



United States
Department of
Agriculture

Forest Service

Pacific Northwest
Research Station

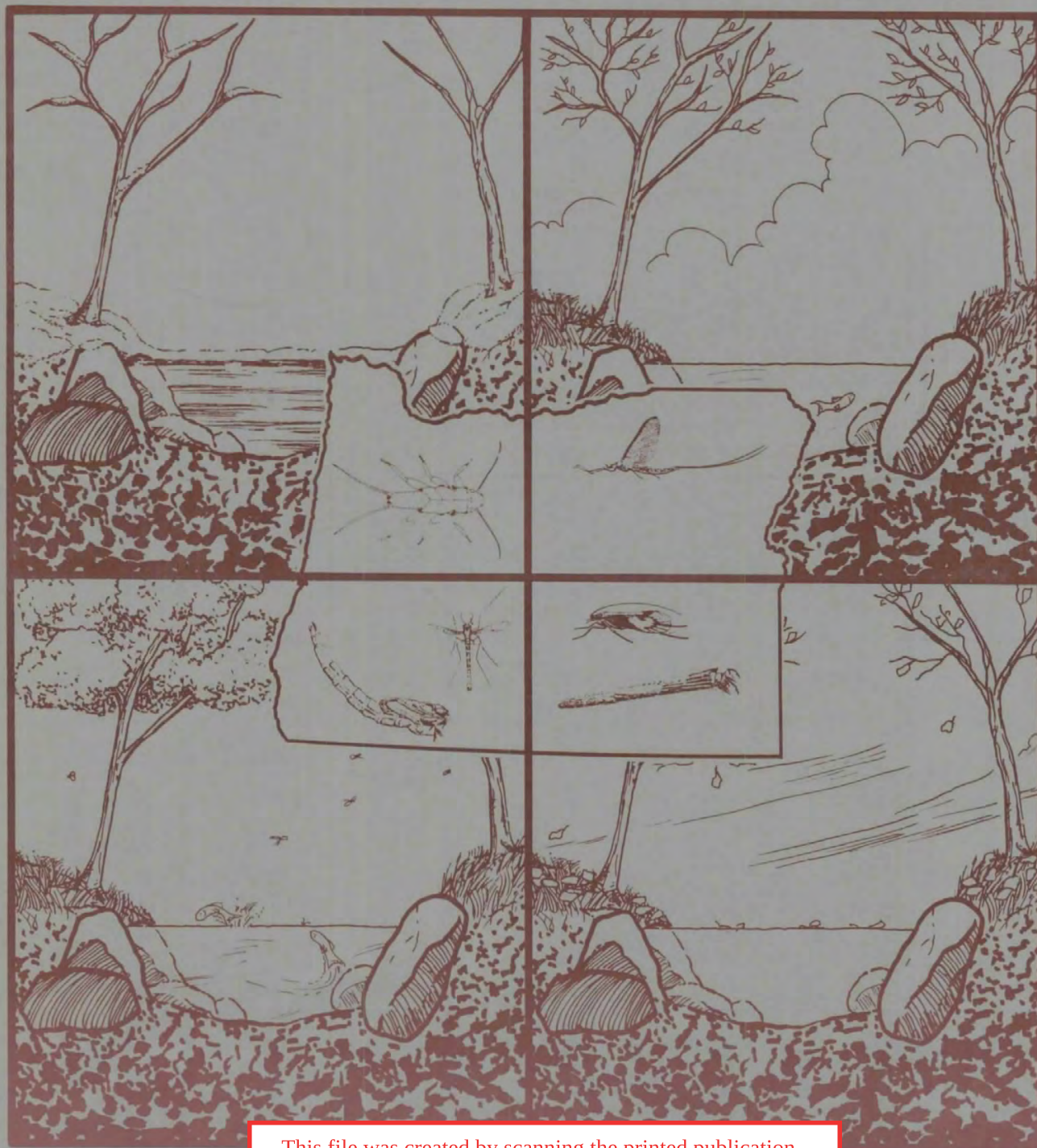
Research Paper
PNW-RP-382



Seasonal Composition of Invertebrates in Several Oregon Streams

EDITORS FILE COPY

Pamela E. Porter and William R. Meehan



This file was created by scanning the printed publication.
Text errors identified by the software have been corrected;
however, some errors may remain.

Authors

PAMELA E. PORTER and WILLIAM R. MEEHAN are research fishery biologists, Forestry Sciences Laboratory, P.O. Box 020909, Juneau, Alaska 99802.

Abstract

Porter, Pamela E.; Meehan, William R. Seasonal species composition of invertebrates in several Oregon streams. Res. Pap. PNW-RP-382. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; **1987**. 36 p.

The invertebrate communities of eight Oregon streams were sampled seasonally from 1974 to 1976. Benthic, drift, and two types of aerial-trap samples were collected. Occurrence and percentage composition are summarized by sample type, season, and geographic area (coastal, Cascade, central, and eastern Oregon). Within 276 families, 426 taxa were identified; the 20 families most prevalent within each sample type accounted for the majority of organisms collected (77.8-91.8 percent). In most areas and seasons, Diptera and Ephemeroptera together comprised over half of the invertebrates collected.

Keywords: Invertebrata, aquatic life, Oregon.

Summary

During 1974-76, we studied the community structure of invertebrates in streams in the coastal, Cascade, central, and eastern areas of Oregon. Benthic, drift, sticky-trap, and water-trap samples were collected seasonally. Occurrence and percentage composition of invertebrates were summarized by sample type, season, and geographic area.

When data for all sample types were combined, Diptera was the most abundant order collected in summer and fall, and Ephemeroptera were prevalent in winter. In most areas and seasons, combined numbers of Diptera and Ephemeroptera comprised over half of the invertebrates collected.

Within the benthic community, Ephemeroptera and Diptera were the most prevalent orders, although other orders such as Coleoptera and Plecoptera occasionally were quite abundant. Ephemeroptera, Diptera, Plecoptera, and Trichoptera were the dominant orders collected in drift samples. Diptera was the most prevalent order collected in sticky-trap and water-trap samples, except for occasional large numbers of Collembola.

Within 276 families, 426 taxa were collected during the study. When data were summarized by family, the 20 most prevalent families accounted for the majority of organisms collected (77.8-91.8 percent).

Contents

1	Introduction
1	Study Area
2	Materials and Methods
2	Aquatic Sample Types
2	Aerial Sample Types
3	Sampling Schedule
3	Identification of Organisms
4	Results and Discussion
6	English Equivalents
6	Literature Cited
8	Appendix 1
8	Presence of Taxa by Season and Area
18	Appendix 2
18	Percentage of Samples From Coastal Streams Containing Listed Taxa, by Season and Sample Type
22	Percentage of Samples From Cascade Streams Containing Listed Taxa, by Season and Sample Type
26	Percentage of Samples From Central Streams Containing Listed Taxa, by Season and Sample Type
30	Percentage of Samples From Eastern Streams Containing Listed Taxa, by Season and Sample Type
33	Appendix 3
33	Summary of Invertebrate Data for Each Season and Sample Type—Coastal Streams
34	Summary of Invertebrate Data for Each Season and Sample Type—Cascade Streams
35	Summary of Invertebrate Data for Each Season and Sample Type—Central Streams
36	Summary of Invertebrate Data for Each Season and Sample Type—Eastern Streams

Introduction

During 1974-76, we studied the relation of riparian vegetation canopy to the community structure of invertebrates in several streams in Oregon. The composition of invertebrates occurring seasonally in the study streams was evaluated according to several sample types.

The purpose of this report is to provide a list of the invertebrate taxa found in the distinct geographic areas of Oregon in each season. This list will serve as a checklist for other studies of stream ecology in Oregon, and it will be the base of reference for future reports on effects of riparian canopy and food habits.

Study Area

Eight streams in Oregon were selected for study (fig. 1)—two in each of four geographical areas: coastal Oregon, the west side of the Cascade Range, central Oregon, and eastern Oregon. Thus, a general transect of the State from west to east was sampled. All the study streams were second- or third-order streams, comparable in size, and representative of the small streams that furnish a large amount of rearing habitat for young salmon and trout. The study streams, by area, were:

Coastal (tributaries of Five Rivers in the Alsea River drainage):

- Green River
- East Fork Green River

Cascades (tributaries of the Lookout Creek system, which drains into the McKenzie River):

- Mack Creek
- MacRae Creek

Central (tributaries of the Deschutes River drainage):

- Ochoco Creek
- Canyon Creek

Eastern (tributaries of the Grand Ronde River):

- Meadow Creek
- McCoy Creek

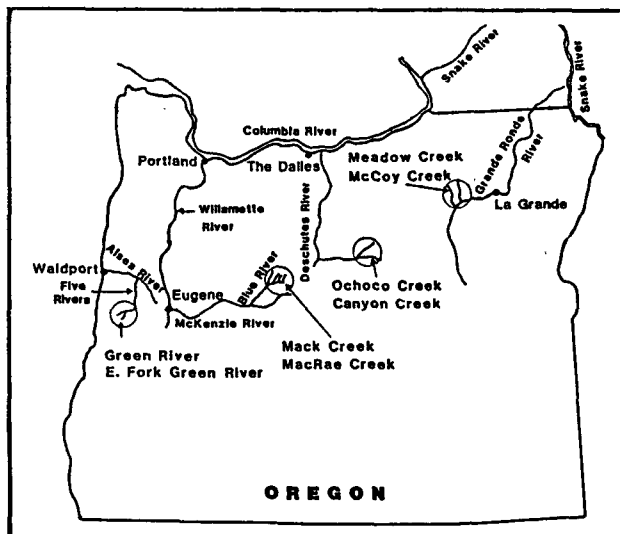


Figure 1—Locations of study streams.

In each of the eight streams, two similar reaches were sampled. Streamside vegetation was a mix of conifers, hardwoods, brush, and grass. Stream substrates were generally similar and ranged from cobble to coarse sand.

Materials and Methods

Aquatic Sample Types

Benthic—Benthic samples were collected with a modified Hess sampler^{1/} covering a surface area of 0.09m². Two samples were collected from each study reach at the beginning of a 16-day study period and again at the end of the 16 days; the samples were preserved in formal alcohol (half 70-percent ethanol and half 10-percent formalin). In the laboratory, invertebrate organisms were sorted from the samples, counted, and identified to the lowest possible taxonomic level (generally to family and, where feasible, to genus or species). After the invertebrates were sorted, the entire sample was freeze-dried and weighed on an analytical balance to the nearest 0.0001 g.

Drift—Aquatic drift was sampled in each study section with a 280-micrometer mesh Nitex drift net, 76 cm long. Openings in the nets were 0.46 by 0.31 m. One drift net was set in place at the lower end of each study reach for 24 hours at the beginning and end of each 16-day sampling period. Nets were placed in riffles or runs with the bottom of the net on the streambed and the top above the stream surface such that the entire water column was sampled. Samples were processed in the field and laboratory as described above.

Aerial Sample Types

Terrestrial insects and adult aquatic insects that drop into the stream and become part of the drift and potential fish food supply were sampled during each sampling period by means of sticky traps and water traps. A pair (one of each type) was located at each of two sites within each study reach.

Sticky trap—The sticky traps were 0.31-m squares of white-painted 6.35-mm plywood; each was covered with a piece of 6-mil clear polyethylene film. This square surface was sprayed with "Tree Tanglefoot," a sticky substance used as a barrier to crawling insects on trees. Each coated board was taped to a Styrofoam float 0.36 m square and 5.1 cm thick. Two sticky traps were set out in each study reach for the full 16 days of each sampling period. When the trap was removed at the end of the sampling period, the plastic film was cut off at the edges of the board so that a 0.31-m-square collection surface was retained, butcher paper was placed over the sticky side to prevent crushing or mold damage to the specimens, and this film and butcher paper "sandwich" was transported to the laboratory. In the laboratory, the butcher paper was removed and the film cut into 2.54-cm strips for viewing under a microscope. Insects were counted and identified, usually to family.

^{1/} The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others that may be suitable.

Water trap—A water trap was made from a 0.33- by 0.28-m plastic dishpan, 0.13 m deep, surrounded by a 0.61- by 0.61-m rectangle of 5.1-cm-thick Styrofoam that supported and floated the pan. The pan was filled to about half its depth with water, and 28.4 g of formalin and 28.4 g of a surfactant (Ortho R X-77 Spreader) were added. The surfactant eliminated surface tension and allowed insects to settle to the bottom. A small hole was bored into a lower corner of the pan and was fitted with a rubber stopper for easy removal of the contents. Two water traps were set out in each study reach for the full 16 days. When a trap was removed at the end of a sampling period, the corner plug was removed and the contents of the pan were strained through a 0.5-mm mesh screen. The material remaining on the screen was washed into a jar with formal alcohol and processed as described for benthic and drift samples.

Sampling Schedule

Each stream was sampled during summer and fall 1974 and during all four seasons in 1975 and 1976. Samples were taken at the following times: winter—mid January to early February; spring—early April to late April; summer—early July to late July; and fall—early October to early November.

A sampling period was organized as follows: On day 1, sticky traps, water traps, and drift nets were set out. On day 2, 24 hours later, drift nets were pulled. During these 2 days, benthic samples were taken.

Two weeks later, another sampling trip was made. On Day 15, drift nets were set out, and 24 hours later (day 16), they were pulled. Sticky traps and water traps that had been in place during the 16-day period were removed. During these 2 days, benthic samples were again taken.

Because of ice and other weather-related problems, the winter sampling period at the central and eastern sites in both years, and at the Cascade site in 1976, was only one trip of 2 days rather than two trips over 16 days. During these shortened sampling periods, samples from sticky traps and water traps were not obtained, and only half as many of the other samples were collected. We had planned to collect the following samples during the entire study: benthic, 600; drift, 300; and sticky trap and water trap, 280 each. But actual numbers of samples were fewer because on a few occasions sampling gear malfunctioned or was lost.

Identification of Organisms

We used several sources to identify the organisms collected. Invertebrates other than insects were identified through descriptions in Pennak (1978), Ward and Whipple (1959), and Burch (1982). Aquatic insects were identified from taxonomic keys in Hatch (1953, 1957, 1961, 1965, 1971), Usinger (1956), Jensen (1966), Cole (1969), Anderson (1976), Edmunds and others (1976), Baumann and others (1977), and Merritt and Cummins (1978). Terrestrial insects were identified primarily from Borror and others (1976). Amphibians and fish were identified from Stebbins (1954) and Bond (1973), respectively.

Results and Discussion

Table 1 and figure 2 show the percentage composition by season of the major orders of invertebrates collected in each of the four study areas. In all areas, Diptera was the most abundant order collected in the summer and fall, and mayflies (Ephemeroptera) were prevalent in the winter. In all areas other than central Oregon, spring samples also contained high percentages of mayflies, although springtails (Collembola) dominated the spring samples in central Oregon and stoneflies (Plecoptera) were prevalent in eastern Oregon. In most areas and seasons, Diptera and Ephemeroptera combined comprised over half of the invertebrates collected.

Table 1—Number and percentage composition of invertebrates, by order, for each season and geographic area

Area and order	Winter		Spring		Summer		Fall		All seasons	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Coastal:										
Gastropoda	51	(1.8)	207	(1.7)	1,052	(4.6)	615	(4.8)	1,925	(3.8)
Collembola	28	(1.0)	477	(3.9)	85	(.4)	192	(1.5)	782	(1.5)
Ephemeroptera	1,293	(46.6)	5,571	(45.1)	2,479	(10.9)	1,819	(14.1)	11,162	(21.9)
Plecoptera	231	(8.3)	1,158	(9.4)	1,586	(6.9)	1,567	(12.1)	4,542	(8.9)
Hemiptera	6	(.2)	85	(.7)	233	(1.0)	51	(.4)	375	(.7)
Homoptera	5	(.2)	32	(.3)	241	(1.1)	117	(.9)	395	(.8)
Coleoptera	70	(2.5)	1,149	(9.3)	2,517	(11.0)	2,575	(19.9)	6,311	(12.4)
Trichoptera	221	(8.0)	676	(5.5)	995	(4.4)	1,550	(12.0)	3,442	(6.8)
Diptera	832	(30.0)	2,777	(22.5)	13,149	(57.6)	4,108	(31.8)	20,866	(41.0)
Other ^{1/}	35	(1.3)	230	(1.9)	501	(2.2)	330	(2.6)	1,096	(2.2)
Total	2,772		12,362		22,838		12,924		50,896	
Cascade:										
Oligochaeta	39	(.8)	231	(1.4)	132	(.5)	183	(1.5)	585	(1.0)
Collembola	574	(12.1)	564	(3.4)	3,031	(11.1)	2,333	(18.8)	6,502	(10.6)
Ephemeroptera	1,734	(36.6)	9,413	(56.0)	4,762	(17.4)	2,063	(16.6)	17,972	(29.3)
Plecoptera	1,327	(28.0)	2,327	(13.8)	1,298	(4.8)	2,250	(18.1)	7,202	(11.8)
Coleoptera	28	(.6)	89	(.5)	832	(3.0)	364	(2.9)	1,313	(2.1)
Trichoptera	564	(11.9)	607	(3.6)	1,311	(4.8)	709	(5.7)	3,191	(5.2)
Diptera	414	(8.7)	3,478	(20.7)	14,563	(53.4)	4,022	(32.4)	22,477	(36.7)
Other	52	(1.1)	104	(.6)	1,367	(5.0)	506	(4.1)	2,029	(3.3)
Total	4,732		16,813		27,296		12,430		61,271	
Central:										
Collembola			14,054	(49.1)	9,046	(24.1)	3,063	(10.0)	26,163	(25.3)
Ephemeroptera	2,076	(32.3)	3,444	(12.0)	4,816	(12.8)	7,464	(24.3)	17,800	(17.2)
Plecoptera	1,865	(29.0)	3,585	(12.5)	922	(2.5)	2,699	(8.8)	9,071	(8.8)
Homoptera			69	(.2)	1,969	(5.2)	1,375	(4.5)	3,413	(3.3)
Coleoptera	205	(3.2)	362	(1.3)	2,269	(6.0)	2,699	(8.8)	5,535	(5.4)
Trichoptera	345	(5.4)	1,192	(4.2)	2,071	(5.5)	2,810	(9.1)	6,418	(6.2)
Diptera	1,873	(29.1)	5,657	(19.8)	14,839	(39.5)	9,777	(31.8)	32,146	(31.1)
Hymenoptera			19	(.1)	586	(1.6)	217	(.7)	822	(.8)
Other	71	(1.1)	242	(.8)	1,040	(2.8)	670	(2.2)	2,023	(2.0)
Total	6,435		28,624		37,558		30,774		103,391	
Eastern:										
Oligochaeta	34	(1.9)	148	(1.8)	28	(.1)	554	(2.2)	764	(1.3)
Gastropoda	19	(1.1)	9	(.1)	34	(.2)	581	(2.3)	643	(1.1)
Araneae			8	(.1)	272	(1.3)	152	(.6)	432	(.8)
Collembola	2	(.1)	442	(5.4)	12	(.1)	245	(1.0)	701	(1.2)
Ephemeroptera	569	(31.5)	563	(6.9)	3,705	(17.2)	5,063	(19.7)	9,900	(17.3)
Plecoptera	446	(24.7)	3,984	(49.0)	1,099	(5.1)	1,342	(5.2)	6,871	(12.0)
Hemiptera	10	(.6)	3	(.0)	211	(1.0)	180	(.7)	404	(.7)
Homoptera	1	(.1)	21	(.3)	1,002	(4.7)	5,426	(21.1)	6,450	(11.3)
Coleoptera	130	(7.2)	128	(1.6)	1,434	(6.7)	1,587	(6.2)	3,279	(5.7)
Trichoptera	124	(6.9)	130	(1.6)	818	(3.8)	1,751	(6.8)	2,823	(4.9)
Diptera	439	(24.3)	2,657	(32.7)	12,350	(57.5)	8,224	(32.0)	23,670	(41.4)
Hymenoptera	1	(.1)	4	(.0)	229	(1.1)	138	(.5)	372	(.7)
Other	30	(1.7)	34	(.4)	287	(1.3)	492	(1.9)	843	(1.5)
Total	1,805		8,131		21,481		25,735		57,152	

^{1/} Other is the total of all orders having a percentage composition less than 1.0 in any season.

Within 276 families, 426 taxa were collected (appendix 1); the 20 most prevalent families within each sample type accounted for the majority of organisms collected (benthos 89.2 percent, drift 80.4 percent, sticky trap 91.8 percent, water trap 77.8 percent—see table 2). Appendix 2 lists the frequency of occurrence, by family, of organisms collected during the study.

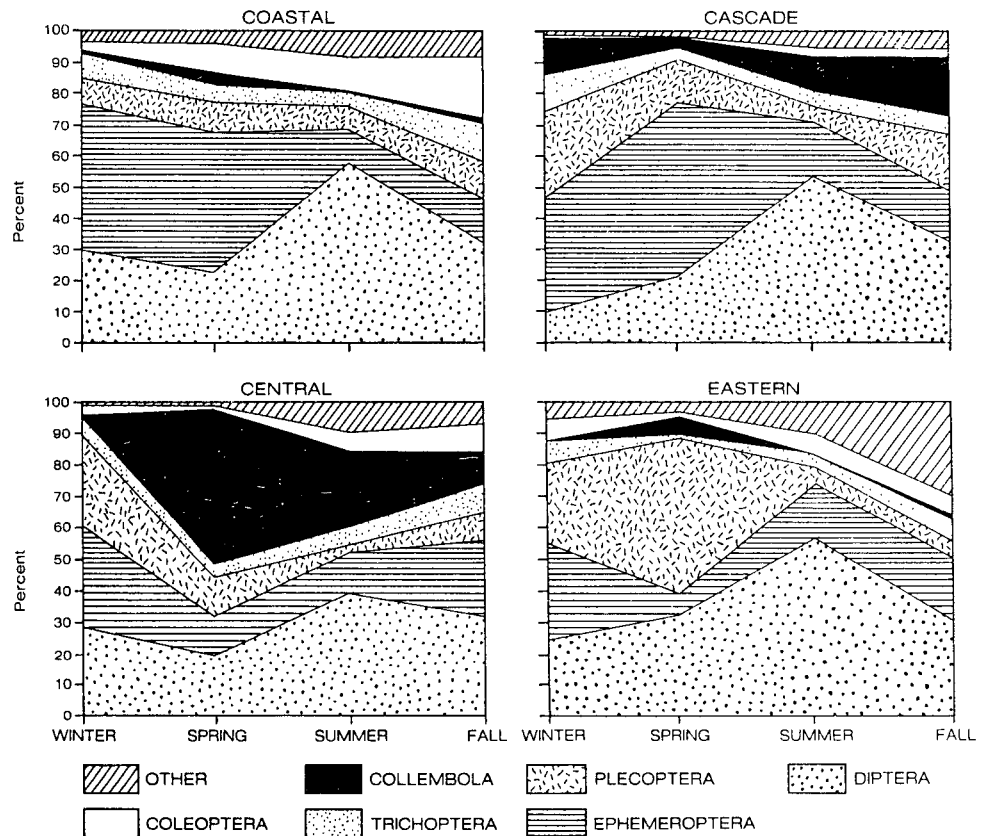


Figure 2—Percentage composition of major orders of invertebrates, by season, for coastal, Cascade, central, and eastern streams in Oregon.

Table 2—Percentage composition of the 20 most prevalent families^{1/} collected, by sample type

Benthic		Drift		Sticky trap		Water trap	
Taxa	Percent	Taxa	Percent	Taxa	Percent	Taxa	Percent
Chironomidae	14.4	Baetidae	16.2	Chironomidae	19.0	Chironomidae	24.4
Heptageniidae	13.7	Chironomidae	15.4	Dolichopodidae	12.9	Isotomidae	8.0
Elmidae	10.5	Nemouridae	7.2	Collembola	9.7	Empididae	6.0
Baetidae	7.0	Heptageniidae	5.3	Empididae	9.2	Collembola	5.5
Chloroperlidae	6.4	Ephemerellidae	4.2	Muscoidea	7.7	Ephydriidae	5.1
Ephemerellidae	6.4	Limnephilidae	4.1	Cicadellidae	5.4	Mycetophilidae	4.2
Tipulidae	4.0	Pleuroceridae	3.7	Trichoptera	4.1	Sciaridae	2.9
Leptophlebiidae	3.8	Simuliidae	3.0	Isotomidae	3.6	Tipulidae	2.6
Nemouridae	3.3	Capniidae	2.8	Mycetophilidae	3.5	Dolichopodidae	2.5
Perlidae	2.8	Siphonuridae	2.3	Nemouridae	3.1	Nemouridae	2.5
Oligochaeta	2.5	Cicadellidae	2.3	Diptera	2.6	Araneae	2.3
Psychodidae	2.4	Elmidae	2.3	Tipulidae	2.0	Aphididae	2.3
Limnephilidae	2.2	Leptophlebiidae	1.9	Sciaridae	1.9	Staphylinidae	1.6
Siphonuridae	2.0	Sciaridae	1.7	Ephemeroptera	1.9	Ceratopogonidae	1.4
Rhyacophilidae	1.4	Amnicolidae	1.6	Platypezidae	1.3	Cecidomyiidae	1.3
Perlidae	1.4	Calamoceratidae	1.2	Staphylinidae	1.3	Cicadellidae	1.3
Hydropsychidae	1.3	Chloroperlidae	1.2	Plecoptera	.9	Capniidae	1.1
Capniidae	1.3	Ephemeroptera	1.0	Araneae	.7	Phoridae	1.1
Pteronarcidae	1.2	Psychodidae	1.0	Ephydriidae	.6	Anthomyiidae	.9
Pleuroceridae	1.2	Aphididae	1.0	Chloroperlidae	.4	Simuliidae	.8
Total	89.2	Total	79.4	Total	91.8	Total	77.8

^{1/} A few highly rare taxa are included where identification could not be made to the family level.

When the data are divided by sample type, seasonal and geographic trends become apparent (appendix 3). Within the benthic community, Diptera were more prevalent in summer and fall than in winter or spring in Cascade streams, while in coastal streams they were more prevalent in fall; in central and eastern streams, Diptera were dominant in spring samples. Within the drift, Diptera showed no obvious trend across season or geographic area. Diptera was also the most prevalent order collected in sticky-trap and water-trap samples except for occasional large numbers of Collembola. Ephemeroptera within the benthos were most common during winter and spring sampling; within the drift, their presence peaked during spring and summer sample periods in all areas except eastern Oregon, where they were most numerous in the winter samples. Adult mayflies were never abundant in sticky-trap or water-trap samples. Plecoptera were an important component of winter and spring drift samples collected in eastern Oregon; adult stoneflies also dominated spring water-trap samples in this area. Collembola were occasionally important in all areas except coastal Oregon, but particularly in central Oregon where they comprised over 25 percent of all organisms collected. Collembola were found primarily in sticky-trap and water-trap samples and generally during spring and fall.

English Equivalents

1 meter (m) = 3.28 feet
 1 square meter (m²) = 10.76 square feet
 1 centimeter (cm) = 0.39 inch
 1 millimeter (mm) = 0.039 inch
 1 micrometer (μ) = 0.000039 inch
 1 gram (g) = 0.035 ounce

Literature Cited

- Anderson, Norman H.** The distribution and biology of the Oregon Trichoptera. Tech. Bull. 134. Corvallis, OR: Oregon State University, Agricultural Experiment Station; **1976**. 152 p.
- Baumann, Richard W.; Gaufin, Arden R.; Surdick, Rebecca F.** The stoneflies (Plecoptera) of the Rocky Mountains. Memoirs of the American Entomological Society. 31: 1-208; **1977**.
- Bond, Carl E.** Keys to Oregon freshwater fishes. Tech. Bull. 58. Corvallis, OR: Oregon State University, Agricultural Experiment Station; **1973**. 42 p.
- Borror, Donald J.; DeLong, Dwight M.; Triplehorn, Charles A.** An introduction to the study of insects. 4th ed. New York, NY: Holt, Rinehart and Winston; **1976**. 852 p.
- Burch, J.B.** Freshwater snails (Mollusca: Gastropoda) of North America. EPA-600/3-82-026. Cincinnati, OH: U.S. Environmental Protection Agency; **1982**. 294 p.
- Cole, Frank R.** The flies of western North America. Berkeley, CA: University of California Press; **1969**. 693 p.
- Edmunds, George F., Jr.; Jensen, Steven L.; Berner, Lewis.** The mayflies of North and Central America. Minneapolis, MN: University of Minnesota Press; **1976**. 330 p.
- Hatch, Melville H.** The beetles of the Pacific Northwest. Part I: Introduction and Adephaga. Seattle, WA: University of Washington Press; **1953**. 340 p.

- Hatch, Melville H.** The beetles of the Pacific Northwest. Part II: Staphyliniformia. Seattle, WA: University of Washington Press; **1957**. 384 p.
- Hatch, Melville H.** The beetles of the Pacific Northwest. Part III: Pselaphidae and Diversicornia I. Seattle, WA: University of Washington Press; **1961**. 503 p.
- Hatch, Melville H.** The beetles of the Pacific Northwest. Part IV: Macroductyles, Palpicornes and Heteromera. Seattle, WA: University of Washington Press; **1965**. 268 p.
- Hatch, Melville H.** The beetles of the Pacific Northwest. Part V: Rhipiceroidea, Sternoxi, Phytophaga, Rhynchophora and Lamellicornia. Seattle, WA: University of Washington Press; **1971**. 662 p.
- Jensen, Stephen Leroy.** The mayflies of Idaho (Ephemeroptera). Salt Lake City, UT: University of Utah; **1966**. 352 p. M.S. thesis.
- Merritt, Richard W.; Cummins, Kenneth W., eds.** An introduction to the aquatic insects of North America. Dubuque, IA: Kendall/Hunt Publishing Co.; **1978**. 411 p.
- Pennak, Robert W.** Fresh-water invertebrates of the United States. 2d ed. New York, NY: John Wiley and Sons; **1978**. 803 p.
- Stebbins, Robert C.** Amphibians and reptiles of western North America. New York, NY: McGraw-Hill Book Co.; **1954**. 528 p.
- Usinger, Robert L., ed.** Aquatic insects of California. Berkeley, CA: University of California Press; **1956**. 508 p.
- Ward, Henry Baldwin; Whipple, George Chandler.** Fresh-water biology. 2d ed. New York, NY: John Wiley and Sons; **1959**. 1248 p.

Appendix 1

Presence of Taxa by Season and Area

Individuals were identified to the lowest taxonomic level. Presence was recorded at this level and not entered at the broader taxonomic levels.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Platyhelminthes																
Turbellaria																
Tricladida																
Planariidae	x				x	x	x	x	x	x	x	x	x	x	x	x
Nematomorpha							x									
Nematoda	x		x	x	x	x	x	x		x	x	x			x	x
Annelida																
Oligochaeta	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hirudinea	x		x	x												
Mollusca																
Gastropoda	x	x	x	x	x	x					x					x
Basommatophora																
Lymnaeidae																
Lymnaea				x												
Physidae																
Physa												x	x	x	x	x
Planorbidae				x												
Helisoma											x	x				x
Ancylidae																
Ferriassia													x	x		x
Stylommatophora	x			x												
Mesogastropoda																
Hydrobiidae				x												
Fluminicola	x	x	x	x						x	x	x	x		x	
Pleuroceridae	x	x	x	x											x	
Juga	x	x	x	x											x	
Pelecypoda										x						
Margaritiferidae															x	
Sphaeriidae			x	x					x			x	x	x	x	x
Unionidae															x	
Arthropoda																
Crustacea																
Decapoda																
Astacidae																
Astacus (Pacifastacus)			x	x											x	x
A. klamathensis															x	x
A. leniusculus			x	x									x		x	x
A. trowbridgi		x	x	x									x	x	x	x
Amphipoda								x		x	x	x		x		x
Isopoda	x	x		x												
Ostracoda					x			x				x				x
Copepoda				x								x				x
Arachnida																
Araneae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Acarina	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Pseudoscorpionida											x					
Opiliones		x	x	x			x	x				x			x	

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Insecta				x			x	x		x	x				x	
Thysanura																
Machilidae		x						x			x					
Collembola	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Sminthuridae	x	x	x	x		x		x		x		x		x		
Poduridae				x			x									
Isotomidae	x	x	x	x	x	x	x	x		x	x	x		x		x
Ephemeroptera	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Siphonuridae	x							x								x
Siphonurus							x									x
Ameletus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Baetidae			x				x				x				x	
Baetis	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
B. bicaudatus	x	x	x	x	x	x	x	x					x	x	x	x
B. hageni		x		x				x								
B. tricaudatus	x	x	x	x	x		x	x					x	x	x	x
Centroptilum						x		x			x				x	
Heptageniidae	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x
Epeorus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
E. sg. Ironopsis					x	x	x	x								
E. longimanus		x		x		x	x	x						x		
E. albertae			x													
E. deceptivus						x										
Ironodes						x										
I. nitidus		x			x	x	x	x								
Cinygmula	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cinygma	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Rhithrogena	x	x	x	x	x	x	x	x	x	x	x	x			x	x
R. hageni								x								
R. robusta				x	x	x		x								
Stenonema			x		x		x				x				x	
Leptophlebiidae				x			x				x			x	x	
Paraleptophlebia	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
P. bicornuta				x												x
P. heteronea			x	x		x									x	x
P. debilis		x		x		x									x	
P. temporalis		x		x	x	x	x	x					x	x	x	x
Leptophlebia													x			x
Ephemerellidae		x					x				x				x	
Ephemerella	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
E. sg. Caudatella						x										
E. sg. Drunella	x	x	x	x		x	x	x								x
E. aurivillii	x															
E. doddsi		x		x	x	x	x	x								
E. edmundsi	x															
E. flavilinea		x				x										
E. grandis						x	x									x
E. infrequens		x		x	x	x	x	x					x	x		x
E. spinifera				x	x	x	x	x								
E. tibialis							x								x	
E. hecuba		x	x	x			x	x							x	x
E. margarita															x	x
E. terea		x					x								x	
E. coloradensis				x		x	x									
E. jacobi		x			x	x	x	x								
E. pelosa						x										
Odonata																

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Anisoptera			x				x								x	
Aeshnidae																x
Anax																x
Gomphidae			x								x					
Ophiogomphus																x
Cordulegastridae									x							
Libellulidae										x						
Coenagrionidae																
Argia			x												x	
Orthoptera		x									x				x	x
Tetrigidae										x		x				
Gryllidae											x				x	
Phaneropterinae				x												
Gryllacrididae		x	x	x		x	x	x								
Acrididae							x	x							x	
Dermaptera			x													
Forficulidae												x				
Plecoptera	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Pteronarcidae		x	x				x									
Pteronarcella			x	x				x								
Pteronarcys			x	x		x	x	x					x			
Peltoperlidae																
Yoraperla			x	x	x	x	x	x	x	x	x	x				
Taeniopterygidae																
Brachypteriginae	x	x	x	x	x	x	x	x			x	x		x		x
Nemouridae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zapada	x	x	x	x	x	x	x	x					x		x	x
Malenka		x		x	x	x	x	x					x	x	x	x
Capniidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Capnia				x	x	x	x	x		x			x	x	x	x
Isocapnia						x										
Eucapnopsis	x		x		x	x			x			x		x		
Leuctridae	x	x	x	x	x	x	x	x	x	x		x		x		
Despaxia																
D. augustus					x	x		x								
Perlidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Calineuria																
C. californica	x	x	x	x	x	x	x	x					x	x	x	x
Claassenia		x	x						x	x	x	x				
Hesperoperla	x	x	x	x				x								
Perlodidae	x	x	x	x		x	x	x			x		x		x	x
Perlodinae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Isoperla	x	x	x	x		x		x	x	x	x	x		x	x	
Perlinodes																
P. aurea													x			x
Skwala				x	x	x	x	x								x
Chloroperlidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Chloroperlinae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hastaperla			x													

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Paraperlinae																
<i>Paraperla</i>		x	x	x			x									
<i>Kathroperla</i>					x		x	x								
Psocoptera			x	x			x	x			x	x			x	x
Mallophaga			x				x	x								
Thysanoptera		x	x	x			x			x	x	x			x	x
Hemiptera		x	x	x	x		x	x		x	x	x	x		x	
Corixidae									x		x	x	x		x	
<i>Graptocorixa</i>																x
<i>Hesperocorixa</i>													x			x
<i>Trichocorixa</i>																x
Neididae											x					
Macroveliidae																
<i>Macrovelia</i>				x												
Gerridae		x	x	x			x	x		x	x	x			x	x
<i>Gerris</i>	x	x	x	x		x	x	x		x	x			x	x	x
<i>Trepobates</i>															x	x
Veliidae		x	x	x								x				
<i>Microvelia</i>		x	x	x								x	x			
Mesoveliidae		x														
Saldidae		x	x				x	x			x	x			x	x
Anthocoridae											x				x	
Miridae		x	x	x			x	x			x	x			x	
Nabidae							x				x				x	x
Reduviidae											x	x				x
Tingidae		x	x	x			x				x					
Aradidae			x								x					
Coreidae							x									x
Lygaeidae		x	x	x			x				x				x	
Pentatomidae			x	x												
Homoptera	x	x	x	x			x	x		x	x	x		x	x	x
Cicadellidae	x	x	x	x		x	x	x		x	x	x	x	x	x	x
Cercopidae			x	x			x	x		x	x	x		x	x	x
Delphacidae						x	x				x				x	
Achilidae							x									
Psyllidae		x	x	x		x	x	x		x	x	x		x		x
Aphididae	x	x	x	x			x	x		x	x	x		x	x	x
Eriosomatidae			x								x	x				x
Chermidae				x												
Coccoidea		x		x						x		x				
Coleoptera	x	x	x	x	x		x	x		x	x	x	x	x	x	x
Cupedidae											x					
Silphidae											x					
Lathridiidae		x		x			x				x					
Noteridae							x	x								
<i>Pronoterus</i>															x	
Carabidae		x	x	x			x			x	x	x			x	x
Halipidae											x	x			x	x
<i>Brychius</i>													x		x	x
Amphizoidae			x	x	x		x	x			x	x				
Dytiscidae	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x
<i>Deronectes</i>		x	x											x		x
<i>Oreodytes</i>		x	x				x				x				x	

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
<i>Agabus</i>		x													x	
<i>Bidessus</i>															x	x
Hydroporinae							x									
<i>Hydroporus</i>								x							x	
<i>Hydrovatus</i>		x	x	x			x	x					x		x	x
Melyridae			x			x										
Gyrinidae	x											x				
Histeridae			x				x								x	x
Hydrophilidae		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Paracymus</i>			x				x									
<i>Crenitis</i>		x	x				x				x				x	
<i>Laccobius</i>				x			x			x	x	x		x	x	
<i>Ametor</i>				x		x	x				x					
<i>Berosus</i>											x				x	
<i>Tropisternus</i>											x					
<i>Helophorus</i>				x	x	x								x	x	x
<i>Hydrobius</i>							x									
Hydraenidae (Limnebiidae)		x			x	x	x	x	x	x	x	x	x	x	x	x
<i>Hydraena</i>		x						x		x	x	x	x	x	x	x
<i>Ochthebius</i>			x		x							x	x	x	x	x
Melandryidae							x				x				x	
Scarabaeidae							x				x				x	
Cicindelidae							x									
Ptiliidae		x	x	x			x				x	x			x	x
Chrysomelidae	x	x	x	x			x	x		x	x	x			x	x
Scaphidiidae											x	x				
Staphylinidae	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Pselaphidae							x									
Colydiidae			x	x												
Scydmaenidae												x			x	
Meloidae							x									
Cantharidae		x	x				x				x				x	
Lampyridae							x								x	
Curculionidae (Nemonychidae)		x	x	x			x	x		x	x	x				x
Malachiidae											x					
Cleridae							x			x	x	x				
Elateridae			x	x	x		x				x				x	
Eucnemidae							x									
Byrrhidae	x			x												
Buprestidae							x				x	x				
Dascillidae			x				x									
Ptilodactylidae						x										
Helodidae						x						x				
Dryopidae											x	x				
Limnichidae							x									
Psephenidae							x									x
<i>Acneus</i>																
<i>A. quadrimaculatus</i>							x									
Elmidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Heterlimnius</i>	x	x	x	x		x	x	x			x	x			x	
<i>Optioservus</i>	x	x	x	x		x	x	x					x	x	x	x

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
<i>Heterlimnius-optioservus</i>		x	x	x				x			x				x	x
<i>Narpus</i>			x	x		x		x			x					
<i>N. concolor</i>							x									
<i>Zaitzevia</i>		x	x								x				x	x
<i>Lara</i>	x	x	x	x	x	x	x	x			x					x
<i>Microcylloepus</i>											x	x				
<i>Cleptelmis</i>								x			x	x	x			x
<i>Dubiraphia</i>												x				
<i>Ordobrevia</i>															x	x
<i>Ampumixis</i>																x
Scolytidae		x	x				x				x	x		x	x	x
Derodontidae							x	x			x	x				
Cryptophagidae		x					x									
Bostrichidae							x								x	
Nitidulidae		x	x				x	x		x	x	x			x	
Cucujidae							x									
Endomychidae	x						x									
Coccinellidae			x	x			x				x				x	x
Cerambycidae		x					x				x				x	
Anthicidae			x				x									
Pedilidae												x				
Cephaloidea											x					
Mordellidae							x				x					
Tenebrionidae							x				x					
Neuroptera		x				x		x				x			x	
Megaloptera																
Sialidae																
<i>Sialis</i>			x	x	x		x	x		x			x	x	x	x
Corydalidae					x	x	x	x								
<i>Dysmicohermes</i>			x		x	x	x									
Raphidioptera																
Raphidiidae											x					
Planipennia																
Coniopterygidae											x					
Hemerobiidae			x			x						x				
Chrysopidae						x	x								x	
Trichoptera	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Limnephilidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Neophylax</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Hesperophylax</i>			x						x	x	x	x	x	x		x
<i>Apatania</i>			x	x		x		x	x	x	x	x	x	x	x	
<i>Dicosmoecus</i>		x	x				x				x	x	x		x	x
<i>Ecclisomyia</i>	x	x	x		x	x	x	x	x	x	x	x		x	x	
<i>Lenarchus</i>			x								x	x				
<i>Chryanda</i>	x															
<i>Onocosmoecus</i>	x	x	x	x	x	x	x		x	x	x	x			x	x
<i>Clostoea</i>								x								
<i>Goera</i>	x	x	x	x												
<i>Hydatophylax</i>	x							x								
<i>Cryptochia</i>	x						x	x				x				
<i>Psychoglypha</i>									x			x				
<i>Neothremma</i>					x		x									

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
<i>Limnephilus</i>						x			x							
<i>Grammotaulius</i>											x	x				
Philopotamidae		x	x	x	x	x	x	x			x	x	x		x	x
<i>Wormaldia</i>	x	x	x	x		x	x				x				x	
<i>Dolophilodes</i>						x	x									
Rhyacophilidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Rhyacophila</i>	x	x	x	x	x	x	x	x	x		x	x	x	x	x	
<i>R. acropedes</i>				x	x	x	x	x								
<i>R. angelita</i>		x				x								x		
<i>R. tucula</i>							x									
<i>R. blarina</i>				x	x		x									
<i>R. narvae</i>					x	x	x	x								
<i>R. vaefes</i>					x	x	x	x						x		
<i>R. betteni group</i>				x		x	x	x								
<i>R. verrula</i>		x			x	x	x									
<i>R. arnaudi</i>				x												
<i>Himalopsyche</i>								x								
<i>H. phryganea</i>																x
Hydropsychidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Hydropsyche</i>		x	x	x					x	x	x	x	x	x	x	x
<i>Arctopsyche</i>			x	x	x	x	x	x	x	x	x	x				x
<i>Parapsyche</i>		x	x	x	x	x	x	x	x	x	x	x				
<i>Homoplectra</i>					x											
<i>Cheumatopsyche</i>	x	x		x									x	x	x	x
Psychomyiidae					x	x	x				x	x				
<i>Psychomyia</i>		x	x	x	x										x	x
Polycentropodidae			x		x	x	x	x		x		x			x	
<i>Polycentropus</i>						x	x	x								
Brachycentridae	x	x	x	x	x	x	x	x	x	x	x	x				
<i>Micrasema</i>	x	x		x	x	x	x	x	x	x	x	x				
Calamoceratidae						x										
<i>Heteroplectron</i>				x				x								
Lepidostomalidae																
<i>Lepidostoma</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Glossosomatidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Anagapetus</i>	x		x			x		x								x
<i>Agapetus</i>					x						x	x			x	
<i>Glossosoma</i>	x	x	x	x		x	x					x	x			x
Phryganeidae			x				x					x				
Hydroptilidae	x		x	x			x	x							x	x
<i>Hydroptila</i>													x		x	x
<i>Palaeagapetus</i>							x									
<i>Ochrotrichia</i>								x								
Leptoceridae															x	
Lepidoptera		x	x	x		x	x	x		x	x	x		x	x	x
Pieridae							x									
Lycaenidae				x			x									
Satyridae				x								x				x
Hesperiidae				x			x					x				x
Arctiidae											x	x				
Noctuidae										x	x	x			x	x
Geometridae		x	x	x			x	x			x	x			x	
Microlepidoptera		x	x				x			x	x	x			x	x
Pyralidae				x			x							x		x

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Aegeriidae (Sesiidae)							x									
Diptera	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Nematocera	x	x		x	x			x		x	x	x		x	x	x
Tanyderidae		x		x			x	x								
Tipulidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Limoniinae														x		
Antocha	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Limnophila		x	x		x	x	x				x			x	x	
Dicranota	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Tipula			x		x			x								x
Hexatoma	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hesperoconopa	x	x	x	x	x			x	x						x	
Molophilus	x	x	x	x												
Psychodidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Psychoda													x			
Pericoma		x		x	x					x						x
Maruina							x								x	
Ptychopteridae	x	x		x												
Blephariceridae					x	x	x			x	x	x		x		x
Deuterophlebiidae						x										
Dixidae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Meringodixa							x				x				x	x
Dixa		x	x	x			x	x			x				x	x
Culicidae		x		x			x					x				
Ceratopogonidae	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Forcipomyia							x	x								
Bezzia			x													
Chironomidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Simuliidae	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Bibionidae		x				x						x				x
Mycetophilidae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Sciaridae	x	x	x	x		x	x	x		x	x	x		x	x	x
Cecidomyiidae		x	x	x			x	x		x	x	x		x	x	x
Brachycera																x
Xylomyidae												x				
Stratiomyidae				x					x	x		x		x		
Tabanidae	x		x				x		x	x	x	x	x	x	x	x
Rhagionidae		x	x				x				x				x	
Therevidae			x								x	x				
Perisclididae							x								x	
Asilidae		x	x				x				x	x			x	
Acroceridae			x				x				x				x	
Bombyliidae							x								x	
Empididae	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
Dolichopodidae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Cyclorrhapha															x	x
Lonchopteridae			x	x			x				x	x			x	x
Phoridae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Pipunculidae			x	x			x				x	x				
Syrphidae		x	x	x			x	x			x	x			x	
Conopidae							x									

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Sepsidae							x			x	x	x				
Sciomyzidae				x			x								x	
Lauxaniidae			x			x	x								x	
Lonchaeidae		x				x				x				x		
Sphaeroceridae	x	x	x	x			x	x		x		x		x	x	
Milichiidae			x				x								x	x
Tephritidae		x					x	x								
Ephydriidae	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Drosophilidae		x	x	x		x	x	x			x	x			x	x
Chloropidae		x	x	x		x	x				x	x			x	
Agromyzidae		x	x	x			x				x	x			x	x
Clusiidae	x	x	x												x	
Heleomyzidae			x			x						x			x	x
Anthomyzidae			x								x				x	
Anthomyiidae																
(Scatophagidae)		x	x	x			x	x		x	x	x		x	x	x
Muscoidea	x	x	x	x	x	x	x	x		x	x	x		x	x	x
Muscidae		x	x	x		x	x	x			x	x		x	x	x
Oestroidea											x					
Calliphoridae			x			x	x			x	x	x			x	x
Sarcophagidae		x	x				x				x				x	
Tachinidae		x	x	x			x	x		x	x	x			x	x
Siphonaptera							x									
Hymenoptera		x	x	x			x	x		x	x	x		x	x	x
Symphyta											x					
Cimbicidae			x													
Tenthredinidae			x													
Apocrita																
Braconidae			x	x			x	x		x	x	x			x	x
Ichneumonidae		x	x	x		x	x	x		x	x	x			x	x
Chalcidoidea		x	x	x		x	x	x		x	x	x			x	x
Myrmecidae								x			x	x			x	x
Eulophidae		x														
Pteromalidae											x	x				
Cynipoidea				x							x			x	x	
Cynipidae		x		x			x	x				x			x	x
Evaniidae											x					
Proctotrupoidea		x	x	x		x	x	x		x	x	x			x	x
Proctotrupidae			x							x	x					
Diapriidae				x			x	x			x	x			x	
Platygasteridae				x							x	x				x
Bethylidae				x												
Dryinidae											x					
Formicidae	x	x	x	x		x	x	x		x	x	x		x	x	x
Vespoidea																
Vespidae							x	x				x				
Pompilidae											x					
Sphecidae				x			x	x			x	x			x	x
Apoidea		x	x				x	x							x	
Halictidae												x			x	x
Apidae		x						x			x	x			x	
Chilopoda		x	x	x												

Table continued on next page.

Taxa	Coastal				Cascade				Central				Eastern			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Diplopoda	x	x		x												x
Chordata																
Amphibia						x										
Salientia	x		x			x										
Ascaphidae																
Ascaphus																
A. truei		x			x	x	x	x								
Agnatha																
Petromyzontiformes																
Petromyzontidae																
Lampetra			x	x												
L. tridentata			x													
L. richardsoni			x													
Osteichthyes			x				x								x	
Salmoniformes																
Salmonidae		x	x					x			x					
Salmo																
S. gairdneri											x	x				
Cypriniformes																
Catostomidae															x	x
Catostomus																
C. macrocheilus															x	x
Cyprinidae																
Rhinichthys																
R. osculus																x
Cottidae		x	x	x											x	
Cottus																
C. confusus		x											x		x	x
C. perplexus				x												x
C. gulosus	x	x	x	x												
Mammalia																
Rodentia																
Zapodidae																
Zapus																
Z. princeps															x	

Appendix 2

Percentage of Samples From Coastal Streams Containing Listed Taxa, by Season and Sample Type

Organisms were tabulated at the family level where possible. Percentages at broader taxonomic levels do not include the individuals identified to the family level.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples	24	31	43	47	11	15	30	19	16	15	24	23	2	9	14	17
	Percent															
Platyhelminthes																
Turbellaria																
Tricladida																
Planariidae	4.2															
Nematoda	4.2		7.0	2.1											21.4	
Annelida																
Oligochaeta	25.0	29.0	18.6	51.1	18.2	13.3	3.2	5.0					42.9	44.4		
Hirudinea	4.2		2.3	4.3												
Mollusca																
Gastropoda		3.2	4.7		18.2	6.7	19.4	20.0								
Basommatophora																
Lymnaeidae								10.0								
Planorbidae								5.0								
Stylommatophora	4.2															5.9
Megastropoda																
Pleuroceridae	25.0	64.5	88.4	76.6	27.3	40.0	83.9	65.0							7.1	
Hydrobiidae	8.3	54.8	58.1	68.1	18.2	40.0	54.8	55.0								
Pelecypoda																
Sphaeriidae			2.3	10.6												
Arthropoda																
Crustacea																
Decapoda																
Astacidae		3.2	20.9	14.9			3.2	5.0					14.3	44.4		11.8
Isopoda						6.7										
Copepoda				2.1												
Arachnida																
Araneae			2.3	2.1		13.3	9.7	25.0	12.5	40.0	12.5	39.1	42.9	88.9	100.0	70.6
Acarina		3.2	16.3	14.9		26.7	25.8	25.0		6.7		4.3	14.3	66.7	50.0	29.4
Opliones											8.3			22.2	7.1	5.9
Insecta												13.0				
Thysanura																
Machilidae														11.1		
Collembola		3.2		8.5					43.8	46.7	12.5	17.4	57.1	88.9	57.1	70.6
Sminthuridae					9.1	6.7	3.2	5.0		6.7		17.4		11.1	7.1	5.9
Poduridae																
Isotomidae			4.7		9.1		9.7	15.0		46.7		13.0		11.1	7.1	11.8
Ephemeroptera		6.5	9.3	6.4		53.3	16.1	10.0	31.3	60.0	45.8	43.5	14.3			11.8
Siphonuridae	25.0	48.4	14.0	2.1	45.5	66.7	16.1	50.0					14.3		7.1	
Baetidae	54.2	90.3	76.7	48.9	72.7	100.0	67.7	90.0		20.0			14.3	44.4	42.9	23.5
Heptageniidae	83.3	100.0	86.0	80.9	45.5	73.3	41.9	40.0	6.3	33.3			14.3	55.6	35.7	23.5
Leptophlebiidae	33.3	71.0	46.5	63.8		46.7	35.5	50.0				4.3				11.8
Ephemerellidae	58.3	93.5	90.7	87.2	36.4	73.3	41.9	45.0			4.2			11.1	7.1	5.9
Odonata																
Anisoptera			2.3													
Gomphidae			2.3													
Coenagrionidae															7.1	
Orthoptera										6.7						
Gryllidae																5.9
Gryllacrididae										20.0	4.2	4.3		44.4		
Dermaptera											4.2					

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Plecoptera		9.7	11.6	4.3			Percent 13.3 22.6 19.4	35.0	25.0	33.3	12.5	26.1				5.9
Pteronarcidae							6.7	19.4								11.8
Peltoperlidae			2.3	2.1				5.0								
Taeniopterygidae	37.5		4.7	6.4	9.1	6.7										
Nemouridae	29.2	25.8	32.6	21.3	27.3	66.7	38.7	50.0	31.3	53.3	12.5	30.4	57.1	33.3	21.4	
Leuctridae	12.5	6.5	16.3	4.3		20.0	6.5	30.0						44.4		
Capniidae	37.5	19.4	11.6	29.8	18.2		6.5	75.0				4.3	14.3	11.1	7.1	23.5
Perlidae	16.7	54.8	83.7	72.3		6.7	25.8	5.0							7.1	
Periodidae	50.0	64.5	41.9	40.4	9.1	33.3	29.0	25.0							7.1	
Chloroperlidae	54.2	100.0	97.7	93.6	18.2	33.3	38.7	50.0		13.3	16.7			22.2	35.7	
Psocoptera			2.3				6.5	5.0							28.6	41.2
Mallophaga															7.1	
Thysanoptera														33.3	14.3	5.9
Hemiptera			2.3			6.7	12.9	20.0		6.7	4.2	13.0		11.1	42.9	
Macroveliidae																5.9
Gerridae				2.1		6.7	6.5	10.0		20.0	16.7	13.0	28.6	77.8	42.9	52.9
Veliidae							3.2	5.0		20.0	4.2	21.7		33.3	7.1	11.8
Mesoveliidae										13.3						
Saldidae										13.3	41.7				57.1	
Miridae				2.1										11.1	14.3	
Tingidae						13.3				13.3				11.1	7.1	5.9
Aradidae							3.2									
Lygaeidae						13.3	3.2			13.3	4.2	4.3			14.3	
Pentatomidae							3.2									5.9
Homoptera							9.7	10.0								
Cicadellidae			4.7	4.3	9.1			15.0	6.3	6.7	8.3	8.7	14.3		35.7	23.5
Cercopidae			2.3					10.0		20.0	37.5	26.1	14.3		78.6	29.4
Psyllidae										13.3		4.3			7.1	52.9
Aphididae			2.3			6.7	9.7	45.0		33.3	12.5	34.8	14.3	22.2	28.6	11.8
Eriosomatidae							3.2									64.7
Coccoidea						6.7										5.9
Chermidae																5.9
Coleoptera	4.2	3.2	4.7	2.1	9.1	13.3	6.5	5.0	12.5	53.3	37.5	13.0		11.1	57.1	5.9
Lathridiidae										6.7						11.8
Carabidae														11.1	7.1	5.9
Amphizoidae							3.2	10.0								
Dytiscidae			30.2	12.8	9.1	33.3	16.1			6.7	4.2	4.3			7.1	
Melyridae																
Gyrinidae													14.3			
Histeridae															7.1	
Hydrophilidae			4.7			13.3	6.5	20.0		13.3	16.7	4.3		22.2	42.9	5.9
Hydraenidae																
(Limnebiidae)														22.2	7.1	
Ptilidae										13.3	4.2	4.3		11.1	28.6	11.8
Chrysomelidae				2.1			22.6			33.3	20.8		28.6	33.3	57.1	
Staphylinidae						26.7	9.7	10.0	31.3	60.0	54.2	13.0	28.6	88.9	85.7	29.4
Colydiidae							3.2	5.0								
Cantharidae						6.7				13.3	4.2			44.4		
Curculionidae																
(Nemonychidae)										6.7		4.3			7.1	
Elateridae							3.2					4.3			14.3	
Byrrhidae									6.3			8.7				11.8
Dascillidae															14.3	
Elmidae	50.0	96.8	100.0	100.0	27.3	53.3	67.7	75.0			16.7			11.1	35.7	17.6
Scolytidae										6.7				11.1	28.6	
Cryptophagidae														11.1		
Nitidulidae		6.5												11.1	7.1	
Endomychidae	4.2															

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Coccinellidae															14.3	11.8
Cerambycidae													11.1			
Anthridae															7.1	
Neuroptera																
Sialidae			4.7	10.6			3.2			6.7						
Corydalidae							3.2									
Hemerobiidae															14.3	
Trichoptera	4.2	12.9	4.7	6.4		26.7	16.1	10.0	43.8	93.3	75.0	82.6		22.2	7.1	
Limnephilidae	66.7	87.1	83.7	57.4	81.8	73.3	35.5	75.0	6.3	20.0		8.7	14.3	55.6	21.4	29.4
Philopotamidae			32.6			13.3	29.0					8.7	28.6	11.1	35.7	35.3
Rhyacophilidae	58.3	71.0	72.1	68.1	9.1	40.0	22.6	35.0		26.7				77.8	28.6	29.4
Hydropsychidae	12.5	58.1	11.6	40.4		20.0	6.5	35.0						22.2	14.3	
Psychomyiidae		29.0		29.8		6.7	3.2								28.6	
Polycentropodidae			2.3												7.1	
Brachycentridae	20.8	3.2			9.1	53.3	6.5	30.0		6.7						
Calamoceratidae							5.0									
Lepidostomatidae	4.2	6.5	4.7	36.2	18.2	33.3	22.6	70.0		6.7		4.3		55.6	14.3	11.8
Glossosomatidae	33.3	41.9	44.2	44.7	18.2	6.7	6.5	25.0						22.2	7.1	17.6
Phryganeidae															7.1	
Hydroptilidae				2.1									14.3		42.9	
Lepidoptera				4.3		6.7	6.5	5.0			12.5	30.4		11.1	21.4	11.8
Lycaenidae				2.1												
Satyridae														4.3		
Hesperiidae				2.1												
Geometridae														11.1	50.0	5.9
Microlepidoptera										13.3	4.2				7.1	
Pyrilidae																5.9
Diptera		3.2	4.7	2.1	9.1		19.4	10.0	12.5	66.7	20.8	30.4			14.3	52.9
Nematocera									31.3	13.3		34.8				
Tanyderidae														22.2		5.9
Tipulidae	79.2	90.3	97.7	95.7	18.2	40.0	16.1	5.0	31.3	100.0	62.5	60.9	57.1	77.8	100.0	70.6
Psychodidae	29.2	3.2	14.0	76.6	36.4	20.0	6.5	35.0	6.3	33.3	4.2		42.9	77.8	50.0	35.3
Ptychopteridae	8.3	3.2		10.6												
Dixidae			4.7		9.1	6.7	22.6	65.0	31.3	40.0	4.2	8.7	28.6	44.4	57.1	64.7
Culicidae										13.3		4.3				5.9
Ceratopogonidae	8.3	12.9	7.0	29.8	9.1					26.7	8.3	34.8			100.0	11.8
Chironomidae	75.0	90.3	85.0	83.0	63.6	73.3	90.3	95.0	87.5	100.0	83.3	87.0	100.0	100.0	100.0	88.2
Simuliidae	41.7	16.1	9.3	10.6	36.4	80.0	48.4	40.0	12.5	6.7	20.8	4.3	14.3	44.4	42.9	17.6
Bibionidae						6.7				13.3				11.1		
Mycetophilidae									56.3	73.3	45.8	52.2	28.6	88.9	64.3	58.8
Sciaridae			4.7			33.3	25.8	15.0	31.3	73.3	66.7	56.5	28.6	88.9	92.9	76.5
Cedidiomyiidae						6.7				26.7	16.7	21.7		44.4	100.0	47.1
Brachycera																
Stratiomyidae																5.9
Tabanidae	4.2		2.3												7.1	
Rhagionidae											25.0			11.1		35.7
Therevidae															7.1	
Asilidae										6.7	50.0				21.4	
Empididae	12.5	25.8	20.9	25.5		6.7	32.3	5.0	56.3	86.7	100.0	82.6	14.3	88.9	100.0	64.7
Dolichopodidae							6.5	5.0	56.3	93.3	95.8	100.0	57.1	55.6	100.0	52.9
Acroceridae															7.1	
Cyclorrhapha																
Lonchoceridae												4.3			28.6	
Phoridae					6.5	5.0	18.8		33.3	25.0	17.4	28.6	77.8	57.1	41.2	

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Pipunculidae							3.2									5.9
Syrphidae										40.0	12.5				7.1	11.8
Lauxaniidae										6.7					7.1	
Lonchaeidae										13.3	12.5		14.3	22.2	64.3	11.8
Sphaeroceridae															7.1	
Milichiidae														11.1		
Tephritidae						26.7			6.3	20.0	20.8	39.1	14.3	55.6	100.0	35.3
Ephydriidae										46.7		13.0		22.2	28.6	
Drosophilidae										6.7		4.3			7.1	
Chloropidae		3.2								13.3		4.3		11.1	7.1	
Agromyzidae													14.3	11.1	14.3	
Clusiidae																5.9
Sciomyzidae																
Heleomyzidae							3.2								7.1	
Anthomyzidae																
Anthomyiidae																
(Scatophagidae)		3.2					3.2							44.4	14.3	29.4
Platypezidae									31.3	13.3		34.8				
Muscoidea									37.5	33.3	87.5	56.5				5.9
Muscidae										6.7				44.4	50.0	17.6
Oestroidea																
Calliphoridae															21.4	
Sarcophagidae														11.1	21.4	
Tachinidae															21.4	
Hymenoptera						6.7	3.2			13.3	4.2	4.3		11.1	21.4	5.9
Symphyta										26.7		17.4				
Cimicidae							3.2									
Tenthredinidae							3.2								7.1	
Apocrita																
Braconidae							3.2	5.0								
Ichneumonidae							3.2									
Chalcidoidea						6.7		5.0		26.7	20.8	17.4		44.4	28.6	17.6
Eulophidae										13.3	4.2	8.7		44.4	50.0	47.1
Cynipoidea														11.1		
Cynipidae						6.7										5.9
Proctotrupoidea							3.2	5.0				8.7				
Proctotrupidae				2.1								4.3		22.2	21.4	17.6
Diapriidae												4.3			7.1	
Platygasteridae												4.3				
Bethyloidea												4.3				
Formicidae					9.1	6.7	6.5	15.0	6.3	13.3	4.2			11.1	35.7	11.8
Vespoidea																
Sphecidae				2.1												5.9
Apoidea							3.2							11.1	7.1	
Apidae														11.1		
Chilopoda								10.0						33.3	7.1	11.8
Diplopoda					9.1							4.3		11.1		29.4
Chordata																
Amphibia																
Salientia	4.2															
Ascaphidae		3.2	2.3													
Agnatha																
Petromyzontiformes																
Petromyzontidae				2.1			29.0									
Osteichthyes							3.2									
Salmoniformes																
Salmonidae						6.7	3.2									
Cypriniformes																
Cottidae	12.5	19.4	27.9	25.5	9.1		35.5	20.0								

Table continued on next page.

Percentage of Samples From Cascade Streams Containing Listed Taxa, by Season and Sample Type

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
<i>Percent</i>																
Platyhelminthes																
Turbellaria																
Tricladidae																
Planariidae	25.0	51.7	45.7	39.6			13.3	17.9							6.3	
Nematomorpha								3.6								
Nematoda	6.3	3.4	2.9	31.3				3.6							12.5	
Annelida																
Oligochaeta	50.0	75.9	37.1	54.2	58.3	33.3	17.9	4.8					6.7			
Mollusca																
Gastropoda		6.9			8.3											
Arthropoda																
Crustacea																
Amphipoda								4.8								
Ostracoda	6.3			10.4												
Arachnida																
Araneae				4.2	8.3	6.7	17.9				50.0	9.1		20.0	100.0	72.7
Acarina			17.1		8.3	33.3	25.0	14.3							50.0	18.2
Opiliones											8.3	4.5			6.3	
Insecta							3.6	4.8								
Thysanura																
Machilidae																9.1
Collembola	6.3			12.5	8.3	20.0		23.8	87.5	87.5	8.3	72.7		53.3	87.5	63.6
Sminthuridae														13.3		9.1
Poduridae							3.6									
Isotomidae	12.5				33.3	26.7	7.1	28.6						33.3	6.3	36.4
Ephemeroptera	18.8	24.1	25.7	4.2	25.0	40.0	67.9	38.1		12.5	100.0	40.9		6.7	18.8	9.1
Siphonuridae	37.5	48.3	68.6	87.5	75.0	86.7	60.7	42.9			4.2				31.3	36.4
Baetidae	87.5	96.6	97.1	79.2	100.0	100.0	96.4	85.7		6.3					81.3	36.4
Heptageniidae	100.0	100.0	100.0	87.5	100.0	100.0	78.6	71.4		6.3	8.3			33.3	75.0	18.2
Leptophlebiidae	56.3	82.8	71.4	87.5	66.7	80.0	57.1	33.3							6.3	
Ephemerellidae	100.0	96.6	97.1	87.5	100.0	100.0	85.7	61.9			8.3			6.7	56.3	
Odonata																
Anisoptera											4.2					
Orthoptera																
Gryllacrididae											37.5	4.5		6.7	25.0	18.2
Acrididae															6.3	9.1
Plecoptera	37.5	44.8	28.6	31.3	50.0	20.0	21.4	28.6		6.3	16.7	13.6			6.3	9.1
Pteronarcidae		6.9	11.4	2.1												
Peltoperlidae	75.0	82.8	77.1	64.6	75.0	80.0	39.3	57.1			4.2				25.0	9.1
Taeniopterygidae	62.5	72.4	5.7	6.3	100.0	80.0		19.0								
Nemouridae	43.8	79.3	51.4	85.4	100.0	86.7	50.0	85.7	25.0	75.0	50.0	13.6		33.3	81.3	45.5
Leuctridae	25.0	37.9	34.3	27.1	83.3	86.7	10.7	14.3						46.7		9.1
Capniidae	87.5	34.5	14.3	25.0	91.7	46.7	10.7	38.1						33.3		9.1
Perlidae	81.3	79.3	88.6	91.7	25.0	13.3	32.1	14.3						6.7	18.8	9.1
Perlodidae	37.5	48.3	80.0	58.3	33.3	26.7	42.9	47.6						6.7	6.3	
Chloroperlidae	81.3	96.6	82.9	95.8	83.3	73.3	28.6	42.9			54.2			6.7	87.5	9.1
Psocoptera				2.1			3.6	23.8							81.3	54.5
Mallophaga															31.3	9.1
Thysanoptera			2.9								4.2				81.3	
Hemiptera					8.3		7.1								31.3	9.1
Gerridae			2.9				3.6	4.8			16.7			6.7	12.5	9.1
Coreidae							3.6									
Saldidae								4.8			58.3				68.8	9.1
Miridae															18.8	9.1
Nabidae															6.3	
Tingidae							3.6								6.3	

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Lygaeidae	7.1								12.5							
Homoptera			2.9				7.1	4.8							18.8	9.1
Cicadellidae			2.9				7.1	14.3			50.0	36.4	6.7		75.0	27.3
Cercopidae							10.7				8.3	4.5			6.3	
Delphacidae													5.7		12.5	
Achilidae															6.3	
Psyllidae								4.8					6.7		25.0	9.1
Aphididae				2.1			39.3	38.1				4.5			100.0	54.5
Coleoptera			2.9		16.7		25.0	4.8			37.5	18.2			43.8	
Lathridiidae															12.5	
Noteridae			5.7					4.8								
Carabidae			2.9				10.7				8.3				68.8	
Amphizoidae					16.7		10.7	14.3								9.1
Dytiscidae			2.9	2.1		6.7	14.3	14.3			4.2					
Melyridae						6.7										
Histeridae															25.0	
Hydrophilidae	6.3		5.7		25.0	20.0	53.6	23.8			33.3				56.3	9.1
Hydraenidae																
(Limnobiidae)					16.7	20.0	7.1	28.6								
Melandryidae															6.3	
Scarabaeidae															6.3	
Cicindelidae							3.6									
Ptilidae															31.3	
Chrysomelidae							14.3				4.2				18.8	9.1
Staphylinidae			2.9		8.3	33.2	25.0	33.3			16.7	72.7			93.8	72.7
Pselaphidae							3.6									
Meloidae															12.5	
Cantharidae							7.1				4.2				6.3	
Lampyridae							7.1									
Curculionidae																
(Nemonychidae)							10.7	9.5				4.5			12.5	9.1
Cleridae							3.6								37.5	
Elatidae					8.3		3.6				8.3				18.8	
Eucnemidae			2.9													
Buprestidae											8.3				31.3	
Dascillidae															6.3	
Ptilodactylidae						6.7										
Helodidae													6.7			
Limnichidae															6.3	
Psephenidae							7.1								6.3	
Elmidae	25.0	58.6	77.1	85.4	58.3	60.0	60.7	52.4		6.3	12.5		6.7		25.0	18.2
Scolytidae							3.6				4.2				6.3	
Derodontidae							3.6	4.8								
Cryptophagidae															12.5	
Bostrichidae							3.6									
Nitidulidae							3.6	4.8							25.0	
Cucujidae											4.2					
Endomychidae							3.6									
Coccinellidae											8.3				12.5	
Cerambycidae							7.1				4.2				18.8	
Anthicidae															37.5	
Mordellidae											8.3				50.0	
Tenebrionidae							3.6									
Neuroptera		3.4		2.1												
Sialidae	6.3			2.1	16.7			4.8			4.2				18.8	
Corydalidae	25.0	20.7	42.9	31.3			3.6									

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Hemerobiidae						6.7										
Chrysopidae						6.7					4.2					
Trichoptera	6.3	10.3	22.9	25.0	33.3	20.0	35.7	19.0	12.5	25.0	100.0	54.5	6.7	18.8	9.1	
Limnephilidae	25.0	44.8	22.9	66.7	91.7	73.3	25.0	52.4		6.3	12.5	4.5		62.5	54.5	
Philopotamidae	6.3		17.1	6.3	16.7	26.7	14.3	9.5						87.5	9.1	
Rhyacophilidae	100.0	69.0	80.0	79.2	91.7	86.7	75.0	38.1						93.8	63.6	
Hydropsychidae	43.8	44.8	51.4	31.3	66.7	40.0	32.1	33.3						87.5		
Psychomyiidae	6.3					13.3	7.1									
Polycentropodidae	6.3	10.3	2.9	4.2	8.3	6.7		9.5						6.3		
Brachycentridae	6.3	3.4	2.9	18.8	66.7	66.7	25.0	38.1								
Calamoceratidae				2.1		6.7										
Lepidostomatidae	25.0	27.6	40.0	29.2	75.0	60.0	32.1	4.8						56.3	9.1	
Glossosomatidae	93.8	75.9	2.9	33.3	58.3	46.7	25.0	23.8						68.8		
Phryganeidae			2.9													
Hydroptilidae				8.3			3.6	4.8						31.3		
Lepidoptera					6.7	10.7	4.8				16.7	18.2		25.0		
Pieridae														6.3		
Lycaenidae														12.5		
Hesperiidae														6.3		
Geometridae							3.6							18.8	9.1	
Microlepidoptera							14.3				8.3			43.8		
Pyrilidae							7.1									
Aegeriidae																
(Sesiidae)											12.5			12.5		
Diptera		3.4	8.6			13.3	17.9	9.5	12.5	12.5	4.2	9.1	13.3	25.0	27.3	
Nematocera									50.0			45.5				
Tanyderidae														12.5	18.2	
Tipulidae	68.8	89.7	82.9	91.7	91.7	66.7	64.3	42.9	12.5	25.0	83.3	54.5	80.0	93.8	36.4	
Psychodidae	12.5			2.1	25.0	13.3	7.1	14.3		6.3	12.5	4.5	20.0	81.3	36.4	
Blephariceridae	6.3	3.4			66.7	60.0	7.1				45.8		6.7	43.8		
Deuterophlebiidae						13.3										
Dixidae			5.7		8.3	20.0	25.0	28.6	12.5				6.7	62.5	63.6	
Culicidae														6.3		
Ceratopogonidae		17.2	20.0	25.0	25.0		25.0	14.3			4.2	9.1		100.0		
Chironomidae	68.8	86.2	100.0	97.9	91.7	100.0	89.3	90.5	50.0	68.8	100.0	68.2	100.0	100.0	90.9	
Simuliidae	18.8	37.9	20.0	2.1	100.0	93.3	57.1	19.0	12.5	12.5	12.5		13.3	31.3		
Bibionidae						6.7										
Mycetophilidae					8.3	46.7	25.0	28.6	37.5	43.8	83.3	95.5	60.0	87.5	90.9	
Sciaridae			5.7			26.7	57.1	28.6		18.8	79.2	54.5	13.3	100.0	63.6	
Cedidiomyiidae											4.2	4.5		100.0	54.5	
Brachycera																
Stratiomyidae								4.8								
Tabanidae			2.9											6.3		
Rhagionidae							3.6							12.5		
Periscleridae														6.3		
Asilidae											50.0			50.0		
Acroceridae														31.3		
Bombyliidae														12.5		
Empididae	6.3	34.5	54.3	31.3	25.0	33.3	75.0	19.0	75.0	87.5	95.8	100.0	86.7	100.0	81.8	
Dolichopodidae			2.9			13.3	7.1		12.5	6.3	100.0	36.4	6.7	75.0	27.3	
Cyclorhapha																
Lonchopteridae														43.8		
Phoridae					8.3	6.7	21.4	14.3			8.3	4.5	33.3	87.5	54.5	
Platypezidae									50.0			45.5				
Pipunculidae											4.2					

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Syrphidae			2.9					4.8			33.3				25.0	
Conopidae															6.3	
Sepsidae															25.0	
Lauxaniidae													6.7		31.3	
Lonchaeidae													6.7			
Sphaeroceridae							3.6								75.0	18.2
Milichiidae															56.3	
Tephritidae															6.3	9.1
Ephydriidae					8.3	13.3	14.3	4.8		6.3	33.3	4.5	53.3		100.0	27.3
Drosophilidae						6.7	3.6								18.8	9.1
Chloropidae						6.7									6.3	
Agromyzidae															12.5	
Sciomyzidae							3.6									
Heleomyzidae														6.7		
Anthomyzidae							3.6								68.8	45.5
Anthomyiidae																
(Scatophagidae)													25.0			
Muscoidea						6.7	3.6		12.5	25.0	95.8	86.4			6.3	
Muscoidea														13.3	56.3	18.2
Oestroidea																
Calliphoridae												6.7	6.3			
Sarcophagidae															25.0	
Tachinidae							3.6								56.3	27.3
Siphonaptera															6.3	
Hymenoptera							7.1	4.8			16.7	22.7				
Apocrita																
Braconidae							17.9	4.8								
Ichneumonidae							14.3	4.8			8.3	13.6		6.7	43.8	18.2
Chalcidoidea						6.7	25.0	9.5			4.2	4.5			75.0	36.4
Mymaridae																9.1
Cynipoidea																
Cynipidae							10.7	4.8								
Prototrupoidea							14.3	9.5			4.2			13.3	50.0	27.3
Diapriidae							3.6	4.8								
Bethyioidea																
Formicidae						6.7	28.6	19.0			33.3	18.2			62.5	9.1
Vespoidea																
Vespidae															6.3	9.1
Sphecidae															25.0	27.3
Apoidea											4.2				31.3	9.1
Apidae																9.1
Chordata																
Amphibia							6.7									
Salientia		3.4														
Ascaphidae		3.4	2.9		16.7	20.0		4.8						6.7	18.8	
Osteichthyes							3.6									
Salmoniformes																
Salmonidae				2.1												

Table continued on next page.

Percentage of Samples From Central Streams Containing Listed Taxa, by Season and Sample Type

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Percent																
Platyhelminthes																
Turbellaria																
Tricladidae																
Planariidae	31.3	26.7	35.4	44.4	12.5	26.7	4.3	12.0								
Nematoda		6.7	10.4	11.1											9.1	
Annelida																
Oligochaeta	56.3	60.0	50.0	75.6	12.5	26.7	4.3	20.0						9.1		
Mollusca																
Gastropoda															9.1	
Basommatophora																
Physidae				6.7												
Planorbidae				2.2			4.3									
Mesogastropoda																
Hydrobiidae			4.2	2.2		6.7	4.3									
Pelecypoda						6.7										
Sphaeriidae	6.3			4.4												
Arthropoda																
Crustacea																
Amphipoda		3.3	4.2	2.2												
Ostracoda				2.2												
Copepoda				2.2												
Arachnida																
Araneae			2.1	4.4		13.3	39.1	36.0		28.6	72.7	41.7		36.4	72.7	73.3
Acarina	6.3		14.6	6.7			13.0	28.0		7.1		12.5		9.1	54.5	6.7
Pseudoscorpionida											4.5				9.1	
Opiliones												4.2				
Insecta						6.7				14.3	4.5					
Thysanura																
Machilidae							8.7									
Collembola				2.2			4.3	24.0		57.1	4.5	12.5			9.1	6.7
Sminthuridae						6.7				21.4		8.3		36.4		
Isotomidae						13.3	8.7	8.0		42.9	18.2	20.8		81.8	54.5	86.7
Ephemeroptera			10.4	8.9			39.1	20.0		21.4	86.4	41.7			27.3	40.0
Siphonuridae	18.8	3.3	52.1	24.4	62.5	60.0	47.8	40.0		7.1						26.7
Baetidae	75.0	86.7	93.8	77.8	75.0	100.0	78.3	88.0		7.1		4.2			9.1	60.0
Heptageniidae	87.5	80.0	83.3	91.1	75.0	93.3	56.5	88.0		14.3				27.3	27.3	13.3
Leptophlebiidae	56.3	36.7	20.8	46.7	50.0	13.3	43.5	52.0							9.1	6.7
Ephemereilidae	87.5	83.3	91.7	91.1	75.0	86.7	82.6	84.0		7.1	13.6			9.1	27.3	13.3
Odonata																
Gomphidae			2.1													
Cordulegastridae	6.3			4.4												
Libellulidae						6.7										
Orthoptera			2.1				8.7					18.2				
Tetrigidae								4.0						9.1		6.7
Gryllidae							4.3									
Dermaptera																
Forficulidae												4.2				6.7
Plecoptera			16.7	2.2			8.7	8.0		42.9	18.2	12.5				6.7
Pellotteriidae	6.3	3.3	2.1	6.7				8.0								
Taeniopterygidae			2.2												9.1	
Nemouridae	100.0	76.7	31.3	66.7	87.5	93.3	21.7	92.0		71.4	31.8	12.5		90.9	36.4	40.0
Leuctridae	6.3	10.0		11.1				8.0		7.1				27.3		
Capniidae	50.0	16.7		53.3	62.5	20.0	8.7	72.0		7.1				36.4		13.3
Perlidae	75.0	73.3	81.3	82.2			13.0	24.0								
Perlodidae	31.3	6.7	41.7	71.1		13.3	30.4	20.0						27.3	18.2	
Chloroperlidae	81.3	76.7	89.6	91.1	62.5		21.7	60.0			22.7				9.1	
Psocoptera			2.1	2.2			8.7	12.0							9.1	6.7
Thysanoptera						6.7		4.0			4.5				63.6	26.7
Hemiptera			10.4					12.0		7.1	18.2	4.2			27.3	26.7
Corixidae					12.5		13.0	8.0								
Neididae							4.3									
Gerridae			2.1				26.1	12.0		7.1	13.6	4.2		9.1	9.1	6.7
Veliidae							4.3	8.0								
Salidae							4.3				63.6				54.5	6.7
Anthocoridae							8.7									
Miridae							8.7	4.0							27.3	
Nabidae							8.7								9.1	
Reduviidae								4.0			4.5					
Tingidae							8.7									
Aradidae							4.3									
Lygaeidae							8.7								27.3	

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Homoptera			2.1	2.2			8.7	8.0		14.3	27.3	12.5		36.4	36.4	6.7
Cicadellidae		3.3	27.1	13.3			52.2	80.0		28.6	81.8	91.7		45.5	63.6	73.3
Cercopidae			6.3				4.3	4.0				4.2		9.1		
Delphacidae															9.1	
Psyllidae		3.3		2.2			26.1	28.0		7.1	9.1	29.2			45.5	53.3
Aphididae			10.4	2.2		6.7	52.2	68.0		28.6	31.8	45.8			72.7	93.3
Eriosomatidae							4.3									33.3
Coccoidea								8.0						9.1		
Coleoptera							30.4	12.0		7.1	36.4	16.7		18.2	27.3	13.3
Cupedidae															18.2	
Silphidae							4.3									
Lathridiidae							4.3									
Carabidae							4.3	12.0			4.5	4.2		9.1		
Halplidae				2.2			4.3									
Amphizoidae							4.3	16.0								
Dytiscidae	12.5	6.7	6.3	20.0		6.7	52.2	32.0			9.1					
Gyrinidae								4.0								
Hydrophilidae	6.3				12.5	6.7	60.9	40.0			4.5	4.2		18.2	18.2	6.7
Hydraenidae																
(Limnebiidae)		6.7	2.1		12.5		21.7	28.0						36.4	9.1	
Melandryidae							4.3								9.1	
Scarabaeidae							13.0				4.5				9.1	
Ptilidae											4.5				27.3	20.0
Chrysomelidae		3.3	2.1				43.5	12.0		21.4	22.7	20.8		54.5	18.2	33.3
Scaphidiidae							8.7									13.3
Staphylinidae						13.3	39.1	44.0		14.3	27.3	58.3		72.7	45.5	46.7
Colydiidae															9.1	
Scydmaenidae								4.0								
Cantharidae							8.7								18.2	
Curculionidae																
(Nemonychidae)							8.7				4.5	4.2		9.1	18.2	
Malachiidae															9.1	
Cleridae							4.3	8.0						9.1	9.1	
Elatidae															9.1	
Buprestidae										17.4	4.0			9.1		
Helodidae								4.0								
Dryopidae							4.3	12.0								
Elmidae	87.5	70.0	91.7	93.3	37.5	26.7	65.2	84.2			18.2	4.2			27.3	
Scolytidae							4.3	4.0							9.1	6.7
Derodontidae											4.5					6.7
Nitidulidae														9.1	27.3	6.7
Coccinellidae							4.3									
Cerambycidae			2.1				13.0								18.2	
Pedilidae								4.0								
Cephaloidae															9.1	
Mordellidae							4.3				9.1				9.1	
Tenebrionidae							8.7									
Neuroptera												4.2				
Sialidae		3.3														
Raphidiidae							4.3				4.5					
Coniopterygidae							4.3									
Hemerobiidae								4.0								
Trichoptera	25.0	6.7	37.5	24.4	12.5		30.4	28.0		21.4	90.9	66.7			27.3	6.7
Limnephilidae	62.5	76.7	85.4	55.6	62.5	80.0	78.3	76.0			13.6	29.2		18.2	27.3	53.3
Philopotamidae			14.6	2.2			4.3	12.0							27.3	60.0
Rhyacophilidae	56.3	76.7	45.8	71.1	12.5	26.7	13.0	40.0						18.2	72.7	60.0
Hydropsychidae	68.8	66.7	50.0	73.3	37.5	13.3	26.1	52.0							36.4	26.7
Psychomyiidae				2.2			4.3									6.7

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Polycentropodidae				4.4		6.7										
Brachycentridae	43.8	43.3	14.6	42.2	25.0	33.3	26.1	44.0							18.2	6.7
Lepidostomatidae	56.3	36.7	16.7	51.1	25.0	53.3	43.5	48.0				4.2	9.1		36.4	6.7
Glossosomatidae	25.0	3.3	47.9	26.7			17.4	4.0							9.1	20.0
Phryganeidae																13.3
Lepidoptera			2.1			6.7	21.7	16.0		7.1	31.8	29.2			27.3	6.7
Satyridae																6.7
Hesperiidae																26.7
Arctiidae															18.2	13.3
Noctuidae													9.1		45.5	13.3
Geometridae															9.1	6.7
Microlepidoptera							17.4	8.0		7.1	18.2	4.2			27.3	
Diptera		3.3	12.5	4.4	12.5		43.5	36.0		50.0	36.4	25.0			27.3	20.0
Nematocera										28.6	45.5	25.0				6.7
Tipulidae		80.0	77.1	80.0			43.5	28.0		21.4	86.4	37.5		36.4	72.7	46.7
Psychodidae	81.3	63.3	4.2	91.1	62.5	20.0	26.1	64.0		7.1	27.3	4.2			63.6	20.0
Blephariceridae		10.0				6.7					4.5				18.2	6.7
Dixidae							34.8	28.0		14.3	13.6	16.7		9.1	27.3	73.3
Culicidae								4.0								
Ceratopogonidae	25.0	23.3	22.9	51.1			26.1	20.0		7.1	4.5	4.2			63.6	33.3
Chironomidae	100.0	96.7	100.0	95.6	100.0	86.7	95.7	92.0		100.0	100.0	100.0		81.8	90.9	100.0
Simuliidae	18.8	70.0	18.8		37.5	66.7	65.2	16.0		7.1	13.6	4.2		27.3	63.6	13.3
Bibionidae								24.0								20.0
Mycetophilidae				2.2			26.1	44.0		35.7	50.0	75.0		72.7	72.7	100.0
Sciaridae							69.6	56.0		35.7	40.9	83.3		27.3	72.7	9.3
Cedidiomyiidae							34.8	4.0		14.3	4.5	12.5		9.1	72.7	46.7
Brachycera																
Xylomyidae											4.5					
Stratiomyidae	6.3		2.1	2.2							4.5					
Tabanidae	12.5	3.3	16.7	17.8		6.7	8.7				4.5					
Rhagionidae											13.6				27.3	
Therevidae											9.1					6.7
Asilidae											9.1	4.2			9.1	13.3
Acroceridae															27.3	
Empididae	18.8	16.7	18.8	46.7			43.5	24.0		50.0	95.5	87.5		18.2	72.7	86.7
Dolichopodidae			2.1	4.4			8.7	16.0		14.3	100.0	66.7		9.1	63.6	33.3
Cyclorhapha															9.1	
Lonchotteridae			2.1													6.7
Phoridae							13.0	12.0		7.1	18.2	12.5		45.5	36.4	40.0
Pipunculidae							4.3				4.5					20.0
Syrphidae								8.0			22.7					6.7
Sepsidae										7.1					9.1	6.7
Lonchaeidae														9.1		
Sphaeroceridae								4.0						18.2		6.7
Ephydriidae			4.2				39.1	16.0		21.4	27.3	20.8		36.4	72.7	73.3

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Drosophilidae							8.7	12.0							18.2	26.7
Chloropidae							13.0	4.0			13.6				18.2	6.7
Agromyzidae							4.3									6.7
Heleomyzidae																6.7
Anthomyzidae							4.3									
Anthomyiidae																
(Scatophagidae)							13.0	24.0		14.3	4.5	8.3		36.4	54.5	73.3
Muscoidea								4.0		28.6	90.9	62.5			9.1	
Muscidae											9.1	4.2			36.4	33.3
Oestroidea											36.4					
Calliphoridae												4.2		45.5	18.2	33.3
Sarcophagidae			4.2												9.1	
Tachinidae							4.3					4.2		9.1	27.3	46.7
Hymenoptera			4.2	2.2			13.0	40.0		7.1	27.3	8.3			18.2	6.7
Symphyta															9.1	
Apocrita																
Braconidae			2.1				43.5	24.0		7.1	4.5				18.2	26.7
Ichneumonidae			2.1				21.7	12.0		7.1	31.8	16.7		18.2	45.5	6.7
Chalcidoidea							34.8	16.0		7.1		8.3			27.3	20.0
Mymaridae				2.2			4.3				4.5				18.2	6.7
Pteromalidae							4.3	4.0								
Cynipoidea							4.3								18.2	
Cynipidae								4.0								
Evanidae							4.3								9.1	
Proctotrupoidea			2.1				13.0	16.0			18.2	12.5		9.1	36.4	46.7
Proctotrupidae							4.3							9.1		
Diapriidae								4.0							18.2	6.7
Platygastridae							4.3	12.0								20.0
Bethyloidea																
Dryinidae							4.3									
Formicidae			8.3	2.2			87.0	40.0		21.4	54.5	25.0		18.2	81.8	53.3
Vespoidea																
Vespidae								4.0				8.3				13.3
Pompilidae							4.3									
Sphecidae							4.3									20.0
Apoidea																
Halictidae															9.1	6.7
Apidae																13.3
Chordaia																
Osteichthyes																
Salmoniformes																
Salmonidae				2.2			8.7									

Table continued on next page.

Percentage of Samples From Eastern Streams Containing Listed Taxa, by Season and Sample Type

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Percent																
Platyhelminthes																
Turbellaria																
Tricladida																
Planariidae	6.3	3.1	6.0	12.8												
Nematoda			2.0	14.9											18.2	
Annelida																
Oligochaeta	75.0	62.5	22.0	70.2		33.3	4.2	14.3								6.3
Mollusca																
Gastropoda																6.3
Basommatophora																
Physidae	12.5	18.8	12.0	40.4	12.5		12.5	19.0								
Planorbidae				4.3												
Ancyliidae	18.8	3.1		17.0												
Mesogastropoda																
Pleuroceridae			2.0													
Hydrobiidae	6.3		2.0													
Pelecypoda																
Margaritanidae			2.0													
Sphaeriidae	6.3	18.8		14.9											9.1	6.3
Unionidae			2.0													
Arthropoda																
Crustacea																
Decapoda																
Astacidae	6.3		24.0	34.0		6.7	12.5	4.8								
Amphipoda		3.1		4.3												
Ostracoda				2.1												
Copepoda				4.3				9.5								
Arachnida																
Araneae			2.0	4.3		6.7	66.7	47.6	13.3	81.0	72.7		20.0	100.0	93.8	
Acarina	6.3		14.0	17.0		6.7	37.5	33.3	6.7		9.5		10.0	63.6	25.0	
Opiliones																
Insecta			2.0													
Collembola		3.1		2.1	12.5	20.0		38.1	20.0	4.8	4.5		30.0	27.3	37.5	
Sminthuridae																
Isotomidae						26.7		4.8	60.0				10.0			37.5
Ephemeroptera			10.0	10.6	12.5	6.7	16.7	33.3			90.5	40.9			38.4	18.8
Siphonuridae	37.5	21.9	66.0	55.3	50.0	66.7	41.7	47.6							9.1	25.0
Baetidae	31.3	65.6	64.0	48.9	37.5	73.3	62.5	81.0							72.7	18.8
Heptageniidae	68.8	81.3	98.0	66.0	37.5	80.0	37.5	47.6			4.8		20.0		36.4	18.8
Leptophlebiidae	75.0	37.5	74.0	83.0	25.0	40.0	37.5	81.0				4.5			45.5	8.3
Ephemerellidae	68.8	28.1	68.0	80.9	50.0	33.3	66.7	66.7			14.3				18.2	6.3
Odonata							4.2									
Anisoptera																
Gomphidae				8.5												
Aeshnidae				2.1												
Coenagrionidae															9.1	
Orthoptera				2.1											9.1	
Gryllidae															9.1	
Acrididae			2.0												9.1	
Plecoptera	6.3	6.3	4.0	4.3	12.5	6.7	4.2	9.5	40.0	19.0			10.0	9.1		
Pteronarcidae	6.3															
Taeniopterygidae		3.1		2.1												
Nemouridae	62.5	78.1	34.0	40.4	50.0	100.0	20.8	52.4	93.3	52.4			70.0	45.5	6.3	
Leuctridae													30.0			
Capniidae	62.5	53.1	4.0	29.8	75.0	46.7	8.3	4.8	13.3				40.0	9.1		
Perlidae	31.3	31.3	46.0	57.4												
Perlodidae	56.3	15.6	52.0	66.0	12.5	6.7	4.2	14.3					10.0	9.1		
Chloroperlidae	68.8	65.6	60.0	74.5	12.5	26.7	4.2	14.3			66.7			45.5		
Psocoptera			2.0												54.5	18.8
Thysanoptera							4.2	9.5							81.8	18.8
Hemiptera	6.3						8.3				4.8					
Corixidae			4.0	27.7	50.0		4.2	42.9							9.1	6.3
Gerridae			10.0				37.5	14.3					10.0	27.3	25.0	
Coreidae								4.8								
Saldidae											61.9				90.9	18.8
Anthocoridae															9.1	
Miridae															9.1	
Nabidae							4.8									9.1
Reduviidae																6.3
Lygaeidae			2.0												27.3	

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Percent																
Homoptera				2.1				14.3		13.3				20.0	18.2	25.0
Cicadellidae			16.0	25.5	12.5	13.3	25.0	61.9		13.3	76.2	68.2		30.0	90.9	68.8
Cercopidae														10.0	27.3	12.5
Delphacidae															36.4	
Psyllidae										13.3				10.0		18.8
Aphididae			2.0			6.7	20.8	71.4			9.5	22.7			100.0	68.8
Eriosomatidae								9.5								12.5
Coleoptera			2.0		12.5	13.3	8.3	19.0		13.3	28.6	27.3			27.3	12.5
Noteridae			2.0													
Carabidae							4.2	9.5			9.5	9.1			45.5	6.3
Haliplidae	6.3		10.0	19.1			4.2	33.3								
Dytiscidae	25.0		22.0	27.7	12.5	20.0	12.5	14.3							18.2	
Histeridae							4.2					4.5				
Hydrophilidae		3.1	2.0		12.5	20.0	16.7	42.9		13.3	19.0	18.2		10.0	54.5	18.8
Hydraenidae																
(Limnebiidae)	6.3			2.1	50.0	26.7	12.5	47.6		6.7						12.5
Melandryidae															9.1	
Scarabaeidae															18.2	
Ptiliidae								4.8							18.2	6.3
Chrysomelidae				2.1			4.2					4.5			27.3	18.8
Staphylinidae					12.5	40.0	16.7	57.1		13.3	14.3	54.5		40.0	72.7	62.5
Scydmaenidae							4.2									
Cantharidae			2.0								4.8				27.3	
Lampyridae															9.1	
Curculionidae																
(Nemonychidae)								4.8								
Elateridae							4.2				4.8				18.2	
Psephenidae				2.1												
Elmidae	43.8	37.5	98.0	87.2	25.0	6.7	54.2	71.4			4.8				9.1	
Scolytidae						6.7	4.2	4.8			4.8			10.0	18.2	
Bostrichidae							8.3									
Nitidulidae															18.2	
Coccinellidae			2.0				4.2	4.8							9.1	
Cerambycidae															18.2	
Neuroptera											4.8					
Sialidae	12.5	3.1	10.0	55.3	12.5										9.1	
Chrysopidae																
Trichoptera			2.0	8.5		6.7	12.5	14.3		6.7	81.0	45.5				
Limnephilidae	12.5	6.3	20.0	14.9	37.5	40.0	16.7	33.3			4.8				18.2	25.0
Philopotamidae	6.3		12.0													31.3
Rhyacophilidae	12.5	43.8	12.0	8.5		26.7		4.8							54.5	6.3
Hydropsychidae	18.8	12.5	18.0	27.7				42.9							18.2	
Psychomyiidae			4.0	17.0				4.8								
Polycentropodidae															9.1	
Lepidostomatidae	50.0	31.3	10.0	48.9	12.5	6.7		38.1							27.3	
Glossosomatidae	12.5	6.3	12.0	8.5				4.8								
Hydroptilidae	12.5		4.0	17.0			4.2	4.8							54.5	25.0
Leptoceridae															9.1	
Lepidoptera						6.7		4.8			38.1	13.6			27.3	6.3
Satyridae																12.5
Hesperiidae																18.8
Noctuidae															18.2	6.3
Geometridae															54.5	
Microlepidoptera							8.3								72.7	6.3
Pyralidae				17.0		6.7		9.5								
Diptera		3.1	2.0			13.3	4.2	23.8		20.0	4.8	27.3			18.2	12.5
Nematocera								9.5		6.7		4.5			9.1	6.3
Tipulidae	81.3	81.3	74.0	83.0	12.5	33.3	8.3	57.1		6.7	76.2	59.1		10.0	90.9	93.8
Psychodidae	25.0	25.0	4.0	36.2	12.5	6.7	8.3	38.1			9.5				72.7	43.8
Blephariceridae		18.8				6.7		4.8		33.3						
Dixidae						6.7	25.0	71.4								
Ceratopogonidae		9.4	10.0	23.4		13.3		28.6			4.8	4.5		90.9	43.8	31.3
Chironomidae	93.8	81.3	88.0	91.5	75.0	86.7	70.8	100.0		73.3	85.7	86.4		70.0	100.0	100.0
Simuliidae	31.3	65.6	22.0	4.3		80.0	37.5	28.6		6.7	9.5	4.5		10.0	9.1	25.0
Bibionidae								9.5				4.5				12.5
Mycetophilidae						13.3		19.0		20.0	47.6	68.2		40.0	63.6	87.5

Table continued on next page.

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Sciaridae		3.1	4.0	4.3		33.3	20.8	52.4		13.3	52.4	54.5			100.0	81.3
Cedidiomyiidae						6.7		14.3		6.7	19.0	9.1			100.0	43.8
Brachycera																6.3
Stratiomyidae		3.1														
Tabanidae	18.8	9.4	8.0	23.4							14.3				9.1	
Rhagionidae											14.3				27.3	
Periscolidae															9.1	
Asilidae											61.9				63.6	
Acroceridae															27.3	
Bombyliidae															9.1	
Empididae			10.0	6.4			16.7	19.0		20.0	61.9	100.0		10.0	72.7	62.5
Dolichopodidae			2.0				12.5	14.3			95.2	50.0		30.0	100.0	81.3
Cyclorrhapha															18.2	12.5
Lauxaniidae															9.1	
Lonchopidae															9.1	6.3
Phoridae								33.3			14.3	4.5		10.0	72.7	12.5
Syrphidae											28.6				27.3	
Lonchaeidae														10.0		
Sphaeroceridae										6.7					27.3	
Mitichidae															27.3	6.3
Ephydriidae			2.0				20.8	47.6			42.9	22.7		20.0	100.0	81.3
Drosophilidae											4.8				27.3	6.3
Chloropidae															54.5	
Agromyzidae								9.5							36.4	
Clusiidae															9.1	
Sciomyzidae															9.1	
Heleomyzidae															18.2	12.5
Anthomyzidae								4.8		33.3					63.6	75.0
Anthomyiidae																
(Scatophagidae)															9.1	
Muscoidea								9.5		13.3	95.2	95.5			9.1	6.3
Muscidae														10.0	72.7	31.3
Oestroidea																
Calliphoridae															27.3	25.0
Sarcophagidae															9.1	
Tachinidae															45.5	18.8
Hymenoptera						6.7	12.5	14.3			23.8				36.4	
Apocrita																
Braconidae				2.1			4.2	4.8							9.1	
Ichneumonidae				2.1			16.7	23.8			23.8	4.5			63.6	12.5
Chalcidoidea							16.7	28.6			4.8	4.5			81.8	12.5
Mymaridae			2.0				4.2	14.3							18.2	12.5
Cynipoidea					12.5			4.8							9.1	6.3
Cynipidae							4.2	4.8								
Proctotruoidea				2.1				38.1			4.8				45.5	25.0
Diapriidae							4.2									
Platygasteridae								4.8								
Bethylidae																
Formicidae						20.0	33.3	38.1			42.9			63.6	43.8	
Vespoidea																
Sphecidae															27.3	6.3
Apoidea															9.1	
Halictidae															9.1	6.3
Apidae															9.1	
Diplopoda																6.3
Chordata																
Osteichthyes							8.3									
Cypriniformes																
Catostomidae			2.0	4.3			8.3									
Cyprinidae				2.1												
Cottidae	6.3		18.0	12.8			16.7	4.8							9.1	
Mammalia																
Rodentia																
Zapodidae															9.1	

Appendix 3

Summary of Invertebrate Data For Each Season and Sample Type—Coastal Streams

1. Composition

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	<i>Percent</i>															
Oligochaeta	0.5	0.2	0.2	0.6	0.6	0.1	0.1						1.5	1.5		
Gastropoda	.7	2.3	10.0	5.0	13.0	2.6	15.7	10.1	0.1							
Araneae						.1	2	3	5	0.6		1.2	1.5	1.9	3.6	3.4
Acarina			.1	1		2	4	2		1		1	5	1.1	.5	.4
Collembola				1	6	4	2	2	3.7	13.5	0.4	3.0	5.0	13.2	1.0	9.7
Ephemeroptera	65.9	59.3	20.5	17.4	24.5	68.3	41.9	18.5	2.1	1.6	3	1.9	2.0	1.1	1.0	1.4
Orthoptera										6		1		10		.1
Plecoptera	8.4	11.8	19.8	11.5	6.5	12.4	10.3	27.3	10.3	3.9	2	2.1	6.5	1.2	.6	5
Psocoptera							2								2	1.9
Hemiptera						3	6	4		1.3	7	1.0	3.0	3.4	4.1	1.7
Homoptera			1		3	1	3	7	2	1.4	4	2.0	1.5	1	5.7	4.8
Coleoptera	1.9	13.6	27.3	32.3	4.7	3.1	6.8	2.8	3.3	10.0	3.9	.9	3.5	3.4	6.1	1.6
Trichoptera	7.0	5.7	10.2	10.3	23.9	5.5	6.0	24.4	2.8	5.4	9	9.4	2.5	4.5	2.6	3.0
Diptera	15.4	7.0	11.1	21.9	24.8	6.7	16.1	14.3	76.8	60.3	92.9	75.6	72.0	64.5	72.6	68.2
Hymenoptera					.6	.2	.3	4	.2	1.3	.2	1.8		1.9	1.4	2.9
Other 1	.2	1	7	.8	5		9	.4			.1	.9	5	1.2	.6	.4

1/ Other is the sum of all taxa that did not comprise more than 1 percent of the total number of organisms within that season

2. Number of organisms and sample weights

Parameter	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples	24	31	43	47	11	15	30	19	16	15	24	23	2	9	14	17
Mean number of organisms per sample	76.0	193.1	145.6	163.0	29.3	192.9	95.3	117.8	26.7	130.3	428.5	66.2	28.6	169.8	238.4	81.6
Minimum number of organisms per sample	1	11	42	25	1	8	7	11	6	34	52	16	4	52	161	2
Maximum number of organisms per sample	251	538	479	472	99	1689	391	283	49	406	1694	145	72			
Mean sample weight(g)	.050	.274	.498	.210	.103	.233	.501	.263					.025	.206	.136	.079
Minimum sample weight(g)	.002	.003	.035	.021	.002	.003	.015	.028					.000	.023	.067	.001
Maximum sample weight(g)	.270	1.064	1.811	.812	.601	.962	1.923	1.223					.087	.417	.264	.362

Summary of Invertebrate Data for Each Season and Sample Type—Cascade Streams

1. Composition

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	Percent															
Nematoda	0.1	0.2	0.2	1.7											0.1	
Oligochaeta	.8	3.3	1.9	2.9	1.1	0.1	0.7	0.1					0.1			
Araneae					.1		.2				0.3	0.1		.5	1.3	1.2
Acarina			.1			.1	1.9	.2							.2	.1
Collembola	.2			.5	.3	.3	.1	6.7	91.2	43.9	9.5	59.7	25.5	23.9	33.0	
Ephemeroptera	50.1	60.5	47.2	25.5	34.7	62.5	45.0	22.7		.5	1.4	.8	1.6	1.2	1.1	
Plecoptera	33.5	19.6	17.7	28.4	30.9	10.0	4.3	23.9	.6	7.5	1.1	.2	13.4	1.2	1.1	
Psocoptera								2.0						.3	1.4	
Thysanoptera															1.2	
Hemiptera							.2	.1			.6			.1	1.8	.3
Homoptera							1.2	1.3			.3	.7		.5	1.7	2.1
Coleoptera	.4	.6	3.4	3.4	.9	.5	4.8	4.5	.1	1.0	1.5			.2	3.7	1.7
Neuroptera	.3	.1	.4	.4	.1			.1							1.1	
Trichoptera	8.4	3.7	5.7	8.6	18.6	4.1	4.8	5.4	.2	.7	5.5	1.3		.1	3.7	1.9
Diptera	4.5	11.4	22.3	26.8	12.9	22.0	35.4	30.9	7.9	46.4	78.9	35.0		57.4	57.1	53.3
Hymenoptera							1.1	1.6			.4	.5		.4	1.1	2.3
Other ^{1/}	1.7	.6	1.1	1.8	.4	.4	.3	.5			.5	1.7		.2	.4	.5

^{1/} Other is the sum of all taxa that did not comprise more than 1 percent of the total number of organisms within that season.

2. Number of organisms and sample weights

Parameter	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples	16	29	35	48	12	13	26	21	8	16	24	22		15	16	11
Mean number of organisms per sample	124.3	227.6	144.2	132.2	177.0	576.5	170.4	85.1	77.4	46.4	331.8	129.6		54.7	594.8	131.7
Minimum number of organisms per sample	28	41	30	19	75	75	1	10	4	5	66	13		4	22	45
Maximum number of organisms per sample	238	657	348	396	318	1445	535	251	424	305	2725	617		130	3182	329
Mean sample weight(g)	.058	.171	.141	.068	.063	.240	.090	.057						.166	.673	.093
Minimum sample weight(g)	.004	.040	.021	.005	.012	.041	.001	.004						.001	.091	.001
Maximum sample weight(g)	.210	.537	.587	.318	.147	.575	.404	.639						1.180	2.788	.279

Summary of Invertebrate Data for Each Season and Sample Type—Central Streams

1. Composition

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	<i>Percent</i>															
Tricladida	0.3	0.1	3.3	2.0	0.1	0.1		0.1								
Oligochaeta	1.0	1.7	1.6	1.3	.3	.2		.1								
Araneae						.1	0.4	.2		0.1	0.4	0.5		0.2	2.9	1.1
Collembola						.1	.1	.2		87.5	44.0	46.8		95.5	.9	16.7
Ephemeroptera	31.7	23.0	33.5	34.3	33.6	31.8	39.6	31.7		.5	.6	1.1		.1	.4	1.1
Plecoptera	28.1	20.4	11.1	11.9	31.0	37.6	.9	12.3		2.7	.2	.2		.8	.4	.6
Thysanoptera															3.8	.2
Hemiptera			.1		.1		1.0	.2			.3				1.3	.3
Homoptera			.7	.1			8.8	8.5		.8	4.4	8.7		.2	12.7	5.0
Coleoptera	4.3	2.7	12.9	9.6	.4	.3	12.5	14.7		.2	.4	1.7		.8	13.2	1.4
Trichoptera	6.9	10.4	16.7	9.3	1.6	3.9	3.2	7.0		.2	2.2	11.1		.1	5.4	10.6
Diptera	27.6	41.5	19.7	31.1	32.9	25.8	26.3	23.0		7.7	46.9	29.1		2.2	55.7	61.0
Hymenoptera			.1				6.5	1.5		.2	.6	.6		.1	2.1	1.6
Other ^{1/}	.1	.2	.5	.4		.1	.7	.5		.1		.2			1.2	.4

^{1/} Other is the sum of all taxa that did not comprise more than 1 percent of the total number of organisms within that season.

2. Number of organisms and sample weights

Parameter	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples	16	30	48	45	8	14	21	21		14	22	24	11	11	15	
Mean number of organisms per sample	284.3	330.5	153.0	302.1	235.9	237.5	243.2	340.8		380.7	930.7	221.5		892.5	376.9	222.9
Minimum number of organisms per sample	39	3	23	1	29	10	8	10		21	43	38	5	5	56	
Maximum number of organisms per sample	909	1054	628	765	773	888	1224	1606		2033	11063	2378		5654	1681	459
Mean sample weight(g)	.101	.200	.160	.138	.093	.081	.096	.085					.095	.401	.162	
Minimum sample weight(g)	.003	.001	.005	.000	.016	.004	.003	.001					.038	.226	.024	
Maximum sample weight(g)	.218	.503	1.348	.653	.216	.180	.581	.655					.132	.732	.451	

Summary of Invertebrate Data for Each Season and Sample Type—Eastern Streams

1. Composition

Taxa	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
	<i>Percent</i>															
Oligochaeta	2.3	3.6	0.3	4.0	0.2	0.4	0.4									
Gastropoda	.9	.2	.4	4.4	1.8		.3	0.1								
Decapoda	1.0		.4	.5			.3	.1								
Araneae							1.6	.4		0.8	1.1	1.8		0.6	2.6	3.3
Acarina	.1		.2	.1			1.7	1.4		.2				.6	.4	.2
Collembola					.6	.4		1.0		53.5				33.6	.1	7.1
Ephemeroptera	31.1	9.8	41.4	30.6	33.2	5.4	18.8	11.7			7.1	2.5		.6	2.0	1.8
Plecoptera	20.9	31.7	6.9	9.3	41.0	76.0	2.4	1.6		15.3	6.0			40.3	3.2	
Hemiptera	.1		.2	1.1	2.7		4.3	.3			.7			.9	1.2	.6
Homoptera			.3	.8	.3	.1	2.4	52.8		1.2	8.5	36.7		3.5	6.2	7.1
Coleoptera	8.1	1.6	17.5	8.8	3.3	1.3	5.1	3.9		1.2	.7	2.5		5.7	1.5	3.0
Neuroptera	.7		.4	1.4	.3											
Trichoptera	8.2	2.8	1.7	12.0	1.2	.6	1.2	1.0		.2	2.5	1.9			.9	1.7
Lepidoptera				.3		.1	23.3				.3	.1			1.4	.5
Diptera	26.4	49.9	29.7	26.4	15.1	15.5	34.5	24.2		26.9	72.0	54.4		13.5	77.2	72.2
Hymenoptera					.3	.1	2.5	1.1			1.0	.1			1.8	1.9
Other ^{1/}	.2	.4	.6	.3		.1	1.2	.4		.7	.1			.7	1.5	.6

^{1/} Other is the sum of all taxa that did not comprise more than 1 percent of the total number of organisms within that season.

2. Number of organisms and sample weights

Parameter	Benthic				Drift				Sticky				Water			
	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
Number of samples	16	32	50	47	8	14	22	21		15	21	22		10	11	16
Mean number of organisms per sample	91.6	121.4	137.9	278.6	42.1	221.7	63.8	393.9		40.1	280.7	98.1		80.3	653.6	138.3
Minimum number of organisms per sample	6	1	1	12	6	11	5	2		5	18	17		1	130	5
Maximum number of organisms per sample	356	459	526	1174	120	1125	501	3859		152	979	282		513	1770	336
Mean sample weight(g)	.264	.052	.106	.355	.043	.043	.300	.074						.026	.299	.076
Minimum sample weight(g)	.003	.000	.001	.012	.005	.004	.000	.003						.001	.021	.004
Maximum sample weight(g)	2.697	.248	1.121	2.318	.180	.185	3.525	.503						.067	.720	.166

Porter, Pamela E.; Meehan, William R. Seasonal species composition of invertebrates in several Oregon streams. Res. Pap. PNW-RP-382. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station; 1987. 36 p.

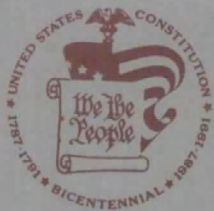
The invertebrate communities of eight Oregon streams were sampled seasonally from 1974 to 1976. Benthic, drift, and two types of aerial-trap samples were collected. Occurrence and percentage composition are summarized by sample type, season, and geographic area (coastal, Cascade, central, and eastern Oregon). Within 276 families, 426 taxa were identified; the 20 families most prevalent within each sample type accounted for the majority of organisms collected (77.8-91.8 percent). In most areas and seasons, Diptera and Ephemeroptera together comprised over half of the invertebrates collected.

Keywords: Invertebrata, aquatic life, Oregon.

The **Forest Service** of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The U.S. Department of Agriculture is an Equal Opportunity Employer. Applicants for all Department programs will be given equal consideration without regard to age, race, color, sex, religion, or national origin.

Pacific Northwest Research Station
319 S.W. Pine St.
P.O. Box 3890
Portland, Oregon 97208



December 1987

U.S. Department of Agriculture
Pacific Northwest Research Station
319 S.W. Pine Street
P.O. Box 3890
Portland, Oregon 97208

BULK RATE
POSTAGE +
FEES PAID
USDA-FS
PERMIT No. G-40

Official Business
Penalty for Private Use, \$300

do NOT detach label