treatments; at three elevations within the intertidal zones.

24. Studies of the aquatic biota associated with Miller Sands were initiated in March, 1975. Three surveys, March, May and July, were conducted prior to the disposal operation in mid-July (Blahm 1975). These combined with six additional bimonthly surveys (August, 1975 to May, 1976) established a baseline inventory of existing aquatic biota near or in the cove at the Miller Sands complex. Baseline date collected during this pre-operational phase included nekton, zooplankton, and benthos. Water quality parameters were also monitored during the nine sampling periods.

25. In July, 1976 studies designed to assess the impact of dredge disposal and subsequent marsh development on the aquatic ecosystem at the Miller Sands site were initiated. The emphases of the six post-operational surveys (July 1976 to July 1977) was to document changes occuring in the macrobenthic and nektonic faunal communities associated with the cove. Biological data collected during this phase of the study included nekton at twelve stations and macrobenthic organisms at twenty-six locations throughout the cove at the Miller Sands site. Substrate material and water-quality parameters were monitored to determine if changes in the physical and chemical characteristics of the cove were occurring.

PART II: METHODS AND MATERIALS

Pre-Disposal Inventory

26. Samples were collected at seven stations in or near the Miller Sands complex during nine sampling periods March, May, July, August, September, and November 1975; and January, March and May 1976.

27. Station designations originally used by Blahm (1975) have been changed to correspond to site designations (Figure B4) used by the site manager from WES in the draft scope of work (March 10, 1976). Sample sites 2, 3, 5, 10 and 11 were located within the Miller Sands cove. Station 12 was located outside the lagoon, at the upstream end of the complex between the sand spit and navigation channel. The station at Snag Island (S.I.) was selected as a control site remote from Miller Sands. This site was discontinued in July 1976.

Post-Operational Studies

28. Eleven sampling stations, laid out in a grid pattern, were established in the cove at Miller Sands prior to the start of post-operational surveys. Cove stations along with Station 12 (previously described) are designated by numbers 1 through 12 (Figure B5).

29. Fifteen sampling stations were established along five transects in or near the intertidal, marsh experimental site. Sampling stations were located on each transect at the .3, 1.2, and 1.8 metre (1, 4 and 6 foot) contour elevations. Stations in the intertidal area are designated by transect (A through E) and site (1, 2 and 3). For example, C2 is the third transect from the main island and is on the 12 metre (4 foot) elevation.

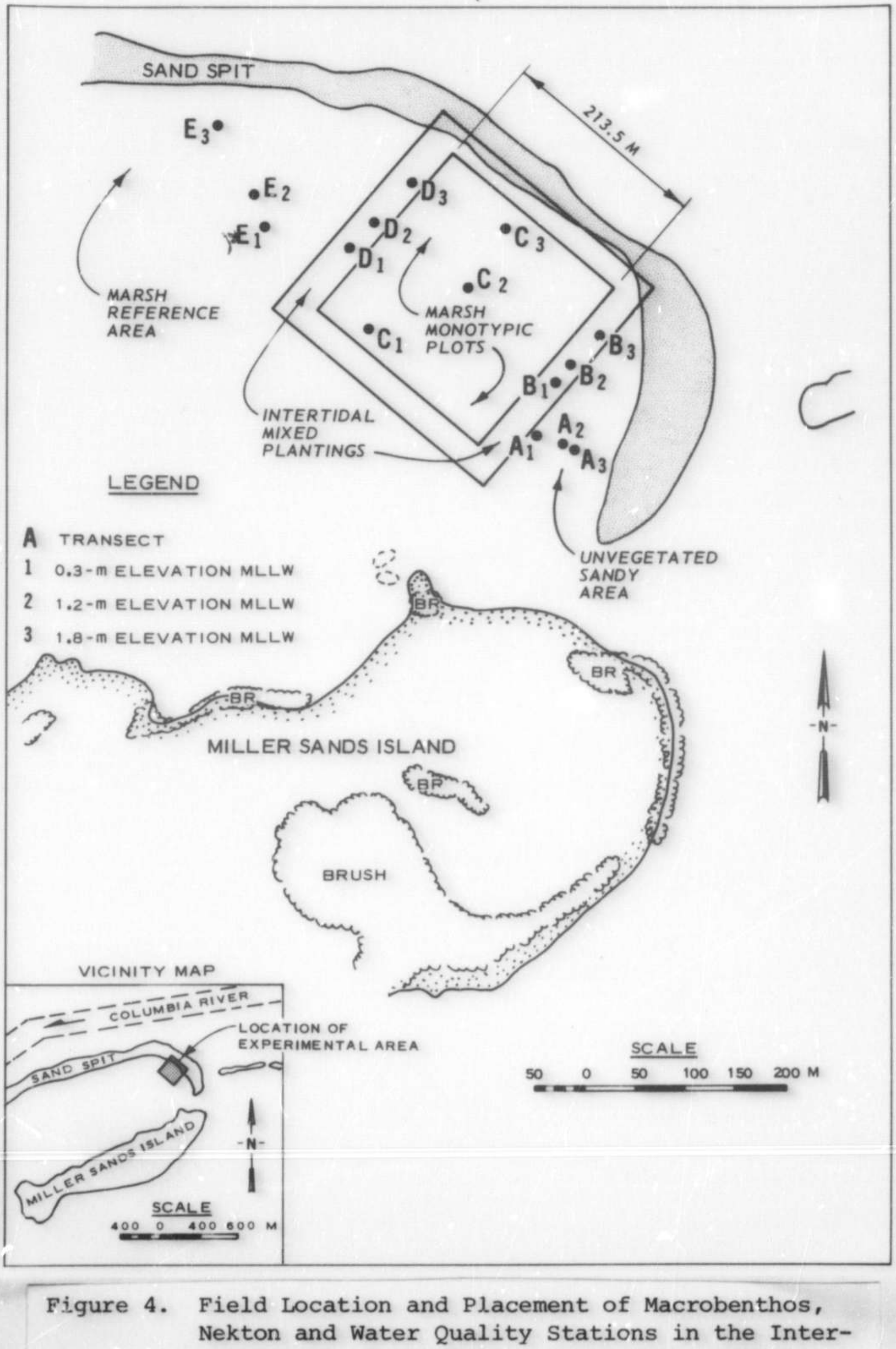


Figure 4. Field Location and Placement of Macrobenthos, Nekton and Water Quality Stations in the Intertidal Area of the Miller Sands Site, Columbia River, Oregon. Each Station is Located in Relation to a Specific Intertidal Elevation.

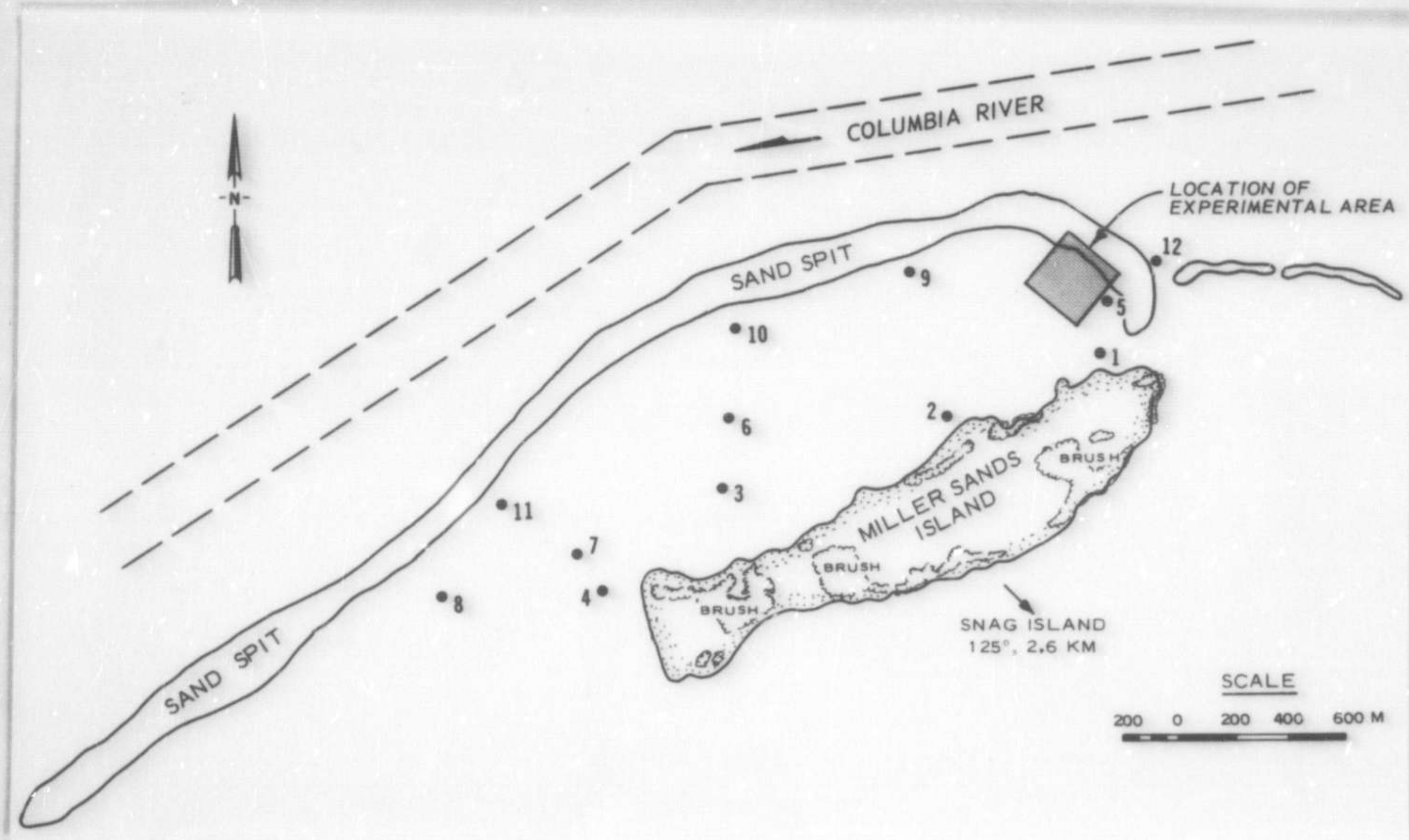


Figure 5. Field Location and Placement of Macrobenthos, Nekton and Water Quality Stations Within the Cove at the Miller Sands Habitat and Marsh Development Site.

30. Stations were marked by bouys or fence posts to aid in relocating sites throughout the study period. Contour elevations and station locations were verified by the Portland District, Corps of Engineers.

31. Throughout the post-operations study (July 1976-July 1977) the Pacific Northwest was experiencing a 100 year record draught. Due to this situation extreme low-flow conditions prevailed at Miller Sands making it necessary to adjust certain sampling schedules. These adjustments are shown in Table B1.

Sampling Program

32. Zooplankton populations were sampled with a 12.7 cm (5 in.) diameter Clark Bumpus sampler with a number 6 (0.24 mm) net and a digital recording flow meter. Five minute horizontal surface tows were made at four locations during each of the nine baseline surveys. Tows were made during daylight hours at mean and high tides in March, May, July and August 1975. Samples were taken only at high tide thereafter because shallow water in the cove prevented proper gear function. Tows were made between stations 5 and 6 and between stations 10 and 11 in the cove; the other two sites were located outside the cove at stations 12 and Snag Island. Samples were preserved in 10 percent buffered formalin solution and returned to the laboratory for identification and enumeration.

33. Samples were treated with a vital stain (Rose Bengal) and allowed to set for at least 24 hours. After an initial examination, samples containing large numbers of organisms or detritus were subsampled with a four-chambered plankton splitter. Organisms from at least two chambers were counted and a comparison was made to assure uniformity between splits. Excess liquid was removed from samples by filtering through a No. 20 screen, remaining material was placed in culture dishes for examination.

34. Zooplankton were identified to genus (Pennak 1953, Ward and Whipple 1959) and counted with the use of a sterozoom dissecting microscope. Developmental stages of the order copepoda were grouped and recorded as copepodites. Rotifiers, present during all sampling periods,

were not included due to the loss of these small organisms through the .24 mm sampling net. Two genera, Brachionus sp. and Asplancha sp. of this class were common.

35. The volume of water strained, during each 5 minute tow was determined from the area at the mouth of the sampler, number of revolutions registered by the flow meter and a clibration factor for the meter. All organisms in a sample or subsample were counted and the number per cubic metre (N/m^3) calculated.

36. Water quality parameters were monitored at all stations during the nine surveys of the Baseline Inventory (Table B1). These samples were collected at mid-depth during daylight hours (0700-1900).

37. Water depth was determined with a Ross Sportsman sounder or a lead line. Temperature, conductivity, and salinity were measured with a Beckman Model RS5-3 salinometer. *In-situ* turbidities were measured by the nephelemetric method and recorded in Formazin Turbidity Units (FTU). An H.F. Instrument Model DRT100 meter was used during the first three surveys; thereafter, a flow-through Hach "Surface Scatter" Turbidimeter was used. A Leeds and Northrup Model 7404 meter was used to record pH. The modified Winkler System (EPA 1974) was used for on-site calibration of a USI (Model 57) dissolved oxygen meter which in turn was used for *in-situ* measurements.

38. Water samples used for the determination of dissolved nitrogen saturations were collected in BOC bottles, chilled and returned to the Prescott Facility for analysis with a Van Slyke Blood Gas Apparatus (Van Slyke-Neil 1924).

39. Two additional water quality parameters were monitored during the Post-operation Phase of the Miller Sands study. Total Alkalinity was determined by the indicator method as described in Standard Methods (EPA 1974). Ammonia (NH_3N/l) concentrations were monitored with an Orion Model 407 specific ion meter and ammonia electrode Model 95-10.

40. Methods of collection and analysis remained consistent during all fifteen surveys. With the exception of dissolved nitrogen, water quality parameters were monitored and analyzed on site. Table B2 lists the parameter, standard units and symbols used in reporting water quality at Miller Sands.

41. During the six post operational surveys at Miller Sands samples were to be collected four times at thirteen stations. Each station was to be monitored on flood and ebb tides, between 0700-1900 (day) and at night between 1900 and 0700 hours. After the first two surveys (July and September 1976) it was determined, this schedule could not be adhered to because of time constraints and bathmetric limitations within the cove resulting from the prevailing low-flow conditions in the river.

42. After a review of available data it was decided that, due to the close proximity of stations and homogeneity of water quality at all stations in the cove, a reduction in number of stations would have the least affect on final information. Thus, nine stations were established two (C and E) associated with the experimental marsh area, and five (2,3,6,10,11) in the cove. Station 1 located in the channel between the island and sandspit provided a reference to inflowing water while Station 12 provided a reference with ambient river conditions (Figure B4). Water

sampling was synoptic with nekton collection period.

43. A beach seine was fished at five sampling sites during each of the baseline surveys. Sites 2 and 3 on the main island and 10 and 11 on the sandspit were within the cove (Figure B5). Station 12 was located on the channel side of the island to provide a reference to the fish present in the area and also timing of anodromous fish migrations. The beach seine was constructed of 12.7mm stretched mesh, nylon web and measured 76.2m long by 3.7m deep. Sampling procedure was to anchor the bunt end of the net on the beach then pay the net over the bow of a 5m outboard-powered boat while backing away from the beach at a 45-60 degree angle. When fully extended the net would be returned to the beach in a 135-120 degree sweep. Area sampled was approximately 0.9 hectares depending on current, tides and bottom configuration. Captured fish were eased to one end of the seine, transferred to tubs, identified, counted by species and returned to the river. A subsample of 10 fish per species were measured (fork length in mm) and weighed (gm). A scale sample was removed for aging.

44. During the post-operational phase of the study a destructive and non-destructive sampling procedure was employed to determine the species, numbers, length, weight, age of dominant species, and food habits of nekton present in the Miller Sands cove. Fyke (hoop nets with wings) nets and the previously described beach seine were used to collect nekton at 12 sampling sites throughout the cove.

45. Fyke nets used were winged D-shaped hoop nets with 12.7mm stretch mesh to the first fyke, remainder of the net was constructed of

.64mm stretch mesh. Wings, on both sides, were 3m long by .9m deep and and were 12.7mm stretch mesh. Five fyke net stations (A,B,C,D,E) were located on the .3 metre contour elevation at the five transects established in or near the experimental intertidal marsh habitat site. A fyke net was also fished at Station 6 near the center of the cove. Nets were fished twice (day and night) during each survey. Fyke nets were set at low water with the axis parallel to the high-low elevation gradient and the hoop opening directed toward the upper elevation. Wings were set to direct fish into the trap during the receding tide. Traps were harvested and reset at the next low water.

46. Six beach seine stations were located within the cove; stations 2,3,10, and 11 were fished during the baseline inventory. Two additional stations were added near the marsh experimental area. Station 5 was located at the head end of the cove between transect A and B while Station 9 was located on the sandspit downstream from the marsh area. Station 12 the river reference site was discontinued. Beach seine stations were sampled during two time period 0700-1900 hours and 1900-0700 hours between mid-flood and mid-ebb tides.

47. All organisms captured were identified to species, counted, and rough sorted into the following length categories. Fish whose total length was between 0-100mm were separated into 25mm groups; those between 101-300mm in 50mm groups; all fish over 300mm were placed into 100mm groups. Ten fish of each species and size group were sacrificed at each station during all surveys. Speciments were preserved in 10 percent buffered formalin and returned to the National Marine Fisheries Service, Hammond

Facility, where they were measured (total length in mm) and weighed (gms). Scale samples were taken for age determination and stomachs removed for a food utilization study.

48. Seven benthos stations were sampled (Table B1) during the nine baseline surveys (March 1975-May 1976). A $0.1m^2$ sample was collected by combining two grabs from a $0.05m^2$ Eckman dredge. Six paired replicate samples were collected at each station during each of the nine surveys. Paired samples were washed through a number 30 seive (.586mm) which is recommended by Schlieper (1972) for sampling macrobenthic organisms. Material retained on the screen was preserved in 10 percent buffered formalin containing Rose Bengal, a vital stain. Samples were returned to the laboratory for identification, enumeration, and weighing of the dominant organisms.

49. After an evaluation of benthic data collected during the baseline inventory it was decided that a reduction in sample quantity, (from $0.1m^2$ to $0.05m^2$) and in number of replicates (from six to three), would not statistically reduce the quality of the data. Sampling stations at Snag Island and at river Station 12 were discontinued prior to the post-operational phase of the study.

50. Twenty-six benthos stations were sampled during the post-operational phase (July 1976-July 1977) at Miller Sands. The eleven stations located within the cove were established on a grid pattern which provided complete coverage of the cove's substrate. Five of these stations (2, 3, 6, 10 and 11) were established during the baseline inventory. Fifteen additional stations were located along the five transects established

in or near the marsh experimental site. The three sites on each transect correspond to the .3, 1.2 and 1.8 metre contour elevations.

51. Samples within the cove were collected with the $0.05m^2$ Eckman dredge during high water. Samples from the fifteen sites located in the intertidal marsh development area were collected by hand during low ebb tide. Hand dug samples were taken from an area defined by a $0.05m^2$ frame to a depth of 10cm. Replicate (three) samples were placed in individual containers and transported to the boat for washing.

52. Samples were preserved and returned to the laboratory where all organisms were removed from the debris, identified, counted, and weighed. Mollusks were weighed separately and estimates of total biomass per sample follow procedures as described by Weber (1973).

53. Sediment samples were collected synoptically with benthos sampling. A coring device which measured 3.8cm inside diameter was used to collect sediment samples to a depth equaling the penetration of the benthic sampling device. Sediment samples taken from the Eckman dredge were measured for depth thus providing a gauge on which to establish uniform penetration of the dredge into the substrate during each replicate grab.

54. Samples from the intertidal marsh area were taken from the sampling frame prior to removal of the benthic samples. Each sediment sample was placed in a plastic sack, marked by station and grab (replicate) number and sent to a testing laboratory for analysis. Particle size was determined by standard seive and pipette procedures. The course fraction >.063 (silt and clay) was broken down only if that fraction was

20 percent or more of the total sample (if less, then only total percent fines is reported).

55. The organic content (volatile solids) found in a sediment sample was determined by standard procedures as outlined by Standard Methods (EPA 1974), and reported as percent volatile solids.

56. After each survey was completed, preserved nekton samples were brought to the NMFS Hammond Facility where they were measured (total length in mm) and weighed (total weight in gm). A subsample from each species at each station was designated for stomach analysis. The guts were cut at the throat and junction of the pyloric caecae (if present), removed, and placed in the appropriate vial according to the following length categories:

0 - 25mm	151 - 200mm	501 - 600mm
26 - 50mm	201 - 250mm	
51 - 75mm	251 - 300mm	
76 - 100mm	301 - 400mm	
101 - 150mm	401 - 500mm	

57. The vials were labelled, filled with 5 percent buffered formalin solution, and stored until analysis. The study design specified examining 10 stomachs containing food for each length category of each species at each station. This, of course, was not possible; however, all stomachs containing food (up to 10) were saved and the numbers of empty stomachs were recorded.

58. Stomach analysis followed Borgeson's technique (Borgeson, 1966). Each month vials were labelled for each station according to total length into which each fish species was grouped. Stomachs thought to contain food were put into each vial and covered with 10 percent formalin. Known empty stomachs were recorded. Later analysis showed some of the guts in

the vials to be empty and data were adjusted accordingly. One disadvantage to Borgeson's technique is that it does not allow computation of frequency of occurrance.

59. Each vial was later emptied into a watch glass and organisms were identified to the lowest feasible taxonomic category and enumerated. The volume of each category was determined by water displacement. For some of the small items, such as cladocerans and copepods, it was necessary to group specimens from several stations to have enough mass to record a volume. Accuracy of laboratory equipment had a lower limit of 0.05ml. Volumes less than this were recorded as trace.

60. Identifications of organisms were based upon the following sources: Banner (1948), Bradley (1908), Brodskii (1950), Chu (1949), Jaques (1947), Mizuno (1975), Needham and Needham (1962), Pennak (1953), Smith and Carlton (1975), Smirnov (1971), Usinger (1956), and Ward and Whipple (1918).

PART 3: RESULTS AND DISCUSSION

Zooplankton

61. A list of zooplankton taxa, and genera of other aquatic organisms found in plankton nets during surveys at Miller Sands, 1975 - 1976 is shown (Table B4). Taxonomic categories identified included 12 genera of Cladocera, 4 Copepods (and the juvenile form Copepodites), 4 taxa representing insects and larval fish forms. Ostrocoda, Anostraca, and Amphipoda were also represented. Although not included in the zooplankton list, two genera of the class Rotifera, *Brachionus* sp. and *Asplancha* sp. were common.

62. Results of zooplankton sampling during the nine baseline surveys are presented in Appendix Table B1, and are summarized in Table B4. Total population densities were numerically larger at cove stations (5 and 11) than at the river (12) or Snag Island reference stations. Total densities at stations 5, 11, 12 and Snag Island were $2466/m^3$, $3208/m^3$, $1975/m^3$ and $1623/m^3$, respectively. Zooplankton densities were low ($21.5/m^3$) in March 1975; they increased with increasing water temperature reaching a peak of $5,984/m^3$ in September 1975. By November, the number of zooplankton per cubic metre had sharply declined ($66/m^3$); thereafter declining through March 1976.

63. Three taxa dominated the zooplankton community at Miller Sands. The two cladocerans *Daphnia* and *Bosmina* and the copepod *Cyclops*. These three organisms represent 96% of the total zooplankton collected and were present at all sampling sites during the entire survey.

64. *Daphnia* the overall most dominant taxa increased to peak abundance in September (5,164/M^3), then declined sharpley (see Table B5). *Daphnia* was dominant during August and September.

65. The population densities of the copepod *Cyclops* follow a normal curve, increasing gradually from March 1975 to September, then declining to a low in March 1976. *Cyclops* was dominant during the January survey, 1976.

66. *Bosmina* increased in abundance during May and reached a peak in July, decreasing during August and September, the period of highest water temperatures, increasing again in November as temperatures declined. *Bosmina* was the dominant zooplankton in May, July, and November, 1975, and again in May 1976.

67. Seasonally abundant taxa included *Eurytemora* sp (August to September) and *Alona* sp in May. *Alona* were present in small numbers throughout the year.

68. The population density of zooplankton at Miller Sands was lower in March and May 1976 than during the same period in 1975. This reduction in zooplankton was also reported by (Beak, 1977) at Columbia River kilometre 116.7.

69. Zooplankton were excluded from post-operational surveys because it was felt a qualitative analysis, based on bimonthly sampling, was not feasible.

Water Quality

70. Water flow conditions in the Columbia River were high in 1975, average in 1976, and were exceedingly low during the winter of 1976 and the spring-summer of 1977. Water quality parameters that were manifested as a result of these changes in flow probably overpowered subtile changes that could have developed as a result of the habitat improvement project at Miller Sands. However, all water quality parameters were analyzed in relation to differences between stations, between years, between ebb and flood tides, and between day and night. In addition, an analysis was made of all parameters during 1976-1977 comparing the cove stations, the habitat improvement area and the river site.

71. Water temperatures reached a maximum of 21°C earlier (July) in 1976 than in 1975; temperatures peaked at 20°C during August of 1975. Generally, there was less than 2°C difference between stations, and usually less than 1°C between tides, and between day and night. Mean temperature and ranges of all samples taken during the study are shown in Figures B6 and B7. Minimum water temperatures normally occur in the Columbia River during January/February; they were measured January of 1976.

72. The pH ranged from a low of 6.6 to a high of 9.0 during the study. The low occurred at Station 12 during the fall (September) of 1975. The high occurred at Station 11 during July 1976. Normally, high alkaline waters originate east of the Cascade Mountains and increase the pH of the waters of the Columbia River during spring run-off which peaks in June at Bonneville Dam (CRK 224, RM 140). The rain west of the Cascades normally causes high water in the tributaries during the winter and this

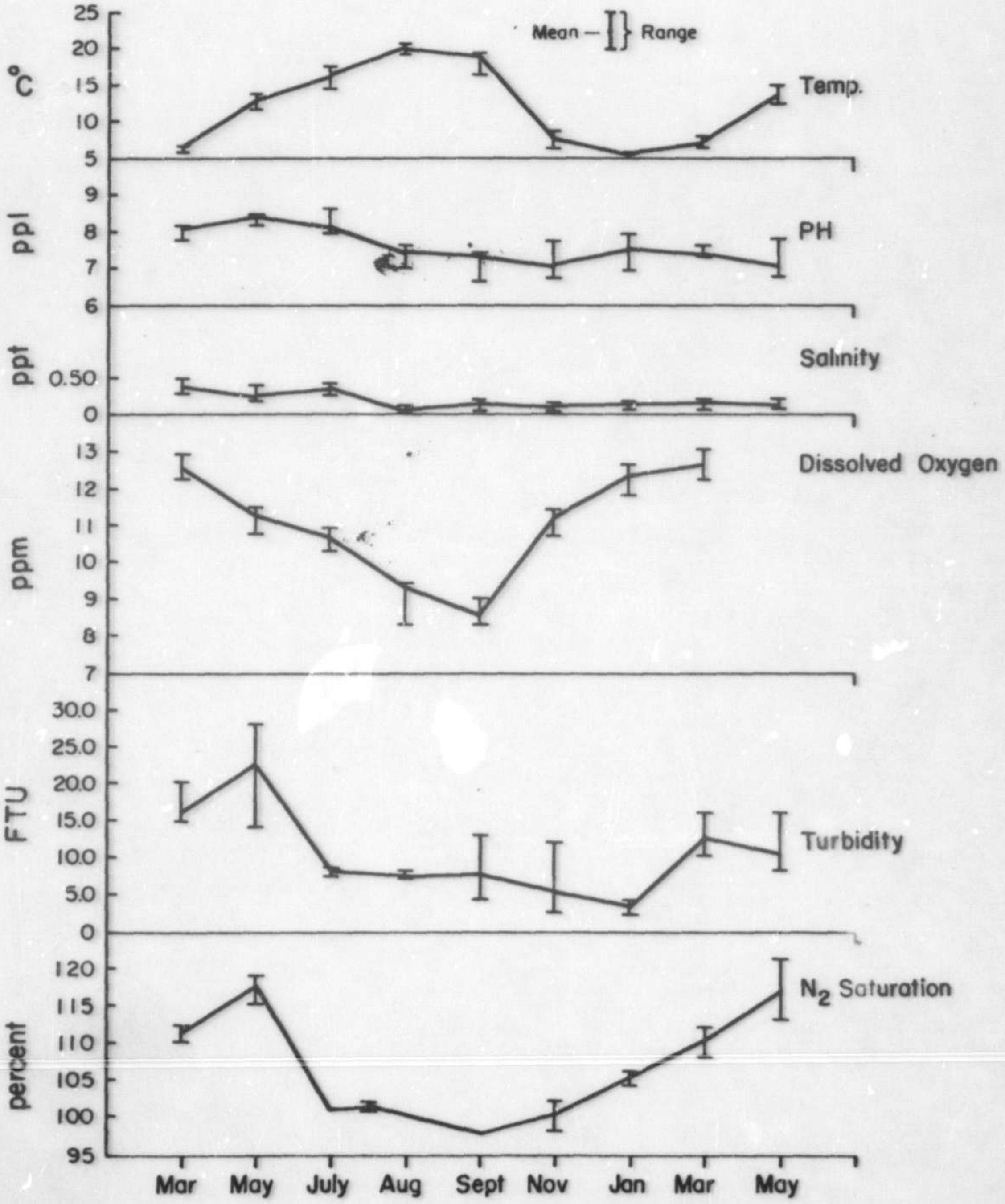


Figure B6. Mean and Range of Water Quality Parameters Taken at High Tide at all Stations, Miller Sands, 1975 - 1976

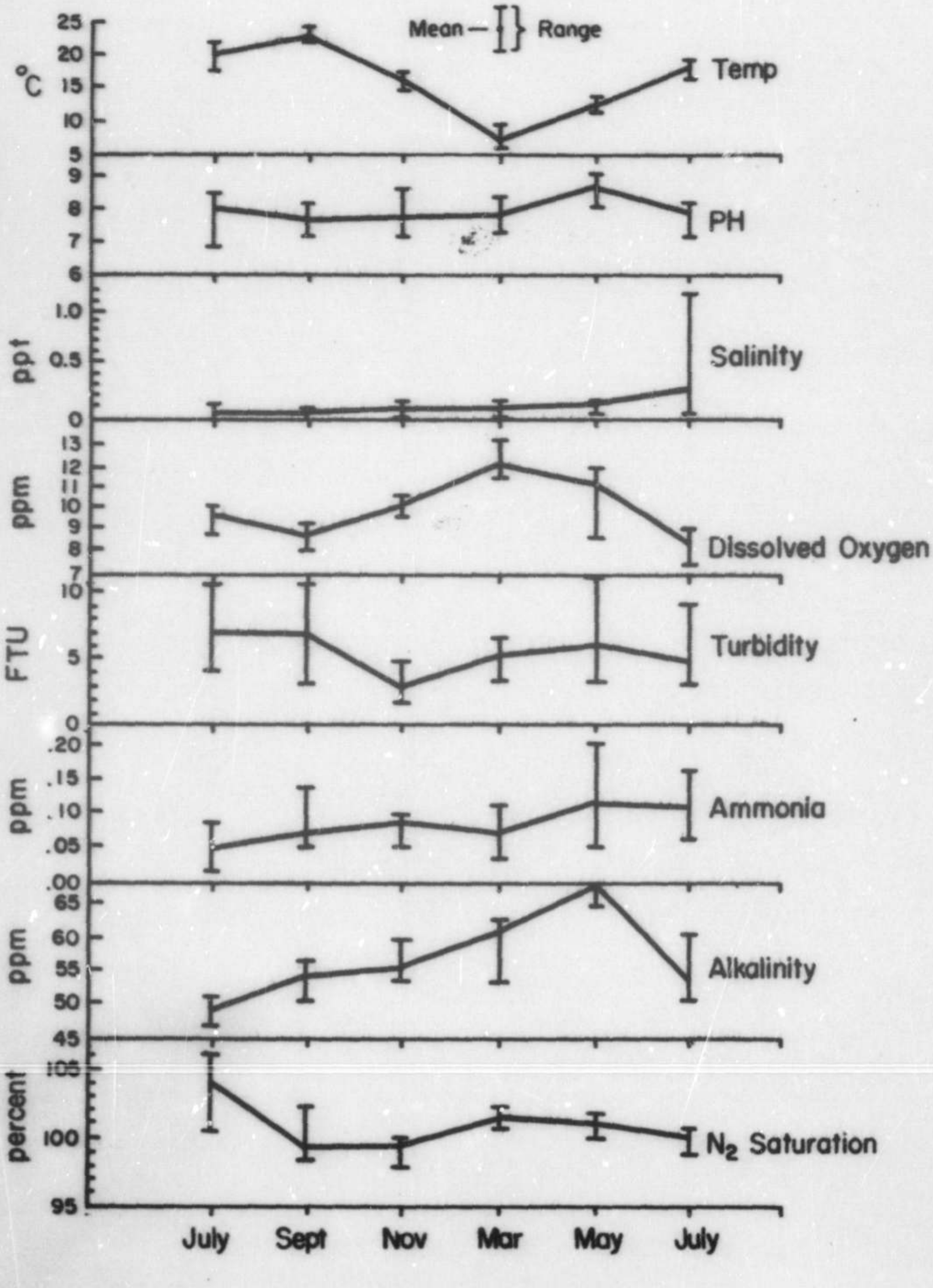


Figure B7. Changes in Water Quality Parameters, 1976 - 1977, at Miller Sands run-off tends to lower pH in the Columbia River. Range of pH seldom varied 1.0 unit between stations, between high and low tides, and between day and night.

73. Salinity measured at the Miller Sands water quality stations did not exceed 0.5 0/00 except during July (Station 12) of 1977 where it reached 1.22 0/00 on a day/ebb tide. The increase in salinity could have been the result of the removal of 9 million cubic yards of material from the Columbia River Bar during the spring and summer of 1977. The removal of this material lowered the channel depth from 48 feet to 53 feet, with the exception of the one measurement above 1.0 0/00, rarely did salinity exceed 0.5 0/00 which normally would be conceded to fall within the accuracy of conventional measurement instrumentation.

74. Dissolved oxygen levels were compared throughout the study at stations 2, 3, 10, 11 and 12. High (13.0 ppm) levels occurred during March of 1975, 1976, and 1977. Low values occurred during July, August and September but rarely dropped below 8.0 ppm. There were no significant differences found in dissolved oxygen levels (at stations 2, 3, 10, 11 and 12) between stations, between high and low tide, or between day and night. The highest range of O_2 values occurred during May 1977 at Station E, where the difference between the night ebb (8.7 ppm) and the day ebb (11.6 ppm) was 2.9 ppm. The ranges between stations, tides and day/night rarely exceeded 1.5 ppm and were always at acceptable ranges for aquatic organisms.

75. Water turbidity reached a maximum of 28 FTU's at Station 12 during May 1975. In general turbidity was higher at comparable stations

(2, 3, 10, 11, 12) in 1975 decreased from 1975 levels during 1976, and were at all time lows in 1977. Turbidity at stations 2, 3, 10, 11 and 12 rarely exceeded 10 FTU's during the 1977 sampling periods. However, 1977 was a record low flow year and turbidity in the lower Columbia River in general was exceedingly low. There was no significant difference between stations, tides, or day/night relationships.

76. Dissolved nitrogen gas (N_2) saturation reached a high 121.0 percent at Station 12 during May of 1976. Station 12 was the outside (river side) station and usually was higher than the cove stations (2, 3, 10, 11) and the intertidal stations (A through E) where the marsh habitat experiment was in progress. In general N_2 saturation that exceeds 115 percent for extended periods could result in aquatic organism fatalities in the shallow cove areas of Miller Sands. High saturation values can be directly correlated with peak run-off from east of the Cascades, and the spilling of large quantities of water through the numerous hydroelectric dams on the main stem Columbia and Snake Rivers, (the Snake River run-off peaks in May, the Columbia River peaks in June).

77. Ammonia was added to the water quality parameters in July of 1976. In general the range did not exceed .15 ppm and then only at three stations; i.e., Stations C, D, and 1. Maximum levels occurred at station 1, during September 1976 during a day/flood. Maximum levels occurred at Stations C and E during May 1977 at all tidal cycles, day and night. The highest level (0.20) occurred on the night ebb at Station E. In general higher levels occurred at the cove stations, 10 and 11, during the night than during the day during May 1977, but these differences overall were not statistically significant.

78. Total alkalinity was the second added parameter in July of 1976. Highest values occurred during May at the cove stations, and at the marsh habitat sites that were sampled during May 1977; i.e., Stations C and E. The range of alkalinity generally increased with time from July 1976 to July 1977 (see Figure B7). No visible trends were apparent in the station comparisons, nor with tidal cycle or day night comparisons.

79. The intertidal or marsh habitat sites were compared to the cove sites 2, 3, 10 and 11, and to the outside river site (Station 12) for the period July 1976 through July 1977. In general, the river was cooler than the cove, temperatures varied several °C, indicating a general warming of the cove and marsh habitat area. However, the warming of the cove had little effect on DO levels.

80. N_2 saturation levels were slightly and consistently higher at the river stations except when river water entered the cove through the cove channel during high river run-off. Turbidities remained fairly constant and at a low level throughout the study inside and outside the cove.

81. The 1976-1977 levels of turbidity rarely exceeded 10 FTO's, which by any standards is exceedingly clear water. More definitive work needs to be conducted on ammonia levels because during May 1977 there appeared to be differences between day and night levels at stations 2, 6, 10, 11, C and D, but these differences did not manifest themselves in the July 1977 sampling period nor at any time prior to the May sampling period. Data for water quality parameters can be found in Appendix Tables B2 and B3.

Nekton

82. A total of 13,755 fish representing twenty species were captured during the fifteen bimonthly surveys at Miller Sands (March 1975-July 1977). A list of these fish in descending order of abundance is presented in Table B6. Four species accounted for 93% of the total catch: juvenile chinook salmon, *Oncorhynchus tshawytscha*; peamouth, *Mylocheilus caurinus*; starry flounder juveniles, *Platichthy stellatus*; and threespine stickleback, *Gasterosteus aculeatus*.

83. Total catch data by station and survey are presented in Appendix Table B4 and Appendix Table B5. Juvenile chinook salmon, threespine stickleback and juvenile starry flounder were captured at all beach seine stations and were present during each survey. Peamouth chub occurred at all stations but were not captured during the March 1975 or January 1976 surveys (Figure B8).

84. Monthly catches of the four dominant species at beach seine sites during the baseline inventory (March 1975-May 1976) are presented in Figure B8. Figure B9 is the monthly catches of these species during the post-operational phase (July 1976-July 1977). The square root transformation of the total monthly catch data is used.

85. Monthly catch and catch per unit of effort for the period March 1975 to May 1976 is presented in Table B7, and represents catch by beach seine, during daylight hours only. In July 1976 the fishing effort was expanded to include fishing with fyke nets and at night. Thus, Tables B8 through B11 are summaries of the monthly catch of the dominant species at all stations, with beach seines at night (Table B8), daytime (Table B9)

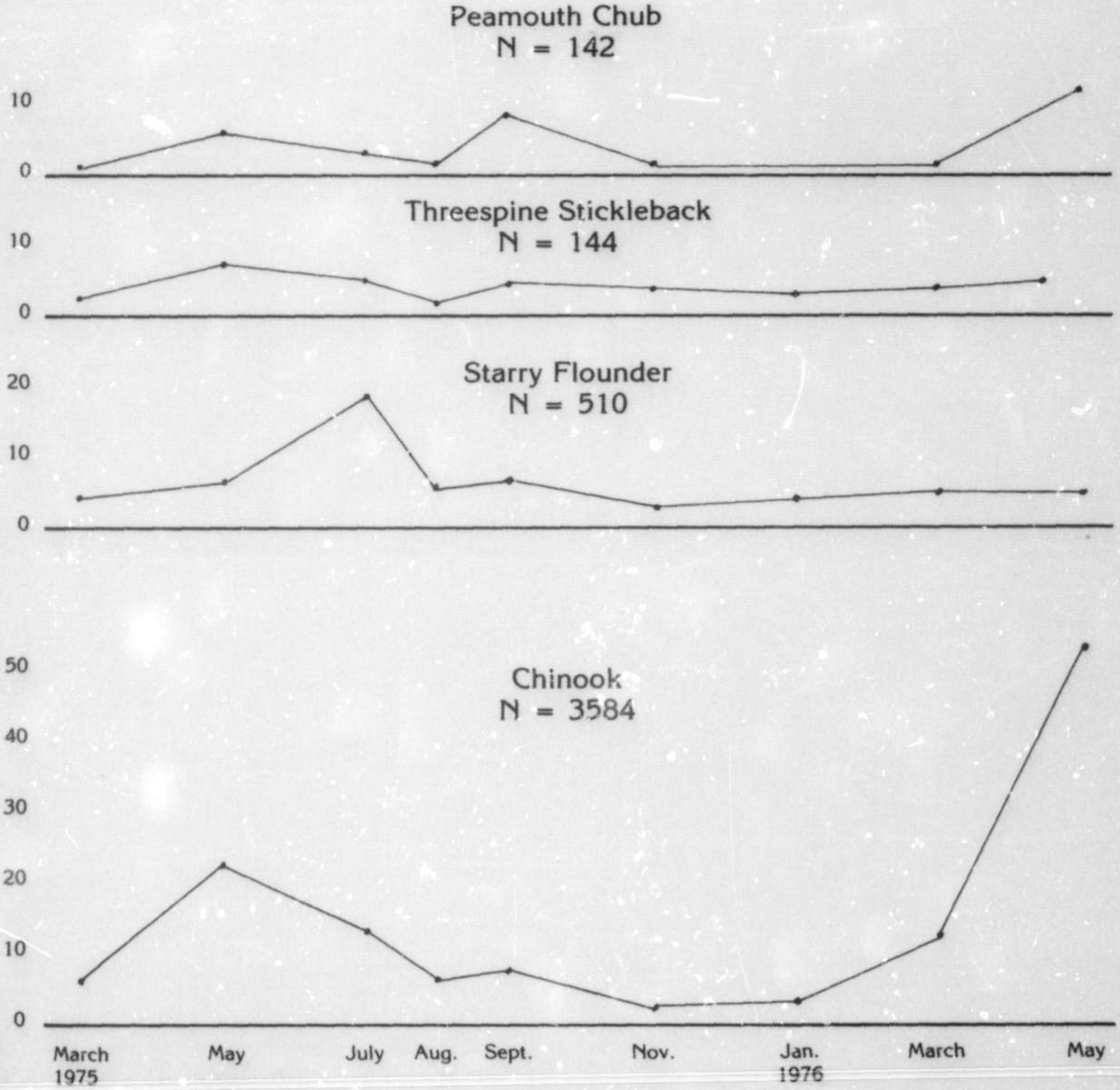


Figure B8. Monthly Catches of Nekton (expressed as $\sqrt{N}$) of Important Species Captured by Beach Seine at Miller Sands, March 1975 - May 1976

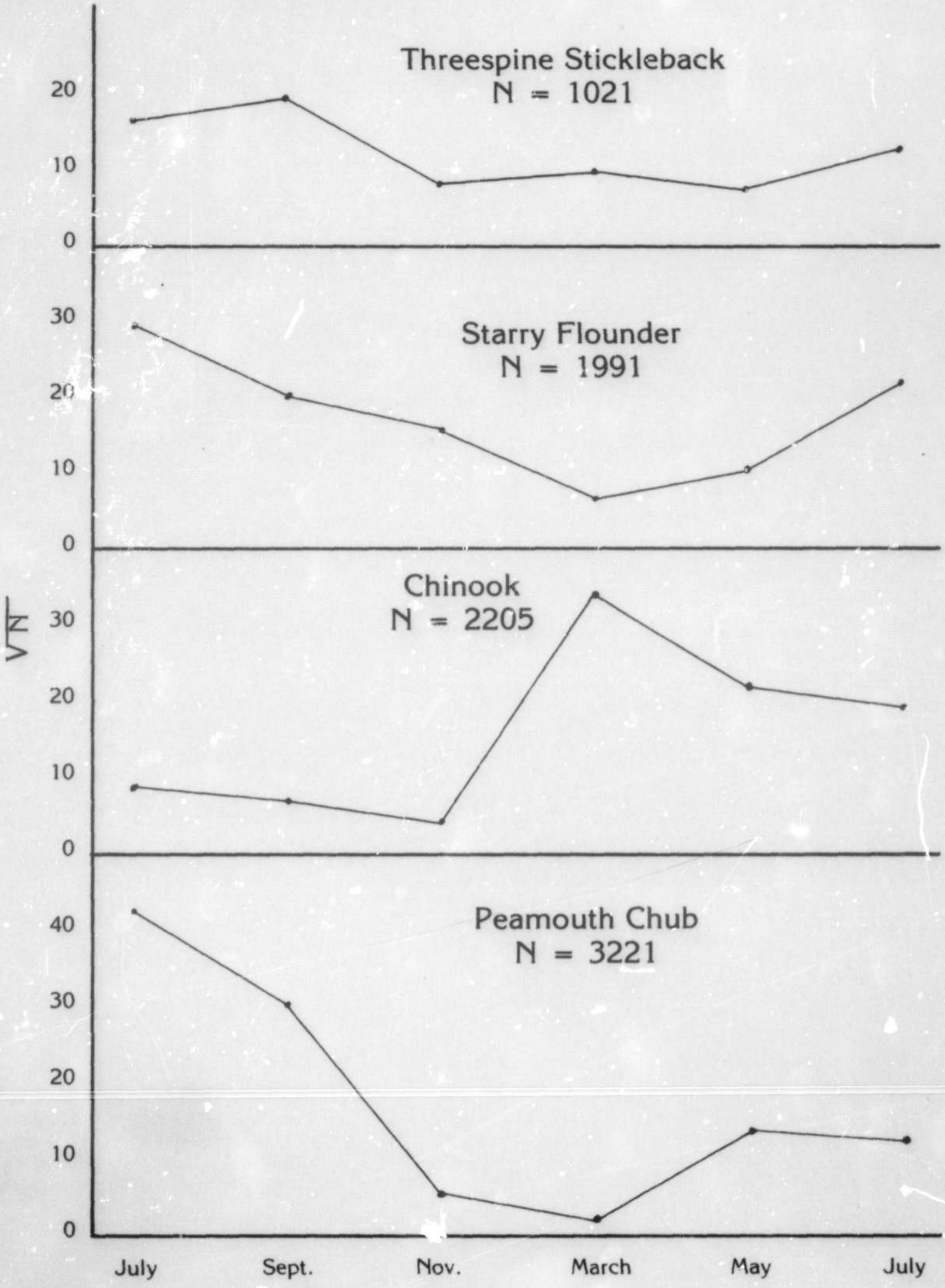


Figure B9. Monthly Catch of Important Species of Nekton (expressed as $\sqrt{N}$) Captured with a Beach Seine and Fyke Nets at all Stations, July 1976 - July 1977 and for fyke nets at night (Table B10) and during the day (Table B11). The tables include total fish captured and catch per unit of effort. A summary of CPUE findings for the entire study period is given in Table B12.

86. Juvenile chinook salmon were the most important economic species and represent 42 percent of the total catch. Chinook juveniles were the numerically dominant species captured at Miller Sands in March and May 1975, 1976 and 1977, also during August, September (1975) and in July 1977 (Figures B8 and B9).

87. During the baseline inventory 2446 juvenile chinook were taken at Station 12, the river index site (See Table B7). This accounts for 68% of all chinook captured during the baseline study.

88. The peak catch of juvenile chinook occurred in May 1976. The respective catch per unit effort (CPUE) 536.4 (Table B12). The early peak during March 1977 may be associated with the low flow conditions which prevailed in the Columbia River during 1976-1977.

89. Peamouth, *Mylocheilus caurinus*, was the dominant species July and September 1976 at Miller Sands during the post-operational phase. This increase was mainly due to the initiation of night fishing during this study period. The night catch of peamoush was 2126 (Table B8) as compared to 664 fish taken during the day (Table B9). The overall peak catch of peamouth occurred in July 1976 when 1442 individuals were captured at Station 5 during the night survey (Table B8).

90. Peamouth were also the most common fish captured by fyke nets at the march development site; of 702 fish captured 434 were peamouth; 121 during the night (Table B10), and 310 during the day (Table B11).

91. Juvenile starry flounder were captured during each survey and are the third most common species present at Miller Sands. Peak occurrence during the three years was during July 1976 and the peak CPUE (71 fish) occurred the same month.

92. Threespine stickleback were also present at Miller Sands during all surveys and were captured at all sites. This species ranged from a low CPUE of 0.4 in August 1975 to a peak of 34 fish in September 1976 (Table B12).

93. Although these four species represent 93% of the total catch at Miller Sands, additional economically important sport or commercial species were captured. These were coho, chum, and sockeye salmon, *Oncorhynchus spp*; steelhead and cutthroat trout, *Salmo spp*; longfin smelt, *Spirinchus sp*; the eulachon, *Thaleichthys pacificus*; and the American shad, *Alosa sapidissima*.

94. During the baseline inventory scale samples were collected for age determination of the important species. Ten fish of each major species were weighed, measured and age determined. During the post-operational phase this effort was expanded in conjunction with the food utilization study. Ten fish from each of the following length categories were sampled at each site during each survey.

0 - 25mm	151 - 200mm
26 - 50mm	201 - 250mm
51 - 75mm	251 - 300mm
76 - 100mm	301 - 400mm
101 - 150mm	401 - 500mm

95. The age, number, mean weight and length of the five dominant species taken during the post-operational surveys is presented in Appendix Table B7.

96. Age for juvenile chinook, peamouth and largescale sucker was determined from scale annuli. The age of threespin stickleback and starry flounder was determined by the length frequency method. (Jones and Hynes, 1950; Haertel and Osterberg, 1966; Scott and Crossman, 1975).

97. Fish in the first year (0-1 year old) were called age class 1. Fish older than age class 4 (3-4 years old) were combined under the heading age class 4.

98. During the baseline studies the age class, mean weight and length was determined for three species; chinook, starry flounder and peamouth chub. Age determination was made for the above dominant species and also for threespine stickleback and largescale sucker during the post-operational phase. The age class by month for the three dominant nekton species captured at Miller Sands during all surveys is shown in Table B13.

99. Juvenile fall chinook age class 1 dominate the chinook catch in March, May, and July during all three years. Spring chinook, which migrate during their second year, were captured during late summer and fall and may remain in the estuary until the following spring. This is indicated by the 22 age class 2, and the nine age class 3 fish captured in March 1977. The larger percentage of these older chinook captured during the spring of 1977 is probably due to the low flow conditions. Alabaster (1978) states that significant numbers of chinook held over throughout the Columbia River in 1977. Mean weight and length by age class for these dominant species is presented in Appendix Table B6 and Appendix Table B7.

100. The mean weight and length for the 1175 juvenile chinook sampled during the Miller Sands surveys was 10.3 grams and 88.7 mm. Eighty-nine percent of juvenile chinook captured were age class 1, fall chinook.

101. Juvenile starry flounder (euryhaline species) is found throughout the lower Columbia River. Both age classes 1 and 2 were present during each survey. Older fish of this species are not usually taken in fresh water. The increase in those fish, age class 3, from July 1976 through July 1977 would indicate a change in conditions possibly due to low flow. Mean weight and length for the 1045 juvenile starry flounder was 10.5 grams and 76.4 mm. As with chinook age class 1, starry flounder age class 1 were the major class present at Miller Sands.

102. All five age categories of peamouth chub were present at the study area; 42 percent were age class 1; 32 percent age class 2; 37 percent age class 3 and 7 percent were age class 4, while 15 percent were older than age 4. Mean weight of the peamouth was 25.2 grams and mean length was 108.9 mm.

103. Nekton in order of mean annual abundance and average weight per individual for all species captured during the post-operational survey is shown in Appendix Table B8.

104. Student's t-tests were performed to determine if there was a difference between the night and day beach seine catches at Miller Sands during the post-operational surveys. At the 95 percent confidence interval there was no statistical reason to conclude the catches were different. The Wilcoxon-Mann-Whitney rank sum test was also performed with the same results.

105. Although statistically there appears to be no overall difference, there are monthly variations (Figure B10).

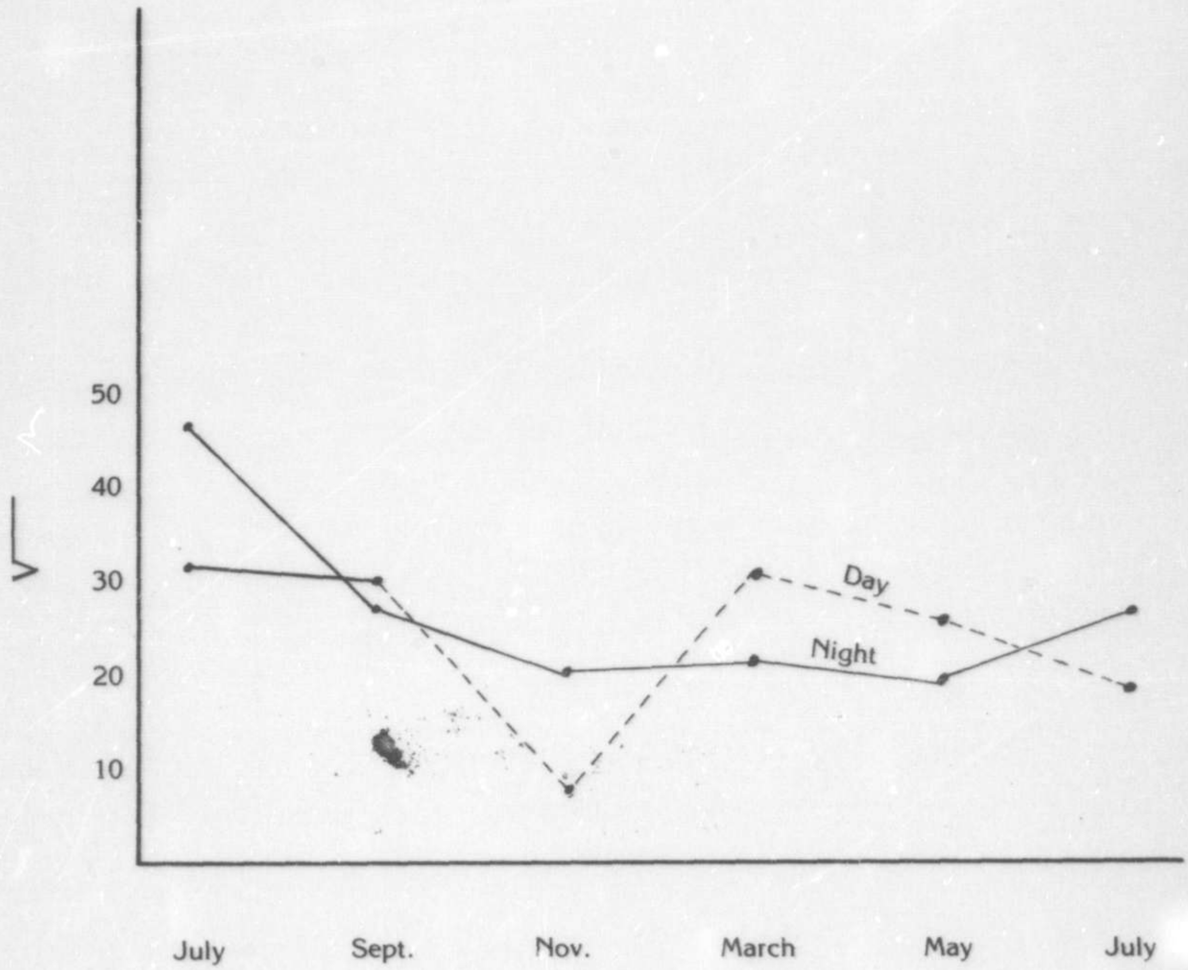


Figure B10. Variations Between Day and Night Beach Seine Catches at Miller Sands, July 1976 - July 1977 (Variations Expressed as the $\sqrt{N}$).

106. A comparison of the nekton captured by beach seine (during the day) at Stations 2, 3, 10 and 11 is shown in Table B14. These four stations were sampled during each of fifteen surveys, March 1975 to July 1977.

107. Total catch was highest during 1976, this reflects a catch of 388 chinook at Station 11 during May and also 368 starry flounder at Station 3 during July of this year. Both of these catches are above normal.

108. The number of fish captured during the three months of 1977 decreased from the highest level in March to the lowest value during any of the July surveys. The high catches at Station 2 and Station 3 during March 1977 reflect a larger than normal catch of juvenile chinook during this month.

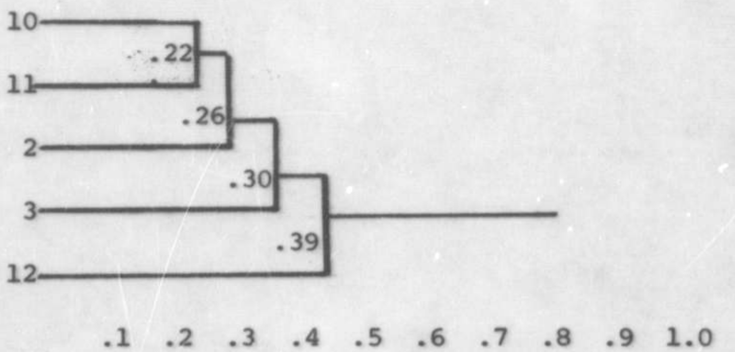
109. Changes between sites and stations during these three months generally reflect a higher than normal occurrence of a given species. An exception is the decreasing total catch in 1977 which again probably indicates changes due to the 100 year round drought during 1976 and 1977.

110. Beach seine sites during the baseline inventory and post-operational phase of the study are classified according to the number of nekton captured at each site. Fyke net sites in the intertidal area and at cove Station 6 are also classified from a data matrix from which a Bray-Curtis dissimilarity analysis was done (Clifford and Stephenson, 1976). A matrix was generated between all possible pairs of stations using the formula:

$$D_{jk} = \frac{\sum_i |x_{ij} - |x_{ik}}{\sum_i (x_{ij} + x_{ik})}$$

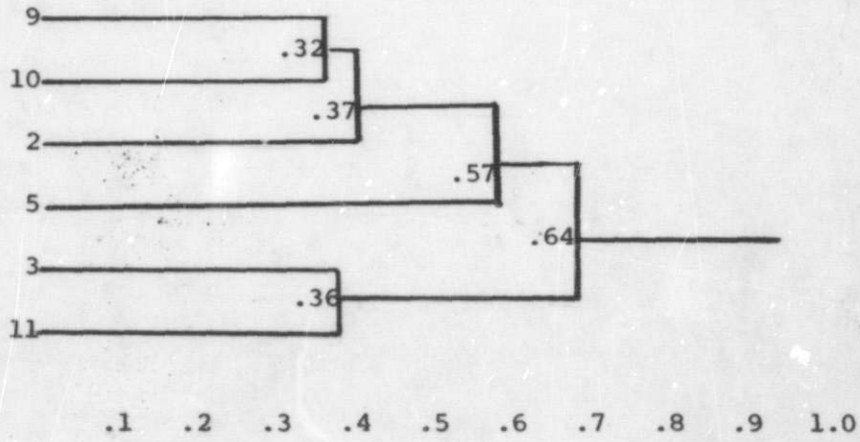
111. D is the measure of dissimilarity between stations j and k and x_{ij} is the square root transformed values of the ith species in the jth station. The value of dissimilarity is constrained between 0 and 1 where 0 represents complete similarity and 1 complete dissimilarity between stations. Stations were then clustered into similar groups using group-average sorting which joins the stations based on the smallest mean dissimilarity value between individual stations or groups of stations already joined.

112. Following are dendrograms of the Bray-Curtis treatment of combined data during the baseline inventory, post-operational cove stations and intertidal marsh habitat sites.



Baseline Inventory March 1975 - May 1976

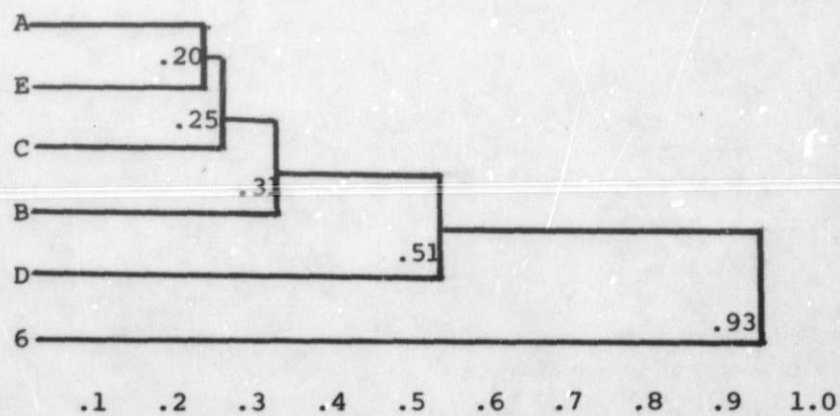
113. The dendrogram shows all stations joined at the .3 level are more similar than dissimilar. Station 12, the river index site, is the most dissimilar, while stations 10 and 11 are the most similar. Stations 10 and 11 are located on the Sand Spit.



Post-operational Cove Beach Seine Sites   July 1976-July 1977

114. Stations 9 and 10 located on the sand spit are shown to be the most similar, Station 5 located on the sand spit at the upper end of the cove is most dissimilar. Stations 3 and 11 located at the downstream end of the cove are similar but dissimilar to those stations located upstream within the cove. This may be due to the low flood conditions during this period and the lower than normal water levels within the cove.

115. The following dendrogram is a comparison of the intertidal marsh habitat sites which were sampled by fyke nets. Also included is the cove fyke net station (5).



Intertidal Marsh Habitat Sites A Through D and Cove Fyke Net Site 6

116. The marsh reference sites A and E are most similar. Station D, the downstream intertidal site, is the most dissimilar of the marsh sites. This may be due to the large number of peamouth captured at this site during September 1976. Station 6, the cove fyke station, is the most dissimilar.

Benthos

117. A computer was used to examine some aspects of the 1975-1976 data. A dissimilarity matrix was generated between all possible pairs of stations using the Bray-Curtis Dissimilarity Index.

118. The value of dissimilarity is constrained between 0 and 1, where 0 represents no dissimilarity or complete similarity between the two stations. The stations were then clustered in similar groups using a group average sorting strategy. This strategy in which the stations are successively joined based on the smallest mean dissimilarity value between individual stations or groups of stations already joined.

119. The results of cluster analysis of the benthic data were compiled into a denogram (Figure B11). Species were grouped using similar techniques as the fish data except that species values were standardized using a square root transformation and by dividing each species value by the sum of the values for that species at all stations.

120. The biomass at each station was averaged throughout the year to show monthly and annual totals. All raw data can be found in Appendix Table B9.

121. All raw data was analyzed by computer to obtain the required tables and figures. The BraypCurtis dissimilarity analysis comparing stations, taxa, and time were not conducted as in the 1975-1976 study. The data were analyzed for monthly numerical abundance and comparisons made in abundance of taxa at subtidal and intertidal sites. All raw data has been compiled and can be found as a computer print-out in Appendix Table B10.

122. It was determined due to the relatively large sieve size some nematodes, although extremely numerous, were passing through the mesh and

quantification was not accurate. They were not enumerated as was done in 1975-1976. Insect families were combined into one heading -- insect larvae.

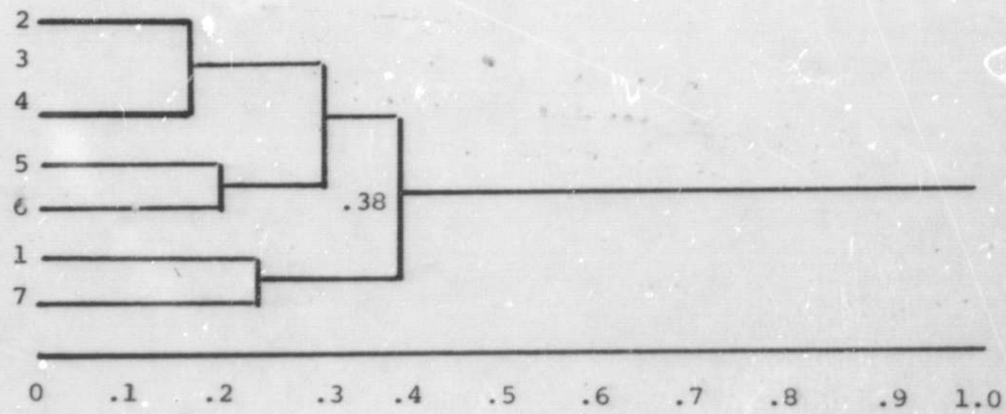
123. The sites fell into three similar groups. Stations 1 and 7 were similar in composition (Bray-Curtis value .23) stations 5 and 6 were similar in composition (.16). This grouping relationship is illustrated by the dendogram in Figure B11. Nematodes, *Neomysis*, Chironomidae and Oligochaete were most abundant at stations 2, 3 and 4 and least abundant at station 1 and 7. *Corophium*, *Corbicula*, Gastropods, Polychaetes and aquatic insects appeared to be equally abundant at all stations. *Anisogammarus*, Platyhelmenthes, *Adonata* were rare at all stations. Fish eggs were found only at station 7 in January and March 1975. These eggs were probably deposited by Eulachon, *Thaleichthys pacificus*, which is known to spawn during the winter in the mainstream of the Columbia River.

124. Stations were analyzed to determine seasonal trends in the benthic community. It was determined that the species composition and their number are relatively stable throughout the year. This is illustrated in Figure B11.

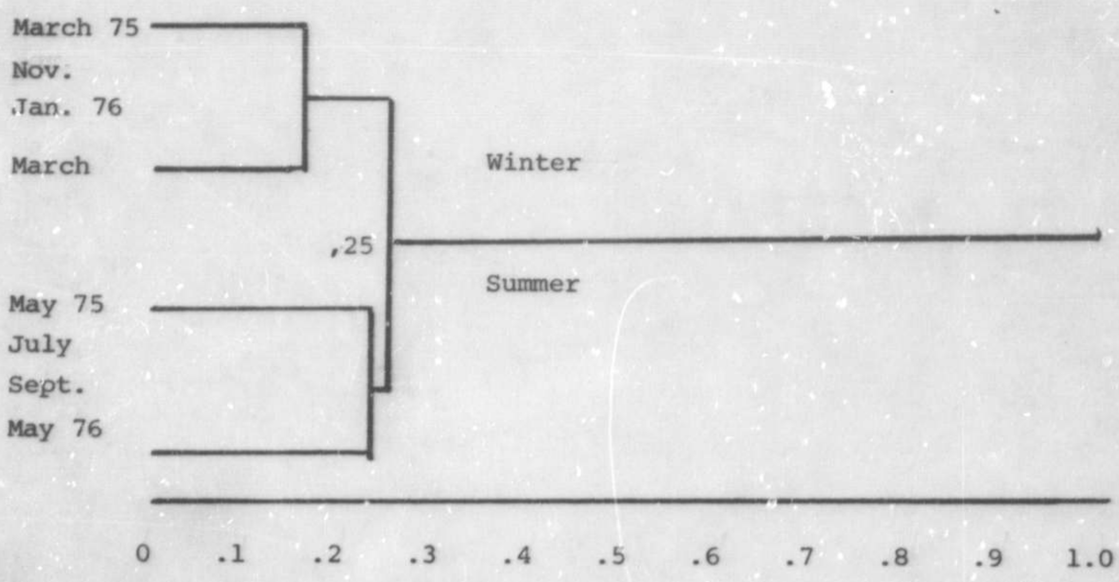
March, November, January exhibited similar species numbers (Bray-Curtis value .16) May, July, September, had a value of .23 and all stations were joined at .25. Analysis of species composition and seasonal trends demonstrated that there is more species variation between stations than there is from summer to winter. This analysis is important in demonstrating that each station has a characteristic community that

BENTHIC ORGANISMS - MILLER SANDS

March 1975 - May 1976



Site-Species



Time-Species

Figure B11. Dendogram's based on group-average sorting of Bray-Curtis dissimilarity values between all possible pairs of samples.

0 = Complete similarity 1.0 complete dissimilarity.

is somewhat stable throughout the year and differs from other areas in the river.

125. The wet weights of the six grabs at each station were averaged and converted to biomass in grams per square metre. This information shows monthly variations in biomass and is a means of determining the highest standing crop stations throughout the year. Station 3 clearly showed the greatest annual biomass of 371 grams (Table B15). Stations 2, 4, 5 and 6 were very similar; their annual biomass ranged between 151 - 165 grams. Station 1, located in the river, was the least dense having a total of 68. These findings were similar to the findings when stations were analyzed for species composition. Table B15 also indicates each station maximum biomass generally occurred in the spring.

126. The mean annual abundence per square metre of each taxon was arranged in descending order in Table B16. Oligochaetes were the most numerous groups averaging 3030/m^2. *Corophium* and Chironomids were the only species that exhibited marked seasonal extremes. In March 1976 the *Corophium* population was most numerous; 21,009 were captured and in August the population was least abundant, 1,159 were captured. Chironomids were numerically stable until May when a marked increase was recorded. Of 209,184 total organisms captured in the study 190,384 or 91% were Oligochaetes and *Corophium*.

127. The mean annual abundance of each taxon is arranged in descending order in Table B17. The amphipod *Corophium* was the most numerous group at Miller Sands, averaging 942.4/m^2 throughout the year. Second in abundance were the Oligochaete worms averaging 731.6/m^2. Chironomidae insect larvae were third in abundance, averaging 251.5/m^2. The small

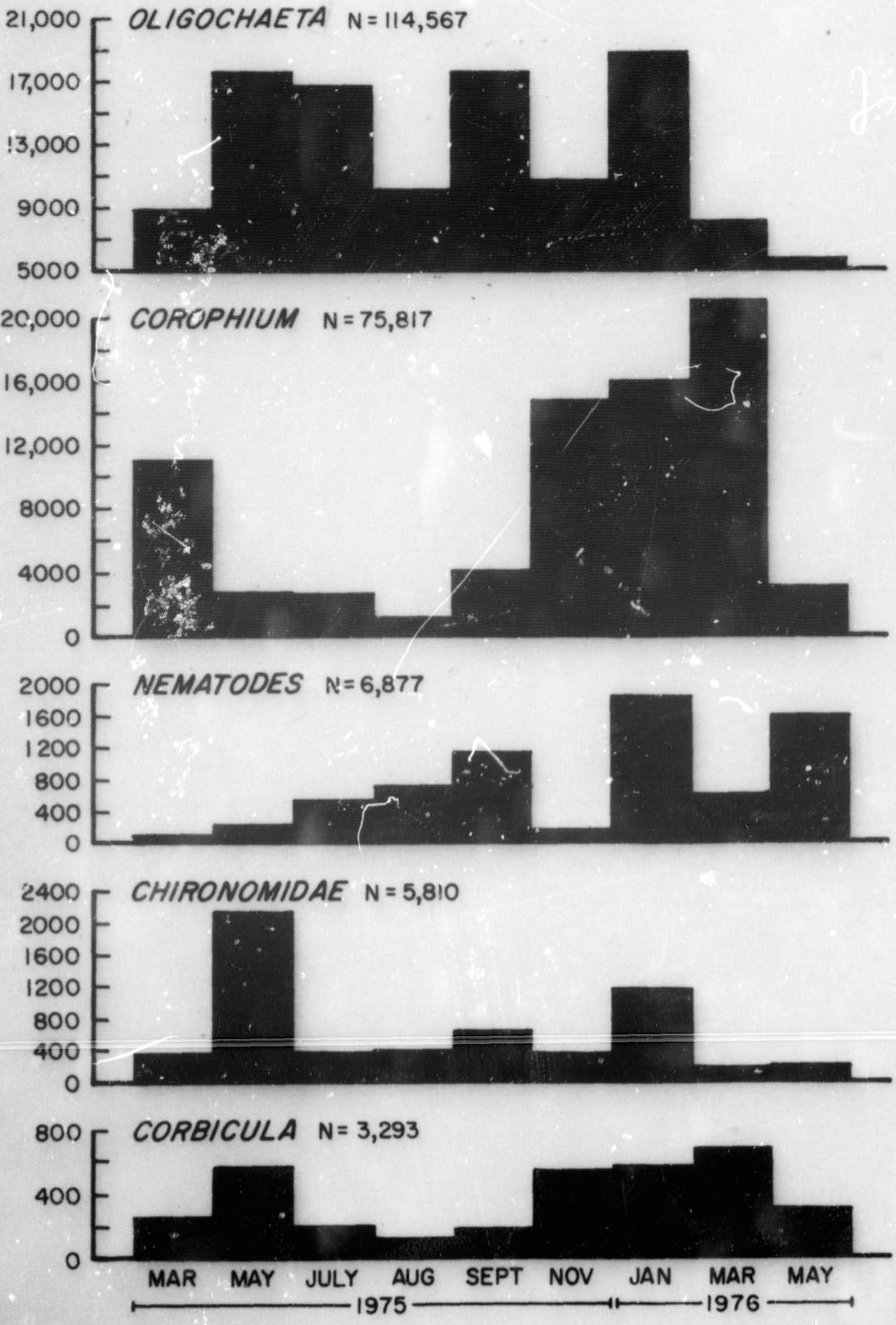


Figure B12. Changes in Total Abundance of Important Macroinvertebrate Taxa at Seven Stations in 1975 - 1976.

clams *Corbicula* were $128/m^2$. The remaining seven taxa were relatively sparse, under $16/m^2$.

128. A total of 22,052 *Corophium* and 17,119 Oligochaetes were captured in the 468 grabs at 27 stations throughout the study. These two groups combined represented approximately 80% of the total organisms present at the Miller Sands, Oregon study sites.

129. Stations were not compared individually as was done in 1975-1976. They were grouped and discussed by similar elevations, stations designated A, B, C, D, E, were stations located at the 0.3m contour. Stations designated A_2, B_2, C_2, D_2, E_2, were located at the 1.2m contour. Stations designated A_3, B_3, C_3, D_3, E_3, were located at the 1.8m contour. Cove stations were under water continually and are number 1-15.

130. The average catch per grab ($0.5/m^2$) of the six most numerous organisms at each of the four elevations is listed in Table B18. This analysis demonstrated that the subtidal cove stations were generally most productive with the exception of Chironomids. The second most productive stations were those on the 1.2m contour. This was the most productive area for the insect larvae.

131. *Corophium* was the densest organism attaining a maximum of 501.6 per grab at the cove stations. They became progressively less dense as station elevations increased, reaching a minimum density of zero per grab at the 1.8m contour. Oligochaetes were the second densest organism, also reaching their maximum of 395.3 at the cove sites and the minimum at the 1.8m stations. Chironomid were third in density but

attained their maximum at either the 0.3 sites apparently doing better intertidally than either *Corophium* or Oligochaetes. The remaining insect larvae and Gastropods attained their maximum density at the 1.2m contour site.

132. Seasonal variations of the six most abundant species can be seen in Figure B13. In general, little numerical fluctuation was observed in the benthic community. Most organisms appeared to be somewhat numerically stable throughout the one year study. *Corophium* and Chironomids were the only two groups that did show some seasonality. *Corophium* reached their peak numbers during the November to March period and their lowest numbers during May to July. Chironomids appeared to be very stable throughout the year but increased substantially during the summer.

133. The dry weights per metre square of the five most numerous taxons (excluding *Corbicula*) were calculated for four elevations (Table B19). Results of biomass measurements were similar to species distribution. The highest biomass was found in the subtidal cove station. An average of 5,8120 g/m^2 dry weight was taken at the cove stations. Second in biomass were the substations at the 0.3m intertidal level. The least biomass, .44020 g/m^2 found at the 1.8m elevation sites. Cove stations had 13 times this biomass. *Corophium* and Oligochaetes represented 90 percent of the total biomass at the cove stations. At the 0.3m elevation Chironomids contributed the major (53.9%) portion of the biomass. Table B19 is also useful in estimating standing crop biomass. *Corbicula* and Gastropod dry weights are misleading, disregarding them, Oligochaetes contributed the highest average biomass of .3103 g/m^2 in the Miller Sands

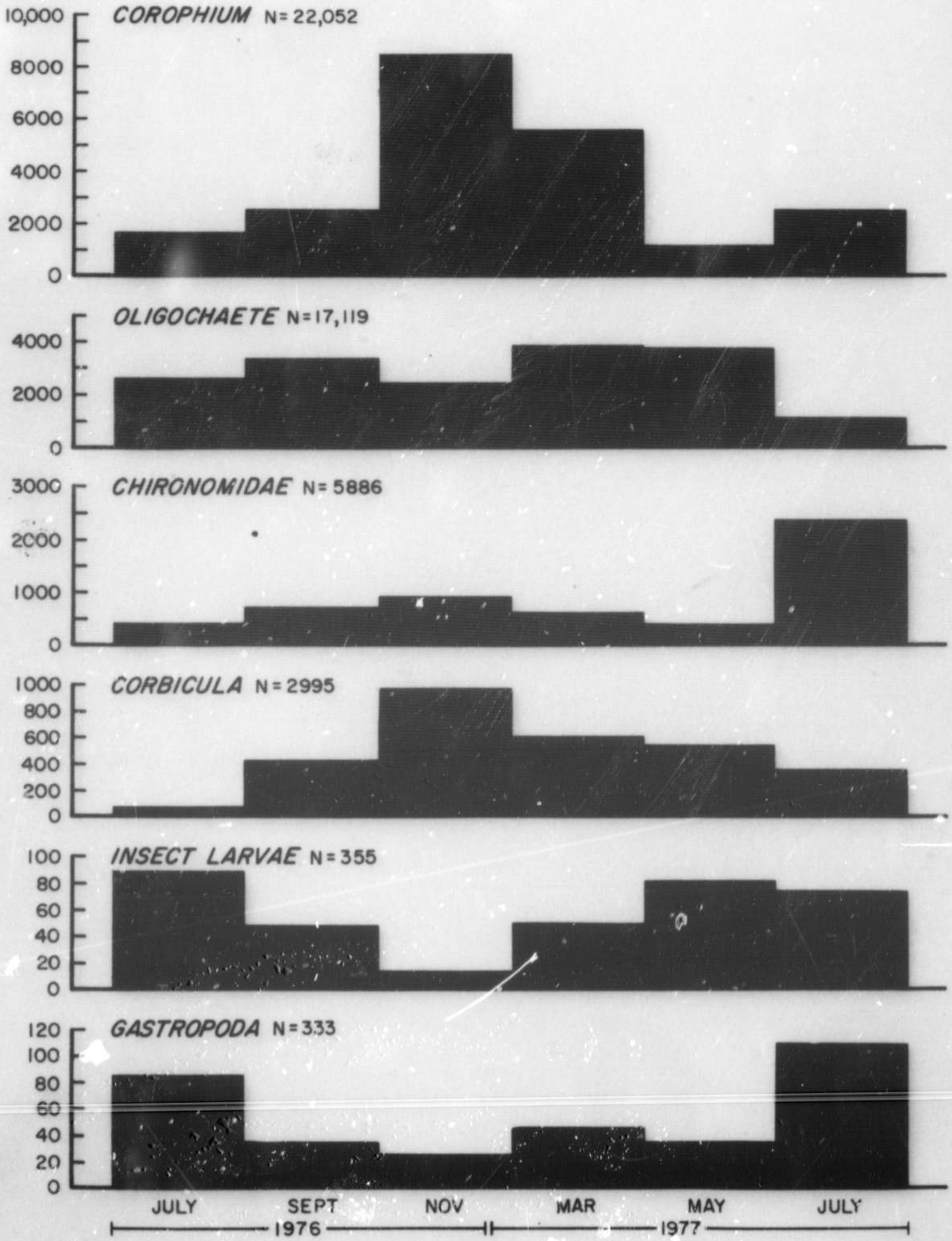


Figure B13. Changes in Total Abundance of Important Macroinvertebrate Taxa at 26 Stations in 1976 - 1977.

region, although *Corophium* were more numerous. Oligochaetes appeared to be the only organism capable of coping with the frequent tidal exposures at the 1.2 and 1.8m stations they comprised 79.3 and 85.4% of the total biomass sampled at those two elevations.

134. A phylogenetic listing of benthic invertebrate species found at Miller Sands during the study can be found in Appendix Table B11.

Substrate

135. There is considerable evidence (Lindroth 1935, Jones 1950, Buchanan 1958, Longhurst 1958, Sanders 1958) that the physical properties of the substrate are important for the structure and distribution of benthic communities. The mean annual sediment sizes and percentage composition of volatile solids in sediments collected at the Miller Sands disposal site are shown in Table B20. Gravel is defined as that portion of the sample, the particles of which measure greater than 2.38 mm in diameter; sand particles measure 0.044 to 2.37 mm; and silt and clay is comprised of particles that measure less than 0.044 mm.

136. Gravel comprised less than 1 percent of each sample collected. Sand comprised nearly 90 percent of all samples and frequently constituted over 98 percent of the sample. Over 75 percent of the sediments collected at all transects at all elevations and at the cove stations consisted of sand ranging in size from 45 to 149 microns and nearly 50 percent of all sediment collected was sand ranging from 75-149 microns. Silt and clay comprised less than 5 percent of most samples but did range as high as 11.95 percent of the mean annual percentage of sediments collected at elevation 1 of transect E. The occurrence of silt and clay at elevation 3 for all transects was consistently less than at the other elevations and the cove stations. Particles finer than 44 microns were further divided into three subclasses: 25-44, 10-25, and 5-10 microns and are presented near the bottom of Table B20. There does not appear to be a significant difference in the distribution of the three subclasses of particles finer than 44 microns among the various sampling

stations. It should be noted that the individual percentage composition of these subclasses will not always equal the total value shown for the percentage composition of particles finer than 44 microns because the testing laboratory did not grade the sample further when it constituted less than about 2 percent of the sample. Values less than 2 percent are included in the table representing total values of particles finer than 44 microns but are treated as zeroes in the presentation of the three subclasses, thus reducing the averages when their total is divided by the number of samples collected (18) at each sampling station.

137. The highest mean annual percentage of volatile solids in the sediments of all the stations was 3.31 percent and occurred in transect B at elevation 1. The lowest mean annual percentage was 0.81 and occurred in transect D of elevation 2.

138. Figure B14 shows the change by time in percentage composition of sediments collected at each sampling elevation by particle size groupings of (1) gravel (greater than 2.38 mm), (2) sand (0.044-2.37 mm), and (3) silt and clay (less than 44 microns). Distribution of sediments by particle size was similar at each elevation throughout the sampling period.

139. Changes in volatile solid content of sediments at the various sampling stations during the course of the sampling period are shown in figure B15. The changes were negligible, less than 2 percent, at each elevation.

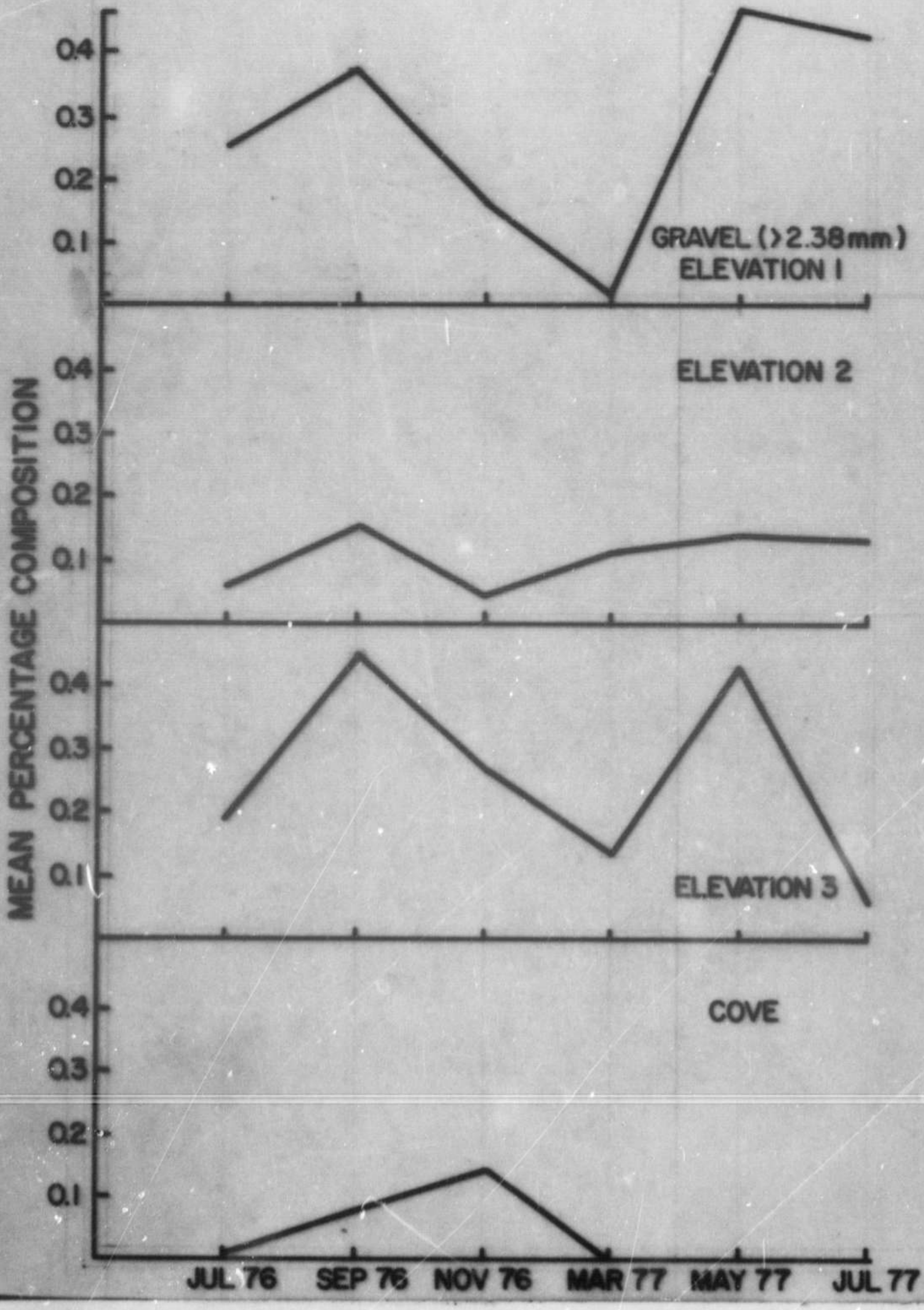


Figure B14. Change by Time in Percentage Composition of Sediments Collected at Each Sampling Elevation by Particle Size Grouping

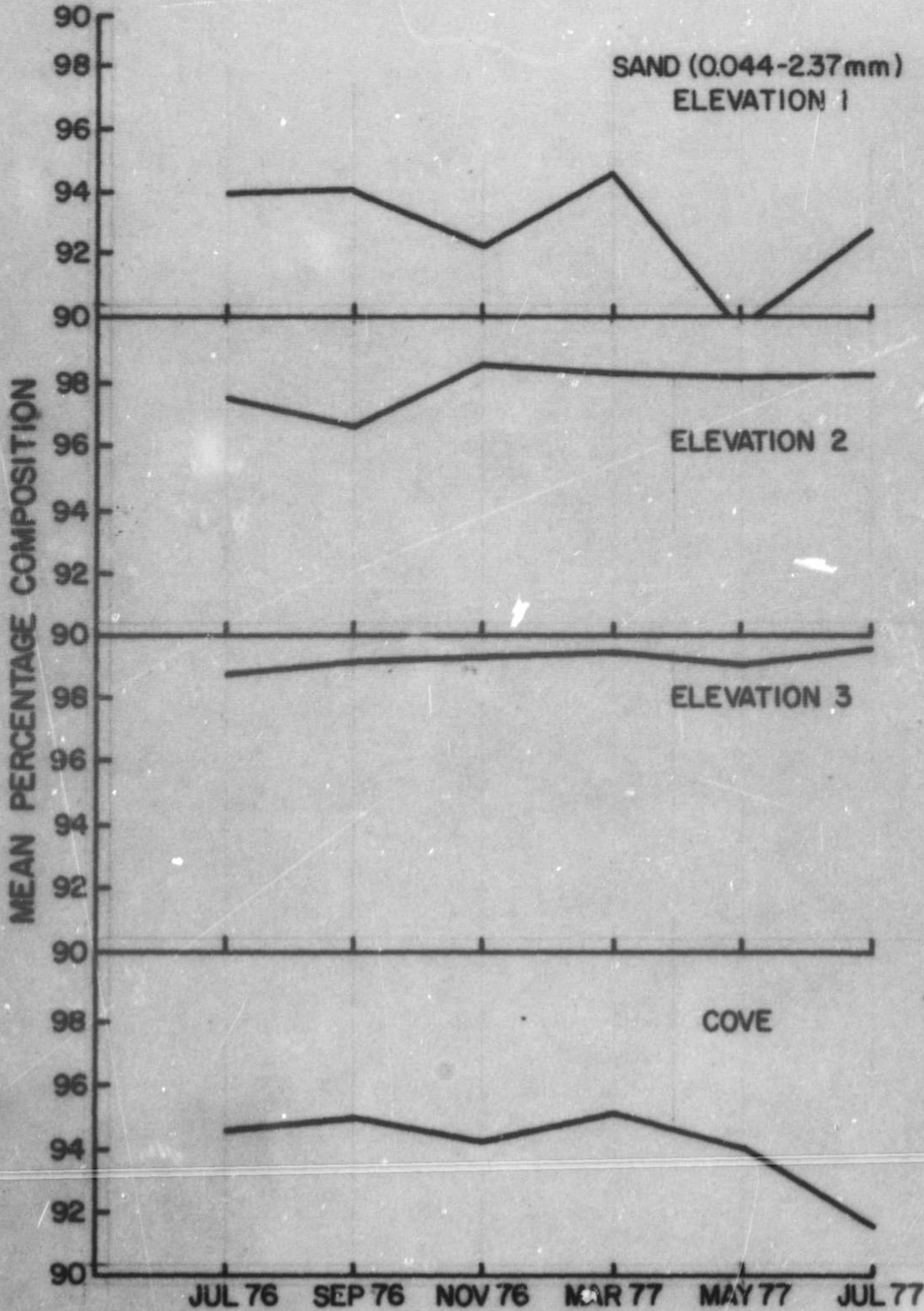


Figure B14 - Continued

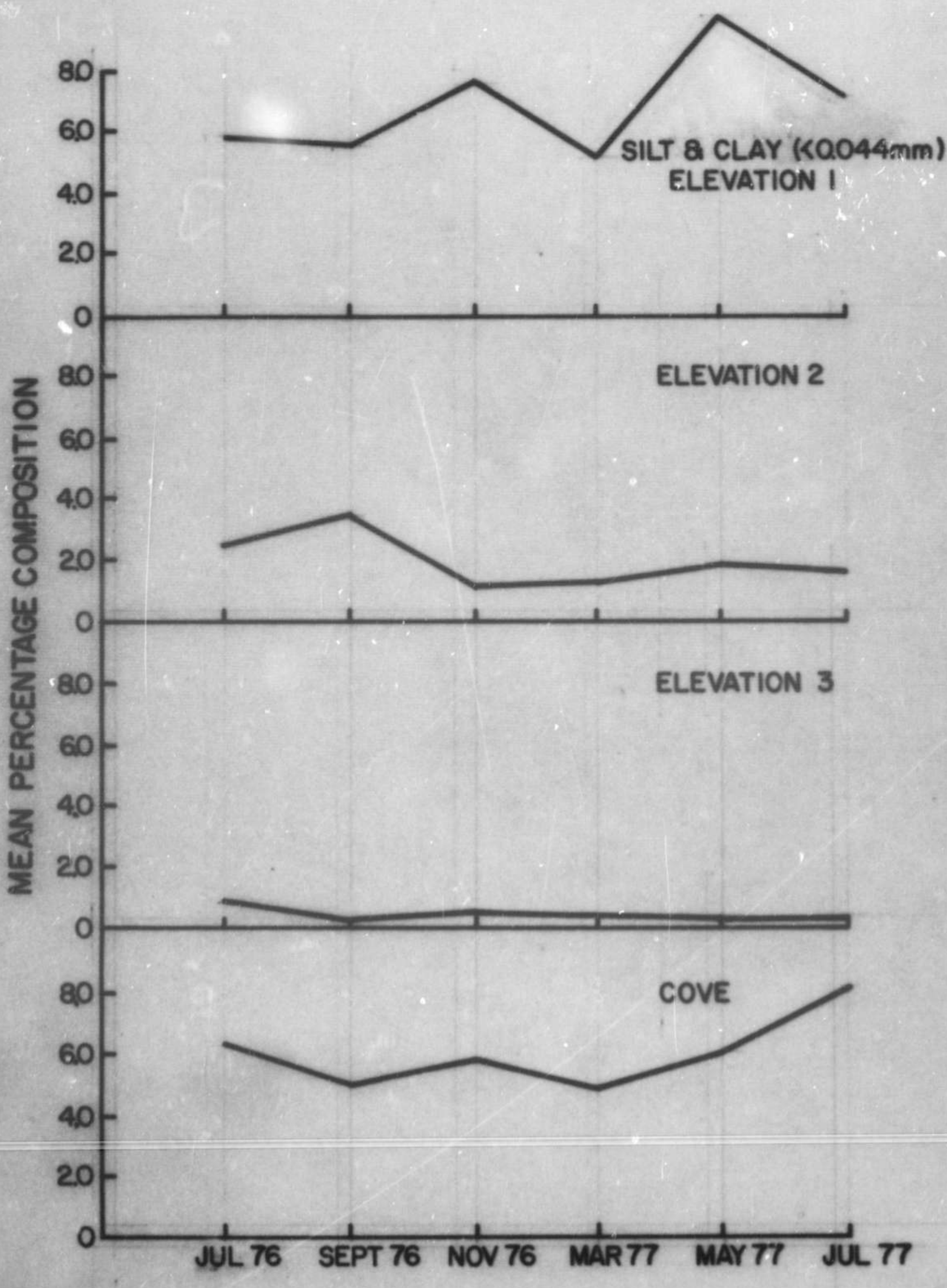


Figure B14 - Concluded

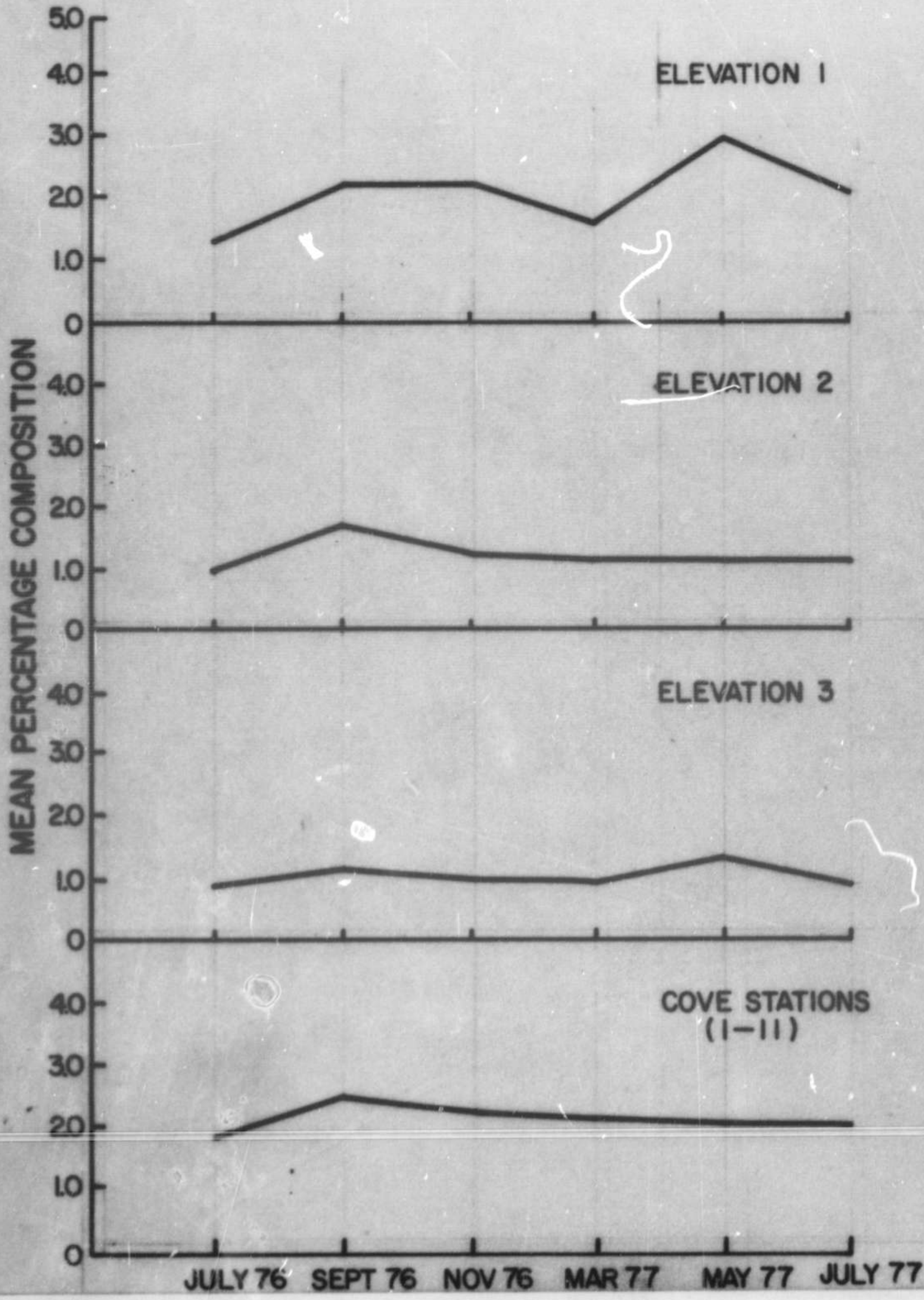


Figure B15. Change in Volatile Solids of Sediments (associated with Macroinvertibrates) Over Time

Food Utilization

140. The results described in this section are based upon data located in Appendix Table B12 which is the complete data matrix for the food utilization study. Detailed descriptions have been prepared for the main nekton species encountered at the Miller Sands study area. Table B21 is a species list of all items consumed by all species of fish at Miller Sands.

Peamouth Chub

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	185	365	34	4	68	127
Total empty stomachs	185	363	34	4	68	126

141. Cove stations:

All peamouth chub collected at the cove stations had empty stomachs.

142. Intertidal stations:

Two peamouth captured in September contained digested material and one sampled in July 1977 contained a small amount of unidentified vegetation.

Coho Salmon

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	0	0	0	0	28	5
Total empty stomachs	0	0	0	0	10	3

Cove stations:

143. Few coho salmon were collected during this study. Coho were captured during the day once; therefore, day to night comparisons cannot be made. *C. salmonis* was the most important food item consumed and made up 13 to 100 percent of the total numbers in May for fish of all sizes and 100 percent for fish 101 to 200 mm in July 1977. *C. salmonis* made up 48 to 100 percent of the volume during this time. Fish 51 to 150 mm consumed chironomid pupae in May.

Intertidal stations:

No coho salmon were sampled from the intertidal stations.

Chum Salmon

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	0	0	0	26	16	0
Total stomachs empty	0	0	0	2	2	0

Cove stations:

144. Fish of all sizes captured during the day in March and May consumed chironomid pupae accounting for 35 to 100 percent of the numbers and 48 to 100 percent of the volume. Also consumed were *N. mercedis* and chironomid larvae in March and *T. pacificus* larvae in March and *T. pacificus* larvae in May.

The night sampling resulted in chironomid pupae accounting for 77 to 100 percent numerically and 26 to 100 percent volumetrically. Also consumed were *C. salmonis* in March and *D. longispina* in May.

Intertidal stations:

No chum salmon were sampled at the intertidal stations.

Chinook Salmon

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	25	37	18	225	213	141
Total empty stomachs	7	5	0	21	52	30

Cove stations:

145. Fish of all sizes captured during the day consumed large numbers and volumes of *C. salmonis* and chironomid pupae. A balance was observed; when few *C. salmonis* were eaten, many chironomid pupae were consumed and vice versa. Chinook 26 to 150 mm consumed few *C. salmonis* and many chironomid pupae while those fish over 151 mm consumed many *C. salmonis* and few chironomid pupae.

146. *Daphnia longispina* composed 91 to 95 percent numerically in July 1976 at Stations 3 and 11, and 96 percent in September at Station 3. Diptera adults made up greater than 90 percent of both number and volume at Station 11 in November. Hymenoptera (ants) were eaten by fish larger than 101 mm at Station 5 in March as were diptera adults. Mysids, *N. mercedis*, were infrequently consumed July through November 1976.

147. The night feeding pattern was similar with *C. salmonis* accounting for much of the stomach contents March through July 1977, especially March. Chironomid pupae were important food items November 1976 through July 1977, especially in May. *N. mercedis* were important to the chinook diet for fish over 101 mm. While they occurred during the entire study, two peaks were noted in September and May when they occasionally accounted

for 100 percent of the stomach contents.

148. The cladoceran, *D. longispina*, was important in July 1976 and 1977 for fish over 51 mm. When *D. longispina* were consumed they accounted for more than 88 percent of the volume. Hymenoptera were consumed by fish over 101 mm at Station 11 in September, and in November 1976 accounted for over 77 percent of the number and weight of the stomach contents.

Intertidal stations:

149. Chironomid pupae accounted for over 77 percent of the total number and volume in July 1977. *C. salmonis* and Ephemeroptera were the two main diet components for March supplemented by occasional mysids, *N. mercedis*, and an Odonata nymph.

Starry Flounder

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	212	81	108	40	93	198
Total empty stomachs	80	58	81	23	81	119

Cove stations:

150. Chironomid larvae made up over 80 percent of the diet numerically for most fish under 100 mm in day samples from July 1976 and 1977. The exception was Station 11 where *D. longispina* and *C. salmonis* were important. *C. salmonis* was also important at Stations 9 and 10 and, for starry flounder over 101 mm, at Stations 3 and 10. Juvenile clams, *C. fluminea*, were eaten by flounder over 100 mm at Stations 3 and 10. Oligochaetes made up 50 to 86 percent of the numbers at Station 3 in July 1976 but did not contribute significantly to the total volume.

151. Chironomid larvae made up 30 to 100 percent of the number and volume of the stomachs of most flounder under 100 mm collected at night during July 1976 and 1977. *C. salmonis* were important in September and November at Stations 9 and 3, respectively, and at Station 10 in July 1976. Chironomid pupae comprised over 40 percent of the number and volume at Station 9 in July 1977. Starry flounder over 100 mm consumed *C. salmonis*, chironomid pupae, and unidentified fish in March at Station 3 and chironomid larvae in November.

Intertidal stations:

Starry flounder between 51 and 75 mm consumed 25 percent *C. salmonis* and 75 percent oligochaetes although each contributed nearly equally to the volume.

Threespine Stickleback

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	109	60	25	79	53	110
Total stomachs empty	51	44	11	19	18	85

Cove stations:

152. All threespine sticklebacks sampled were 75 mm or less. Planktonic organisms were dominant in the diet of day samples although *C. salmonis* was the sole diet in March at Station 11 and chironomid pupae made up over 50 percent of the diet in July 1977 at Station 5. The copepod, *E. hirundoides*, accounted for more than 77 percent of the number and 29 percent of the volume in May at Stations 2 and 3 while *Diaptomus*

sp. was important in July 1977 at Station 10. *D. longispina* accounted for over 60 percent of the number and 35 percent of the volume in July 1976 at Stations 3, 9 and 10; in September at Station 3; in March at Station 5; in May at Station 11; and in July 1977 at Stations 9 and 10.

153. Nocturnal samples showed a similar pattern although *C. salmonis* was more prevalent, especially in March when it accounted for 10 to 100 percent numerically, and 35 to 100 percent volumetrically. *E. hirundoides* was especially important in September and November at Stations 2, 3 and 11, and in July 1976 at Station 9. *D. longispina* contributed to the July 1976 night diet in amounts exceeding 90 percent numerically and volumetrically at Stations 2, 5,9 and 10. Ostracods accounted for 27 to 50 percent of the diet of some fish in March at Stations 2 and 5.

Intertidal stations:

154. Oligochaetes accounted for all the diet in November and *C. salmonis* in March. *D. longispina* made up over 75 percent of the number in July 1976 although it was not significant volumetrically. Chironomid pupae accounted for 97 and 99 percent of the number and volume in July 1977.

Largescale Sucker

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	39	31	14	12	6	1
Total stomachs empty	39	31	14	12	6	1

All largescale sucker stomachs were empty during this study.

Prickly Sculpin

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	9	10	7	0	0	0
Total stomachs empty	6	1	3	0	0	0

Cove stations:

155. The stomachs sampled contained starry flounder juveniles at Station 3 in July 1976. At Station 6 (a night sample) *N. mercedis* and unidentified fish completed the diet in November.

Intertidal stations:

156. In September *C. salmonis* contributed 62 percent of the number and *N. mercedis* 29 percent, while unidentified fish made up 95 percent of the volume. *N. mercedis* was the sole diet item in November.

Pacific Staghorn Sculpin

	1976			1977		
	Jul	Sep	Nov	Mar	May	Jul
Total fish examined	0	2	20	55	80	103
Total stomachs empty	0	2	9	14	17	49

Cove stations:

157. *C. salmonis* dominated the daytime diet in March and May making up 33 to 100 percent of the total diet except at Stations 3 and 6 which had no staghorn sculpin in March. Chironomid larvae were important at Stations 3 and 6 in July, accounting for 80 to 100 percent numerically and less volumetrically. *N. mercedis* accounted for 29 to 67 percent of

the diets in November and May at Stations 11 and 10, respectively.

158. The night samples showed *C. salmonis* to account for much of the diet November through July 1977 supplemented by *N. mercedis*. A juvenile chinook salmon was consumed by a staghorn sculpin larger than 101 mm in July 1977 at Station 10.

Intertidal stations:

C. salmonis in March and chironomid larvae in July 1977 were the dominant food items consumed by Pacific Staghorn sculpin 26-50 mm total length.

159. Table B22 (based upon Appendix Table B13) lists the food items consumed by all fish captured at Miller Sands in decreasing order of abundance based upon total numbers. Four species make up 96 percent of the total number of food items consumed: *Daphnia longispina*, *Eurytemora hirundoides*, *Corophium salmonis*, and chironomid larvae and pupae. Of these, the first two are planktonic and the third benthic, while the last are epibenthic to drift organisms.

160. The planktonic items were usually consumed in quantity and often composed most of the stomach contents. Chironomid larvae and pupae were often found together with *C. salmonis* in the stomachs.

161. Figure B16 shows the seasonality of the dominant food items plus *N. mercedis* based on percent numbers (based upon Appendix Table B13. Distinct peaks occur for all items:

Chironomid larvae	July 1976, March 1977, July 1977
Chironomid pupae	March 1977, May 1977
Corophium salmonis	March 1977
Daphnia longispina	July 1976, July 1977

Eurytemora hirundoides November 1976, May 1977

Neomysis mercedis September 1976, March 1977

Consumption of *E. hirundoides* peaks in November when the other dominant food items were not eaten. *C. salmonis* and chironomid pupae increased in the diet along an almost parallel course from November to March although peak *C. salmonis* consumption occurs in March and chironomid pupae in May. *D. longispina* consumption peaks twice, July 1976 and July 1977. Small peaks were noted for *N. mercedis* in September and March. Peak consumption of chironomid larvae occurred in July 1976 and March 1977.

162. Table B23 lists the mean annual percent number of food in the nekton stomachs of important species and in the benthic environment. Since many of the fish consumed planktonic organisms, this table shows only the relationship to the benthos and not to the Miller Sands environment as a unit.

163. Peamouth chub and largescale sucker did not contain full stomachs. The chinook salmon consumed oligochaetes in a percentage far less than the percentage of their occurrence in the benthos. However, they consumed *D. longispina, N. mercedis, C. salmonis, A. confervicolus,* chironomid larvae and pupae, and diptera in percentages greater than their percentage occurrences.

164. Starry flounder and threespine stickleback related to the benthos in a similar way, consuming most items in greater proportion to that in which they occur in the benthos. These means are not weighted

averages but merely indicator means. Staghorn sculpin and prickly sculpin also displayed a similar relationship to the benthos, consuming most items in a greater proportion than that in which they occur in the benthos. Prickly sculpin did not utilize the amphipods *C. salmonis* and *A. confervicolus* as much as did the staghorn sculpin.

165. Distinct seasonal feeding trends occurred for fish sampled from Miller Sands (Figure B16.) While the chart indicates the pattern derived from the total data matrix, seasonal patterns of selected fish species correlate to Figure B16, hereafter called the master chart. Peamouth chub and largescale sucker did not contain food and coho and chum salmon were small samples; seasonal trends were not noted. The following comparisons were made:

1. Chinook salmon fed heavily on *C. salmonis* and chironomid pupae March through July 1977, corresponding to the bimodal peak of the two species. Heavy predation on *D. longispina* in July fits the master pattern.
2. Starry flounder consumed chironomid larvae in July, September, and November 1976 and July 1977, following the general plot of the master chart. During March, *C. salmonis* and chironomid pupae were both consumed. As with the chinook, starry flounder fed on *D. longispina* in July, in accordance with the charted peak.
3. Threespine stickleback consumed *E. hirundoides* July through November 1976 which corresponds to the master chart. *D. longispina* peak consumption was in July 1976 and 1977,

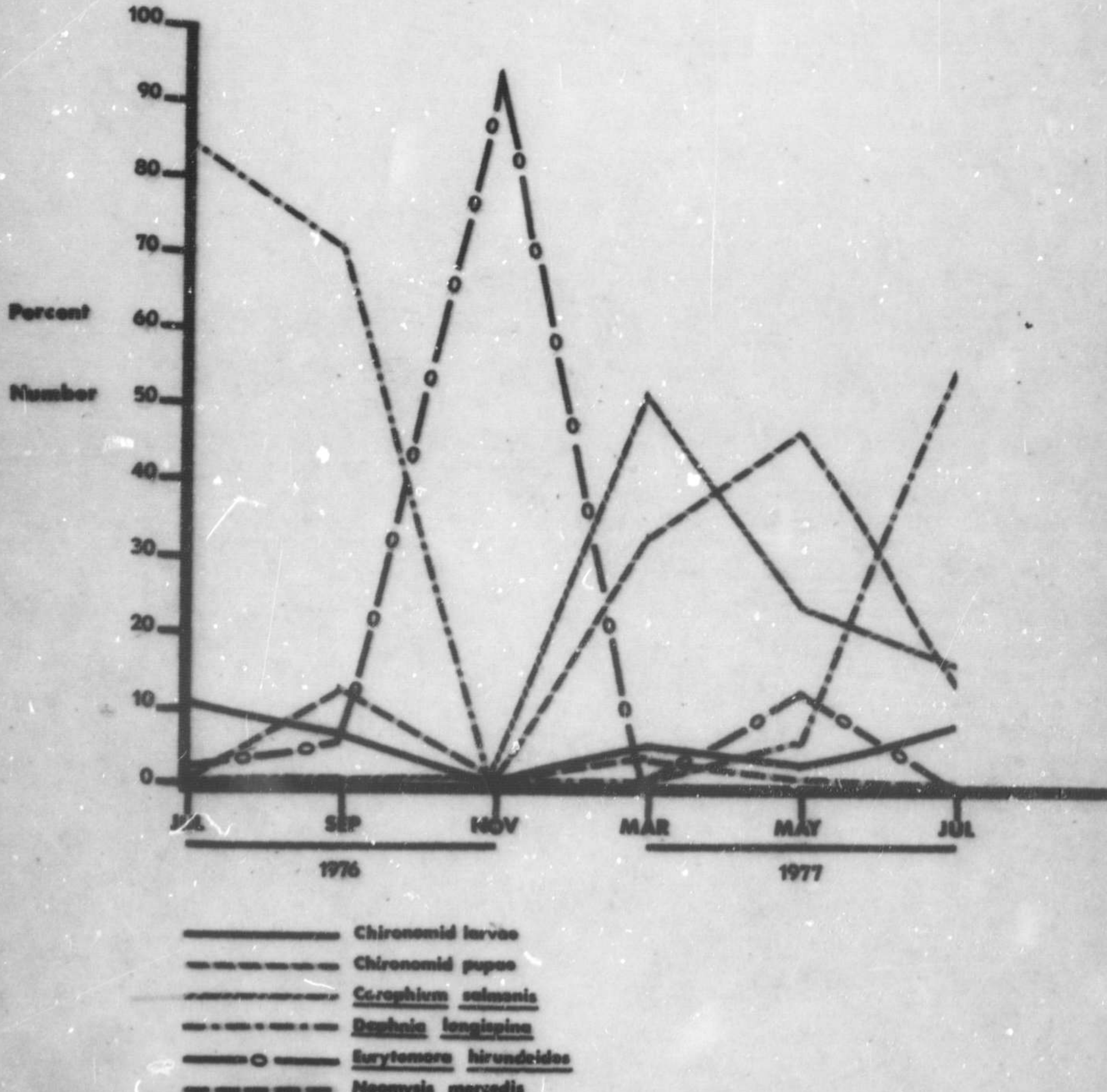


Figure B16. Bimonthly numerical percentages of six main food items consumed by all nekton at Miller Sands, Columbia River, July 1976 through July 1977.

in accordance with the charted peak. *C. salmonis* and chironomid pupae were consumed most often March through July 1977.

4. Prickly sculpin were not sampled often but those examined had consumed *N. mercedis* in September, corresponding to the peak in Figure B16.

5. Staghorn sculpin consumed *C. salmonis* March through July 1977 which matches the declining side of the peak. However, in this case chironomid pupae were not eaten together with the *C. salmonis*. Instead, chironomid larvae were preyed upon March through July which spans two of the three overall peaks.

166. The main predator species consumed a variety of food items (see Appendix Table B13) yet several prey species were dominant. Peamouth chub and largescale sucker stomachs did not contain identifiable food. Chum and coho were collected in small numbers and the data suggests they are primarily benthic and epibenthic feeders, occasionally consuming zooplankton.

167. Chinook salmon consumed the greatest variety of items yet primarily fed on benthic and epibenthic chironomid pupae. In July planktonic *D. longispina* were consumed and *N. mercedis* were eaten occasionally throughout the study.

168. Starry flounder, staghorn sculpin, and prickly sculpin all fed on *C. salmonis*, chironomid larvae and pupae, *N. mercedis*, and small fish. In addition, starry flounder also consumed oligochaetes and *C. fluminea*.

169. Threespine stickleback was predominantly a planktonic feeder on *D. longispina* and *E. hirundoides* and also consumed *C. salmonis* and chironomid pupae.

170. The sizes of the fish did not significantly affect the food habits of most fish. Chinook salmon greater than 100 mm consumed more mysids and insects than did fish under 100 mm. Staghorn sculpin over 75 mm also consumed slightly more mysids than did the smaller sculpin. While the large fish were able to consume greater quantities of food, the species composition was similar for all sizes.

171. Comparing data between day and night samples and among areas presents a problem in food utilization studies. A fish may have fed during the day and been captured at night. Similarly, a fish may have eaten in one area and then swam to the area where it was captured.

172. Data from the Miller Sands food utilization study showed few differences between day and night samples, between cove and intertidal areas, and among stations within the cove area. *N. mercedis* were consumed slightly more during the night samples than during the day.

173. With the exception of peamouth chub and largescale sucker, the dominant nekton species captured at Miller Sands contained food during the entire study and are feeding in the area. The four dominant prey items have been recognized as being important to salmon and other species of fish in the lower Columbia River estuary (Craddock et al. 1976, Durkin et al. 1977a, Durkin et al. 1977b).

PART IV: SUMMARY AND CONCLUSIONS

BENTHOS

174. The 1976-1977 data showed conclusively the greatest density of organisms existed at the subtidal and 0.3m elevation sites. Results of sediment analysis showed that sediment size and types were similar for intertidal and tidal areas. Sand, those particles between 0.044 to 2.37mm, comprised about 90-98% of all samples at all elevations. Organic matter was between 8.81 and 3.31% and there was no significant seasonal changes. Density of organisms is therefore not, in this situation, a function of sediment size and types, but density differences were more a function of tidal exposure and wave action. Maximum numbers occurring where water was calmer and they were continually submerged.

175. It is difficult to make comparisons between the 1975-1976 study and the 1976-1977 study because stations have been changed and added, the Miller Sands region has been built up and methods of analyzing data were dissimilar. There are some important comparisons that can be mentioned. Tables B15 and B18 show the average number of organisms per square metre is much higher the first year than the second. Oligochaetes were $3030/m^2$ the first year and $942/m^2$ the second year. There are also more variety of organisms found the first year. The clam, *Adonata*, the amphipod, *Eohaustorius*, the flatworm, Platyhelmenthes, and the mysid, *Neomysis*, were not found in 1976-1977. Gastropods were grouped together under one heading but two types are present. Approximately 87% belong to the family Amnicolidae and the remaining 13% were the genus *Plearocera*. In both

studies Oligochaetes, *Corophium*, and Chironomids constituted approximately 92-94% of the total organisms captured at Miller Sands.

NEKTON

176. The Miller Sands nekton studies cover the fifteen survey periods March 1975 - July 1977, as summarized below:

1. Twenty species of nekton were captured during this study period.
2. Four of these were dominant and accounted for 93 percent of the total catch; i.e., juvenile chinook salmon, peamouth chub, starry flounder, and threespine stickleback.
3. Juvenile chinook, the most important economic species was present during each survey with peak catch occurring in May 1976. This species was distributed throughout the cove.
4. Peamouth chub was the most abundant species captured at the intertidal marsh habitat site. Peamouth was the major species captured at all fyke net sites and at beach seine stations number 5 (the marsh habitat site).
5. The largescale sucker was the dominant species by total weight (76,489 grams). The carp was the largest individual species captured with an average weight per individual of 1445.7 grams.
6. Main age class of the five dominate species aged are as follows:

Peamouth Chub	age class 1
Chinook Salmon	age class 1
Starry Flounder	age class 1
Threespine Stickleback	age class 4
Largescale Sucker	age class 4

7. Statistical analyses did not reveal a difference between daytime and night time catches although there were bimonthly variations.

8. A comparison of four beach seine stations (2, 3, 10, 11) fished during daylight hours in March, May and June during the three years of the study indicated that a change occurred during the post-operational phase; i.e., the general trend in 1975 and 1976 was for the CPUE to be low in March and then increase during May and July. In 1977 the catch was at its highest in March and decreased to the lowest value recorded in July.

FOOD UTILIZATION

177. The Miller Sands food utilization study generated new and valuable information regarding feeding habits of fish in the lower Columbia River. The predator species designated for analysis were peamouth chub, coho salmon, chum salmon, chinook salmon, starry flounder, threespine stickleback, largescale sucker, prickly sculpin, and staghorn sculpin. The food utilization study of fish captured at the Miller Sands site yielded information indicating that the habitat development project did indeed provide a feeding area for indigenous nekton species. Important conclusions are:

1. Four main species of prey items made up 96 percent of the total number of items consumed by all fish at all stations. These are *Daphnia longispina*, *Eurytemora hirundoides*, *Corophium salmonis*, and chironomid larvae and pupae.

2. Distinct seasonal trends in feeding were observed that were applicable to most species examined. The peaks were:

   a. July 1976 - *D. longispina* and chironomid larvae
   b. September 1976 - *D. longispina* and *N. mercedis*
   c. November 1976 - *E. hirundoides*
   d. March 1977 - *C. salmonis* and chironomid pupae
   e. May 1977 - Chironomid pupae and *E. hirundoides*
   f. July 1977 - *D. longispina* and chironomid larvae

3. Size of the predator did not have a great effect on species composition of the prey. *N. mercedis* were consumed often by chinook salmon over 100 mm and staghorn sculpin over 75 mm.

4. Overlap between percentages of prey items consumed by selected fish species and percentages of invertebrates occurring in the benthic samples was limited.

5. Little difference was detected between day and night samples although more *N. mercedis* seemed to be recorded from night samples.

6. Few differences were noted between stations although the fishes' mobility makes this type of determination a problem.

7. *C. salmonis* and chironomid larvae were frequently found together within the stomaches. Some association may be occurring that would merit further study.

8. Peamouth chub and largescale sucker did not seem to be feeding in the vicinity of Miller Sands.

9. Juvenile chinook salmon made heavy use of the Miller Sands area for feeding March through July 1977.

178. The data base for this report was three years. Limiting factors for growth and survival of salmon and other species of fish are increasing in the Columbia River. As much information as possible on

the migration, growth, survival, and feeding behavior of indigenous fish species will be invaluable to decision-making processes now and in the future. Additional data would serve as a basis for comparing and strengthening conclusions derived from this study.

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Table B1. Designated sampling sites at Miller Sands which were monitored for benthos, nekton, zooplankton, and water quality during I - Baseline Inventory, March 1975 - May 1976, and II - Post-Operational Study, July 1976 - July 1977.

	Benthos		Nekton		Water Quality		Zooplankton
	I	II	I	II	I	II	I
1	-	x	-	-	-	x	-
2	x	x	x	x	x	x	-
3	x	x	x	x	x	x	-
4	-	x	-	-	-	-	-
5	-	x	-	x	-	-	x
6	x	x	-	x	x	x	-
7	-	x	-	-	-	-	-
8	-	x	-	-	-	-	-
9	-	x	-	x	-	x 1/	-
10	x	x	x	x	x	x	x
11	x	x	x	x	x	x	-
12	x	-	x	-	x	x	x
SI	x	-	-	-	x	-	x

Elevations Monitored at Marsh Development Site
July 1976 - July 1977

Transects	Benthos	Nekton (fyke)	Water Quality
A	1-2-3	1	1 1/
B	1-2-3	1	1 1/
C	1-2-3	1	1 1/
D	1-2-3	1	1 1/
E	1-2-3	1	1 1/

Elevations at sampling sites 1, 2, and 3 are .3, 1.2, and 1.8 meters respectively.

1/ Water quality stations were discontinued after the September 1976 survey.

Table B2. Variables, standard units and symbols, and methods used in monitoring and reporting water quality at the Miller Sands site, Columbia River, Oregon.

VARIABLE	UNITS	SYMBOLS	METHOD
Temperature	Degrees	(°C)	Meter
pH	pH Units	-	Meter
Salinity	Parts/thousnad	(°100)	Meter
Conductivity	Micro M ho/CM at 25°C	(mho/cm)	Meter
Dissolved Oxygen	Milligrams/litre	(mg/l)	Meter
Alkalinity	Milligrams/litre $CaCO_3$	(mg/l,$CaCO_3$)	Chemical
Ammonia (NH-N/l)	Milligrams/Nitrogen/litre	(mg N/l)	Meter
Turbidity 1/	Formazin Turbidity	(FTU)	Nephelometric
Nitrogen Saturation	Millilitres Nitrogen/ litre	(ml N_2/l)	Van Slyke
Nitrogen Saturation	Percent Saturation	(0/0)	Van Slyke

1/ Formazin turbidity units (FTU) and Nephelometric turbidity units are interchangeable.

Table B3. List of zooplankton taxa and other genera of aquatic organisms found in nets during zooplankton surveys at Miller Sands, 1975 - 1976.

Cladocera
- Bosmina
- Daphnia
- Chydorus
- Ceriodaphnia
- Monosphilus
- Leydigia
- Simocephalus
- Alona
- Macrothrix
- Sida
- Leptodora
- Eurycerus

Copepoda
- Cyclops
- Eurytemora
- Bryacamptus
- Copepodites
- Diaptomus

Other
- Plecoptera
- Diptera
- Odonta
- Thaleichthys (smelt larva)
- Ostracoda
- Eubranchips
- Gammarus

Table B4. Summary of total catch per cubic metre of zooplankton and other related organisms by station and sampling period at Miller Sands, 1975 - 1976.

Date	Station Numbers 1/ 5	11	12	Snag Island	Total
March 1975	6.0	2.0	6.4	7.1	21.5
May	53.6	23.2	71.9	60.4	209.2
July	179.2	72.5	139.0	99.9	490.6
August	484.7	948.6	299.7	576.5	2309.5
September	1669.5	2115.5	1368.5	830.2	5983.7
November	21.7	17.2	10.6	16.5	66.0
January 1976	8.5	9.1	9.7	4.0	31.3
March	4.5	3.3	5.8	7.8	21.4
May	39.2	16.6	13.9	20.6	90.3
Totals	2466.9	3208.1	1975.5	1623.0	9223.5

1/ Stations 5 and 11 were in the cove, Station 12 was on the river side, and Snag Island was used as a remote reference area.

Table B5. Numbers of dominant zooplankton in cubic metres captured at all stations at Miller Sands, March 1975 to May 1976.

	March	May	July	August	September	November	January	March	May	Totals
Cladocera	2.5	117.3	427.4	1977.4	5202.8	47.1	8.5	8.4	54.6	7846.0
Bosmina	1.4	77.2	348.7	28.8	36.8	40.6	4.0	7.9	41.4	586.0
Daphnia	1.0	26.4	75.3	1943.4	5164.2	5.7	4.2	.5	12.6	7233.3
Alona	.1	13.7	3.4	5.2	1.8	.8	.3	-	.6	25.9
Copepods	14.0	30.5	37.6	277.7	763.8	18.5	19.4	9.9	29.7	1201.1
Cyclops	10.4	30.5	37.6	173.1	585.1	15.6	14.1	7.0	26.1	899.5
Eurytemora	3.6	-	-	104.6	178.7	2.9	5.3	2.9	3.6	301.6
Smelt Larva	3.1	5.5	-	-	-	-	.2	.3	.3	9.4
Totals	19.6	153.3	465.0	2255.1	5966.6	65.1	28.1	18.6	84.8	9056.5

TABLE B6. A list of fishes captured during fifteen sampling periods at the Miller Sands study area, March 1975 to July 1977.

Common Name	Scientific Name	Number Captured
Chinook Salmon	*Oncorhynchus tshawytscha*	5789
Peamouth	*Mylocheilus caurinus*	3361
Starry Flounder	*Platichthys stellatus*	2502
Threespine Stickleback	*Gasterosteus aculeatus*	1164
Largescale Sucker	*Catostomus macrocheilus*	263
Staghorn Sculpin	*Leptocottus armatus*	218
American Shad	*Alosa sapidissima*	216
Prickly Sculpin	*Cottus asper*	125
Longfin Smelt	*Spirinchus thaleichthys*	120
Coho Salmon	*Oncorhynchus kisutch*	77
Chum Salmon	*Oncorhynchus keta*	51
Eulachon	*Thaleichthys pacificus*	50
Squawfish	*Ptychocheilus oregonensis*	32
Carp	*Cyprinus carpio*	30
Steelhead Trout	*Salmo gairdneri*	7
Surf Smelt	*Hypomesus pretiosus*	4
Cutthroat	*Salmo clarki*	2
Sockeye Salmon	*Oncorhynchus nerka*	2
Mountain Whitefish	*Prosopium williamsoni*	1
Pacific Lamprey	*Entosphenus tridentatus*	1
Sculpin	*Cottus sp.*	2

able B7. Monthly Catch and Catch Per Unit of Effort for the Four Major Fish Species Collected During Baseline Survey March 1975 - May 1976.

Chinook

Station	12	2	3	10	11	Total	CPUE
March 75	6	8	5	5	5	29	15.8
May	162	108	87	49	59	465	93.0
July	90	1	37	9	34	171	34.2
August	1	31	3	-	5	40	8.0
September	31	2	16	2	-	51	10.2
November	1	2	-	-	-	3	0.6
January 76	-	-	2	1	3	6	1.2
March	3	19	14	74	27	137	27.4
May	2152	47	6	89	388	2682	536.4
Total	2446	218	170	229	521	3584	79.6
CPUE	271.8	24.2	18.9	25.4	57.9	79.6	

Starry Flounder

Station	12	2	3	10	11	Total	CPUE
March 75	7	-	1	7	2	17	3.4
May	-	2	16	15	6	39	7.8
July	4	10	168	58	98	338	67.6
August	2	2	16	2	2	24	4.8
September	5	-	15	10	6	36	7.2
November	1	-	1	2	-	4	0.8
January 76	5	1	2	1	4	13	2.6
March	-	-	19	-	1	20	4.0
May	5	-	2	10	2	19	3.8
Total	29	15	240	105	121	510	11.3
CPUE	3.2	1.7	26.7	11.7	13.4	11.3	

Threespine Stickleback

Station	12	2	3	10	11	Total	CPUE
March 75	1	1	-	2	3	7	1.4
May	-	43	5	1	4	53	10.6
July	13	-	1	2	4	20	4.0
August	-	-	2	-	-	2	0.4
September	16	-	-	-	-	16	3.2
November	2	2	-	8	-	12	2.4
January 76	1	1	-	3	3	8	1.6
March	1	1	7	-	1	10	2.0
May	4	7	-	5	-	16	3.2
Total	38	55	15	21	15	144	3.2
CPUE	4.2	6.1	1.7	2.3	1.7	3.2	

Peamouth

Station	12	2	3	10	11	Total	CPUE
March 75	-	-	-	-	-	-	-
May	-	27	-	-	-	27	5.4
July	4	-	7	-	2	13	2.5
August	-	-	2	-	2	4	.8
September	-	28	6	3	3	39	7.8
November	-	-	-	-	2	2	.2
January 76	-	-	-	-	-	-	-
March	-	-	1	-	1	2	.2
May	-	54	-	-	1	55	6.1
Total	4	109	16	3	10	142	3.2
CPUE	.4	12.1	1.8	.3	1.1	3.2	

le B8. Monthly Catch and Catch Per Unit of Effort of the Four Dominant Fish Species Collected at Night with Beach Seines July 1976 - July 1977.

Chinook

Station	2	3	5	9	10	11	Total	CPUE
July 76	-	1	-	-	-	77	78	13.0
September	6	12	3	7	1	13	42	7.0
November	-	4	-	1	3	4	12	2.0
March 77	42	44	18	44	145	44	337	56.2
May	9	66	22	51	22	8	178	29.7
July	4	27	77	59	65	56	288	48.0
Total	61	154	120	162	236	202	935	25.9
CPUE	10.2	26.7	20.0	27.0	39.3	33.7	25.9	

Starry Flounder

Station	2	3	5	9	10	11	Total	CPUE
July 76	11	78	-	67	81	111	348	58.0
September	-	-	-	7	-	107	114	19.0
November	4	107	1	1	-	102	215	35.8
March 77	5	8	5	3	-	3	24	4.0
May	-	37	16	13	10	8	84	14.0
July	1	49	3	4	2	47	106	17.7
Total	21	279	25	95	93	378	891	24.8
CPUE	3.5	46.5	4.2	15.8	15.5	63.0	24.8	

Threespine Stickleback

Station	2	3	5	9	10	11	Total	CPUE
July 76	8	3	7	41	6	2	67	11.2
September	-	1	6	1	-	22	30	5.0
November	5	38	3	-	1	9	56	9.3
March 77	10	12	11	15	4	1	53	8.8
May	3	4	6	-	-	1	14	2.3
July	1	3	11	11	-	1	24	4.5
Total	27	61	44	68	6	36	247	6.9
CPUE	4.5	10.2	7.3	11.3	1.0	6.0	6.9	

Peamouth

Station	2	3	5	9	10	11	Total	CPUE
July 76	5	2	1442	73	6	3	1531	255.2
September	35	220	122	86	12	26	501	83.5
November	2	2	2	2	2	9	19	3.2
March 77	1	1	-	-	-	-	2	.3
May	-	3	5	1	-	-	9	1.5
July	-	31	3	-	-	30	64	10.7
Total	43	259	1574	162	20	68	2126	59.1
CPUE	7.2	43.2	262.3	27.0	3.3	11.3	59.1	

DREDGED MATERIAL RESEARCH PROGRAM

TECHNICAL REPORT D-77-38

HABITAT DEVELOPMENT FIELD INVESTIGATIONS,
MILLER SANDS MARSH AND UPLAND HABITAT
DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

APPENDIX B: INVENTORY AND ASSESSMENT OF
PREDISPOSAL AND POSTDISPOSAL AQUATIC HABITATS

by

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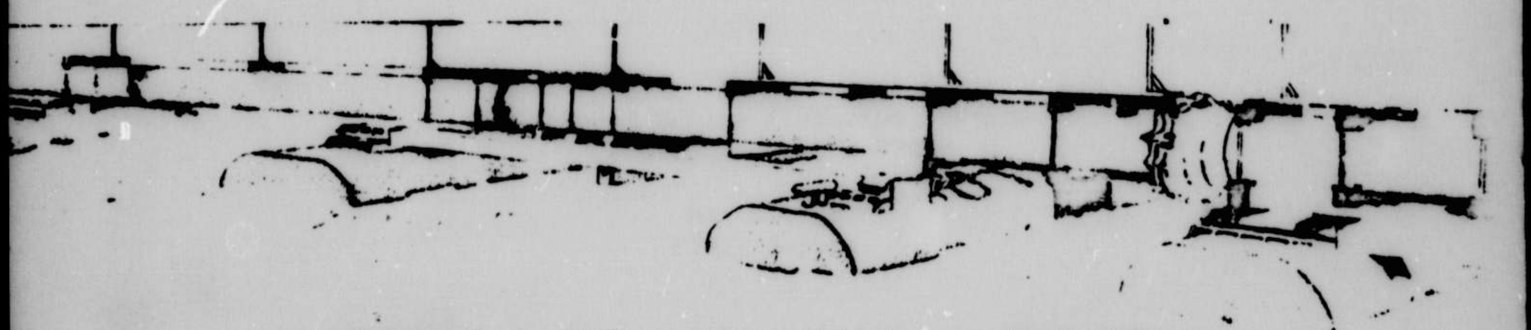
National Marine Fisheries Service
Prescott, Oregon 97048

June 1978

Final Report



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

able B9. Monthly Catch and Catch Per Unit of Effort of the Four Dominant Fish Species Collected During the Day with Beach Seines July 1976 - July 1977.

Chinook

Station	2	3	5	9	10	11	Total	CPUE
July 76	-	1	-	-	-	1	2	0.3
September	1	3	-	1	-	3	8	1.3
November	2	-	2	3	1	2	10	1.7
March 77	362	160	116	164	5	24	831	138.5
May	70	39	102	42	37	24	314	52.3
July	4	12	43	17	6	9	91	15.2
Total	439	215	263	227	49	63	1256	34.9
CPUE	73.2	35.8	43.8	37.8	8.2	10.5	34.9	

Starry Flounder

Station	2	3	5	9	10	11	Total	CPUE
July 76	26	368	1	28	26	60	509	84.8
September	14	43	1	-	6	232	296	49.3
November	2	9	-	1	9	18	39	6.5
March 77	3	5	1	-	1	14	24	4
May	-	22	-	1	5	4	32	5.3
July	2	41	44	11	22	72	193	32.2
Total	47	488	47	41	69	400	1093	30.4
CPUE	7.8	81.3	7.8	6.8	11.5	66.7	30.4	

Threespine Stickleback

Station	2	3	5	9	10	11	Total	CPUE
July 76	1	156	3	6	5	1	172	28.6
September	2	352	1	-	-	26	381	63.5
November	1	1	3	-	-	1	6	1.0
March 77	-	-	18	-	2	2	22	3.7
May	24	1	-	-	-	3	28	4.7
July	1	9	6	5	6	1	28	4.7
Total	29	519	31	11	13	34	637	17.7
CPUE	4.8	86.5	5.2	1.8	2.2	5.7	17.7	

Peamouth

Station	2	3	5	9	10	11	Total	CPUE
July 76	30	2	260	16	-	5	313	52.2
September	92	42	8	12	6	10	170	38.2
November	-	-	-	-	1	-	1	0.2
March 77	-	2	-	-	-	-	2	0.3
May	7	38	127	3	-	-	165	27.5
July	-	1	2	10	-	-	13	2.2
Total	129	75	397	41	7	15	664	18.4
CPUE	21.5	12.5	66.2	6.8	1.2	2.5	18.4	

Table B10. Monthly Catch and Catch Per Unit of Effort of the Four Dominant Fish Species Collected at Night with Fyke Nets July 1976 - July 1977.

Chinook / **Starry Flounder**

Station	A	B	C	D	E	6	Total	CPUE	A	B	C	D	E	6	Total	CPUE
July 76	-	-	-	1	-	-	1	0.2	2	-	-	-	-	-	2	0.3
September	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	0.2
March 77	-	-	-	1	2	-	3	0.5	-	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	-	-	-	3	-	-	3	0.5	-	-	-	-	1	-	1	0.2
Total	-	-	-	5	2	-	7	0.2	3	-	-	-	1	-	4	0.1
CPUE	-	-	-	0.8	0.3	-	0.2		0.5	-	-	-	0.2	-	0.1	

Threespine Stickleback / **Peamouth**

Station	A	B	C	D	E	6	Total	CPUE	A	B	C	D	E	6	Total	CPUE
July 76	5	-	4	8	10	-	27	4.5	2	1	4	6	3	1	17	2.8
September	-	-	-	2	2	-	4	0.7	-	-	10	22	21	-	53	8.8
November	-	-	-	-	-	-	-	-	1	2	-	6	-	-	9	1.5
March 77	-	-	1	-	-	-	1	0.2	-	-	-	1	-	-	1	0.2
May	2	1	1	3	3	-	10	1.7	1	3	1	-	2	-	7	1.2
July	4	2	-	17	4	-	27	4.5	2	5	11	11	4	1	34	5.7
Total	11	3	6	30	19	-	69	1.9	6	11	26	46	30	2	121	3.4
CPUE	1.8	0.5	1.0	5.0	3.2	-	1.9		1.0	1.8	4.3	7.7	5.0	0.3	3.4	

Table B11. Monthly Catch and Catch Per Unit of Effort of the Four Dominant Fish Species Collected During the Day with Fyke Nets July 1976 - July 1977.

Chinook

Station	A	B	C	D	E	6	Total	CPUE
July 76	-	-	-	-	-	-	-	-
September	-	-	-	-	-	-	-	-
November	-	-	-	-	-	-	-	-
March 77	1	-	-	1	-	-	2	0.3
May	-	-	-	-	-	-	-	-
July	-	-	3	2	-	-	5	0.8
Total	1	-	3	3	-	-	7	0.2
CPUE	0.2	-	0.5	0.5	-	-	0.2	

Starry Flounder

Station	A	B	C	D	E	6	Total
July 76	2	-	-	-	-	-	2
September	-	-	-	-	-	-	-
November	-	-	-	-	-	-	-
March 77	-	-	-	-	-	-	-
May	-	-	-	-	-	-	-
July	-	-	-	1	-	-	1
Total	2	-	-	-	-	-	3
CPUE	0.3	-	-	-	-	-	0.1

Threespine Stickleback

Station	A	B	C	D	E	6	Total	CPUE
July 76	1	1	2	3	2	-	9	1.5
September	-	-	-	-	-	-	-	-
November	-	-	-	-	2	-	2	0.3
March 77	-	-	-	16	-	-	16	2.7
May	1	2	1	1	2	-	7	1.2
July	5	8	1	32	12	1	59	9.8
Total	7	11	4	52	18	1	93	2.6
CPUE	1.2	1.8	0.7	8.7	3.0	0.2	2.6	

Peamouth

Station	A	B	C	D	E	6	Total
July 76	6	6	1	9	4	1	27
September	36	12	33	113	12	2	208
November	1	-	1	3	1	-	6
March 77	-	-	-	-	-	-	-
May	2	10	2	1	3	1	19
July	10	9	6	10	15	-	50
Total	55	37	43	136	35	4	310
CPUE	9.2	6.2	7.2	22.7	5.8	0.7	8.6

Table B12 . Catch per Unit of Effort of the Four Dominant Fish Species Captured by Beach Seine During Day and Night at Miller Sands, March, 1975 to July 1977.

	Chinook			Starry Flounder			Peamouth			Stickleback		
	Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
March 1975	15	-	15	3	-	3	-	-	-	1	-	1
May	93	-	93	8	-	8	5	-	5	11	-	11
July	34	-	34	67	-	67	3	-	3	4	-	4
August	8	-	8	5	-	5	1	-	1	1	-	-
September	10	-	10	7	-	7	8	-	8	3	-	3
November	1	-	1	1	-	1	-	-	-	2	-	2
January 1976	1	-	1	3	-	3	-	-	-	2	-	2
March	27	-	27	4	-	4	-	-	-	2	-	2
May	536	-	536	4	-	4	6	-	6	3	-	3
July	-	13	6	85	58	71*	52	255	157*	29	11	20
September	1	7	4	49	19	34	38	83	56*	64	5	34
November	2	2	2	7	35	21	-	3	2	1	9	5
March 1977	139	56	97	-	4	4	-	-	-	4	9	6
May	52	29	41	5	14	10	28	2	6	5	2	4
July	15	48	32	32	17	17	2	11	6	5	5	4

1/ Total CPUE was obtained by adding the numbers of fish captured at all stations during day and night and dividing by the number of times the nets were fished at all stations day and night.

* Peak CPUE

Table B13. Age Class by Month of the Three Dominant Nekton Species Captured at Miller Sands During all Surveys March 1975 - July 1977.

Peamouth	Age 1		Age 2		Age 3		Age 4		Age>4	
	Number	Length	Number	Length	Number	Length	Number	Length	Number	Length
March 75	-	-	-	-	-	-	-	-	-	-
May	10	91.8	-	-	-	-	-	-	-	-
July	-	-	12	103.0	-	-	-	-	-	-
August	1	95.0	2	113.0	-	-	-	-	1	218.0
September	8	51.1	8	112.0	-	-	5	194.0	-	-
November	2	53.5	-	-	-	-	-	-	-	-
January 76	-	-	-	-	-	-	-	-	-	-
March	-	-	-	-	-	-	-	-	1	194.0
May	8	70.0	-	-	-	-	-	-	-	-
July	49	48.6	109	105.4	6	160.8	12	179.6	16	230.6
September	333	60.0	67	128.1	21	168.1	35	185.0	34	229.7
November	19	59.9	4	127.0	-	-	2	190.0	10	235.6
March 77	-	-	4	65.5	-	-	-	-	-	-
May	-	-	40	81.9	2	106.0	6	136.8	51	203.8
July	8	54.7	90	106.4	4	108.0	14	164.7	44	219.8

Starry Flounder	Age 1		Age 2		Age 3		Age 4		Age>4	
	Number	Length	Number	Length	Number	Length	Number	Length	Number	Length
March 75	14	69.6	3	116.0	-	-	-	-	-	-
May	25	71.0	2	139.0	-	-	-	-	-	-
July	38	54.7	5	104.0	-	-	-	-	-	-
August	18	57.2	-	-	-	-	-	-	-	-
September	17	85.7	13	146.7	-	-	-	-	-	-
November	1	82.0	-	-	3	171.3	-	-	-	-
January 76	1	104.0	7	143.4	-	-	-	-	-	-
March	1	100.0	8	152.0						
May	2	34.5	17	105.0	-	-	-	-	-	-
July	250	48.1	5	13.1	3	161.7	-	-	-	-
September	72	53.9	-	-	9	165.6	-	-	-	-
November	95	61.2	25	150.7	4	173.7	-	-	-	-
March 77	25	67.4	15	154.8	4	181.5	2	204.5	-	-
May	52	90.6	39	141.3	13	184.7	5	202.0	-	-
July	212	51.9	36	135.5	4	180.5	-	-	-	-

Table B13. (Continued

Chinook	Age 1 Number	Age 1 Length	Age 2 Number	Age 2 Length	Age 3 Number	Age 3 Length	Age 4 Number	Age 4 Length	Age>4 Number	Age>4 Leng
March 75	29	52.1	-	-	1	187.0	-	-	-	
May	50	78.9	-	-	-	-	-	-	-	
July	40	73.7	-	-	-	-	-	-	-	
August	5	54.2	14	107.0	-	-	-	-	-	
September	-	-	24	132.5	-	-	-	-	-	
November	3	104.3	-	-	-	-	-	-	-	
January 76	5	51.8	1	165.0	-	-	-	-	-	
March	41	63.1	2	142.0	-	-	-	-	-	
May	44	78.6	-	-	-	-	-	-	-	
July	29	106.4	-	-	-	-	-	-	-	
September	50	123.7	-	-	-	-	-	-	-	
November	21	130.2	1	189.0	-	-	-	-	-	
March 77	273	48.2	22	162.9	9	221.1	-	-	-	
May	271	98.2	18	136.6	-	-	-	-	-	
July	189	102.7	33	120.6	-	-	-	-	-	

Table B14. Site Comparison for Beach Seine Stations of Total Nekton Sampled During Each of the Fifteen Sampling Periods.

	1975				1976				1977			
Station	March	May	July	Total	March	May	July	Total	March	May	July	Total
2	2	192	11	212	20	125	62	207	370	103	8	481
3	6	115	213	334	44	10	533	587	174	105	65	344
10	15	70	69	154	76	111	31	218	33	87	34	154
11	10	72	140	222	35	405	67	507	54	54	87	195
	40	449	433	922	175	651	693	1519	631	349	194	1174

TABLE B15

Average* Monthly Biomass (g/m^2 Wet Weight) at Seven Sampling Sites on Miller Sands, 1975-1976.

	Station						
	12	2	5	3	10	11	SI
Month							
March 1975	2.9280	19.6020	5.8680	45.3860	33.9780	8.1920	14.9600
May 1975	3.3840	45.9640	68.1300	27.0720	17.7820	11.1800	12.1560
July 1975	1.0680	15.3700	16.7000	6.8888	18.5440	4.9900	1.3540
August 1975	1.1320	4.2980	50.1600	4.2020	3.3220	2.4640	.3540
September 1975	30.2960	13.9120	15.4300	12.1960	3.6140	5.5300	3.0560
November 1975	19.4700	22.5420	13.2440	9.3940	10.1160	1.8440	22.1000
January 1976	6.5120	8.8888	77.6940	15.2120	12.1000	61.2740	.8720
March 1976	2.2520	20.5040	52.4060	29.9140	14.5060	50.8900	1.8940
May 1976	1.5640	.5100	71.9580	15.4740	48.3460	9.1000	39.3720
Total Yearly Biomass g/m^2	68.6060	151.5908	371.5900	165.7388	162.3080	155.4640	96.1180

*Average of Six Grabs

TABLE B16

Macroinvertebrate Taxa in Order of Mean Annual Abundance From Seven Stations at Miller Sands, Oregon, 1975-1976

Taxa	No/m^2	Wet Wt./m^2
Oligochaeta	3030.50	2.7500
Corophium	2005.50	2.2142
Nematoda	181.95	.0230
Chironomidae	153.70	.4563
Corbicula	87.10	2.6085
Fish eggs	45.70	.0139
Polychaeta	10.60	.0444
Gastropoda	10.00	.6430
Neomysis	5.05	.0064
Anisogammarus	1.95	.0061
Insect Larvae	.95	.0221
Platyhelmenthes	.15	.0006
Eohaustorius	.15	.0005
Lamprey	.05	.0410
Adonata	.03	-

Table B17

Macroinvertebrate Taxa in Order of Mean Annual Abundance
from 27 Stations at Miller Sands, Oregon

July 1976 - July 1977

	Avg. No. M^2	Avg. Wt. M^2
Corophium	942.4	.1838
Oligochaete	731.6	.3103
Chironomidae	251.5	.1038
Corbicula	128.0	5.6596
Insect Larva	15.2	.0124
Gastropoda	14.2	.3932
Polychaete	10.9	.0039
Cladocera	4.7	.0000
Ostracod	3.6	.0000
Neomysis	1.5	.0015
Anisogammarus	1.2	.0005

Table B18

Mean Annual Macroinvertebrates per .05m^2 Grab at 15 Intertidal and 11 Subtidal (Cove) Stations at Miller Sands, Oregon.

July 1976 - July 1977

	INTERTIDAL			SUBTIDAL
	Elevation 0.3m	Elevation 1.2m	Elevation 1.8m	Cove
	$\bar{x}$ ± SE 1/	$\bar{x}$ ± SE 1/	$\bar{x}$ ± SE 1/	$\bar{x}$ ± SE 2/
Corophium				
Avg. No.	125.6 ± 22.2625	16.8 ± 3.2672	4.0 ± 2.1974	601.6 ± 72.1872
Avg. Wt.	.0242 ± .0042	.0074 ± .0042	.0010 ± .0009	.1154 ± .0128
Oligochaete				
Avg. No.	169.1 ± 37.2241	60.6 ± 1.6624	41.6 ± 4.3311	395.3 ± 44.2475
Avg. Wt.	.0479 ± .0100	.0944 ± .0159	.0188 ± .0036	.1467 ± .0188
Chironomidae				
Avg. No.	192.2 ± 38.7703	9.4 ± .8739	1.2 ± .1532	86.1 ± 6.9146
Avg. Wt	.0971 ± .0180	.0025 ± .0003	.0001 ± .0000	.0281 ± .0045
Corbicula				
Avg. No.	33.9 ± 6.9340	10.3 ± 1.9057	2.6 ± .4062	69.4 ± 9.3421
Avg. Wt.	3.3867 ± 1.3929	.4451 ± .1215	.0069 ± .0026	2.2683 ± .6237
Insect Larvae				
Avg. No.	4.9 ± .1532	11.6 ± .8717	3.4 ± .1425	1.6 ± .3499
Avg. Wt.	.0011 ± .0000	.0149 ± .0030	.0022 ± .0009	.0004 ± .0000
Gastropoda				
Avg. No.	.7 ± .1532	12.8 ± 3.0750	1.0 ± .3304	3.4 ± .0441
Avg. Wt.	.0071 ± .0039	.0150 ± .0048	.0010 ± .0048	.2682 ± .0616

1/ Mean of 90 Samples
2/ Mean of 198 Samples

Table B19

Average Biomass and Percent Total of Important Macroinvertebrates Per Square Metre by Elevation. Mollusca (*Corbicula*) have been excluded due to the large weight discrepancy introduced by the shell.

	0.3m Elevation	1.2m Elevation	1.8m Elevation	Cove
Corophium	.4840 (13.4 %)	.1480 (6.2 %)	.0200 (4.5 %)	2.3080 (39.7 %)
Oligochaete	.9580 (26.6 %)	1.8880 (79.3 %)	.3760 (85.4 %)	2.9340 (50.5 %)
Chironomidae	1.942 (53.9 %)	.0500 (1.9 %)	.0002 (.0 %)	.5620 (9.7 %)
Insect Larvae	.2200 (6.1 %)	.2980 (12.6 %)	.0440 (10.1 %)	.0080 (.1 %)
Total Average Annual Dry Weight by Elevation g/m^2	3.604	2.3840	.4402	5.8120

Table B20. Mean Annual Sediment Size and Percent Volatile Solids in Sediments Associated with Macroinvertebrates at Miller Sands.

	ELEVATION 1 MEAN	ELEVATION 1 S.E.	ELEVATION 2 MEAN	ELEVATION 2 S.E.	ELEVATION 3 MEAN	ELEVATION 3 S.E.	COVE MEAN	COVE S.E.
SEDIMENT PARTICLE SIZE >4.75 mm								
TRANSECT								
A	0.00	0.00	0.00	0.00	0.00	0.00		
B	0.00	0.00	0.00	0.00	0.08	0.04		
C	0.00	0.00	0.00	0.00	0.00	0.00		
D	0.00	0.00	0.00	0.00	0.00	0.00		
E	0.00	0.00	0.00	0.00	0.00	0.00		
COVE MEAN							0.00	0.00
SEDIMENT PARTICLE SIZE 2.38 - 4.74 mm								
TRANSECT								
A	0.14	0.09	0.00	0.00	0.08	0.02		
B	1.26	0.29	0.33	0.09	0.52	0.12		
C	0.00	0.00	0.21	0.08	0.24	0.06		
D	0.07	0.02	0.02	0.01	0.14	0.04		
E	0.00	0.00	0.01	0.01	0.18	0.14		
COVE MEAN							0.04	0.01
SEDIMENT PARTICLE SIZE 1.19 - 2.37 mm								
TRANSECT								
A	0.20	0.04	0.13	0.03	0.70	0.05		
B	1.35	0.26	0.69	0.14	1.41	0.11		
C	0.17	0.06	0.74	0.05	0.93	0.11		
D	0.60	0.05	0.30	0.06	0.83	0.07		
E	0.18	0.06	0.48	0.21	0.17	0.07		
COVE MEAN							0.30	0.06
SEDIMENT PARTICLE SIZE 0.42 - 1.18 mm								
TRANSECT								
A	14.17	0.37	10.83	0.36	16.35	0.47		
B	6.40	1.22	14.44	1.06	22.27	1.14		
C	1.41	0.41	13.39	0.39	15.92	0.97		
D	13.11	0.71	13.80	0.59	16.42	1.12		
E	1.17	0.33	1.65	0.29	5.70	0.53		
COVE MEAN							5.07	0.57
SEDIMENT PARTICLE SIZE 0.149 - 0.41 mm								
TRANSECT								
A	75.79	0.70	83.76	0.77	80.93	0.65		
B	59.85	2.20	77.63	1.07	73.64	0.94		
C	49.42	3.44	81.24	0.53	78.70	0.94		
D	81.90	0.67	83.88	0.80	80.13	1.08		
E	53.80	1.66	63.70	1.87	87.82	2.33		
COVE MEAN							50.76	1.99

Table B20. Continued

	ELEVATION 1 MEAN	ELEVATION 1 S.E.	ELEVATION 2 MEAN	ELEVATION 2 S.E.	ELEVATION 3 MEAN	ELEVATION 3 S.E.	COVE MEAN	COVE S.E.
SEDIMENT PARTICLE SIZE 0.074 - 0.148 mm								
TRANSECT								
A	2.70	0.24	2.02	0.23	1.31	0.11		
B	18.88	1.80	4.51	0.29	1.94	0.19		
C	31.57	2.40	2.94	0.12	3.13	0.12		
D	3.17	0.20	1.64	0.16	1.93	0.21		
E	24.75	0.74	25.39	0.83	4.44	1.32		
COVE MEAN							30.25	1.67
SEDIMENT PARTICLE SIZE 0.044 - 0.073 mm								
TRANSECT								
A	2.23	0.17	0.92	0.22	0.13	0.01		
B	4.53	0.44	1.02	0.08	0.33	0.04		
C	8.27	0.88	0.78	0.30	0.48	0.04		
D	0.38	0.05	0.12	0.02	0.21	0.05		
E	8.13	0.55	3.73	0.68	0.83	0.64		
COVE MEAN							7.56	0.53
SEDIMENT PARTICLE SIZE <0.044 mm								
TRANSECT								
A	4.73	0.40	2.30	0.45	0.11	0.01		
B	7.69	0.86	1.34	0.18	0.27	0.04		
C	9.14	1.21	0.60	0.05	0.56	0.04		
D	0.75	0.09	0.20	0.02	0.25	0.05		
E	11.95	0.59	5.01	1.02	0.82	0.50		
COVE MEAN							6.06	0.47

TOTAL 100.0 PERCENT

NEXT 3 BLOCKS ARE A FURTHER BREAKDOWN OF THE PERCENTS OF THE LAST PRECEDING BLOCK

	ELEVATION 1 MEAN	ELEVATION 1 S.E.	ELEVATION 2 MEAN	ELEVATION 2 S.E.	ELEVATION 3 MEAN	ELEVATION 3 S.E.	COVE MEAN	COVE S.E.
SEDIMENT PARTICLE SIZE 25 - 44 microns								
TRANSECT								
A	2.17	0.26	1.15	0.20	0.00	0.00		
B	3.32	0.44	0.55	0.14	0.00	0.00		
C	4.72	0.66	0.00	0.00	0.01	0.01		
D	0.12	0.06	0.00	0.00	0.02	0.01		
E	4.83	0.59	2.15	0.41	0.10	0.09		
COVE MEAN							2.85	0.24
SEDIMENT PARTICLE SIZE 10 - 25 microns								
TRANSECT								
A	1.54	0.13	0.78	0.17	0.00	0.00		
B	2.50	0.31	0.32	0.07	0.00	0.00		
C	2.74	0.36	0.00	0.00	0.02	0.01		
D	0.09	0.03	0.00	0.00	0.02	0.01		
E	4.06	0.24	1.39	0.26	0.16	0.16		
COVE MEAN							1.72	0.15

Table B20. Concluded

	ELEVATION 1 MEAN	ELEVATION 1 S.E.	ELEVATION 2 MEAN	ELEVATION 2 S.E.	ELEVATION 3 MEAN	ELEVATION 3 S.E.	COVE MEAN	COVE S.E.
SEDIMENT PARTICLE SIZE 5 - 10 microns								
TRANSECT								
A	1.00	0.15	0.36	0.08	0.00	0.00		
B	1.93	0.42	0.17	0.03	0.01	0.00		
C	1.67	0.28	0.02	0.01	0.05	0.03		
D	0.08	0.03	0.01	0.01	0.07	0.04		
E	3.05	0.57	1.46	0.57	0.27	0.26		
COVE MEAN							1.24	0.17
VOLATILE SOLIDS								
TRANSECT								
A	1.37	0.11	1.04	0.08	0.85	0.03		
B	3.31	0.52	1.22	0.08	0.90	0.04		
C	2.13	0.17	0.85	0.04	1.12	0.12		
D	0.89	0.05	0.81	0.04	0.92	0.02		
E	2.57	0.12	2.07	0.20	1.50	0.19		
COVE MEAN							2.27	0.07

TABLE B21
Species List of Items Consumed at Miller Sands
July 1976 Through July 1977

Nematodes

Oligochaetes

Cladocerans
- *Daphnia longispina*
- *Bosmina longisrostris*
- *Eurycercus* sp.
- Digested cladocerans

Copepods
- *Eurytemora hirundoides*
- *Diaptomus* sp.
- Digested copepods

Mysids
- *Neomysis mercedis*
- Digested mysids

Amphipods
- *Corophium salmonis*
- *Anisogammarus confervicolus*

Pelecypods
- *Corbicula fluminea*

Gastropods
- *Pleurocera* sp.
- Unid. gastropods

Ostracods
- Unid. ostracods

Insects
- Chironomid larvae
- Chironomid pupae
- Diptera
- Digested diptera
- Coleoptera
- Odonata nymph (dragonfly)
- Odonata (damselfly)
- Hemiptera
- Hemiptera--Corixidae
- Hymenoptera
- Hymenoptera--Formicidae
- Ephemeroptera
- Unid. insects

Teleosts
- *Thaleichthys pacificus* larvae
- *Platichthys stellatus* juvenile
- *Oncorhynchus tshawytscha* juv.
- *Gasterosteus aculeatus* eggs.
- Unid. fish eggs
- Unid. fish scales
- Unid. fish bones
- Unid. fish

Other
- Arachnids
- *Gnorimosphaeroma oregonensis*
- Gravel and sand
- Sticks
- Synthethic fiber
- Vegetation seeds
- Unid. vegetation
- Digested material

Table B22

FOOD CONSUMED BY NEKTON AT MILLER SANDS IN ORDER OF DECREASING TOTAL NUMBER JULY 1976 THRU JULY 1977.

Food Item	Total Number	Percent
Daphnia longispina 1/	22,218	41
Eurytemora hirundoides	18,555	34
Corophium salmonis	4,185	8
Chironomid pupae	3,902	7
Chironomid larvae	3,282	6
Neomysis mercedis	674	1
Diptera	501	1
Diaptomus sp.	466	1
Unid. insects	106	
Thaleichthys pacificus larvae	98	Combined Total 1 Percent
Oligochaetes	83	
Anisogammarus confervicolus	46	
Ostracods	37	
Gasterosteus aculeatus eggs	34	
Eurycercus sp.	30	
Hymenoptera	26	
Vegetation seeds	26	
Coleoptera	11	
Hemiptera	8	
Sticks	8	
Unid. fish	7	
Arachnid	6	
Ephemeroptera	6	
Hemiptera--Corixidae	5	
Odonata nymph	4	
Nematode	4	
Corbicula fluminea	3	
Pleurocera sp.	2	
Unid. gastropods	2	
Platichthys stellatus juveniles	2	
Unid. fish scales	2	
Bosmina longirostris	1	
Odonata	1	
Tipulidae	1	
Unid. fish bones	1	
Gnorimosphaeroma oregonensis	1	
TOTAL	54,342	100 %

1/ Fewer than 5% cladocerans other than *D. longispina*

TABLE B23

MEAN ANNUAL PERCENT NUMBER[1/] OF FOOD IN NEKTON STOMACHS OF IMPORTANT SPECIES AND IN THE BENTHIC ENVIRONMENT.

	Nekton Species					
Food category	Peamouth Chub	Chinook Salmon	Starry Flounder	3-spine Stickleback	Largescale Sucker	Staghorn Sculpin
Nematode						
Stomach	--	30	--	--	--	2.5
Benthos	--	--	--	--	--	--
Oligochaetes						
Stomach	--	12.5	50	50	--	--
Benthos	38	38	38	38	38	38
Polychaete						
Stomach	--	--	--	--	--	--
Benthos	.5	.5	.5	.5	.5	.5
Neanthes sp.						
Stomach	--	--	--	--	--	--
Benthos	.5	.5	.5	.5	.5	.5
Daphnia longispina[2/]						
Stomach	--	50	50	50	--	--
Benthos	0.6	0.6	0.6	0.6	0.6	0.6
Eurycercus sp.						
Stomach	--	--	--	22	--	--
Benthos	--	--	--	--	--	--
Eurytemora hirundoides						
Stomach	--	--	--	50	--	46
Benthos	--	--	--	--	--	--
Neomysis mercedis						
Stomach	--	49.5	16.5	--	--	50
Benthos	0.1	0.1	0.1	0.1	0.1	0.1
Corophium salmonis						
Stomach	--	50	50	50	--	50
Benthos	43	43	43	43	43	43
Anisogammarus confervicolus						
Stomach	--	20	4	13	--	14.5
Benthos	.05	.05	.05	.05	.05	.05
Corbicula fluminea						
Stomach	--	--	50	--	--	--
Benthos	5	5	5	5	5	5

1/ number is the mid-range estimated number; for example, if the range is 25-50 percent, the mid-range value is 37.5 percent.

2/ 95% *D. longispina*--time did not permit one-by-one identification

TABLE B23(continued)
MEAN ANNUAL PERCENT NUMBER[1] OF FOOD IN NEKTON STOMACHS OF IMPORTANT SPECIES AND IN THE BENTHIC ENVIRONMENT.

	Nekton Species					
Food Category	Peamouth Chub	Chinook Salmon	Starry Flounder	3-spine Stickleback	Largescale Sucker	Staghorn Sculpin
Gastropoda						
Stomach	--	--	--	--	--	1.5
Benthos	.9	.9	.9	.9	.9	.9
Ostracod						
Stomach	--	--	--	26.5	--	--
Benthos	.3	.3	.3	.3	.3	.3
Chironomids (larvae & pupae)						
Stomach	--	50	50	48.5	--	50
Benthos	23	23	23	23	23	23
Diptera						
Stomach	--	48	--	--	--	--
Benthos	.67	.67	.67	.67	.67	.67
Collembula						
Stomach	--	--	--	--	--	--
Benthos	.02	.02	.02	.02	.02	.02
Coleoptera						
Stomach	--	5	--	--	--	--
Benthos	--	--	--	--	--	--
Odonata adult						
Stomach	--	0.5	--	--	--	--
Benthos	--	--	--	--	--	--
Odonata nymph						
Stomach	--	10	50	--	--	2.5
Benthos	--	--	--	--	--	--
Humenoptera						
Stomach	--	38.5	--	--	--	--
Benthos	--	--	--	--	--	--
Hemiptera						
Stomach	--	2.5	--	--	--	--
Benthos	--	--	--	--	--	--
Ephemeroptera						
Stomach	--	33.5	--	--	--	--
Benthos	--	--	--	--	--	--

1/ number is the mid-range estimated number; for example, if the range is 25-50 percent, the mid-range value is 37.5 percent.
2/ 95% D. longispina--time did not permit one-by-one identification

TABLE B23 (concluded)

MEAN ANNUAL PERCENT NUMBER[1/] OF FOOD IN NEKTON STOMACHS OF IMPORTANT SPECIES AND IN THE BENTHIC ENVIRONMENT.

	Nekton Species					
Food Category	Peamouth Chub	Chinook Salmon	Starry Flounder	3-spine Stickleback	Largescale Sucker	Staghorn Sculpin
Tipulidae larvae						
Stomach	--	0.5	--	--	--	--
Benthos	--	--	--	--	--	--
Tabanidae						
Stomach	--	--	--	--	--	--
Benthos	.4	.4	.4	.4	.4	.4
Corixidae						
Stomach	--	2.5	--	--	--	--
Benthos	.01	.01	.0	.01	.01	.01
Oncorhynchus tsawytscha						
Stomach	--	--	--	--	--	50
Benthos	--	--	--	--	--	--
Platichthys stellatus						
Stomach	--	--	--	--	--	--
Benthos	--	--	--	--	--	--
Unidentified fish						
Stomach	--	0.5	--	--	--	--
Benthos	--	--	--	--	--	--
Fish bones						
Stomach	--	25	--	--	--	--
Benthos	--	--	--	--	--	--
Stickleback eggs						
Stomach	--	--	--	9.5	--	--
Benthos	--	--	--	--	--	--
Eulachon larvae						
Stomach	--	16	--	--	--	--
Benthos	--	--	--	--	--	--
Arachnid						
Stomach	--	2.5	--	--	--	--

/ number is the mid-range estimated number; for example, if the range is 25-50 percent, the mid-range value is 37.5 percent.

/ 95% D. longispina--time did not permit one-by-one identification

APPENDIX B1: ZOOPLANKTON PER CUBIC METRE COLLECTED AT MILLER SANDS AND SNAG ISLAND, MARCH 1975-MAY 1976

Appendix Table B1

Zooplankton Per Cubic Metre Collected at
Miller Sands and Snag Island

March 1975

	Cove		River	Snag Island
	5	11	12	SI
Temperature (°C)	6.3	6.7	6.0	6.7
Cubic Metre	31.9	42.9	20.8	6.9
Cladocera				
Bosmina	.3	.1	.4	.6
Daphnia	.3	.1	.3	.3
Chydorus	-	-	.3	-
Ceriodaphnia	-	-	.2	-
Monosphilus	.1	-	.1	-
Leydigia	-	-	.1	-
Simocephalus	-	.1	-	-
Alona	-	.1	-	-
Copepoda				
Cyclops	2.5	.8	3.2	3.9
Eurytemora	1.4	.4	.9	.9
Bryocamptus	.2	-	.1	.1
Others				
Plecoptera	.2	-	.1	-
Diptera	.2	-	-	-
Odonta	.1	-	-	-
Smelt Larva	.7	.4	.7	1.3
Total/m^3	6.0	2.0	6.4	7.1

May 1975

	5	11	12	SI
Temperature (°C)	13.0	12.6	12.2	12.0
Cubic Metre	14.2	48.9	55.8	23.2
Cladocera				
Bosmina	31.4	2.1	25.9	17.8
Daphnia	2.7	.9	13.0	9.8
Alona	8.1	2.3	1.4	1.9
Chydorus	.2	.5	.2	.2
Ceriodaphnia	1.1	-	.6	-
Macrothrix	.1	-	-	-
Copepoda				
Copepodites	3.9	9.1	13.2	12.6
Cyclops	2.5	4.7	11.1	12.2
Diaptomus	2.4	2.4	5.1	3.2
Bryocamptus	-	.3	.3	.3

May 1975 (Cont.)

	Cove 5	Cove 11	River 12	Snag Island SI
Others				
Ostracoda	.1	-	-	-
Diptera	-	.1	-	-
Smelt Larva	1.1	.9	1.1	2.4
Total/m^3	53.6	23.3	71.9	60.4

July 1975

	Cove 5	Cove 11	River 12	Snag Island SI
Temperature (°C)	17.1	14.8	15.0	15.0
Cubic Metre	58.9	73.5	60.8	27.6
Cladocera				
Bosmina	143.8	44.2	96.1	64.6
Daphnia	19.2	17.4	15.4	23.3
Alona	1.6	.7	.4	.7
Ceriodaphnia	.6	.4	.2	.3
Sida	.4	.1	.1	.1
Leptodora	-	-	.2	.4
Eurycercus	-	.2	-	-
Chydorus	.3	-	-	-
Copepoda				
Cyclops	10.7	4.6	16.8	5.5
Diaptomus	1.9	2.2	2.6	2.4
Copepodites	-	2.3	6.6	2.5
Bryocamptus	.7	.4	.5	.1
Others				
Ostracoda	-	-	.1	-
Total/m^3	179.2	72.5	139.0	99.9

August 1975

	Cove 5	Cove 11	River 12	Snag Island SI
Temperature (°C)	19.6	20.0	19.8	19.5
Cubic Metre	26.8	27.5	71.5	30.4
Cladocera				
Bosmina	4.3	9.5	6.1	8.9
Daphnia	426.1	852.5	180.6	484.2
Sida	1.9	3.1	5.8	4.2
Leptodora	.9	1.4	1.8	1.0
Alona	3.1	1.2	.9	-
Ceriodaphnia	5.6	9.2	1.9	3.1
Simocephalus	.6	-	-	.5
Chydorus	-	.5	-	-

August 1975 (Cont.)

	Cove 5	Cove 11	River 12	Snag Island SI
Copepoda				
Cyclops	22.4	45.6	64.8	40.3
Eurytemora	18.9	25.3	35.6	24.8
Bryocamptus	.9	.3	.9	.3
Others				
Eubranchipus	-	-	1.3	.2
Total/m^3	484.7	948.6	299.7	576.5

September 1975

	Cove 5	Cove 11	River 12	Snag Island SI
Temperature (°C)	18.0	19.2	18.4	18.9
Cubic Metre	59.3	41.3	52.3	21.7
Cladocera				
Bosmina	6.1	10.0	11.8	8.9
Dahpnia	1464.1	1933.2	1079.7	687.2
Ceriodaphnia	-	-	2.8	-
Sida	2.0	-	6.7	2.9
Chydorus	-	-	.4	-
Alona	1.4	-	.4	-
Copepoda				
Cyclops	139.3	131.1	210.0	104.7
Eurytemora	56.6	41.2	54.4	26.5
Bryocamptus	-	-	2.7	-
Total/m^3	1669.5	2115.5	1368.5	830.2

November 1975

	Cove 5	Cove 11	River 12	Snag Island SI
Temperature (°C)	8.5	6.6	8.2	7.6
Cubic Metre	94.3	72.4	50.3	37.3
Cladocera				
Bosmina	15.5	8.8	5.6	10.7
Daphnia	1.1	1.1	2.4	1.1
Alona	-	.1	.5	.2
Sida	-	-	-	.2
Copdpoda				
Cyclops	4.1	6.4	1.6	3.5
Eurytemora	1.0	.8	.3	.8
Others				
Odonta	-	-	.2	-
Total/m^3	21.7	17.2	10.6	16.5

January 1976

	Cove 5	11	River 12	Snag Island SI
Temperature (°C)	5.1	5.1	5.2	5.8
Cubic Metre	54.8	59.1	55.5	82.5
<u>Cladocera</u>				
Bosmina	1.2	.9	1.4	.5
Daphnia	1.9	.8	1.3	.2
Ceriodaphnia	.5	.1	.3	.1
Alona	.1	.1	.1	-
Chydorus	-	T	.1	T
<u>Copepoda</u>				
Copepodid	.3	.3	.4	.1
Cyclops	2.9	4.7	5.5	1.0
Eurytemora	1.3	1.8	.5	1.7
Dioptemus	.2	.3	.1	.4
<u>Others</u>				
Gammarus	-	-	-	T
Plecoptera	-	-	-	T
Smelt Larva	.1	.1	-	T
Total/m^3	8.5	9.1	9.7	4.0

March 1976

	Cove 5	11	River 12	Snag Island SI
Temperature (°C)	6.7	7.0	6.8	7.2
Cubic Metre	63.6	67.1	63.4	66.7
<u>Cladocera</u>				
Bosmia	.7	1.0	3.5	2.7
Daphnia	.1	.1	.1	.2
Ceriodaphnia	.1	.1	-	.1
Chydorus	.1	.1	.1	.2
Alona	-	T	T	T
Sida	-	-	T	-
<u>Copepoda</u>				
Copepodid	.1	.1	.1	.1
Cyclops	2.3	1.5	.14	3.1
Eurytemora	.9	.3	.5	1.2
Dioptemus	.1	.1	T	.1
<u>Others</u>				
Smelt Larva	.1	T	.1	.1
Total/m^3	4.5	3.3	5.8	7.8

May 1976

	Cove 5	Cove 11	River 12	Snag Island SI
Temperature (°C)	12.6	13.0	13.2	13.2
Cubic Metre	62.6	59.4	59.5	60.6
Cladocera				
Bosmina	16.4	10.9	5.7	8.4
Daphnia	4.7	1.9	2.1	3.9
Chydorus	.5	.7	.4	.6
Alona	.2	.2	.1	.1
Ceriodaphnia	.9	.5	.1	.3
Leptodora	T	-	-	-
Copepoda				
Copepodid	.1	.1	.1	-
Cyclops	14.9	2.1	4.2	4.9
Eurytemora	1.1	.2	.9	1.4
Diaptomus	.4	T	.3	.7
Others				
Smelt Larva	T	-	T	.3
Total/m^3	39.2	16.6	13.9	20.6

APPENDIX B2: WATER QUALITY AT MILLER SANDS AND SNAG ISLAND, MARCH 1975-MAY 1976

Appendix B2

Water Quality at Miller Sands and Snag Island March 1975 - May 1977

	Mar 75	May 75	July 75	Aug 75	Sept 75	Nov 75	Jan 76	Mar 76	May 76
Station 2									
Temperature (°C)									
Day Flood	6.1	11.6	17.2	19.2	16.2	7.3	5.6	6.5	12.3
pH									
Day Flood	8.1	8.2	8.6	7.6	6.7	6.7	7.1	7.4	6.8
Salinity (0/00)									
Day Flood	.40	.40	.30	.02	.14	.10	.12	.13	.18
Dissolved Oxygen (mgl)									
Day Flood	12.8		10.8	8.3	8.3	10.9	12.4	12.2	10.3
Turbidity (FTU)									
Day Flood	15.0	25.0	14.0	10.3	13.0	4.6	4.0	16.0	16.0
Station 3									
Temperature (°C)									
Day Flood	6.0	12.8	15.2	19.6	18.7	8.8	5.5	6.3	12.6
pH									
Day Flood	8.1	8.4		7.0	7.3	7.7	7.5	7.5	7.2
Salinity (0/00)									
Day Flood	.45	.40	.30	.04	.08	.07	.09	.11	.08
Dissolved Oxygen (mgl)									
Day Flood	12.7	11.1	11.7	9.1	8.8	11.1	12.5	12.6	11.1

	Mar 75	May 75	July 75	Aug 75	Sept 75	Nov 75	Jan 76	Mar 76	May 76
Station 3 (cont.)									
Turbidity (FTU)									
Day Flood	15.0	23.0	22.0	8.2	7.4	3.3	3.2	12.0	10.5
Nitrogent Saturation (%)									
Day Flood		119.8	100.6				106.6		
Station 5									
Temperature (°C)									
Day Flood	6.2	12.9	17.0	19.6	17.2	8.3	5.1	6.7	12.4
pH									
Day Flood	8.1	8.3	8.2	7.2	7.2	7.1	7.0	7.3	6.8
Salinity (0/00)									
Day Flood	.40	.30	.30	.06	.12	.07	.08	.05	.10
Dissolved Oxygen (mgl)									
Day Flood	12.6	10.7	10.7	9.1	8.6	10.7	12.2	12.4	10.9
Turbidity (FTU)									
Day Flood	15.0	23.0	12.0	9.7	5.3	2.8	2.6	14.0	13.0
Nitrogen Saturation (%)									
Day Flood	110.9				98.3			113.3	
Station 10									
Temperature (°C)									
Day Flood	6.4	13.7	14.6	19.7	18.3	7.5	5.6	7.9	12.9

	Mar 75	May 75	July 75	Aug 75	Sept 75	Nov 75	Jan 76	Mar 76	May 76
Station 10 (cont.)									
ph									
Day Flood	8.0	8.3	7.9	7.6	7.4	6.8	6.9	7.4	7.3
Salinity (0/00)									
Day Flood	.30	.30	.30	.04	.12	.07	.10	.17	.12
Dissolved Oxygen (mgl)									
Day Flood	12.5	11.1	10.3	9.0	8.7	11.1	11.8	12.4	11.3
Turbidity (FTU)									
Day Flood	15.0	23.0	22.0	8.0	11.0	2.7	3.2	11.0	10.0
Station 11									
Temperature (°C)									
Day Flood	6.7	14.6	14.6	20.4	19.2	6.3	5.1	7.0	15.0
pH									
Day Flood	8.1	8.0	8.0	7.4	6.8	6.8	7.2	7.4	7.4
Salinity (0/00)									
Day Flood	.35	.30	.30	.05	.07	.13	.14	.12	.12
Dissolved Oxygen (mgl)									
Day Flood	12.5	10.8	10.8	9.4	9.0	11.4	12.3	13.0	11.5
Turbidity (FTU)									
Day Flood	15.0	18.0	18.0	7.0	5.3	12.0	3.3	10.0	9.0
Nitrogen Saturation (%)									
Day Flood									117.7

	Mar 75	May 75	July 75	Aug 75	Sept 75	Nov 75	Jan 76	Mar 76	May 76
Station 12									
Temperature (°C)									
Day Flood	6.0	12.2	14.7	19.8	18.4	7.8	5.6	6.8	12.8
pH									
Day Flood	7.9	8.2	8.2	7.6	6.6	7.2	7.1	7.5	7.5
Salinity (0/00)									
Day Flood	.40	.40	.40	.07	.10	.07	.12	.14	.10
Dissolved Oxygen (mgl)									
Day Flodo	12.3	11.3	11.2	9.2	8.9	11.0	12.4	12.8	
Turbidity (FTU)									
Day Flood	15.0	28.0	19.0	5.8	5.5	7.0	4.0	14.0	8.0
Nitrogen Saturation (%)									
Day Flood	112.3	115.0	100.6	101.0	97.8	102.3		108.9	121.0
Station Snag Island									
Temperature (°C)									
Day Flood	6.6	12.5	14.8	19.5	18.4	7.7	5.8	7.2	13.2
pH									
Day Flood	7.8	8.3	8.1	7.4	7.2	6.8	7.0	7.4	7.8
Salinity (0/00)									
Day Flood	.35	.20	.30	.10	.05	.12	.11	.18	.03

Appendix B2 (Concluded)

	Mar 75	May 75	July 75	Aug 75	Sept 75	Nov 75	Jan 76	Mar 76	May 76
Station Snag Island									
Dissolved Oxygen (mgl)									
Day Flood	12.9	11.5	10.9	9.9	8.5	10.9	12.6	12.8	12.4
Turbidity (FTU)									
Day Flood	20.0	14.0	20.0	7.6	4.9	5.0	3.2	13.0	8.0
Nitrogen Saturation (%)									
Day Flood		114.7	109.5	101.2			104.7	112.4	118.2

APPENDIX B3: WATER QUALITY AT MILLER SANDS,
JULY 1976 - JULY 1977

Appendix Table B3

Table 31. Water Quality at Miller Sands (Appendix)

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 1						
Temperature (°C)						
Day Flood	21.5	18.0	11.4	8.5	12.7	17.1
Day Ebb			11.3	8.6	12.9	17.1
Night Flood	21.9	17.9	11.8	7.9	12.6	18.3
Night Ebb			11.6	6.7	12.5	18.1
pH						
Day Flood	7.8	7.9	7.3	7.9	8.5	7.2
Day Ebb			7.1	8.0	8.5	7.4
Night Flood	6.9	7.7	7.5	7.4	8.9	8.0
Night Ebb			7.5	7.8	8.6	7.4
Salinity (0/00)						
Day Flood	.09	.10	.08	.10	.10	.42
Day Ebb			.14	.11	.10	.42
Night Flood	.05	.10	.08	.12	.14	.18
Night Ebb			.04	.11	.11	.48
Dissolved Oxygen (mgl)						
Day Flood	9.8	8.9	10.3	13.1	11.8	8.0
Day Ebb			10.6	13.0	11.5	8.0
Night Flood	9.6	9.0	10.2	12.3	10.6	8.6
Night Ebb			10.1	13.2	10.3	8.1
Turbidity (FTU)						
Day Flood	7.2	6.5	2.5	4.6	5.2	4.3
Day Ebb			3.0	5.2	6.0	4.6
Night Flood	9.3	10.0	2.1	4.6	6.3	5.8
Night Ebb			2.0	4.0	6.2	6.4
Ammonia (mg N/l)						
Day Flood	<.09	.14	<.09	<.09	<.09	.10
Day Ebb			<.09	<.09	<.09	<.09
Night Flood		<.09	<.09	.10	.10	.15
Night Ebb			<.09	<.09	.10	.14
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	49.0	54.0	55.0	60.0	67.0	51.0
Day Ebb			54.0	60.0	66.0	51.0
Night Flood	50.0	53.0	54.0	61.0	64.0	51.0
Night Ebb			55.0	60.0	65.0	51.0

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 1 (cont.)						
Nitrogen Saturation (%)						
Day Flood						100.1
Day Ebb			97.8		100.5	
Night Flood		99.3				
Night Ebb						
Station 2						
Temperature (°C)						
Day Flood	20.9	18.1	11.7	8.5	12.9	18.0
Day Ebb			11.6	8.8	13.0	18.2
Night Flood			11.9	8.4	12.6	18.3
Night Ebb	21.7	17.7	11.9	7.3	12.7	18.0
pH						
Day Flood	8.0	7.8	7.6	7.7	8.5	7.6
Day Ebb			8.5	8.0	8.5	7.7
Night Flood			7.5	7.4	8.8	8.1
Night Ebb	8.1	7.8	7.5	7.6	8.4	7.9
Salinity (0/00)						
Day Flood	.09	.08	.16	.08	.10	.22
Day Ebb			.16	.12	.10	.18
Night Flood			.16	.10	.18	.20
Night Ebb	.10	.18	.04	.12	.12	.16
Dissolved Oxygen (mgl)						
Day Flood	10.1	9.3	10.1	13.2	11.5	8.6
Day Ebb			10.2	13.2	11.7	9.0
Night Flood			10.0	12.1	10.8	8.8
Night Ebb	9.8	8.9	9.8	13.3	10.9	8.3
Turbidity (FTU)						
Day Flood	4.8	5.0	3.0	4.6	8.0	4.1
Day Ebb			3.2	4.6	6.0	4.5
Night Flood			3.1	5.8	5.8	5.2
Night Ebb	7.0	10.5	2.6	4.3	4.8	6.2
Ammonia (mg N/l)						
Day Flood	<.09	<.09	<.09	<.09	.11	.14
Day Ebb			<.09	<.09	.10	.11
Night Flood			<.09	<.09	.15	.14
Night Ebb	<.09	<.09	<.09	<.09	.13	.12

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 2 (cont.)						
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	49.0	54.0	55.0	60.0	66.0	53.0
Day Ebb			54.0	61.0	68.0	52.0
Night Flood			56.0	60.0	66.0	51.0
Night Ebb	50.0	54.0	54.0	60.0	65.0	52.0
Nitrogen Saturation (%)						
Day Flood						99.4
Day Ebb			98.2		100.9	
Night Flood						
Night Ebb	104.9	100.5				
Station 3						
Temperature (°C)						
Day Flood	21.7	18.2	11.7	6.8	12.7	18.0
Day Ebb			11.6	7.2	12.8	18.6
Night Flood			11.7	7.5	12.7	18.4
Night Ebb	19.2	17.9	11.7	6.8	12.6	18.0
pH						
Day Flood	7.8	7.7	7.5	8.2	8.3	7.9
Day Ebb			7.6	7.8	8.6	8.0
Night Flood			7.4	7.0	8.0	8.5
Night Ebb	7.6	7.6	7.5	7.3	8.5	7.9
Salinity (0/00)						
Day Flood	.10	.08	.12	.10	.10	.12
Day Ebb			.14	.08	.12	.10
Night Flood			.08	.11	.10	.22
Night Ebb	.10	.04	.10	.12	.10	.22
Dissolved Oxygen (mgl)						
Day Flood	9.5	8.9		13.0	11.5	8.6
Day Ebb			10.1	13.2	12.0	8.8
Night Flood			10.1	12.2	10.3	8.5
Night Ebb	9.2	8.8	9.8	13.4	10.7	8.3
Turbidity (FTU)						
Day Flood	7.7	3.5	3.8	5.2		4.4
Day Ebb			3.9	4.0	3.8	4.6
Night Flood			2.0	6.2	5.8	5.0
Night Ebb	8.0	8.0	3.4	4.0	4.8	7.0

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 3 (cont.)						
Ammonia (mg N/l)						
Day Flood	<.09	<.09	<.09	<.09	.10	<.09
Day Ebb			<.09	<.09	<.09	<.09
Night Flood			<.09	<.09	<.09	.13
Night Ebb	<.09	<.09	<.09	<.09	.13	.10
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	48.0	54.0	55.0	60.0	67.0	52.0
Day Ebb			54.0	61.0	69.0	52.0
Night Flood			55.0	60.0	64.0	51.0
Night Ebb	49.0	54.0	55.0	60.0	69.0	51.0
Nitrogen Saturation (%)						
Day Flood						99.8
Day Ebb		98.5		101.5		
Night Flood						
Night Ebb	102.5	99.3				
Station 6						
Temperature (°C)						
Day Flood		18.0	11.4	6.8	12.6	18.1
Day Ebb	22.0		11.2	7.0	12.9	18.4
Night Flood			11.7	7.4	12.8	18.2
Night Ebb	19.1	17.7	11.8	7.4	12.6	18.0
pH						
Day Flood		7.9	7.3	8.0	8.6	7.9
Day Ebb	8.0		7.2	8.0	8.4	7.9
Night Flood			7.9	7.2	8.8	8.2
Night Ebb	7.4	7.0	7.3	7.4	8.5	8.0
Salinity (0/00)						
Day Flood		.08	.12	.04	.13	.12
Day Ebb	.09		.12	.09	.09	.12
Night Flood			.12	.11	.10	.20
Night Ebb	.12	.06	.12	.12	.08	.21
Dissolved Oxygen (mgl)						
Day Flood		9.0	10.2	12.5	11.8	8.8
Day Ebb	9.9		10.4	13.3	11.9	9.0
Night Flood			9.8	12.3	12.5	8.7
Night Ebb	9.3	8.8	10.1	13.4	11.9	8.0

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 6 (cont.)						
Turbidity (FTU)						
Day Flood		5.5	3.0	4.8	5.5	3.4
Day Ebb	6.8		3.0	4.8	4.2	4.5
Night Flood			1.8	3.8	3.8	3.0
Night Ebb	6.0	8.5	3.0	4.2	3.8	6.0
Ammonia (mg N/l)						
Day Flood		<.09	<.09	<.09	<.09	<.09
Day Ebb	<.09		<.09	<.09	<.09	<.09
Night Flood			<.09	<.09	.13	.17
Night Ebb	<.09	<.09	<.09		.10	<.09
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood		55.0	55.0	60.0	67.0	52.0
Day Ebb	48.0		55.0	60.0	68.0	51.0
Night Flood			54.0	61.0	68.0	51.0
Night Ebb	49.0	54.0				
Nitrogen Saturation (%)						
Day Flood						99.6
Day Ebb			98.5		100.4	
Night Flood						
Night Ebb	104.3	99.3		101.1		
Station 9						
Temperature (°C)						
Day Flood	21.7	18.0				
Day Ebb						
Night Flood						
Night Ebb	19.1	17.6				
pH						
Day Flood	8.0	7.7				
Day Ebb						
Night Flood						
Night Ebb	7.5	6.7				

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 9 (cont.)						
Salinity (0/00)						
Day Flood	.10	.08				
Day Ebb						
Night Flood						
Night Ebb	.12					
Dissolved Oxygen (mgl)						
Day Flood	10.2	8.9				
Day Ebb						
Night Flood						
Night Ebb	8.8	8.9				
Turbidity (FTU)						
Day Flood	6.5	6.5				
Day Ebb						
Night Flood						
Night Ebb	7.0	6.5				
Ammonia (mg N/l)						
Day Flood	<.09	<.09				
Day Ebb						
Night Flood						
Night Ebb		<.09				
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	49.0	55.0				
Day Ebb						
Night Flood						
Night Ebb	48.0	57.0				
Nitrogen Saturation (%)						
Day Flood						
Day Ebb						
Night Flood						
Night Ebb		99.5				
Station 10						
Temperature (°C)						
Day Flood	20.3	18.2	11.6	7.1	13.0	8.3
Day Ebb			11.6	7.6	12.9	18.5
Night Flood			11.7	7.3	12.5	18.3
Night Ebb	19.0	18.0	11.7	7.2	12.6	17.9

	July 76	Sept 76	Nov 76	March 77	May 77	Sept 77
Station 10 (cont.)						
pH						
Day Flood	8.1	7.7	7.8	8.0	8.7	7.8
Day Ebb			7.7	7.9	8.5	7.6
Night Flood			8.1	7.5	8.7	8.0
Night Ebb	7.5	7.2	7.9	7.4	8.5	7.9
Salinity (0/00)						
Day Flood	.10	.08	.11	.10	.09	.19
Day Ebb			.12	.12	.17	.11
Night Flood			.11	.10	.12	.22
Night Ebb	.12	.06	.10	.09	.09	.24
Dissolved Oxygen (mgl)						
Day Flood	10.0	9.2	10.0	12.8	11.7	8.6
Day Ebb			10.2	12.8	12.0	9.1
Night Flood			9.8	12.4	12.9	8.3
Night Ebb	9.0	9.2	9.9	13.1	10.5	8.2
Turbidity (FTU)						
Day Flood	4.3	3.5	2.4	4.4	5.2	4.3
Day Ebb			2.6	4.4	4.8	4.6
Night Flood			1.9	4.2	6.0	7.4
Night Ebb	8.0	4.5	2.0	4.8	5.4	4.0
Ammonia (mg N/l)						
Day Flood	<.09	<.09	<.09	<.09	.10	.10
Day Ebb			<.09	<.09	<.09	<.09
Night Flood			<.09	<.09	.12	.15
Night Ebb	<.09	<.09	<.09	<.09	.13	.11
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	49.0	54.0	55.0	60.0	68.0	52.0
Day Ebb			55.0	60.0	68.0	52.0
Night Flood			55.0	61.0	65.0	51.0
Night Ebb	50.0	54.0	55.0	61.0	67.0	51.0
Nitrogen Saturation (%)						
Day Flood						100.3
Day Ebb			98.5		100.4	
Night Flood						
Night Ebb	101.6	101.0		100.5		

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 11						
Temperature (°C)						
Day Flood	20.5	18.2	11.5	6.9	12.9	18.3
Day Ebb			11.6	7.5	12.9	18.7
Night Flood			11.5	7.4	12.8	18.2
Night Ebb	20.9	17.2	11.5	7.3	12.6	18.0
pH						
Day Flood	8.1	7.9	7.8	7.9	8.5	8.0
Day Ebb			7.7	7.8	8.6	8.0
Night Flood			8.1	7.2	8.5	8.7
Night Ebb	9.0	7.4	7.9	7.4	8.5	8.0
Salinity (0/00)						
Day Flood	.10	.08	.11	.10	.12	.18
Day Ebb			.12	.12	.08	.12
Night Flood			.08	.11	.10	.84
Night Ebb	.10	.06	.09	.12	.17	.24
Dissolved Oxygen (mgl)						
Day Flood	9.9	9.2	10.1	12.6	11.6	8.6
Day Ebb			10.2	13.2	11.9	8.9
Night Flood			9.9	11.7	10.8	8.2
Night Ebb	9.9	8.4	10.0	13.1	10.8	8.4
Turbidity (FTU)						
Day Flood	4.2	3.0	2.1	4.6	4.0	3.8
Day Ebb			2.0	5.0	4.8	3.0
Night Flood			1.5	3.4	4.5	3.8
Night Ebb	5.5	6.0	1.7	4.0	5.0	4.2
Ammonia (mg N/1)						
Day Flood	<.09	<.09	<.09	.11	<.09	<.09
Day Ebb			<.09	<.09	<.09	<.09
Night Flood			<.09	<.09	.15	.15
Night Ebb	<.09	<.09	<.09	<.09	.13	.10
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	48.0	53.0	54.0	58.0	67.0	51.0
Day Ebb			53.0	60.0	68.0	51.0
Night Flood			54.0	60.0	70.0	52.0
Night Ebb	47.0	56.0	54.0	60.0	67.0	51.0

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 11 (cont.)						
Nitrogen Saturation (%)						
Day Flood						99.2
Day Ebb			98.0		100.0	
Night Flood						
Night Ebb	105.0	99.5		100.7		
Station 12						
Temperature (°C)	19.7	18.2	11.4	6.9	12.9	18.4
Day Flood			11.3		12.7	18.6
Day Ebb			11.5	6.8	12.8	18.7
Night Flood	18.8	18.2	11.5	6.8	12.2	18.3
Night Ebb						
pH						
Day Flood	7.8	8.1	7.8	7.4	8.5	7.8
Day Ebb			7.9		8.6	8.0
Night Flood			7.7	7.9	8.9	7.8
Night Ebb	7.7	8.1	7.7	7.5	8.7	7.6
Salinity (0/00)						
Day Flood	.10	.10	.11	.10	.12	.92
Day Ebb			.12		.10	1.22
Night Flood			.14	.10	.12	.28
Night Ebb	.12	.05	.14	.12	.11	.58
Dissolved Oxygen (mgl)						
Day Flood	10.0	9.2	10.5	12.8	11.6	8.5
Day Ebb			10.6		12.0	8.6
Night Flood			10.4	12.3	10.5	8.5
Night Ebb	9.5	9.4	10.5	13.3	10.6	8.4
Turbidity (FTU)						
Day Flood	6.0	4.7	3.0	4.3	3.0	2.7
Day Ebb			4.2		6.0	1.8
Night Flood			1.8	4.2	3.5	2.6
Night Ebb	8.0	5.5	2.0	4.2	3.5	3.4
Ammonia (mg N/1)						
Day Flood	<.09	.11	<.09	<.09	<.09	<.09
Day Ebb			<.09		<.09	<.09
Night Flood			<.09	.10	<.09	<.09
Night Ebb	<.09	.12	<.09	<.09	.11	<.09

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station 12 (cont.)						
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood	50.5	50.0	55.0	62.0	68.0	51.0
Day Ebb			55.0		68.0	51.0
Night Flood			55.0	61.0	66.0	51.0
Night Ebb	50.0	54.0	55.0	59.0	66.0	51.0
Nitrogen Saturation (%)						
Day Flood						99.8
Day Ebb			98.0		101.7	
Night Flood						
Night Ebb	104.5	102.1		101.9		
Station A						
Temperature (°C)						
Day Flood		17.0				
Day Ebb	21.9					
Night Flood						
Night Ebb	22.3	17.6				
pH						
Day Flood		7.9				
Day Ebb	7.9					
Night Flood						
Night Ebb	6.7	7.6				
Salinity (0/00)						
Day Flood		.07				
Day Ebb	.12					
Night Flood						
Night Ebb	.10	.08				
Dissolved Oxygen (mgl)						
Day Flood		8.6				
Day Ebb	9.8					
Night Flood						
Night Ebb	10.0	8.5				
Turbidity (FTU)						
Day Flood		10.0				
Day Ebb	7.0					
NIght Flood						
Night Ebb	9.5	10.5				

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station A (cont.)						
Ammonia (mg N/l)						
Day Flood		<.09				
Day Ebb	<.09					
Night Flood						
Night Ebb	<.09	<.09				
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood		54.0				
Day Ebb	49.0					
Night Flood						
Night Ebb	51.0	54.0				
Nitrogen Saturation (%)						
Day Flood						
Day Ebb						
Night Flood						
Night Ebb	110.3	97.9				
Station B						
Temperature (^{o}C)						
Day Flood		17.0				
Day Ebb	22.3					
Night Flood						
Night Ebb	22.1	17.5				
pH						
Day Flood		7.7				
Day Ebb	7.9					
Night Flood						
Night Ebb	7.8	7.7				
Salinity (0/00)						
Day Flood		.07				
Day Ebb	.10					
Night Flood						
Night Ebb	.10	.10				
Dissolved Oxygen (mgl)						
Day Flood		8.9				
Day Ebb	10.2					
Night Flood						
Night Ebb	9.7	8.5				

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station B (cont.)						
Turbidity (FTU)						
Day Flood		9.5				
Day Ebb	7.5					
Night Flood						
Night Ebb	10.0	10.0				
Ammonia (mg N/l)						
Day Flood		<.09				
Day Ebb	<.09					
Night Flood						
Night Ebb	<.09	<.09				
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood		54.0				
Day Ebb	50.0					
Night Flood						
Night Ebb	48.0	56.0				
Nitrogen Saturation (%)						
Day Flood						
Day Ebb						
Night Flood						
Night Ebb	107.8	98.1				
Station C						
Temperature (°C)						
Day Flood		18.0	11.9	9.1	12.6	17.8
Day Ebb	22.1		11.9	8.5	12.8	18.0
Night Flood			11.9	8.4	12.6	18.0
Night Ebb	21.9	17.7	12.0	7.7	12.4	18.0
pH						
Day Flood		7.8	7.6	7.8	8.8	7.8
Day Ebb	8.0		7.1	8.2	8.7	7.8
Night Flood			7.7	7.3	8.9	7.9
Night Ebb	8.4	7.3	7.9	7.7	8.2	7.6
Salinity (0/00)						
Day Flood		.04	.13	.10	.10	.25
Day Ebb	.11		.12	.13	.10	.21
Night Flood			.02	.11	.14	.21
Night Ebb	.05	.02	.14	.11	.11	.20

	July 76	Sept 76	Nov 77	March 76	May 77	July 77
Station C (cont.)						
Dissolved Oxygen (mgl)						
Day Flood		8.5	10.0	13.2	11.7	8.4
Day Ebb	9.8		10.0	13.2	11.6	8.6
Night Flood			10.0	12.4	10.4	8.2
Night Ebb	9.6	8.7	10.0	13.0	10.2	8.1
Turbidity (FTU)						
Day Flood		9.0	3.0	5.8	5.8	4.0
Day Ebb	7.0		3.4	4.8	5.9	4.2
Night Flood			2.8	4.8	4.2	7.2
Night Ebb	11.0	9.5	2.8	4.3	4.5	8.2
Ammonia (mg N/l)						
Day Flood		<.09	<.09	<.09	.15	<.09
Day Ebb	<.09		<.09	<.09	.11	<.09
Night Flood			<.09	<.09	.12	.16
Night Ebb	<.09	<.09	<.09	<.09	.18	.14
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood		54.0	54.0	60.0	68.0	50.0
Day Ebb	49.0		54.0	60.0	68.0	51.0
Night Flood			55.0	61.0	68.0	53.0
Night Ebb	51.0	54.0	55.0	61.0	68.0	52.0
Nitrogen Saturation(%)						
Day Flood						99.1
Day Ebb			97.7		101.7	
Night Flood	106.1	98.1		100.8		
Night Ebb						
Station D						
Temperature (^oC)						
Day Flood		18.0				
Day Ebb	22.2					
Night Flood						
Night Ebb	20.9	17.6				
pH						
Day Flood		8.7				
Day Ebb	7.8					
Night Flood						
Night Ebb	8.3	7.8				

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station D (cont.)						
Salinity (0/00)						
Day Flood		.07				
Day Ebb	.16					
Night Flood						
Night Ebb	.11	.07				
Dissolved Oxygen (mgl)						
Day Flood		8.6				
Day Ebb	8.9					
Night Flood						
Night Ebb	9.6	8.7				
Turbidity (FTU)						
Day Flood		8.0				
Day Ebb	7.0					
Night Flood						
Night Ebb	9.0	9.5				
Ammonia (mg N/l)						
Day Flood		<.09				
Day Ebb	<.09					
Night Flood						
Night Ebb	<.09	<.09				
Total Alkalinity (mg/l, $CaCo_3$)						
Day Flood		55.0				
Day Ebb	48.0					
Night Flood						
Night Ebb	48.0	55.0				
Nitrogen Saturation (%)						
Day Flood						
Day Ebb						
Night Flood						
Night Ebb	103.4	97.9				
Station E						
Temperature (°C)						
Day Flood		17.9	11.9	8.4	12.2	16.8
Day Ebb	21.7		11.8	8.6	13.0	17.1
Night Flood			11.9	8.0	12.2	18.3
Night Ebb	22.1	17.8	12.0	8.0	12.0	18.2

Appendix B3 (Concluded)

	July 76	Sept 76	Nov 76	March 77	May 77	July 77
Station E (cont.)						
pH						
Day Flood		7.7	7.6	7.9	8.2	7.4
Day Ebb	8.0		7.5	8.2	8.7	7.5
Night Flood			7.3	7.5	8.7	7.8
Night Ebb	8.0	7.3	8.2	7.7	8.0	7.6
Salinity (0/00						
Day Flood		.06	.14	.11	.10	.45
Day Ebb	.05		.14	.13	.16	.36
Night Flood			.08	.11	.14	.20
Night Ebb	.11	.04	.13	.12	.12	.20
Dissolved Oxygen (mgl)						
Day Flood		8.4	10.0	13.2	11.5	7.5
Day Ebb	9.9		10.0	13.1	11.6	8.1
Night Flood			10.1	12.4	10.3	8.4
Night Ebb	9.6	8.7	10.0	12.7	8.7	8.0
Turbidity (FTU)						
Day Flood		10.0	3.5	5.4	5.5	4.4
Day Ebb	6.5		3.3	5.2	9.0	5.1
Night Flood			2.6	5.0	6.0	7.0
Night Ebb	8.0	9.5	4.0	3.7	6.0	7.0
Ammonia (mg N/1)						
Day Flood		<.09	<.09	<.09	.14	<.09
Day Ebb	<.09		<.09	<.09	<.09	<.09
Night Flood			<.09	<.09	.15	.16
Night Ebb	<.09	<.09	<.09	<.09	.20	.12
Total Alkalinity (mg/1, $CaCo_3$)						
Day Flood		54.0	55.0	60.0	67.0	54.0
Day Ebb	49.0		54.0	61.0	67.0	53.0
Night Flood			59.0	61.0	68.0	52.0
Night Ebb	50.0	54.0	55.0	61.0		52.0
Nitrogen Saturation (%)						
Day Flood						98.8
Day Ebb			98.3		101.7	
Night Flood						
Night Ebb	105.4	98.8		101.2		

APPENDIX B4: NEKTON CAPTURED AT EACH STATION AND SAMPLING PERIOD, MARCH 1975-MAY 1976

Appendix Table B4

Nekton Captured at Each Station and Sampling Period--March 1975-May 1976.

March 1975

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	6	8	5	5	5
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	1	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	1	1	-	2	3
American Shad *Alosa sapidissima*	-	-	-	-	-
Starry Flounder *Platichthys stellotus*	7	-	1	7	2
Peamouth *Mylocheilus caurinus*	-	-	-	-	-
Sucker *Catostomus macrocheilus*	-	-	-	-	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Scokeye *Oncorhynchus nerka*	-	-	-	-	-

May 1975

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	162	108	87	49	59
Coho Salmon *Oncorhynchus kisutch*	-	-	3	-	-
Chum Salmon *Oncorhynchus keta*	-	3	2	-	2
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	-	43	5	1	4
American Shad *Alosa sapidissima*	-	9	-	4	1
Starry Flounder *Platichthys stellotus*	-	2	16	15	6
Peamouth *Mylocheilus caurinus*	-	27	-	-	-
Sucker *Catostomus macrocheilus*	-	-	1	-	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	;	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	1	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

July 1975

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	90	1	37	9	34
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	13	-	1	2	4
American Shad *Alosa sapidissima*	-	-	-	-	-
Starry Flounder *Platichthys stellotus*	4	10	168	58	98
Peamouth *Mylocheilus caurinus*	4	-	7	-	2
Sucker *Catostomus macrocheilus*	-	-	-	-	-
Carp *Cyprinus carpio*	-	-	-	-	1
Sculpin *Cottus sp*	-	-	-	-	1
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

August 1975

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	1	31	3	-	5
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	-	-	2	-	-
American Shad *Alosa sapidissima*	-	-	-	-	1
Starry Flounder *Platichthys stellotus*	2	2	16	2	2
Peamouth *Mylocheilus caurinus*	-	-	2	-	2
Sucker *Catostomus macrocheilus*	-	1	3	1	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitfish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

September 1975

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	31	2	16	2	-
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchul thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	16	-	-	-	-
American Shad *Alosa sapidissima*	1	-	3	-	-
Starry Flounder *Platichthys stellotus*	5	-	15	10	6
Peamouth *Mylocheilus caurinus*	-	28	6	3	2
Sucker *Catostomus macrocheilus*	4	-	1	-	-
Carp *Cyprinus carpio*	-	-	1	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

November 1975

Species	Station 12	Station 2	Station 3	Station 10	Station 11
Chinook Salmon *Oncorhynchus tshawytscha*	1	2	-	-	-
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	2	-
Threespine Stickleback *Gasterosteus aculeatus*	2	2	-	8	-
American Shad *Alosa sapidissima*	-	-	-	-	-
Starry Flounder *Platichthys stellotus*	1	-	1	2	-
Peamouth *Mylocheilus caurinus*	-	-	-	-	2
Sucker *Catostomus macrocheilus*	-	-	-	-	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

January 1976

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	-	-	2	1	3
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	1	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	1	1	-	3	3
American Shad *Alosa sapidissima*	5	-	-	-	-
Starry Flounder *Platichthys stellotus*	-	1	2	1	4
Peamouth *Mylocheilus caurinus*	-	-	-	-	-
Sucker *Catostomus macrocheilus*	-	6.	1	-	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	5	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

March 1976

Species	12	2	3	10	11
			Station		
Chinook Salmon *Oncorhynchus tshawytscha*	3	19	14	74	27
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	-
Chum Salmon *Oncorhynchus keta*	-	-	-	1	-
Eulachon *Thaleichthys pacificus*	-	-	1	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	1	1	7	-	1
American Shad *Alosa sapidissima*	-	-	-	-	-
Starry Flounder *Platichthys stellotus*	-	-	19	-	1
Peamouth *Mylocheilus caurinus*	-	-	1	-	1
Sucker *Catostomus macrocheilus*	-	-	2	-	-
Carp *Cyprinus carpio*	-	-	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	1	-
Steelhead *Salmo gairdneri*	-	-	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	-	-	-	-	-

Appendix Table B4 (concluded)

May 1976

Species	Station 12	2	3	10	11
Chinook Salmon *Oncorhynchus tshawytscha*	2152	47	6	89	388
Coho Salmon *Oncorhynchus kisutch*	-	-	-	-	1
Chum Salmon *Oncorhynchus keta*	-	-	-	-	-
Eulachon *Thaleichthys pacificus*	-	-	-	-	-
Longfin Smelt *Spirinchus thaleichthys*	-	-	-	-	-
Threespine Stickleback *Gasterosteus aculeatus*	4	7	-	-	5
American Shad *Alosa sapidissima*	51	14	2	7	12
Starry Flounder *Platichthys stellotus*	5	-	2	10	2
Peamouth *Mylocheilus caurinus*	-	54	-	-	1
Sucker *Catostomus macrocheilus*	5	-	-	-	1
Carp *Cyprinus carpio*	-	1	-	-	-
Sculpin *Cottus sp*	-	-	-	-	-
Whitefish *Prosopium williamsoni*	-	-	-	-	-
Steelhead *Salmo gairdneri*	-	2	-	-	-
Lamprey *Entosphenus tridentatus*	-	-	-	-	-
Sockeye *Oncorhynchus nerka*	1	-	-	-	-

APPENDIX B5: NEKTON CAPTURED AND MEAN WEIGHT (IN GRAMS) PER INDIVIDUAL AT EACH STATION AND SAMPLING TIME, MILLER SANDS 1976 - 1977

Appendix Table B5

Nekton Captured and Mean Weight (in Grams) Per Individual at Each Station and Sampling Time
Miller Sands 1976 - 1977

Species: Peamouth Chub *Mylocheilus caurinus*

<u>Size Class 26-50 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	17	.91	6	1.03	-	-	-	-	-	-	-	-
Sta 2 - Night	2	.74	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	3	.93	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	1	1.15	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	2	1.22	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	1	.75	-	-	-	-	-	-	-	-	-	-
Total Day	17	.91	9	1.31	-	-	-	-	-	-	-	-
SD		(.173)		(.130)								
Total Night	3	.74	3	1.20	-	-	-	-	-	-	-	-
SD		(.125)		(.051)								

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 26-50 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	5	.79	8	.92	-	-	-	-	-	-	-	-
Sta A - Night	2	.54	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	1	.80	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	1	.90
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	53	.78	-	-	-	-	-	-	1	.60
Sta D - Night	2	.79	5	.87	-	-	1	1.25	-	-	2	1.05
Sta E - Day	-	-	2	.75	-	-	-	-	-	-	-	-
Sta E - Night	3	.66	8	.81	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	1	.95	-	-	-	-	-	-	-	-	-	-
Total Day	5	.79	64	.80	-	-	-	-	-	-	1	.60
SD		(.193)		(.202)								
Total Night	8	.70	13	.83	-	-	1	1.25	-	-	3	1.00
SD		(.148)		(.247)								

Species Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 51-75 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	8	1.61	89	2.03	-	-	-	-	1	4.40	-	-
Sta 2 - Night	-	-	13	2.68	2	1.50	1	3.00	-	-	-	-
Sta 3 - Day	-	-	31	1.93	-	-	1	3.00	-	-	-	-
Sta 3 - Night	-	-	213	2.34	1	2.40	1	3.00	-	-	-	-
Sta 5 - Day	-	-	5	1.86	-	-	-	-	1	3.90	-	-
Sta 5 - Night	-	-	96	2.41	2	1.70	-	-	1	2.20	-	-
Sta 9 - Day	6	1.85	12	2.12	-	-	-	-	-	-	-	-
Sta 9 - Night	1	3.86	57	2.35	1	2.00	-	-	-	-	-	-
Sta 10 - Day	-	-	6	2.21	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	11	2.28	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	5	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	12	2.59	-	-	-	-	-	-	-	-
Total Day	14	1.71	148	2.02	-	-	1	3.00	2	4.15		
SD		(.403)		(.333)						(.353)		
Total Night	1	3.86	402	2.37	6	1.80	2	3.00	1	2.20	-	-
SD				(.374)		(.572)						

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 51-75 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	11	1.47	-	-	-	-	1	3.80	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	8	1.94	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	1	1.80	-	-	-	-	-	-
Sta C - Day	-	-	11	2.07	1	-	-	-	-	-	-	-
Sta C - Night	-	-	4	2.04	-	-	-	-	-	-	-	-
Sta D - Day	-	-	45	1.79	3	1.40	-	-	-	-	-	-
Sta D - Night	-	-	16	1.78	6	4.80	-	-	1	3.50	4	2.04
Sta E - Day	-	-	2	2.23	1	1.50	-	-	-	-	-	-
Sta E - Night	-	-	11	1.66	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	77	1.81	5	1.43	-	-	1	3.80	-	-
SD				(.508)		(.096)						
Total Night	-	-	31	1.79	7	4.37	-	-	1	3.50	4	2.04
SD				(.698)		(.096)						(.386)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	2	7.25	1	4.55	-	-	-	-	6	6.25	-	-
Sta 2 - Night	-	-	6	5.66	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	4	8.00
Sta 5 - Day	126	8.96	-	-	-	-	-	-	125	5.56	-	-
Sta 5 - Night	9	9.22	1	4.20	-	-	-	-	1	2.20	-	-
Sta 9 - Day	2	9.00	-	-	-	-	-	-	1	9.00	-	-
Sta 9 - Night	-	-	2	7.00	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	1	10.00	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	4	4.35	-	-	-	-	-	-	3	9.67
Total Day	130	8.93	1	4.55	-	-	-	-	132	5.62	-	-
SD		(2.302)								(1.546)		
Total Night	10	9.30	13	5.35	-	-	-	-	1	2.20	7	8.72
SD		(1.337)		(1.231)								(1.380)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 76-100 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	1	7.00	1	3.88	1	5.40	-	-	-	-	3	7.00
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	3	6.33
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	7	4.57	-	-	-	-	-	-	-	-
Sta C - Night	3	6.33	2	4.80	-	-	-	-	-	-	1	7.00
Sta D - Day	5	3.70	3	6.00	-	-	-	-	-	-	1	7.00
Sta D - Night	3	5.67	-	-	-	-	-	-	-	-	2	6.00
Sta E - Day	-	-	-	-	-	-	-	-	-	-	2	4.80
Sta E - Night	-	-	-	-	-	-	-	-	1	5.20	1	9.00
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	6	4.25	11	4.90	1	5.40	-	-	-	-	9	6.29
SD		(1.541)		(1.025)								(1.703)
Total Night	6	6.00	2	4.80	-	-	-	-	1	5.20	4	7.00
SD		(2.097)		(.570)								(2.828)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

<u>Size Class 101-125 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	3	6.67	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	2	8.00	3	16.67	-	-	-	-	-	-	-	-
Sta 3 - Day	2	16.50	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	1	18.50	-	-	-	-	-	-	19	11.11
Sta 5 - Day	130	13.29	-	-	-	-	-	-	-	-	2	14.50
Sta 5 - Night	1431	13.46	1	16.50	-	-	-	-	-	-	1	11.00
Sta 9 - Day	8	11.06	-	-	-	-	-	-	1	10.00	-	-
Sta 9 - Night	66	11.39	3	16.83	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	1	9.50	-	-	-	-	-	-
Sta 10 - Night	1	18.00	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	1	20.00	1	61.00	-	-	-	-	-	-	23	13.67
Total Day	143	13.07	-	-	1	9.50	-	-	1	10.00	2	14.50
SD		(3.52)										(2.12)
Total Night	1501	13.37	9	21.83	-	-	-	-	-	-	43	12.48
SD		(3.27)		(2.18)								(2.65)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 101-125 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	3	10.17	-	-	-	-	-	-	5	10.40
Sta A - Night	-	-	-	-	-	-	-	-	-	-	2	12.00
Sta B - Day	1	10.00	-	-	-	-	-	-	-	-	2	8.00
Sta B - Night	-	-	1	13.00	-	-	-	-	-	-	2	13.50
Sta C - Day	1	15.00	-	-	-	-	-	-	-	-	4	9.38
Sta C - Night	1	9.00	1	14.00	-	-	-	-	-	-	4	11.75
Sta D - Day	-	-	5	16.40	-	-	-	-	1	8.00	4	8.75
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	12.00
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	1	15.00	-	-	-	-	-	-	1	15.00
Sta 6 - Day	-	-	1	16.00	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	2	12.50	9	14.28	-	-	-	-	1	8.00	15	9.37
SD		(3.54)		(1.87)								(1.76
Total Night	1	9.00	3	14.00	-	-	-	-	-	-	10	12.50
SD				(1.00)								(2.59)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 126-150 mm

	July 76		Sept 76		Nov 77		March 76		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	1	23.00	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	5	22.50	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	1	28.00	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	2	24.50	1	20.00	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	1	20.00	-	-
Sta 5 - Night	2	17.00	4	17.75	-	-	-	-	2	27.50	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	4	19.50	1	25.00	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	2	15.00	1	26.50	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	4	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	6	20.17	1	15.50	-	-	-	-	2	20.75
Total Day	-	-	6	25.50	-	-	-	-	1	26.00	-	-
SD				(3.536)								
Total Night	8	17.75	19	21.32	2	17.75	-	-	2	27.50	2	20.75
SD		(4.621)		(3.309)		(3.180)				(13.435)		(1.768)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 126-150 mm

Fyke Net	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	-	-	7	19.93	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	1	10.00	-	-	-	-	-	-
Sta B - Day	-	-	3	18.67	-	-	-	-	2	30.00	2	16.00
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	5	19.10	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	4	16.88	-	-	-	-	1	18.00	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	1	22.00	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	1	21.50	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	21	19.14	-	-	-	-	3	24.00	2	16.00
SD				(3.738)						(7.210)		(1.414)
Total Night	-	-	-	-	1	10.00	-	-	-	-	-	-
SD												

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	1	48.00	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	1	53.50	-	-	-	-	2	42.00	-	-
Sta 3 - Night	-	-	1	33.50	-	-	-	-	-	-	1	29.00
Sta 5 - Day	2	38.50	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	2	38.50	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	1	38.00	3	51.33	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	1	50.00	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	2	42.50	1	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	38.00
Total Day	4	40.50	2	53.50	-	-	-	-	2	42.00	-	-
SD		(2.309)										
Total Night	2	44.00	7	44.64	-	-	-	-	-	-	2	33.50
SD		(8.485)		(8.148)								(6.364)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 151-175 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	1	45.00	-	-	-	-	-	-	1	45.00
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	1	42.00	-	-	-	-	-	-	1	52.00	-	-
Sta B - Night	1	42.00	-	-	-	-	-	-	1	59.00	2	41.50
Sta C - Day	-	-	6	43.33	-	-	-	-	-	-	1	30.00
Sta C - Night	-	-	-	-	-	-	-	-	1	49.00	1	51.00
Sta D - Day	-	-	2	43.50	-	-	-	-	-	-	3	39.00
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	47.00
Sta E - Day	-	-	2	47.25	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	1	44.00
Sta 6 - Day	1	36.00	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	2	39.00	11	44.23	-	-	-	-	1	52.00	5	38.40
SD		(4.24)		(3.281)								(5.771)
Total Night	1	42.00	-	-	-	-	-	-	2	54.00	5	45.00
SD										(7.071)		(4.416)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 176-200 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	1	61.00	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	2	54.00	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	12	65.33	-	-
Sta 3 - Night	2	55.00	2	52.00	-	-	-	-	1	84.00	2	84.00
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	9	57.50	1	58.00	-	-	1	69.00	1	54.00
Sta 9 - Day	-	-	-	-	-	-	-	-	1	69.00	-	-
Sta 9 - Night	1	55.00	14	51.12	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	1	48.00	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	1	78.00	1	43.00	1	63.00	-	-	-	-	-	-
Total Day	-	-	1	61.00	-	-	-	-	13	65.61	-	-
SD										(8.949)		
Total Night	5	58.20	28	56.15	2	61.00	-	-	2	76.50	3	74.00
SD		(11.670)		(7.350)		(3.536)				(10.607)		(17.776)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 176-200 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	5	47.38	-	-	-	-	2	57.00	1	85.00
Sta A - Night	-	-	-	-	-	-	-	-	1	70.00	-	-
Sta B - Day	3	49.67	-	-	-	-	-	-	6	67.00	-	-
Sta B - Night	-	-	-	-	-	-	-	-	2	63.50	-	-
Sta C - Day	-	-	3	60.67	-	-	-	-	1	60.00	-	-
Sta C - Night	-	-	1	48.00	-	-	-	-	-	-	1	82.00
Sta D - Day	-	-	1	61.00	-	-	-	-	-	-	-	-
Sta D - Night	-	-	1	71.00	-	-	-	-	-	-	1	53.00
Sta E - Day	1	58.00	1	73.00	-	-	-	-	1	68.00	2	84.00
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	1	50.00	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	4	51.75	10	56.29	-	-	-	-	11	63.09	3	84.33
SD		(6.850)		(8.157)						(9.864)		(4.040)
Total Night	-	-	2	60.00	-	-	-	-	3	65.67	2	67.50
SD				(12.042)						(5.859)		(20.506)

167

168

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

<u>Size Class 201-250 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	1	88.00	3	95.33	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	3	77.25	-	-	1	88.00	10	109.10	1	108.00
Sta 3 - Night	-	-	1	104.00	1	96.00	-	-	2	95.50	1	102.00
Sta 5 - Day	2	109.00	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	7	75.73	-	-	-	-	-	-	1	107.00
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	10	120.55
Sta 9 - Night	-	-	2	102.50	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	1	89.00	-	-	-	-	-	-
Sta 11 - Day	1	93.70	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	2	117.50	5	119.40	-	-	-	-	1	138.00
Total Day	3	103.70	3	77.25	-	-	1	88.00	10	109.10	11	119.41
SD		(10.504)		(3.180						(19.440)		(20.038)
Total Night	1	88.00	15	99.67	7	111.71	-	-	2	95.50	3	110.78
				(17.483)		(22.088)				(4.950)		(21.879)

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 201-250 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	1	67.00	-	-	-	-	-	-	1	73.00	2	104.50
Sta B - Night	-	-	-	-	1	81.00	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	1	123.00
Sta C - Night	-	-	2	64.00	-	-	-	-	-	-	4	101.00
Sta D - Day	4	89.95	-	-	-	-	-	-	-	-	1	92.00
Sta D - Night	1	88.00	-	-	-	-	-	-	-	-	-	-
Sta E - Day	3	85.67	4	82.25	-	-	-	-	1	100.00	11	80.07
Sta E - Night	-	-	1	116.00	-	-	-	-	-	-	1	104.00
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	1	82.00
Total Day	8	85.38	4	81.33	-	-	-	-	2	86.50	15	96.87
SD		(12.188)		(9.390)						(19.092)		(16.039)
Total Night	1	88.00	3	38.67	1	81.00	-	-	-	-	6	98.33
SD				(30.551)								(12.098)

169
170

Species: Peamouth Chub *Mylocheilus caurinus* (cont.)

Size Class 251-300 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	1	169.00	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	1	199.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	2	212.00
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	1	168.00	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	2	136.50	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	2	235.50	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	2	241.5	-	-	-	-	-	-
Total Day	2	235.50	-	-	-	-	-	-	1	199.00	-	-
SD		(20.510)										
Total Night	-	-	4	152.50	2	241.5	-	-	-	-	2	212.00
SD				(31.670)		(43.134)						(59.397)

Species: Peamouth Chub *Mylocheilus caurinus* **(cont.)**

Size Class 301-350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	1	329.00	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	1	405.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	1	290.00	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	1	329.00	-	-	-	-	1	405.00	-	-
SD												
Total Night	-	-	-	-	-	-	-	-	1	290.00	-	-
SD												

Species: Chinook Salmon *Oncorhynchus tshawytscha*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	350	.91	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	31	.10	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	156	1.04	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	32	1.03	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	112	.83	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	12	.94	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	160	1.14	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	36	.96	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	2	1.10	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	134	.94	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	12	.88	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	21	.71	-	-	-	-
Total Day	-	-	-	-	-	-	792	.97	-	-	-	-
SD								(.107)				
Total Night	-	-	-	-	-	-	266	.84	-	-	-	-
SD								(.269)				

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 26-50 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Net	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	-	-	-	-	-	-	1	.85	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	1	.92	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	2	.77	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	1	.85	-	-	-	-
SD												
Total Night	-	-	-	-	-	-	3	.82	-	-	-	-
SD								(.106)				

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 51-75 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	7	1.73	2	5.00	-	-
Sta 2 - Night	-	-	-	-	-	-	6	1.73	1	4.00	1	2.20
Sta 3 - Day	-	-	-	-	-	-	4	1.68	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	7	1.49	1	6.00	2	2.85
Sta 5 - Day	-	-	-	-	-	-	4	1.65	1	2.00	4	3.85
Sta 5 - Night	-	-	-	-	-	-	4	1.55	3	3.43	-	-
Sta 9 - Day	-	-	-	-	-	-	4	1.93	2	5.50	-	-
Sta 9 - Night	-	-	-	-	-	-	6	1.63	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	1	1.60	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	10	2.02	-	-	2	3.25
Sta 11 - Day	-	-	-	-	-	-	12	2.03	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	13	1.68	-	-	-	-
Total Day	-	-	-	-	-	-	32	1.85	5	4.60	4	3.85
SD								(.217)		(1.475)		(.590)
Total Night							46	1.71	5	4.06	5	2.88
SD								(.213)		(1.113)		(.429)

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 51-75 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	1	4.30
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	1	1.50	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	2.10
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	1	1.50	-	-	1	4.30
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	1	2.10

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

<u>Size Class 76-100 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	56	8.57	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	7	8.64	1	8.00
Sta 3 - Day	-	-	-	-	-	-	-	-	29	8.55	6	8.92
Sta 3 - Night	-	-	1	7.00	-	-	-	-	43	7.48	4	5.70
Sta 5 - Day	-	-	-	-	-	-	-	-	93	7.58	22	6.71
Sta 5 - Night	-	-	-	-	-	-	-	-	13	7.12	38	9.12
Sta 9 - Day	-	-	-	-	-	-	-	-	30	9.39	5	9.08
Sta 9 - Night	-	-	-	-	-	-	-	-	23	9.73	5	8.62
Sta 10 - Day	-	-	-	-	-	-	-	-	28	8.76	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	10	8.75	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	10	8.95	-	-
Sta 11 - Night	6	11.50	-	-	-	-	-	-	1	10.00	1	10.00
Total Day	-	-	-	-	-	-	-	-	246	8.33	33	7.47
SD										(1.417)		(1.000)
Total Night	6	11.50	1	7.00	-	-	-	-	97	8.27	49	8.78
SD										(2.311)		(1.008)

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 76-100 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	2	4.25
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	2	5.15
Sta D - Night	1	5.00	-	-	-	-	-	-	-	-	1	9.00
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	4	4.70
SD												(.636)
Total Night	1	5.00	-	-	-	-	-	-	-	-	1	9.00
SD												

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 101-125 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	1	9.00	2	12.50	1	12.00	12	10.63	4	14.63
Sta 2 - Night	-	-	2	17.00	-	-	-	-	1	12.00	2	11.50
Sta 3 - Day	1	16.50	1	13.00	-	-	-	-	10	13.50	5	11.20
Sta 3 - Night	1	11.10	2	16.50	1	11.00	1	14.70	15	13.05	20	12.00
Sta 5 - Day	-	-	-	-	-	-	-	-	8	10.75	17	12.69
Sta 5 - Night	-	-	3	15.33	-	-	1	15.00	6	9.83	39	13.31
Sta 9 - Day	-	-	-	-	-	-	-	-	10	12.40	12	14.08
Sta 9 - Night	-	-	4	13.23	-	-	-	-	27	12.96	54	13.65
Sta 10 - Day	-	-	-	-	1	12.00	1	17.00	9	11.56	6	10.92
Sta 10 - Night	-	-	1	11.50	1	14.00	-	-	10	9.80	61	13.33
Sta 11 - Day	1	12.00	1	18.70	-	-	-	-	11	12.50	8	13.69
Sta 11 - Night	70	15.62	10	15.50	1	19.50	-	-	7	11.00	50	16.74
Total Day	2	14.25	3	13.57	3	12.33	2	14.50	60	11.90	52	12.97
SD		(3.182)		(4.875)		(.455)		(3.536)		(1.050)		(1.148)
Total Night	71	15.38	22	15.11	3	14.83	2	14.70	66	11.99	226	14.02
SD		(2.410)		(1.372)		(4.328)		(.354)		(1.470)		(1.553)

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 101-125 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Met	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	11.00
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	1	11.00
SD												

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 126-150 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	4	20.06	-	-	1	26.00	-	-	-	-
Sta 3 - Day	-	-	2	25.25	-	-	-	-	-	-	1	20.00
Sta 3 - Night	-	-	9	20.06	3	23.00	1	26.00	5	23.80	1	19.00
Sta 5 - Day	-	-	-	-	1	15.00	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	1	22.50	3	20.33	-	-	-	-	-	-
Sta 9 - Night	-	-	3	20.33	1	24.00	-	-	1	22.00	-	-
Sta 10 - Day	-	-	-	-	-	-	1	22.00	-	-	-	-
Sta 10 - Night	-	-	-	-	2	21.50	-	-	2	19.00	2	20.00
Sta 11 - Day	-	-	2	-	2	21.00	-	-	3	25.33	1	23.10
Sta 11 - Night	1	23.50	3	20.00	2	25.00	-	-	-	-	5	23.10
Total Day	-	-	5	24.33	6	19.64	1	22.00	3	25.33	2	18.00
SD				(1.660)		(2.300)				(3.510)		(2.830)
Total Night	1	23.50	19	20.42	8	23.28	2	26.00	8	22.38	8	21.81
SD				(.761)		(1.468)				(2.110)		(1.840)

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 151-175 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	2	37.30	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	2	50.00	2	34.50	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	1	54.00	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	1	39.00	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	1	49.00	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	1	30.00	1	48.00	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	1	30.00	8	45.63	2	34.50	-	-
SD								(6.520)		(.710)		

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 176-200 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77			
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	1	58.00	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	1	46.00	-	-	-	-
Sta 5 - Day	-	-	-	-	1	65.50	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	5	55.60	-	-	-	-
Total Day	-	-	-	-	1	65.50	1	58.00	-	-	-	-
SD												
Total Night	-	-	-	-	-	-	6	53.93	-	-	-	-
SD								(3.892)				

Species: Chinook Salmon *Oncorhynchus tshawytscha* (cont.)

Size Class 201-250 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	3	97.66	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	2	115.50	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	1	100.00	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	4	90.50	-	-	-	-
Total Day	-	-	-	-	-	-	3	97.66	-	-	-	-
SD								(2.517)				
Total Night	-	-	-	-	-	-	7	109.28	-	-	-	-
SD								(24.109)				

Species: Starry Flounder *Platichthys stellatus*

Size Class 0-25 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	4	.173	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	3	.184	-	-	-	-	-	-	-	-	-	-
Total Day	4	.173	-	-	-	-	-	-	-	-	-	-
SD		(.046)										
Total Night	3	.184	-	-	-	-	-	-	-	-	-	-
SD		(.048)										

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 26-50 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	11	.95	-	-	-	-	-	-	-	-	3	1.80
Sta 2 - Night	6	1.26	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	366	.93	11	1.27	-	-	-	-	-	-	28	1.41
Sta 3 - Night	71	1.08	-	-	2	1.55	-	-	-	-	15	1.51
Sta 5 - Day	-	-	1	1.25	-	-	-	-	-	-	8	1.33
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	10	1.66	-	-	-	-	-	-	-	-	1	2.00
Sta 9 - Night	32	1.16	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	16	.97	1	1.50	-	-	-	-	-	-	13	1.15
Sta 10 - Night	73	.39	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	50	.97	213	-	6	1.91	-	-	-	-	64	1.34
Sta 11 - Night	100	.83	53	1.43	-	-	-	-	-	-	25	1.20
Total Day	453	.95	226	1.34	6	1.91	-	-	-	-	117	1.35
SD		(.127)		(.139)		(.580)						(.144)
Total Night	282	.88	53	1.43	2	1.55	-	-	-	-	40	1.29
SD		(.309)		(.210)		(.070)						(.156)

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 26-50 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	2	.54	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	1	1.00
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	1	1.80
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	2	2.40
SD												(.566)
Total Night	2	.54	-	-	-	-	-	-	-	-	-	-
SD		(.010)										

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	15	3.18	14	2.96	1	1.80	3	4.67	-	-	-	-
Sta 2 - Night	5	3.11	-	-	1	3.40	-	-	-	-	1	4.90
Sta 3 - Day	2	3.94	29	2.16	9	2.53	4	3.25	1	2.00	13	3.03
Sta 3 - Night	6	3.25	-	-	50	3.18	2	3.50	-	-	31	4.00
Sta 5 - Day	1	5.00	-	-	-	-	-	-	-	-	15	5.04
Sta 5 - Night	-	-	-	-	1	4.40	-	-	-	-	1	5.80
Sta 9 - Day	16	3.62	-	-	1	3.30	-	-	-	-	7	4.80
Sta 9 - Night	32	2.86	-	-	-	-	2	4.00	-	-	-	-
Sta 10 - Day	8	3.73	4	3.23	9	3.08	-	-	-	-	8	2.54
Sta 10 - Night	6	3.68	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	5	2.41	8	-	12	3.04	9	4.22	-	-	7	2.43
Sta 11 - Night	8	3.13	53	3.32	99	2.85	2	3.00	-	-	14	3.49
Total Day	47	3.41	55	2.49	32	2.88	16	4.06	1	2.00	50	3.72
SD		(.494)		(.425)		(.289)		(.530)				(1.130)
Total Night	57	3.16	53	3.32	151	2.97	6	3.50	-	-	47	3.91
SD		(.230)		(.520)		(.241)		(.450)				(.412)

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 51-75 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Net	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	2	4.80	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	1	4.55	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	2	4.80	1	4.55	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	-	-
SD												

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	1	6.70	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	1	7.20	-	-	-	-	-	-
Sta 3 - Day	-	-	1	9.50	-	-	-	-	2	8.50	-	-
Sta 3 - Night	-	-	-	-	2	7.70	-	-	13	10.11	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	2	10.00	4	7.33
Sta 9 - Day	1	6.33	-	-	-	-	-	-	-	-	1	10.50
Sta 9 - Night	1	4.00	1	15.00	-	-	-	-	7	10.43	-	-
Sta 10 - Day	1	7.50	-	-	-	-	-	-	1	9.00	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	4	8.63	-	-
Sta 11 - Day	-	-	1	-	-	-	2	6.00	2	7.75	-	-
Sta 11 - Night	-	-	1	5.60	3	7.33	-	-	8	2.24	-	-
Total Day	2	6.92	2	9.50	1	6.70	2	6.00	5	8.30	1	10.50
SD		(.739)						(8.370)		(.542)		
Total Night	1	4.00	2	6.65	6	7.41	-	-	34	8.14	4	7.33
SD				(12.960)		(.657)				(3.370)		(3.800)

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 101-125 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	1	16.00	1	16.00	2	19.00	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	2	23.00
Sta 5 - Night	-	-	-	-	-	-	1	25.00	10	20.80	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	1	21.00	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	3	20.00	1	28.00
Sta 10 - Day	2	20.50	-	-	-	-	1	15.00	3	17.33	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	3	16.67	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	1	24.00	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	2	23.50
Total Day	2	20.50	-	-	-	-	1	15.00	5	19.40	2	23.00
SD										(3.000)		
Total Night	-	-	-	-	1	16.00	2	20.50	18	19.78	3	25.00
SD										(1.530)		(2.598)

DREDGED MATERIAL RESEARCH PROGRAM

TECHNICAL REPORT D-77-38

HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

APPENDIX B: INVENTORY AND ASSESSMENT OF PREDISPOSAL AND POSTDISPOSAL AQUATIC HABITATS

by

Robert J. McConnell, Sandy J. Lipovsky,
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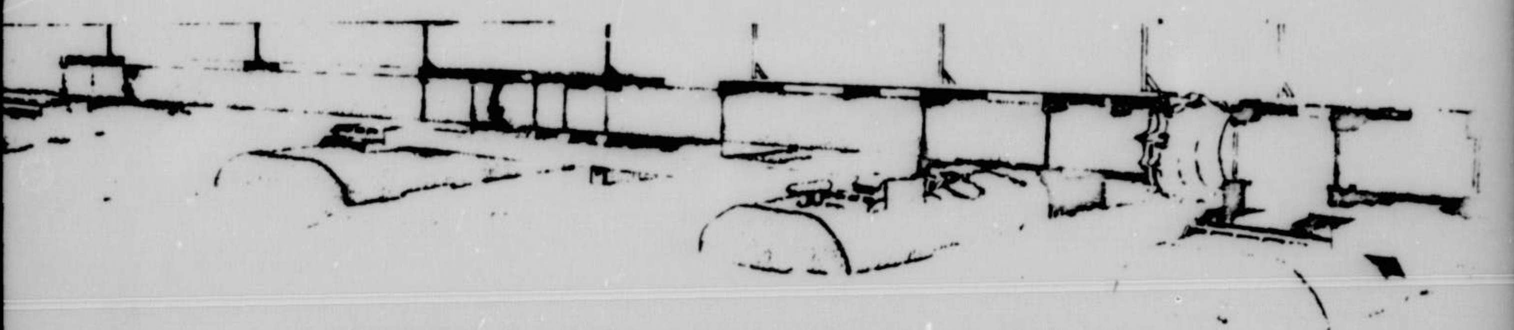
and John R. Hughes

National Marine Fisheries Service
Prescott, Oregon 97048

June 1978

Final Report



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

Under Interagency Agreement Nos. WESRF 75-88, WESRF 76-39, WESRF 76-178
(DMRP Work Unit Nos. 4B05C, J, and L)

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

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 126-150 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	2	30.00	-	-	-	-
Sta 3 - Day	1	28.00	1	33.00	-	-	-	-	2	29.50	-	-
Sta 3 - Night	-	-	-	-	8	29.38	1	27.00	13	32.78	2	34.50
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	14	32.50
Sta 5 - Night	-	-	-	-	-	-	-	-	3	33.33	2	30.00
Sta 9 - Day	1	35.50	-	-	-	-	-	-	-	-	2	41.50
Sta 9 - Night	-	-	1	22.00	1	30.00	-	-	3	31.67	2	39.00
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	3	27.53	1	34.00
Sta 11 - Day	1	41.00	4	-	-	-	1	40.00	1	40.00	1	38.00
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	4	31.50
Total Day	3	34.83	5	33.00	-	-	1	40.00	3	33.00	17	33.88
SD		(6.526)								(6.060)		(3.190)
Total Night	-	-	1	32.00	9	29.45	3	29.00	22	31.99	11	22.26
SD						(.210)		(1.730)		(1.830)		(3.250)

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	2	33.00	2	51.00	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	3	53.67	-	-
Sta 3 - Night	-	-	-	-	42	43.43	3	57.00	5	58.20	1	69.00
Sta 5 - Day	-	-	-	-	-	-	1	55.00	-	-	1	69.00
Sta 5 - Night	-	-	-	-	-	-	3	34.67	1	53.00	-	-
Sta 9 - Day	1	48.50	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	1	48.50	4	45.63	-	-	1	55.00	-	-	1	42.00
Sta 10 - Day	1	44.50	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	1	56.20
Sta 11 - Day	-	-	5	-	-	-	1	75.00	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	1	41.00	-	-	1	50.00
Total Day	2	46.50	5	-	-	-	2	65.00	3	53.67	1	69.00
SD		(2.830)						(14.140)		(8.390)		
Total Night	1	48.50	4	45.63	44	42.96	10	47.75	6	55.60	4	54.31
SD				(9.460)		(2.110)		(7.300)		(15.470)		(11.330)

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 151-175 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	1	37.00	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	1	37.00	-	-	-	-	-	-
SD												

193

194

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	1	79.00	-	-	-	-
Sta 3 - Day	-	-	1	61.00	-	-	1	71.00	13	77.38	-	-
Sta 3 - Night	-	-	-	-	2	62.00	1	100.00	4	65.00	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	1	67.00	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	1	60.00	-	-	-	-	1	76.00	1	72.00
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	1	-	-	-	1	76.00	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	68.00
Total Day	-	-	3	60.50	-	-	2	73.50	14	76.69	1	72.00
SD				(.707)				(3.540)		(9.910)		
Total Night	-	-	1	67.00	2	62.00	2	89.50	4	65.00	1	68.00
SD								(14.850)		(10.920)		

194

195

Species: Starry Flounder *Platichthys stellatus* (cont.)

Size Class 201-250 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	1	132.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	1	107.00	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	13.20	-	-
SD												
Total Night	-	-	-	-	-	-	1	107.00	-	-	-	-

Species: Largescale Sucker *Catostomus macrocheilus*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	5	.60	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	2	.55	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	7	.59	-	-	-	-	-	-	-	-	-	-
SD		(.218)										
Total Night	-	-	-	-	-	-	-	-	-	-	-	-
SD												

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	1	2.30	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	4	2.15	-	-	-	-	-	-
Sta 5 - Day	-	-	2	1.70	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	1	2.48	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	2	1.70	-	-	-	-	-	-	-	-
SD				(.210)								
Total Night	-	-	1	2.48	5	2.18	-	-	-	-	-	-
SD						(.192)						

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 51-75 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	2	1.81	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	1	2.70	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	2	1.81	-	-	-	-	-	-	-	-
SD				(.580)								
Total Night	-	-	-	-	1	2.70	-	-	-	-	-	-
SD												

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

<u>Size Class 76-100 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	1	7.60	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	1	9.00	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	9.00	-	-
SD												
Total Night	-	-	-	-	1	7.60	-	-	-	-	-	-
SD												

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 76-100 mm

Fyke Net	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	1	5.90	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	-	-
SD					1	5.90						

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

<u>Size Class 101-125 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	1	10.00	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	1	9.00	-	-
Sta 5 - Night	1	20.00	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	9.00	-	-
SD												
Total Night	1	20.00	-	-	1	10.00	-	-	-	-	-	-

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 126-150 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	2	31.50	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	5	31.60	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	4	25.00	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	2	31.50	-	-	-	-	-	-	-	-	-	-
SD		(2.120)										
Total Night	9	28.67	-	-	-	-	-	-	-	-	-	-
SD		(6.782)										

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	117	42.13	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	4	36.25	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	121	40.89	-	-	-	-	-	-	-	-	-	-
SD		(7.187)										

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 201-250 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	4	120.00	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
STa 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
STa 10 - Night	1	132.00	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	5	122.40	-	-	-	-	-	-	-	-	-	-
SD												

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 251-300 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	1	235.00	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	1	195.00	-	-	-	-	-	-	-	-
Sta 5 - Day	1	114.00	-	-	-	-	-	-	-	-	-	-
STa 5 - Night	1	172.00	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	1	185.00	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	1	114.00	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	1	172.00	2	215.00	-	-	-	-	1	185.00	-	-
				(28.284)								

205

206

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 350> mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	11	1175	1	600	2	563	-	-	-	-
Sta 3 - Day	2	563	10	1175	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	1	717	5	669	-	-	-	-	1	518
Sta 5 - Day	-	-	-	-	-	-	4	1141	3	889	-	-
Sta 5 - Night	-	-	2	907	-	-	1	1283	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	1	916	-	-	1	870	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	2	652	-	-	-	-	1	1654	-	-	-	-
Sta 11 - Day	-	-	8	-	1	1440	4	1041	-	-	-	-
Sta 11 - Night	-	-	1	1129	-	-	-	-	-	-	7	966
Total Day	2	563	18	1175	1	1440	8	1091	3	889	-	-
SD		(26.870)		(431.540)				(200.100)		(139.170)		
Total Night	2	632	16	924	6	657	5	1125	-	-	8	910
SD		(33.930)		(207.160)		(175.630)		(370.300)				(322.900)

Species: Largescale Sucker *Catostomus macrocheilus* (cont.)

Size Class 350> mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	1	1059	-	-
Sta B - Night	-	-	-	-	1	527	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	1059	-	-
SD												
Total Night	-	-	-	-	1	527	-	-	-	-	-	-
SD												

Species Threespine Stickleback *Gasterosteus aculeatus*

Size Class 0-25 mm

Beach Seine	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	4	.10
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	4	.10
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	-	-
SD												

Species Threespine Stickleback *Gasterosteus aculeatus* (cont.)

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	1	1.15	1	1.00	-	-	-	-	-	-
Sta 2 - Night	7	.64	-	-	2	1.10	3	1.00	-	-	-	-
Sta 3 - Day	155	.67	352	1.33	-	-	-	-	-	-	6	.85
Sta 3 - Night	3	.59	1	1.60	30	1.31	4	1.50	-	-	-	-
Sta 5 - Day	2	.83	1	1.10	1	1.10	6	1.00	-	-	-	-
Sta 5 - Night	6	.89	5	1.28	1	1.20	4	1.08	-	-	1	.60
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	7	1.37	1	.80	-	-	4	1.00	-	-	1	.60
Sta 10 - Day	2	1.10	-	-	-	-	-	-	-	-	1	.40
Sta 10 - Night	1	.80	-	-	1	1.50	1	1.00	-	-	-	-
Sta 11 - Day	1	.95	-	-	1	1.05	-	-	-	-	-	-
Sta 11 - Night	2	.70	22	1.23	4	1.19	-	-	-	-	1	.40
Total Day	160	.68	354	1.33	3	1.05	6	1.00	-	-	7	.79
SD		(.043)				(.050)						(.145)
Total Night	26	.90	29	1.24	38	1.29	16	1.15	-	-	3	.53
SD		(.307		(1.240)		(.024)		(.184)				(.137)

Species Threespine Stickleback *Gasterosteus aculeatus* (cont.)

Size Class 26-50 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	5	.40	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	2	.39	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	1	.33	-	-	6	1.17	-	-	6	1.10
Sta D - Night	3	.75	2	.78	-	-	-	-	-	-	-	-
Sta E - Day	1	.48	-	-	-	-	-	-	-	-	3	.50
Sta E - Night	7	.58	2	2.28	-	-	-	-	-	-	3	.43
Sta 6 - Day	-	-	-	-	1	.90	-	-	-	-	1	1.10
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	1	.48	1	.33	1	.90	6	1.17	-	-	10	.92
SD								(.150)				(.290)
Total Night	17	.53	4	1.53	-	-	-	-	-	-	3	.43
SD		(.152		(.866)								(.150)

Species Threespine Stickleback *Gasterosteus aculeatus* (cont.)

Size Class 51-75 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	1	3.00	1	1.85	-	-	-	-	24	2.84	1	2.50
Sta 2 - Night	1	2.63	-	-	3	1.97	7	2.43	3	2.63	1	4.20
Sta 3 - Day	1	3.35	-	-	1	1.30	-	-	1	2.10	2	3.35
Sta 3 - Night	-	-	-	-	8	1.76	8	2.50	4	2.73	3	2.60
Sta 5 - Day	1	2.63	-	-	2	1.50	12	1.72	-	-	6	3.67
Sta 5 - Night	1	2.25	1	1.60	2	1.70	7	1.69	6	2.72	10	4.07
Sta 9 - Day	6	3.25	-	-	-	-	11	2.00	-	-	5	4.48
Sta 9 - Night	34	3.47	-	-	-	-	-	-	-	-	9	4.41
Sta 10 - Day	3	2.91	-	-	-	-	2	2.50	-	-	5	3.98
Sta 10 - Night	5	3.65	-	-	-	-	3	2.00	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	2	2.00	3	3.13	1	4.30
Sta 11 - Night	-	-	-	-	5	1.53	1	2.00	1	2.10	-	-
Total Day	12	3.10	1	1.85	3	1.43	27	1.91	28	2.84	20	3.89
SD		(.233)				(.166)		(.240)		(.239)		(.508)
Total Night	41	3.44	1	1.60	18	1.72	26	2.19	14	2.66	23	4.05
SD		(.265)				(.197)		(.324)		(.153)		(.561)

Species Threespine Stickleback *Gasterosteus aculeatus* (cont.)

Size Class 51-75 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	1	3.25	-	-	-	-	-	-	1	2.70	5	3.74
Sta A - Night	-	-	-	-	-	-	-	-	2	3.05	4	4.03
Sta B - Day	1	3.14	-	-	-	-	-	-	2	2.75	4	4.23
Sta B - Night	-	-	-	-	-	-	-	-	-	-	2	3.90
Sta C - Day	2	3.95	-	-	-	-	1	2.45	1	1.70	1	4.00
Sta C - Night	2	3.67	-	-	-	-	-	-	1	2.50	-	-
Sta D - Day	3	3.29	-	-	-	-	10	1.58	1	2.00	25	4.22
Sta D - Night	5	3.32	-	-	-	-	-	-	3	2.83	17	4.15
Sta E - Day	1	3.60	-	-	-	-	-	-	2	3.38	9	3.86
Sta E - Night	3	3.20	-	-	-	-	-	-	3	3.40	1	3.00
Sta 6 - Day	-	-	-	-	1	2.10	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	8	3.08	-	-	1	2.10	10	1.58	7	2.67	44	4.09
SD		(1.739)						(.230)		(.613)		(.135)
Total Night	10	3.35	-	-	-	-	1	2.45	9	3.03	24	4.06
SD		(.246)								(.342)		(.260)

Species Threespine Stickleback *Gasterosteus aculeatus* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	1	6.20
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	1	4.90
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	1	6.20
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	1	4.90
SD												

Species **Threespine Stickleback** *Gasterosteus aculeatus* (cont.)

Size Class 76-100 mm

Fyke Net	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	1	6.20
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	1	6.20
SD												
Total Night	-	-	-	-	-	-	-	-	-	-	-	-
SD												

Species: Staghorn Sculpin *Leptocottus armatus*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	1	.50	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	3	.76	-	-	2	1.20
Sta 3 - Night	-	-	-	-	-	-	1	1.00	-	-	11	1.41
Sta 5 - Day	-	-	-	-	-	-	5	1.08	1	1.30	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	5	.94	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	1	2.00	-	-	1	.90
Sta 10 - Day	-	-	-	-	-	-	25	.92	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	2	.75	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	5	.86	-	-	3	1.50
Sta 11 - Night	-	-	-	-	-	-	1	1.00	1	1.00	6	2.57
Total Day	-	-	-	-	-	-	44	.854	1	1.30	5	1.38
SD								(.466)				(.164)
Total Night	-	-	-	-	-	-	5	1.35	1	1.00	18	1.77
SD								(.548)				(.301)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 26-50 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	1	1.43	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	1	.80
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	2	.50
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	2	1.10
Sta D - Night	-	-	-	-	-	-	1	1.00	-	-	10	.81
Sta E - Day	-	-	-	-	-	-	1	.70	-	-	9	1.20
Sta E - Night	-	-	-	-	-	-	-	-	-	-	6	1.08
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	1	1.10
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	2	1.07	-	-	15	1.35
SD								(.516)				(.367)
Total Night	-	-	-	-	-	-	1	1.00	-	-	16	.91
SD												(.307)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	9	2.04
Sta 5 - Day	-	-	-	-	-	-	-	-	2	3.50	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	2	2.00	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	5	2.96	8	3.39
Total Day	-	-	-	-	-	-	2	2.00	2	3.50	-	-
SD										(.140)		
Total Night	-	-	-	-	-	-	-	-	5	2.96	17	2.68
SD										(1.000)		(.675)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

<u>Size Class 51-75 mm</u>

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Day	-	-	1	4.70	-	-	-	-	1	4.00	-	-
Sta B - Night	-	-	-	-	-	-	-	-	1	1.00	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	3	2.23
Sta E - Night	-	-	-	-	-	-	-	-	-	-	4	2.30
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	1	4.70	-	-	-	-	1	4.00	3	2.23
SD												(.450)
Total Night	-	-	-	-	-	-	-	-	1	1.00	4	2.30
												(.240)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	1	13.00
Sta 5 - Day	-	-	1	5.80	-	-	-	-	2	6.40	3	6.67
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	4	14.50
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	1	12.00
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	10	12.90
Total Day	-	-	1	5.80	-	-	-	-	2	6.40	7	11.14
SD										(.280)		(4.810)
Total Night	-	-	-	-	-	-	-	-	-	-	12	12.83
SD												(2.440)

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	1	10.00	-	-	-	-	-	-	-	-
Total Night	-	-	1	10.00	-	-	-	-	-	-	-	-

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 101-125 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	1	13.00	-	-	-	-	1	28.00
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	2	19.00	-	-	-	-	2	25.50
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	1	19.00
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	3	29.35
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	3	20.33	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	2	18.50
Sta 11 - Night	-	-	1	22.00	10	16.30	-	-	-	-	5	20.60
Total Day	-	-	-	-	-	-	-	-	-	-	6	24.00
SD												(5.835)
Total Night	-	-	1	22.00	16	17.19	-	-	-	-	8	22.75
SD						(1.200)						(3.070)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 101-125 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	1	12.00	2	13.50	-	-	-	-	-	-
Sta B - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	1	25.00	-	-	-	-	-	-
Sta D - Day	-	-	-	-	1	19.00	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	1	16.00	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	1	19.00	-	-	-	-	-	-
SD												
Total Night	-	-	1	12.00	4	17.00	-	-	-	-	-	-
SD												

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 126-150 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	1	34.00	-	-	-	-	1	53.00
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	1	28.00	-	-	-	-	1	29.00
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	1	31.00	-	-	-	-	1	26.00
Total Day	-	-	-	-	-	-	-	-	-	-	-	-
SD												
Total Night	-	-	-	-	3	31.00	-	-	-	-	3	36.00
SD												(14.799)

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 126-150 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta A - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta A - Night	-	-	-	-	1	31.00	-	-	-	-	-	-
Sta B - Day	-	-	-	-	1	30.10	-	-	-	-	-	-
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta C - Night	-	-	-	-	1	29.00	-	-	-	-	-	-
Sta D - Day	-	-	-	-	1	29.00	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	1	26.00	-	-	-	-	-	-
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	2	29.55	-	-	-	-	-	-
SD						(.778)						
Total Night	-	-	-	-	3	28.60	-	-	-	-	-	-
SD						(3.606)						

Species: Staghorn Sculpin *Leptocottus armatus* (cont.)

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	1	118.00
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	107.00
Total Night	-	-	-	-	-	-	-	-	-	-	2	107.00 (15.57
Fyke Net												
Sta 6 - Day	-	-	-	-	1	106.00	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	1	106.00	-	-	-	-	-	-

Species: Prickly Sculpin *Cottus asper*

<u>Size Class 26-50 mm</u>

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	3	.57	2	.76	-	-	-	-	3	1.03	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	14	1.11		
Sta 5 - Day	-	-	-	-	-	-	-	-	1	1.50	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	1	1.50	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	1	1.70	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	5	1.59	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	3	.57	2	.76	-	-	-	-	10	1.42	-	-
SD		(.140)		(.035)						(.335)		
Total Night	-	-	-	-	-	-	-	-	15	1.14		
										(.258)		

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta D - Day	-	-	1	.50	-	-	-	-	-	-	-	-
Total Day	-	-	1	.50	-	-	-	-	-	-	-	-

Species: Prickly Sculpin *Cottus asper* (cont.)

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	1	2.20	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	3	4.17	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	2	2.25	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	5	3.04	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	39	4.16	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	1	3.10	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	14	4.01	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	62	3.93	-	-
SD										(1.332)		
Total Night	-	-	-	-	-	-	-	-	3	2.53	-	-
SD										(.602		

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta C - Day	-	-	-	-	-	-	-	-	2	5.45	-	-
Sta C - Night	1	1.63	-	-	-	-	-	-	1	5.10	-	-
Total Day	-	-	-	-	-	-	-	-	2	5.45	-	-
SD										(.070)		
Total Night	1	1.63	-	-	-	-	-	-	1	5.10	-	-

Species: Prickly Sculpin *Cottus asper* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	ay 77 No	ay 77 Wt	July 77 No	July 77 Wt
Sta 10 - Day	-	-	-	-	-	-	-	-	5	7.88	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	5	7.88	-	-
SD										(.850)		

Size Class 101-125 mm

	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	ay 77 No	ay 77 Wt	July 77 No	July 77 Wt
Beach Seine												
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	1	34.00	-	-	-	-	-	-	-	-	-	-
Total Night	1	34.00	-	-	-	-	-	-	-	-	-	-
Fyke Net												
Sta E - Day	1	28.00	1	30.50	-	-	-	-	-	-	-	-
Sta E - Night	-	-	1	28.00	-	-	-	-	-	-	-	-
Total Day	-	-	1	30.50	-	-	-	-	-	-	-	-
Total Night	1	28.00	1	28.00	-	-	-	-	-	-	-	-

Size Class 126-150 mm

	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	ay 77 No	ay 77 Wt	July 77 No	July 77 Wt
Fyke Net												
Sta A - Day	-	-	1	47.00	1	48.00	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	1	41.00	-	-	-	-	-	-	-	-

Species: Prickly Sculpin *Cottus asper* (cont.)

<u>Size Class 126-150 mm (cont.)</u>

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Net	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	-	-	2	43.50	-	-	-	-	-	-
Total Day	-	-	1	47.00	1	48.00	-	-	-	-	-	-
SD												
Total Night	-	-	1	41.00	2	43.50	-	-	-	-	-	-
						(2.120)						
<u>Size Class 151-175 mm</u>												
Beach Seine												
Sta 3 - Day	1	94.00	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	1	94.00	-	-	-	-	-	-	-	-	-	-
						**********						
Fyke Net												
Sta A - Day	-	-	-	-	1	63.00	-	-	-	-	-	-
Sta A - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Day	1	81.00	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	1	35.50	-	-	-	-	-	-	-	-

Species: Prickly Sculpin *Cottus asper* (cont.)

Size Class 151-175 mm (cont.)	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Net	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	2	63.00	3	70.33	-	-	-	-	-	-
Total Day	1	81.00	-	-	1	63.00	-	-	-	-	-	-
SD												
Total Night	-	-	3	53.83	3	70.33	-	-	-	-	-	-
				(16.158)		(12.060)						
Size Class 176-200 mm												
Fyke Net												
Sta 6 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 6 - Night	-	-	1	111.00	-	-	-	-	-	-	-	-
Total Night	-	-	1	111.00	-	-	-	-	-	-	-	-
Size Class 201-250 mm												
Fyke Net												
Sta D - Day	1	31.00	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	1	31.00	-	-	-	-	-	-	-	-	-	-

Species: Coho Salmon *Oncorhynchus kisutch*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 9 - Day	-	-	-	-	-	-	-	-	1	30.00	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	30.00	-	-

Size Class 51-75 mm

	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Beach Seine												
Sta 3 - Day	-	-	-	-	-	-	-	-	1	5.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	5.00	-	-
Fyke Net												
Sta C - Day	-	-	-	-	-	-	-	-	1	3.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	1	3.00	-	-

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	1	7.00	-	-
Total Night	-	-	-	-	-	-	-	-	1	7.00	-	-

Species: Coho Salmon *Oncorhynchus kisutch* (cont.)

Size Class 76-100 mm (cont.)

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta B - Day	-	-	-	-	-	-	-	-	-	-	1	6.80
Sta B - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	1	6.80

Size Class 102-125 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	2	15.00	-	-
Total Night	-	-	-	-	-	-	-	-	2	15.00	-	-

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta C - Day	-	-	-	-	-	-	-	-	-	-	1	9.00
Sta C - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	1	9.00

Size Class 126-150 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	6	21.00	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	1	30.00	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	7	21.57	-	-

Species: Coho Salmon *Oncorhynchus kisutch* (cont.)

Size Class 126-150 mm (cont.

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	2	25.00	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	6	23.67	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	3	28.67	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	3	24.00	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	1	28.00	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	2	25.50	-	-
Total Day	-	-	-	-	-	-	-	-	4	27.00	-	-
SD										(2.449)		
Total Night	-	-	-	-	-	-	-	-	27	22.58	-	-
										(10.470)		

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	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Fyke Net	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta D - Day	-	-	-	-	-	-	-	-	-	-	1	12.00
Sta D - Night	-	-	-	-	-	-	-	-	1	20.00	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	1	12.00
Total Night	-	-	-	-	-	-	-	-	1	20.00		

Species: Coho Salmon *Oncorhynchus kisutch* (cont.)

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	1	34.00	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	7	35.43	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	3	31.00	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	13	32.62	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	3	30.00	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	1	31.00	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	3	26.67	-	-
Total Day	-	-	-	-	-	-	-	-	1	31.00	-	-
Total Night	-	-	-	-	-	-	-	-	30	33.30 (4.550)	-	-

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	1	50.00	-	-
Total Night	-	-	-	-	-	-	-	-	1	50.00	-	-

Species: Chum Salmon *Oncorhynchus keta*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	1	.90	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	1	.60	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	1	.60	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	5	.83	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	5	.98	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	1	.90	-	-	-	-
Total Day	-	-	-	-	-	-	11	.90	-	-	-	-
SD								(.121)				
Total Night	-	-	-	-	-	-	2	.75	1	.60	-	-
								(.212)				

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	2	1.35	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	2	1.15	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	4	1.43	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	2	1.43	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	2	1.40	7	2.59	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	4	2.78	-	-

Species: Chum Salmon *Oncorhynchus keta* (cont.)

Size Class 51-75 mm (cont.)

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	1	1.40	1	1.10	-	-
Total Day	-	-	-	-	-	-	6	1.39	7	2.59	-	-
SD								(.112)		(.700)		
Total Night	-	-	-	-	-	-	7	1.44	5	2.44	-	-
								(.062)		(.767)		

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	-	-	1	3.00	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	1	4.00	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	1	1.50	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	1	4.70	-	-
Total Day	-	-	-	-	-	-	-	-	2	2.25		
SD										(1.061)		
Total Night	-	-	-	-	-	-	-	-	2	4.35		
										(.495)		

Species: American Shad *Alosa sapidissima*

Size Class 26-50 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 2 - Day	-	-	2	1.08	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	1	.15	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	3	.77	-	-	-	-	-	-	-	-
SD				(.537)								

Size Class 51-75 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	4	1.76	-	-	-	-	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	5	1.62	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	4	3.40	-	-	-	-	-	-
Sta 9 - Day	-	-	7	1.71	1	2.50	-	-	-	-	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	2	3.30	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Day	-	-	1	3.09	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-

Species: American Shad *Alosa sapidissima* (cont.)

Size Class 51-75 mm (cont.)

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Total Day	-	-	17	1.78	3	3.03	-	-	-	-	-	-
				(.323)		(.494)						
Total Night	-	-	-	-	4	3.40	-	-	-	-	-	-
SD						(.700)						

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	8	6.15	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	13	6.11	-	-	-	-	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	1	10.00	-	-
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	10	6.05	-	-	-	-	-	-
Sta 11 - Day	-	-	1	3.90	1	6.35	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	25	6.97	-	-	-	-	-	-
Total Day	-	-	1	3.90	1	6.35	-	-	-	-	-	-
Total Night	-	-	-	-	56	6.43	-	-	1	10.00	-	-
SD						(.445)						

Species: American Shad *Alosa sapidissima* (cont.)

Size Class 101-125 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	1	10.00	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	1	12.00	-	-	-	-	1	10.00
Sta 9 - Day	-	-	-	-	-	-	-	-	-	-	1	12.00
Sta 9 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	1	10.00	-	-	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	1	14.00
Sta 11 - Night	-	-	-	-	6	8.00	-	-	-	-	-	-
Total Day	-	-	-	-	-	-	-	-	-	-	2	13.00
SD												(1.414)
Total Night	-	-	-	-	9	8.89	-	-	-	-	1	10.00
SD						(1.445)						

Size Class 151-175 mm

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Beach Seine												
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	1	33.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	33.00

Species: American Shad *Alosa sapidissima* (cont.)

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	61.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	61.00

Size Class 201-250 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	2	115.5	-	-	-	-	-	-	4	79.30
Total Night	-	-	2	115.5	-	-	-	-	-	-	4	56.60
SD												(10.116)

Size Class 251-300 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	121.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	121.00

Size Class 301-350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	2	255.50

Species: American Shad *Alosa sapidissima* (cont.)

Size Class 301-350 mm (cont.)

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	2	236.00
Total Night	-	-	-	-	-	-	-	-	-	-	4	245.75
SD												(14.974)

Species: Carp *Cyprinus carpio*

Size Class 26-50 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	1	.99	-	-	-	-	-	-	-	-	-	-
Total Night	1	.99	-	-	-	-	-	-	-	-	-	-

Size Class 51-75 mm

Beach Seine												
Sta 5 - Day	1	3.55	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	1	3.55	-	-	-	-	-	-	-	-	-	-

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Fyke Net												
Sta E - Night	2	3.71	-	-	-	-	-	-	-	-	-	-
Total Night	2	3.71	-	-	-	-	-	-	-	-	-	-
		(2.149)										

Species: Carp *Cyprinus carpio* (cont.)

Size Class 350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	9	2314	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Day	1	1384	-	-	-	-	-	-	1	1625	-	-
Sta 5 - Night	1	1132	-	-	-	-	-	-	1	1380	-	-
Sta 9 - Day	-	-	-	-	-	-	-	-	1	1652	2	1558
Sta 9 - Night	3	1893	-	-	-	-	-	-	1	1332	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	1	1016	-	-
Sta 11 - Night	1	1242	-	-	-	-	-	-	1	759	-	-
Total Day	1	1384	-	-	-	-	-	-	12	2093	-	-
Total Night	5	1610	-	-	-	-	-	-	3	1157	-	-

Species: Squawfish *Ptychocheilus oregonensis*

Size Class 51-75 mm

Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	1	4.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	4.00

Species: Squawfish *Ptychocheilus oregonensis* (cont.)

Size Class 76-100 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	8	7.63	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	8	7.63	-	-	-	-	-	-	-	-	-	-
SD		(1.640)										

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	8.00
Sta E - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta E - Night	-	-	-	-	-	-	-	-	-	-	1	5.00
Total Night	-	-	-	-	-	-	-	-	-	-	2	6.50

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	2	34.00	-	-	-	-	-	-	-	-	-	-
Total Night	2	34.00	-	-	-	-	-	-	-	-	-	-
SD		(5.660)										

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Fyke Net	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta D - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta D - Night	-	-	-	-	-	-	-	-	-	-	1	34.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	34.00

Species: Squawfish *Ptychocheilus oregonensis* (cont.)

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day		-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	1	63.00	-	-	-	-	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	5	51.40	-	-	-	-	-	-	-	-	-	-
Total Night	5	51.40	1	63.00	-	-	-	-	-	-	-	-

Size Class 201-250 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	1	118.00	-	-	-	-	-	-	-	-	-	-
Total Night	1	118.00	-	-	-	-	-	-	-	-	-	-

Size Class 251-300 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	1	267.00	-	-	-	-	-	-	-	-	-	-
Total Night	1	267.00	-	-	-	-	-	-	-	-	-	-

Species: Squawfish *Ptychocheilus oregonensis* (cont.)

Size Class 301-350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	4	404.25	-	-	-	-	-	-	-	-	-	-
Total Night	4	404.25										
SD		(43.150)										

Size Class 350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	6	549.00	-	-	-	-	-	-	-	-	-	-
Total Night	6	549.00	-	-	-	-	-	-	-	-	-	-
SD		(244.67)										

Species: Cutthroat *Salmo clarki*

Size Class 201-250 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	-	-	1	96.00	-	-
Total Night	-	-	-	-	-	-	-	-	1	96.00	-	-

Species: Cutthroat *Salmo Clarki* (cont.)

Size Class 301-350 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	1	294.00
Total Night	-	-	-	-	-	-	-	-	-	-	1	294.00

Species: Surf Smelt *Hypomesus pretiosus*

Size Class 101-125 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	2	5.75	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	2	5.75	-	-	-	-	-	-
SD						(.351)						

Size Class 126-150mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	1	18.00	-	-	-	-	-	-
Total Night	-	-	-	-	1	18.00	-	-	-	-	-	-

Species: Surf Smelt *Hypomesus pretiosus* (cont.)

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	1	39.50	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Total Day	-	-	-	-	1	39.50	-	-	-	-	-	-

Species: Eulachon *Thaleichthys pacificus*

Size Class 126-150 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	1	15.00	-	-	-	-
Total Night	-	-	-	-	-	-	1	15.00	-	-	-	-

Size Class 151-175 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 2 - Day	-	-	-	-	-	-	1	21.00	-	-	-	-
Sta 2 - Night	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	13	19.46	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	1	22.00	-	-	-	-

Species: Eulachon *Thaleichthys pacificus* (cont.)

Size Class 151-175 mm (cont.)

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 11 - Day	-	-	-	-	-	-	3	23.67	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	20	20.00	-	-	-	-
Total Day	-	-	-	-	-	-	4	23.00	-	-	-	-
SD								(1.391)				
Total Night	-	-	-	-	-	-	34	19.85	-	-	-	-
SD								(2.862)				

Size Class 176-200 mm

Beach Seine	July 76 No	July 76 Wt	Sept 76 No	Sept 76 Wt	Nov 76 No	Nov 76 Wt	March 77 No	March 77 Wt	May 77 No	May 77 Wt	July 77 No	July 77 Wt
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	-	-	2	25.50	-	-	-	-
Sta 5 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 5 - Night	-	-	-	-	-	-	2	27.00	-	-	-	-
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	4	29.00	-	-	-	-
Total Night	-	-	-	-	-	-	8	27.63	-	-	-	-
SD								(1.472)				

APPENDIX TABLE B5 (Concluded)

Species: Longfin Smelt *Spirinchus thaleichthys*

	July 76		Sept 76		Nov 76		March 77		May 77		July 77	
Size Class 76-100 mm												
Beach Seine	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	-	-	-	-	-	-	92	4.96
Total Night	-	-	-	-	-	-	-	-	-	-	92	4.96
SD												(1.380)
Size Class 101-125 mm												
Beach Seine												
Sta 3 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 3 - Night	-	-	-	-	4	9.88	-	-	-	-	1	8.00
Sta 10 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 10 - Night	-	-	-	-	1	8.00	-	-	-	-		
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	9	10.61	-	-	-	-	10	8.93
Total Night	-	-	-	-	14	10.22	-	-	-	-	11	8.85
SD						(.640)						(.280)
Size Class 126-150 mm												
Beach Seine												
Sta 11 - Day	-	-	-	-	-	-	-	-	-	-	-	-
Sta 11 - Night	-	-	-	-	1	16.00	-	-	-	-	-	-
Total Night	-	-	-	-	1	16.00	-	-	-	-	-	-

APPENDIX B6: AGE CLASS, NUMBER, MEAN WEIGHT AND LENGTH PER INDIVIDUAL FOR IMPORTANT NEKTON, COLLECTED AT MILLER SANDS, RIVER KILOMETRE 39, MARCH 1975 - MAY 1976

Appendix Table B6

Age Class, Number, Mean Weight and Length Per Individual for Important Nekton, Collected at Miller Sands, River Kilometre 39 March 1975 - May 1976.

	Peamouth Chub	Chinook Salmon	Starry Flounder
Age Class 1			
Number	29	217	117
Weight (g)	5.1	5.1	5.9
Length (mm)	72.3	69.6	73.2
Age Class 2			
Number	22	41	55
Weight (g)	15.7	30.2	46.7
Length (mm)	109.3	136.6	129.4
Age Class 3			
Number	-	1	3
Weight (g)	-	72.5	45.5
Length (mm)	-	187.0	171.3
Age Class 4			
Number	5	-	-
Weight (g)	77.3	-	-
Length (mm)	194.0	-	-
Age Class >4			
Number	2	-	-
Weight (g)	112.5	-	-
Length (mm)	206.0	-	-
Total			
Number	58	259	175
Weight (g)	19.1	9.3	19.4
Length (mm)	101.4	80.7	92.5

APPENDIX B7: AGE CLASS, NUMBER, MEAN WEIGHT, AND LENGTH PER INDIVIDUAL COLLECTED OF IMPORTANT NEKTON AT RIVER KILOMETRE 39, JULY 1976 - JULY 1977

Appendix Table B7

Age Class, Number, Mean Weight and Length Per Individual for Important Nekton, Collected at Miller Sands, River Kilometre 39. July 1976 - July 1977.

	Peamouth Chub	Chinook Salmon	Starry Flounder	Threespine Stickleback	Largescale Sucker
Age Class 1					
Number	409	833	706	36	18
Weight (g)	1.95	7.94	3.02	.48	1.51
Length (mm)	58.53	85.46	55.44	33.69	52.16
Age Class 2					
Number	314	74	120	147	5
Weight (g)	12.40	28.32	35.96	.98	8.30
Length (mm)	102.20	137.90	137.86	43.08	97.20
Age Class 3					
Number	33	9	37	155	31
Weight (g)	35.66	109.20	63.78	2.04	36.65
Length (mm)	158.15	221.10	176.22	53.90	151.40
Age Class 4					
Number	69	-	7	190	-
Weight (g)	49.21	-	100.60	3.64	-
Length (mm)	175.90	-	202.70	64.10	-
Age Class 4>					
Number	155	-	-	-	71
Weight (g)	103.70	-	-	-	963.30
Length (mm)	218.10	-	-	-	449.70
Total					
Number	980	916	870	528	135
Weight (g)	25.85	10.58	10.93	2.21	515.40
Length (mm)	109.37	91.03	73.13	53.18	218.80

APPENDIX B8: NEKTON IN ORDER OF MEAN ANNUAL ABUNDANCE. AVERAGE WEIGHT, IN GRAMS, PER INDIVIDUAL MEASURED AND EXPANDED, TOTAL WEIGHT OF FISH CAPTURED AT MILLER SANDS, JULY 1976 - JULY 1977

Appendix Table B8

Nekton in order of mean annual abundance. Average weight, in grams, per individual measured and expanded total weight of fish captured at Miller Sands. July 1976 - July 1977.

Species	Total			Beach Seine			Fyke Net		
	No	Wt	Wt/Ind	No	Wt	Wt/Ind	No	Wt	Wt/Ind
Peamouth Chub	3219	47055	14.6	2784	37634	13.5	434	9419	21.7
Chinook Salmon	2205	15235	6.9	2191	15180	6.9	14	44	3.9
Starry Flounder	1992	12559	6.3	1984	12502	6.3	8	57	7.1
Threespine Stickleback	1020	1787	1.8	862	1344	1.6	158	442	2.8
Largescale Sucker	237	76489	322.7	231	74891	324.2	6	1589	266.4
Staghorn Sculpin	218	1870	8.6	161	1447	8.9	57	424	7.4
Prickly Sculpin	125	1441	11.5	111	1079	9.7	14	362	25.9
Longfin Smelt	118	935	7.9	118	935	7.9	-	-	-
American Shad	111	2298	20.7	111	2298	20.7	-	-	-
Coho	73	1894	25.9	68	1843	27.1	5	51	10.2
Eulachon	47	1003	21.3	47	1003	21.3	-	-	-
Chum Salmon	43	74	1.7	43	74	1.7	-	-	-
Squawfish	32	5793	181.0	28	5742	205.1	4	51	12.7
Carp	27	39033	1445.7	25	39025	1561.0	2	7	3.7
Surf Smelt	4	69	17.3	4	69	17.3	-	-	-
Cutthroat	2	390	195.0	2	390	195.0	-	-	-

APPENDIX B9: MACROINVERTEBRATE, NUMBER OF INDIVIDUALS CAPTURED IN ALL REPLICATIONS AT MILLER SANDS, OREGON, MARCH 1975 - MAY 1976

APPENDIX TABLE B9

Macroinvertebrate, Number of Individuals Captured in all Replications at Miller Sands, Oregon.
March 1975 - May 1976

March 1975

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	We
Corophium salmonis	78	0.1772	33	0.0680	37	0.0642	35	0.0758	2		96	0.[illegible]
Chironomidae	1		-		1		-		-		15	
Nematoda	1		-		-		-		-		1	
Oligochaeta	1		1		1		5		3		17	
Corbicula	-		1		1		1		2		-	
Anisogammarus	-		1		-		-		-		13	0.[illegible]
Agnatha	-		1		-		-		-		-	
Gastropoda	-		-		1		1		-		-	
Eohaustorus	-		-		-		-		2		-	
Plecoptera	-		-		-		-		-		1	
Total Organisms	81		37		41		42		9		143	
Composite Wet Wt.		0.0054		0.2236		0.0003		0.0083		0.0144		0.[illegible]
Total Biomass		0.1826		0.2916		0.0645		0.0841		0.0144		0.[illegible]

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	We
Corophium salmonis	42	0.0323	52	0.0616	34	0.0462	70	0.1041	63	0.0886	89	0.[illegible]
Oligochaeta	152	0.1080	155	0.2712	175	0.4377	354	0.8551	361	0.8395	846	2.[illegible]
Corbicula	6		1		-		2		2		1	
Chironomidae	2		4		2		14		6		13	
Nematoda	2		1		2		1		-		1	
Neomysis mercedis	1		-		2		-		-		-	
Gastropoda	-		-		-		-		-		1	
Ostracoda	-		-		-		-		-		1	
Anisogammarus	-		-		-		-		-		1	
Total Organisms	205		213		415		441		432		953	
Composite Wet Wt.		0.0044		0.0397		0.0135		0.0909		0.1063		0.[illegible]
Total Biomass		0.1447		0.3725		0.4974		1.0501		1.0344		2.[illegible]

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.
Corophium salmonis	80	0.1916	31	0.0496	41	0.0858	67	0.1415	42	0.0766	40
Oligochaeta	51	0.0910	29	0.0779	19	0.0300	53	0.0891	88	0.1333	80
Polycheata	1		-		-		-		-		-
Corbicula	3		4		-		6		3		3
Chironomidae	2		2		2		2		1		3
Nematoda	4		1		1		4		2		1
Gastropoda	-		-		-		-		1		-
Neomysis mercedis	-		-		-		-		1		-
Total Organisms	141		67		63		132		138		127
Composite Wet Wt.		0.0158		0.0143		0.0026		0.0520		0.5110	
Total Biomass		0.2984		0.1418		0.1184		0.2826		0.7209	

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.
Corophium salmonis	370	0.6507	514	0.8250	315	0.6727	192	0.2950	241	0.4819	307
Oligochaeta	706	1.1633	418	0.8332	560	1.4318	496	1.1659	606	1.2090	467
Polycheata	1		-		4		1		3		-
Corbicula	15		22		10		25		16		21
Chironomidae	51	0.1962	15		50	0.2456	31	[illegible]	51	0.2115	28
Gastropoda	1		1	0.5388	-		1		3		-
Nemertea	-		5		3		20	0.3920	17	0.5265	4
Nematoda	-		7		4		5		2		2
Ephemeroptera	-		-		1		2		-		-
Anisogammarus	-		-		-		1		-		-
Nomysis mercedis	-		-		-		-		1		-
Total Organisms	1053		676		947		774		940		829
Composite Wet Wt.		0.1612		0.2744		0.1914		0.1726		0.1074	
Total Biomass		2.1714		2.4714		2.5415		2.0255		2.5363	

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gr No.
Corophium salmonis	370	o.6507	514	0.8250	456	0.8568	569	1.0423	393	0.5774	550
Oligochaeta	269	0.4772	365	0.6281	320	0.6374	437	0.9672	246	0.4392	395
Corbicula	13		17		9		9		19		3
Chironomidae	2		3		6		7		3		7
Gastropoda	4	0.5077	3	0.5944	-		2		1		1
Nematoda	1		1		2		-		-		-
Neomysis mercedis	1		-		-		-		-		-
Anisogammarus	-		1		-		-		-		-
Total Organisms	656		904		793		1024		662		956
Composite Wet Wt.		0.0719		0.0348		0.0220		0.1759		0.0582	
Total Biomass		1.7075		2.0823		1.5162		2.1854		1.0748	

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gr No.
Corophium salmonis	327	0.4481	257	0.3819	249	0.3862	206	0.3833	325	0.4589	186
Oligochaeta	3		2		2		-		3		1
Chironomidae	1		2		-		-		-		-
Nematoda	25		-		-		-		2		-
Corbicula	-		3		2		5		2		3
Gastropoda	-		-		1		-		-		-
Arisogammarus	-		-		-		1		2		-
Neanthes mercedis	-		-		-		-		1		-
Total Organisms	356		264		254		212		335		190
Composite Wet Wt.		0.0067		0.0163		0.0647		0.0331		0.0427	
Total Biomass		0.4548		0.3982		0.4509		0.4164		0.5016	

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	1352	0.5459	1304	1.3235	906	0.5678	11	0.0092	7	0.0075	6	
Oligochaeta	674	0.9682	496	0.8056	40	0.1037	-		1		-	
Corbicula	5		7		1		1	0.0030	-		1	
Chirinomids	20		6		1		-		-		-	
Polychaeta	1		-		-		-		-		-	
Total Organisms	2052		1813		948		12		8		7	
Composite Wet Wt.		0.0907		0.0523		0.0034						[illegible]
Total Biomass		1.6048		2.1824		0.6749		0.0122		0.0075		[illegible]

259

MILLER SANDS
Benthic Samples
May 1975

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	65	0.1863	22	0.0684	63	0.1907	62	0.2130	60	0.1674	57	[illegible]
Corbicula	1		-		1		2		-		1	
Chironomidae	10	0.0006	7		6		11		9		10	[illegible]
Oligochaeta	-		1		3		2		1		-	
Nematoda	-		-		1	0.0005	-		-		-	
Cladocera	-		-		-		1		-		-	
Osmerdae	-		-		-		1		-		-	
Total Organisms	76		30		74		79		70		68	
Composite Wet Wt.		0.0005		0.0010		0.0027		0.0089		0.0005		[illegible]
Total Biomass		0.1874		0.0694		0.1939		0.2219		0.1679		[illegible]

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	4		-		-		-		2		12	
Oligochaeta	1096	1.8088	880	0.8092	1208	1.7532	740	0.8968	708	1.6120	1220	[illegible]
Corbicula	16		24		16		16		8		8	
Chironomidae	172	0.9612	180	0.0400	280	1.0632	160	0.6212	86	0.6228	176	[illegible]
Nematoda	28	<0.0020	20	<0.0020	16	<0.0020	12	<0.0020	12	<0.0010	12	[illegible]
Neomysis mercedis	4				-		-		-		-	
Nemertea	-		2	0.4070	-		4		-		-	
Aquatic insect	-		1	0.0593	-		1	0.0723	-		-	
Total Organisms	1320		1107		1520		933		816		1428	
Composite Wet Wt.		0.0316		0.0316		0.0092		0.0180		0.0214		[illegible]
Total Biomass		2.8036		1.3491		2.8276		1.6103		2.2575		[illegible]

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gra[b 6] No.
Corophium salmonis	73	0.2134	56	0.1579	116	0.3768	85	0.2654	54	0.1644	82
Oligochaeta	231	0.3224	190	0.3487	161	0.3448	202	0.3368	167	0.2535	144
Corbicula	10		13		7		20	0.1130	6		6
Chironomidae	30		29	0.0132	22		27	0.0172	43	0.0162	27
Gastropoda	4		6		4		5	0.4680	3		3
Nematodes	5	<0.0005	4	<0.0005	5	<0.0005	6	<0.0005	1	<0.0005	6
Anisogammarus	-		-		-		1	0.0033	-		-
Total Organisms	353		298		315		346		274		268
Composite Wet Wt.		0.1427		0.6751		0.3125				0.1590	
Total Biomass		.6790		1.1954		1.0346		1.2042		.5936	

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gra[b 6] No.
Corophium salmonis	77	0.2006	530	0.1172	620	0.1345	60	0.1370	36	0.0622	37
Oligochaeta	151	0.3526	112	0.2820	139	0.2947	114	0.2573	99	0.2500	37
Corbicula	42	0.0658	32	0.4292	19	0.0497	22	0.0565	19	0.0611	25
Chironomidae	17		18		27		15		16		17
Gastropoda	1		2		-		1		1		1
Nematodes	2	<0.0005	2	<0.0005	3	<0.0005	2	<0.0005	2	<0.0005	3
Ostrcod	-		-		-		1		-		-
Osmericae Larva	-		-		-		-		1		-
Total Organisms	290		696		808		215		174		120
Composite Wet Wt.		0.0136		0.1159		0.0107		0.0173		0.0230	
Total Biomass		.6331		.9448		.4901		.4686		.3968	

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.
Corophium salmonis	-		-		4		8		4		2
Oligochaeta	1320	2.6100	1452	2.1344	1168	1.4852	1104	1.1136	1808	2.9716	974
Corbicula	8		8		8		8	0.0304	20	0.0276	8
Chironomidae	136	0.5012	144	0.3740	136	0.6824	160	0.3512	132	0.3376	64
Nematodes	8	<0.0020	12	<0.0020	12	<0.0020	16	<0.0020	12	<0.0020	2
Polychaeta	8		12		8		8		12		10
Aquatic insects	8		-		-		-		-		-
Gastropoda	-		4	4.0172	-		-		4		-
Neomysis m.	-		-		-		4		-		-
Platyhelminthes	-		-		-		4		-		-
Total Organisms	1488		1632		1336		1312		1992		1060
Composite Wet Wt.		0.5500		0.1872		0.4036		0.1900		0.1972	
Total Biomass		3.6632		6.7148		2.5732		1.6872		3.5360	

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.
Corophium salmonis	87	0.3133	106	0.3926	32	0.1198	37	0.1011	33	0.1385	48
Oligochaeta	360	0.3716	514	0.6388	121	0.1473	391	0.3944	354	0.2813	521
Corbicula	21		24		1		12		21	0.0336	33
Chiroromidae	24	0.0611	15		5		15		16		22
Gastropoda	1		-		-		4	1.7400	-		1
Nematodes	9	0.0005	6	0.0005	3	0.0005	3	0.0005	10	0.0005	5
Lamprey	-		1	1.5655	-		-		-		-
Polychaeta	-		-		1		1		-		-
Nemertea	-		-		1		-		-		2
Neomysis m.	-		-		1		-		-		-
Anisogammarus	-		-		-		1		-		-
Osmericae Larvae	-		-		-		-		-		6
Total Organisms	502		666		165		464		434		648
Composite Wet WT.		0.0502		0.7149		0.0445		0.1564		0.0355	

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	118	0.2683	12	0.0248	16	0.0341	3	0.0038	7	0.0104	2	[illegible]
Oligochaeta	3		-		2		-		-		-	
Corbicula	3		0	0.0170	8	0.0382	8	0.0235	3	0.0026	8	[illegible]
Chironomids	1		2	0.0005	4		8	0.0017	4	0.0005	1	
Gastropoda	2		-		-		-		-		-	
Anisogammarus	1		-		-		-		-		-	
Total Organisms	128		23		30		19		14		11	
Composite Wet Wt.		0.1269		0.0175		0.0048						[illegible]
Total Biomass		.3952		.0598		.0771		.0290		.0135		[illegible]

MILLER SANDS
Benthic Samples
July 1975

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	23	0.0351	16	0.0238	22	0.0298	25	0.0259	27	0.0524	18	
Oligochaeta	4		1		2		-		-		1	
Corbicula	3		9	0.0190	9	0.0104	3	0.0005	5		6	
Chironomidae	12		7	0.0005	11	0.0016	2		1		8	
Polychaeta	-		4		-		-		-		2	
Nemertea	-		-		1		-		-		-	
Anisogammarus	-		-		-		22	0.0593	-		-	
Total Organisms	42		37		45		52		35		36	
Composite Wet Wt.		0.0073		0.0034		0.0064		<0.0005		0.0086		
Total Biomass		0.0424		0.0467		0.0482		0.0862		0.0610		

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	12	0.0100	112	0.1016	44	0.0126	104	0.1372	26	0.0150	56	
Oligochaeta	1036	0.5044	1756	0.3276	1684	0.4208	2160	0.6920	1132	0.2582	2824	
Corbicula	16	0.0220	-		4		4		-		4	
Chironomidae	36	0.4112	16	0.0224	20	0.2084	8		14	0.0908	12	
Nematoda			252	0.0020	24		40		6		28	
Polychaeta	-		-		-		4		-		-	
Nemertea	-		-		-		-		4	0.0406	-	
Neomysis m.	-		-		-		-		2		-	
Total Organisms	1100		2136		1776		2324		1184		2924	
Composite Wet Wt.						0.0020		0.0176		0.0022		
Total Bilmass		0.9476		0.4536		0.6438		0.8468		0.4068		

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab W
Corophium salmonis	1		0	0.0095	5	0.0096	-		4		-	
Oligochaeta	297	0.3975	517	0.2624	563	0.3977	752	0.4584	168	0.1564	1400	0.
Polychaeta	1		-		-		-		1		4	
Chironomidae	4		76	9,2174	6	9,9287	20	0.2540	5	0.0418	20	0.
Gastropoda	1	0.5800	1	0.0088	-		-		-		-	
Corbicula	-		3		6	0.0216	-		1		-	
Nematoda	-		3		7		4		-		12	
Nemertea	-		2	0.0427	2		-		-		-	
Total Organisms	304		615		590		776		179		1436	
Composite Wet Wt.		0.0352		0.0039		0.0070		<0.0020		0.0031		0.
Total Biomass		1.0127		0.5447		1.3646		0.7144		0.2013		1

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab W
Corophium salmonis	84	0.0796	125	0.1221	94	0.1028	104	0.1634	81	0.0975	93	0.
Oligochaeta	57	0.0394	138	0.0674	102	0.0328	160	0.0976	128	0.0869	132	0.
Polychaeta	1		-		-		-		-		-	
Corbicula	9	0.0060	1		5		4		-		-	
Chironomidae	1		5		-		1		2		1	
Gastropoda	2	0.0707	3	0.1163	3	0.1004	1	0.462	4	0.1243	1	0.
Nematoda	1		2		1		2		5		3	
Neomysis mercedis	-		-		-		1		2		-	
Total Organisms	155		274		205		273		222		230	
Composite Wet Wt.		0.0041		0.0192		0.0085		0.0101		0.0189		<0.
Total Biomass		0.1998		0.3150		0.2445		0.7331		0.3276		0.

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	76	0.0851	87	0.0855	64	0.0544	41	0.0540	75	0.0540	57	[illegible]
Oligochaeta	260	0.1170	388	0.1371	403	0.1466	197	0.0936	246	0.0956	71	[illegible]
Corbicula	12	0.0652	7		3		-		5	1.1683	4	[illegible]
Chironomidae	3		4		14		2		1		1	
Gastropoda	4	0.2276	5	0.1639	5	0.1015	3	0.1255	5	0.1205	15	[illegible]
Nematoda	10		18		13		5		3		12	
Neomysis mercedis	-		-		-		-		-		1	
Total Organisms	365		509		502		248		335		162	
Composite Wet Wt.		<0.0005		0.0071		0.0151		<0.0005		<0.0005		[illegible]
Total Biomass		0.4954		0.3936		0.3176		0.2736		1.4389		[illegible]

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	145	0.1224	148	0.1554	220	0.2331	108	0.1088	133	0.1851	86	[illegible]
Oligochaeta	34	0.0094	34	0.0332	46	0.0548	48	0.0366	44	0.0830	16	[illegible]
Polychaeta	2		-		5		1		-		-	
Corbicula	2		2		5		1		5		8	[illegible]
Chironomidae	1		5		6		2		4		2	
Nematoda	12		2		10		8		6		6	
	-		1		2	0.0496	-		1	0.0870	1	[illegible]
Nemertea	-		-		1		-		-		-	
Neomysis mercedis	-		-		-		1		-		-	
Total Organisms	197		192		295		169		193		119	
Composite Wet Wt.		0.0014		0.0620		0.0183		0.0017		0.1004		[illegible]
Total Biomass		0.1332		0.2506		0.3558		0.1471		0.4555		[illegible]

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab W
Corophium salmonis	52	0.0642	21	0.0244	65	0.1214	5	0.0054	8	0.0087	54	0
Oligochaeta	3		1		2		-		-		1	
Polychaeta	1		-		-		-		1		-	
Corbicula	8	0.0083	7	0.0185	3		7	0.0131	11	0.0223	7	0
Chironomidae	10		-		2		1		3		-	
Anisogammarus	-		-		4		-		-		-	
Total Organisms	74		29		76		13		23		62	
Composite Wet Wt.		0.0038		<0.0005		0.0076		<0.0005		0.0017		<0
Total Biomass		0.0763		0.0434		0.1290		0.0190		0.0327		0

MILLER SANDS
Benthic Samples
August, 1975

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab W
Corophium salmonis	23	0.0447	29	0.0572	24	0.0528	23	0.0362	33	0.0575	35	0.
Corbicula	6		3		3		-		5	0.0225	5	0.
Chironomidae												
(Aquatic insects)	-		6		1		3		4		2	
Cladocera	-		-		1		-		-		-	
Neomysis mercedis	-		-		-		1		-		-	
Total organisms	29		38		29		27		42		42	
Composite Wet Wt.		0.003		0.0025		0.0028		0.0048		0.0009		0.
Total Biomass		0.0480		0.0597		0.0556		0.0410		0.0809		<

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab W
Corophium salmonis	33	0.0645	-		-		-		-		-	
Oligochaeta	54	0.0268	53	0.0111	10		13	0.0058	23	0.0071	36	0.
Polychaeta	2		-		-		-		-		-	
Corbicula	-		-		1	0.7876	-		-		-	
Chironomidae												
(Aquatic Insects)	2		8	0.0179	17	0.0632	21	0.0938	8	0.0276	32	0.
Nematoda	-		5		4	<0.0005	4		8	<0.0005	17	<0.
Gastropoda	-		-		1	0.0702	-		-		-	
Nemertea	-		-		-		-		-		1	
Anodonta	-		-		-		1		-		-	
Total organisms	91		66		33		40		39		86	
Composite Wet Wt.		0.0050		<0.0005		0.0046		0.0008		<0.0005		0.
Total Biomass		0.0963		0.0295		0.9261		0.1004		0.0357		0.

STATION 5

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.
Corophium salmonis	55	0.1168	75	0.1557	55	0.0884	39	0.0501	81	0.0891	62
Oligochaeta	107	0.0656	231	0.0482	316	0.1141	138	0.0468	497	0.1345	623
Polychaeta	-		2		-		2		2		6
Corbicula	1		3	0.0115	1		1		5	12.1292	2
Chironomidae (Aquatic insects)	7		5		11	0.0162	2		15	0.0221	7
Nematoda	5	<0.0005	19	<0.0005	12	<0.0005	14	<0.0005	22		8
Gastropoda	-		1	1.5277	-		-		-		-
Neomysis mercedis	-		-		2	0.0052	-		-		1
Insect larva	2		-		-		-		-		-
Osmeridae larva	-		-		-		-		1		-
Total organisms	177		336		397		196		623		709
Composite Wet Wt.		0.0208		0.0080		0.0057		0.0099		0.0010	
Total Biomass		0.2037		1.7818		0.2301		0.1073		12.3759	

STATION 3

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.
Corophium salmonis	12	0.0148	-		13	0.0242	20		24		8
Oligochaeta	810	0.1609	1024	0.0900	1016	0.3876	960	0.0994	1072	0.1131	1008
Polychaeta	2		-		7		8		4		-
Corbicula	4		-		-		-		4		4
Chironomidae (Aquatic insects)	26		44		15		20		28	0.0326	32
Nematoda	50	<0.0005	56	<0.0005	11		48	<0.0005	56	<0.0005	<60
Cladocera	2		-		-		-		-		-
Neomysis mercedis	2		4		-		-		-		-
Nemertea	2		4		2	0.0380	-		4		4
Osmeridae Larva	-		4		-		-		-		-
Total organisms	910		1136		1064		1156		1192		1116
Composite Wet Wt.		0.0577		0.0140		0.0361		0.0209		0.0137	
Total Biomass		0.2339		0.1045		0.4859		0.1208		0.1599	

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	W
Corophium salmonis	42	0.0264	21	0.0144	30	0.0144	30	0.0124	34	0.0101	43	0
Oligochaeta	527	0.1719	235	0.0593	241	0.0702	294	0.0693	354	0.1232	352	0
Polychaeta	-		2		-		2		1		4	
Corbicula	1	0.0149	-		-		-		-		-	
Chironomidae (Aquatic insects)	5		5		2		5		6		4	
Gastropoda	3	0.1738	3		1	0.0451	2	0.0223	1		1	0
Nematoda	21	<0.0005	9	<0.0005	9		8		13	<0.0005	25	<0
Cladocera	-		-		-		1		-		-	
Total organisms	599		275		283		346		396		430	
Composite Wet Wt.		0.0026		0.0082		0.0005		0.0038		0.0070		0
Total Biomass		0.3901		0.0824		0.1282		0.1055		0.1392		0

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	W
Corophium salmonis	46	0.0400	53	0.0583	62	0.0574	53	0.0574	59	0.0455	30	0.
Oligochaeta	31	0.0049	38	0.0083	50	0.0084	47	0.0165	68	0.0134	2	
Polychaeta	10	0.0046	2		1		3		2		1	
Corbicula	4		10	0.0572	3	0.0276	1		1		-	
Chironomidae (Aquatic insects)	1		5		5		4		3		1	
Gastropoda	1		1		1	0.0531	4	0.2048	-		-	
Nematoda	11	<0.0005	-		9	<0.0005	5	<0.0005	11		2	
Cladocera	-		1		1		-		-		1	
Neomysis mercedis	-		-		-		-		1		-	
Total organisms	104		110		132		117		145		37	
Composite Wet Wt.		0.0058		0.0056		0.0022		0.0170		0.0056		0.
Total Biomass		0.0558		0.1294		0.1492		0.2962		0.0645		0.

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gra No.
Corophium salmonis	5	0.0078	-		9	0.0204	3		2	0.0020	-
Oligochaeta	-		-		1		-		-		-
Polychaeta	-		-		-		-		1	0.0022	
Corbicula	6	0.0049	6	0.0408	13	0.0054	17		2		8
Chironomidae (Aquatic insects)	1		3	0.0006	8	0.0013	1		1		-
Cladocera	1		-		-		2		-		-
Total organisms	13		9		31		23		6		8
Composite Wet Wt.		<0.0005		0.0006		0.0024		0.0053		0.0005	
Total Biomass		0.0132		0.0420		0.0295		0.0053		0.0047	

MILLER SANDS
Benthic Samples
September - 1975

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No./
STATION 12											
Corophium salmonis	89	0.1589	106	0.2064	79	0.1386	112	0.1547	97	0.1329	103
Corbicula											
Bottle #1	2	0.1008	3	0.1042	4	0.0900	6	0.1218	1	0.0005	6
Bottle #2	-		-		-		-		5	0.0208	-
Cladocera											
Bottle #1	-		-		-		-		4		2
Bottle #2	-		-		-		-		-		8
Chironomidae											
Bottle #1	-		-		1		1		1		1
Bottle #2	-		-		-		-		-		1
Copepod	-		-		-		-		1		1
Neomysis mercedis	-		1		-		-		-		-
Total Organisms	91		110		84		119		109		122
Composite Wet Wt.				0.0005		0.0005		0.0005		0.0005	
Total Biomass		0.2597		0.3111		0.2291		0.2770		0.1547	
STATION 2											
Oligochaeta	835	0.5727	824	0.5461	764	0.4098	860	0.4922	<566	0.3252	754
Chironomidae	81	0.1634	84	0.1351	108	0.1556	80	0.1122	78	0.1174	90
Nematoda	82		81		76		56		74		52
Corophium salmonis	49	0.0602	28	0.0342	38	0.0544	32	0.0392	28	0.0336	40
Corbicula	12		-		4		8		4		4
Nemertea	3		-		2		-		2		2
Cladocera	4		-		-		2		2		-
Polychaeta	-		2		4		2		-		-
Neomysis mercedis	-		-		4		-		-		-
Gastropoda	-		-		-		2	0.1536	-		-
Odonata	1	0.1542	-		-		-		-		-
Ephemeroptera	1	0.0080	-		-		-		-		-
Total Organisms	1068		1019		1000		1042		754		942
Composite Wet Wt.		0.0276		0.0052		0.0126		0.0028		0.0086	
Total Biomass		0.9861		0.7206		0.6324		0.8000		0.4848	

STATION 5

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight
Oligochaeta	911	0.4974	1306	0.7462	842	0.4606	647	0.4322	1004	0.5034
Corophium salmonis	205	0.2608	156	0.1902	202	0.2770	110	0.1826	152	0.2010
Nematoda	80		154		138		75		180	
Chironomidae	16		26		4		12		8	
Corbicula	9		8		16		2		14	
Polychaeta	2		10		-		3		8	
Cladocera	-		2		2		1		6	
Nemertea	-		-		-		2	0.0271	2	
Total Organisms	1223		1662		1204		852		1374	
Composite Wet Wt.		0.0233		0.0972		0.0376		0.0043		0.0270
Total Biomass		0.7815		1.0336		0.7752		0.6856		0.7314

STATION 3

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight
Oligochaeta	670	0.1517	440	0.0884	409	0.0731	856	0.2144	923	0.2168
Corophium salmonis	138	0.1420	122	0.1104	98	0.1099	171	0.1447	172	0.1895
Nematoda	20		13		27		61		35	
Chironomidae	8		8		3		7		10	
Polychaeta	3		6		1		9		4	
Corbicula	7	0.0040	4	0.0058	1		3		3	
Cladocera	5		3		5		4		2	
Gastropoda	-		4	0.5826	2	0.0587	6	0.0779	<2	0.0850
Neomysis mercedis	-		1	0.0126	-		1	0.0162	-	
Total Organisms	851		601		546		1118		1151	
Composite Wet Wt.		0.0072		0.0142		0.0018		0.0292		0.0101
Total Biomass		0.3049		0.8140		0.2435		0.4824		0.5014

STATION 10

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight
Oligochaeta	348	0.0833	205	0.0418	372	0.0759	491	0.1084	286	0.0605
Corophium salmonis	77	0.0436	77	0.0792	84	0.0718	69	0.0487	80	0.0511
Nematoda	11		3		22		13		3	
Chironomidae	1		2		2		3		6	
Corbicula	2	0.0563	-		4		1		2	
Gastropoda	1		1	0.0042	2	0.0179	2	0.1335	1	0.0533
Cladocera	2		1		3		-		1	
Total Organisms	442		289		489		579		379	
Composite Wet Wt.		<0.0005		<0.0005		0.0013		0.0008		0.0061
Total Biomass		0.1837		0.1257		0.1669		0.2914		0.1710

STATION 11

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight
Oligochaeta	228	0.0460	314	0.0707	164	0.0343	385	0.0793	393	0.0918
Corophium salmonis	41	0.0517	66	0.1010	163	0.1755	147	0.1334	77	0.0879
Nematoda	41		43		32		36		30	
Chironomidae	31	0.0468	31	0.0589	2		3		3	
Corbicula	8		7		2		2		3	
Polychaeta	7		4		4		-		<2	
Gastropoda	1		1		-		3		3	
Odonata	2		1	0.0362	-		-		1	0.3239
Neomysis mercedis	-		-		-		1		3	
Cladocera	-		-		1		1		1	
Platyhelminthes	1		-		-		-		-	
Total Organisms	360		467		368		578		516	
Composite Wet Wt.		0.0254		0.0201		0.0043		0.0075		0.0445
Total Biomass		0.1699		0.2869		0.2141		0.2202		0.5481

STATION SI

Organisms	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight
Corophium salmonis	18	0.0194	9	0.0087	63	0.0826	96	0.1009	33	0.0497
Corbicula										
Bottle #1	1		3	0.3190	3	0.0015	9	0.0076	3	0.0998
Bottle #2	1	0.0020	-		-		-		-	
Cladocera	4		2		-		4		2	
Chironomidae	1		2	0.0005	-		-		-	
Oligochaeta	-		-		-		-		1	
Gastropoda	-		-		-		-		1	0.0353
Total Organisms	25		16		66		109		40	
Composite Wet Wt.		<0.0005		<0.0005				<0.0005		<0.0005
Total Biomass		0.0219		0.3287		0.0841		0.1090		0.1853

MILLER SANDS
Benthic Samples
November 1975

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Wei
Corophium salmonis	687	0.8655	477	0.4474	47	0.0602	998	1.0796	1412	1.6133	463	0.4
Oligochaeta	11	0.0082	25	0.0284	-		-		6		1	
Corbicula fluminea	7	0.0102	14	0.5854	1	0.0005	22	0.2000	(6)25*	0.0477	13	0.3
Gastropoda	1		-		-		2		2		2	
Anisogammarus	-		-		-		4		-		-	
Chironomidae	-		-		-		-		1		-	
Total Organisms	706		516		48		1024		1452		479	
Composite Wet Wt.		0.0026						0.0041		0.0098		0.0
Total Biomass		0.8865		1.0612		0.0607		1.2837		1.6708		0.8

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Wei
Corophium salmonis	168	0.1700	183	0.2580	114	0.1416	214	0.2634	250	0.3888	142	0.1
Oligochaeta	907	0.7902	841	0.8239	884	0.3529	1022	1.0802	910	0.7542	754	0.5
Polychaeta	1	-										
Corbicula fluminea	14	0.0308	10	0.0031	6	-	26	-	18	-	14	
Chironomidae	63	0.1444	48	0.2032	18	-	44	0.0970	34	0.1080	22	0.0
Gastropoda	1	-	1	-	2	0.3096	2	-				
Nematoda	27	<0.0005	32	-	14	-	30		20	-	16	
Neomysis mercedis	1	0.0115										
Anisogammarus			1	0.0044								
Total Organisms	1182		1116		1038		1338		1232		948	
Composite Wet Wt.		0.0166		0.0054		0.0258		0.0314		0.0062		
Total Biomass		1.1640		1.2980		0.8299		1.4720		1.2572		0.7

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab We
Corophium salmonis	577	0.5246	435	0.4717	505	0.4078	473	0.4977	387	0.3950	572	0.
Oligochaeta	38	0.0184	89	0.0368	26	0.0178	6	0.0035	89	0.1004	32	0.
Corbicula fluminea	13	0.0103	18	0.0071	14	0.0072	19	0.0200	18	0.0143	26	0.
Gastropoda	1	-							1	0.9875		
Hydra	1	-	1	-								
Nematoda			5	-					4	-	1	
Oligochaeta			1	-								
Total Organisms	630		549		545		498		499		631	
Composite Wet Wt.		0.0021		0.0181		0.0072		<0.0005		<0.0005		
Total Biomass		0.5554		0.5337		0.4400		0.5217		1.4977		0

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab We
Corophium salmonis	308	0.2638	391	0.2968	328	0.3853	340	0.4765	368	0.2778	185	0.
Oligochaeta	73	0.0540	182	0.0898	147	0.1144	246	0.1826	109	0.0708	50	0.
Polychaeta									1			
Corbicula fluminea	13	0.0385	14	0.0655	18	0.0230	11	0.0127	16	0.0454	9	0.
Chironomidae	2	-	2	-	2	-	4	0.0097	3	-	1	
Gastropoda	-	-	3	0.0331	-	-	-	-	3	0.0733	3	0.
Nematoda	3	-	1	-	-	-	1	-	-	-	-	
Neomysis	1	-	1	-	-	-	-	-	1	-	-	
Total Organisms	400		594		495		602		501		248	
Composite Wet Wt.		0.0034		0.0036		0.0051		<0.0005		0.0042		0.
		0.3597		0.4888		0.5278		0.6820		0.4715		0.

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gra[b 6] No.
Corophium Salmonis	272	0.2784	349	0.3696	372	0.3423	251	0.1964	349	0.3762	400
Ologochaeta	20	0.0045	14	0.0040	51	0.0144	36	0.0104	61	0.0152	213
Corbicula	11	0.0375	7	0.0778	5	-	6	0.0106	10	0.3028	5
Gastropoda	1	-	1	-	2	0.1964	2	0.0230			3
Neomysis	2	0.0119	1	-							
Chironomidae			6	0.0093	10	0.0302	5	0.0122	9	0.0303	7
Polychaeta					1						
Nematoda					2						2
Total Organisms	306		378		443		300		429		630
Composite Wet Wt.		0.0101		0.0091		0.0069		0.0122			
Total Biomass		0.3424		0.4698		0.5902		0.2648		0.7254	

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Gra[b 6] No.
Corophium salmonis	42	0.0485	51	0.0530	67	0.0655	29	0.0242	20	0.0248	23
Corbicula	7	-	1	<0.0005	4	0.0129	2	0.2713	3	<0.0005	1
Chironomidae	1	-									1
Gastropoda	1	-									
Eohaustorius Washingtonianus	1	-			1	0.0028					1
Polychaeta							1	0.0007			1
Total Organisms	52		52		72		32		23		27
Composite Wet Wt.		0.0055									
Total Biomass		0.0540		0.0535		0.0812		0.2962		0.0253	

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.
Corbicula	4	0.0069	17	0.0049	21	0.0204	9	-	12	0.0143	6
Corophium salmonis			6	0.0057	603	0.7751	597	0.8025	778	0.8290	607
Oligochaeta					292	0.2312	1165	1.3061	1283	0.9037	1162
Polychaeta					1	0.0591	1	-	1	-	
Chironomidae					7	-	15	-	13	-	14
Gastropoda					1	-			1	-	
Ephemoptera							1	-			
Lamprey							1	0.0303			
Nematoda									1	-	
Total Organisms	4		23		925		1789		2089		1789
Composite Wet Wt.		-		-		0.0156		0.0297		0.0084	
Total Biomass		0.0069		0.0106		1.1014		2.1686		1.7554	

MILLER SANDS
Benthic Samples
January 1976

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab We
Corophium salmonis	198	0.2462	214	0.2297	393		126	0.1650	141	0.2427	295	0.
Oligochaeta	2		-		2	0.0015	-		4	0.0073	5	0.
Corbicula	(3)13	0.3052	8	0.0048	17	0.3180	(5)6	0.0047	3	0.0005	6	0.
Chironomidae	15		-		1		-		-		-	
Nematoda	-		-		-		-		-		2	
Gastrotoda	-		(1)2	0.0057	-		1		-		-	
Total Organisms	228		224		413		133		148		308	
Composite Wet Wt. Total Biomass		0.5514		0.2402		0.3195		0.1697		0.2505		0.

280

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab No.	Grab We
Corophium salmonis	2	0.0029	7	0.0090	12	0.0234	1	0.0011	2	0.0026	6	0.
Oligochaeta	2	0.0008	51	0.0628	41	0.0741	-		-		95	0.
Corbicula	6	1.7897	2	0.0208	1		4	0.4318	-		1	
Chironomidae	-		1		1		-		-		1	
Neomysis	-		-		-		1	0.0037	-		-	
Gastrotoda	1		-		-		-		-		1	0.
Total Organisms	11		61		55		6		2		104	
Composite Wet Wt. Total Biomass		1.7934		0.0926		0.0975		0.4366		0.0026		0.2

281

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	296	0.4492	216	0.4220	316	0.5384	256	0.4592	320	0.5376	276	0.
Oligochaeta	2804	3.0976	2300	2.2600	3172	4.2180	1744	1.3728	1648	1.2000	4028	2.
Corbicula	48	0.0692	8		20		24		4		20	
Chironomidae	204	1.0048	236	1.2612	140	0.6044	136	0.3732	116	0.7240	276	1.
Nematoda	320		216	0.0020	240		288		260		516	
Neomysis	4	0.0920	-		-		-		-		-	
Gastrotoda	-		-		-		-		4		-	
Polychaeta	-		-		-		-		-		4	0.
Anisogammarus	-		4		-		-		-		-	
Total Organisms	3676		2980		6732		2448		2352		5120	
Total Biomass		4.7128		3.9452		5.3608		2.2052		2.4716		4.

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	362	0.2953	304	0.1983	253	0.1922	270	0.2088	285	0.2107	192	0.
Oligochaeta	393	0.4271	461	0.4057	172	0.1325	168	0.1402	515	0.6178	214	0.
Corbicula	14	0.0255	16	0.0560	20	0.0560	18	0.0800	19	0.0546	7	0.
Chironomidae	4	0.0141	6		-		2		3		2	
Nematoda	1		4		2		-		1		1	
Neomysis	-		-		-		-		-		1	0.
Gastrotoda	1	0.8241	2	0.0182	3	0.0433	3	0.0781	-		1	0.
Polychaeta	-		-		-		-		2		-	
Plecoptera	1	0.1381	-		-		-		-		-	
Total Organisms	776		793		450		461		825		418	
Total Biomass		1.7242		0.6782		0.4240		0.5071		0.8831		0.

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	401	0.4554	302	0.4135	351	0.4262	535	0.5661	413	0.4355	290	0.3683
Oligochaeta	145	0.0977	94	0.0748	94	0.0920	203	0.2022	116	0.1239	154	0.1107
Corbicula	11	0.0155	9	0.0256	3	0.0051	14	0.0342	7	0.0113	8	0.0220
Chironomidae	1		1		1		1		-		-	
Neomysis	2	0.0169	3	0.0183	-		-		-		1	
Gastropoda	1	0.0499	3	0.0332	-		1	0.0098	2	0.0217	1	
Total Organisms	561		412		449		754		538		454	
Total Biomass		0.6354		0.5654		0.5233		0.8123		0.5924		0.5010

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	1557	1.1483	1530	1.4119	1373	1.3398	1561	1.3054	1426	1.2848	1447	1.1038
Oligochaeta	35	0.0171	39	0.0233	23	0.0213	38	0.0296	18	0.0205	33	0.0313
Corbicula	31	0.0316	25	0.0644	31	10.0139	27	0.0600	25	0.1308	23	0.1764
Chironomidae	1		-		-		2		-		-	
Neomysis	-		-		2	0.0295	1	0.0053	-		-	
Anisogammarus	-		1	0.0232	1		-		-		1	0.0021
Gastropoda	-		-		1	0.0046	2	0.0010	-		1	0.1021
Total Organisms	1644		1595		1431		1631		1469		1535	
Total Biomass		1.1970		1.5228		11.4091		1.4013		1.4361		1.4157

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Wei
Corophium Salmonis	1		6	0.0087	2	0.0022	4	0.0047	2	0.0024	2	0.0
Ologochaeta	1		-		-		-		-		-	
Corbicual	5	0.0138	6	0.0077	6	0.0082	5	0.0004	4	0.0016	1	
Chironomidae	-		1		-		-		-		1	
Nematoda	-		-		-		-		1		-	
Fish Eggs	90	0.0479	670	0.0387	16	0.0070	121	0.0716	60	0.0265	37	0.0
Total Organisms	97		683		24		130		67		41	
Total Biomass		0.0617		0.0551		0.0174		0.0767		0.0305		0.0

MILLER SANDS
Benthic Samples
March 1976

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	83	0.1818	45	0.0878	80	0.1785	56	0.1152	3	0.0060	25	0.0
Ologochaeta	1		-		-		-		-		-	
Corbicula	-		-		-		-		2		-	
Chironomidae	1		-		-		1		-		-	
Gastrotoda	1	0.0399	-		-		-		-		-	
Fish Eggs	-		-		-		-		48	0.0169	-	
Total Organisms	86		45		80		57		53		25	
Total Biomass		0.2217		0.0878		0.1785		0.1152		0.0229		0.0

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weight
Corophium salmonis	105	0.1389	58	0.0512	71	0.0859	55	0.0558	39	0.0471	41	0.0
Oligochaeta	73	0.0245	415	0.4219	416	0.3682	328	0.2667	263	0.3501	131	0.0
Corbicula	8	0.0166	3		3	0.0094	10	3.7775	7	0.0125	5	0.0
Chironomidae	2		2		2		1		3		1	0.0
Nematoda	-		-		1		-		-		-	
Neomysis	-		-		-		1		-		-	
Gastrotoda	1	0.3603	-		1		-		-		-	
Plecoptera	1		-		-		-		-		-	
Fish Eggs	-		2		-		-		-		-	
Total Organisms	190		480		494		395		312		178	
Total Biomass		0.5403		0.4731		0.4635		4.1000		0.4097		0.1

285

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 We
Corophium salmonis	580	0.3400	448	0.2708	384	0.2996	928	0.4404	496	0.3180	492	0.
Oligochaeta	300	0.3396	488	0.4948	172	0.1852	340	0.4632	22		219	0.
Corbicula	36		20		8		16		25	0.2289	19	11.
Chironomidae	-		4		-		4		7	0.0133	1	
Nematoda	60		24		20		36		10		1	
Gastrotoda	-		-		-		-		3	0.0187	-	
Plecoptera	-		-		-		-		-		1	
Fish Eggs	-		-		-		-		2		-	
Total Organism	976		984		584		1324		565		733	
Total Biomass		0.6796		0.7656		0.4848		0.9036		0.5789		12.

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 We
Corophium salmonis	364	0.5828	332	0.3536	448	0.6318	272	0.4948	264	0.3013	304	0.
Oligochaeta	772	0.7436	792	1.0592	936	1.1672	808	0.7432	539	0.8989	484	0.
Corbicula	28		28	0.1024	27	0.3092	32	0.0248	26	0.0661	60	0.
Chironomidae	20		24		20		20	0.0528	8	0.0181	16	
Nematoda	100		60		32		164		31	0.0005	40	
Anisogammarus	-		-		4		-		-		-	
Gastrotoda	4		4		-		-		3	0.0196	-	
Polychaeta	12		-		8		-		-		8	
Plecoptera	-		-		4		-		-		-	
[illegible]	-		-		-		36		-		-	
Fish Eggs	-		-		12		-		-		-	
Total Organisms	1300		1240		1491		1332		871		912	
Total Biomass		1.3264		1.5152		2.1082		1.3156		1.3045		1.

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Wei
Corophium salmonis	494	0.3520	494	0.3882	476	0.3582	724	0.4128	514	0.2920	496	0.3
Oligochaeta	8		6		30	0.0181	63	0.0313	36	0.0104	22	
Corbicula	7	0.0268	6		17	0.0639	51	0.0610	25	0.0276	25	0.2
Chironomidae	1		1		2		4		3		7	0.0
Nematoda	1		4		-		-		9	0.7706	10	
Gastrotoda	6	0.4982	5	0.4619	4		6		-		3	0.0
Plecoptera	1		-		-		-		-		-	
Fish Eggs	1		-		-		-		-		2	
Total Organisms	519		516		529		848		587		565	
Total Biomass		0.8770		0.8501		0.4402		0.5051		1.1006		0.5

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Wei
Corophium salmonis	2276	2.3118	1880	2.2722	2386	2.7172	1902	2.1168	2614	2.6900	1358	1.9
Ologochaeta	102	0.1000	96	0.1208	108	0.1676	51	0.1300	110	0.1090	68	0.0
Corbicula	34	0.0208	18	0.0120	18	0.0136	18	0.0162	30	0.0254	10	0.0
Chironomidae	-		-		-		2		-		-	
Gastrotoda	10	0.1540	-		8	0.2262	-		2	0.0226	4	
Plecoptera	-		-		2		-		-		-	
Fish Eggs	4		4		-		4		-		-	
Total Organisms	2426		1998		2522		1977		2756		1440	
Total Biomass		2.5866		2.4050		3.1246		2.2630		2.8470		2.0

DREDGED MATERIAL RESEARCH PROGRAM

TECHNICAL REPORT D-77-38

HABITAT DEVELOPMENT FIELD INVESTIGATIONS, MILLER SANDS MARSH AND UPLAND HABITAT DEVELOPMENT SITE, COLUMBIA RIVER, OREGON

APPENDIX B: INVENTORY AND ASSESSMENT OF PREDISPOSAL AND POSTDISPOSAL AQUATIC HABITATS

by

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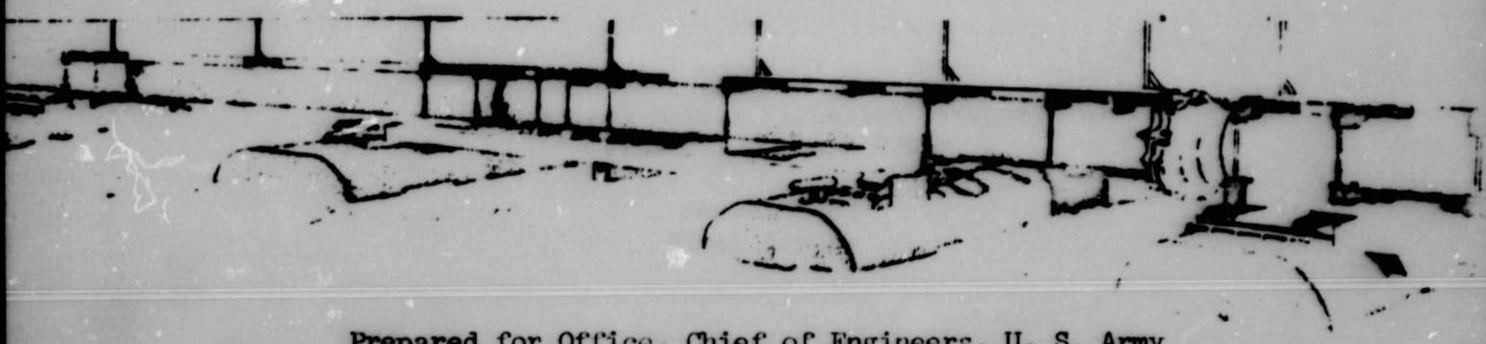
National Marine Fisheries Service
Prescott, Oregon 97048

June 1978

Final Report



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Washington, D. C. 20314

Under Interagency Agreement Nos. WESRF 75-88, WESRF 76-39, WESRF 76-178
(DMRP Work Unit Nos. 4B05C, J, and L)

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

STATION SI

Organism	Grab 1		Grab 2		Grab 3		Grab 4		Grab 5		Grab 6	
	No.	Weight	No.	Weight	No.	Weight	No.	Weight	No.	Weight	No.	Weig[illegible]
Corophium salmonis	6		4		1		6	0.0123	3	0.0060	2	
Corbicula	4	0.2400	5	0.0074	4	0.0022	6		2		4	[illegible]
Chironomidae	1		4		1		-		-		-	
Fish Eggs	205	0.0973	157	0.0690	55	0.0226	102	0.0443	48	0.0169	118	0.050[illegible]
Total Organisms	216		170		61		114		53		124	
Total Biomass		0.3373		0.0764		0.0248		0.0566		0.0229		0.050[illegible]

MILLER SANDS
Benthic Samples
May 1976

STATION 12

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	73	0.1661	79	0.1602	41	0.0932	12	0.0334	121	0.2257	67	0.17
Oligochaeta	-		1		-		1		11		34	
Corbicula	-		-		-		-		9	0.5595	4	
Chironomidae	9		12	0.0012	1		-		1		1	
Anisogammarus	-		2	0.0149	-		-		-		-	
Total Organisms	82		94		42		13		142		106	
Total Biomass		0.1661		0.1763		0.0932		0.0334		0.7852		0.177

STATION 2

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	8	0.0096	8	0.0200	7	0.0093	11	0.0216	14	0.0287	7	0.01
Oligochaeta	5	0.0056	2	0.0011	5	0.0020	70	0.0079	5	0.0178	16	0.01
Corbicula	2	0.0009	-		-		1		-		-	
Chironomidae	-		-		-		1		-		-	
Nematoda	2		-		-		-		-		-	
Total Organisms	17		10		12		20		19		23	
Total Biomass		0.0161		0.0211		0.0113		0.0295		0.0465		0.02

STATION 5

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	153	0.2501	152	0.2828	122	0.1730	152	0.3208	224	0.2880	123	0.15
Oligochaeta	702	0.6702	1344	1.4012	605	0.5511	623	0.6014	908	0.9704	334	0.34
Corbicula	21	0.0354	8		14	0.0468	11	13.6997	20		7	0.00
Chironomidae	7	0.0096	8		7	0.0124	9		28		11	0.01
Nematoda	153		592	0.0044	168		132		340		-	
Neomysis	-		-		1		-		-		112	
Gastrotoda	1	1.0256	-		-		-		-		1	0.62
Platyhelminthes	1	0.0264	-		-		-		-		-	
Plecoptera	1	0.0198			(1)2	0.0086	1	0.0340				
Total Organisms	1039		2104		919		928		1520		588	
Total Biomass		2.0371		1.6884		0.7919		14.6559		1.2584		1.15

STATION 3

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	62	0.0847	146	0.0976	88	0.0476	117	0.1094	82	0.1041	83	0.133
Oligochaeta	13	0.0249	64	0.1584	57	0.1752	31	0.0907	60	0.1087	23	0.045
Corbicula	6		8		9		8		6		4	0.003
Chironomidae	1		5		7		2		1		1	
Nematoda	7		33		20		38		25		10	
Neomysis	1		-		1		-		-		1	
Gastrotoda	5	1.2496	3	1.1608	7	0.6640	6	0.1415	2	0.0965	5	0.146
Total Organisms	95		259		189		202		176		122	
Total Biomass		1.3592		1.4168		0.8868		0.3416		0.3093		0.328

STATION 10

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	43	0.0970	50	0.0948	37	0.0566	37	0.0411	27	0.0691	13	0.02
Oligochaeta	8	0.0093	28	0.0180	7	0.0061	36	0.0623	12	0.0225	2	
Corbicula	6	1.2116	5	0.0119	5	0.2373	7	6.8192	8	5.6914	6	
Chirononidae	1		3		2		4		1		1	
Nematoda	10		21		12		11		-		5	
Neomysis	-		1		-		1		-		-	
Gastrotoda	-		-		-		1	0.0301	1		-	
Total Organisms	68		108		63		97		49		27	
Total Biomass		1.3179		1.1247		1.3000		6.9527		5.7830		0.02

STATION 11

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	120	0.1319	125	0.0915	167	0.1883	111	0.1221	99	0.1963	98	0.18
Oligochaeta	135	0.2094	119	0.1424	91	0.2058	85	0.1214	127	0.3489	82	0.18
Corbicula	4		12		11	0.0279	8	0.0402	2		8	0.04
Chironomidae	17	0.0126	11	0.0053	11		10	0.0073	3		8	
Neomysis	2		-		-		2		-		1	
Gastrotoda	2	0.0224	3	0.1779	-		2	0.1548	4	0.0904	-	
Plecoptera	-		-		1	0.0213	-		-		-	
Total Organisms	334		347		334		244		257		227	
Total Organisms		0.3763		0.4171		0.4433		0.4458		0.6356		0.41

APPENDIX TABLE B9 (CONCLUDED)

STATION SI

Organism	Grab 1 No.	Grab 1 Weight	Grab 2 No.	Grab 2 Weight	Grab 3 No.	Grab 3 Weight	Grab 4 No.	Grab 4 Weight	Grab 5 No.	Grab 5 Weight	Grab 6 No.	Grab 6 Weig
Corophium salmonis	15	0.0241	18	0.0358	26	0.0517	26	0.0395	28	0.0422	18	0.03
Corbicula	7		5	6.4023	7		11	0.0158	23	5.0936	1	
Chironomidae	1		3		5		9		9		2	0.00
Anisogammarus	-		-		-		1	0.0051	-		-	
Polychaeta	2	0.0103	2	0.0476	-		1	0.0068	-		-	
Total Organisms	25		28		38		48		60		21	
Total Biomass		0.0344		6.4857		0.0517		0.0672		5.1358		0.03

APPENDIX B10: MACROINVERTEBRATE, TAXA IN ORDER OF MEAN ANNUAL ABUNDANCE FROM ALL STATIONS AT MILLER SANDS, OREGON, JULY 1976 - JULY 1977

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	C… WEIGHT
776	1	1	0.0010	13	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	1	2	0.0029	28	0.0003	1	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0
776	1	3	0.0018	13	0.0002	2	0.0000	0	0.9869	1	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0
776	2	1	0.0076	64	0.0053	77	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0004	3	0.0000	0	0.0000	0	0.0
776	2	2	0.0170	51	0.0017	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	2	3	0.0062	37	0.0021	26	0.0001	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0
776	3	1	0.0000	1	0.0343	23	0.0001	6	0.0001	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	3	2	0.0000	0	0.0100	66	0.0001	7	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0001	3	0.0000	0	0.0000	0	0.0
776	3	3	0.0000	0	0.0215	78	0.0005	10	0.0034	4	0.0000	0	0.0000	0	0.0000	0	0.0009	6	0.0000	0	0.0000	0	0.0
776	4	1	0.0095	70	0.0052	17	0.0000	1	5.6708	3	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0017	3	0.0000	0	0.0
776	4	2	0.0041	68	0.0024	15	0.0000	0	0.0000	1	0.0019	1	0.0000	0	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0
775	4	3	0.0025	45	0.0001	20	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.6902	1	0.0000	0	0.0018	3	0.0000	0	0.0
776	5	1	0.0002	8	0.0146	104	0.0024	26	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0006	5	0.0000	0	0.0000	0	0.0
776	5	2	0.0001	2	0.0290	122	0.0069	34	0.2035	2	0.0000	0	0.0000	0	0.0000	0	0.0000	4	0.0000	1	0.0000	0	0.0
776	5	3	0.0002	2	0.0000	14	0.0184	26	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	6	1	0.0107	53	0.0070	56	0.0000	1	0.0016	6	0.0000	1	0.0000	0	0.0283	1	0.0000	1	0.0000	2	0.0000	0	0.0
776	6	2	0.0029	112	0.0016	27	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	2	0.0000	0	0.0
776	6	3	0.0021	80	0.0014	19	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	7	1	0.0120	67	0.0040	9	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.1697	7	0.0000	0	0.0000	0	0.0000	0	0.0
776	7	2	0.0134	73	0.0342	6	0.0000	2	0.0004	1	0.0000	0	0.0000	0	0.0755	2	0.0000	0	0.0000	0	0.0000	0	0.0
776	7	3	0.0057	68	0.0021	7	0.0000	0	0.0001	6	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	20	0.0
776	8	1	0.0015	34	0.0095	119	0.0000	0	0.0001	3	0.0000	0	0.0000	0	0.0000	0	0.0004	10	0.0000	0	0.0000	0	0.0
776	8	2	0.0026	12	0.0200	66	0.0000	0	0.0001	3	0.0000	0	0.0000	0	0.0000	0	0.0000	3	0.0000	0	0.0000	0	0.0
776	8	3	0.0073	33	0.0511	74	0.0000	0	0.0002	3	0.0000	0	0.0000	0	1.3693	3	0.0033	9	0.0000	0	0.0000	0	0.0
776	9	1	0.0003	8	0.0000	0	0.0000	0	0.0071	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	9	2	0.0003	3	0.0000	0	0.0000	0	2.3522	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
776	9	3	0.0002	3	0.0000	0	0.0000	0	0.0666	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	10	1	0.0043	54	0.0376	139	0.0011	16	0.0000	0	0.0010	2	0.0000	0	0.0000	0	0.0067	9	0.0000	0	0.0000	0	0.0
776	10	2	0.0087	45	0.0522	124	0.0026	14	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0
776	10	3	0.0024	51	0.0208	145	0.0024	19	0.0000	0	0.0000	0	0.0000	0	0.0181	2	0.0008	6	0.0000	0	0.0000	0	0.0
776	11	1	0.0045	78	0.0005	27	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0252	1	0.0000	0	0.0000	2	0.0000	0	0.0
776	11	2	0.0049	51	0.0025	42	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	11	3	0.0019	122	0.0023	69	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	A1	1	0.0000	1	0.0044	75	0.0077	39	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0015	6	0.0000	2	0.0000	0	0.0
776	A1	2	0.0025	8	0.0022	52	0.0047	30	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	1	0.0000	0	0.0
776	A1	3	0.0000	3	0.0001	34	0.0044	20	0.0179	2	0.0000	0	0.0000	0	0.0000	0	0.0016	12	0.0000	7	0.0000	0	0.0
776	A2	1	0.0000	2	0.0000	4	0.0000	0	0.0108	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0017	8	0.0000	0	0.0
776	A2	2	0.0001	3	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	9	0.0
776	A2	3	0.0000	0	0.0000	0	0.0000	0	1.1256	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	A3	1	0.0000	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	A3	2	0.0000	0	0.0000	0	0.0000	0	0.0003	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	A3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	7	0.0
776	B1	1	0.0000	0	0.0045	26	0.0156	46	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	2	0.0
776	B1	2	0.0000	0	0.0089	50	0.0097	62	1.0624	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0
776	B1	3	0.0000	1	0.0026	15	0.0110	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0
776	B2	1	0.0161	17	0.0000	4	0.0000	0	1.4000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	B2	2	0.0626	57	0.0000	1	0.0000	0	0.0013	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
776	B2	3	0.0193	35	0.0000	0	0.0000	0	0.0009	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	B3	1	0.0000	0	0.0000	2	0.0000	0	0.0030	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	B3	2	0.0000	0	0.0001	1	0.0000	0	0.0003	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	24	0.0

Appendix Table B10

Macroinvertebrate, taxa in order of mean annual abundance, from all stations at Miller Sands, Oregon 1975 - 19

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	CS WEI
776	B3	3	0.0000	0	0.0000	0	0.0002	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	3	0.0
776	C1	1	0.0039	26	0.0041	52	0.0001	12	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	3	0.0000	1	0.0000	0	0.0
776	C1	2	0.0105	35	0.0079	46	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0
776	C1	3	0.0011	5	0.0069	15	0.0002	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0018	4	0.0000	0	0.0000	0	0.0
776	C2	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	2	0.0000	2	0.0
776	C2	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0
776	C2	3	0.0000	0	0.0000	0	0.0002	1	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	7	0.0000	0	0.0
776	C3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	5	0.0
776	C3	2	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0
776	C3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	D1	1	0.0040	26	0.0001	3	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	4	0.0
776	D1	2	0.0045	36	0.0001	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0
776	D1	3	0.0027	28	0.0002	5	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
776	D2	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
776	D2	2	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	D2	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	D3	1	0.0000	0	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
776	D3	2	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	D3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	E1	1	0.0000	0	0.0263	94	0.0020	16	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
776	E1	2	0.0010	3	0.0151	126	0.0094	46	0.0424	1	0.0000	0	0.0000	0	0.0000	0	0.0002	4	0.0002	1	0.0000	0	0.0
776	E1	3	0.0000	0	0.0001	42	0.0010	10	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	E2	1	0.0000	0	0.1003	62	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0081	15	0.0000	0	0.0273	7	0.0000	0	0.0
776	E2	2	0.0000	0	0.1275	162	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0233	36	0.0000	0	0.0272	9	0.0000	0	0.0
776	E2	3	0.0000	0	0.0659	46	0.0001	1	0.0009	1	0.0000	0	0.0000	0	0.0053	17	0.0000	0	0.0274	10	0.0000	0	0.0
776	E3	1	0.0000	0	0.0021	47	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	3	0.0000	0	0.0006	3	0.0000	1	0.0
776	E3	2	0.0000	0	0.0009	26	0.0001	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
776	E3	3	0.0000	0	0.0001	36	0.0000	0	0.0269	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0010	9	0.0000	0	0.0
976	A1	1	0.0006	9	0.0006	26	0.0065	15	0.0000	13	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0
976	A1	2	0.0006	10	0.0057	41	0.0037	25	0.0000	6	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0
976	A1	3	0.0004	8	0.0005	10	0.0016	6	0.0000	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	A2	1	0.0000	0	0.0000	4	0.0039	22	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	A2	2	0.0000	0	0.0000	1	0.0002	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	2	0.0
976	A2	3	0.0000	1	0.0000	1	0.0013	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	A3	1	0.0000	0	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	A3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	A3	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	0	0.0000	0	0.0000	0	0.0
976	B1	1	0.0004	11	0.0001	14	0.0189	32	0.0000	10	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	B1	2	0.0036	16	0.0003	18	0.0108	11	2.6482	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	B1	3	0.0021	12	0.0005	9	0.0215	22	0.0002	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0
976	B2	1	0.0000	5	0.0000	6	0.0003	9	0.5216	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	3	0.0000	0	0.0
976	B2	2	0.0000	3	0.0000	2	0.0004	5	1.7933	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	B2	3	0.0000	4	0.0000	2	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	B3	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	B3	2	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	B3	3	0.0000	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	1	1	0.0003	11	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	3	0.0
976	1	2	0.0006	12	0.0000	1	0.0000	0	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	1	3	0.0038	33	0.0000	0	0.0000	0	0.0000	11	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	2	0.0
976	2	1	0.0097	78	0.0136	109	0.0000	0	0.0000	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0

295

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGO CHAETE WEIGHT	NO	CHIRONO MIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAM MARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	OS WEI
976	2	2	0.0026	84	0.0039	96	0.0000	6	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	2	3	0.0092	64	0.0068	64	0.0000	4	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	3	1	0.0026	14	0.0144	210	0.0000	4	0.0003	17	0.0000	0	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0
976	3	2	0.0037	21	0.0203	155	0.0000	6	0.0955	20	0.0008	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	3	3	0.0002	22	0.0142	140	0.0000	10	0.0002	23	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	3	0.0
976	4	1	0.0143	103	0.0023	10	0.0000	2	0.0004	31	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0
976	4	2	0.0076	66	0.0021	5	0.0000	2	0.0002	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	4	3	0.0148	78	0.0063	22	0.0000	2	0.0064	36	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	5	1	0.0000	4	0.0762	130	0.0374	69	0.0003	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
976	5	2	0.0000	1	0.0343	176	0.0200	40	******	5	0.0000	0	0.0000	0	0.0467	2	0.0000	0	0.0000	1	0.0000	0	0.0
976	5	3	0.0000	3	0.0394	235	0.0222	54	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0
976	6	1	0.0116	152	0.0236	110	0.0011	9	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0021	3	0.0000	0	0.0000	0	0.0
976	6	2	0.0176	103	0.0046	15	0.0037	6	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	1	0.0
976	6	3	0.0019	53	0.0046	15	0.0002	4	0.0495	9	0.0010	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	7	1	0.0095	156	0.0004	7	0.0000	0	0.0024	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	7	2	0.0084	133	0.0003	6	0.0000	2	0.0002	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	7	3	0.0059	222	0.0029	26	0.0000	1	0.0001	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	8	1	0.0077	71	0.0547	164	0.0009	15	0.0000	2	0.0000	0	0.0000	0	0.4756	1	0.0016	20	0.0000	3	0.0000	0	0.0
976	8	2	0.0059	86	0.0321	212	0.0027	4	0.0000	4	0.0000	0	0.0000	0	0.2641	1	0.0020	12	0.0000	1	0.0000	1	0.0
976	8	3	0.0055	96	0.0603	336	0.0033	21	0.0000	5	0.0000	1	0.0000	0	0.0000	0	0.0006	20	0.0000	0	0.0000	1	0.0
976	9	1	0.0004	6	0.0000	6	0.0000	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	9	2	0.0010	8	0.0000	11	0.0000	6	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	9	3	0.0006	17	0.0000	6	0.0000	6	0.0000	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	10	1	0.0023	20	0.0528	124	0.0085	17	0.0001	8	0.0017	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	10	2	0.0097	38	0.0507	74	0.0012	4	0.0001	14	0.0050	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	10	3	0.0026	37	0.0364	47	0.0041	11	0.0002	13	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	11	1	0.0021	124	0.0138	58	0.0002	9	0.0000	17	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	11	2	0.0011	59	0.0334	142	0.0002	6	0.0000	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	11	3	0.0013	52	0.0133	94	0.0003	16	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	C1	1	0.0051	32	0.0003	11	0.0026	10	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	C1	2	0.0027	12	0.0037	6	0.0003	4	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	C1	3	0.0057	26	0.0000	65	0.0000	13	0.0000	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	11	0.0000	0	0.0
976	C2	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	1	0.0000	0	0.0
976	C2	2	0.0002	2	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
976	C2	3	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	C3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0
976	C3	2	0.0000	0	0.0000	0	0.0000	0	0.0049	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	C3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D1	1	0.0131	51	0.0000	0	0.0000	0	0.0000	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
976	D1	2	0.0030	29	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
976	D1	3	0.0046	49	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	D2	1	0.0002	4	0.0000	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D2	2	0.0001	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D2	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
976	D3	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	[illegible]	0.0000	0	0.0
976	E1	1	0.0309	89	0.0144	31	0.0194	49	******	2	0.0000	0	0.0000	0	0.0226	2	0.0000	0	0.0000	0	0.0000	0	0.0
976	E1	2	0.0054	58	0.0327	120	0.0102	52	0.0065	18	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
976	E1	3	0.0030	40	0.0168	93	0.0170	74	******	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGO CHAETE WEIGHT	NO	CHIRONO MIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAM MARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	WE…
976	E2	1	0.0000	6	0.1269	24	0.0015	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
976	E2	2	0.0000	2	0.0768	14	0.0000	0	0.0000	0	0.0000	0	0.0023	2	0.0014	7	0.0000	0	0.0000	0	0.0000	0	0.
976	E2	3	0.0000	1	0.0762	15	0.0042	2	0.0000	0	0.0000	0	0.0000	2	0.0100	19	0.0000	0	0.0000	0	0.0000	0	0.
976	E3	1	0.0000	0	0.0029	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0003	3	0.0000	0	0.
976	E3	2	0.0000	0	0.0063	3	0.0023	1	0.0205	2	0.0205	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
976	E3	3	0.0000	1	0.0031	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A1	1	0.0006	3	0.0161	54	0.0122	31	0.0007	27	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A1	2	0.0012	5	0.0074	21	0.0000	0	0.0005	24	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A1	3	0.0023	8	0.0367	27	0.0330	45	0.0005	16	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.
1176	A2	1	0.0000	0	0.0066	12	0.0000	1	0.0002	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0004	2	0.0000	0	0.
1176	A2	2	0.0000	5	0.0066	22	0.0000	1	0.0001	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.
1176	A2	3	0.0000	0	0.0000	2	0.0000	0	1.0315	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	A3	3	0.0000	1	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0025	2	0.0000	0	0.
1176	B1	1	0.0014	8	0.0028	12	0.0734	102	0.0000	1	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	B1	2	0.0060	18	0.0059	16	0.0654	96	0.0040	9	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.0007	1	0.0000	0	0.
1176	B1	3	0.0024	9	0.0067	26	0.0780	61	0.9365	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	B2	1	0.0016	10	0.0072	6	0.0056	10	0.0001	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	B2	2	0.0020	17	0.0069	5	0.0033	7	0.0001	13	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	B2	3	0.0051	31	0.0074	11	0.0014	4	0.0001	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.
1176	B3	1	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	B3	2	0.0003	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0012	1	0.0000	0	0.
1176	B3	3	0.0000	0	0.0063	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.
1176	1	1	0.0003	3	0.0062	3	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	1	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	1	3	0.0006	5	0.0065	3	0.0000	0	0.0069	51	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	2	1	0.0248	193	0.0148	30	0.0002	1	0.0063	32	0.0000	0	0.0000	0	0.0015	2	0.0000	0	0.0000	4	0.0000	0	0.
1176	2	2	0.0297	162	0.0365	65	0.0006	2	0.0140	11	0.0000	0	0.0000	0	0.0189	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	2	3	0.0291	182	0.0264	47	0.0002	2	6.5696	49	0.0000	0	0.0000	0	0.0550	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	3	1	0.0013	50	0.0061	12	0.0003	13	0.0017	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	3	2	0.0046	81	0.0052	11	0.0000	1	0.0006	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	3	3	0.0012	7	0.0865	107	0.0056	17	0.0004	4	0.0000	0	0.0000	0	0.8466	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	4	1	0.0662	722	0.0166	14	0.0000	0	0.0161	50	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	4	2	0.0876	678	0.0013	12	0.0000	0	0.0130	73	0.0000	0	0.0000	0	0.6990	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	4	3	0.1545	792	0.0063	19	0.0170	26	0.0093	71	0.0000	0	0.0000	0	0.7663	3	0.0000	0	0.0000	0	0.0000	0	0.
1176	5	1	0.0020	5	0.0761	172	0.0629	92	0.0004	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	5	2	0.0301	128	0.0864	207	0.0144	44	0.0066	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	5	3	0.0202	46	0.1159	224	0.0703	65	0.0068	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	6	1	0.0821	402	0.0069	2	0.0000	0	0.0001	8	0.0000	0	0.0000	0	0.5426	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	6	2	0.0499	310	0.0061	1	0.0006	0	0.0005	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	6	3	0.0766	486	0.0026	2	0.0000	0	0.0016	24	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	7	1	0.0453	692	0.0064	6	0.0000	0	0.0004	18	0.0000	0	0.0000	0	0.0099	1	0.0000	0	0.0000	0	0.0000	0	0.
1176	7	2	0.0574	541	0.0026	3	0.0000	0	0.0130	21	0.0000	0	0.0000	0	0.0228	4	0.0000	0	0.0000	0	0.0000	0	0.
1176	7	3	0.0382	616	0.0018	5	0.0000	0	0.0066	19	0.0000	0	0.0000	0	0.1767	5	0.0000	0	0.0000	0	0.0000	0	0.
1176	8	1	0.0722	582	0.0029	12	0.0014	4	0.0016	21	0.0000	0	0.0000	0	0.0000	0	0.0017	8	0.0007	1	0.0000	0	0.
1176	8	2	0.0942	391	0.0060	10	0.0019	2	0.0100	17	0.0000	0	0.0000	0	0.0000	0	0.0052	10	0.0000	0	0.0000	0	0.
1176	8	3	0.0650	247	0.0016	7	0.0005	2	0.0004	7	0.0000	0	0.0000	0	0.0000	0	0.0042	12	0.0000	0	0.0000	0	0.
1176	9	1	0.0001	2	0.0044	23	0.0000	0	0.0013	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
1176	9	2	0.0004	11	0.0018	27	0.0000	0	7.6687	12	0.0000	0	0.0000	0	0.0019	1	0.0000	0	0.0000	0	0.0000	0	0.

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	CS WEI
1176	9	3	0.0003	9	0.0036	40	0.0000	0	0.0042	22	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	10	1	0.0045	74	0.0906	347	0.0009	3	0.0006	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	10	2	0.0007	32	0.0306	169	0.0005	4	0.0002	3	0.0000	0	0.0000	0	0.0007	1	0.0000	0	0.0000	0	0.0000	0	0.0
1176	10	3	0.0070	50	0.1106	221	0.0016	5	0.0004	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	11	1	0.0302	221	0.0015	4	0.0007	4	0.1058	40	0.0000	0	0.0000	0	0.0000	0	0.0008	1	0.0000	0	0.0000	0	0.0
1176	11	2	0.0119	86	0.0090	40	0.0009	4	0.0090	17	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	11	3	0.0253	238	0.0070	5	0.0002	3	0.1923	37	0.0000	0	0.0000	0	0.0036	1	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C1	1	0.0096	42	0.0046	9	0.0036	10	0.0006	19	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C1	2	0.0121	41	0.0236	48	0.0030	10	0.0050	21	0.0016	2	0.0000	0	0.0576	1	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C1	3	0.0067	38	0.0037	25	0.0139	16	0.0250	15	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C2	1	0.0000	0	0.0149	2	0.0000	0	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C2	2	0.0000	0	0.0000	0	0.0000	0	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C2	3	0.0000	0	0.0000	2	0.0000	0	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C3	2	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	C3	3	0.0000	0	0.0000	0	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D1	1	0.0142	72	0.0005	3	0.0016	2	0.0015	31	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D1	2	0.0056	51	0.0040	1	0.0025	2	0.0003	12	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D1	3	0.0040	28	0.0000	0	0.0000	0	0.0019	17	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D2	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0011	1	0.0000	0	0.0
1176	D2	2	0.0000	1	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D2	3	0.0004	4	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	D3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E1	1	0.0075	18	0.0152	44	0.0316	48	0.0012	15	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E1	2	0.0090	24	0.0162	24	0.0778	47	0.0006	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E1	3	0.0046	182	0.0030	51	0.0567	60	0.0003	13	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E2	1	0.0000	4	0.0004	6	0.0000	0	0.0524	1	0.0000	0	0.0000	0	0.0000	0	0.0009	0	0.0000	0	0.0000	0	0.0
1176	E2	2	0.0000	0	0.0152	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E2	3	0.0000	0	0.0200	11	0.0000	0	0.0200	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E3	1	0.0000	1	0.0032	4	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E3	2	0.0000	1	0.0049	6	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
1176	E3	3	0.0009	8	0.0060	9	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A1	1	0.0034	12	0.0144	41	0.0000	1	0.0056	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A1	2	0.0002	5	0.0240	28	0.0002	4	0.0041	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A1	3	0.0006	4	0.0147	55	0.0006	11	0.0036	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A2	1	0.0000	1	0.0043	6	0.0006	4	0.0011	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A2	2	0.0000	1	0.0000	0	0.0000	0	0.1310	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A2	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0071	2	0.0000	0	0.0
377	A3	1	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	A3	2	0.0000	0	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.0
377	A3	3	0.0002	1	0.0001	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	B1	1	0.0000	1	0.0260	58	0.0023	6	0.0072	1	0.0000	0	0.0002	3	0.0010	1	0.0000	0	0.0000	0	0.0000	0	0.0
377	B1	2	0.0009	3	0.0246	53	0.0060	10	0.0022	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	B1	3	0.0003	2	0.0130	26	0.0096	14	0.0100	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	B2	1	0.0000	0	0.0043	10	0.0050	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	B2	2	0.0010	8	0.0040	16	0.0001	1	0.0032	1	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0014	4	0.0000	0	0.0
377	B2	3	0.0004	2	0.0006	15	0.0012	1	0.0017	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0011	1	0.0000	0	0.0
377	B3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	WE
377	B3	2	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	B3	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	1	1	0.0006	5	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0012	1	0.0000	0	0.0000	1	0.0000	6	0.0
377	1	2	0.0011	3	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	5	0.0
377	1	3	0.0070	21	0.0000	2	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0015	2	0.0000	0	0.0000	0	0.0000	7	0.0
377	2	1	0.0009	26	0.0006	9	0.0004	7	0.0009	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	2	2	0.0003	28	0.0000	5	0.0006	12	0.0001	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
377	2	3	0.0000	10	0.0006	10	0.0002	3	0.0067	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
377	3	1	0.0168	112	0.0402	120	0.0036	37	0.0170	52	0.0000	0	0.0000	0	0.0000	0	0.0024	2	0.0000	0	0.0000	0	0.0
377	3	2	0.0056	58	0.0048	21	0.0007	7	0.0053	36	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	3	3	0.0076	55	0.0444	182	0.0035	22	0.0000	37	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	4	1	0.0946	349	0.0177	19	0.0001	4	0.0222	28	0.0000	0	0.0000	1	0.0225	4	0.0000	0	0.0000	0	0.0000	0	0.0
377	4	2	0.1425	425	0.0315	31	0.0000	0	0.0548	35	0.0000	0	0.0000	1	0.0665	2	0.0000	0	0.0000	0	0.0000	0	0.0
377	4	3	0.1307	533	0.0241	33	0.0000	0	0.0470	47	0.0000	0	0.0000	1	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0
377	5	1	0.0055	13	0.0496	44	0.0104	23	0.0046	16	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	5	2	0.0230	88	0.0924	156	0.0062	31	0.0370	51	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	5	3	0.0021	41	0.2105	264	0.0250	31	0.0102	31	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	6	1	0.0670	104	0.0458	86	0.0010	16	0.0168	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
377	6	2	0.0252	70	0.0730	92	0.0055	32	7.3110	18	0.0000	0	0.0000	0	0.0000	0	0.0000.	0	0.0000	0	0.0000	0	0.0
377	6	3	0.0321	142	0.0569	73	0.0021	24	0.0031	19	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	7	1	0.0063	256	0.0108	19	0.0001	5	0.0070	7	0.0000	1	0.0000	0	0.0183	1	0.0002	1	0.0000	0	0.0000	0	0.0
377	7	2	0.1456	653	0.0220	36	0.0002	11	0.0340	28	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	7	3	0.0757	379	0.0224	35	0.0002	6	0.0079	7	0.0000	0	0.0000	1	0.0500	1	0.0000	0	0.0000	0	0.0000	0	0.0
377	8	1	0.1305	525	0.0240	16	0.0000	4	0.0099	9	0.0000	0	0.0000	0	0.0000	0	0.0004	2	0.0000	0	0.0000	0	0.0
377	8	2	0.1102	300	0.0510	56	0.0010	6	0.0110	11	0.0000	0	0.0000	0	0.0000	0	0.0005	7	0.0000	1	0.0000	0	0.0
377	8	3	0.0875	274	0.0146	33	0.0008	12	0.0640	7	0.0000	0	0.0000	0	0.0000	0	0.0006	0	0.0000	0	0.0000	0	0.0
377	9	1	0.0000	1	0.0137	327	0.0000	4	0.0000	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	9	2	0.0000	1	0.0280	622	0.0000	5	0.0000	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	9	3	0.0000	0	0.0049	86	0.0000	1	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	10	1	0.0317	88	0.0337	45	0.0003	6	0.0000	1	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0
377	10	2	0.0151	49	0.0320	141	0.0074	14	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	10	3	0.0100	41	0.0700	122	0.0018	16	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	11	1	0.0368	112	0.0014	9	0.0000	0	0.0410	21	0.0000	0	0.0000	0	0.0193	1	0.0007	1	0.0000	0	0.0000	0	0.0
377	11	2	0.0265	94	0.0180	43	0.0000	0	0.0083	12	0.0000	0	0.0000	0	0.0300	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	11	3	0.0820	177	0.0034	6	0.0008	1	0.0951	42	0.0000	0	0.0000	0	0.0000	4	0.0000	0	0.0000	0	0.0000	0	0.0
377	C1	1	0.0210	110	0.0095	17	0.0049	13	0.0014	0	0.0000	0	0.0000	0	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.0
377	C1	2	0.0225	142	0.0108	57	0.0019	12	0.0179	3	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0
377	C1	3	0.0342	126	0.0190	38	0.0058	14	0.0680	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	C2	1	0.0004	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0013	6	0.0000	0	0.0
377	C2	2	0.0000	3	0.0000	0	0.0003	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
377	C2	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0024	2	0.0000	0	0.0
377	C3	1	0.0001	1	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	C3	2	0.0002	2	0.0000	1	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	1	0.0000	0	0.0
377	C3	3	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0
377	D1	1	0.0034	14	0.0000	0	0.0003	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	D1	2	0.0045	23	0.0000	2	0.0011	6	0.0011	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	D1	3	0.0022	23	0.0000	1	0.0057	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	D2	1	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
377	D2	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
377	D2	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	WE
577	E3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.
577	E3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E1	1	0.0045	15	0.0340	40	0.0469	44	0.0141	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0024	[illegible]	0.0000	0	0.
577	E1	2	0.0022	20	0.0270	56	0.0204	34	0.0000	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E1	3	0.0055	23	0.0265	46	0.0446	51	0.0107	3	0.0000	0	0.0000	0	0.0082	1	0.0000	0	0.0000	0	0.0000	0	0.
577	E2	1	0.0000	0	0.0825	132	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0061	3	0.0000	0	0.0174	5	0.0000	0	0.
577	E2	2	0.0000	0	0.0341	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0146	14	0.0000	0	0.0256	6	0.0000	0	0.
577	E2	3	0.0000	0	0.0308	26	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0122	6	0.0000	0	0.
577	E3	1	0.0000	0	0.0534	73	0.0000	0	0.0053	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E3	2	0.0000	0	0.0207	22	0.0000	0	0.0280	0	0.0000	0	0.0000	0	0.0000	4	0.0000	0	0.0122	2	0.0000	0	0.
577	E3	3	0.0000	0	0.0428	26	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0020	2	0.0000	0	0.
577	A1	1	0.0003	1	0.0002	14	0.0002	2	0.0073	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	A1	2	0.0000	0	0.0316	45	0.0090	13	0.0100	7	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0012	4	0.0000	0	0.
577	A1	3	0.0000	0	0.0119	31	0.0019	5	0.0022	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0012	3	0.0000	0	0.
577	A2	1	0.0000	0	0.0004	2	0.0000	1	0.0028	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	37	0.0000	0	0.
577	A2	2	0.0000	0	0.0009	5	0.0000	0	0.0105	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	A2	3	0.0000	0	0.0000	0	0.0000	0	0.3909	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	11	0.0000	0	0.
577	A3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	A3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	4	0.0000	0	0.
577	A3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.
577	B1	1	0.0000	0	0.0173	23	0.0180	15	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B1	2	0.0000	0	0.0050	10	0.0041	7	0.0013	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B1	3	0.0000	0	0.0057	9	0.0067	3	******	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B2	1	0.0005	2	0.0024	6	0.0009	2	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0012	1	0.0000	0	0.0
577	B2	2	0.0010	9	0.0065	2	0.0046	4	0.0164	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0015	2	0.0000	0	0.0
577	B2	3	0.0000	1	0.0007	2	0.0001	1	0.0043	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B3	1	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	B3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0003	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	1	1	0.0039	11	0.0000	0	0.0000	0	0.0007	4	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0
577	1	2	0.0056	14	0.0000	1	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	1	3	0.0021	8	0.0000	0	0.0022	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	2	1	0.0001	2	0.0141	11	0.0001	16	0.0007	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	2	2	0.0001	1	0.0036	8	0.0002	22	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	2	3	0.0005	4	0.0046	5	0.0007	36	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	3	1	0.0001	3	0.1334	130	0.0029	7	0.1447	32	0.0000	0	0.0000	0	1.1634	2	0.0000	0	0.0000	0	0.0000	0	0.0
577	3	2	0.0001	2	0.1209	670	0.0034	6	0.0540	40	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	3	3	0.0006	4	0.0926	650	0.0046	6	0.0174	39	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	4	1	0.0078	42	0.0070	19	0.0006	3	0.1336	4	0.0000	0	0.0000	0	0.0074	1	0.0000	0	0.0000	0	0.0000	0	0.0
577	4	2	0.0153	29	0.0150	16	0.0023	7	0.1557	58	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	4	3	0.0059	28	0.0035	13	0.0003	3	0.0415	28	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	5	1	0.0001	1	0.0562	36	0.0065	12	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	5	2	0.0005	1	0.0296	43	0.0130	13	0.0069	10	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	5	3	0.0001	1	0.0473	36	0.0026	5	0.0061	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	6	1	0.0240	139	0.0845	41	0.0001	1	0.0190	11	0.0000	0	0.0000	0	0.0184	1	0.0000	0	0.0000	0	0.0000	0	0.0
577	6	2	0.0166	81	0.0690	27	0.0009	3	0.0135	13	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
577	6	3	0.0216	78	0.0507	20	0.0001	1	0.0155	19	0.0000	0	0.0000	0	0.0016	1	0.0000	0	0.0000	0	0.0000	0	0.0
577	7	1	0.0111	48	0.0355	13	0.0000	3	0.0769	23	0.0000	0	0.0000	0	0.0423	4	0.0000	0	0.0000	0	0.0000	0	0.0
577	7	2	0.0135	37	0.0592	12	0.0000	0	0.0106	14	0.0000	0	0.0000	0	0.1560	8	0.0000	0	0.0000	0	0.0000	0	0.0

MOTH	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	C WE
577	7	3	0.0145	53	0.0665	20	0.0000	0	0.0099	16	0.0000	0	0.0000	0	0.0566	4	0.0000	4	0.0000	0	0.0000	0	0.
577	8	1	0.0490	77	0.0299	12	0.0001	2	0.0106	6	0.0000	0	0.0000	0	0.0064	0	0.0057	2	0.0000	0	0.0000	0	0.
577	8	2	0.0763	153	0.0664	22	0.0012	7	0.0154	5	0.0000	0	0.0000	0	0.0000	0	0.0048	1	0.0000	0	0.0000	0	0.
577	8	3	0.0808	159	0.0675	24	0.0025	19	0.0380	17	0.0000	0	0.0000	0	0.0000	0	0.0016	1	0.0000	0	0.0000	0	0.
577	9	1	0.0000	0	0.0061	224	0.0004	3	0.0049	10	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	9	2	0.0000	0	0.0143	27	0.0000	0	0.0000	8	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	9	3	0.0000	0	0.0150	21	0.0000	0	0.0081	22	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	10	1	0.0010	5	0.0521	320	0.0056	9	0.0033	5	0.0000	0	0.0000	0	0.0325	1	0.0000	0	0.0000	0	0.0000	0	0.
577	10	2	0.0046	11	0.0878	425	0.0069	14	0.0059	8	0.0000	0	0.0000	0	0.0503	1	0.0000	0	0.0000	0	0.0000	0	0.
577	10	3	0.0036	7	0.1604	370	0.0021	4	0.0162	8	0.0000	0	0.0000	1	0.0830	1	0.0000	0	0.0000	0	0.0000	0	0.
577	11	1	0.0073	43	0.0450	27	0.0000	0	0.0060	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	11	2	0.0136	52	0.0523	47	0.0003	3	0.0057	12	0.0000	0	0.0000	0	0.0541	3	0.0000	0	0.0000	0	0.0000	0	0.
577	11	3	0.0097	49	0.0376	15	0.0000	0	0.0002	3	0.0000	0	0.0000	0	0.0500	2	0.0000	0	0.0000	0	0.0000	0	0.
577	C1	1	0.0000	0	0.0000	24	0.0000	0	0.0005	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C1	2	0.0000	0	0.0000	21	0.0005	2	0.0000	0	0.0000	0	0.0090	10	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C1	3	0.0000	0	0.0000	11	0.0001	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C2	1	0.0000	0	0.0000	0	0.0000	0	0.0006	3	0.0000	0	0.0000	0	0.0000	0	0.0050	0	0.0000	0	0.0000	0	0.
577	C2	2	0.0000	0	0.0000	0	0.0000	0	0.0003	1	0.0000	0	0.0000	0	0.0000	0	0.0006	0	0.0000	0	0.0000	1	0.
577	C2	3	0.0000	0	0.0000	0	0.0004	1	0.0006	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C3	2	0.0000	0	0.0006	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	C3	3	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.
577	D1	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	D1	2	0.0027	5	0.0004	2	0.0033	4	0.0006	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0015	8	0.0000	0	0.
577	D1	3	0.0054	14	0.0000	1	0.0040	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0018	2	0.0000	0	0.
577	D2	1	0.0000	1	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	D2	2	0.0000	0	0.0000	1	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	D2	3	0.0000	1	0.0000	0	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	D3	1	0.0137	34	0.0004	2	0.0002	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0024	2	0.0000	0	0.
577	D3	2	0.0000	0	0.0000	1	0.0000	1	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	D3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E1	1	0.0000	0	0.0000	26	0.0249	41	0.0550	11	0.0000	0	0.0000	0	0.0028	1	0.0000	0	0.0000	1	0.0000	0	0.
577	E1	2	0.0002	1	0.0000	16	0.0407	40	0.0074	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E1	3	0.0000	0	0.0000	23	0.0417	37	0.0090	10	0.0000	0	0.0000	0	0.0023	1	0.0008	1	0.0000	0	0.0000	0	0.
577	E2	1	0.0000	0	0.3092	26	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0165	2	0.0000	0	0.0150	2	0.0000	0	0.
577	E2	2	0.0000	0	0.1164	59	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0037	1	0.0000	0	0.0001	1	0.0000	0	0.
577	E2	3	0.0000	0	0.0617	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0050	2	0.0000	0	0.0000	0	0.0000	0	0.
577	E3	1	0.0000	0	0.0150	29	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E3	2	0.0000	0	0.0037	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
577	E3	3	0.0000	0	0.0178	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	1	1	0.0181	60	0.0003	4	0.0005	4	0.0321	2	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	1	2	0.0248	65	0.0002	4	0.0017	4	0.0018	1	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	1	3	0.0182	68	0.0000	0	0.0097	73	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	2	1	0.0066	41	0.0005	3	0.0222	29	0.0255	3	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	2	2	0.0037	14	0.0005	2	0.0045	23	0.0169	2	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	2	3	0.0230	106	0.0008	4	0.0237	97	0.0090	2	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.
777	3	1	0.0140	30	0.0320	53	0.0540	126	0.1463	58	0.0000	0	0.0000	0	0.0563	1	0.0000	0	0.0000	0	0.0000	0	0.
777	3	2	0.0001	1	0.0171	44	0.0076	31	0.0422	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	3	3	0.0000	0	0.0253	66	0.0066	34	0.0427	18	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	4	1	0.0004	5	0.0002	1	0.0000	0	0.0242	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	O… WE…
777	4	2	0.0325	52	0.0150	10	0.0000	0	0.0142	11	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	4	3	0.0136	38	0.0059	13	0.0000	0	0.0413	23	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	5	1	0.0054	11	0.0096	26	0.1140	334	1.1146	5	0.0000	0	0.0000	0	0.0000	0	0.0011	4	0.0000	0	0.0000	0	0.
777	5	2	0.0030	4	0.0098	12	0.1187	264	0.0185	2	0.0000	0	0.0000	0	0.0000	0	0.0021	2	0.0000	0	0.0000	0	0.
777	5	3	0.0010	3	0.0056	14	0.0501	161	******	5	0.0000	0	0.0000	0	0.0000	0	0.0005	1	0.0000	0	0.0000	0	0.
777	6	1	0.0023	14	0.0095	20	0.0088	27	0.0092	2	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	6	2	0.0021	4	0.0029	5	0.0096	59	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	6	3	0.0257	97	0.0096	9	0.0057	17	0.0150	4	0.0000	0	0.0000	0	0.0000	0	0.0002	2	0.0000	0	0.0000	0	0.
777	7	1	0.0052	68	0.0020	8	0.0014	4	0.0058	6	0.0000	1	0.0000	0	0.2820	8	0.0000	0	0.0000	0	0.0000	0	0.
777	7	2	0.0011	42	0.0008	3	0.0004	5	0.0025	5	0.0000	0	0.0000	0	0.0015	1	0.0000	0	0.0000	0	0.0000	0	0.
777	7	3	0.0062	94	0.0062	6	0.0017	7	0.0193	9	0.0000	0	0.0000	0	0.0883	1	0.0000	0	0.0000	0	0.0000	0	0.
777	8	1	0.1033	303	0.0622	28	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0203	1	0.0000	0	0.0000	0	0.0000	0	0.
777	8	2	0.0674	296	0.0404	76	0.0000	0	0.0003	6	0.0006	1	0.0000	0	0.0000	0	0.0053	2	[illegible]	0	0.0000	0	0.
777	8	3	0.0524	229	0.0448	114	0.0002	2	0.0067	4	0.0000	0	0.0000	0	0.0000	0	0.0026	2	[illegible]	0	0.0000	0	0.
777	9	1	0.0000	0	0.0000	0	0.0000	0	4.2650	13	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	6	0.0000	0	0.
777	9	2	0.0000	0	0.0000	0	0.0000	0	3.2136	14	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	[illegible]	0.0000	0	0.
777	9	3	0.0000	0	0.0000	0	0.0005	3	0.6961	20	0.0000	0	0.0000	0	0.0288	1	0.0000	0	[illegible]	9	0.0000	0	0.
777	10	1	0.0355	169	0.0175	20	0.0109	26	0.0222	6	0.0000	0	0.0000	0	0.0000	0	0.0017	2	0.0000	0	0.0000	0	0.
777	10	2	0.0264	140	0.0141	22	0.0048	23	0.0007	1	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	10	3	0.0068	94	0.0149	26	0.0006	6	0.0247	4	0.0000	0	0.0000	0	0.0000	0	0.0004	2	0.0000	0	0.0000	0	0.
777	11	1	0.0353	85	0.0321	38	0.0070	27	0.0000	0	0.0004	3	0.0000	0	0.0485	1	0.0005	2	0.0000	0	0.0000	0	0.
777	11	2	0.0462	100	0.0273	32	0.0046	22	0.0264	5	0.0001	1	0.0000	0	0.0421	3	0.0000	0	0.0000	0	0.0000	0	0.
777	11	3	0.0504	108	0.0155	21	0.0150	45	0.0571	3	0.0007	2	0.0000	0	0.0017	1	0.0000	0	0.0000	0	0.0000	0	0.
777	A1	1	0.0001	1	0.0068	12	0.0200	100	0.0276	4	0.0000	0	0.0000	0	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.
777	A1	2	0.0000	0	0.0072	16	0.0197	49	0.0368	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	A1	3	0.0003	3	0.0091	28	0.0159	67	0.0112	2	0.0000	0	0.0000	0	0.0000	0	0.0002	1	0.0000	0	0.0000	0	0.
777	A2	1	0.0000	0	0.0001	1	0.0002	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	A2	2	0.0000	0	0.0002	3	0.0002	1	0.0080	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	A2	3	0.0000	0	0.0001	2	0.0000	0	0.0090	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	A3	1	0.0000	0	0.0000	0	0.0000	0	0.0006	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	A3	2	0.0000	0	0.0000	0	0.0000	0	0.0007	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	A3	3	0.0000	0	0.0000	0	0.0000	0	0.0100	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	B1	1	0.0000	0	0.0102	31	0.0142	53	0.1223	9	0.0000	0	0.0000	0	0.0000	0	0.0004	1	0.0000	0	0.0000	0	0.
777	B1	2	0.0000	0	0.0102	25	0.0323	146	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	B1	3	0.0000	0	0.0051	10	0.0274	69	0.0368	1	0.0000	0	0.0000	0	0.0000	0	0.0003	1	0.0000	0	0.0000	0	0.
777	B2	1	0.0000	0	0.0001	3	0.0004	4	0.1648	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	6	0.0000	0	0.
777	B2	2	0.0000	0	0.0012	5	0.0003	3	0.0478	3	0.0000	0	0.0000	0	0.0000	0	0.0001	1	0.0000	0	0.0000	0	0.
777	B2	3	0.0000	0	0.0012	2	0.0003	4	0.0056	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	B3	1	0.0000	0	0.0000	0	0.0000	0	0.0004	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	B3	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	0	0.0000	0	0.0000	0	0.
777	B3	3	0.0000	0	0.0000	0	0.0000	0	0.0004	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	C1	1	0.0011	2	0.0063	9	0.1160	204	0.0788	18	0.0000	0	0.0000	0	0.0000	0	0.0013	1	[illegible]	[illegible]	0.0000	0	0.
777	C1	2	0.0019	4	0.0022	5	0.0571	151	0.0275	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	6	0.0000	0	0.
777	C1	3	0.0000	0	0.0068	11	0.0965	172	0.0462	10	0.0000	0	0.0000	0	0.0000	0	0.0003	1	[illegible]	[illegible]	0.0000	0	0.
777	C2	1	0.0003	1	0.0000	0	0.0012	5	0.0214	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	C2	2	0.0000	0	0.0000	1	0.0007	6	0.0900	5	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	C2	3	0.0006	3	0.0000	0	0.0004	2	0.0139	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	C3	1	0.0000	0	0.0000	1	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.
777	C3	2	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.
777	C3	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.

MOYR	STA	GRAB	COROPHIUM WEIGHT	NO	OLIGOCHAETE WEIGHT	NO	CHIRONOMIDAE WEIGHT	NO	CORBICULA WEIGHT	NO	NEOMYSIS WEIGHT	NO	ANISOGAMMARUS WEIGHT	NO	GASTROPODA WEIGHT	NO	POLYCHAETE WEIGHT	NO	INSECT LARVAE WEIGHT	NO	CLADOCERA WEIGHT	NO	OS… WEIGHT
777	L1	1	0.0120	47	0.0002	4	0.0009	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	3	0.0000	0	0.0
777	L1	2	0.0165	56	0.0004	6	0.0009	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
777	L1	3	0.0094	36	0.0004	2	0.0010	6	0.0019	1	0.0000	0	0.0000	0	0.0014	1	0.0000	0	0.0000	0	0.0000	0	0.0
777	L2	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
777	L2	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
777	L2	3	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0
777	L3	1	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	3	0.0000	0	0.0
777	L3	2	0.0000	0	0.0025	7	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	0	0.0
777	L3	3	0.0000	0	0.0015	6	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0006	1	0.0000	0	0.0000	0	0.0000	0	0.0
777	E1	1	0.0000	0	0.0038	5	0.0384	65	0.0044	4	0.0000	0	0.0000	0	0.0097	1	0.0184	1	0.0000	0	0.0000	0	0.0
777	E1	2	0.0006	2	0.0042	3	0.0444	66	0.1017	2	0.0000	0	0.0000	0	0.0012	1	0.0007	2	0.0000	0	0.0000	0	0.0
777	E1	3	0.0007	4	0.0026	4	0.0566	91	0.0032	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	[illegible]	1	0.0000	0	0.0
777	E2	1	0.0000	0	0.0550	21	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0416	27	0.0000	0	0.0156	4	0.0000	0	0.0
777	E2	2	0.0000	0	0.0362	9	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0329	16	0.0000	0	0.0166	5	0.0000	0	0.0
777	E2	3	0.0000	0	0.0258	12	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0666	35	0.0000	0	0.0356	9	0.0000	0	0.0
777	E3	1	0.0000	0	0.0272	43	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0034	1	0.0000	0	0.0131	1	0.0000	0	0.0
777	E3	2	0.0000	0	0.0253	67	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0096	3	0.0000	0	0.0000	0	0.0000	0	0.0
777	E3	3	0.0000	0	0.0141	34	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0027	1	0.0000	0	0.0000	0	0.0000	0	0.0

Appendix Table B10

APPENDIX B11: PHYLOGENETIC LIST OF BENTHIC INVERTEBRATE SPECIES AT MILLER SANDS, OREGON, 1975 - 1977

Appendix Table B11

Phylogenetic List of Benthic Invertebrate Species at Miller Sands, Oregon 1975 - 1977

Phylum	Class	Order	Family	Genus	Specie
Nemata	Nematoda	----	----	----	----
Platyhelminthes	Turbellaria	----	----	----	----
Anelida	Oligochaeta	----	----	----	----
	Polychaetea	Errantiformes	Nereidae	*Neanthes*	*limnic*
Mollusca	Gastropoda	Mesogastropoda	Pleuroceridae	*Pleurocera*	
		Ctenobranchiata	Amnicolidae	----	----
	Pelecypoda	Heterodonta	Corbiculidae	*Corbicula*	*flumin*
		Eulamellibranchia	Unionidae	*Anodonta*	----
Arthropoda	Insecta (aquatic larvae)	Diptera	Chironomidae	----	----
		Collembola	----	----	----
		Hemiptera	Corixidae	----	----
		Odonata	----	----	----
		Plecoptera	----	----	----
		Ephemeroptera	----	----	----
Arthropoda	Crustacea	Cladocera	----	----	----
		Ostracoda	----	----	----

		Amphipoda	Corophiidae	*Corophium*	*salmon*
			Gammaridae	*Anisogammarus*	*conver*
			Haustoriidae	*Eohaustorius*	*washin*
		Peracarida	Mysidacea	*Neomysis*	*mercia*
Vertebrata	Agnatha	Petromyzontiformes	Petromyzontidae	*Lampetra*	----
	Osteichthyes	Clupeiformes	Osmeridae	----	----

APPENDIX B12: NUMBERS AND VOLUMES OF ITEMS CONSUMED BY FISH AT ALL AREAS, JULY 1976 - JULY 1977

APPENDIX TABLE 12

Numbers and Volumes of Items Consumed by Fish at all Areas July 1976 - July 1977.

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
THREESPINE STICKLEBACK												
26-50 mm	(7)	[6]			(2)	[0]	(3)	[0]				
Daphnia longispina	26	tr										
Corophium salmonis					5	.08						
Chironomid pupae					5	tr						
Eurytemora hirundoides							301	.09				
51-75 mm	(1)	[0]			(3)	[0]	(7)	[6]	(3)	[1]	(1)	[1]
Digested material									*	.05		
Daphnia longispina	41	tr			9	tr						
Corophium salmonis							6	.10				
Anisogammarus confervicolus							9	.18				
Ostracods							18	tr				
Eurytemora hirundoides					269	.08						
Bosmina longirostris							1	tr				
CHUM SALMON												
26-50 mm									(1)	[0]		
Digested insects									*	tr		
51-75 mm							(2)	[0]				
Chironomid pupae							6	tr				
CHINOOK SALMON												
26-50 mm							(8)	[2]				
Chironomid pupae							6	tr				
51-75 mm							(6)	[0]			(1)	[0]
Chironomid pupae							7	.05			4	tr
Corophium salmonis							2	tr				
76-100 mm									(8)	[1]	(1)	[0]
Neomysis mercedis									6	.06		
Digested material									8	tr	8	tr
Corophium salmonis									7	.13		
Chironomid pupae									5	tr	3	tr
Hymenoptera-Formicidae											1	tr
101-150 mm			(6)	[0]			(1)	[1]	(1)	[0]	(2)	[0]
Daphnia longispina											68	tr
Neomysis mercedis			51	.45			2	tr				
Digested material			*	.70			*	tr				
Chironomid pupae											6	.05
Hymenoptera			1	.05								
Coleoptera			2	.10								
Hemiptera-Corixidae			2	.10								
Hymenoptera-Formicidae											1	tr
Digested insects											*	.20
151-200 mm							(2)	[0]				
Sticks							1	tr				
Anisogammarus confervicolus							3	.06				
Corophium salmonis							6	.10				
201-250 mm							(2)	[0]				
Anisogammarus confervicolus							2	tr				
Corophium salmonis							1	.05				

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
THREESPINE STICKLEBACK (continued)												
51-75 mm	(1)	[0]			(1)	[1]			(1)	[0]	(2)	[2]
Daphnia longispina (digested)	43	tr										
Daphnia longispina									4	tr		
Eurytemora hirundoides									37	tr		
Corophium salmonis									2	tr		
Chironomid pupae									5	tr		
76-100 mm											(1)	[1]
LARGESCALE SUCKER												
401-500 mm			(7)	[7]								
501-600 mm			(3)	[3]								
PEAMOUTH CHUB												
26-50 mm			(6)	[6]								
51-75 mm			(17)	[17]	(1)	[1]	(1)	[1]				
101-150 mm	(2)	[2]	(1)	[1]								
151-200 mm			(2)	[2]					(14)	[14]		
201-250 mm					(1)	[1]	(1)	[1]	(10)	[10]	(1)	[1]
251-300 mm									(1)	[1]		
301-400 mm			(1)	[1]					(1)	[1]		
SURF SMELT												
101-150 mm					(2)	[2]						
PACIFIC STAGHORN SCULPIN												
26-50 mm							(3)	[3]			(2)	[1]
Chironomid larvae											4	tr
51-75 mm									(5)	[0]		
Corophium salmonis									36	.65		
COHO SALMON												
51-75 mm									(1)	[0]		
Corophium salmonis									4	.07		
Chironomid pupae									6	tr		
Chironomid larvae									21	tr		
101-150 mm									(1)	[0]		
Corophium salmonis									4	.07		
Chironomid pupae									7	tr		
CARP												
401-500 mm									(5)	[5]		
501-600 mm									(3)	[3]		
601-700 mm									(1)	[1]		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
STARRY FLOUNDER												
26-50 mm	(10)	[0]			(2)	[2]					(11)	[5]
Chironomid larvae											111	.11
Corophium salmonis	14	tr										
51-75 mm	(2)	[0]			(15)	[11]	(2)	[2]			(14)	[4]
Corophium salmonis	21	.19			4	tr						
Neomysis mercedis					3	tr						
Chironomid larvae					4	tr					89	.09
Anisogammarus confervicolus					1	tr						
76-100 mm					(2)	[0]			(9)	[8]		
Chironomid larvae					9	.06			6	tr		
Digested material									*	tr		
101-150 mm					(9)	[6]	(2)	[0]	(11)	[10]	(2)	[2]
Chironomid pupae									2	tr		
Corophium salmonis					4	tr	3	.05				
Chironomid larvae					64	.45			3	tr		
Digested material					*	tr						
151-200 mm					(14)	[11]	(4)	[1]			(1)	[1]
Oligochaetes							2	.40				
Chironomid pupae							6	tr				
Unid. fish							1	1.20				
Neomysis mercedis					4	.05						
Chironomid larvae					56	.39						
Anisogammarus confervicolus							1	tr				
Nematodes					6	tr						
Digested material					*	.61	*	.20				
THREESPINE STICKLEBACK												
26-50 mm	(3)	[3]	(1)	[1]			(4)	[0]				
Chironomid pupae							4	tr				
Corophium salmonis							7	.12				
51-75 mm			(8)	[1]			(8)	[4]			(3)	[3]
Chironomid pupae							1	tr				
Corophium salmonis							6	.10				
Eurytemora hirundoides			899	.18								
Unid. eggs							*	tr				
CHINOOK SALMON												
26-50 mm							(18)	[1]				
Corophium salmonis							9	.14				
Chironomid pupae							21	.11				
51-75 mm							(7)	[0]			(2)	[0]
Corophium salmonis							11	.18				
Chironomid pupae							17	.09			16	.14
76-100 mm			(2)	[2]					(10)	[0]	(4)	[4]
Corophium salmonis									6	.11		
Eurytemora hirundoides									71	tr		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
CHINOOK SALMON												
101-150 mm	(1)	[0]	(11)	[1]	(4)	[0]	(1)	[0]	(12)	[2]	(10)	[0]
Arachnids					1	tr						
Synthethid fiber					1	tr						
Sticks			4	.50								
Anisogammarus confervicolus			1	tr								
Nematodes			2	tr								
Digested material			*	.50	*	.50			*	.05		
Corophium salmonis	3	tr	6	tr	961	.40	7	.11	17	.31	6	.06
Diptera			1	tr	3	tr						
Neomysis mercedis	22	.60	23	.40	7	.08						
Hemiptera					1	tr						
Chironomid pupae							4	tr	8	.05	4	tr
Daphnia longispina											1239	.12
151-200 mm							(4)	[3]	(1)	[0]		
Anisogammarus confervicolus							1	tr				
Digested material									*	.05		
Corophium salmonis							89	1.80				
Neomysis mercedis							1	tr				
Unid. fish							1	.80				
Chironomid pupae							8	tr				
PEAMOUTH CHUB												
51-75 mm			(23)	[23]								
76-100 mm											(4)	[4]
101-150 mm			(3)	[3]	(1)	[1]					(19)	[19]
151-200 mm	(2)	[2]	(3)	[3]							(3)	[3]
201-250 mm			(1)	[1]	(1)	[1]					(3)	[3]
251-300 mm											(2)	[2]
LARGESCALE SUCKER												
51-75 mm					(1)	[1]						
76-100 mm					(1)	[1]						
251-300 mm			(1)	[1]								
301-400 mm					(2)	[2]					(1)	[1]
401-500 mm			(1)	[1]	(3)	[3]						
NORTHERN SQUAWFISH												
151-200 mm			(1)	[1]								
PACIFIC STAGHORN SCULPIN												
26-50 mm							(1)	[0]	(14)	[4]	(11)	[2]
Corophium salmonis							1	tr	13	.23	31	.59
Chironomid larvae									4	tr		
51-75 mm									(2)	[0]	(9)	[9]
Corophium salmonis									4	.07		
Chironomid larvae									3	tr		
76-100 mm											(1)	[1]
101-150 mm					(3)	[0]					(3)	[1]
Neomysis mercedis					6	.08						
Corophium salmonis											13	.13

( ) Number examined in parentheses
[ ] Number empty in brackets
* Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
SURF SMELT												
101-150 mm					(1)	[0]						
<u>Eurytemora hirundoides</u>					620	.10						
LONGFIN SMELT												
101-150 mm					(4)	[4]						
AMERICAN SHAD												
76-100 mm					(8)	[0]						
<u>Eurytemora hirundoides</u>					1462	.50						
101-150 mm					(1)	[0]						
<u>Eurytemora hirundoides</u>					511	.10						
<u>Corophium salmonis</u>					1	tr						
151-200 mm									(1)	[0]		
<u>Corophium salmonis</u>									7	.13		
301-400 mm											(2)	[0]
Digested material											*	4.0
Fish scales											2	tr
CHUM SALMON												
26-50 mm							(1)	[1]				
51-75 mm							(4)	[0]				
<u>Corophium salmonis</u>							1	tr				
Chironomid pupae							5	tr				
76-100 mm									(1)	[0]		
Digested copepods									*	tr		
COHO SALMON												
101-150 mm									(7)	[2]		
Digested material									*	.10		
<u>Corophium salmonis</u>									6	.11		
151-200 mm									(7)	[3]		
<u>Corophium salmonis</u>									69	1.24		

( ) Number examined in parentheses
[ ] Number empty in brackets
* Volumes in ml

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
THREESPINE STICKLEBACK												
51-75 mm	(1)	[0]			(2)	[1]	(12)	[1]			(6)	[2]
Digested material											[illegible]	tr
Eurycercus sp.											21	tr
Stickleback eggs											9	tr
Chironomid larvae											17	tr
Daphnia sp.							12	tr				
Daphnia longispina (digested)	29	tr										
Eurytemora hirundoides					10	tr						
Anisogammarus confervicolus											1	tr
Corophium salmonis							16	.24			4	tr
Chironomid pupae							4	tr			11	.10
Ostracods							7	tr				
26-50 mm	(2)	[0]	(1)	[1]	(1)	[1]	(6)	[0]				
Daphnia longispina (digested)	46	tr										
Anisogammarus confervicolus							1	tr				
Corophium salmonis							13	.20				
Chironomid pupae							18	.12				
NORTHERN SQUAWFISH												
76-100 mm	(8)	[7]										
Unid. seeds	21	.0[illegible]										
CARP												
51-75 mm	(1)	[1]										
501-600 mm	(1)	[1]							(1)	[1]		
LARGESCALE SUCKER												
26-50 mm	(2)	[2]										
51-75 mm			(2)	[2]								
76-100 mm									(1)	[1]		
101-150 mm	(2)	[2]							(1)	[1]		
251-300 mm	(1)	[1]										
401-500 mm							(3)	[3]	(3)	[3]		
501-600 mm							(1)	[1]				
PEAMOUTH CHUB												
26-50 mm			(3)	[3]								
51-75 mm			(5)	[5]								
76-100 mm	(12)	[12]										
101-150 mm	(14)	[14]									(2)	[2]
151-200 mm	(4)	[4]										
STARRY FLOUNDER												
26-50 mm			(1)	[1]							(4)	[0]
Chironomid larvae											67	.09
51-75 mm	(1)	[1]									(10)	[0]
Chironomid larvae											223	.30
Corophium salmonis											3	tr
76-100 mm											(3)	[1]
Chironomid larvae											44	.06
Corophium salmonis											1	tr

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
STARRY FLOUNDER (continued)												
101-150 mm											(10)	[0]
Chironomid larvae											81	.11
151-200 mm							(1)	[1]				
AMERICAN SHAD												
26-50 mm			(1)	[1]								
51-75 mm			(5)	[0]								
Corophium salmonis			1	tr								
Daphnia longispina (digested)			42	tr								
Eurytemora hirundoides			3	tr								
CHUM SALMON												
26-50 mm							(7)	[0]				
Corophium salmonis							6	.09				
Chironomid pupae							56	.38				
Chironomid larvae							18	tr				
76-100 mm									(1)	[0]		
Chironomid pupae									61	.37		
CHINOOK SALMON												
26-50 mm							(18)	[2]				
Corophium salmonis							27	.41				
Chironomid pupae							104	.71				
Chironomid larvae							49	.08				
51-75 mm							(4)	[0]	(1)	[0]	(4)	[0]
Corophium salmonis							7	.11				
Chironomid pupae							17	.12	44	.26	104	.94
76-100 mm									(18)	[8]	(10)	[0]
Chironomid pupae									176	1.1	501	2.5
Neomysis mercedis											1	tr
101-150 mm					(1)	[0]			(8)	[0]	(10)	[0]
Digested insects					*	.40						
Hemiptera--Corixidae					1	.10					1	tr
Coleoptera					2	.05						
Hymenoptera					7	.05						
Diptera					10	.05						
Corophium salmonis											25	.26
Chironomid pupae									167	1.00	816	3.5
151-200 mm					(1)	[0]						
Hemiptera					1	tr						
Fish bones					1	.5						
PACIFIC STAGHORN SCULPIN												
26-50 mm							(5)	[0]	(1)	[0]		
Corophium salmonis							6	.09	3	.05		
Chironomid pupae							3	tr				
51-75 mm									(3)	[1]		
Chironomid larvae									14	tr		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
PACIFIC STAGHORN SCULPIN (continued)												
76-100 mm									(2)	[0]	(3)	[0]
<u>Corophium salmonis</u>									11	.20	22	tr
Chironomid larvae									7	tr	6	.06
Digested material									*	tr		
101-150 mm											(1)	[0]
Digested material											*	tr
COHO SALMON												
101-150 mm									(2)	[0]		
Chironomid pupae									31	.9		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
THREESPINE STICKLEBACK												
26-50 mm	(6)	[3]	(5)	[5]			(4)	[1]				
Daphnia longispina (digested)	18	tr										
Corophium salmonis							6	.10				
51-75 mm	(1)	[1]	(1)	[1]	(3)	[0]	(6)	[0]	(5)	[5]	(10)	[5]
Digested material											*	tr
Eurycercus sp.											9	tr
Stickleback eggs											2	tr
Eurytemora hirundoides					59	tr						
Corophium salmonis							16	.22			4	tr
Chironomid larvae											14	tr
Chironomid pupae							14	.10			7	.05
Ostracods							11	tr				
NORTHERN SQUAWFISH												
151-200 mm	(7)	[7]										
201-250 mm	(1)	[1]										
251-300 mm	(1)	[1]										
301-400 mm	(9)	[8]										
Digested material	*	2.51										
401-500 mm	(1)	[1]										
LARGESCALE SUCKER												
101-150 mm	(6)	[6]										
151-200 mm	(15)	[15]										
201-250 mm	(4)	[4]										
251-300 mm	(1)	[1]										
401-500 mm			(1)	[1]								
501-600 mm							(1)	[1]				
CARP												
401-500 mm									(1)	[1]		
501-600 mm	(1)	[1]										
PEAMOUTH CHUB												
26-50 mm			(1)	[1]								
51-75 mm			(22)	[22]	(1)	[1]			(1)	[1]		
76-100 mm	(9)	[9]	(1)	[1]					(1)	[1]		
101-150 mm	(15)	[15]	(5)	[5]					(2)	[2]	(1)	[1]
151-200 mm			(11)	[11]	(1)	[1]			(1)	[1]	(1)	[1]
201-250 mm			(7)	[7]							(1)	[1]
251-300 mm			(1)	[1]								
PACIFIC STAGHORN SCULPIN												
26-50 mm			(1)	[1]								
76-100 mm									(1)	[1]		
CHINOOK SALMON												
26-50 mm							(12)	[0]				
Corophium salmonis							7	.11				
Chironomid pupae							43	.29				
51-75 mm							(4)	[0]	(3)	[0]		
Corophium salmonis							3	.05				
Chironomid pupae							17	.12	17	.10		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
CHINOOK SALMON (continued)												
76-100 mm									(13)	[3]	(10)	[0]
Corophium salmonis									14	.25		
Chironomid pupae									30	.18	101	.70
Digested material									*	.05		
101-150 mm			(3)	[3]					(6)	[1]	(10)	[0]
Corophium salmonis											6	.06
Chironomid pupae									11	.07	61	.42
Arachnids									1	tr		
Odonata adult											1	.10
Hemiptera-Corixidae											1	tr
151-200 mm							(1)	[0]				
Corophium salmonis							7	.11				
201-250 mm							(1)	[0]				
Corophium salmonis							24	.36				
Anisogammarus confervicolus							1	tr				
STARRY FLOUNDER												
51-75 mm					(1)	[0]					(1)	[1]
Chironomid larvae					11	.08						
76-100 mm									(2)	[1]		
Digested material									*	tr		
101-150 mm							(1)	[1]	(11)	[11]	(2)	[1]
Chironomid larvae											6	tr
151-200 mm							(3)	[1]				
Chironomid larvae							4	tr				
Corophium salmonis							6	.10				
Chironomid pupae							3	tr				
Sticks							*	tr				
Sand							*	tr				
201-250 mm							(1)	[1]				
AMERICAN SHAD												
51-75 mm					(4)	[4]						
76-100 mm					(13)	[4]						
Neomysis mercedis					14	.18						
Eurytemora hirundoides					234	.07						
Corophium salmonis					1	tr						
101-150 mm					(1)	[0]			(1)	[0]		
Neomysis mercedis					18	.20						
Eurytemora hirundoides					51	tr						
Digested material									*	tr		
EULACHON												
151-200 mm							(3)	[3]				
COHO SALMON												
76-100 mm									(1)	[0]		
Chironomid pupae									6	.04		
101-150 mm									(8)	[1]		
Corophium salmonis									9	.16		
Digested material									*	.10		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
COHO SALMON (continued)												
151-200 mm												
Corophium salmonis									(3) 6	[1] .11		
CUTTHROAT TROUT												
201-250 mm												
Corophium salmonis									(1) 24	[0] .43		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
PEAMOUTH CHUB												
101-150 mm	(1)	[1]	(2)	[2]								
151-200 mm									(1)	[1]		
PACIFIC STAGHORN SCULPIN												
26-50 mm											(1)	[0]
Corophium salmonis											1	tr
Chironomid larvae											4	tr
151-200 mm					(1)	[1]						
PRICKLY SCULPIN												
101-150 mm					(1)	[1]						
THREESPINE STICKLEBACK												
51-75 mm											(1)	[1]

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
STARRY FLOUNDER												
26-50 mm	(13)	[0]									(3)	[3]
Chironomid larvae	275	.27										
51-75 mm	(10)	[0]	(12)	[8]	(1)	[1]	(3)	[0]	(2)	[2]		
Corophium salmonis			4	tr			5	.08				
Chironomid larvae	146	.15	86	.17								
Diptera			16	.05								
Chironomid pupae							17	.05				
76-100 mm					(1)	[1]						
SHAD												
26-50 mm	(2)	[0]										
Daphnia longispina	7	tr										
51-75 mm	(4)	[3]										
Neomysis mercedis	5	tr										
CHINOOK SALMON												
26-50 mm							(20)	[2]				
Corophium salmonis							17	.27				
Chironomid pupae							107	.43				
51-75 mm							(7)	[0]				
Corophium salmonis							13	.21				
Chironomid pupae							56	.22				
Unid. insects							3	tr				
76-100 mm									(14)	[4]		
Corophium salmonis									7	.13		
Chironomid pupae									316	2.5		
101-150 mm			(1)	[1]	(2)	[0]	(1)	[0]	(10)	[2]	(4)	[0]
Diptera (digested)												.80
Corophium salmonis									7	.13		
Chironomid pupae									99	.73	11	tr
Digested insects								.10				
Coleoptera					3	.05						
Hymenoptera					6	.05						
Diptera					217	.85						
Anisogammarus confervicolus									1	tr		
151-200 mm							(1)	[0]				
Corophium salmonis							36	.80				
Chironomid pupae							1	tr				
201-250 mm							(3)	[0]				
Corophium salmonis							123	1.70				
Chironomid pupae							11	tr				
Neomysis mercedis							81	1.20				
Digested material								.10				
PACIFIC STAGHORN SCULPIN												
26-50 mm							(1)	[0]				
Corophium salmonis							3	.05				
51-75 mm									(1)	[0]		
Corophium salmonis									2	tr		

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Volumes in ml

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
CHUM SALMON												
26-50 mm							(1)	[0]				
Chironomid pupae							16	.06				
51-75 mm							(2)	[1]				
Chironomid pupae							4	tr				
Neomysis mercedis							1	tr				
76-100 mm									(1)	[0]		
Chironomid pupae									61	.49		
Daphnia longispina									46	tr		
PEAMOUTH CHUB												
26-50 mm	(10)	[10]										
51-75 mm	(8)	[8]	(24)	[24]					(1)	[1]		
76-100 mm	(2)	[2]	(1)	[1]					(6)	[6]		
101-150 mm	(3)	[3]	(1)	[1]								
151-200 mm			(1)	[1]								
LARGESCALE SUCKER												
26-50 mm	(2)	[2]										
THREESPINE STICKLEBACK												
26-50 mm			(1)	[1]	(1)	[1]						
51-75 mm			(1)	[1]					(24)	[14]	(1)	[1]
Chironomid pupae									6	.05		
Eurytemora hirundoides									79	tr		
EULACHON												
151-200 mm							(1)	[1]				

( ) Number examined in parentheses
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Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
PRICKLY SCULPIN												
101-150 mm			(3)	[0]	(1)	[1]						
Unid. fish			1	2.0								
Neomysis mercedis			26	.2								
151-200 mm					(3)	[0]						
Neomysis mercedis					26	.34						
Unid. fish					2	2.0						
Gastropods					2	.20						
Digested material					*	2.0						
COHO SALMON												
101-150 mm									(1)	[1]		
PEAMOUTH CHUB												
201-250 mm											(1)	[1]

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
THREESPINE STICKLEBACK												
51-75 mm	(6)	[4]									(5)	[3]
Daphnia longispina	147	tr										
Corophium salmonis											26	.27
STARRY FLOUNDER												
26-50 mm	(10)	[2]										
Chironomid larvae	322	.32										
51-75 mm	(14)	[4]			(3)	[3]					(7)	[2]
Corophium salmonis	341	.34									3	tr
Chironomid larvae											41	tr
76-100 mm	(1)	[0]									(1)	[0]
Corophium salmonis	1	tr										
Chironomid larvae											67	.07
101-150 mm									(1)	[1]		
151-200 mm	(1)	[1]										
PEAMOUTH CHUB												
51-75 mm	(6)	[6]	(12)	[12]								
76-100 mm	(2)	[2]							(1)	[1]		
101-150 mm	(8)	[8]							(1)	[1]		
151-200 mm									(1)	[1]		
201-250 mm											(10)	[10]
AMERICAN SHAD												
51-75 mm			(7)	[0]	(1)	[0]						
Corophium salmonis			2	tr								
Daphnia longispina (digested)			136	tr								
Eurytemora hirundoides					64	tr						
Diptera adults					8	tr						
101-150 mm									(2)	[0]		
Eurytemora hirundoides									171	.05		
CHINOOK SALMON												
26-50 mm							(13)	[0]				
Chironomid larvae							3	tr				
Corophium salmonis							2	tr				
Chironomid pupae							24	.07				
51-75 mm							(4)	[0]	(2)	[0]		
Corophium salmonis									1	tr		
Chironomid larvae							28	tr	4	tr		
Chironomid pupae							8	tr				
Neomysis mercedis							8	.12				
76-100 mm									(13)	[3]	(5)	[1]
Corophium salmonis									9	.16	21	.21
Chironomid pupae									14	.08	16	.14

( ) Number examined in parentheses
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Volumes in ml

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
CHINOOK SALMON (continued)												
101-150 mm			(1)	[0]	(3)	[0]			(10)	[1]	(10)	[0]
Gravel			•	.40								
Diptera adults					187	.50						
Corophium salmonis					6	.05			22	.40	71	.71
Coleoptera					4	.07						
Chironomid larvae					8	.06			21	tr		
Chironomid pupae											4	tr
PACIFIC STAGHORN SCULPIN												
26-50 mm							(5)	[2]				
Corophium salmonis							3	.05				
51-75 mm									(5)	[1]		
Corophium salmonis									6	.11		
76-100 mm											(4)	[0]
Corophium salmonis											59	.59
Digested material											•	.10
Gastropods											2	.10
101-150 mm											(3)	[0]
Corophium salmonis											16	.16
Odonata											1	.20
Digested material											•	.40
CHUM SALMON												
26-50 mm							(5)	[0]				
Chironomid pupae							6	tr				
51-75 mm							(2)	[0]	(7)	[0]		
Chironomid pupae							10	tr	46	.28		
Chironomid larvae							3	tr				
Thaleichthys pacificus lar.									84	.30		
COHO SALMON												
101-150 mm.									(1)	[0]		
Chironomid pupae									7	tr		
CARP												
401-500 mm											(1)	[1]
501-600 mm									(1)	[1]	(1)	[1]

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
STARRY FLOUNDER												
26-50 mm	(11)	[1]										
Chironomid larvae	216	.22										
51-75 mm	(11)	[1]					(2)	[1]				
Chironomid larvae	197	.30										
Corophium salmonis	6	.05										
Oligochaetes							*	tr				
76-100 mm			(1)	[0]					(7)	[7]		
Corophium salmonis			3	tr								
101-150 mm	(1)	[1]			(1)	[1]			(6)	[4]	(4)	[3]
Chironomid larvae									4	tr		
Chironomid pupae									3	tr		
Digested material											*	tr
151-200 mm	(1)	[0]	(6)	[5]			(1)	[1]				
Corophium salmonis			1	tr								
Odonata	2	.70										
THREESPINE STICKLEBACK												
26-50 mm	(7)	[0]	(1)	[1]			(4)	[1]			(1)	[1]
Eurytemora hirundoides	419	.20										
Corophium salmonis							3	.05				
Oligochaetes							*	tr				
51-75 mm	(14)	[4]									(10)	[10]
Stickleback eggs	7	tr										
Daphnia longispina	620	.06										
CARP												
401-500 mm									(1)	[1]		
501-600 mm	(2)	[2]										
701-800 mm	(1)	[1]										
LARGESCALE SUCKER												
51-75 mm			(1)	[1]								
101-150 mm	(4)	[4]										
151-200 mm	(4)	[4]										
251-300 mm									(1)	[1]		
301-400 mm							(1)	[1]				
401-500 mm			(1)	[1]								
CHINOOK SALMON												
26-50 mm							(19)	[6]				
Chironomid pupae							5	tr				
Anisogammarus confervicolus							1	tr				
Corophium salmonis							14	.22				
Insect parts							[illegible]	tr				
51-75 mm							(6)	[0]				
Chironomid pupae							1	tr				
Corophium salmonis							7	.11				
76-100 mm									(11)	[1]	(5)	[0]
Chironomid pupae									26	.16	13	.12
Corophium salmonis									19	.34	6	.06
Chironomid larvae									10	tr		

( ) Number examined in parentheses
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Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
CHINOOK SALMON (continued)												
101-150 mm			(7)	[0]	(1)	[0]	(1)	[0]	(15)	[5]	(10)	[0]
Neomysis mercedis			114	1.00			1	tr				
Chironomid pupae			3	tr			3	tr	13	.23	61	.55
Digested material			*	.80	*	tr			*	.1	*	tr
Anisogammarus confervicolus							4	.08				
Corophium salmonis							13	.21	7	.13	21	.21
151-200 mm							(1)	[0]				
Neomysis mercedis							1	tr				
Chironomid pupae							1	tr				
Anisogammarus confervicolus							1	tr				
Corophium salmonis							3	tr				
PEAMOUTH CHUB												
26-50 mm			(2)	[2]								
51-75 mm	(1)	[1]	(9)	[9]	(2)	[2]						
76-100 mm			(2)	[2]								
101-150 mm	(23)	[23]	(4)	[4]								
151-200 mm	(2)	[2]	(17)	[17]								
201-250 mm			(2)	[2]								
251-300 mm			(2)	[2]								
301-400 mm									(1)	[1]		
PACIFIC STAGHORN SCULPIN												
26-50 mm							(1)	[1]			(1)	[1]
76-100 mm											(1)	[1]
CHUM SALMON												
51-75 mm									(4)	[1]		
Chironomid pupae									6	.04		
76-100 mm									(1)	[0]		
Daphnia longispina									17	tr		
COHO SALMON												
101-150 mm									(3)	[1]		
Corophium salmonis									9	.16		
151-200 mm									(13)	[3]		
Corophium salmonis									60	1.0		
Digested material									*	.05		

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Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
STARRY FLOUNDER												
26-50 mm	(16)	[8]	(1)	[1]							(13)	[10]
Chironomid larvae	4	tr										
<u>Daphnia longispina</u> (digested)	13	tr										
<u>Corophium salmonis</u>	16	.14									2	tr
Unid. insects											*	.05
51-75 mm	(9)	[8]	(4)	[4]	(9)	[8]						
Chironomid larvae	26	tr										
<u>Corophium salmonis</u>					1	tr						
101-150 mm							(1)	[1]	(3)	[3]		
151-200 mm	(1)	[1]	(1)	[1]					(1)	[0]	(1)	[0]
Chironomid larvae											4	tr
<u>Corophium salmonis</u>											3	tr
<u>Corbicula fluminea</u>									1	tr	2	tr
THREESPINE STICKLEBACK												
26-50 mm	(2)	[2]									(1)	[1]
51-75 mm	(3)	[2]					(2)	[1]			(5)	[3]
<u>Daphnia longispina</u> (digested)	37	tr										
<u>Corophium salmonis</u>							22	tr			4	tr
Chironomid larvae											3	tr
Chironomid pupae											6	.05
<u>Daphnia longispina</u>											2310	.05
<u>Diaptomus</u> sp.											466	tr
PEAMOUTH CHUB												
51-75 mm			(6)	[6]								
101-150 mm					(1)	[1]						
CHINOOK SALMON												
26-50 mm							(2)	[0]				
<u>Corophium salmonis</u>							6	.10				
Digested insects							*	tr				
51-75 mm							(3)	[1]				
<u>Corophium salmonis</u>							4	.06				
76-100 mm									(17)	[7]		
<u>Corophium salmonis</u>									51	.92		
<u>Neomysis mercedis</u>									26	.26		
Chironomid larvae									6	.04		
101-150 mm					(1)	[0]	(2)	[0]	(9)	[2]	(6)	[0]
<u>Corophium salmonis</u>					6	.05	16	.25	31	.56	134	1.34
Oligochaetes					2	tr						
Chironomid larvae									7	tr		
PACIFIC STAGHORN SCULPIN												
0-25 mm							(1)	[0]				
<u>Corophium salmonis</u>							2	tr				
26-50 mm							(25)	[5]	(1)	[1]		
<u>Corophium salmonis</u>							21	.34				
Digested mysids							1	tr				

( ) Number examined in parentheses
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Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
PACIFIC STAGHORN SCULPIN (continued)												
51-75 mm									(15)	[5]		
Corophium salmonis									14	.25		
Digested material									*	.05		
76-100 mm									(5)	[0]		
Corophium salmonis									3	.05		
Neomysis mercedis									6	.06		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
PRICKLY SCULPIN												
101-150 mm	(1)	[0]										
Digested material	*	.05										
STARRY FLOUNDER												
26-50 mm	(17)	[9]										
Chironomid larvae	*	tr										
51-75 mm	(6)	[3]										
Chironomid larvae	3	tr										
Corophium salmonis	6	.05										
76-100 mm									(4)	[4]		
101-150 mm	(2)	[2]							(6)	[6]	(1)	[1]
151-200 mm											(1)	[1]
THREESPINE STICKLEBACK												
26-50 mm					(1)	[1]						
51-75 mm	(6)	[1]					(4)	[3]				
Daphnia longispina (digested)	369	tr										
Corophium salmonis							2	tr				
76-100 mm												
101-150 mm												
CARP												
26-50 mm	(1)	[1]										
SUCKER												
201-250 mm	(1)	[1]										
301-400 mm	(1)	[1]										
401-500 mm	(1)	[1]										
PEAMOUTH CHUB												
26-50 mm	(1)	[1]										
51-75 mm	(5)	[5]	(11)	[11]	(1)	[1]						
101-150 mm			(1)	[1]								
AMERICAN SHAD												
51-75 mm					(2)	[2]						
76-100 mm					(10)	[1]						
Unid. eggs					*	tr						
Neomysis mercedis					3	tr						
Chironomid pupae					1	tr						
Eurytemora hirundoides					5137	.12						
101-150 mm					(1)	[0]						
Unid. eggs					*	tr						
CHUM SALMON												
51-75 mm							(2)	[0]	(1)	[1]		
Digested material							*	tr				
COHO SALMON												
101-150 mm									(3)	[2]		
Digested material									*	.10		
151-200 mm									(3)	[1]		
Digested material									*	.10		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
CHINOOK SALMON												
26-50 mm							(16)	[2]				
Corophium salmonis							13	.21				
Chironomid pupae							2	tr				
51-75 mm							(10)	[3]			(2)	[2]
Corophium salmonis											8	.13
76-100 mm									(10)	[5]		
Digested material									*	.20		
101-150 mm			(1)	[1]	(3)	[0]			(12)	[6]	(10)	[0]
Anisogammarus confervicolus					1	tr						
Corophium parts					*	.05						
Nematodes					3	tr						
Corophium salmonis									10	.18	18	.18
Chironomid pupae											45	.40
Daphnia longispina											3010	.30
151-200 mm							(1)	[1]				
PACIFIC STAGHORN SCULPIN												
26-50 mm							(2)	[0]				
Corophium salmonis							2	tr				
51-75 mm							(1)	[0]				
Corophium salmonis							4	.07				
101-150 mm					(4)	[2]					(1)	[1]
Nematodes					1	tr						
Corophium salmonis					16	.14						
Neomysis mercedis					3	tr						
Digested material					*	.50						
151-200 mm											(1)	[0]
Oncorhynchus tshawytscha juv.											1	10.0
LONGFIN SMELT												
101-150 mm					(1)	[0]						
Neomysis mercedis					3	tr						

( ) Number examined in parentheses
[ ] Number empty in brackets
\- Volumes in ml

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
STARRY FLOUNDER												
26-50 mm	(18)	[8]			(6)	[3]					(26)	[18]
Daphnia longispina (digested)	307	tr										
Corophium salmonis					13	.12					6	.06
Digested material											*	tr
51-75 mm	(5)	[3]			(12)	[11]					(8)	[6]
Daphnia longispina (digested)	86	tr										
Corophium salmonis					7	.06					8	.08
Digested material											*	tr
76-100 mm							(8)	[2]	(1)	[1]		
Corophium salmonis							2	.03				
Digested mysids							1	tr				
101-150 mm	(1)	[1]					(2)	[1]	(2)	[1]	(1)	[1]
Corophium salmonis							97	1.50	14	.25		
PEAMOUTH CHUB												
151-200 mm	(2)	[2]										
201-250 mm	(1)	[1]										
251-300 mm	(2)	[2]										
CHINOOK SALMON												
26-50 mm							(5)	[1]				
Corophium salmonis							7	.11				
Digested insects							1	tr				
51-75 mm							(12)	[0]				
Corophium salmonis							24	.38				
Digested insects							6	tr				
Thaleichthys pacificus lar.							14	tr				
76-100 mm									(10)	[1]		
Neomysis mercedis									3	tr		
Daphnia longispina									98	tr		
Corophium salmonis									6	.11		
101-150 mm	(1)	[1]			(2)	[0]			(14)	[4]	(9)	[1]
Digested Copepods									*	.05		
Chironomid larvae									2	tr		
Corophium salmonis					4	tr			43	.77	366	3.66
Diptera					57	.17						
Digested material					*	.05						
THREESPINE STICKLEBACK												
26-50 mm	(1)	[1]			(1)	[1]						
51-75 mm							(2)	[0]	(3)	[2]	(1)	[1]
Corophium salmonis							9	.14				
Daphnia longispina									16	tr		
AMERICAN SHAD												
76-100 mm					(1)	[0]						
Eurytemora hirundoides					33	tr						

( ) Number examined in parentheses
[ ] Number empty in brackets

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
AMERICAN SHAD (continued)												
101-150 mm									(1)	[0]		
<u>Corophium salmonis</u>									1	tr		
Chironomid larvae									2	tr		
<u>Daphnia longispina</u>									*	.05		
<u>Eurytemora hirundoides</u>									11	tr		
LARGESCALE SUCKER												
401-500 mm							(3)	[3]				
501-600 mm					(1)	[1]	(1)	[1]				
SURF SMELT												
151-200 mm					(1)	[1]						
PACIFIC STAGHORN SCULPIN												
26-50 mm							(5)	[2]	(5)	[0]	(3)	[3]
<u>Corophium salmonis</u>							1	.07	6	.11		
51-75 mm							(2)	[0]	(14)	[4]		
Digested material									*	.50		
<u>Corophium salmonis</u>							1	tr				
Digested mysids							1	tr				
101-150 mm											(2)	[2]
EULACHON												
151-200 mm							(3)	[3]				
COHO SALMON												
101-150 mm									(1)	[0]		
<u>Corophium salmonis</u>									25	.45		
151-200 mm									(1)	[1]		
CARP												
601-700 mm									(1)	[1]		

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
STARRY FLOUNDER												
26-50 mm	(15)	[15]	(11)	[10]							(25)	[23]
Corophium salmonis			1	tr							3	tr
51-75 mm	(8)	[6]	(11)	[8]	(17)	[9]	(2)	[2]			(14)	[9]
Corophium salmonis	3	tr	4	tr	43	.39					31	.31
Neomysis mercedis					2	tr						
76-100 mm			(1)	[1]	(3)	[1]			(8)	[8]		
Corophium salmonis					23	.21						
101-150 mm											(6)	[6]
151-200 mm							(1)	[1]			(2)	[1]
Corophium salmonis											41	.41
Digested material											*	.4
Digested insects											*	tr
THREESPINE STICKLEBACK												
26-50 mm	(2)	[1]	(22)	[22]	(4)	[4]					(1)	[1]
Digested material	*	tr										
51-75 mm					(5)	[2]	(1)	[0]	(1)	[0]		
Digested material									*	tr		
Eurytemora hirundoides					209	tr						
Digested insects							*	.05				
CARP												
401-500 mm									(1)	[1]		
501-600 mm	(1)	[1]										
PEAMOUTH CHUB												
26-50 mm	(1)	[1]										
51-75 mm			(12)	[12]								
76-100 mm			(4)	[4]								
101-150 mm	(1)	[1]	(7)	[7]	(1)	[1]					(25)	[25]
151-200 mm	(1)	[1]	(1)	[1]	(1)	[1]					(1)	[1]
201-250 mm			(2)	[2]	(5)	[5]					(1)	[1]
251-300 mm					(2)	[2]						
CHINOOK SALMON												
26-50 mm							(15)	[5]				
Corophium salmonis							16	.22				
51-75 mm	(6)	[0]					(13)	[4]				
Corophium salmonis							31	.46				
Daphnia longispina	3160	.5										
101-150 mm	(10)	[0]	(11)	[1]	(3)	[0]			(7)	[5]	(25)	[17]
Arachnids					4	.05						
Corophium salmonis	2	tr							4	.07	3	tr
Neomysis mercedis	6	.05	4	tr							4	.07
Daphnia longispina	8312	8.0										
Digested material			*	tr							*	.4
Sticks			3	.05								
Hymenoptera-Formicidae			6	.05	58	.75						
Diptera			3	tr	8	.1						
Hemiptera					5	.06						

( ) Number examined in parentheses
[ ] Number empty in brackets

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
CHINOOK SALMON (continued)												
151-200 mm					(1)	[0]	(6)	[1]				
Anisogammarus confervicolus							9	.2				
Insect pieces					*	.65						
Corophium salmonis							138	2.00				
Hymenoptera-Formicidae					4	.05						
Diptera					6	.10						
Hemiptera					1	.05						
201-250 mm							(4)	[0]				
Corophium salmonis							165	2.40				
PACIFIC STAGHORN SCULPIN												
26-50 mm									(1)	[0]	(6)	[6]
Corophium salmonis									2	.04		
51-75 mm									(5)	[0]	(8)	[3]
Corophium salmonis									7	.13	43	.43
Digested material									*	.05		
Anisogammarus confervicolus									3	tr.		
76-100 mm											(10)	[2]
Corophium salmonis											318	3.18
101-150 mm			(1)	[0]	(11)	[1]					(6)	[1]
Neomysis mercedis			26	.23	15	.13						
ophium salmonis					62	.56					451	4.51
Chironomid larvae					1	tr						
Digested material					*	.3						
151-200 mm											(1)	[0]
Corophium salmonis											94	.94
LARGESCALE SUCKER												
401-500 mm			(1)	[1]							(6)	[6]
501-600 mm											(1)	[1]
AMERICAN SHAD												
76-100 mm					(14)	[4]						
Eurytemora hirundoides					6062	.10						
101-150 mm					(6)	[2]						
Eurytemora hirundoides					436	.50						
151-200 mm											(1)	[1]
201-250 mm			(2)	[2]							(4)	[4]
251-300 mm											(1)	[1]
301-400 mm											(2)	[2]
LONGFIN SMELT												
76-100 mm											(17)	[10]
Neomysis mercedis											18	.25
Corophium salmonis											2	tr
101-150 mm					(10)	[5]						
Neomysis mercedis					28	.20						
EULACHON												
101-150 mm							(1)	[1]				
151-200 mm							(24)	[24]				

( ) Number examined in parentheses
[ ] Number empty in brackets

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
COHO SALMON												
101-150 mm									(2)	[0]		
Corophium salmonis									51	1.00		
151-200 mm									(3)	[3]		
CUTTHROAT TROUT												
301-400 mm											(1)	[1]

( ) Number examined in parentheses
[ ] Number empty in brackets
[illegible]

	Jul 76		Sept 76		Nov 76		Mar 77		May 77		Jul 77	
	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.	No.	Vol.
PRICKLY SCULPIN												
51-75 mm	(1)	[1]										
101-150 mm	(1)	[0]	(4)	[0]	(1)	[0]						
Digested material	*	.05										
<u>Neomysis mercedis</u>			6	.05	6	.08						
<u>Corophium salmonis</u>			13	.10								
Unid. fish			2	3.0								
151-200 mm	(1)	[1]	(1)	[1]	(1)	[1]						
201-250 mm	(1)	[1]										
STARRY FLOUNDER												
26-50 mm	(2)	[2]									(2)	[2]
51-75 mm	(2)	[1]	(1)	[1]								
<u>Corophium salmonis</u>	1	tr										
Oligochaetes	3	tr										
151-200 mm					(1)	[1]						
THREESPINE STICKLEBACK												
26-50 mm	(18)	[13]	(5)	[5]	(1)	[0]	(8)	[0]			(12)	[9]
Digested material											*	tr
Oligochaetes	36	.07			13	.32						
<u>Corophium salmonis</u>							11	.18				
51-75 mm	(17)	[10]			(1)	[1]	(8)	[0]	(16)	[10]	(49)	[41]
Digested material											*	.10
<u>Daphnia longispina</u>											31	tr
Chironomid larvae											18	tr
Unid. vegetation											*	.20
<u>Corophium salmonis</u>	6	.05					5	.07			4	tr
<u>Daphnia longispina</u> (digested)	51	tr										
Stickleback eggs	7	tr									14	tr
<u>Anisogammarus confervicolus</u>	1	tr							1	tr	1	tr
Chironomid pupae									29	.17	12	.11
CARP												
51-75 mm	(1)	[1]										
CHINOOK SALMON												
26-50 mm							(4)	[0]				
<u>Neomysis mercedis</u>							1	tr				
<u>Corophium salmonis</u>							1	tr				
Ephemeroptera							4	tr				
51-75 mm							(1)	[0]			(2)	[1]
<u>Corophium salmonis</u>							2	tr				
Ephemeroptera							2	tr				
Odonata							1	tr				
Chironomid pupae											2	tr
76-100 mm	(1)	[1]									(5)	[4]
Chironomid pupae											10	.09
Hemiptera											3	tr
101-150 mm											(1)	[1]

( ) Number examined in parentheses
[ ] Number empty in brackets
Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
COHO SALMON												
101-150 mm									(6)	[1]		
Digested material									*	.10		
Corophium salmonis									8	.14		
151-200 mm									(2)	[1]		
Corophium salmonis									16	.29		
STARRY FLOUNDER												
26-50 mm	(6)	[2]										
Chironomid larvae	103	.1										
51-75 mm	(5)	[0]			(1)	[1]					(1)	[1]
Chironomid larvae	161	.16										
76-100 mm					(1)	[1]						
101-150 mm							(2)	[2]				
151-200 mm					(2)	[2]	(3)	[3]				
PACIFIC STAGHORN SCULPIN												
101-150 mm					(1)	[0]					(1)	[1]
Corophium salmonis					2	tr						
Neomysis mercedis					1	tr						
Digested material					*	.05						
LARGESCALE SUCKER												
51-75 mm					(1)	[1]						
101-150 mm					(1)	[1]						
251-300 mm			(1)	[1]								
301-400 mm			(1)	[1]	(1)	[1]						
401-500 mm			(9)	[9]			(1)	[1]				
501-600 mm			(1)	[1]			(1)	[1]				
PEAMOUTH CHUB												
26-50 mm	(2)	[2]										
51-75 mm			(13)	[13]	(2)	[2]	(1)	[1]				
76-100 mm			(6)	[6]								
101-150 mm	(2)	[2]	(8)	[8]								
151-200 mm			(3)	[3]								
201-250 mm	(1)	[1]	(4)	[4]								
301-400 mm			(1)	[1]								

( ) Number examined in parentheses
[ ] Number empty in brackets
* Volumes in ml

	Jul 76 No.	Jul 76 Vol.	Sept 76 No.	Sept 76 Vol.	Nov 76 No.	Nov 76 Vol.	Mar 77 No.	Mar 77 Vol.	May 77 No.	May 77 Vol.	Jul 77 No.	Jul 77 Vol.
CHINOOK SALMON												
26-50 mm							(20)	[0]				
Chironomid pupae							56	.38				
Corophium salmonis							9	.14				
51-75 mm							(4)	[0]				
Chironomid pupae							16	.11				
Corophium salmonis							7	.11				
76-100 mm									(15)	[5]	(6)	[4]
Neomysis mercedis									3	.03	6	.12
Chironomid pupae									61	.37	21	.19
101-150 mm	(1)	[0]	(3)	[0]					(10)	[0]	(6)	[1]
Chironomid larvae									6	tr		
Neomysis mercedis	3	.07	24	.20					2	tr		
Daphnia longispina (digested)	61	tr										
Digested material			*	.70								
Daphnia longispina			676	.07								
Chironomid pupae			3	tr					40	.24	19	.17
Corophium salmonis									8	.14	3	tr
PRICKLY SCULPIN												
26-50 mm	(3)	[3]	(2)	[0]								
Digested material			*	tr								
151-200 mm	(1)	[0]										
Platichthys stellatus juv.	2	1.75										
STARRY FLOUNDER												
26-50 mm	(10)	[0]	(11)	[8]							(10)	[0]
Corophium salmonis	6	.05									4	tr
Oligochaetes	7	tr										
Chironomid larvae			5	tr							21	tr
Digested material											*	tr
51-75 mm	(2)	[0]	(15)	[7]	(9)	[9]	(4)	[4]	(1)	[1]	(13)	[6]
Corophium salmonis	1	tr									6	.06
Oligochaetes	6	tr										
Chironomid larvae			76	.15							24	tr
Neomysis mercedis			10	tr								
Digested material											*	tr
76-100 mm			(1)	[1]					(2)	[2]		
101-150 mm			(1)	[1]					(1)	[1]		
151-200 mm			(1)	[1]			(1)	[0]	(16)	[6]		
Corophium salmonis									21	.38		
Chironomid larvae							12	tr				
Corbicula fluminea									*	2.0		
201-250 mm									(1)	[1]		
THREESPINE STICKLEBACK												
26-50 mm	(10)	[0]	(14)	[7]							(6)	[5]
Daphnia longispina (digested)	186	tr										
Daphnia longispina			226	tr								
Eurytemora hirundoides			151	tr								
Digested material											*	tr

( ) Number examined in parentheses
[ ] Number empty in brackets

APPENDIX TABLE 12 (CONCLUDED)

	Jul 76 No.	Vol.	Sept 76 No.	Vol.	Nov 76 No.	Vol.	Mar 77 No.	Vol.	May 77 No.	Vol.	Jul 77 No.	Vol.
PEAMOUTH CHUB												
26-50 mm	(13)	[13]	(49)	[48]			(1)	[1]			(4)	[4]
Digested material			*	tr								
51-75 mm			(1)	[0]	(11)	[11]			(2)	[2]	(4)	[4]
Digested material			*	tr								
76-100 mm	(12)	[12]	(13)	[13]					(1)	[1]	(13)	[13]
101-150 mm	(3)	[3]	(31)	[31]	(1)	[1]			(4)	[4]	(27)	[27]
151-200 mm	(6)	[6]	(23)	[23]					(16)	[16]	(15)	[15]
201-250 mm	(9)	[9]	(7)	[7]	(1)	[1]			(2)	[2]	(20)	[19]
Unid. vegetation											*	2.5
PACIFIC STAGHORN SCULPIN												
26-50 mm							(3)	[0]			(20)	[10]
Unid. animal material							*	tr				
<u>*Neomysis mercedis*</u>											3	.05
<u>*Corophium salmonis*</u>							1	tr			6	.06
Chironomid larvae											36	tr
0-25 mm											(4)	[4]
LARGESCALE SUCKER												
51-75 mm			(2)	[2]	(1)	[1]						
76-100 mm					(1)	[1]						
401-500 mm					(1)	[1]			(1)	[1]		
COHO SALMON												
51-75 mm									(1)	[0]		
Chironomid pupae									5	tr		
76-100 mm											(1)	[1]
101-150 mm											(2)	[2]
NORTHERN SQUAWFISH												
51-75 mm											(1)	[1]
76-100 mm											(2)	[2]
151-200 mm											(1)	[1]

APPENDIX B13: PERCENT NUMBER AND VOLUME OF ITEMS CONSUMED BY ALL FISH THROUGH JULY 1977

Appendix Table B13

Percent Number of Items Consumed by all Fish at Miller Sands
July 1976 through July 1977

	July 1976		Sept 1976		Nov 1976		Mar 1977		May 1977		July 1977	
	No.	% No.	No.	% No.	No.	% No.	No.	% No.	No.	% No.	No.	% No.
Nematodes			2	tr	10	tr						
Oligochaetes	52	tr			15	tr	3	tr				
Cladocerans												
Daphnia longispina	214	1	909	41	9	tr	12	tr	181	7	6657	55
Bosmina longirostris							1	tr				
Eurycercus sp.											30	tr
Digested cladocerans (mainly *D. longispina*)	13339	83	178	8								
Copepods												
Eurytemora hirundoides	419	3	498	23	17613	93			369	13		
Diaptomus sp.											466	4
Digested copepods									*	tr		
Mysids												
Neomysis mercedis	31	tr	351	16	155	1	94	4	48	2	32	tr
Digested mysids							4	tr				
Amphipods												
Corophium salmonis	86	tr	38	2	293	2	1145	52	720	25	1903	16
Anisogammarus confervicolus	1	tr	1	tr	2	tr	33	2	5	tr	4	tr
Pelecypods												
Corbicula fluminea									5	tr	2	tr
Gastropods												
Pleurocera sp.											2	tr
Unid. gastropods					2	tr						
Ostracods												
Unid. ostracods							37	2				
Insects												
Chironomid larvae	1803	11	180	8	159	1	117	5	123	4	922	8
Chironomid pupae			6	tr	1	tr	713	33	1300	46	1854	15
Diptera			20	1	496	3					1	tr
Coleoptera			2	tr	9	tr						
Odonata nymphs (dragonfly)	2	tr					1	tr			1	tr
Odonata (damselfly)											1	tr
Tipulidae larvae											1	tr
Hemiptera					8	tr						
Hemiptera--Corixidae			2	tr	1	tr					2	tr
Hymenoptera			1	tr	13	tr					2	tr
Hymenoptera--Formicidae			6	tr	62	tr						
Ephemeroptera							6	tr				
Unid. insects							3	tr			96	1
Dig. insects					*	tr	*	tr			*	tr
Teleosts												
Thaleichthys pacificus lar.							14	1	84	3		
Platichthys stellatus juv.	2	tr										
Oncorhynchus tshawytscha juv.											1	tr
Gasterosteus aculeatus eggs	14	tr									11	tr
Unid. fish scales											2	tr
Unid. fish bones					1	tr						
Unid. fish			3	tr	2	tr	2	tr				
Other												
Arachnids					5	tr			1	tr		
Gnorimosphaeroma oregonensis					1	tr						
Gravel and sand			*	tr	*	tr	*	tr				
Sticks			7	tr			2	tr				
Synthetic fiber					1	tr						
Vegetation seeds	26	tr										
Unid. vegetation											*	tr
Digested material	*	tr	*	tr	*	tr	*	tr	*	tr	*	tr
Unid. invertebrate eggs					*	tr	*	tr			14	tr

* - indicates presence
tr - trace

In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

McConnell, Robert J
Habitat development field investigations, Miller Sands marsh and upland habitat development site, Columbia River, Oregon; Appendix B: Inventory and assessment of predisposal and post-disposal aquatic habitats / by Robert J. McConnell ... [et al.], National Marine Fisheries Service, Prescott, Oregon. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1978.
344 p. : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; D-77-38, Appendix B)
Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C., under Interagency Agreement Nos. WESRF 75-88, WESRF 76-39, WESRF 76-178 (DMRP Work Unit Nos. 4B05C, J, and L.
Literature cited: p. 83-86.

1. Aquatic habitats. 2. Benthic fauna. 3. Columbia River. 4. Dredged material. 5. Dredged material disposal.

(Continued on next card)

McConnell, Robert J
Habitat development field investigations, Miller Sands marsh and upland habitat development site, Columbia River, Oregon; Appendix B: Inventory and assessment of predisposal and post-disposal aquatic habitats ... 1978. (Card 2)

6. Field investigations. 7. Fishes. 8. Food utilization. 9. Habitat development. 10. Habitats. 11. Marsh development. 12. Marshes. 13. Miller Sands Island. 14. Sediment 15. Water quality. 16. Zooplankton. I. United States. National Marine Fisheries Service. II. United States. Army. Corps of Engineers. III. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; D-77-38, Appendix B.
TA7.W34 no.D-77-38 Appendix B