

Appendix A

Rapid Bioassessment Protocol Habitat Form

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HABITAT ASSESSMENT FIELD DATA SHEET

Habitat Parameter	Category			
	Excellent	Good	Fair	Poor
1. *Bottom substrate/ available cover ^(a)	Greater than 50% rubble, gravel, submerged logs, undercut banks, or other stable habitat. 16-20	30-50% rubble, gravel or other stable habitat. Adequate habitat. 11-15	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 6-10	Less than 10% rubble, gravel or other stable habitat. Lack of habitat is obvious. 0-5
2. Embeddedness ^(b)	Gravel, cobble, and boulder particles are between 0 and 25 % surrounded by fine sediment 16-20	Gravel, cobble, and boulder particles are between 25 and 50 % surrounded by fine sediment 11-15	Gravel, cobble, and boulder particles are between 50 and 75 % surrounded by fine sediment 6-10	Gravel, cobble, and boulder particles are over 75 % surrounded by fine sediment 0-5
3. ≤ 0.15 cms (5cfs) * Flow ^(a) at rep. low flow or > 0.15 cms (5cfs) * Velocity/depth	Cold > 0.05 cms (2 cfs) Warm > 0.15 cms (5 cfs) 10-20	0.03-0.05 cms (1-2 cfs) 0.05-0.15 cms (2-5 cfs) 11-15	0.01-0.03 cms (.5-1 cfs) 0.03-0.05 cms (1-2 cfs) 6-10	< 0.01 cms (.5 cfs) < 0.03 cms (1 cfs) 0-5
	Slow (< 0.3 m/s), deep (> 0.5 m); slow, shallow (< 0.5 m); fast (> 0.3 m/s), deep; fast, shallow habitats all present. 16-20	Only 3 of the 4 habitat categories present (missing riffles or runs receive lower score than missing pools). 11-15	Only 2 of the 4 habitat categories present (missing riffles/runs receive lower score). 6-10	Dominated by one velocity/depth category (usually pool). 0-5
4. * Channel alteration ^(a)	Little or no enlargement of islands or point bars, and/or no channelization. 12-15	Some new increase in bar formation, mostly from coarse gravel; and/or some channelization present. 8-11	Moderate deposition of new gravel, coarse sand on old and new bars; pools partially filled w/silt; and/or embankments on both banks. 4-7	Heavy deposits of fine material, increased bar development; most pools filled w/silt; and/or extensive channelization. 0-3
5. Bottom scouring and deposition ^(a)	Less than 5% of the bottom affected by scouring and deposition. 12-15	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. 8-11	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. 4-7	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed. 0-3

(a) From Ball 1982.

(b) From Platts et al. 1983.

Note: * = Habitat parameters not currently incorporated into BIOS.

HABITAT ASSESSMENT FIELD DATA SHEET (cont.)

Habitat Parameter	Category			
	Excellent	Good	Fair	Poor
6. Pool/riffle, run/bend ratio ^(a) (distance between riffles divided by stream width)	5-7. Variety of habitat. Deep riffles and pools.	7-15. Adequate depth in pools and riffles. Bends provide habitat.	15-25. Occasional riffle or bend. Bottom contours provide some habitat.	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat.
	12-15	8-11	4-7	0-3
7. Bank stability ^(a)	Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problem.	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight potential in extreme floods.	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme high flow.	Unstable. Many eroded areas. Side slopes >60% common. "Raw" areas frequent along straight sections and bends.
	9-10	6-8	3-5	0-2
8. Bank vegetative stability ^(b)	Over 80% of the streambank surfaces covered by vegetation or boulders and cobble.	50-79% of the streambank surfaces covered by vegetation, gravel or larger material.	25-49% of the streambank surfaces covered by vegetation, gravel, or larger material.	Less than 25% of the streambank surfaces covered by vegetation, gravel, or larger material.
	9-10	6-8	3-5	0-2
9. Streamside cover ^(b)	Dominant vegetation is shrub.	Dominant vegetation is of tree form.	Dominant vegetation is grass or forbes.	Over 50% of the streambank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings.
	9-10	6-8	3-5	0-2
Column Totals				
Score				

Appendix B

List of Useful Taxonomic Macroinvertebrate Keys

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General Taxonomic Keys

- Edmondson, W.T. (Ed.) 1959. Fresh-Water Biology, 2nd Ed. John Wiley & Sons, New York, NY. 1248 p.
- Merritt, R.W. and K.W. Cummins (Eds.). 1984. An Introduction to the Aquatic Insects of North America, 2nd Ed. Kendall/Hunt Publishing Company, Dubuque, Iowa. 722 p.
- Pennak, R.W. 1978. Fresh-Water Invertebrates of the United States, 2nd Ed. John Wiley & Sons, New York, NY. 803 p.
- Pennak, R.W. 1989. Fresh-Water Invertebrates of the United States: Protozoa to Mollusca, 3rd Ed. John Wiley & Sons, New York, NY. 628 p.
- Usinger, R.L. 1963. Aquatic insects of California with keys to North American genera and California species. University of California Press, Berkeley, CA.

Ephemeroptera

- Allen, R.K. 1955. Mayflies of Oregon. Department of Zoology, University of Utah. Master's Thesis. 162 p.
- Allen, R.K. 1963. A revision of the Genus *Ephemerella* (Ephemeroptera: Ephemerellidae) VI. The subgenus *Serratella* in North America. Ann. Entom. Soc. Amer. 56:583-600.
- Allen, R.K. 1965. A review of the subfamilies of Ephemerellidae (Ephemeroptera). J. Kansas Entom. Soc. 38: 262-266.
- Allen, R.K. and G.F. Edmunds, Jr. 1962. A revision of the Genus *Ephemerella* (Ephemeroptera: Ephemerellidae) V. The Subgenus *Drunella* in North America. Misc. Publ. Entom. Soc. Amer. 3: 147-179.
- Allen, R.K. and G.F. Edmunds, Jr. 1963. A revision of the Genus *Ephemerella* (Ephemeroptera: Ephemerellidae) VII. The Subgenus *Eurylophella*. Can. Entom. 95: 597-623.
- Allen, R.K. and G.F. Edmunds, Jr. 1965. A revision of the Genus *Ephemerella* (Ephemeroptera: Ephemerellidae) VIII. The Subgenus *Ephemerella* in North America. Misc. Publ. Entom. Soc. Amer. 4(6): 244-282.
- Edmunds, G.F., Jr. and R.K. Allen. 1964. The Rocky Mountain species of *Epeorus* (*Iron*) Eaton (Ephemeroptera: Heptageniidae). J. Kansas Entom. Soc. 37: 275-288.

- Edmunds, G.F., Jr., S.L. Jensen and L. Berner. 1976. The Mayflies of North and Central America. University of Minnesota Press, Minneapolis, Minnesota. 330 p.
- Jensen, S.L. 1966. The Mayflies of Idaho (Ephemeroptera). Department of Zoology and Entomology, University of Utah. Master's Thesis. 367 p.
- Traver, J.R. 1933. Heptagenine mayflies of North America. J. New York Entom. Soc. 41: 105-125.

Plecoptera

- Baumann, R.W., A.R. Gaufin, and R.F. Surdick. 1977. The stoneflies (Plecoptera) of the Rocky Mountains. Mem. Amer. Entom. Soc. 31: 1-208.
- Hoppe, G.N. 1938. Plecoptera of Washington. University of Washington Publications in Biology 4(2): 139-174.
- Hynes, H.B.N. 1988. Biogeography and origins of the North American Stoneflies (Plecoptera). Mem. Entom. Soc. Can. 144: 31-38.
- Jewett, S.G., Jr. 1959. The stoneflies (Plecoptera) of the Pacific Northwest. Oregon State Monographs 3: 1-95.
- Stark, B.P. and A.R. Gaufin. 1976. The nearctic Genera of Perlidae (Plecoptera). Misc. Publ. Entomol. Soc. Amer. 10(1): 1-80.
- Stark, B.P., S.W. Szczytco and B.C. Kondratieff. 1988. The *Cultus decisus* complex of Eastern North America (Plecoptera: Perlodidae). Proc. Entomol. Soc. Wash. 90(1): 91-96.
- Stewart, K.W. and B.P. Stark. 1989. Nymphs of North American stonefly genera (Plecoptera). Thomas Say Foundation Series, Volume 12, Amer. Entomol. Soc., Hyattsville, MD.
- Szczytco, S.W. and K.W. Stewart. 1979. The Genus *Isoperla* (Plecoptera) of Western North America; holomorphology and systematics, and a new Stonefly Genus *Cascadoperla*.

Trichoptera

- Anderson, N.H. 1976. The distribution and biology of the Oregon Trichoptera. Agricultural Experiment Station, Technical Bulletin 134. Oregon State University, Corvallis, OR. 152 pp.

- Newell, R.L. and D.S. Potter. 1973. Distribution of some Montana caddisflies. *Proc. Montana Acad. Sci.* 33: 12-21.
- Nimmo, A.P. and G.G.E. Scudder. 1978. An annotated checklist of the Trichoptera (Insecta) of British Columbia. *SYESIS* 11: 117-134.
- Roemhild, G. 1982. The Trichoptera of Montana with distributional and ecological notes. *Northwest Science* 56(1): 8-13.
- Ross, H.H. 1956. Evolution and classification of the mountain caddisflies. The University of Illinois Press, Urbana, IL. 213 pp.
- Smith, S.D. 1968. The Rhyacophila of the Salmon River drainage of Idaho with special reference to larvae. *Annals Entomol. Soc. Amer.* 61(3): 655-674.
- Wiggins, G.B. 1965. Additions and revisions to the genera of North American caddisflies of the family Brachycentridae with special reference to the larval stages (Trichoptera). *Canad. Entomol.* 97: 1089-1106.
- Wiggins, G.B. 1977. Larvae of the North American caddisfly genera (Trichoptera). University of Toronto Press, Toronto, Ontario. 401 pp.

Diptera: General

- McAlpine, J.F., B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth, and D.M. Wood, Eds. 1981. *Manual of Nearctic Diptera, Volume 1.* Research Branch, Agriculture Canada. Biosystematics Research Institute, Ottawa, Ontario. 674 pp.
- McAlpine, J.F., B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth, and D.M. Wood, Eds. 1987. *Manual of Nearctic Diptera, Volume 2.* Research Branch, Agriculture Canada. Biosystematics Research Institute, Ottawa, Ontario. pp. 675-1332.

Diptera: Chironomidae

- Mason, W.T., Jr. 1968. An introduction to the identification of chironomid larvae. Federal Water Pollution Control Administration, Division of Pollution Surveillance, Cincinnati, OH. 89 pp.
- Oliver, D.R., D. McClymont, and M.E. Roussel. 1978. A key to some larvae of Chironomidae (Diptera) from the Mackenzie and Porcupine River Watersheds. Fisheries and Marine Service, Technical Report No. 791. Winnipeg, Manitoba. 73 pp.

Roback, S.S. 1971. The subfamily Tanypodinae in North America. Monogr. Acad. Nat. Sci. Philad. 17: 1-410.

Simpson, K.W. 1982. A guide to basic taxonomic literature for the genera of North American Chironomidae (Diptera)-adults, pupae, and larvae. New York State Museum, Bulletin No. 447. Albany, New York. 43 pp.

Wiederholm, T., Ed. 1983. Chironomidae of the Holarctic region keys and diagnoses: Part 1-Larvae. Entomologica Scandinavica, Supplement No. 19. 457 pp.

Diptera: Simuliidae

Adler, P.H. and K.C. Kim. 1986. The blackflies of Pennsylvania (Simuliidae, Diptera): bionomics, taxonomy, and distribution. The Pennsylvania State University, College of Agriculture, Agricultural Experiment Station, Bulletin 856. University Park, PA. 88 pp.

Kim, K.C. and R.W. Merritt, Eds. 1987. Black flies: ecology, population management, and annotated world list. The Pennsylvania State University. University Park, PA. 528 pp.

Other Taxonomic Keys

Burch, J.B. 1972. Biota of Freshwater Ecosystems Identification Manual No. 3. Freshwater sphaeriacean clams (Mollusca-Pelecypoda) of North America. Museum of Zoology, The University of Michigan, Ann Arbor, Michigan. 31 pp.

Hobbs, H.H., Jr. 1972. Biota of Freshwater Ecosystems Identification Manual No. 9. Crayfishes (Astacidae) of North and Middle America. Smithsonian Institution, Washington, D.C. 173 pp.

Holsinger, J.R. 1972. Biota of Freshwater Ecosystems Identification Manual No. 5. The freshwater amphipod crustaceans (Gammaridae) of North America. Old Dominion University, Norfolk, Virginia. 89 pp.

Kenk, R. 1972. Biota of Freshwater Ecosystems Identification Manual No. 1. Freshwater planarians (Turbellaria) of North America. Smithsonian Institution, Washington, D.C. 81 pp.

Appendix C

**Description of
Rapid Bioassessment Biometrics**

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Riffle/Run Sample

Metric 1. Species Richness

Reflects health of the community through a measurement of the variety of taxa (total number of genera and/or species) present. Generally increases with increasing water quality, habitat diversity, and/or habitat suitability. Sampling of highly similar habitats will reduce the variability in this metric attributable to factors such as current speed and substrate type. Some pristine headwater streams may be naturally unproductive, supporting only a very limited number of taxa. In these situations, organic enrichment may result in an increase in number of taxa (including EPT taxa).

Metric 2. Modified Hilsenhoff Biotic Index

Tolerance values range from 0 to 10, increasing as water quality decreases. The index was developed by Hilsenhoff (1987b) to summarize overall pollution tolerance of the benthic arthropod community with a single value. This index was developed as a means of detecting organic pollution in communities inhabiting rock or gravel riffles, and has been modified for this docu-

ment to include non-arthropod species as well, on the basis of the biotic index used by the State of New York (Bode 1988).

Although Hilsenhoff's biotic index was originally developed for use in Wisconsin, it is successfully used by several States and should prove reliable for extensive use, *requiring regional modification in some instances*. Alternative tolerance classifications and biotic indices have also been developed by some State agencies (Appendix C). The formula for calculating the Biotic Index is:

$$HBI = \sum \frac{x_i t_i}{n}$$

where

x_i = number of individuals within a species

t_i = tolerance value of a species

n = total number of organisms in the sample

Although it may be applicable for other types of pollutants, use of the HBI in detecting non-organic pollution effects has not been thoroughly evaluated. The State of Wisconsin is conducting a study to evaluate the ability of Hilsenhoff's index to detect non-organic effects. Winget and Mangum (1979) have developed a tolerance classification system applicable to the assessment of nonpoint source impact. Additional biotic indices are also listed in U.S. EPA (1983).

Metric 3. Ratio of Scraper and Filtering Collector Functional Feeding Groups

The Scraper and Filtering Collector Functional Group ratio reflects the riffle/run community foodbase and provides insight into the nature of potential disturbance factors. The proportion of the two feeding groups is important because predominance of a particular feeding type may indicate an unbalanced community responding to an overabundance of a particular food source. The predominant feeding strategy reflects the type of impact detected.

A description of the Functional Feeding Group concept can be found in Cummins (1973). Genus-level Functional Feeding Group designations for most aquatic insects can be found in Merritt and Cummins (1984).

The relative abundance of Scrapers and Filtering Collectors in the riffle/run habitat provides an indication of the periphyton community composition and availability of suspended Fine Particulate Organic Material (FPOM) associated with organic enrichment. Scrapers increase with increased abundance of diatoms and decrease as filamentous algae and aquatic mosses (which cannot be efficiently harvested by Scrapers) increase. However, filamentous algae and aquatic mosses provide good attachment sites for Filtering Collectors, and the organic enrichment often responsible for overabundance of filamentous algae provides FPOM utilized by the Filterers.

Filtering Collectors are also sensitive to toxicants bound to fine particles and may decrease in abundance when exposed to sources of such bound toxicants (Cummins 1987). The Scraper to Filtering Collector ratio may not be a good indication of organic enrichment if adsorbing toxicants are present. This situation is often

associated with point source discharges where certain toxicants adsorb readily to dissolved organic matter (DOM) forming FPOM during flocculation. Toxicants thus become available to Filterers via FPOM. In these instances the HBI and EPT Index may provide additional insight. Qualitative field observations on periphyton abundance may also be helpful in interpreting results.

Metric 4. Ratio of EPT and Chironomidae Abundances

The EPT and Chironomidae abundance ratio uses relative abundance of these indicator groups as a measure of community balance. Good biotic condition is reflected in communities having a fairly even distribution among all four major groups and with substantial representation in the sensitive groups Ephemeroptera, Plecoptera, and Trichoptera. Skewed populations having a disproportionate number of the generally tolerant Chironomidae relative to the more sensitive insect groups may indicate environmental stress (Ferrington 1987). Certain species of some genera such as *Cricotopus* are highly tolerant (Lenat 1983, Mount et al. 1984), opportunistic, and may become numerically dominant in habitats exposed to metal discharges where EPT taxa are not abundant, thereby providing a good indicator of toxicant stress (Winner et al. 1980). Clements et al. (1988) found that mayflies were more sensitive than chironomids when exposed to 15 to 32 $\mu\text{g/L}$ of copper.

Chironomids tend to become increasingly dominant in terms of percent taxonomic composition and relative abundance along a gradient of increasing enrichment or heavy metals concentration (Ferrington 1987).

An alternative to the ratio of EPT and Chironomidae abundance metric is the Indicator Assemblage Index (IAI) developed by Shackelford (1988). The IAI integrates the relative abundances of the EPT taxonomic groups and the relative abundances of chironomids and annelids upstream and downstream of a pollutant source to evaluate impairment. The IAI may be a valuable metric in areas where the annelid community may fluctuate substantially in response to pollutant stress.

Metric 5. Percent Contribution of Dominant Taxon

The percent contribution of the numerically dominant taxon to the total number of organisms is an indication of community balance at the lowest positive taxonomic level. (The lowest positive taxonomic level is assumed to be genus or species in most instances.) A community dominated by relatively few species would indicate environmental stress. (If the Pinkham and Pearson Similarity Index is used as a community similarity index for metric number 7, this metric may be redundant.) Shackleford (1988) has modified this metric to reflect "dominants in common" (DIC) utilizing the dominant five taxa at the stations of comparison.

This DIC approach is based on the original metric used in earlier drafts of this RBP document. The DIC will provide a measure of replacement or substitution between the reference community and the downstream station. The purpose of the modification to "percent contribution of dominant taxon" used in RBP III (and RBP II) is to focus on evenness/redundancy of the benthic community regardless of taxa composition. Compositional shifts are measured by other metrics such as the community similarity indices.

Metric 6. EPT Index

The EPT Index generally increases with increasing water quality. The EPT Index is the total number of distinct taxa within the orders Ephemeroptera, Plecoptera, and Trichoptera. This value summarizes taxa richness within the insect orders that are generally considered to be pollution sensitive.

Headwater streams which are naturally unproductive may experience an increase in taxa (including EPT taxa) in response to organic enrichment. In this situation, a "missing genera" approach may be more valuable. Shackleford (1988) uses a "missing genera" metric to evaluate the loss of EPT taxa from upstream to downstream to avoid the complication in data interpretation resulting from the addition or replacement of genera.

CPOM Sample

Metric 8. Ratio of Shredder Functional Feeding Group and Total Number of Individuals Collected

Also based on the Functional Feeding Group concept, the abundance of the Shredder Functional Group relative to the abundance of all other Functional Groups allows evaluation of potential impairment as indicated by the CPOM-based Shredder community. Shredders are sensitive to riparian zone impacts and are particularly good indicators of toxic effects when the toxicants involved are readily adsorbed to the CPOM and either affect the microbial communities colonizing the CPOM or the Shredders directly (Cummins 1987).

The degree of toxicant effects on Shredders versus Filterers depends on the nature of the toxicants and the organic particle adsorption efficiency. Generally, as the size of the particle decreases, the adsorption efficiency increases as a function of the increased surface to volume ratio (Hargrove 1972). As stated in metric 3, water-borne toxicants are readily adsorbed to FPOM. Toxicants of a terrestrial source (e.g., pesticides, herbicides) accumulate on CPOM prior to leaf fall thus having a substantial effect on Shredders (Swift et al. 1988a and 1988b). The focus of this approach is on a comparison to the reference community, which should have an abundance and diversity of Shredders representative of the particular area under study. This allows for an examination of Shredder or Collector "relative" abundance as indicators of toxicity.

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Appendix D
Reference Site Descriptions

By
Henry L. Dietrich

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Puget Lowlands Ecoregion Reference Sites

BINGHAM CREEK

The Bingham Creek site is within second growth timber and located on commercial forest lands. The sample station is approximately 650 feet above mean sea level in elevation. Upstream drainage basin area is 4.6 square miles. The basin terminates in the surrounding hills, 2 miles upstream from the sampling site. Highest elevations within the Bingham Creek drainage reach 2,600 feet. Bingham Creek is a tributary of the East Fork Satsop River.

Stream substrate within the sample reach contains cobble, gravel, and silty areas. Large diameter woody debris is present along and within the stream. The reference reach was nearly dry during water quality and benthic macroinvertebrate sampling in May. The sample reach was dry in June and August. A large marsh persists just downstream of the reference reach. Outflow from this marsh maintains stream flow in the lower reaches of Bingham Creek year round.

Forests in the vicinity of the sample station are dominated by Douglas fir (*Pseudotsuga menziesii*) which are 1-2 feet diameter. Larger well rotted stumps are visible above the forest floor. Other tree species observed include western hemlock (*Tsuga heterophylla*), big-leaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and black cottonwood (*Populus Trichocarpa*). Tall shrubs include osoberry (*Oemleria cerasiformis*), vine maple (*Acer circinatum*), and ninebark (*Physocarpus capitatus* at this site). Lower shrubs include Oregon grape (*Berberis nervosa*), salal (*Gaultheria shallon*), baldhip rose (*Rosa gymnocarpa*), red huckleberry (*Vaccinium parvifolium*), and salmonberry (*Rubus spectabilis*). Herbs include sword-fern (*Polystichum munitum*), false lily-of-the-valley (*Maianthemum dilatatum*), rattlesnake-plantain (*Goodyera oblongifolia*), bleeding heart (*Dicentra formosa*), pig-a-back-plant (*Tolmiea menziesii*), and Siberian miner's lettuce (*Montia sibirica*).

SNOW CREEK

The sample reach on Snow Creek is 300 feet above mean sea level. Approximately 6 miles upstream, the basin reaches its highest point at Mount Zion, about 4,250 feet in elevation. Drainage area upstream from the sample reach is 11.4 square miles. The stream substrate is primarily cobble, gravel, and sand. However, a few areas have been scoured to bedrock. The mouth of Snow Creek is located at Discovery Bay.

Red alder was the most common tree species noted in creekside areas. An occasional western red cedar can be found along the sample reach. Big leaf maple and vine maple are also present. Douglas fir and western hemlock are scattered among deciduous trees on slopes above the east bank of the sample reach. Elderberry (*Sambucus* species), osoberry, and salmonberry are abundant shrubs.

SEABECK CREEK

Upstream drainage basin area for the original Seabeck Creek sample reach was 2.2 square miles. The site was changed to a point one mile downstream from the original location in May 1991. A reference site change was necessary when surface flow ceased and intergravel flow persisted. Intergravel stream flow during the spring was also observed at the Bingham Creek reference site. The new reference reach is just upstream from Seabeck Creek's mouth at Seabeck Bay. This change more than doubled the upstream drainage basin area of the reference site. Highest elevations within this basin are 540 feet above mean sea level. The original sample reach was located at 120 feet elevation while the new location is approximately at sea level. Current uses include minimal residential development, grazing, and forest practice activities.

Stream substrate was cobble, gravel, and sand. Water was clear, but with a slight brown tint indicating the presence of naturally occurring organic acids. Algal growth was noted on the stream substrate during the May site visit. Large diameter woody debris was absent from the sample reach.

Tree species along the creek include western red cedar to three feet in diameter at breast height, Douglas fir, and red alder. Shrubby plants include salmonberry, thimbleberry (*Rubus*

parviflorus), osoberry, cascara (*Rhamnus purshiana*), and vine maple. Herbs include horsetail (*Equisetum* species), ladyfern (*Athyrium filix-femina*), buttercup, and non-native species.

DEWATTO RIVER

Drainage basin area upstream of the Dewatto River sample reach is 5.5 square miles. The sample reach is located at 180 feet above mean sea level and the highest points within the basin exceed 400 feet elevation. Basin uses include historical forest practices and minimal residential development. Dewatto River enters the lower south end of Hood Canal.

Stream substrate within the sample reach is primarily gravel and sand. Water is tea colored. Large organic debris is present within and along the river. The river is heavily shaded by adjacent deciduous trees and shrubs. Evidence of recent beaver activity within the sample reach was found during the August site visit.

Vegetation along slopes above the eastern side of the sample reach was dominated by moderately sized big-leaf maples. Red alder and black cottonwood were found near the river. Scattered second growth western red cedar and western hemlock were noted as well. The tall shrub layer along the sample reach consists of a particularly dense coverage of vine maple. Other shrubby species include: salmonberry, devil's club (*Oplopanax horridum*), ninebark, salal, and evergreen huckleberry (*Vaccinium ovatum*). Herbaceous species include: ladyfern, bleeding heart, and pig-a-back plant. The distribution of original growth stumps and downed wood within and along the sample reach indicates this sites vegetation was historically dominated by large diameter western red cedar as was most of the Puget Lowland ecoregion.

TAHUYA RIVER

The Tahuya River sample reach is located on Department of Natural Resources (DNR) land at 400 feet elevation above mean sea level. Upstream drainage basin area is 8 square miles and includes Panther and Tahuya Lakes. The highest points within the basin are near 1600 feet elevation at Green Mountain and Gold Mountain. The Tahuya River empties into the south end of Hood Canal.

Stream substrate is primarily cobble, gravel, and sand. Large amounts of deciduous leafy debris are also present within the stream. Portions of the sample reach are overhung by dense deciduous shrubs, especially ninebark. Water was clear, but tea colored during the May site visit. Large organic debris is present in small quantities within the sample reach.

Tree species include second growth Douglas fir and western hemlock in upland areas and western red cedar along the river. The largest conifers approached 2 feet diameter at breast height. Red alder was also commonly encountered. Close to the river, shrubby plants encountered include: ocean spray (*Holodiscus discolor*), spirea (*Spirea* species), devil's club, ninebark, and salmonberry. Snowberry (*Symphoricarpos* species), salal, oregon grape, baldhip rose, cascara, red huckleberry, evergreen huckleberry, and twinflower (*Linnaea borealis*) were found in upland areas. Herbaceous species include: ladyfern, brakefern (*Pteridium aquilinum*), vanillaleaf (*Achlys triphylla*), and fragrant bedstraw (*Galium triflorum*).

TOBOTON CREEK

The Toboton Creek sample reach is 460 feet above mean sea level. Upstream basin area is 2.2 square miles. The highest point in the basin is 800 feet elevation about three miles upstream of the sample reach. Toboton Creek originates from springs, a likely source being nearby Clear Lake. Present basin uses include minimal residential development and some nearby recreation.

Typical stream substrate within the sample reach includes moss covered cobbles, gravel, and sand. Water is slightly tea colored. Large organic debris is present in the creek. Shrubs close over portions of the channel and, in combination with overstory trees, provide a high degree of stream shading.

Overstory of the creekside areas is dominated by red alder and western red cedar. Douglas fir and pacific yew (*Taxus brevifolia*) are present as well. Common shrubs include Oregon grape, ninebark, ocean spray, elderberry, devil's club, salmonberry, thimbleberry, osoberry, and snowberry. Herbs include swordfern, ladies-fern, nettles, skunk cabbage (*Lysichitum americanum*), fragrant bedstraw, and grasses.

Cascades Ecoregion Reference Sites

HEDRICK CREEK

Hedrick Creek lies northwest of Mt. Baker in the Mt. Baker-Snoqualmie National Forest and is one of a series of steep, narrow creek basins bisecting the northeast-facing slopes of Slide Mountain. The sampling station's elevation is 1,000 feet above mean sea level. The drainage basin area upstream is approximately 2 square miles. Two miles upstream from the sampling site, Hedrick Creek reaches the highest point of the basin at an elevation of 4,900 feet. The creek enters the North Fork of the Nooksack River a short distance downstream from the sample reach.

Hedrick Creek is the northernmost Cascade reference stream evaluated in this pilot project. Stream substrate is primarily cobbles and boulders. Destabilized banks, loss of streamside vegetation, and characteristic mountain stream channel revisions resulted from winter storm runoff in Hedrick Creek prior to the January 1991 surface water sampling. Portions of the slopes along the lower end of the sample reach were undercut, exposing a 25-foot denuded bank on the east side of the creek. Recently-fallen trees initially lay over the channel at the midpoint of the sample reach, but were removed immediately above the wetted channel during the spring.

Upland areas near the Hedrick Creek site contain closed canopy second growth western hemlock and Douglas fir forests with dominants 1-2 feet in diameter. Deciduous tree species common in the vicinity include red alder, big-leaf maple, and willows (*Salix* sp.). Vine maple as well as salmonberry and devil's club in low areas were noted in the shrub layer near the creek. Herbs include lady-fern, sword-fern, and pig-a-back-plant.

GREENWATER RIVER

The headwaters of the Greenwater River originate in mountainous slopes west of the Pacific Cascade Crest in the vicinity of Naches Pass (4,900 feet elevation). The sample reach on the Greenwater river is located at around 2,300 feet elevation and nine miles downstream from the river's origin. Drainage basin area upstream of the sampling site is 52 square miles. This basin is located within the Mt. Baker-Snoqualmie National Forest. Minor impacts from riverside car

campers were noted downstream from the sample reach this spring and include: abandoned trash, multiple fire pits, minor streamside alterations, and vegetation disturbance. Land uses within this basin include recreation and forestry. The Greenwater River is part of the Puyallup River drainage.

River substrate is primarily boulder and cobble within the sample reach. River banks are lined with deciduous trees of moderate height. A paved mainline forest road runs along lower slopes above the south bank of the sample reach. Slopes above the north river bank are covered with large conifers. A few large stumps with springboard notches were noted along the rivers edge. It is likely that more of the river was shaded by overhead canopy historically. The deciduous riparian areas show signs of seasonal inundation. However, the river channel is well stabilized in this reach with a narrow flood plain. During low flows at the August site visit, attached green filamentous algae were noted.

Tree species in the riparian areas include red alder, willow species, and an occasional large black cottonwood. Currents (*Ribes* species), vanilla leaf, coltsfoot (*Petasites* species), and Siberian miner's lettuce were also found here. Slopes above the north side of the river contain large Douglas fir, silver fir (*Abies amabilis*), western hemlock, and moderately sized western red cedar. South of the river, between the riparian area and the road, a stand of Douglas fir, Western hemlock, Western red cedar, Pacific yew, grand fir (*Abies grandis*), and vine maple are regenerating.

AMERICAN RIVER

The American River sample reach is approximately 2,950 feet above mean sea level and located 20 miles downstream from the rivers headwaters. The highest points within the basin exceed 6,500 feet elevation in the vicinity of Chinook Pass. Upstream of the sample reach, the American River watershed covers 79 square miles. Much of this drainage is within two USFS wilderness areas, although the river corridor itself is not. This watershed originates along the eastern edge of the Cascade Crest and is part of the Yakima River drainage.

River substrate is boulder and cobble. Banks of the sample reach are stable and contain

deciduous shrub thickets in places. Moderate shading of the reach is provided by adjacent conifers. A partially stabilized cobble and boulder island is located at the upper end of the sample reach. Human influences of note along the sample reach include a paved road paralleling the river on the north side. A USGS gauging station is located at the base of the sample reach. River water was cloudy during August 1991. An identifiable layer of silt had been deposited in pools and along channel edges prior to our August site visit. Five miles upstream of the reference reach the river water was clear during the same site visit in August 1991 .

Douglas fir, grand fir, and Ponderosa pine are common in the upland forests along the river reach. Oregon grape, Oregon boxwood (*Pachystima myrsinites*), and snowberry shrubs are common in forested areas. Calypso orchids (*Calypso bulbosa*) were in bloom during the May site visit. A few black cottonwoods are scattered closer to the river. Red-osier dogwood (*Cornus stolonifera*) and alder provide much of the shrub cover along the river. Knapweed (*Centaurea* species), monkey-flowers (*Mimulus* species), lupines (*Lupinus* species), grasses, and other herbs were present in open areas.

ENTIAT RIVER

The Entiat River valley is oriented northwest to southeast. It is bordered by the Entiat Mountains on the south and the Chelan Mountains to the north. High points within the watershed are well over 6,500 feet above mean sea level. The sample reach is at 1,950 feet elevation. Upstream basin area is 158 square miles. The river originates 24 miles above the sample reach and empties into the Columbia River about 28 miles downstream.

Slopes along the sample reach include a patchwork of bare rock, young post-fire reproduction, and open pine forest. These areas had been burned over within the last several years as a result of a naturally occurring forest fire. Patches of dead standing trees are visible on upper slopes. A recently cut Ponderosa pine stump has a diameter of 2 feet and shows 110 annual rings. River substrate is primarily boulder, cobble, and gravel. Kick net samples contain a coarse white quartz sand.

Ponderosa pine is the predominant upland tree species in the vicinity of the sample reach. However, Douglas fir saplings are present in moderate numbers. Riparian areas contain black cottonwood and willows. Shrubs include baldhip rose, *Ceanothus* species, and Oregon box. Common herbs include lupine and yarrow (*Achillea* species).

TRAPPER CREEK

The Trapper Creek sample reach and its entire upstream drainage basin are located within U.S. Forest Service-designated wilderness area. Drainage area upstream of the sample reach is 7 square miles. The sample reach is approximately 1,800 feet above mean sea level. The steep upper portions of this drainage exceed 3,900 feet elevation within 3 miles of the reference site. This area appears to be used for only low-impact recreational activities at present. A few old cut stumps were noted along the western bank, but in most cases the logs had not been removed and have rotted on site. Trapper Creek is a tributary to the Wind River.

Creek substrate is primarily boulder and gravel. Streamside rocks are moss-covered. Large organic debris of varied decay class, including cedar logs greater than 6 feet in diameter, are present in and along the stream. This is the only reference stream found for this project which is currently recruiting debris logs with diameters greater than 2 to 3 feet. Although streambanks may be seasonally inundated, there is no evidence of recent bank failure or stream course changes.

Trees found along the sample reach include: Douglas fir and western red cedar frequently in excess of 6 feet diameter at breast height (DBH); western hemlock often greater than 4 feet DBH; and big-leaf maple. No fire scars were seen. Small red alders dominate narrow open areas along the stream. Where the forest canopy has been opened by windthrow, western hemlock appears to dominate regeneration. Shrubs along the sample reach include: vine maple, salmonberry, red huckleberry, and devil's club. Herbaceous species along the sample reach include: Trillium (*Trillium ovatum*), swordfern, brake fern, maidenhair fern (*Adiantum pedatum*), ladyfern, vanilla leaf, bleeding heart, and violet (*Viola* species).

MIDDLE FORK TEANAWAY RIVER

The Middle Fork of the Teanaway River drains a 26 square mile area upstream of the sample reach. The sample site is 2,600 feet elevation above mean sea level and highest elevations within the basin exceed 5,900 feet. The Middle Fork of the Teanaway originates about 9 miles upstream of the sample reach. Most of this basin is within the Wenatchee National Forest, however, portions checkered are with private forest lands.

Substantial changes in the river course occurred last winter just upstream from the sample reach. Bare dirt and clay banks were exposed where the river cut new channels. Upland conifers up to 2 feet in diameter fell into the river and large amounts of gravel and cobble were deposited within the sample reach. Spring benthic sampling took place in June, as the river was too high to sample during the May visit. Water was clear during the June visit. The August site visit showed very low flows and a newly deposited layer of fine silt on the stream substrate.

Common upland tree species found along the sample reach include grand fir, western hemlock, and Ponderosa pine. Dominants are 1-2 feet in diameter. Black cottonwood, willows, and alders occur along the river. Shrubs noted include: vine maple, oregon boxwood, bald-hip rose, and red-osier dogwood. Herbaceous species include starflower (*Trientalis latifolia*) and monkey-flowers.

Columbia Basin Ecoregion Reference Sites

NANEUM CREEK

The Naneum Creek reference reach is located on private timberlands near 2,600 feet above mean sea level. The highest points within the basin exceed 5,900 feet elevation approximately 13 miles upstream. Drainage basin area upstream of the sample reach is 67 square miles. Creekside areas are fenced leaving an ungrazed riparian buffer, but the uplands within this basin are grazed by cattle. Naneum Creek is a tributary of the Yakima River.

Stream substrate within the sample reach is composed of moderately embedded cobble and gravel. Water is typically clear. Variation in stream flow is partially moderated by water impounded behind a 200 foot long beaver dam just upstream from the sample reach. Beaver dam construction may be a regular occurrence in streams draining the east side Cascades into the Columbia Basin. Partial shading of the sample reach results from the upper, open deciduous canopy along the creek. Minor washouts as well as gravel deposition and seasonal inundation have occurred along banks within the reference reach. Occasional pieces of large organic debris can be found in and along the creek.

Upland areas are composed of open Ponderosa pine forests with sagebrush (*Artemisia* species) and bunchgrass understory. Alder and black cottonwood are scattered along the creek. Red-osier dogwood is dense and very common along the creek border. Other common shrubby species include: willow species, snowberry, ninebark, ocean-spray, blue elderberry (*Sambucus cerulea*), chokecherry (*Prunus virginiana*), and rarely oregon grape. Herbaceous species noted include: iris (*Iris missouriensis*), sedges (*Carex* species) and knapweed.

UMTANUM CREEK

The Umtanum Creek sample reach is located within the LT Murray Wildlife area. The sample reach is about 1,600 feet above mean sea level. Upstream basin area is 52 square miles and the highest points within the drainage are about 3,900 feet in elevation. Umtanum Creek's valley is oriented west to east between Manastash Ridge to the north and Umtanum Ridge to the south. Umtanum Creek originates from a series of springs approximately 15 miles upstream from the

sample site. A short distance downstream from the sample reach, Umtanum Creek empties into the Yakima River.

Streamside vegetation within the sample reach is dominated by willow species which provide a high degree of shading to the stream. Alder and cottonwood are present in the riparian area as well. The creek substrate is cobble and gravel interspersed with decomposed organics. There are no signs of recent erosion or channel changes within the sample reach. Streamflow is relatively constant year-round. Large organic debris is not found within this sample reach.

Upland vegetation becomes sparse and the most noticeable plants are sagebrush and knapweed. Cactus (*Opuntia* species) were in bloom during the June visit. Steeper portions of the valley walls north of the stream are talus slopes. South of the stream, sagebrush, knapweed, and bunchgrass cover areas between basalt cliffs.

LITTLE KLICKITAT RIVER

The Little Klickitat River sample reach is located along Highway 97 about 1,800 feet above mean sea level. The upstream drainage basin area is 52 square miles and includes the southern slopes of the Simcoe Mountains. Highest elevations within the drainage exceed 4,600 feet in elevation about 10 miles north of the reference reach. Land uses within the basin include dryland farming and grazing. Streamside fencing provides intact riparian zone vegetation. The Little Klickitat River is a tributary of the Klickitat River.

Substrate within the sample site includes cobbles and leafy organic debris. Banks are gently sloping, covered with vegetation, and without signs of recent erosion. Partial shading is provided by riverside trees.

Tree species along the sample reach include alder and willow. Upland areas contain scattered Ponderosa pine. Red-osier dogwood was the most notable shrubby plant species along the stream edge. Herbaceous species include: horsetail, reeds (*Juncus* species), sedges, and grasses.

CUMMINGS CREEK

Cummings Creek is a tributary of the Tucannon River. The sample site is located on Washington Department of Wildlife land at around 2,300 feet in elevation. Cummings Creek extends about 8 miles upstream beyond the reference reach to elevations of near 4,900 feet. It drains a narrow north-by-northwest to south-by-southeast oriented valley. Upstream of the sample reach are 19 square miles of land within the drainage basin. The Blue Mountains and Umatilla National Forest lie to the south.

Streamside vegetation is mostly deciduous and the creek substrate contains noticeable quantities of detrital material. Moss-covered cobble, gravel, and silt are present as well. The stream channel appears stable, without recent signs of erosion. Infrequent grazing activity may occur along this stream reach, although there was little recent evidence of such activity.

Upland areas contain open Ponderosa pine forests with some fire scars. Quaking aspen (*Populus tremuloides*) is found along the creek. Shrubs in the vicinity of the sample reach include red-osier dogwood, ninebark, blue elderberry, snowberry, rose, and alder. Horsetails and grasses grow along the stream riparian zone.

NORTH FORK ASOTIN CREEK

The North Fork Asotin Creek sample reach is located about 2,400 feet above sea level. Upstream from this reference site the creek drains 42 square mile of canyon country between Smoothing Iron Ridge to the south and Bracken Ridge to the north. Higher elevations within this drainage exceed 4900 feet. Lands within this drainage are managed by the Washington Department of Wildlife, Washington Department of Natural Resources, and U.S. Forest Service. This stream is a part of the Snake River drainage.

The southern edge of the sample reach is bounded by highly weathered rock cliffs. The northern creekside areas contain both deciduous and coniferous forest. Stream substrate is cobble and gravel. Leafy organic input to the stream is large.

Ponderosa pine and Douglas fir up to 2 feet in diameter occur in upland areas. Deciduous trees

and shrubs include water-birch (*Betula occidentalis*), blue elderberry, rose, and ocean-spray. Sagebrush and grasses provide understory below patches of open coniferous forest in upland areas. A very large thistle (probably *Carduus* sp.) was observed on the access road to the stream reach.

SPRING CREEK

The Spring Creek sample reach is located 1,600 feet above sea level and drains an 18 square mile area. The upstream drainage area reaches elevations of 2800 feet. Much of the upper end of this basin consists of rolling plateaus and buttes. Above the reference reach, Spring Creek changes from a network of grassy swales running across fields at its headwaters to a rock-lined creek in a narrow, forested canyon further downstream. All of the drainage basin was reportedly forested in historic times prior to its present use of dryland farming. Spring Creek is a tributary of the Spokane River.

As the name suggests, this creek originates from springs in its upper reaches. Stream substrate within the reference reach is cobble, boulder, and mud. No large organic debris was found within the reference reach. Deciduous shrubs and tall grasses inhabit portions of the stream riparian area along the reference reach. Rock slides and talus are found on the steep slopes above the road on the north side of the sample reach.

Above a break in slope along the south side of the creek is an open Douglas fir forest. Above the road on the north side of the canyon is an open, mixed forest of Ponderosa pine and Douglas fir. Alders, birch, and quaking aspen are scattered close to the stream. Shrubs noted include: snowberry, thimbleberry, rose, and red-osier dogwood. Herbs include nettles and grasses. Duckweed (*Lemnaceae* Family) is growing in slower flowing stream areas.

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Appendix E

Benthic Macroinvertebrate Mean Abundance Tables

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Fall 1990 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	0.00	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyaella	0.00	.70	0.00	0.00	0.00	0.00
AMPHIPODA	UNIDENTIFIED	Amphipoda	.50	0.00	0.00	0.00	0.00	0.00
ARACHNOIDEA	ARANEAE	Araneae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	1.40	.50	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	5.60	0.00	3.40	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	.70	0.00	0.00	0.00	1.50
COLEOPTERA	ELMIDAE	Optioservus	0.00	0.00	0.00	0.00	0.00	1.50
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	0.00	0.00	0.00	0.00	.35	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	0.00	3.75
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	4.25	4.20	4.25	4.25	.35	3.75
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	.25	0.00	0.00	0.00	0.00	0.00
DIPTERA	DIXIDAE	Dixa	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	.70	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Maruina	0.00	3.50	0.00	.85	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Psychodidae (Pupa)	0.00	.70	0.00	0.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	.70	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	.50	0.00	.50	1.70	.35	.75
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	.70	0.00	0.00	0.00	.75
DIPTERA	TIPULIDAE	Dicranota	0.00	1.40	0.00	4.25	1.05	4.50
DIPTERA	TIPULIDAE	Hexatoma	.50	3.50	0.00	.85	1.40	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	3.00
DIPTERA	TIPULIDAE	Tipula	0.00	.70	2.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	immature	0.00	0.00	.25	0.00	0.00	0.00
DIPTERA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	0.00	2.80	.25	24.65	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Dannella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	.85	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	1.40	0.00	5.95	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	10.75	42.00	5.00	2.55	5.95	14.25
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	0.00	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

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Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	1.25	9.80	0.00	45.05	4.90	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	0.00	10.50	0.00	0.00	1.05	8.25
EPHEMEROPTERA	TRICORYTHIDAE	Tricorythodes	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	.35	0.00
GASTROPODA	PLEUROCERIDAE	Juga	0.00	0.00	0.00	0.00	0.00	18.00
HEMIPTERA	UNIDENTIFIED	Hemiptera	0.00	0.00	0.00	0.00	0.00	0.00
ISOPODA	UNIDENTIFIED	Isopoda	0.00	0.00	.25	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	3.75
ODONATA	COENAGRIONIDAE	Argia	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	.75	4.90	9.00	5.95	20.65	49.50
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	1.70	0.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	0.00	0.00	0.00	0.00	0.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	2.25
PLECOPTERA	CAPNIIDAE	Unidentified	0.00	.70	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Utacapnia	0.00	0.00	0.00	6.80	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Alloperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	0.00	23.80	.25	6.80	2.10	3.00
PLECOPTERA	CHLOROPERLIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Utaperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	.50	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	0.00	2.80	0.00	4.25	0.00	3.00
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	3.50	0.00	10.20	7.00	.75
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	9.35	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	0.00	0.00	5.10	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	5.95	0.00	0.00
PLECOPTERA	PERLODIDAE	Diura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	0.00	2.55	0.00	1.50
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Osobenus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Setvena	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	.70	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

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-----	-----	-----	-----	-----	-----	-----	-----	-----
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	.70	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Doddsia	2.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	.85	1.75	.75
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	0.00	.70	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HELICOPSYCHIDAE	Helicopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	1.40	0.00	0.00	0.00	4.50
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	0.00	5.95	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPTILIDAE	Ochrotrichia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Hydatophylax	0.00	.70	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Moselyana	0.00	.70	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Neophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	0.00	0.00	0.00	.85	0.00	0.00
TRICHOPTERA	PSYCHOMYIIDAE	Psychomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	PSYCHOMYIIDAE	Tinodes	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	0.00	0.00	2.55	0.00	8.25
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	0.00	3.50	0.00	2.55	0.00	.75

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	0.00	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyalella	0.00	0.00	0.00	0.00	0.00	0.00
AMPHIPODA	UNIDENTIFIED	Amphipoda	0.00	0.00	0.00	0.00	0.00	0.00
ARACHNOIDEA	ARANEAE	Araneae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	.35	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	1.40	1.20	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	.35	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	0.00	0.00	0.00	0.00	1.10	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	ATHERICIDAE	Atherix	.50	.35	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	.50	.70	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	DIXIDAE	Dixa	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Maruina	0.00	0.00	1.20	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	.35	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Psychodidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	9.50	1.40	0.00	.25	1.10	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	1.50	0.00	8.40	0.00	1.10	1.05
DIPTERA	TIPULIDAE	Dicranota	0.00	.70	2.40	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	0.00	0.00	1.20	0.00	1.10	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Tipula	.50	0.00	0.00	.25	0.00	0.00
DIPTERA	TIPULIDAE	immature	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	2.20	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	32.50	20.65	26.40	.75	6.60	23.10
EPHEMEROPTERA	EPHEMERELLIDAE	Dannella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	.70	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	2.45	4.80	.25	9.90	10.50
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	.50	2.45	3.60	0.00	0.00	1.05
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00	1.05
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	2.50	0.00	36.00	0.00	5.50	13.65
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	11.50	17.50	103.20	1.75	140.80	94.50
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	3.50	5.95	0.00	.50	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	12.00	4.55	58.80	2.50	19.80	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	.50	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	TRICORYTHIDAE	Tricorythodes	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLEUROCERIDAE	Juga	0.00	0.00	0.00	0.00	0.00	0.00
HEMIPTERA	UNIDENTIFIED	Hemiptera	0.00	0.00	0.00	0.00	0.00	0.00
ISOPODA	UNIDENTIFIED	Isopoda	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	COENAGRIONIDAE	Argia	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	8.50	2.45	0.00	0.00	1.10	10.50
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	0.00	0.00	0.00	0.00	0.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Utacapnia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Alloperla	0.00	.70	0.00	0.00	1.10	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	2.10
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	2.10
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	10.00	2.10	16.80	1.50	18.70	43.05
PLECOPTERA	CHLOROPERLIDAE	Unidentified	.50	.35	0.00	0.00	1.10	0.00
PLECOPTERA	CHLOROPERLIDAE	Utaperla	0.00	0.00	0.00	0.00	0.00	1.05
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	0.00	.50	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	0.00	0.00	1.05
PLECOPTERA	NEMOURIDAE	Zapada	1.00	0.00	0.00	0.00	3.30	3.15
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	1.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	1.20	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	10.50
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	3.60	0.00	1.10	0.00
PLECOPTERA	PERLODIDAE	Diura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	.70	4.80	0.00	1.10	1.05
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Osobenus	.50	.70	0.00	0.00	4.40	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	.50	0.00	0.00	0.00	1.10	0.00
PLECOPTERA	PERLODIDAE	Setvena	0.00	.35	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	.50	0.00	22.80	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	0.00	1.05
PLECOPTERA	TAENIOPTERYGIDAE	Doddsia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	2.50	0.00	0.00	15.00	1.10	1.05
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	1.00	.70	4.80	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	.50	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	0.00	0.00	1.10	4.20
TRICHOPTERA	HELICOPSYCHIDAE	Helicopsyche	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species						
			American River	Entiat River	Greenwater River	Hedrick Creek	Middle Fork Teanaway River	Trapper Creek
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	1.00	1.40	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	1.05	0.00	0.00	9.90	2.10
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	15.60	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	.25	0.00	2.10
TRICHOPTERA	HYDROPTILIDAE	Ochrotrichia	0.00	.35	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	4.20
TRICHOPTERA	LIMNEPHILIDAE	Hydatophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	1.05
TRICHOPTERA	LIMNEPHILIDAE	Neophylax	1.00	0.00	0.00	0.00	6.60	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	PSYCHOMYIIDAE	Psychomyia	0.00	0.00	0.00	0.00	0.00	1.05
TRICHOPTERA	PSYCHOMYIIDAE	Tinodes	.50	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	.50	.35	4.80	.25	2.20	1.05
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	1.50	.70	0.00	.50	0.00	9.45

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	.60	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyalella	0.00	0.00	0.00	0.00	.80	0.00
AMPHIPODA	UNIDENTIFIED	Amphipoda	0.00	0.00	0.00	0.00	0.00	0.00
ARACHNOIDEA	ARANEAE	Araneae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	1.20	0.00	0.00	0.00	3.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	1.20	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	3.00	0.00	22.80	28.80	17.60	.75
COLEOPTERA	ELMIDAE	Stenelmis	1.00	.60	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	0.00	0.00	0.00	2.40	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	4.20	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	.60	0.00	0.00	0.00	2.25
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	6.65	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	18.00	6.60	9.50	4.80	12.80	9.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	DIXIDAE	Dixa	0.00	0.00	0.00	0.00	0.00	.75
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Maruina	3.00	0.00	0.00	3.60	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Psychodidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	7.00	0.00	9.50	2.40	1.60	29.25
DIPTERA	TABANIDAE	Tabanus	0.00	.60	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	3.00	0.00	2.85	1.20	5.60	10.50
DIPTERA	TIPULIDAE	Dicranota	1.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	0.00	20.40	0.00	6.00	0.00	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Tipula	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	immature	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	16.00	1.80	78.85	60.00	12.00	27.00
EPHEMEROPTERA	EPHEMERELLIDAE	Dannella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	0.00	1.90	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	0.00	.95	45.60	9.60	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	47.00	0.00	.95	34.80	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	23.00	.60	0.00	7.20	17.60	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	2.00	2.40	0.00	1.20	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	4.80	13.30	2.40	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	13.00	.60	0.00	2.40	0.00	45.75
EPHEMEROPTERA	TRICORYTHIDAE	Tricorythodes	0.00	3.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	.95	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	17.60	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	1.60	0.00
GASTROPODA	PLEUROCIDAE	Juga	0.00	0.00	0.00	0.00	0.00	0.00
HEMIPTERA	UNIDENTIFIED	Hemiptera	0.00	0.00	0.00	0.00	0.00	0.00
ISOPODA	UNIDENTIFIED	Isopoda	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	2.40	2.25
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	COENAGRIONIDAE	Argia	0.00	1.80	0.00	0.00	0.00	2.25
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	18.00	3.00	2.85	1.20	2.40	0.00
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	1.00	1.20	0.00	0.00	63.20	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	0.00	0.00	0.00	0.00	3.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	1.90	2.40	0.00	0.00
PLECOPTERA	CAPNIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Utacapnia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Alloperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	4.00	27.00	0.00	15.60	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Unidentified	1.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Utaperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	2.00	3.60	1.90	1.20	0.00	3.75
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	1.20	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	4.00	.60	0.00	3.60	1.60	7.50
PLECOPTERA	PELTOPTERIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	1.00	16.80	0.00	0.00	0.00	1.50
PLECOPTERA	PERLIDAE	Claassenia	4.00	0.00	1.90	6.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	3.60	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	9.00	9.60	2.85	1.20	0.00	7.50
PLECOPTERA	PERLODIDAE	Cultus	5.00	3.60	0.00	6.00	0.00	4.50
PLECOPTERA	PERLODIDAE	Diura	1.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	1.00	0.00	0.00	1.20	4.00	1.50
PLECOPTERA	PERLODIDAE	Kogotus	2.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Osobenus	2.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	5.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Setvena	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	2.00	0.00	0.00	1.20	0.00	0.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	.95	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	8.00	0.00	22.80	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Doddsia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	9.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	64.60	1.20	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	4.80	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Fall 1990 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	5.70	0.00	0.00	0.00
TRICHOPTERA	HELICOPSYCHIDAE	Helicopsyche	0.00	1.80	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	2.00	0.00	0.00	4.80	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	17.40	0.00	0.00	0.00	7.50
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	3.00	0.00	12.35	15.60	.80	48.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPTILIDAE	Ochrotrichia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Hydatophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Neophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	16.00	0.00	0.00	0.00	0.00	2.25
TRICHOPTERA	PSYCHOMYIIDAE	Psychomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	PSYCHOMYIIDAE	Tinodes	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	6.00	0.00	.95	1.20	.80	1.50
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Tobaton Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	1.75	0.00	0.00	0.00	1.60
AMPHIPODA	TALITRIDAE	Hyaella	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	5.40	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	0.00	0.00	1.35	5.40	0.00
COLEOPTERA	ELMIDAE	Stenelmis (Adult)	0.00	1.75	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	0.00	7.00	0.00	0.00	2.70	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PTILODACTYLIDAE	Ptilodactylidae	0.00	0.00	.25	1.35	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	1.35	3.20
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	1.35	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Philorus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	5.25	0.00	1.35	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	1.50	42.00	1.25	6.75	39.15	59.20
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	1.75	0.00	0.00	0.00	6.40
DIPTERA	EMPIDIDAE	Chelifera	0.00	0.00	0.00	0.00	1.35	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	0.00	31.50	.25	0.00	22.95	11.20
DIPTERA	SIMULIIDAE	Simuliidae(Pupa)	0.00	0.00	0.00	0.00	1.35	0.00
DIPTERA	TABANIDAE	Chrysops	0.00	0.00	0.00	0.00	0.00	1.60
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	1.35	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	0.00	0.00	0.00	0.00	4.80
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	0.00	0.00	0.00	6.40
DIPTERA	TIPULIDAE	Hexatoma	.25	43.75	.25	2.70	20.25	11.20
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Molophilus	.75	0.00	.25	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	0.00	15.75	0.00	68.85	4.05	24.00
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	5.40	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemerella	0.00	1.75	0.00	1.35	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	0.00	0.00	8.10	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	11.25	245.00	0.00	98.55	27.00	124.80
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	0.00	7.00	0.00	4.05	4.05	3.20
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	.50	0.00	0.00	33.75	24.30	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	0.00	3.50	0.00	2.70	1.35	49.60
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	7.00	0.00	0.00	0.00	0.00
GASTROPODA	PLEUROCIDAE	Juga	0.00	0.00	0.00	0.00	0.00	4.80
ISOPODA	UNIDENTIFIED	Isopoda	.50	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	COENAGRIONIDAE	Argia	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	GOMPHIDAE	Gomphus	0.00	0.00	0.00	0.00	0.00	4.80
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	1.00	21.00	1.00	25.65	55.35	32.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	5.40	0.00
PLECOPTERA	CHLOROPERLIDAE	Cultus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	1.35	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Paraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	0.00	14.00	0.00	2.70	2.70	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	.50	0.00	0.00	5.40	1.35	4.80
PLECOPTERA	NEMOURIDAE	Malenka	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	.25	0.00	.25	0.00	1.35	9.60
PLECOPTERA	NEMOURIDAE	Zapada	0.00	1.75	0.00	0.00	0.00	1.60
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	10.50	0.00	10.80	20.25	6.40
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	15.75	0.00	10.80	0.00	3.20
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	.25	0.00	0.00	0.00	0.00	11.20
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	0.00	0.00	0.00	1.60
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	.25	0.00	0.00	5.40	48.60	6.40
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	0.00	0.00	1.60
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	1.75	0.00	0.00	0.00	1.60
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	9.60
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	0.00	5.40	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNIPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNIPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNIPHILIDAE	Pedomoecus	0.00	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
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TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	5.25	0.00	9.45	1.35	3.20
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	0.00	0.00	0.00	0.00	8.10	25.60
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	1.25	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyalella	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	1.25	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	.90	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PTILODACTYLIDAE	Ptilodactylidae	0.00	0.00	0.00	0.00	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	ATHERICIDAE	Atherix	0.00	7.50	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Philorus	0.00	0.00	.90	1.50	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	0.00	41.25	2.70	0.00	2.00	2.70
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Chelifera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	0.00	0.00	.90	1.50	2.00	1.35
DIPTERA	SIMULIIDAE	Simuliidae(Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Chrysops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	0.00	0.00	0.00	4.00	0.00
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	0.00	1.25	2.70	0.00	0.00	4.05
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	.90	0.00	2.00	0.00
DIPTERA	TIPULIDAE	Molophilus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified	0.00	1.25	0.00	0.00	2.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	66.50	128.75	62.10	18.00	64.00	29.70
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	6.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	.95	11.25	2.70	1.50	8.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	1.25	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemerella	0.00	0.00	5.40	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	.95	3.75	.90	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	4.75	6.25	41.40	0.00	0.00	5.40
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	48.45	78.75	49.50	12.00	266.00	122.85
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	1.90	16.25	9.90	1.50	12.00	17.55
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	25.65	10.00	2.70	15.00	16.00	1.35
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	0.00	1.25	0.00	0.00	0.00	1.35
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
GASTROPODA	PLEUROCERIDAE	Juga	0.00	0.00	0.00	0.00	0.00	0.00
ISOPODA	UNIDENTIFIED	Isopoda	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	COENAGRIONIDAE	Argia	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	GOMPHIDAE	Gomphus	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	19.00	12.50	0.00	0.00	18.00	9.45
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Cultus	0.00	1.25	2.70	0.00	16.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	1.35
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	2.00	2.70
PLECOPTERA	CHLOROPERLIDAE	Paraperla	0.00	0.00	0.00	0.00	6.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	21.85	3.75	14.40	1.50	12.00	48.60
PLECOPTERA	LEUCTRIDAE	Perlomyia	1.90	2.50	.90	6.00	2.00	4.05
PLECOPTERA	NEMOURIDAE	Malenka	0.00	0.00	0.00	0.00	0.00	2.70
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	0.00	3.75	0.00	0.00	0.00	6.75
PLECOPTERA	PELTOPTERIDAE	Yoraperla	0.00	0.00	0.00	6.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	.95	0.00	0.00	0.00	0.00	10.80
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	5.00	1.80	1.50	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	1.25	2.70	0.00	16.00	0.00
PLECOPTERA	PERLODIDAE	Doroneuria	.95	0.00	0.00	0.00	0.00	10.80
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	.95	0.00	1.80	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	1.25	0.00	0.00	12.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	1.25	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	5.70	3.75	5.40	307.50	54.00	2.70
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	.95	6.25	3.60	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	1.25	0.00	0.00	4.00	4.05
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	7.50	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	1.35
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	9.00	0.00	14.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	1.25	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	2.50	5.40	0.00	0.00	2.70
TRICHOPTERA	LIMNEPHILIDAE	Pedomoecus	.95	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	0.00	.90	3.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	8.50	2.50	.90	1.50	6.00	2.70
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	0.00	1.35

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little		North Fork		Spring	Umtanum
			Cummings	Klickitat	Asotin	Naneum		
			Creek	River	Creek	Creek	Creek	Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	0.00	0.00	0.00	0.00	1.75
AMPHIPODA	TALITRIDAE	Hyaella	0.00	0.00	3.00	0.00	0.00	3.50
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	2.50	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	12.50	0.00	42.00	0.00	1.60	10.50
COLEOPTERA	ELMIDAE	Stenelmis (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Zaitzevia	17.50	0.00	3.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	2.75	0.00	0.00	0.00	0.00
COLEOPTERA	PTILODACTYLIDAE	Ptilodactylidae	0.00	0.00	0.00	0.00	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	0.00	1.60	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	5.00	0.00	0.00	0.00	0.00	1.75
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	30.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Philorus	0.00	0.00	3.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	30.00	42.35	141.00	162.00	6.40	33.25
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	2.50	1.65	15.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Chelifera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	12.50	0.00	0.00	3.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	10.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	2.50	0.00	57.00	6.00	1.60	31.50
DIPTERA	SIMULIIDAE	Simuliidae(Pupa)	0.00	0.00	3.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Chrysops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	2.50	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	2.50	.55	6.00	9.00	3.20	40.25
DIPTERA	TIPULIDAE	Dicranota	5.00	0.00	0.00	0.00	0.00	3.50
DIPTERA	TIPULIDAE	Hexatoma	0.00	13.20	0.00	6.00	0.00	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Molophilus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	47.50	4.95	642.00	273.00	52.80	106.75
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	0.00	3.00	3.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	9.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	0.00	3.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemerella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	15.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	7.50	1.10	3.00	39.00	73.60	8.75
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	120.00	6.05	0.00	240.00	142.40	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	35.00	2.20	57.00	15.00	11.20	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	13.20	78.00	3.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	7.50	1.10	0.00	45.00	0.00	54.25
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	3.00	0.00	1.75

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Winter 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
GASTROPODA	PLEUROCERIDAE	Juga	0.00	0.00	0.00	0.00	0.00	0.00
ISOPODA	UNIDENTIFIED	Isopoda	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	5.25
ODONATA	COENAGRIONIDAE	Argia	0.00	0.00	0.00	0.00	0.00	1.75
ODONATA	GOMPHIDAE	Gomphus	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	42.50	3.85	24.00	24.00	11.20	19.25
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	.55	6.00	0.00	0.00	1.75
PLECOPTERA	CHLOROPERLIDAE	Cultus	0.00	0.00	0.00	12.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Paraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	5.00	5.50	0.00	3.00	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	.55	12.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Malenka	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	2.20	9.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	2.50	0.00	0.00	18.00	3.20	14.00
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	2.50	12.65	0.00	0.00	0.00	1.75
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	9.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	7.50	0.00	0.00	0.00	0.00	3.50
PLECOPTERA	PERLIDAE	Hesperoperla	45.00	0.00	18.00	15.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	12.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Doroneuria	7.50	0.00	0.00	0.00	0.00	3.50
PLECOPTERA	PERLODIDAE	Isoperla	2.50	1.65	0.00	9.00	0.00	12.25
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	0.00	0.00	3.00	1.60	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	3.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	7.50	0.00	45.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	130.00	0.00	3.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	150.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	9.00	1.60	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	27.00	0.00	1.60	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	2.50	0.00	0.00	3.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	22.50	0.00	0.00	12.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	2.50	6.60	33.00	0.00	25.60	49.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	3.20	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	.55	0.00	0.00	0.00	5.25
TRICHOPTERA	LIMNEPHILIDAE	Pedomoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	5.00	0.00	12.00	6.00	6.40	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	65.00	0.00	3.00	3.00	0.00	1.75
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	11.20	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	0.00	0.00	0.00	1.35	0.00
AMPHIPODA	TALITRIDAE	Hyalella	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	4.80	2.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	1.20	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Exuvia)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	0.00	1.00	0.00	0.00	1.25
COLEOPTERA	ELMIDAE	Optioservus (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	1.20	0.00	2.00	1.35	0.00
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	2.40	0.00	2.00	1.35	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	29.00	62.40	44.00	28.00	39.15	21.25
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	1.20	0.00	0.00	0.00	0.00
DIPTERA	DIXIDAE	Dixidae	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Clinocera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	2.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	0.00	9.60	0.00	2.00	0.00	5.00
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	0.00	0.00	2.00	0.00	0.00
DIPTERA	TIPULIDAE	Chelifera	0.00	0.00	0.00	0.00	0.00	2.50
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	0.00	0.00	0.00	2.50
DIPTERA	TIPULIDAE	Hexatoma	0.00	15.60	8.00	0.00	8.10	6.25
DIPTERA	TIPULIDAE	Limnophila	1.00	27.60	6.00	0.00	55.35	6.25
DIPTERA	TIPULIDAE	Molophilus	0.00	0.00	2.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Pseudolimnophila	0.00	0.00	0.00	0.00	0.00	1.25
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	0.00	21.60	23.00	180.00	4.05	30.00
EPHEMEROPTERA	EPHEMERELLIDAE	Attenella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	4.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	1.50	0.00	8.00	20.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemerella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	2.40	3.00	10.00	28.35	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	0.00	27.60	42.00	84.00	1.35	8.75
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	0.00	3.60	13.00	56.00	8.10	2.50
EPHEMEROPTERA	HEPTAGENIIDAE	Ironodes	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	0.00	0.00	12.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	.50	9.60	19.00	0.00	18.90	33.75
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	20.40	4.00	8.00	8.10	0.00
EPHEMEROPTERA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLEUROCIDAE	Jugus	0.00	0.00	0.00	0.00	0.00	6.25
LEPIDOPTERA	PYRALIDAE	Pyralidae	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
NEMATODA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
NEMATOMORPHA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	1.25
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	2.00	0.00	2.00	12.00	37.80	70.00
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	0.00	0.00	0.00	0.00	0.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	5.00
PLECOPTERA	CAPNIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	61.20	32.00	2.00	22.95	6.25
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	1.00	0.00	0.00	10.00
PLECOPTERA	NEMOURIDAE	Amphinemura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	.50	2.40	1.00	0.00	1.35	7.50
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	1.25
PLECOPTERA	PERLIDAE	Calineuria	0.00	10.80	6.00	6.00	10.80	5.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	0.00	0.00	18.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	1.00	1.20	2.00	0.00	2.70	1.25

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

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Spring 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Bingham Creek	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	1.25
PLECOPTERA	PERLODIDAE	Skwala	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	4.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	1.20	0.00	4.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	1.20	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	0.00	10.00	0.00	1.25
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Dicosmoecus	0.00	0.00	0.00	0.00	1.35	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	1.20	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Limnephilidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Neophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Onocosmoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Pedomoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	0.00	0.00	0.00	0.00	68.85	21.25
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	0.00	0.00	0.00	0.00	1.25
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	0.00	7.20	4.00	28.00	5.40	2.50
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	0.00	1.20	0.00	0.00	4.05	1.25
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
ACARI	UNIDENTIFIED	Hydracarina	3.00	2.20	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyaella	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	3.30	0.00	0.00	0.00	4.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Exuvia)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	0.00	0.00	0.00	4.50	4.00
COLEOPTERA	ELMIDAE	Optioservus (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	0.00	0.00	2.25	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	2.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	ATHERICIDAE	Atherix	3.00	2.20	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	1.50	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala (Pupa)	1.50	0.00	0.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	1.10	1.35	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	7.50	7.70	6.75	3.00	11.25	14.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	0.00	1.35	0.00	0.00	0.00
DIPTERA	DIXIDAE	Dixidae	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Clinocera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	2.25	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	0.00	0.00	1.35	0.00	9.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	0.00	4.50	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	2.25	0.00
DIPTERA	TIPULIDAE	Antocha	1.50	0.00	0.00	0.00	0.00	6.00
DIPTERA	TIPULIDAE	Chelifera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	0.00	2.20	8.10	3.00	11.25	14.00
DIPTERA	TIPULIDAE	Limnophila	0.00	1.10	0.00	0.00	11.25	0.00
DIPTERA	TIPULIDAE	Molophilus	0.00	6.60	0.00	1.50	0.00	0.00
DIPTERA	TIPULIDAE	Pseudolimnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	106.50	84.70	72.90	103.50	11.25	100.00
EPHEMEROPTERA	EPHEMERELLIDAE	Attenella	7.50	1.10	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	1.10	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	2.25	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	13.50	0.00	2.70	1.50	20.25	4.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	10.50	5.50	6.75	1.50	2.25	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemera	1.50	7.70	0.00	0.00	9.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	3.30	0.00	0.00	4.50	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	15.00	0.00	12.15	1.50	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	25.50	26.40	91.80	24.00	63.00	112.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	93.00	2.20	48.60	214.50	144.00	106.00
EPHEMEROPTERA	HEPTAGENIIDAE	Ironodes	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	7.50	3.30	2.70	0.00	42.75	6.00
EPHEMEROPTERA	HEPTAGENIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	0.00	0.00	0.00	0.00	0.00	8.00
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	3.00	5.50	1.35	1.50	0.00	2.00
EPHEMEROPTERA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLEUROCIDAE	Jugus	0.00	0.00	0.00	0.00	0.00	0.00
LEPIDOPTERA	PYRALIDAE	Pyralidae	0.00	0.00	0.00	0.00	2.25	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
NEMATODA	UNIDENTIFIED	Unidentified	1.50	0.00	0.00	0.00	0.00	0.00
NEMATOMORPHA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	82.50	2.20	24.30	6.00	42.75	52.00
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	0.00	0.00	0.00	0.00	0.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	31.90	25.65	21.00	114.75	84.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	6.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	12.00	0.00	0.00	0.00	2.25	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	0.00	1.50	0.00	0.00
PLECOPTERA	NEMOURIDAE	Amphinemura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	0.00	0.00	1.35	0.00	0.00	0.00
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	3.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	0.00	0.00	0.00	2.25	18.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	4.00
PLECOPTERA	PERLIDAE	Hesperoperla	1.50	0.00	4.05	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	9.45	0.00	0.00	30.00
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	6.00	12.10	0.00	0.00	0.00	0.00

*

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

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(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	2.25	2.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	4.50	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	6.00	28.60	2.70	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	2.20	0.00	0.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	0.00	0.00	0.00	8.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	0.00	16.20	0.00	11.25	6.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	4.50	0.00	2.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	1.50	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Dicosmoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Limnephilidae (Pupa)	3.00	4.40	0.00	0.00	2.25	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	2.00
TRICHOPTERA	LIMNEPHILIDAE	Neophylax	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Onocosmoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Pedomoecus	0.00	0.00	2.70	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	4.50	1.10	5.40	4.50	4.50	6.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	13.50	7.70	8.10	3.00	6.75	8.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	1.50	0.00	0.00	1.50	0.00	4.00
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICLADIDA	PLANARIIDAE	Planariidae	3.00	3.30	0.00	0.00	0.00	4.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
ACARI	UNIDENTIFIED	Hydracarina	0.00	0.00	0.00	0.00	0.00	0.00
AMPHIPODA	TALITRIDAE	Hyalella	0.00	0.00	0.00	0.00	2.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	0.00	0.00	2.40	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	0.00	0.00	6.00	0.00	2.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius (Exuvia)	0.00	0.00	0.00	0.00	4.00	0.00
COLEOPTERA	ELMIDAE	Lara	0.00	0.00	0.00	1.20	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	1.35	34.00	2.40	0.00	14.00
COLEOPTERA	ELMIDAE	Optioservus (Adult)	0.00	0.00	0.00	0.00	0.00	1.75
COLEOPTERA	ELMIDAE	Stenelmis	12.00	0.00	4.00	1.20	0.00	19.25
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	12.15	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	1.35	0.00	0.00	0.00	5.25
DIPTERA	ATHERICIDAE	Atherix	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	12.00	0.00	0.00	1.20	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Bibiocephala (Pupa)	0.00	0.00	0.00	0.00	2.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	2.40	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	186.00	116.10	34.00	25.20	66.00	175.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	12.00	14.85	2.00	2.40	16.00	3.50
DIPTERA	DIXIDAE	Dixidae	0.00	0.00	0.00	0.00	2.00	0.00
DIPTERA	EMPIDIDAE	Clinocera	0.00	8.10	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Pericoma	0.00	0.00	0.00	2.40	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	9.00	0.00	0.00	10.80	2.00	3.50
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	1.20	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	9.00	0.00	2.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	27.00	8.10	32.00	2.40	30.00	3.50
DIPTERA	TIPULIDAE	Chelifera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	6.00	0.00	0.00	1.75
DIPTERA	TIPULIDAE	Hexatoma	0.00	43.20	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Molophilus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Pseudolimnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	6.75	0.00	0.00	2.00	1.75
EPHEMEROPTERA	BAETIDAE	Baetis	114.00	32.40	94.00	57.60	212.00	110.25
EPHEMEROPTERA	EPHEMERELLIDAE	Attenella	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Caudatella	0.00	0.00	8.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	6.00	0.00	20.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemerella	3.00	0.00	4.00	2.40	24.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little North Fork					
			Cummings Creek	Klickitat River	Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	7.20	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	0.00	0.00	13.20	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	210.00	6.75	6.00	24.00	28.00	1.75
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	0.00	0.00	0.00	3.60	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	90.00	5.40	58.00	22.80	50.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Ironodes	3.00	0.00	0.00	0.00	2.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	2.70	40.00	7.20	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Unidentified	0.00	0.00	2.00	0.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	30.00	2.70	0.00	22.80	0.00	22.75
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	UNIDENTIFIED	Unidentified	0.00	1.35	0.00	0.00	0.00	0.00
GASTROPODA	ANCYLIDAE	Ferrissia	0.00	0.00	2.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	2.00	0.00
GASTROPODA	PLEUROCIDAE	Jugus	0.00	0.00	0.00	0.00	0.00	0.00
LEPIDOPTERA	PYRALIDAE	Pyralidae	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	1.20	0.00	0.00
NEMATODA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
NEMATOMORPHA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	2.00	0.00
ODONATA	ANISOPTERA	Anisoptera	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	21.00	10.80	4.00	6.00	4.00	5.25
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	4.05	0.00	0.00	4.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	3.00	0.00	4.00	18.00	0.00	5.25
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	1.35	6.00	1.20	0.00	0.00
PLECOPTERA	CAPNIIDAE	Unidentified	6.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	0.00	0.00	6.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	3.00	13.50	0.00	3.60	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	2.00	0.00	0.00	3.50
PLECOPTERA	NEMOURIDAE	Amphinemura	0.00	0.00	0.00	0.00	2.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Podmosta	0.00	0.00	0.00	2.40	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	3.00	0.00	0.00	0.00	0.00	17.50
PLECOPTERA	PELTOPTERIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	15.00	33.75	0.00	0.00	0.00	8.75
PLECOPTERA	PERLIDAE	Claassenia	12.00	8.10	0.00	1.20	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	30.00	0.00	8.00	8.40	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	2.70	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	0.00	4.80	0.00	0.00
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	0.00	0.00	1.20	0.00	0.00
PLECOPTERA	PERLODIDAE	Unidentified	6.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	3.00	0.00	30.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Spring 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Cummings Creek	Little Klickitat River	North Fork Asotin Creek	Naneum Creek	Spring Creek	Umtanum Creek
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	3.60	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Amiocentrus	0.00	0.00	0.00	2.40	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	68.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	2.70	2.00	6.00	8.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	1.35	18.00	1.20	0.00	1.75
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	0.00	0.00	2.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	3.00	0.00	0.00	6.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	6.75	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	12.00	13.50	10.00	13.20	28.00	8.75
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Dicosmoecus	3.00	2.70	0.00	0.00	0.00	5.25
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Limnephilidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	1.20	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Neophylax	0.00	0.00	8.00	0.00	4.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Onocosmoecus	12.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Pedomoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	0.00	0.00	0.00	1.20	0.00	1.75
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	9.00	1.35	12.00	10.80	10.00	1.75
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	57.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	3.00	0.00	0.00	0.00	0.00	3.50
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
ACARI	UNIDENTIFIED	Hydracarina	2.25	5.00	3.00	14.45	4.00
COLEOPTERA	CHRYSOMELIDAE	Donacia (Adult)	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	DYTISCIDAE	Hydaticus	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	DYTISCIDAE	Hydrovatus	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	2.25	1.00	0.00	4.25	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	2.25	2.00	12.00	2.55	2.00
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	45.00	2.00	0.00	1.70	0.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	1.00	0.00	0.00	1.00
COLEOPTERA	ELMIDAE	Optioservus (Adult)	2.25	0.00	27.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus (Pupa)	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	3.00	0.00	0.00
COLEOPTERA	GYRINIDAE	Gyrinidae	0.00	1.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	6.75	1.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae (Adult)	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	0.00	3.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	2.25	0.00	0.00	6.80	3.00
DIPTERA	ATHERICIDAE	Atherix	2.25	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	0.00	0.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	81.00	69.00	6.00	49.30	9.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	0.00	0.00	.85	0.00
DIPTERA	EMPIDIDAE	Clinocera	0.00	1.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	3.00	9.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Maruina	0.00	0.00	3.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	0.00	0.00	0.00	1.00
DIPTERA	SIMULIIDAE	Simuliidae	29.25	36.00	99.00	1.70	5.00
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanidae (Pupa)	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Dicranota	0.00	1.00	0.00	0.00	2.00
DIPTERA	TIPULIDAE	Hesperoconopa	0.00	5.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	2.25	1.00	3.00	2.55	1.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Tipula	0.00	0.00	3.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	45.00	109.00	171.00	11.90	15.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	84.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	19.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemera	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	0.00	0.00	12.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Timpanoga	0.00	11.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	6.75	13.00	30.00	.85	4.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	24.75	5.00	102.00	14.45	30.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	0.00	0.00	3.00	0.00	1.00
EPHEMEROPTERA	HEPTAGENIIDAE	Heptagenia	0.00	0.00	0.00	1.70	1.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	0.00	3.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	P. bicornuta	0.00	0.00	0.00	6.80	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	4.50	5.00	0.00	7.65	6.00
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	1.00
NEMATODA	UNIDENTIFIED	Unidentified	0.00	0.00	6.00	0.00	2.00
ODONATA	GOMPHIDAE	Octogomphus	0.00	0.00	0.00	0.00	2.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	0.00	1.00	0.00	0.00	2.00
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	6.80	15.00
OLIGOCHAETA	NAIDIDAE	Naididae	0.00	1.00	0.00	4.25	5.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Capniidae	0.00	0.00	0.00	.85	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	0.00	0.00	18.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	20.25	9.00	36.00	27.20	28.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	0.00	0.00	2.00
PLECOPTERA	NEMOURIDAE	Amphinemura	2.25	0.00	0.00	.85	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	11.25	44.00	45.00	3.40	12.00
PLECOPTERA	PELTOPERLIDAE	Soliperla	0.00	0.00	0.00	0.00	3.00
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	40.50	4.00	27.00	20.40	2.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	99.00	0.00	198.00	26.35	22.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	9.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	1.00
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Puget Lowland Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Dewatto River	Seabeck Creek	Snow Creek	Tahuya River	Toboton Creek
PLECOPTERA	PERLODIDAE	Setvena	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	0.00	19.00	0.00	0.00	4.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	0.00	0.00	0.00	1.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	1.00	0.00	2.55	1.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	1.00	0.00	0.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	4.00	12.00	0.00	1.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	0.00	0.00	24.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	1.70	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	33.75	0.00	21.00	2.55	12.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	2.25	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Apatania	2.25	1.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Clostoecca	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Dicosmoecus	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisocosmoecus	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	72.00	1.00	3.00	10.20	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	0.00	3.00	.85	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	6.75	2.00	3.00	5.10	2.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	2.25	3.00	18.00	.85	0.00
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	.85	0.00

Note: Seabeck Creek Fall 1990 and Winter 1991 benthic macroinvertebrate samples were collected at an upstream location. Spring 1991 and Summer 1991 macroinvertebrate samples were collected near the mouth of Seabeck Creek.

Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
ACARI	UNIDENTIFIED	Hydracarina	2.25	0.00	0.00	0.00	6.00	18.00
COLEOPTERA	CHRYSOMELIDAE	Donacia (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	DYTISCIDAE	Hydaticus	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	DYTISCIDAE	Hydrovatus	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	0.00	0.00	0.00	3.00	24.00
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	0.00	0.00	0.00	0.00	0.00	21.00
COLEOPTERA	ELMIDAE	Optioservus	0.00	9.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus (Adult)	0.00	0.00	6.00	0.00	3.00	0.00
COLEOPTERA	ELMIDAE	Optioservus (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Stenelmis	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	GYRINIDAE	Gyrinidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae (Adult)	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	0.00	0.00	0.00	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	2.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	ATHERICIDAE	Atherix	0.00	9.00	0.00	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	36.00	33.75	69.00	174.00	105.00	54.00
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	2.25	0.00	0.00	2.00	33.00	3.00
DIPTERA	EMPIDIDAE	Clinocera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	6.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	0.00	0.00	0.00	0.00	0.00	6.00
DIPTERA	PSYCHODIDAE	Maruina	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	0.00	0.00	6.00	2.00	0.00	15.00
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanidae (Pupa)	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	0.00	0.00	0.00	0.00	3.00	6.00
DIPTERA	TIPULIDAE	Dicranota	2.25	2.25	0.00	46.00	3.00	0.00
DIPTERA	TIPULIDAE	Hesperoconopa	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	4.50	4.50	0.00	16.00	18.00	3.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	2.00	0.00	0.00
DIPTERA	TIPULIDAE	Tipula	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified	2.25	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	0.00	0.00	0.00	6.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	171.00	202.50	321.00	92.00	132.00	93.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	2.25	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	9.00	2.25	42.00	2.00	18.00	33.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	20.25	30.00	4.00	0.00	3.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemera	2.25	0.00	3.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	0.00	0.00	4.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	4.50	6.75	108.00	4.00	0.00	57.00
EPHEMEROPTERA	EPHEMERELLIDAE	Timpanoga	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	4.50	40.50	0.00	38.00	60.00	18.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	9.00	0.00	6.00	0.00	150.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	15.75	85.50	6.00	0.00	3.00	15.00
EPHEMEROPTERA	HEPTAGENIIDAE	Heptagenia	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	22.50	27.00	21.00	18.00	39.00	3.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	P. bicornuta	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	13.50	6.75	0.00	0.00	0.00	0.00
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	0.00	0.00	24.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	0.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	0.00	0.00
NEMATODA	UNIDENTIFIED	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
ODONATA	GOMPHIDAE	Octogomphus	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	0.00	0.00	0.00	2.00	0.00	15.00
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	38.25	189.00	9.00	0.00	39.00	0.00
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CAPNIIDAE	Capniidae	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	62.00	0.00	9.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	2.25	3.00	0.00	0.00	12.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	2.25	11.25	15.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	78.75	22.50	186.00	0.00	63.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	0.00	4.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Amphinemura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	9.00	2.25	3.00	26.00	9.00	3.00
PLECOPTERA	PELTOERLIDAE	Soliperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PELTOERLIDAE	Yoraperla	0.00	0.00	0.00	10.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	0.00	4.50	3.00	0.00	0.00	12.00
PLECOPTERA	PERLIDAE	Claassenia	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	11.25	0.00	9.00	12.00	0.00	24.00
PLECOPTERA	PERLIDAE	Hesperoperla	0.00	9.00	9.00	16.00	9.00	66.00
PLECOPTERA	PERLODIDAE	Cultus	2.25	2.25	0.00	0.00	3.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	3.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00	24.00
PLECOPTERA	PERLODIDAE	Setvena	0.00	0.00	0.00	0.00	6.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	40.50	2.25	27.00	10.00	117.00	33.00
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	6.00	0.00
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Cascade Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Middle Fork					
			American River	Entiat River	Greenwater River	Hedrick Creek	Teanaway River	Trapper Creek
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	0.00	4.50	0.00	0.00	0.00	6.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	8.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	9.00	24.75	3.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	0.00	0.00	0.00	0.00	3.00	9.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	0.00	0.00	0.00	0.00	6.00	3.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	0.00	0.00	0.00	0.00	3.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	6.75	18.00	3.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	0.00	0.00	6.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	4.50	12.00	0.00	30.00	3.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	12.00	0.00	3.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Apatania	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Clostoeca	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Dicosmoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNephilidae	Ecclisocosmoecus	0.00	0.00	0.00	0.00	0.00	9.00
TRICHOPTERA	LIMNephilidae	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	18.00
TRICHOPTERA	LIMNephilidae	Moselyana	0.00	0.00	0.00	0.00	0.00	3.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	24.75	13.50	18.00	0.00	3.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	4.50	0.00	0.00	12.00	0.00	3.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	9.00	0.00	0.00	2.00	0.00	36.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	11.25	9.00	12.00	6.00	0.00	0.00
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	0.00	2.25	0.00	0.00	6.00	0.00
TRICLADIDA	PLANARIIDAE	Planariidae	2.25	2.25	6.00	0.00	0.00	18.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little		North Fork		Spring	Umtanum
			Cummings	Klickitat	Asotin	Naneum		
			Creek	River	Creek	Creek	Creek	Creek
ACARI	UNIDENTIFIED	Hydracarina	2.00	2.50	6.75	3.00	8.00	0.00
COLEOPTERA	CHRYSOMELIDAE	Donacia (Adult)	0.00	2.50	0.00	0.00	0.00	0.00
COLEOPTERA	DYTISCIDAE	Hydaticus	0.00	0.00	0.00	0.00	4.00	0.00
COLEOPTERA	DYTISCIDAE	Hydrovatus	0.00	0.00	0.00	0.00	6.00	0.00
COLEOPTERA	ELMIDAE	Cleptelmis	0.00	0.00	2.25	15.00	0.00	0.00
COLEOPTERA	ELMIDAE	Heterlimnius	0.00	2.50	0.00	0.00	0.00	10.50
COLEOPTERA	ELMIDAE	Heterlimnius (Adult)	12.00	2.50	0.00	0.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus	72.00	5.00	78.75	30.00	10.00	14.00
COLEOPTERA	ELMIDAE	Optioservus (Adult)	56.00	0.00	38.25	15.00	0.00	0.00
COLEOPTERA	ELMIDAE	Optioservus (Pupa)	0.00	0.00	0.00	0.00	0.00	5.25
COLEOPTERA	ELMIDAE	Stenelmis	6.00	2.50	0.00	0.00	0.00	5.25
COLEOPTERA	GYRINIDAE	Gyrinidae	0.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae	2.00	0.00	0.00	0.00	0.00	0.00
COLEOPTERA	HYDROPHILIDAE	Hydrophilidae (Adult)	0.00	0.00	0.00	0.00	2.00	0.00
COLEOPTERA	PSEPHENIDAE	Psephenus	0.00	32.50	0.00	0.00	0.00	0.00
COLLEMBOLA	UNIDENTIFIED	Collembola	0.00	0.00	0.00	0.00	0.00	0.00
DECAPODA	ASTACIDAE	Pacifasticus leniusculus	6.00	2.50	2.25	3.00	0.00	49.00
DIPTERA	ATHERICIDAE	Atherix	2.00	0.00	15.75	0.00	0.00	0.00
DIPTERA	BLEPHARICERIDAE	Agathon	0.00	0.00	20.25	0.00	0.00	0.00
DIPTERA	CERATOPOGONIDAE	Bezzia	0.00	0.00	0.00	3.00	0.00	0.00
DIPTERA	CHIRONOMIDAE	Chironomidae	16.00	400.00	119.25	309.00	94.00	36.75
DIPTERA	CHIRONOMIDAE	Chironomidae (Pupa)	0.00	25.00	6.75	3.00	8.00	3.50
DIPTERA	EMPIDIDAE	Clinocera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	EMPIDIDAE	Oreogeton	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PELECORHYNCHIDAE	Glutops	20.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PSYCHODIDAE	Maruina	8.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	PTYCHOPTERIDAE	Ptychoptera	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	SIMULIIDAE	Simuliidae	6.00	0.00	15.75	339.00	8.00	1.75
DIPTERA	SIMULIIDAE	Simuliidae (Pupa)	0.00	0.00	0.00	6.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanidae (Pupa)	0.00	0.00	4.50	0.00	0.00	0.00
DIPTERA	TABANIDAE	Tabanus	2.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Antocha	2.00	0.00	47.25	12.00	6.00	0.00
DIPTERA	TIPULIDAE	Dicranota	0.00	0.00	18.00	0.00	6.00	1.75
DIPTERA	TIPULIDAE	Hesperoconopa	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Hexatoma	0.00	12.50	0.00	3.00	0.00	0.00
DIPTERA	TIPULIDAE	Limnophila	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Tipula	0.00	0.00	0.00	0.00	2.00	1.75
DIPTERA	TIPULIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	0.00
DIPTERA	TIPULIDAE	Unidentified (Pupa)	0.00	0.00	0.00	0.00	2.00	0.00
EPHEMEROPTERA	BAETIDAE	Baetis	68.00	55.00	270.00	390.00	66.00	54.25
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella coloradensis	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella doddsi	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Drunella spinifera	0.00	0.00	0.00	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little		North Fork		Spring	Umtanum
			Cummings	Klickitat	Asotin	Naneum		
			Creek	River	Creek	Creek	Creek	Creek
EPHEMEROPTERA	EPHEMERELLIDAE	Ephemera	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Eurylophella	0.00	7.50	4.50	3.00	14.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Serratella	14.00	0.00	9.00	21.00	0.00	0.00
EPHEMEROPTERA	EPHEMERELLIDAE	Timpanoga	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #1	0.00	0.00	6.75	6.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Cinygmula #2	20.00	37.50	13.50	90.00	6.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Epeorus	6.00	10.00	0.00	3.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Heptagenia	0.00	2.50	0.00	0.00	0.00	0.00
EPHEMEROPTERA	HEPTAGENIIDAE	Rhithrogena	0.00	0.00	0.00	0.00	0.00	0.00
EPHEMEROPTERA	LEPTOPHLEBIIDAE	P. bicornuta	0.00	0.00	0.00	0.00	0.00	10.50
EPHEMEROPTERA	LEPTOPHLEBIIDAE	Paraleptophlebia	0.00	7.50	0.00	12.00	2.00	138.25
EPHEMEROPTERA	SIPHONURIDAE	Ameletus	0.00	0.00	0.00	0.00	0.00	0.00
GASTROPODA	PHYSIDAE	Physa	0.00	0.00	0.00	0.00	8.00	0.00
GASTROPODA	PLANORBIDAE	Gyraulus	0.00	0.00	0.00	0.00	2.00	0.00
MEGALOPTERA	SIALIDAE	Sialis	0.00	0.00	0.00	0.00	4.00	1.75
NEMATODA	UNIDENTIFIED	Unidentified	0.00	15.00	0.00	57.00	2.00	1.75
ODONATA	GOMPHIDAE	Octogomphus	0.00	0.00	0.00	0.00	0.00	0.00
OLIGOCHAETA	LUMBRICULIDAE	Lumbriculidae	14.00	15.00	6.75	3.00	12.00	5.25
OLIGOCHAETA	LUMBRICULIDAE	Rhynchelmis	0.00	0.00	0.00	3.00	4.00	0.00
OLIGOCHAETA	NAIDIDAE	Naididae	14.00	7.50	9.00	123.00	4.00	5.25
PELECYPODA	SPHAERIIDAE	Pisidium	0.00	0.00	18.00	6.00	2.00	0.00
PLECOPTERA	CAPNIIDAE	Capniidae	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Haploperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Kathroperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Neaviperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	CHLOROPERLIDAE	Sweltsa	24.00	7.50	4.50	75.00	0.00	0.00
PLECOPTERA	LEUCTRIDAE	Perlomyia	0.00	0.00	11.25	0.00	0.00	0.00
PLECOPTERA	NEMOURIDAE	Amphinemura	0.00	0.00	0.00	0.00	0.00	12.25
PLECOPTERA	NEMOURIDAE	Nemoura	0.00	0.00	0.00	0.00	2.00	0.00
PLECOPTERA	NEMOURIDAE	Zapada	12.00	22.50	0.00	36.00	98.00	49.00
PLECOPTERA	PELTOPERLIDAE	Soliperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PELTOPERLIDAE	Yoraperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Calineuria	26.00	35.00	0.00	0.00	0.00	7.00
PLECOPTERA	PERLIDAE	Claassenia	8.00	0.00	0.00	18.00	0.00	0.00
PLECOPTERA	PERLIDAE	Doroneuria	0.00	2.50	0.00	0.00	0.00	0.00
PLECOPTERA	PERLIDAE	Hesperoperla	56.00	2.50	33.75	18.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Cultus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Isoperla	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Kogotus	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Perlinodes	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Setvena	0.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	PERLODIDAE	Skwala	4.00	7.50	4.50	6.00	38.00	8.75
PLECOPTERA	PERLODIDAE	Unidentified	0.00	0.00	0.00	0.00	0.00	1.75
PLECOPTERA	PTERONARCYIDAE	Pteronarcella	0.00	0.00	6.75	0.00	0.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Summer 1991 Synoptic Taxonomic List: Columbia Basin Streams

Benthic Macroinvertebrate Mean Abundance Tables
(Density of Organisms/Square Meter)

Order	Family	Genus/Species	Little		North Fork		Spring	Umtanum
			Cummings	Klickitat	Asotin	Naneum		
			Creek	River	Creek	Creek	Creek	Creek
PLECOPTERA	PTERONARCYIDAE	Pteronarcys	22.00	0.00	0.00	0.00	0.00	0.00
PLECOPTERA	TAENIOPTERYGIDAE	Taenionema	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Brachycentrus	0.00	0.00	256.50	0.00	0.00	0.00
TRICHOPTERA	BRACHYCENTRIDAE	Micrasema	2.00	0.00	22.50	6.00	18.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma	4.00	5.00	40.50	6.00	4.00	0.00
TRICHOPTERA	GLOSSOSOMATIDAE	Glossosoma (Pupa)	12.00	17.50	33.75	3.00	2.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Arctopsyche	24.00	0.00	0.00	45.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche	0.00	0.00	0.00	3.00	0.00	0.00
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche	0.00	182.50	0.00	12.00	0.00	10.50
TRICHOPTERA	HYDROPSYCHIDAE	Hydropsyche	0.00	70.00	18.00	15.00	120.00	77.00
TRICHOPTERA	HYDROPSYCHIDAE	Parapsyche	0.00	0.00	0.00	0.00	6.00	0.00
TRICHOPTERA	LEPIDOSTOMATIDAE	Lepidostoma	0.00	2.50	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Apatania	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Clostoeca	0.00	2.50	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Dicosmoecus	2.00	2.50	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisocosmoecus	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Ecclisomyia	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	LIMNEPHILIDAE	Moselyana	0.00	0.00	0.00	0.00	0.00	0.00
TRICHOPTERA	POLYCENTROPODIDAE	Polycentropus	16.00	5.00	4.50	33.00	4.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #1	0.00	0.00	2.25	0.00	0.00	0.00
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila #2	0.00	0.00	9.00	12.00	0.00	1.75
TRICHOPTERA	RHYACOPHILIDAE	Rhyacophila (Pupa)	0.00	0.00	0.00	0.00	0.00	7.00
TRICHOPTERA	UNIDENTIFIED	Unidentified (Pupa)	0.00	0.00	4.50	9.00	2.00	0.00
TRICLADIDA	PLANARIIDAE	Planariidae	0.00	0.00	0.00	0.00	10.00	0.00

Note: Mean density of taxa were calculated from two replicate transect collections that were two-square meters each in substrate area sampled.

Appendix F
Surface Water Quality Tables

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Bingham Creek Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen		Discharge (cubic ft./sec)
						Oxygen (mg/L)	Saturation (% O2 Sat.)	
8	Apr	1991	6.1	7.2	48.0	13.3	110.0	12.55
12	Aug	1991						0.00
13	Dec	1990	6.5	7.5	54.0	12.9	107.0	17.16
5	Feb	1991	6.3	7.3	47.0	13.0	108.0	74.59
8	Jan	1991	4.9	7.3	59.0	13.0	104.0	3.91
17	June	1991	8.1	6.6	70.0	11.6	101.0	0.00
18	Mar	1991	7.1	7.1	61.0	13.6	115.0	.04
7	May	1991	8.0	6.9	77.0	11.4	99.0	.01
27	Nov	1990	6.9	7.3	56.0	14.2	119.0	40.34

Note: Extreme low discharge occurred during June 1991 sampling and the stream was dry during the August 1991 sampling date.

Bingham Creek Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
8	Apr	1991	0	21	15	1.2	.01	.11	.01		.16
12	Aug	1991									
13	Dec	1990	1	24	15	2.5	.01	.21	.01		.28
5	Feb	1991	7	18	15	2.0	.01	.14	.03	.02	.10
8	Jan	1991	1	21	17	.8	.01	.24	.01		.10
17	June	1991	0	29	24	1.6	.01	.13	.01		.01
18	Mar	1991	0	27	19	3.8	.01	.11	.02		.10
7	May	1991	0	29	25	2.1	.01	.10	.04	.01	.10
27	Nov	1990	2	22	18	1.5	.01	.24	.02		.35

Note: Extreme low discharge occurred during June 1991 sampling and the stream was dry during the August 1991 sampling date.

Dewatto River Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature	pH	Conductivity	Dissolved	Oxygen	Discharge
			(Celsius)	(units)	(umhos/cm)	Oxygen	Saturation	
						(mg/L)	(%O2 Sat.)	(cubic ft./sec)
8	Apr	1991	7.3	7.2	24.0	12.6	105.0	41.56
13	Aug	1991	15.5	6.7	65.0	8.7	88.0	2.55
13	Dec	1990	5.8	6.9	28.0	12.4	100.0	27.39
5	Feb	1991	6.7	6.9	21.0	13.2	109.0	16.87
8	Jan	1991	2.5	7.4	48.0	13.3	98.0	14.06
17	June	1991	12.0	7.0	56.0	9.2	86.0	3.32
18	Mar	1991	6.8	7.2	38.0	13.0	107.0	9.37
8	May	1991	10.6	7.7	45.0	10.4	94.0	8.78
26	Nov	1990	7.7	7.0	33.0	13.3	112.0	

Dewatto River Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
8	Apr	1991	.4	11	10	3.0	.01	.02	.01		.01
13	Aug	1991	.7	30	28	3.9	.01	.06	.01	.02	.19
13	Dec	1990	1.0	12	10	3.5	.01	.11	.01		.32
5	Feb	1991	1.0	6	7	3.1	.01	.07	.01	.01	.10
8	Jan	1991	1.0	16	16	2.9	.02	.21	.03		.10
17	June	1991	.5	26	25	2.6	.01	.04	.01		.12
18	Mar	1991	.6	14	11	3.2	.01	.06	.01		.12
8	May	1991	1.1	19	20	3.0	.01	.05	.01	.02	3.90
26	Nov	1990	1.0	11	13	4.3	.01	.22	.01	.01	.41

Seabeck Creek Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
8	Apr	1991	6.9	7.0	29.0	13.2	109.0	6.85
12	Aug	1991	12.8	7.4	98.0	9.8	93.0	.38
13	Dec	1990	5.8	7.5	33.0	12.7	102.0	4.89
5	Feb	1991	7.0	7.1	28.0	13.2	109.0	36.08
8	Jan	1991	1.2	7.2	41.0	13.4	95.0	
17	June	1991	10.7	7.5	91.0	10.6	96.0	.27
18	Mar	1991	5.9	7.0	37.0	13.2	106.0	6.85
7	May	1991	9.4	7.6	81.0	11.4	100.0	1.10
26	Nov	1990	7.4	7.6	34.0	14.0	117.0	10.46

Seabeck Creek Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
8	Apr	1991	.5	9	11	3.1	.01	.15	.01		.10
12	Aug	1991	.5	42	44	2.8	.01	.45	.02	.03	.43
13	Dec	1990	1.0	11	13	4.1	.01	.33	.01		.56
5	Feb	1991	3.7	6	8	4.3	.02	.26	.02	.01	.13
8	Jan	1991	1.0	9	14	3.6	.02	.40	.01		.10
17	June	1991	.2	39	37	1.5	.01	.42	.01		.42
18	Mar	1991	.1	12	11	3.4	.01	.25	.01		.10
7	May	1991	.4	33	34	2.1	.01	.28	.15	.01	.61
26	Nov	1990	1.0	8	19	5.8	.01	.57	.01	.01	.68

Snow Creek Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
8	Apr	1991	5.1	8.0	69.0	14.4	114.0	43.81
12	Aug	1991	13.1	7.2	135.0	10.0	96.0	3.45
13	Dec	1990	3.4	7.5	78.0	13.4	102.0	21.66
5	Feb	1991	5.8	7.6	64.0	13.4	108.0	24.97
8	Jan	1991	1.5	7.5	106.0	13.8	99.0	5.28
17	June	1991	9.4	7.7	70.0	10.8	95.0	14.24
18	Mar	1991	4.5	8.2	88.0	14.0	109.0	15.63
7	May	1991	9.2	8.0	102.0	11.6	102.0	8.27
26	Nov	1990	3.9	7.7	80.0	14.9	115.0	32.43

Snow Creek Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
8	Apr	1991	3.1	21	25	5.7	.01	.38	.01		.01
12	Aug	1991	.3	55	54	5.9	.01	.11	.02	.02	.19
13	Dec	1990	2.0	25	29	8.0	.01	.83	.02		1.07
5	Feb	1991	33.0	13	25	8.8	.01	.76	.11	.03	.10
8	Jan	1991	1.0	36	41	4.0	.01	.47	.03		.45
17	June	1991	.8	34	35	5.7	.01	.11	.02		.19
18	Mar	1991	.8	26	30	6.4	.01	.34	.02		.10
7	May	1991	.8	38	39	4.1	.01	.05	.02	.01	.10
26	Nov	1990	4.7	21	31	13.9	.01	1.33	.04	.01	1.43

Tahuya River Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
8	Apr	1991	.5	18	18	2.8	.01	.03	.01		.36
13	Aug	1991	.5	29	27	5.1	.01	.01	.01	.01	.14
13	Dec	1990	1.0	12	11	3.8	.01	.18	.01		.37
5	Feb	1991	1.1	13	14	3.3	.01	.14	.01	.01	.10
8	Jan	1991	1.0	18	20	1.9	.02	.17	.01		.10
17	June	1991	.7	27	26	2.6	.01	.01	.01		.15
18	Mar	1991	.3	20	20	3.0	.02	.06	.01		.10
8	May	1991	1.2	23	22	2.7	.01	.01	.01	.01	.10
26	Nov	1990	1.0	17	19	4.0	.01	.24	.01	.01	.42

Tahuya River Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature	pH	Conductivity	Dissolved Oxygen	Oxygen Saturation	Discharge
			(Celsius)	(units)	(umhos/cm)	(mg/L)	(%O2 Sat.)	(cubic ft./sec)
8	Apr	1991	7.5	7.2	42.0	12.3	104.0	90.47
13	Aug	1991	15.7	6.6	66.0	8.6	88.0	.21
13	Dec	1990	5.6	7.2	47.0	12.1	98.0	67.08
5	Feb	1991	6.9	6.8	41.0	12.8	107.0	29.27
8	Jan	1991	1.5	7.0	50.0	13.2	96.0	25.12
17	June	1991	14.2	7.2	56.0	9.2	91.0	2.39
18	Mar	1991	6.8	7.1	53.0	13.0	108.0	25.04
8	May	1991	11.1	7.8	56.0	10.3	95.0	16.54
26	Nov	1990	7.6	7.0	54.0	12.7	108.0	

Toboton Creek Surface Water Field Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cu.ft/sec)
9	Apr	1991	6.9	7.2	60.0	12.3	103.0	11.98
14	Aug	1991	13.4	6.7	124.0	9.6	93.0	1.55
14	Dec	1990	4.7	7.5	79.0	13.4	106.0	4.83
7	Feb	1991	4.0	7.1	66.0	12.7	98.0	9.32
9	Jan	1991	1.3	7.4	72.0	14.2	102.0	7.68
18	June	1991	10.4	7.0	99.0	10.4	95.0	1.01
19	Mar	1991	5.2	7.6	74.0	14.1	113.0	4.36
8	May	1991	9.6	7.3	79.0	10.4	93.0	6.76
27	Nov	1990	5.9	7.2	72.0	13.1	107.0	7.49

Toboton Creek Surface Water Laboratory Parameters

Puget Lowlands Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
9	Apr	1991	4.9	25	25	8.8	.05	.08	.02		1.05
14	Aug	1991	2.2	53	47	5.2	.01	.04	.06	.04	.17
14	Dec	1990	3.0	30	24	11.3	.02	.28	.04		.81
7	Feb	1991	4.2	22	23	14.4	.01	.15	.03	.02	.10
9	Jan	1991	6.1	21	23	11.6	.07	.40	.03		.21
18	June	1991	2.8	44	39	5.8	.01	.03	.21		.05
19	Mar	1991	8.5	31	27	7.2	.01	.02	.04		.30
8	May	1991	6.8	33	32	12.7	.02	.05	.09	.01	.35
27	Nov	1990	3.7	20	28	19.3	.01	.14	.08		.79

Entiat River Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
16	Apr	1991	4.1	7.2	46.0	11.6	95.0	261.39
29	Aug	1991	9.7	7.2	42.0	10.8	102.0	206.85
5	Dec	1990	1.8	7.1	39.0	14.3	110.0	327.14
12	Feb	1991	2.4	8.0	48.0	12.9	101.0	151.16
10	Jan	1991	.5	7.3	50.0	13.9	104.0	115.31
24	June	1991	7.7	6.8	34.0	10.6	95.0	1393.15
21	Mar	1991	3.3	7.0	47.0	13.9	112.0	184.88
21	May	1991	5.8	6.9	43.0	12.0	103.0	2062.08
12	Nov	1990	3.1	7.0	35.0	15.1	121.0	70.67

Entiat River Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphorus (mg/L)	Total Persulfate-N (mg/L)
16	Apr	1991	1.9	19	18	2.6	.01	.01	.01		.10
29	Aug	1991	1.6	16	13	2.4	.01	.01	.01	.01	.10
5	Dec	1990	1.0	16	15	2.2	.01	.02	.01		.14
12	Feb	1991	1.0	19	17	1.8	.01	.01	.01	.02	.10
10	Jan	1991	1.0	18	16	1.3	.01	.02	.01		.10
24	June	1991	.5	12	11	1.2	.01	.01	.01		.10
21	Mar	1991	.1	20	17	2.1	.01	.01	.01		.12
21	May	1991	4.5	12	12	2.2	.02	.02	.07	.02	.10
12	Nov	1990	1.0	15	13	2.8	.01	.03	.01	.03	.01

Greenwater River Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved	Oxygen	Discharge (cubic ft./sec)
						Oxygen	Saturation	
			(Celsius)	(units)	(umhos/cm)	(mg/L)	(%O2 Sat.)	
9	Apr	1991	3.8	7.8	55.0	14.3	118.0	230.35
14	Aug	1991	15.6	6.9	82.0	9.0	98.0	36.44
14	Dec	1990	2.9	7.1	54.0	12.9	104.0	183.65
6	Feb	1991	4.4	7.8	49.0	13.8	116.0	317.54
9	Jan	1991	2.4	7.4	63.0	13.8	110.0	79.97
18	June	1991	10.1	7.4	56.0	10.1	98.0	192.03
19	Mar	1991	3.9	8.4	56.0	13.2	109.0	128.10
9	May	1991	4.4	7.4	53.0	11.8	99.0	235.02
21	Nov	1990	4.3	7.8	59.0	14.6	123.0	

Greenwater River Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
9	Apr	1991	1.0	23	20	1.2	.01	.01	.01		10.00
14	Aug	1991	.2	29	21	2.9	.02	.01	.03	.02	.10
14	Dec	1990	1.2	25	17	1.8	.01	.03	.03		.17
6	Feb	1991	1.5	21	17	2.5	.01	.02	.02	.03	.10
9	Jan	1991	1.0	26	21	1.1	.01	.01	.01		.10
18	June	1991	.5	23	17	1.5	.01	.01	.02		.10
19	Mar	1991	2.4	24	19	1.3	.01	.01	.02		.10
9	May	1991	2.9	23	18	1.8	.01	.01	.03	.02	.10
21	Nov	1990	1.0	25	21	1.8	.01	.02	.03	.02	.09

Hedrick Creek Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
15	Apr	1991	6.6	7.3	56.0	14.4	122.0	5.87
28	Aug	1991	11.4	7.3	76.0	11.0	104.0	2.57
20	Dec	1990	.3	7.3	48.0	12.1	87.0	7.88
8	Feb	1991	4.8	7.2	45.0	13.5	109.0	25.12
14	Jan	1991	3.9	7.4	34.0	13.8	109.0	34.53
24	June	1991	9.8	7.0	40.0	9.9	91.0	7.86
20	Mar	1991	5.5	7.3	57.0	14.2	117.0	4.43
9	May	1991	5.5	7.3	38.0	11.4	94.0	14.36
20	Nov	1990	3.1	7.3	47.0	15.7	121.0	14.40

Hedrick Creek Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total - Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Perulfate-N (mg/L)
15	Apr	1991	1.5	24	23	1.2	.02	.01	.01		.10
28	Aug	1991	1.5	28	43	3.9	.01	.07	.01	.01	.13
20	Dec	1990	1.0	21	20	2.5	.01	.07	.01		.10
8	Feb	1991	3.8	18	17	2.1	.01	.06	.01	.01	
14	Jan	1991	5.1	16	16	4.7	.07	.07	.01		.10
24	June	1991	1.0	19	17	1.6	.01	.01	.01		.10
20	Mar	1991	.4	25	21	3.0	.01	.01	.01		.10
9	May	1991	2.5	18	20	1.7	.01	.01	.01	.01	.01
20	Nov	1990	1.0	20	21	2.0	.01	.11	.01	.01	.01

Middle Fork Teanaway River Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved	Oxygen	Discharge (cubic ft./sec)
						Oxygen (mg/L)	Saturation (%O2 Sat.)	
16	Apr	1991	5.7	7.6	99.0	10.8	95.0	127.73
29	Aug	1991	15.3	7.5	120.0	8.2	90.0	7.80
19	Dec	1990	0.0	7.1	102.0	13.6	102.0	
11	Feb	1991	4.2	7.9	112.0	11.4	96.0	32.54
17	Jan	1991	3.2	7.8	90.0	11.8	97.0	124.00
25	June	1991	8.7	7.4	66.0	10.3	97.0	42.79
15	Mar	1991	3.8	7.5	102.0	12.8	107.0	45.07
21	May	1001	8.5	7.4	70.0	10.5	99.0	
21	Nov	1990	2.8	8.0	92.0	14.5	118.0	59.01

Middle Fork Teanaway Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
16	Apr	1991	2.0	45	43	3.1	.01	.01	.01		.10
29	Aug	1991	1.6	55	53	2.4	.01	.01	.01	.01	.10
19	Dec	1990	1.3	47	45	3.9	.01	.01	.01		.10
11	Feb	1991	1.3	46	44	2.9	.01	.01	.01	.02	.10
17	Jan	1991	3.8	44	41	2.3	.01	.01	.01		.10
25	June	1991	.5	30	27	1.2	.01	.01	.01		.10
15	Mar	1991	1.6	47	45	3.5	.01	.03	.01		.10
21	May	1001	5.3	27	28	3.0	.03	.02	.02	.02	
21	Nov	1990	1.0	42	40	2.7	.01	.01	.01	.01	.05

American River Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
16	Apr	1991	5.6	7.3	68.0	11.3	100.0	227.00
29	Aug	1991	9.1	7.4	79.0	9.8	95.0	144.00
6	Dec	1990	1.7	8.1	54.0	12.1	97.0	192.00
13	Feb	1991	3.5	8.2	61.0	11.8	99.0	280.00
11	Jan	1991	1.7	6.9	71.0	12.1	97.0	92.00
25	June	1991	7.2	7.0	52.0	9.9	92.0	404.00
22	Mar	1991	2.4	7.3	69.0	12.7	104.0	132.00
20	May	1991	6.4	7.3	46.0	10.0	91.0	565.00
13	Nov	1990	5.2	9.0	53.0	13.6	120.0	188.00

American River Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
16	Apr	1991	1.2	28	27	2.0	.01	.02	.01		.10
29	Aug	1991	3.7	31	53	2.9	.01	.01	.03		.10
6	Dec	1990	1.0	24	23	3.4	.01	.02	.01		.14
13	Feb	1991	1.0	25	23	3.4	.01	.01	.01	.02	.10
11	Jan	1991	1.0	28	26	1.0	.01	.01	.01		.10
25	June	1991	.9	19	20	1.7	.01	.01	.01	.10	.10
22	Mar	1991	.7		25	1.6	.01	.01	.01		.10
20	May	1991	3.3	20	20	2.8	.02	.02	.05	.02	.10
13	Nov	1990	1.0	21	19	1.6	.01	.01	.01	.01	.01

Trapper Creek Surface Water Field Parameters

Cascades Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
10	Apr	1991	3.9	7.0	39.0	13.1	106.0	100.14
19	Aug	1991	14.6	6.9	104.0	8.8	92.0	3.98
17	Dec	1990	3.6	7.4	50.0	13.6	109.0	45.49
14	Feb	1991	5.4	7.4	44.0	11.4	96.0	1.03
15	Jan	1991	4.6	7.2	28.0	12.7	105.0	
19	June	1991	9.5	7.1	65.0	10.0	94.0	10.60
13	Mar	1991	3.4	7.4	48.0	13.8	111.0	40.39
13	May	1991	5.8	7.2	48.0	13.6	116.0	54.66
16	Nov	1990	5.6	7.1	43.0	14.4	122.0	77.58

Trapper Creek Surface Water Laboratory Parameters

Cascades Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
10	Apr	1991	.2	16	15	1.0	.01	.03	.01		.10
19	Aug	1991	.8	34	32	2.2	.04	.04	.01	.01	.12
17	Dec	1990	1.0	19	19	1.2	.01	.02	.02		.10
14	Feb	1991	1.0	13	11	2.0	.01	.01	.01	.00	.10
15	Jan	1991	3.2	12	10	2.5	.01	.01	.01		.10
19	June	1991	.2	24	21	1.0	.01	.03	.01		.10
13	Mar	1991	1.5	19	16	2.5	.01	.01	.06		.10
13	May	1991	.3	16	12	1.7	.01	.01	.01	.02	.10
16	Nov	1990	1.0	17	15	1.2	.01	.01	.01	.01	.01

Cummings Creek Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
11	Apr	1991	4.5	7.6	85.0	11.6	98.0	10.28
20	Aug	1991	15.8	7.7	110.0	9.2	101.0	2.48
18	Dec	1990	3.2	7.9	98.0	12.1	98.0	4.75
20	Feb	1991	7.2	8.0	91.0	11.0	99.0	8.19
16	Jan	1991	4.1	8.1	82.0	12.5	104.0	9.90
20	June	1991	9.6	7.4	76.0	9.6	92.0	6.18
14	Mar	1991	4.4	7.7	89.0	14.2	119.0	9.12
14	May	1991	8.4	7.4	82.0	10.4	97.0	10.51
14	Nov	1990	6.0	7.6	100.0	13.8	121.0	3.39

Cummings Creek Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
11	Apr	1991	2.5	38	33	2.8	.02	.10	.05		4.60
20	Aug	1991	2.3	51	42	3.6	.04	.07	.07	.04	.18
18	Dec	1990	1.0	47	41	2.4	.01	.06	.03		.10
20	Feb	1991	3.2	38	32	4.3	.01	.04	.05	.04	.10
16	Jan	1991	6.3	44	39	3.0	.01	.16	.06		.01
20	June	1991	1.6	43	37	2.2	.01	.02	.05		.10
14	Mar	1991	2.6	41	35	5.6	.01	.03	.05		.10
14	May	1991	1.8	37	32	4.9	.01	.01	.03	.04	.10
14	Nov	1990	1.0	48	42	2.5	.01	.02	.04	.05	.01

Little Klickitat River Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
10	Apr	1991	7.7	7.5	69.0	12.6	113.0	101.25
19	Aug	1991	28.3	8.5	112.0	8.4	115.0	.81
17	Dec	1990	3.6	8.1	105.0	13.3	107.0	19.86
14	Feb	1991	5.4	8.0	74.0	11.7	99.0	87.46
15	Jan	1991	3.2	7.5	68.0	11.9	95.0	153.00
19	June	1991	15.9	8.0	88.0	8.7	94.0	11.73
13	Mar	1991	5.7	8.1	79.0	14.3	122.0	69.15
13	May	1991	13.2	7.4	89.0	10.2	104.0	32.54
28	Nov	1990	3.9	7.6	80.0	12.9	105.0	17.74

Little Klickitat River Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO ₃)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
10	Apr	1991	2.5	32	29	2.6	.01	.01	.01		.97
19	Aug	1991	2.8	71	57	3.2	.04	.02	.04	.18	.02
17	Dec	1990	1.0	50	42	3.3	.01	.01	.01		.10
14	Feb	1991	3.7	35	30	5.7	.01	.01	.03	.01	.10
15	Jan	1991	10.5	31	27	4.1	.01	.07	.06		.29
19	June	1991	.6	42	34	1.5	.01	.01	.01		.01
13	Mar	1991	3.5	34	29	4.2	.01	.01	.03		.10
13	May	1991	1.8	34	30	5.0	.01	.01	.02	.01	.01
28	Nov	1990	1.3	36	29	4.1	.01	.01	.02		.16

North Fork Asotin Creek Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
11	Apr	1991	9.2	7.6	76.0	10.6	101.0	41.93
20	Aug	1991	18.2	7.6	108.0	8.8	102.0	21.56
18	Dec	1990	4.9	8.4	91.0	12.7	108.0	25.96
20	Feb	1991	6.4	7.9	87.0	10.9	97.0	36.86
16	Jan	1991	5.2	8.1	70.0	11.8	102.0	40.82
20	June	1991	10.7	7.5	74.0	10.0	98.0	40.92
14	Mar	1991	5.7	8.3	87.0	13.6	119.0	36.33
14	May	1991	8.6	7.5	62.0	10.8	101.0	107.37
14	Nov	1990	7.8	8.0	95.0	13.2	121.0	24.74

North Fork Asotin Creek Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
11	Apr	1991	3.1	37	32	3.5	.03	.01	.04		.10
20	Aug	1991	1.4	47	37	3.9	.04	.06	.04	.03	.23
18	Dec	1990	1.0	43	37	2.4	.01	.06	.04		.10
20	Feb	1991	2.0	39	32	5.0	.01	.05	.05	.04	.10
16	Jan	1991	3.7	40	33	3.0	.01	.08	.07		.10
20	June	1991	1.7	35	29	1.9	.01	.02	.04		.10
14	Mar	1991	2.5	40	33	3.5	.01	.03	.05		.10
14	May	1991	2.6	27	25	4.1	.01	.01	.04	.03	.10
14	Nov	1990	1.0	45	37	1.6	.01	.04	.03	.04	.01

Naneum Creek Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
12	Apr	1991	8.6	7.3	96.0	11.8	111.0	48.31
21	Aug	1991	18.3	7.6	102.0	8.6	101.0	11.99
19	Dec	1990	0.0	7.4	95.0	14.1	106.0	
12	Feb	1991	3.1	8.3	90.0	12.3	101.0	25.22
17	Jan	1991	.7	7.9	91.0	12.8	98.0	24.58
21	June	1991	9.0	7.5	69.0	10.2	97.0	95.10
14	Mar	1991	3.1	8.5	98.0	13.2	108.0	33.12
21	May	1991	8.9	7.3	68.0	11.0	105.0	92.44
13	Nov	1990	5.4	8.0	85.0	13.5	118.0	16.99

Naneum Creek Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
12	Apr	1991	3.9	43	38	2.5	.03	.01	.03		.10
21	Aug	1991	2.3	42	34	4.0	.04	.02	.05		
19	Dec	1990	1.6	41	37	5.2	.01	.03	.04		.10
12	Feb	1991	5.4	42	38	4.6	.01	.02	.03	.06	.10
17	Jan	1991	3.2	44	33	2.3	.01	.04	.04		1.68
21	June	1991	2.7	31	27	3.5	.01	.01	.03		.10
14	Mar	1991	2.6	43	37	5.3	.01	.01	.03		.10
21	May	1991	2.6	30	27	3.2	.01	.01	.04	.02	.10
13	Nov	1990	1.0	42	36	2.4	.01	.01	.03	.03	.01

Spring Creek Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
12	Apr	1991	8.4	8.4	360.0	13.2	119.0	.80
21	Aug	1991	14.0	7.9	345.0	8.9	92.0	.30
19	Dec	1990	-.1	8.3	400.0	14.5	105.0	
21	Feb	1991	2.4	8.0	350.0	12.4	96.0	1.14
17	Jan	1991	1.3	8.4	200.0	12.9	97.0	1.87
21	June	1991	10.5	8.3	334.0	9.9	94.0	.28
14	Mar	1991	2.7	8.2	320.0	13.3	104.0	1.36
15	May	1991	7.8	8.1	345.0	10.6	94.0	.75
15	Nov	1990	4.4	8.1	350.0	15.2	124.0	.79

Spring Creek Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
12	Apr	1991	1.5	149	140	4.8	.05	2.66	.06		2.50
21	Aug	1991	2.8	153	98	3.0	.04	2.20	.06	.06	2.00
19	Dec	1990	1.0	155	150	3.7	.01	3.52	.03		2.98
21	Feb	1991	2.4	151	140	4.9	.01	3.16	.08	.08	3.00
17	Jan	1991	61.0	78	72	12.7	.06	1.94	.21		2.56
21	June	1991	1.1	147	133	1.9	.02	2.70	.05		2.50
14	Mar	1991	2.3	153	144	3.2	.01	3.06	.06		2.24
15	May	1991	1.4	153	142	6.7	.01	2.34	.05	.03	1.26
15	Nov	1990	1.0	139	138	4.4	.01	3.71	.05	.06	3.24

Umtanum Creek Surface Water Field Parameters

Columbia Basin Ecoregion

Day	Month	Year	Temperature (Celsius)	pH (units)	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Oxygen Saturation (%O2 Sat.)	Discharge (cubic ft./sec)
16	Apr	1991	12.5	8.1	219.0	10.3	101.0	2.01
29	Aug	1991	18.2	8.1	230.0	7.9	89.0	.27
6	Dec	1990	3.1	7.9	209.0	12.4	98.0	1.54
13	Feb	1991	3.6	8.2	194.0	12.2	98.0	2.18
11	Jan	1991	1.9	8.2	218.0	13.2	101.0	1.49
25	June	1991	15.2	8.0	280.0	8.2	87.0	.87
21	Mar	1991	9.1	8.2	206.0	11.9	109.0	2.39
20	May	1991	16.3	8.2	215.0	8.2	89.0	1.39
13	Nov	1990	9.0	8.3	225.0	12.9	118.0	1.91

Umtanum Creek Surface Water Laboratory Parameters

Columbia Basin Ecoregion

Day	Month	Year	Turbidity (NTU)	Alkalinity (mg/L as CaCO3)	Hardness (mg/L)	Total Organic C (mg/L)	Ammonia-N (mg/L)	Nitrate+ Nitrite-N (mg/L)	Total Phosphorus (mg/L)	Ortho- Phosphate (mg/L)	Total Persulfate-N (mg/L)
16	Apr	1991	1.8	103	83	5.6	.02	.01	.86		.10
29	Aug	1991	3.0	130	100	3.5	.01	.01	.10	.12	.13
6	Dec	1990	1.0	106	85	7.7	.03	.01	.08		.35
13	Feb	1991	1.0	95	77	9.0	.01	.01	.07	.11	.10
11	Jan	1991	1.0	99	81	2.3	.01	.01	.02		.10
25	June	1991	.9	119	92	2.4	.01	.01	.08		.10
21	Mar	1991	.3		76	2.9	.01	.02	.09		.10
20	May	1991	7.5	112	90	7.7	.02	.02	.10	.02	.75
13	Nov	1990	1.0	110	95	2.0	.01	.01	.08	.08	.01

Appendix G

Benthic Macroinvertebrate Occurrence Frequency Tables

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TWINSPAN - FALL 1990 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Puget Lowlands

Frequently Present (3-6 Sites)

Chironomidae

Occasionally Present (1-2 Sites)

Ephemeroptera

Paraleptophlebia

Serratella

Plecoptera

Isoperla

Cultus

Hesperoperla

Calineuria

Trichoptera

Rhyacophila #1

Rhyacophila #2

Ceratopsyche

Coleoptera

Heterlimnius

Diptera

Hexatoma

Decapoda

Pacifasticus leniusculus

TWINSPAN - FALL 1990 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Columbia Basin

Frequently Present (3-6 Sites)

Plecoptera

Hesperoperla

Coleoptera

Optioservus

Diptera

Chironomidae

Simuliidae

Antocha

Occasionally Present (1-2 Sites)

Ephemeroptera

Cinygmula #2

Paraleptophlebia

Epeorus

Serratella

Plecoptera

Doroneuria

Cultus

Perlomyia

Calineuria

Pteronarcys

Trichoptera

Cheumatopsyche

Polycentropus

Glossosoma

Brachycentrus

Megaloptera

Sialis

Diptera

Hexatoma

Coleoptera

Psephenus

Decapoda

Pacifasticus leniusculus

Gastropoda

Physa

Oligochaeta

Rhynchelmis

TWINSPAN - FALL 1990 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Cascades

Frequently Present (3-6 Sites)

Ephemeroptera

Drunella doddsi

Occasionally Present (1-2 Sites)

Ephemeroptera

Drunella spinifera

Serratella

Epeorus

Plecoptera

Doroneuria

Skwala

Osobenus

Isoperla

Cultus

Trichoptera

Ecclisomyia

Glossosoma

Neophylax

Ceratopsyche

Brachycentrus

Rhyacophila #1

Rhyacophila #2

Diptera

Antocha

TWINSpan - FALL 1990 BENTHIC MACROINVERTEBRATES

TAXA WITH DISTRIBUTION AMONG ALL ECOREGIONS

Frequently Present (3-6 Sites)

Ephemeroptera

Rithrogena

Occasionally Present (1-2 Sites)

Ephemeroptera

Cinygmula #1

Baetis

Plecoptera

Sweltsa

Zapada

Trichoptera

Hydropsyche

Oligochaeta

Lumbriculidae

Note: "Frequently Present" taxa appeared at 3-6 sites within each of the three ecoregions.
"Occasionally Present" taxa appeared at 1-2 sites within each of the three ecoregions during the season.

TWINSPAN - WINTER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Puget Lowlands

Frequently Present (3-6 Sites)

Ephemeroptera

Paraleptophlebia

Plecoptera

Calineuria

Hesperoperla

Taenionema

Trichoptera

Rhyacophila #1

Diptera

Simuliidae

Occasionally Present (1-2 Sites)

Ephemeroptera

Baetis

Drunella doddsi

Plecoptera

Isoperla

Nemoura

Perlomyia

Trichoptera

Ceratopsyche

Hydropsyche

Rhyacophila #2

Diptera

Chironomidae (Pupa)

Dicranota

Antocha

Bezzia

Gastropoda

Juga

Pelecypoda

Pisidium

Coleoptera

Zaitzevia

Cleptelmis

Optioservus

Decapoda

Pacifasticus leniusculus

Odonata

Gomphus

TWINSPAN - WINTER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Columbia Basin

Frequently Present (3-6 Sites)

Ephemeroptera

Baetis

Trichoptera

Hydropsyche

Diptera

Antocha

Occasionally Present (1-2 Sites)

Ephemeroptera

Paraleptophlebia

Plecoptera

Calineuria

Isoperla

Nemoura

Hesperoperla

Zapada

Pteronarcys

Doroneuria

Trichoptera

Arctopsyche

Ceratopsyche

Rhyacophila #1

Moselyana

Diptera

Chironomidae (Pupa)

Simuliidae

Dicranota

Tabanus

Glutops

Antocha

Megaloptera

Sialis

Coleoptera

Zaitzevia

Psephenus

Lara

Optioservus

Amphipoda

Hyalella azteca

TWINSPAN - WINTER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Cascades

Frequently Present (3-6 Sites)

Plecoptera

Taenionema

Sweltsa

Trichoptera

Rhyacophila #2

Moselyana

Occasionally Present (1-2 Sites)

Ephemeroptera

Ephemerella

Eurylophella

Drunella doddsi

Plecoptera

Zapada

Doroneuria

Perlomyia

Malenka

Kathroperla

Cultus

Trichoptera

Glossosoma

Arctopsyche

Brachycentrus

Diptera

Atherix

TWINSPAN - WINTER 1991 BENTHIC MACROINVERTEBRATES

TAXA WITH DISTRIBUTION AMONG ALL ECOREGIONS

Frequently Present (3-6 Sites)

Ephemeroptera
 Cinygmula #1
Diptera
 Chironomidae

Occasionally Present (1-2 Sites)

Ephemeroptera
 Serratella
 Epeorus
 Rithrogena
Plecoptera
 Sweltsa
Diptera
 Hexatoma
Oligochaeta
 Lumbriculidae

Note: "Frequently Present" taxa appeared at 3-6 sites within each of the three ecoregions.
"Occasionally Present" taxa appeared at 1-2 sites within each of the three ecoregions during the season.

TWINSPAN - SPRING 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Puget Lowlands

Frequently Present (3-6 Sites)

Ephemeroptera

Paraleptophlebia

Plecoptera

Haploperla

Trichoptera

Rhyacophila #2

Occasionally Present (1-2 Sites)

Ephemeroptera

Amaletus

Plecoptera

Zapada

Trichoptera

Rhyacophila (Pupa)

Polycentropus

Diptera

Bezzia

Dicranota

Simuliidae

Chelifera

Coleoptera

Cleptelmis

Gastropoda

Jugus

TWINSPAN - SPRING 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Columbia Basin

Frequently Present (3-6 Sites)

Ephemeroptera

Paraleptophlebia

Trichoptera

Hydropsyche

Diptera

Chironomidae (Pupa)

Antocha

Occasionally Present (1-2 Sites)

Ephemeroptera

Cinygmula #2

Eurylophella

Rithrogena

Ephemerella

Plecoptera

Cultus

Taenionema

Sweltsa

Claassenia

Hesperoperla

Zapada

Podmosta

Trichoptera

Amiocentrus

Cheumatopsyche

Parapsyche

Rhyacophila #1

Micrasema

Dicosmoecus

Diptera

Clinocera

Pericoma

Bezzia

Tipulidae (Pupa)

Simuliidae

Coleoptera

Psephenus

Stenelmis

Optioservus

Heterlimnius

Oligochaeta

Naididae

Rhynchelmis

TWINSPAN - SPRING 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Cascades

Frequently Present (3-6 Sites)

Ephemeroptera

Drunella doddsi
Drunella spinifera
Rithrogena

Plecoptera

Haploperla

Trichoptera

Rhyacophila #1
Rhyacophila #2

Occasionally Present (1-2 Sites)

Ephemeroptera

Taenionema
Eurylophella
Attenella
Drunella coloradensis
Amaletus
Ephemerella

Plecoptera

Sweltsa
Skwala
Pteronarcys

Trichoptera

Limnephilidae (Pupa)
Pedomoecus
Brachycentrus
Hydropsyche
Micrasema

Diptera

Simuliidae (Pupa)
Molophilus
Oreogeton
Pericoma
Atherix
Tabanus

Coleoptera

Cleptelmis
Optioservus
Stenelmis

Acari

Hydracarina

Lepidoptera

Pyralidae

Turbellaria

Planariidae

TWINSPAN - SPRING 1991 BENTHIC MACROINVERTEBRATES

TAXA WITH DISTRIBUTION AMONG ALL ECOREGIONS

Frequently Present (3-6 Sites)

Occasionally Present (1-2 Sites)

Ephemeroptera

Serratella

Cinygmula #1

Epeorus

Baetis

Plecoptera

Isoperla

Calineuria

Diptera

Hexatoma

Chironomidae

Oligochaeta

Lumbriculidae

Note: "Frequently Present" taxa appeared at 3-6 sites within each of the three ecoregions.
"Occasionally Present" taxa appeared at 1-2 sites within each of the three ecoregions during the season.

TWINSPAN - SUMMER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Puget Lowlands

Frequently Present (3-6 Sites)

Occasionally Present (1-2 Sites)

Ephemeroptera

Paraleptophlebia bicornuta

Cinygmula #2

Plecoptera

Hesperoperla

Calineuria

Amphinemura

Trichoptera

Lepidostoma

Apatania

Hydropsyche

Rhyacophila #2

Rhyacophila (Pupa)

Diptera

Atherix

Tabanus

Megaloptera

Sialis

Coleoptera

Cleptelmis

Heterlimnius

Optioservus (Adult)

Hydrophilidae

Decapoda

Pacifasticus leniusculus

TWINSPAN - SUMMER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Columbia Basin

Frequently Present (3-6 Sites)

Plecoptera

Skwala

Occasionally Present (1-2 Sites)

Ephemeroptera

Paraleptophlebia bicornuta

Heptagenia

Eurylophella

Cinygmula #2

Plecoptera

Amphinemura

Pteronarcella

Sweltsa

Soliperla

Perlomyia

Hesperoperla

Doroneuria

Trichoptera

Brachycentrus

Cheumatopsyche

Clostoeca

Lepidostoma

Dicosmoecus

Glossosoma

Glossosoma (Pupa)

Rhyacophila #1

Micrasema

Megaloptera

Sialis

Diptera

Agathon

Atherix

Chironomidae (Pupa)

Antocha

Coleoptera

Donacia (Adult)

Optioservus (Pupa)

Psephenus

Cleptelmis

Heterlimnius

Heterlimnius (Adult)

TWINSPAN - SUMMER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Columbia Basin (Continued)

Occasionally Present (1-2 sites)

Coleoptera

Optioservus

Optioservus (Adult)

Decapoda

Pacifasticus leniusculus

Oligochaeta

Lumbriculidae

TWINSPAN - SUMMER 1991 BENTHIC MACROINVERTEBRATES

REGIONAL OCCURRENCE FREQUENCIES

Cascades

Frequently Present (3-6 Sites)

Occasionally Present (1-2 Sites)

Ephemeroptera

Drunella doddsi

Drunella spinifera

Drunella coloradensis

Ephemerella

Epeorus

Rithrogena

Plecoptera

Cultus

Neaviperla

Calineuria

Doroneuria

Skwala

Kathroperla

Pteronarcys

Trichoptera

Brachycentrus

Hydropsyche

Rhyacophila #1

Rhyacophila #2

Arctopsyche

Diptera

Tipula

Chironomidae (Pupa)

Dicranota

Oligochaeta

Rhynchelmis

Turbellaria

Planariidae

TWINSPAN - SUMMER 1991 BENTHIC MACROINVERTEBRATES

TAXA WITH DISTRIBUTION AMONG ALL ECOREGIONS

Frequently Present (3-6 Sites)

Occasionally Present (1-2 Sites)

Ephemeroptera

Paraleptophlebia sp.

Cinygmula #1

Baetis

Plecoptera

Yoroperla

Trichoptera

Polycentropus

Diptera

Chironomidae

Hexatoma

Tipulidae (Pupa)

Coleoptera

Stenelmis

Acari

Hydracarina

Oligochaeta

Naididae

Note: "Frequently Present" taxa appeared at 3-6 sites within each of the three ecoregions.
"Occasionally Present" taxa appeared at 1-2 sites within each of the three ecoregions during the season.

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Appendix H

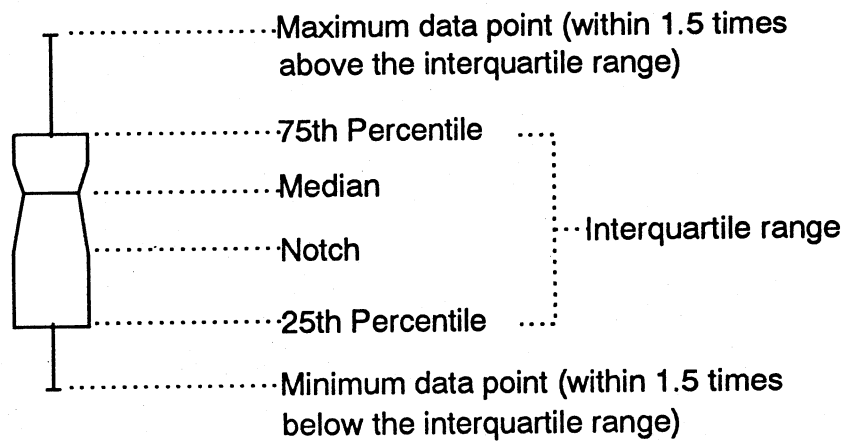
Rapid Bioassessment Protocol III Biometric Results Seasonal Boxplot Figures

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Box Plot Example

□ Data outlier (greater than 3.0 times the interquartile range)

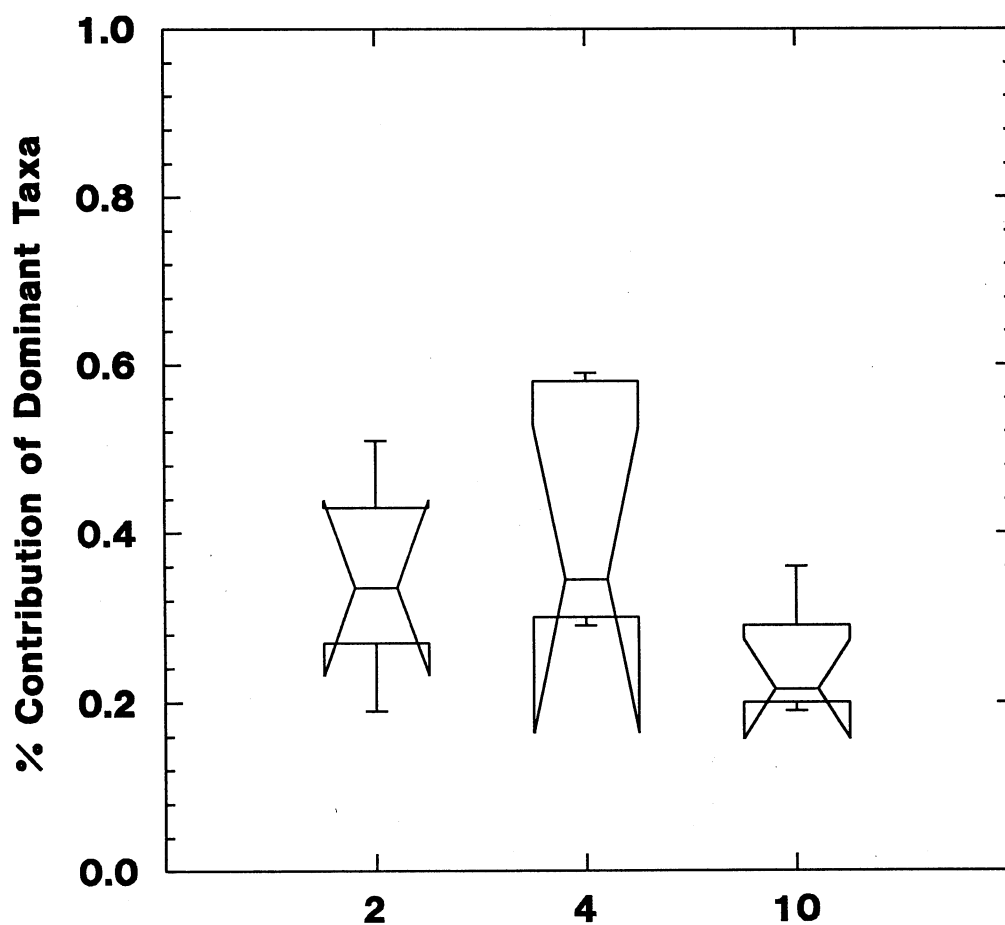
* Data outlier (within 1.5-3.0 times the interquartile range)



(notches in the box indicate 95% confidence intervals about the median)

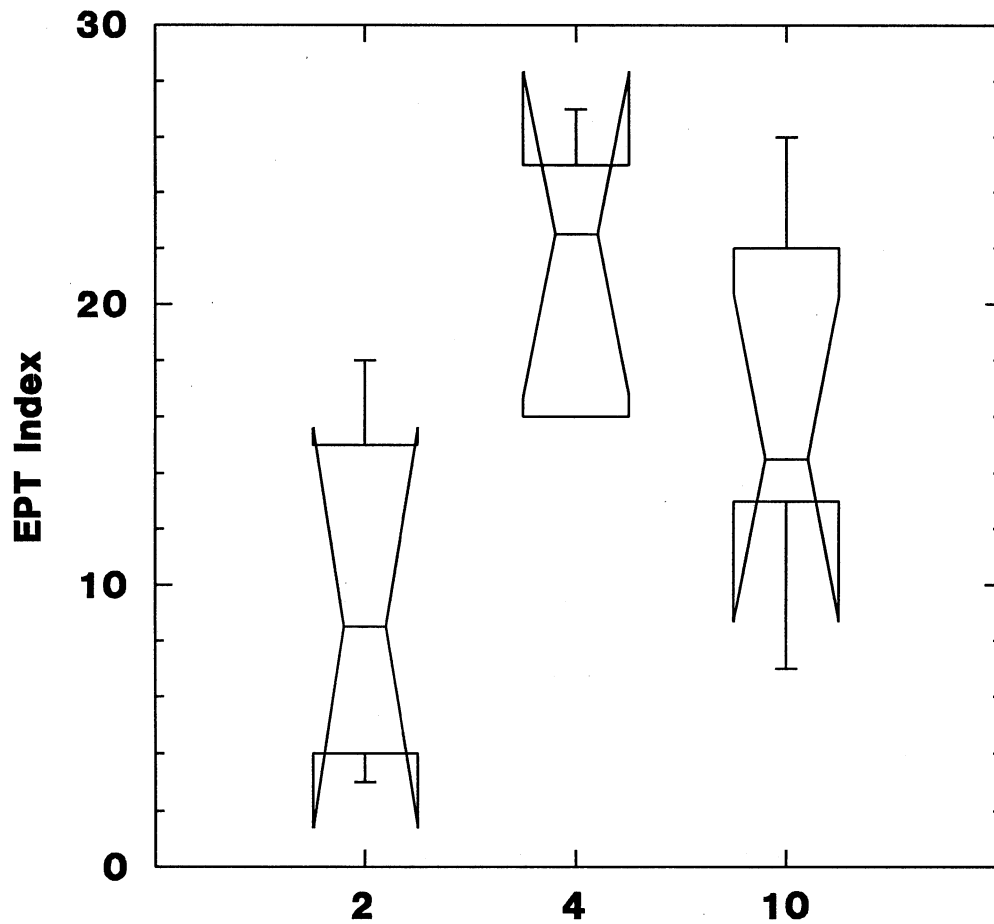
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Appendix H1. RBP III (Fall 1990)



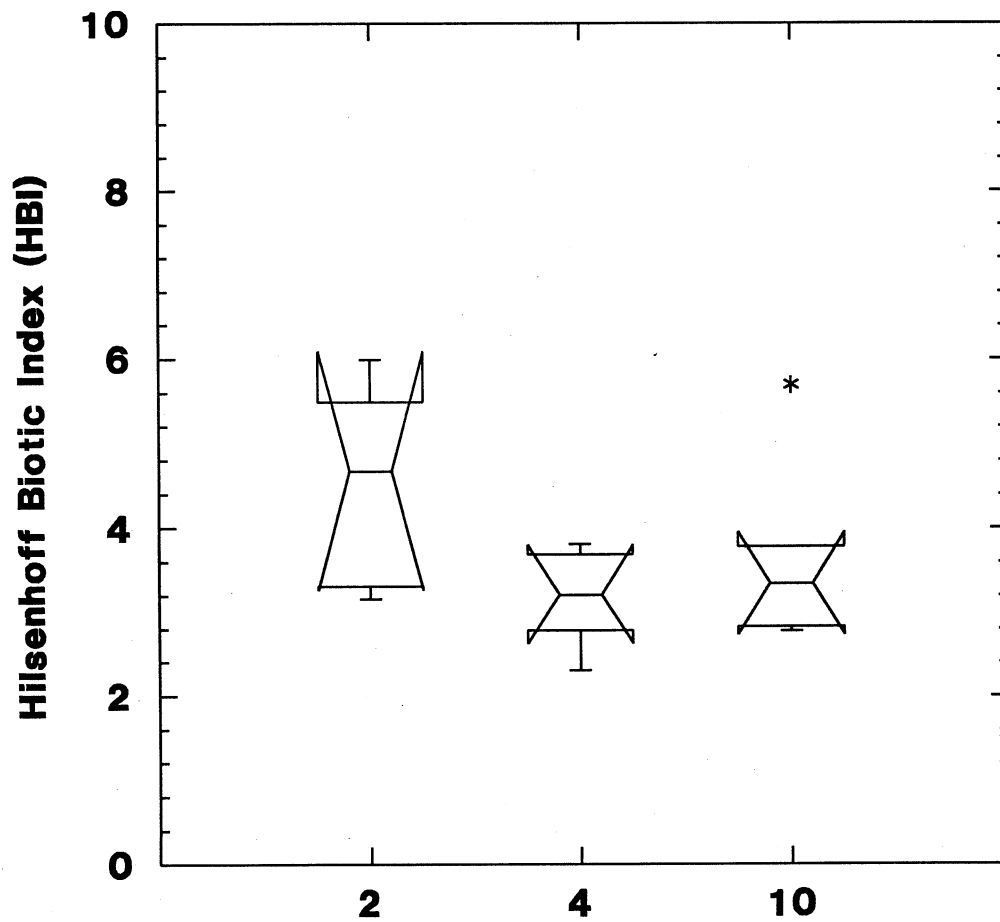
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H2. RBP III (Fall 1990)



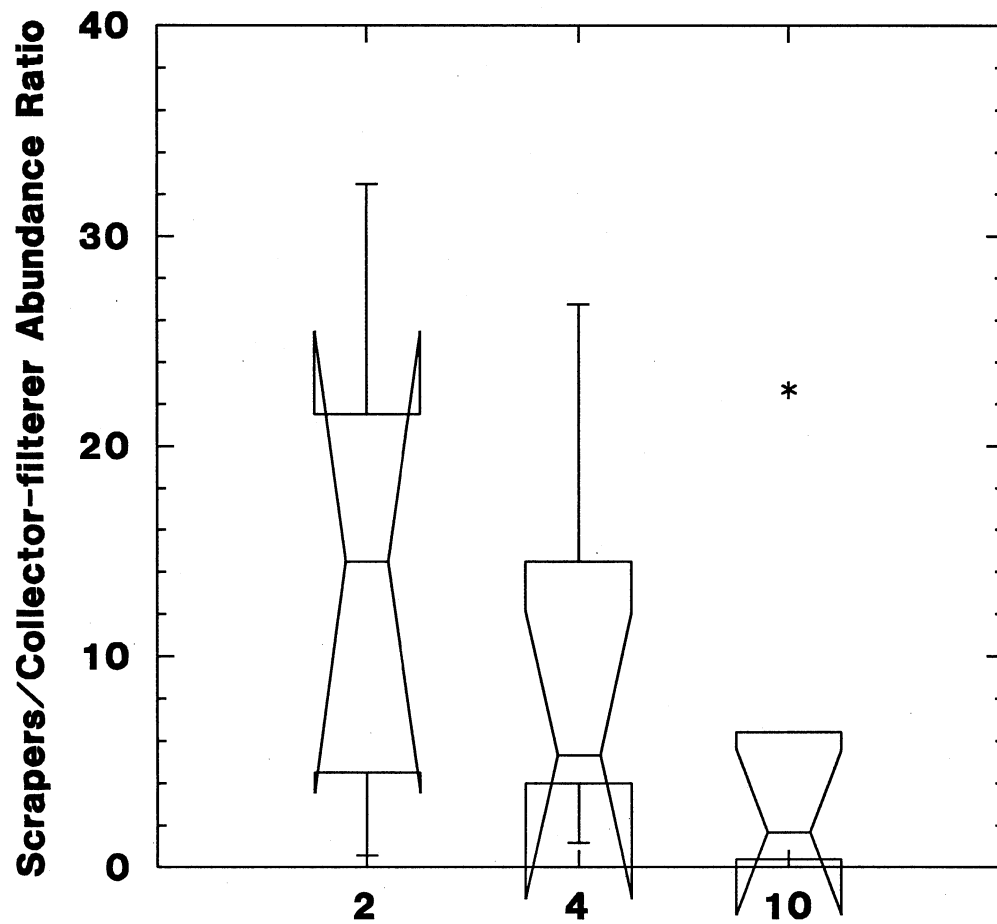
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H3. RBP III (Fall 1990)



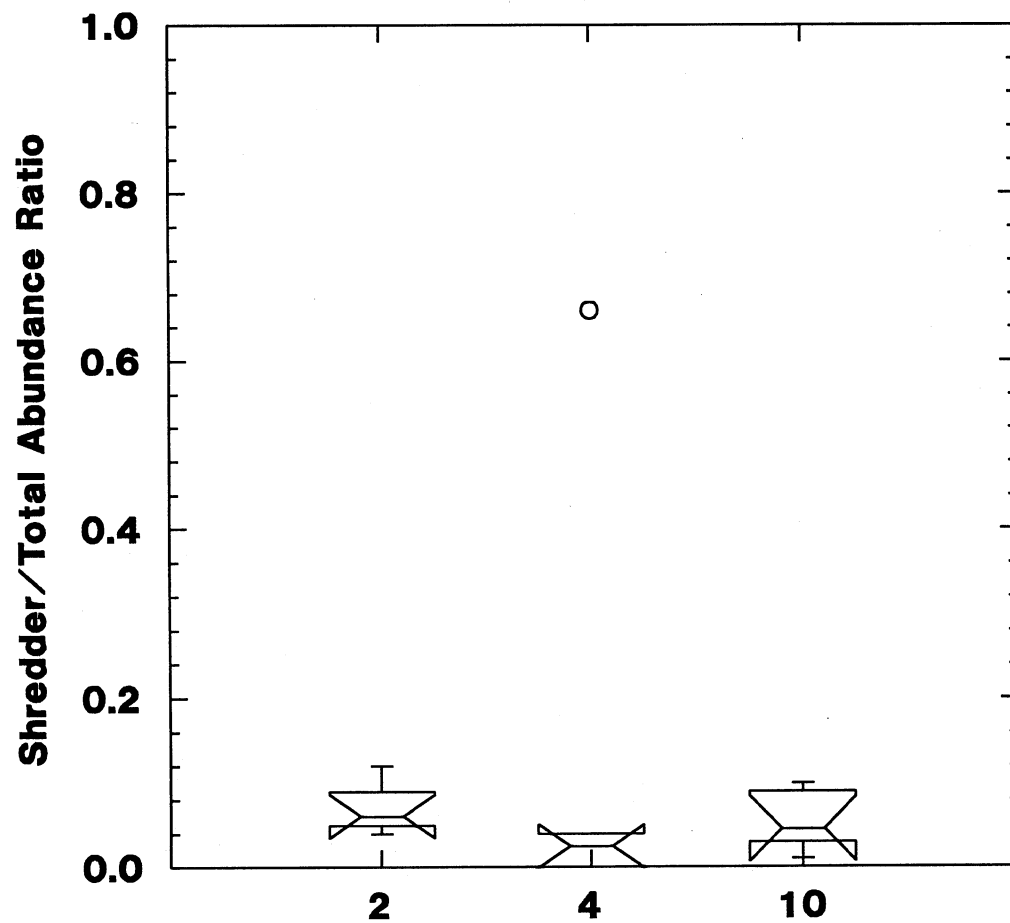
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H4. RBP III (Fall 1990)



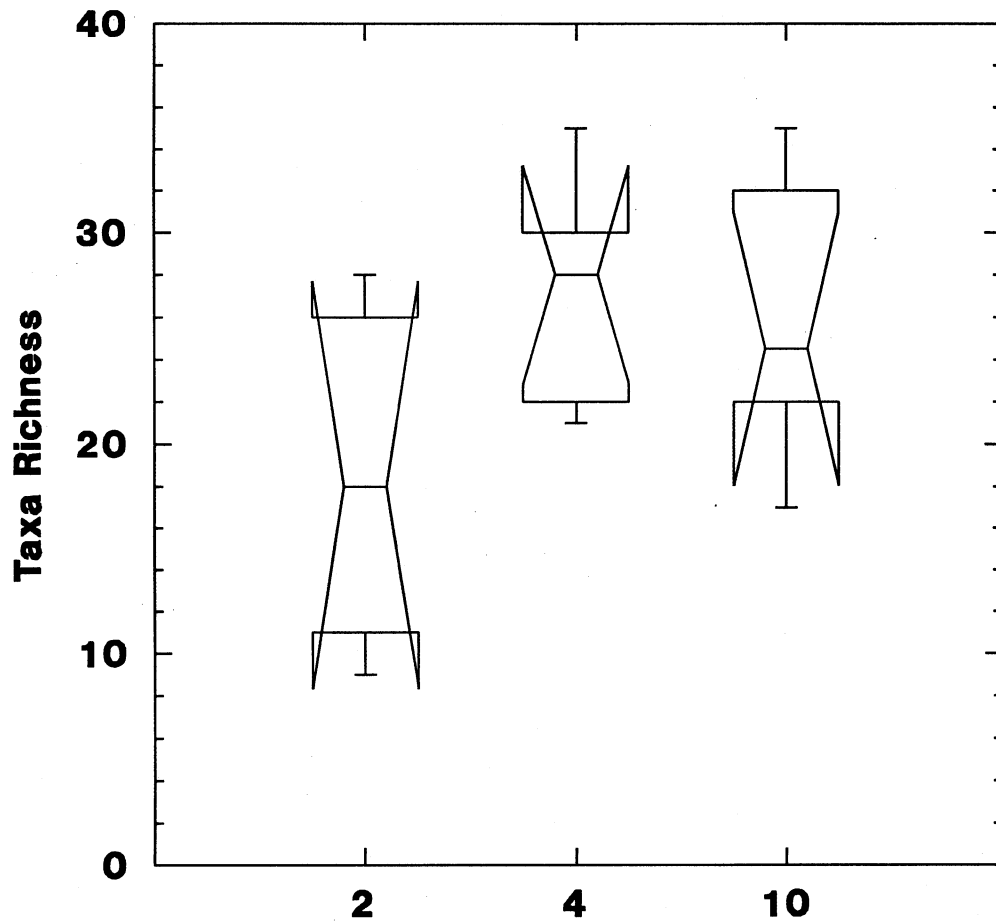
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H5. RBP III (Fall 1990)



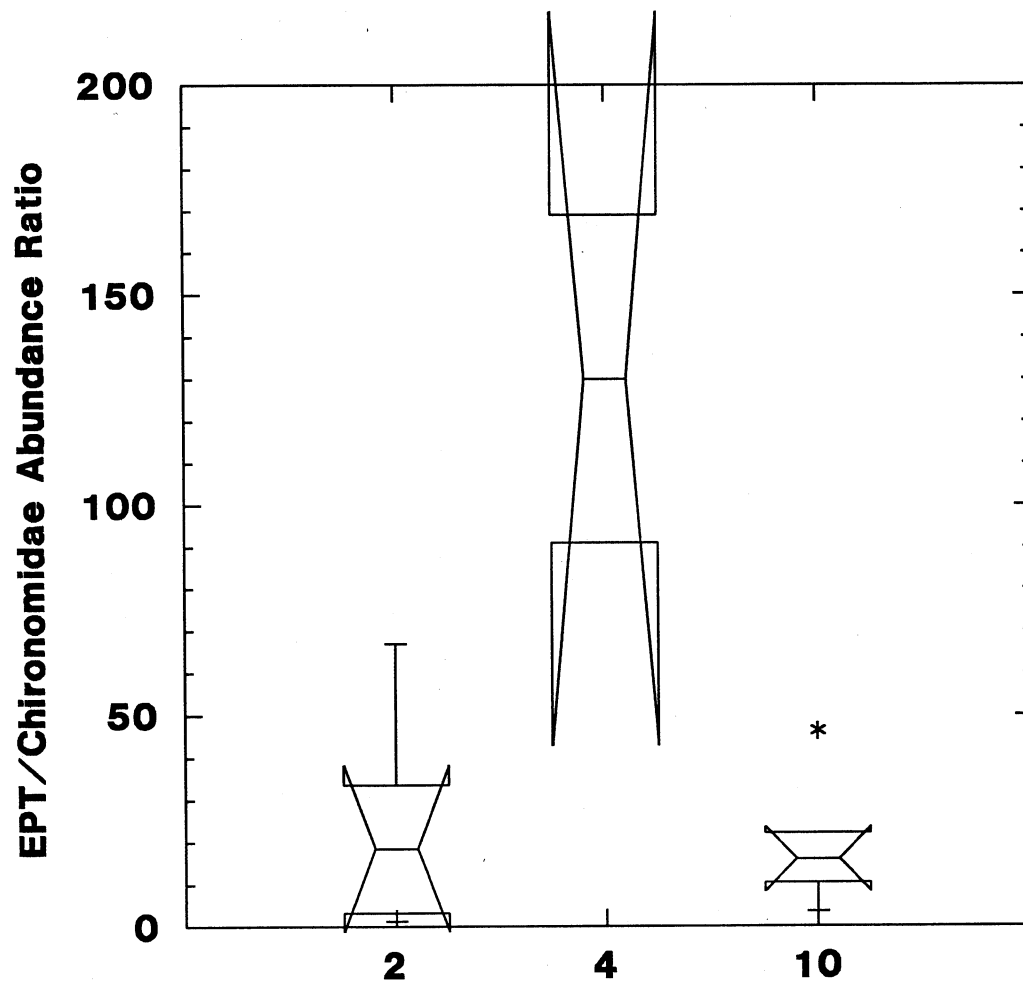
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H6. RBP III (Fall 1990)



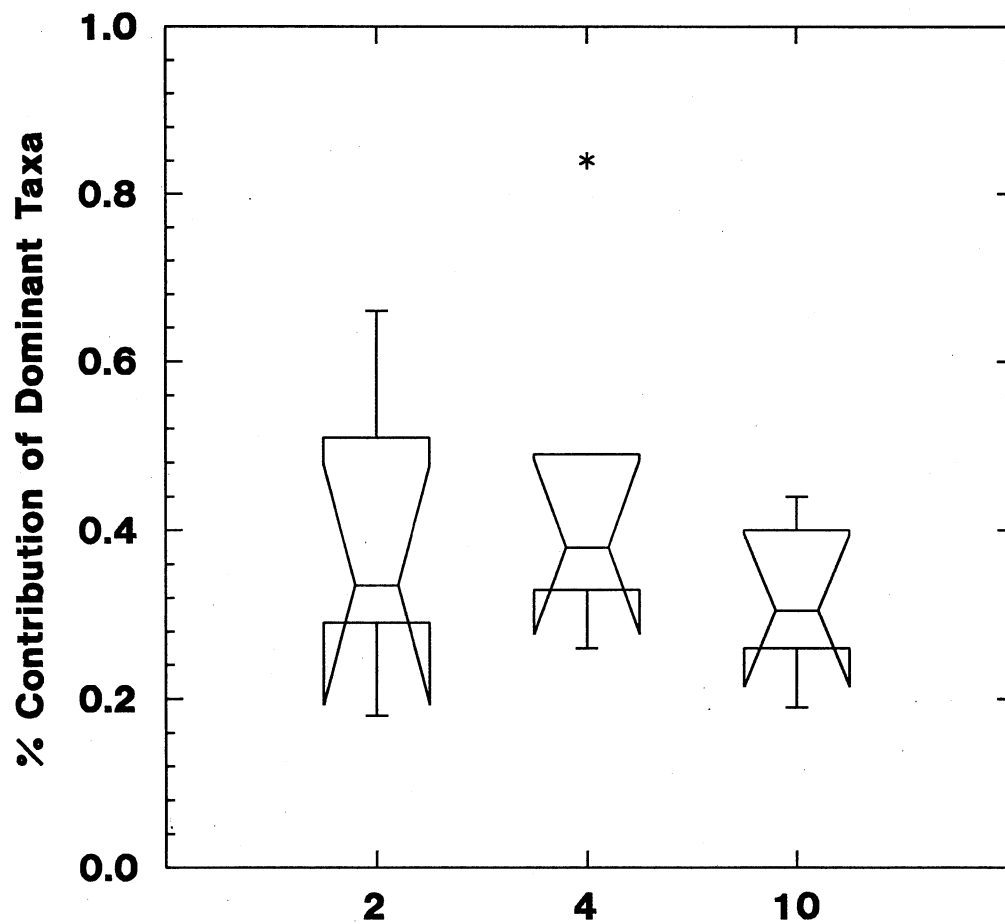
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H7. RBP III (Fall 1990)



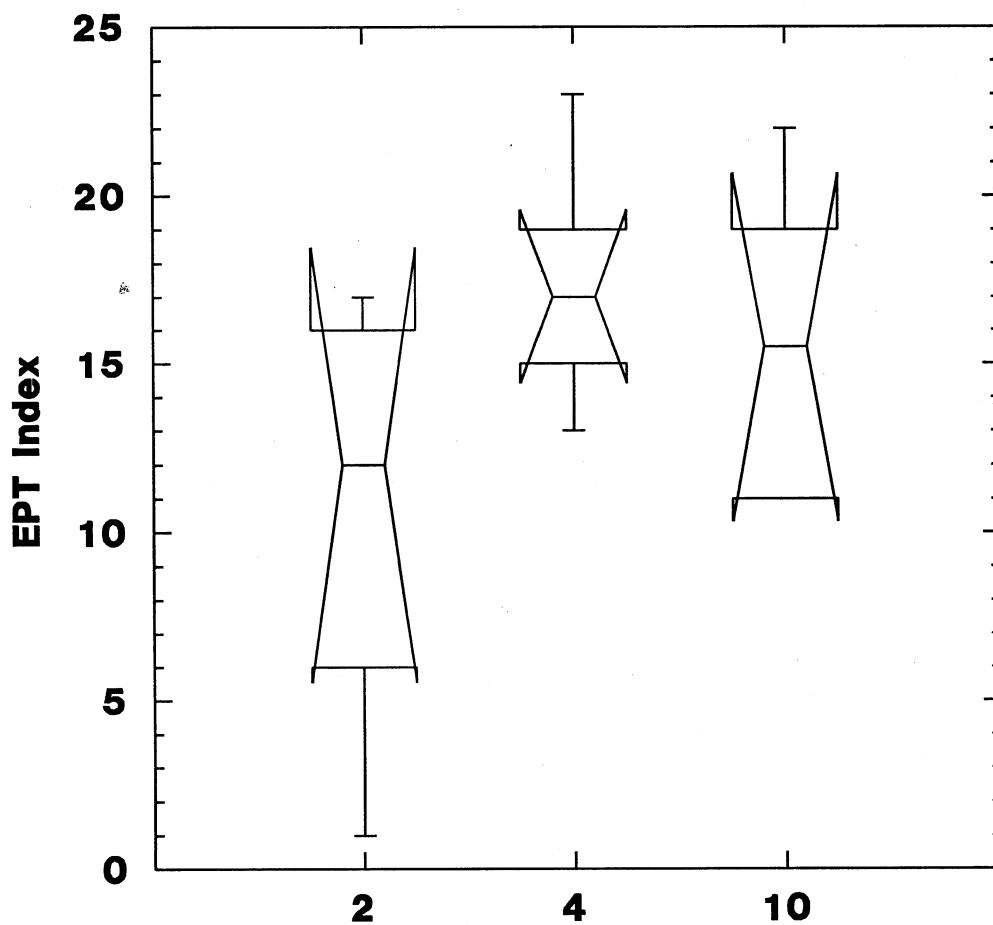
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H8. RBP III (Winter 1991)



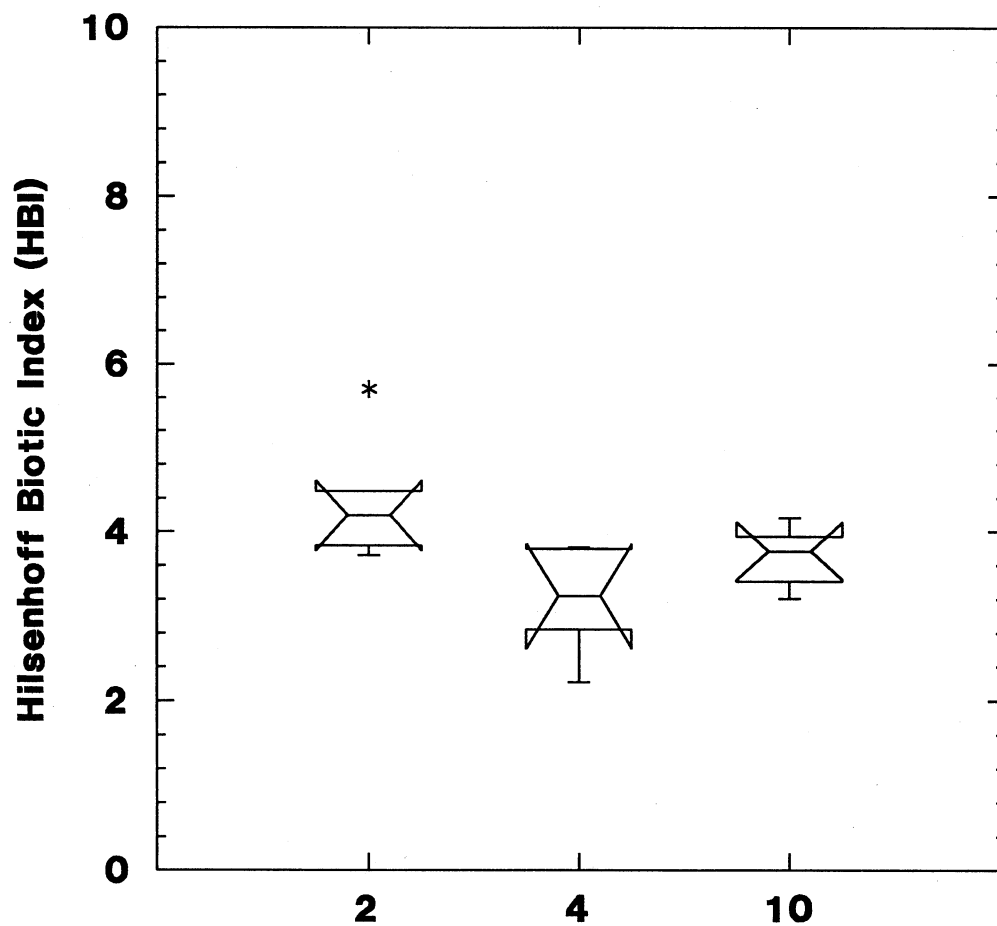
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H9. RBP III (Winter 1991)



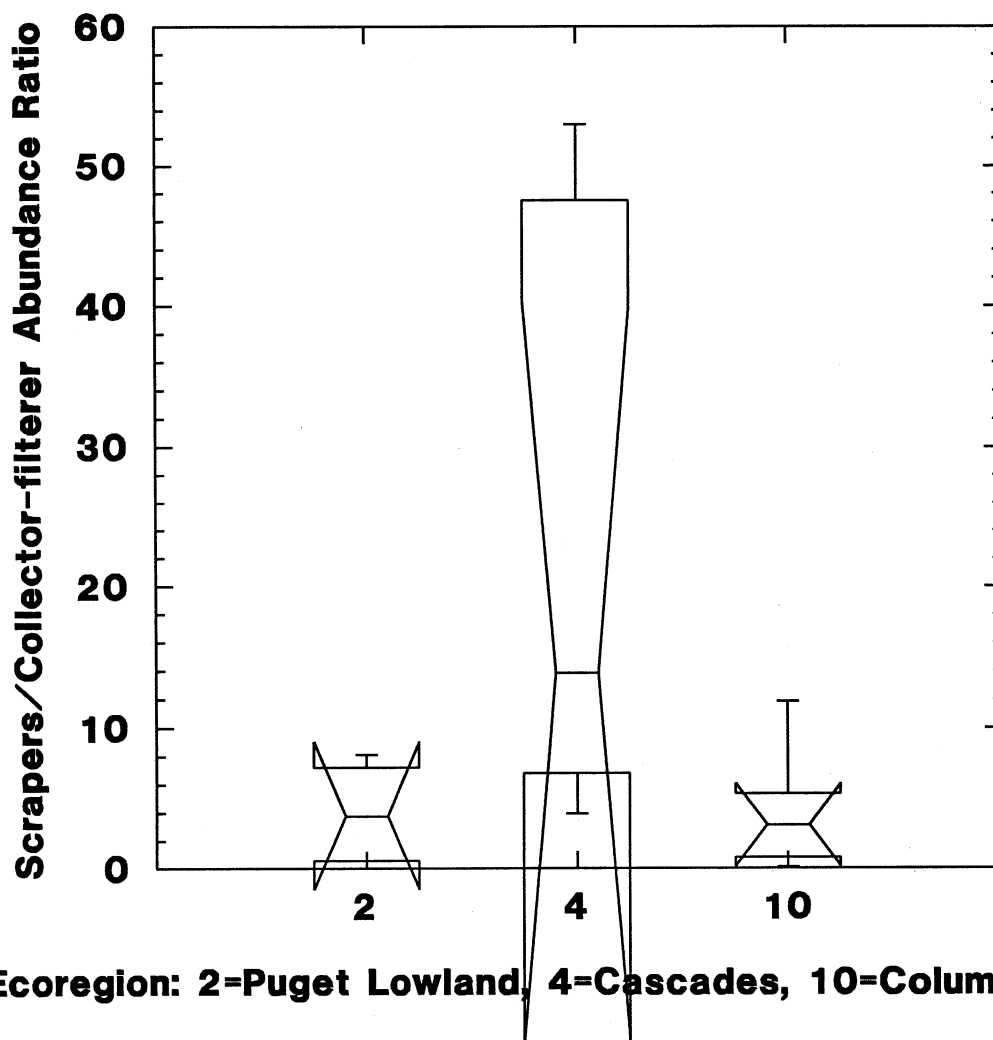
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H10. RBP III (Winter 1991)



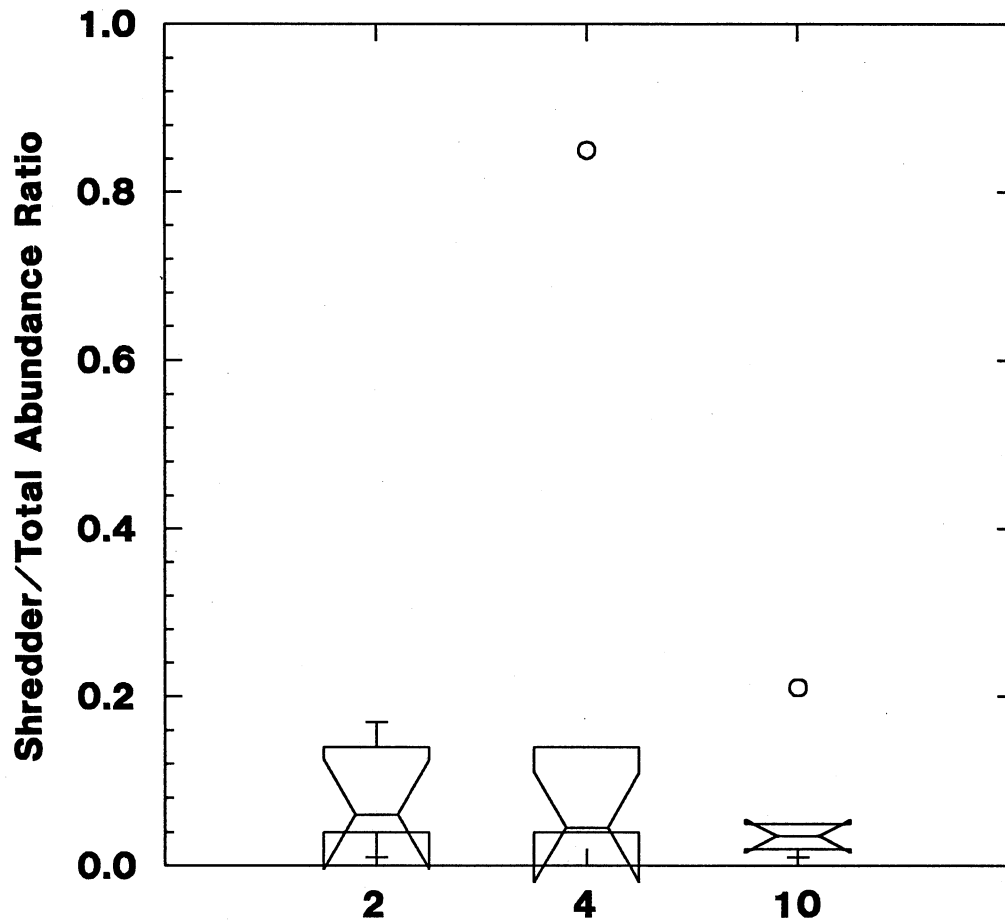
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H11. RBP III (Winter 1991)



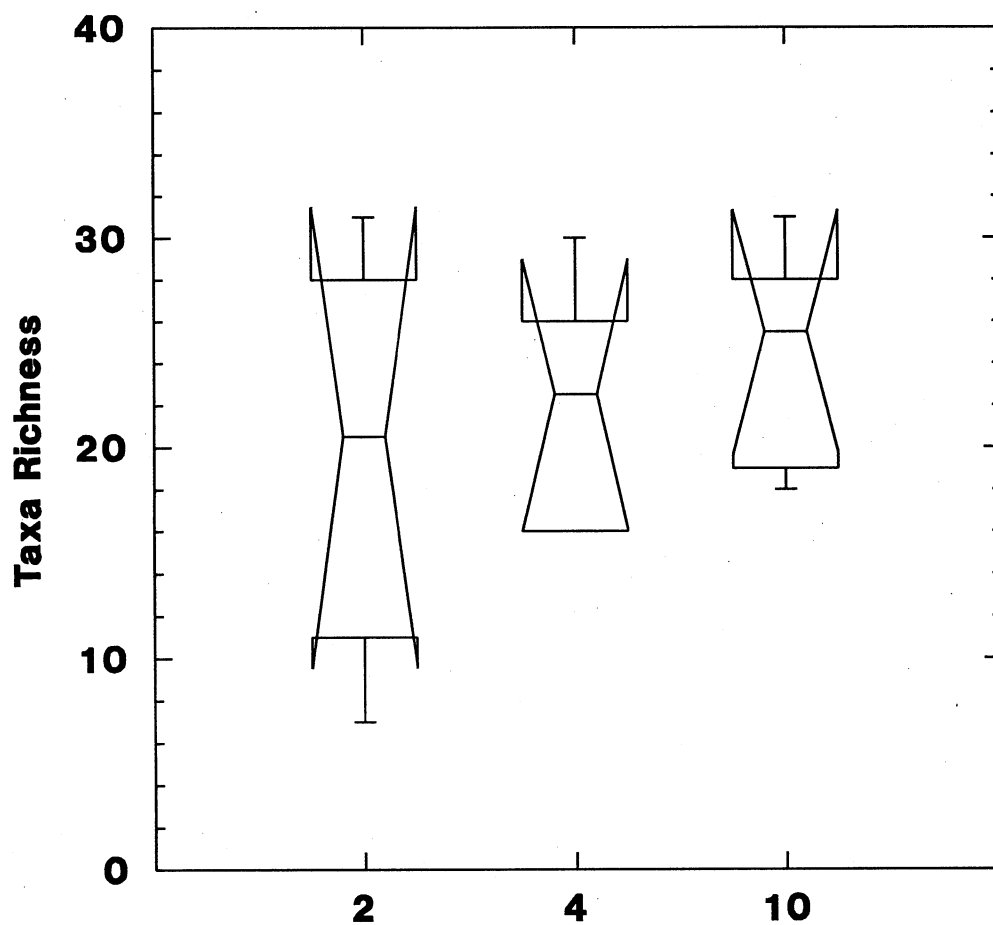
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H12. RBP III (Winter 1991)



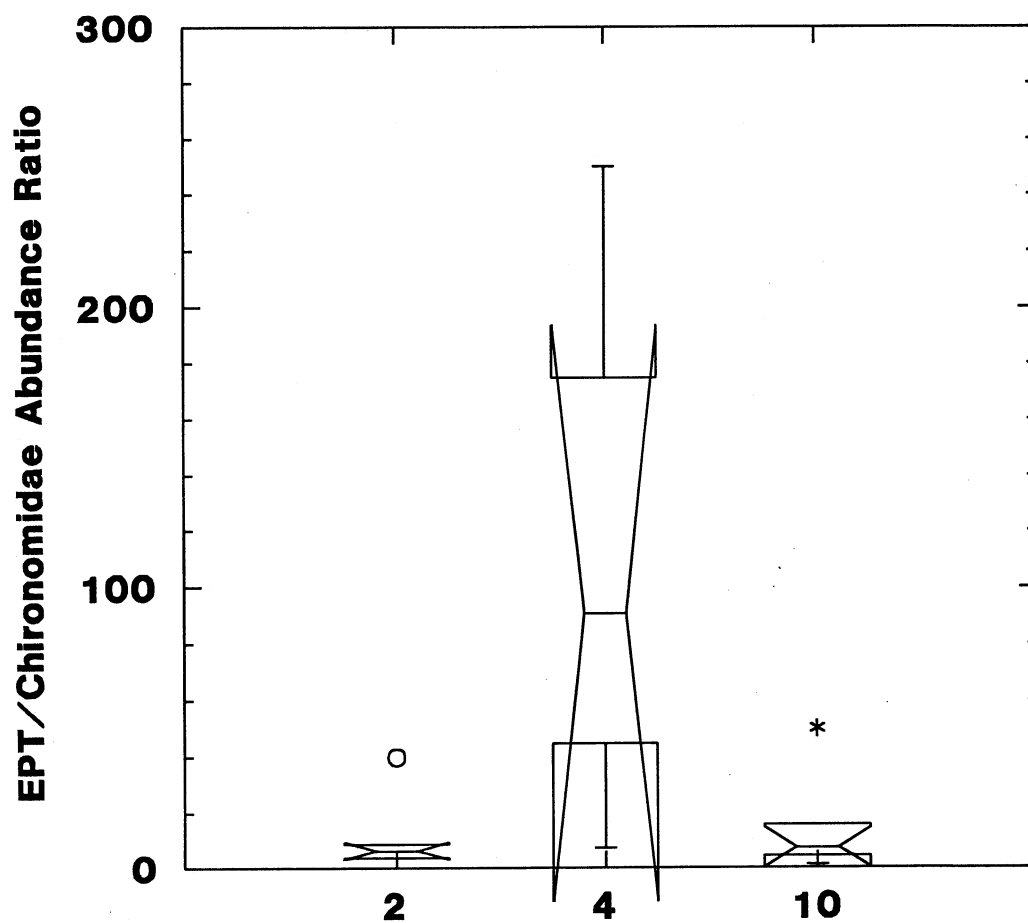
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H13. RBP III (Winter 1991)



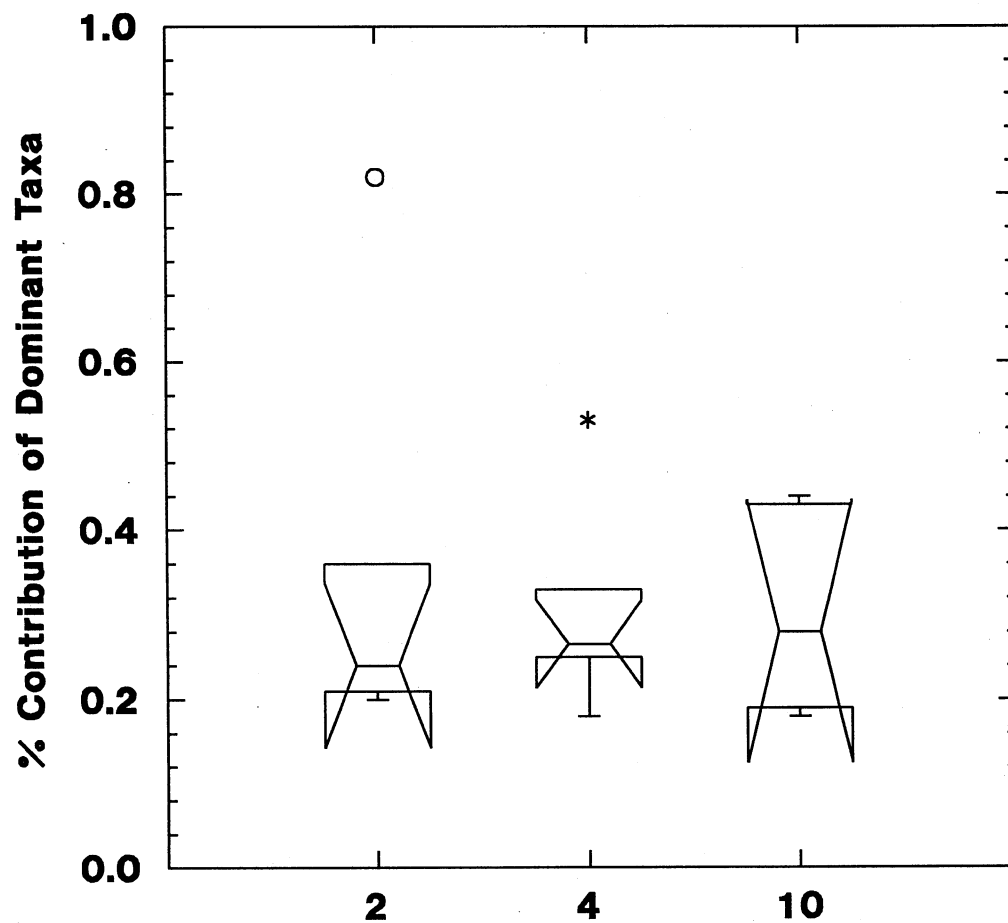
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H14. RBP III (Winter 1991)



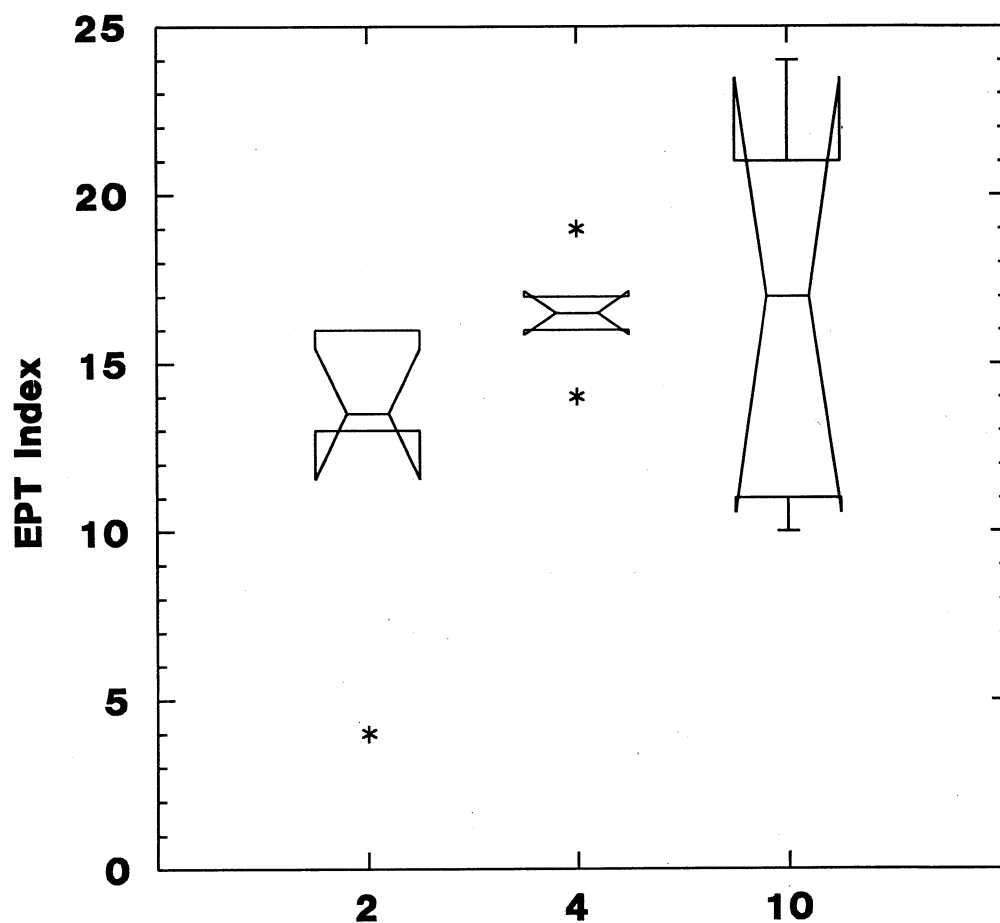
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H15. RBP III (Spring 1991)



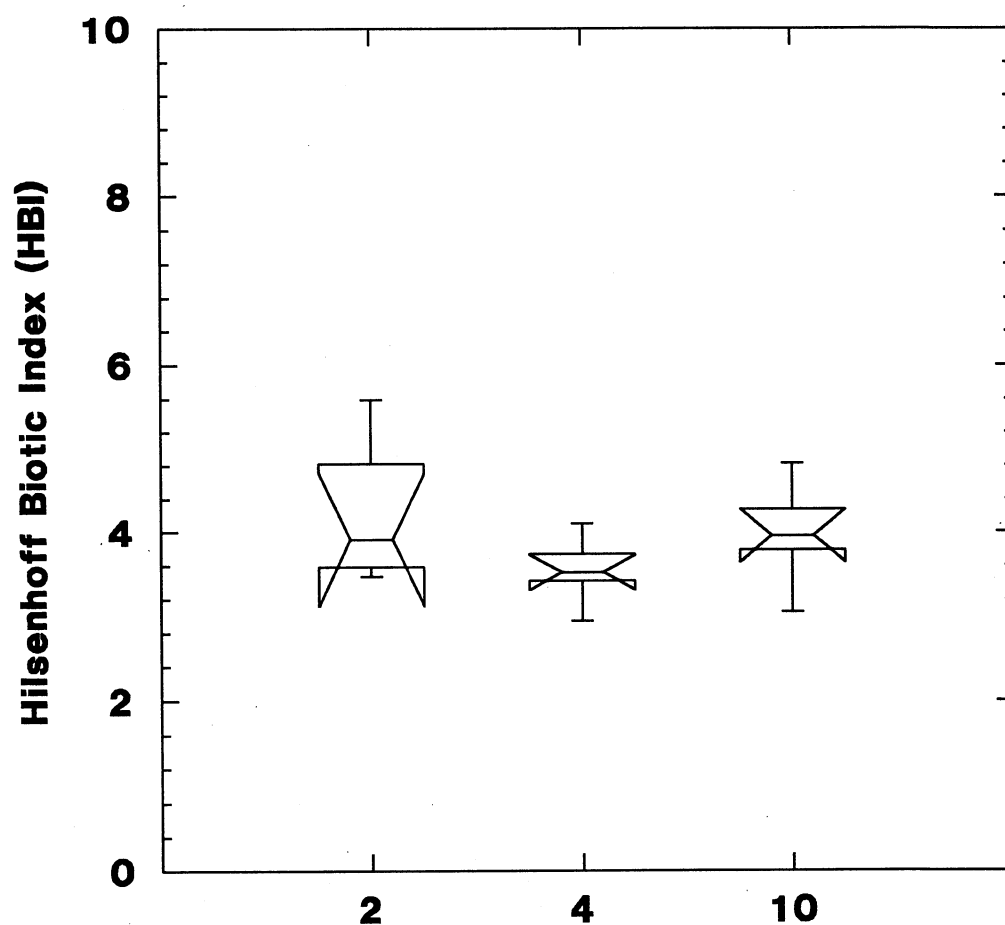
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H16. RBP III (Spring 1991)



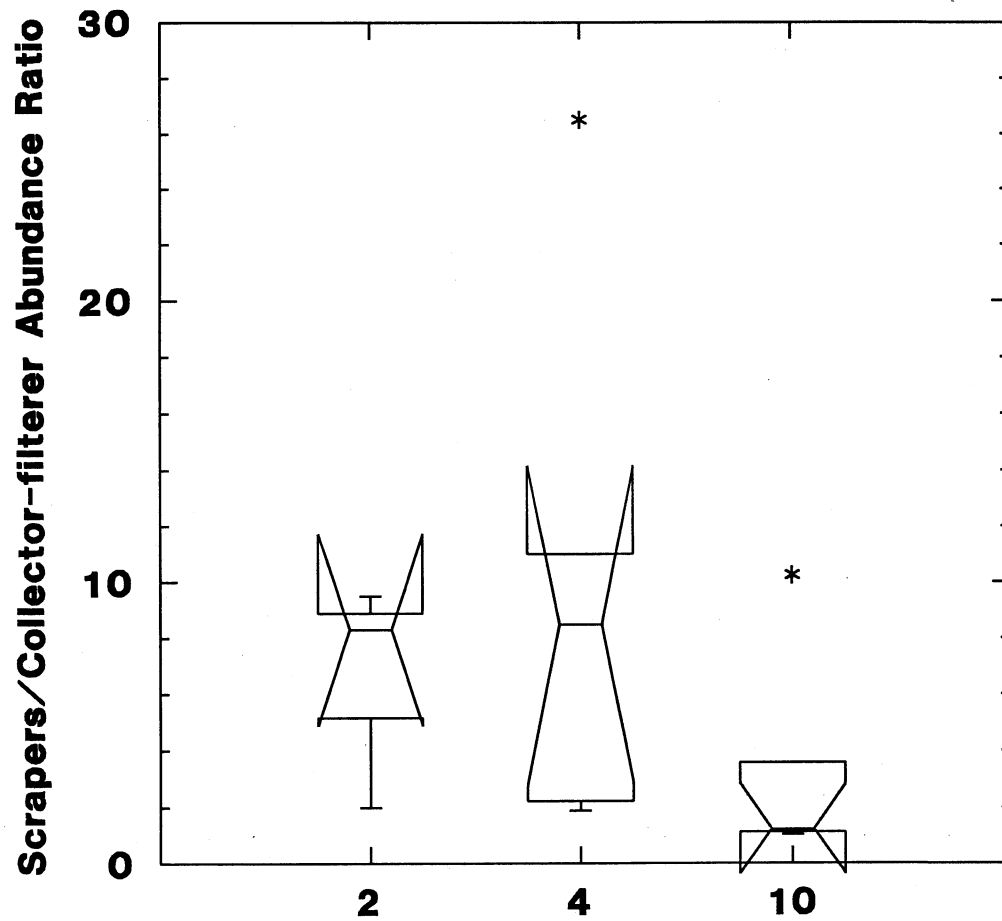
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H17. RBP III (Spring 1991)



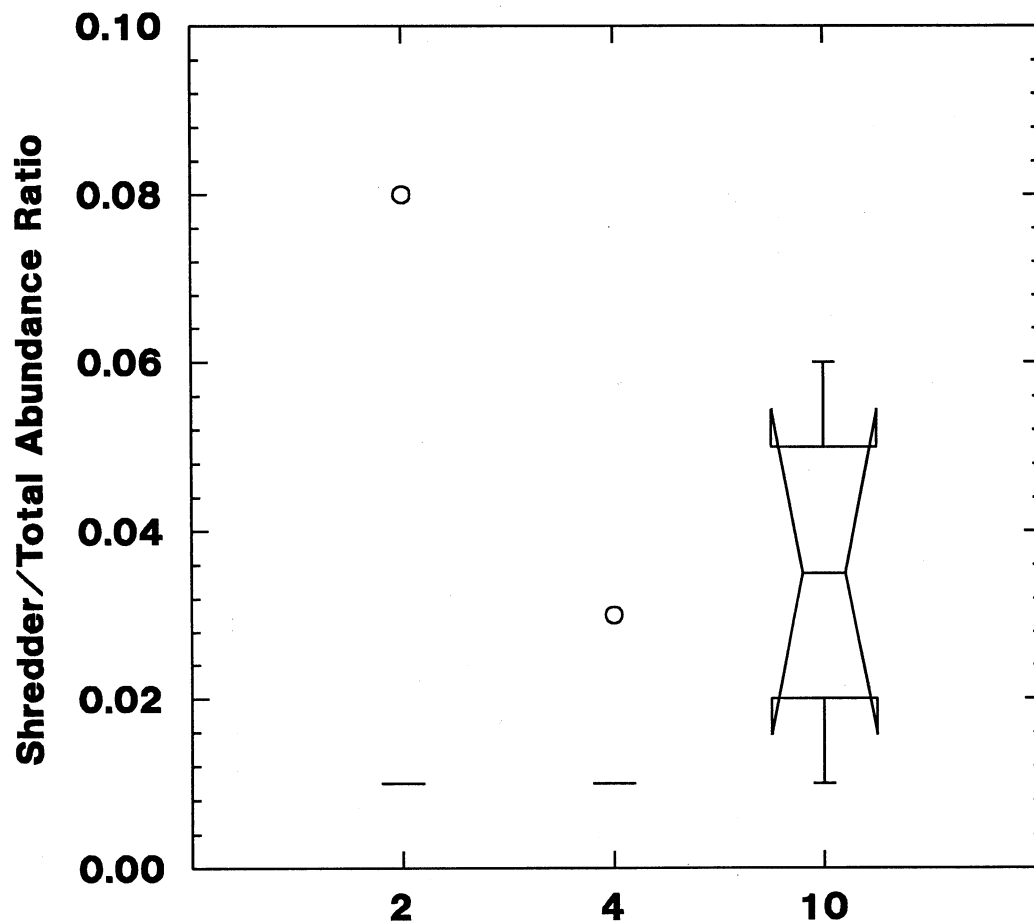
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H18. RBP III (Spring 1991)



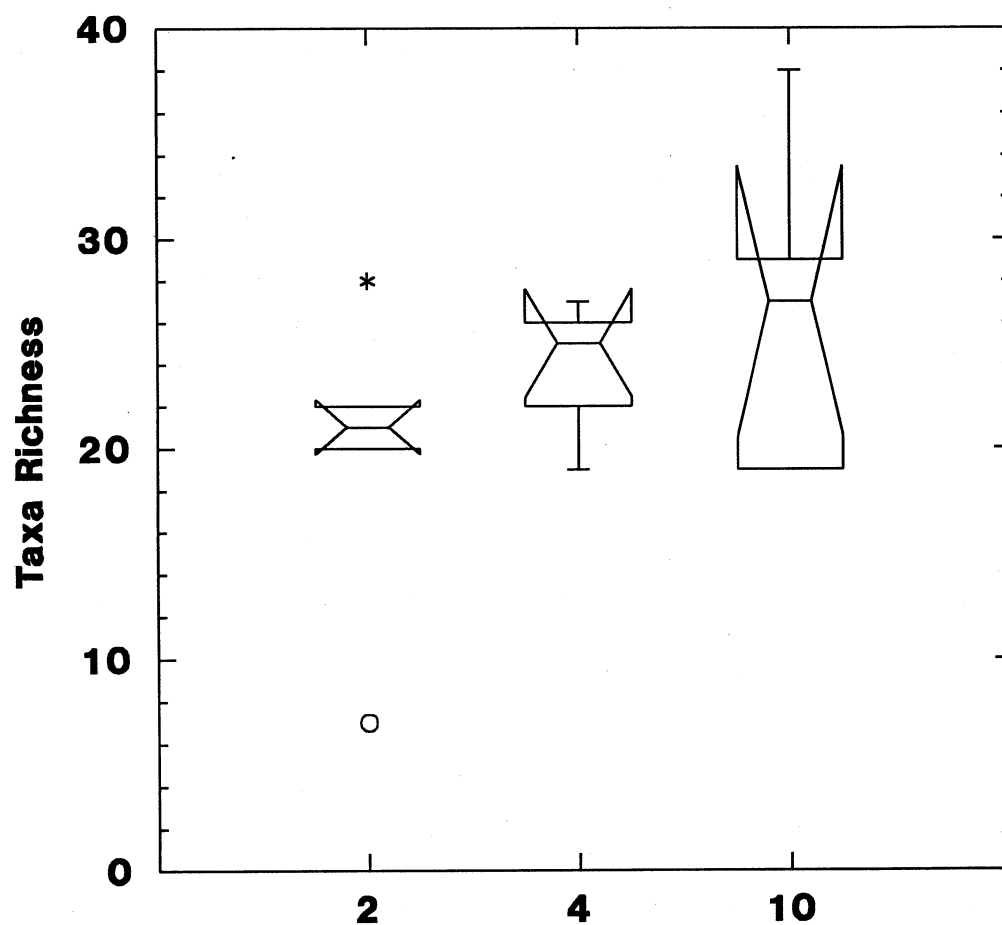
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H19. RBP III (Spring 1991)



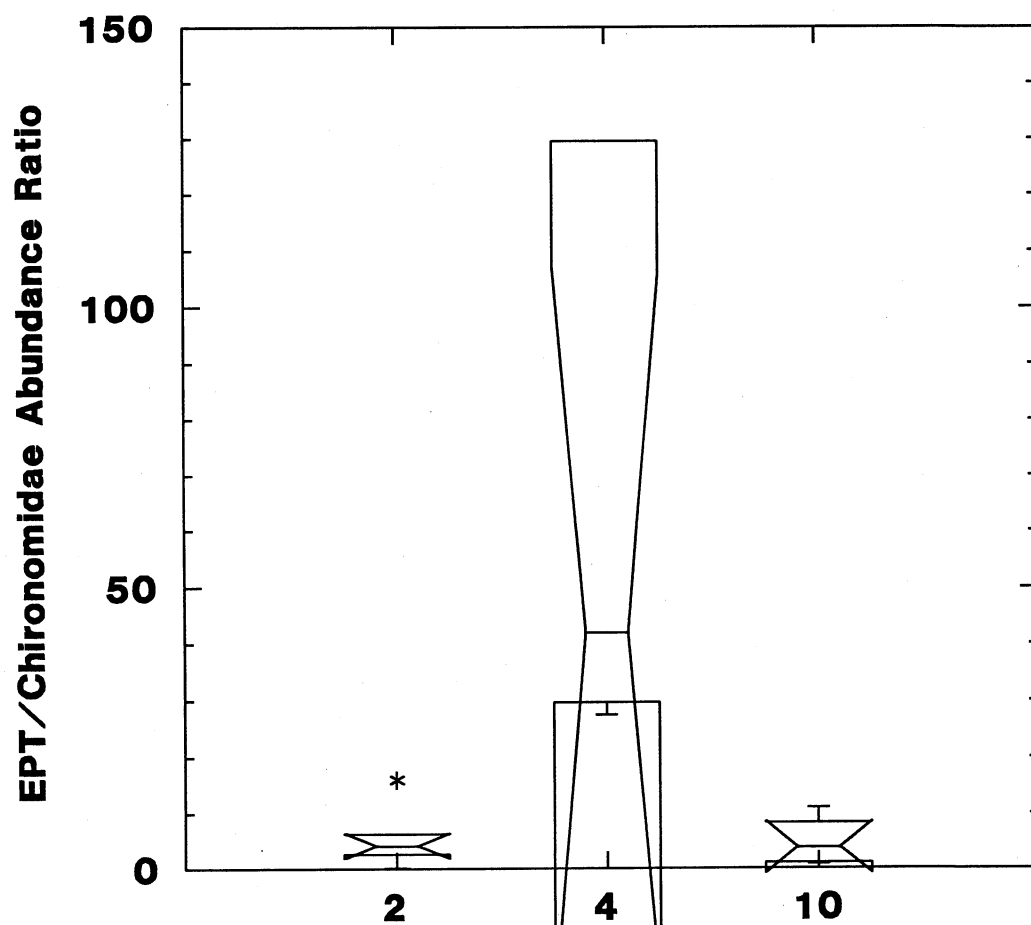
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H20. RBP III (Spring 1991)



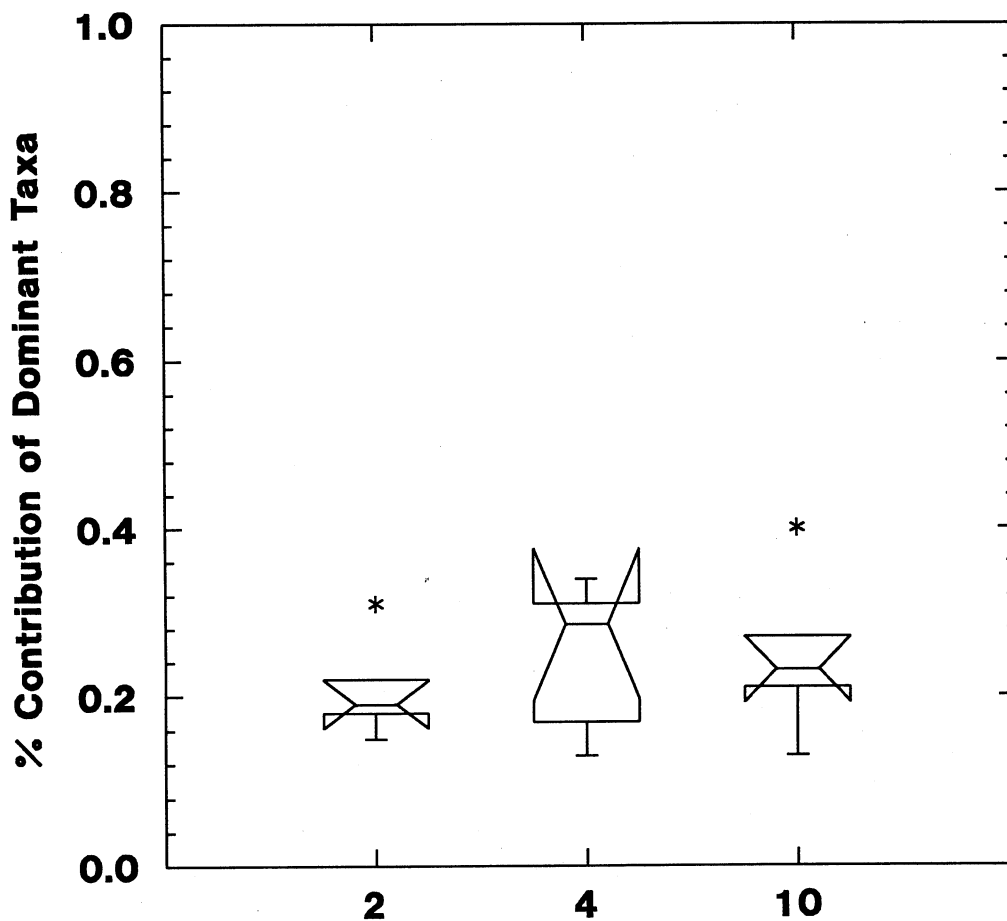
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H21. RBP III (Spring 1991)



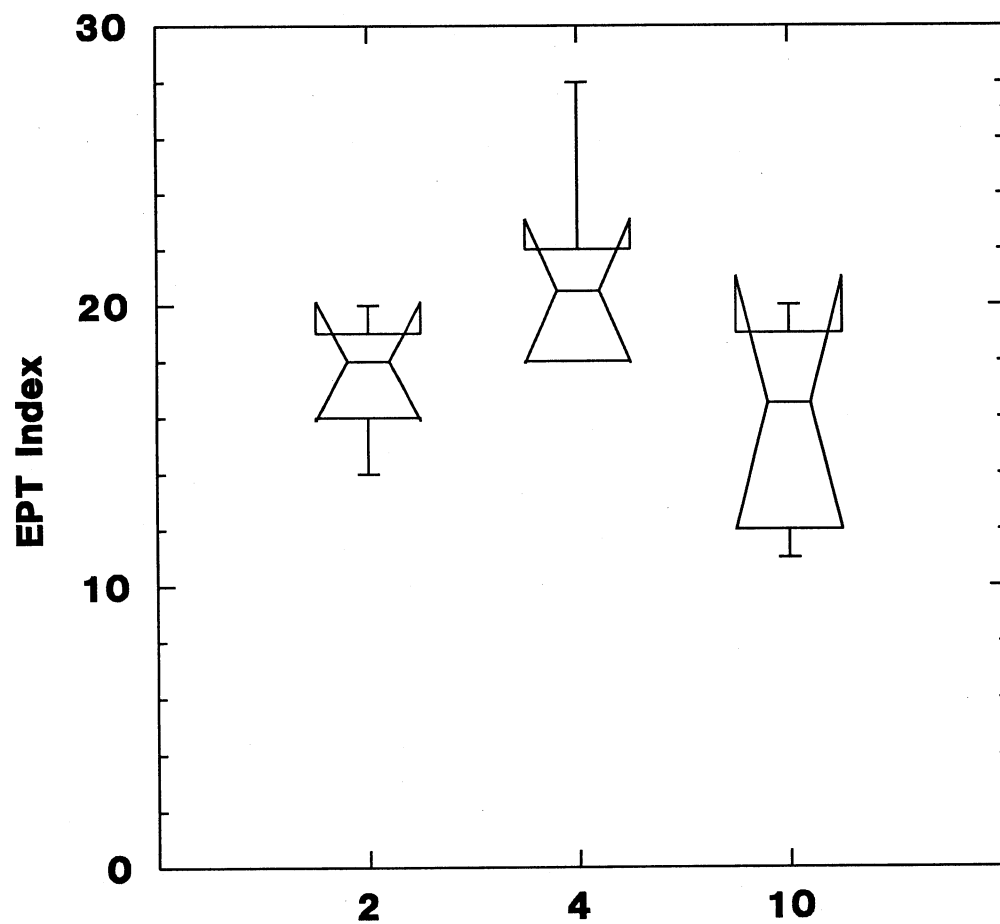
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H22. RBP III (Summer 1991)



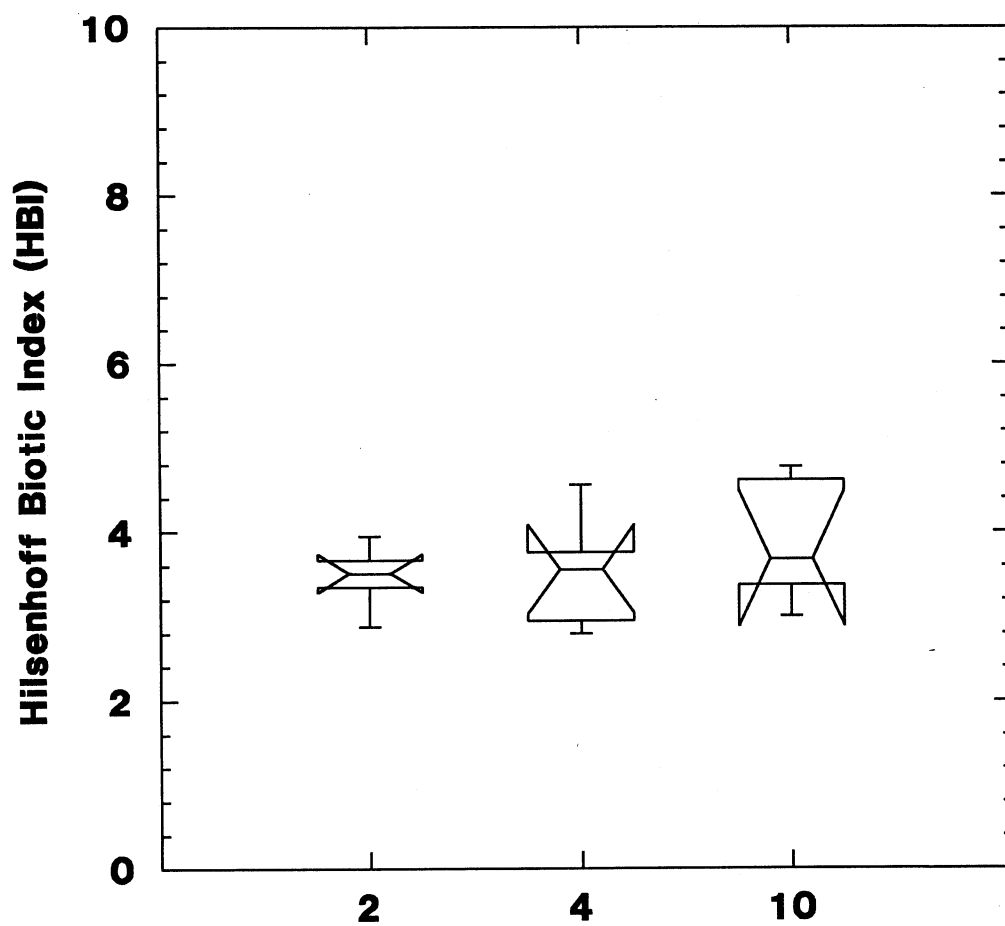
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H23. RBP III (Summer 1991)



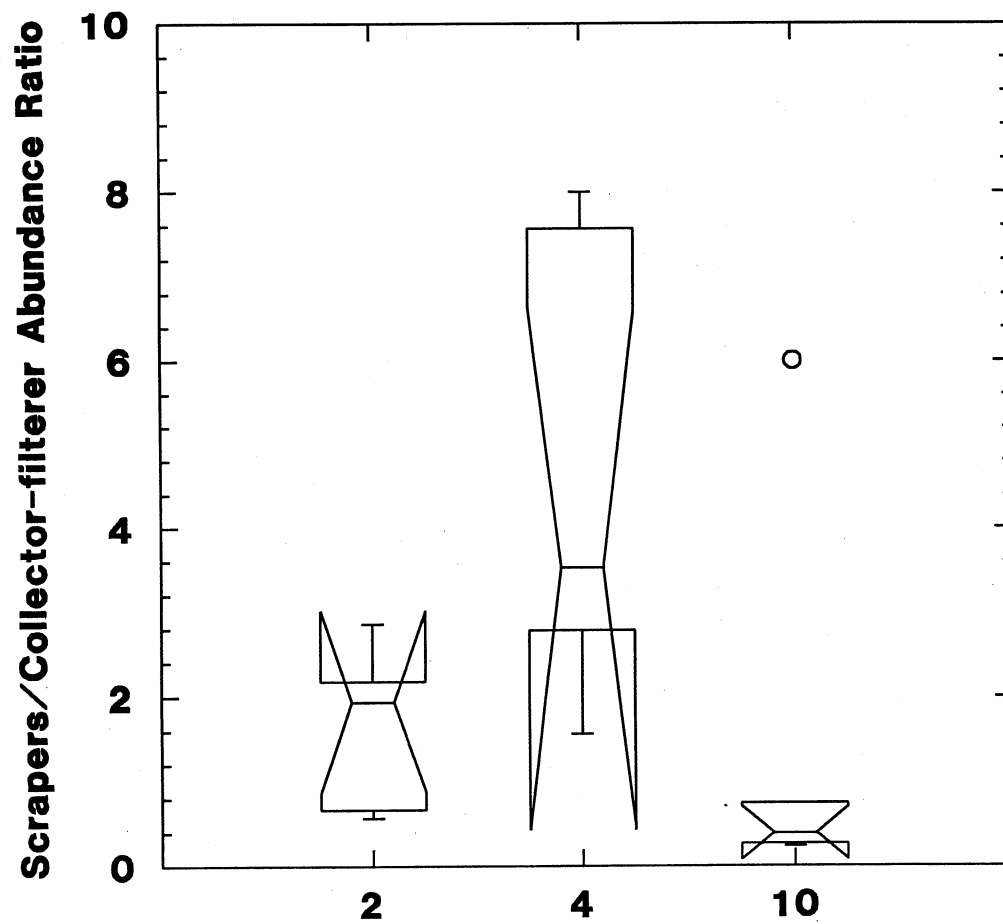
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H24. RBP III (Summer 1991)



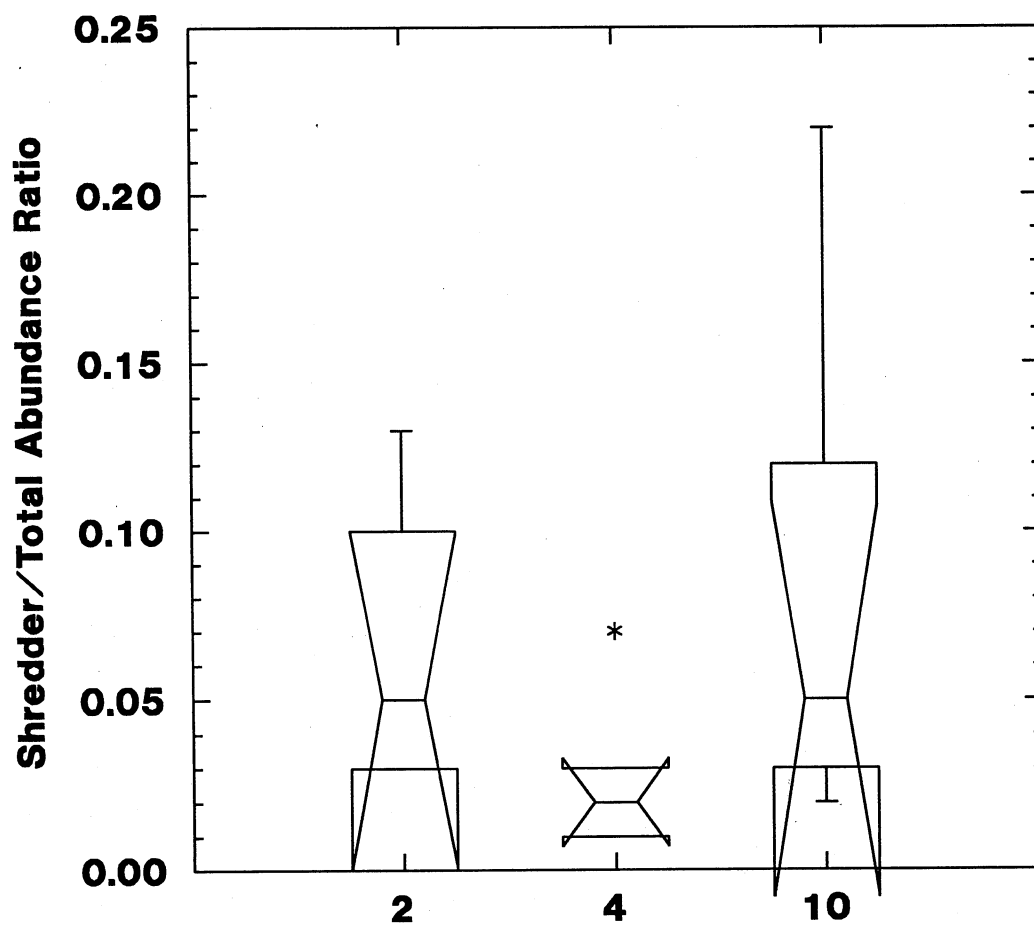
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H25. RBP III (Summer 1991)



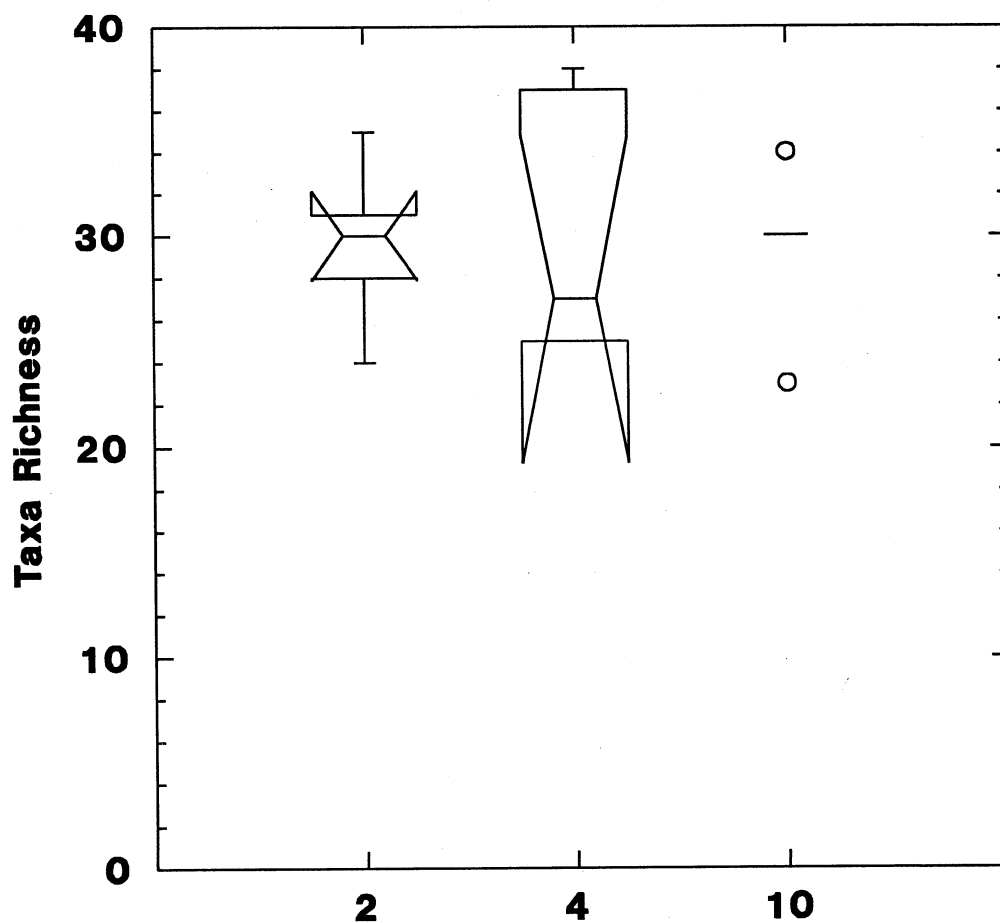
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H26. RBP III (Summer 1991)



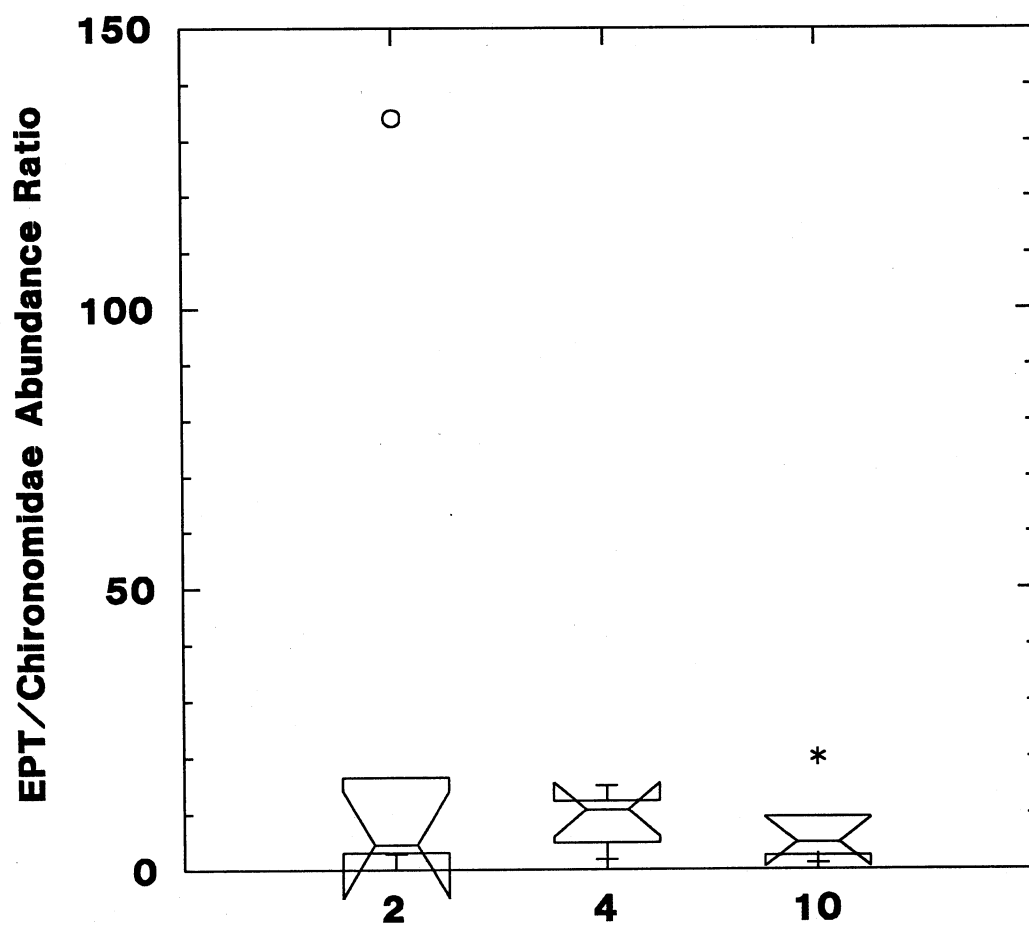
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H27. RBP III (Summer 1991)



(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix H28. RBP III (Summer 1991)



(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I

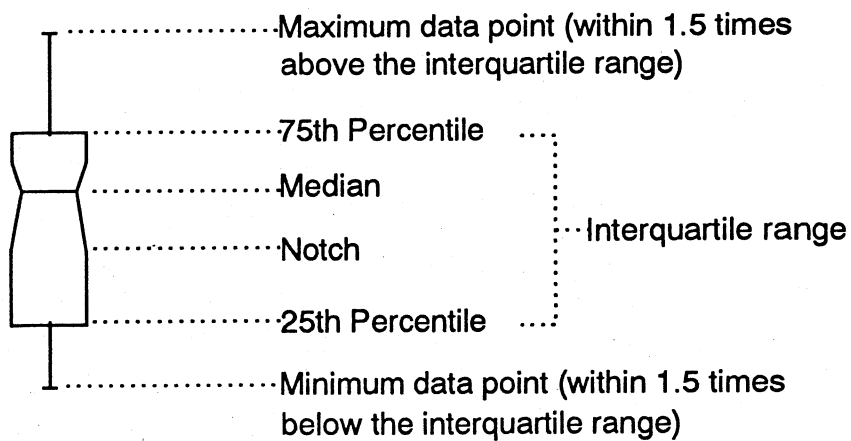
Rapid Bioassessment Protocol II Biometric Results Seasonal Boxplot Figures

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Box Plot Example

□ Data outlier (greater than 3.0 times the interquartile range)

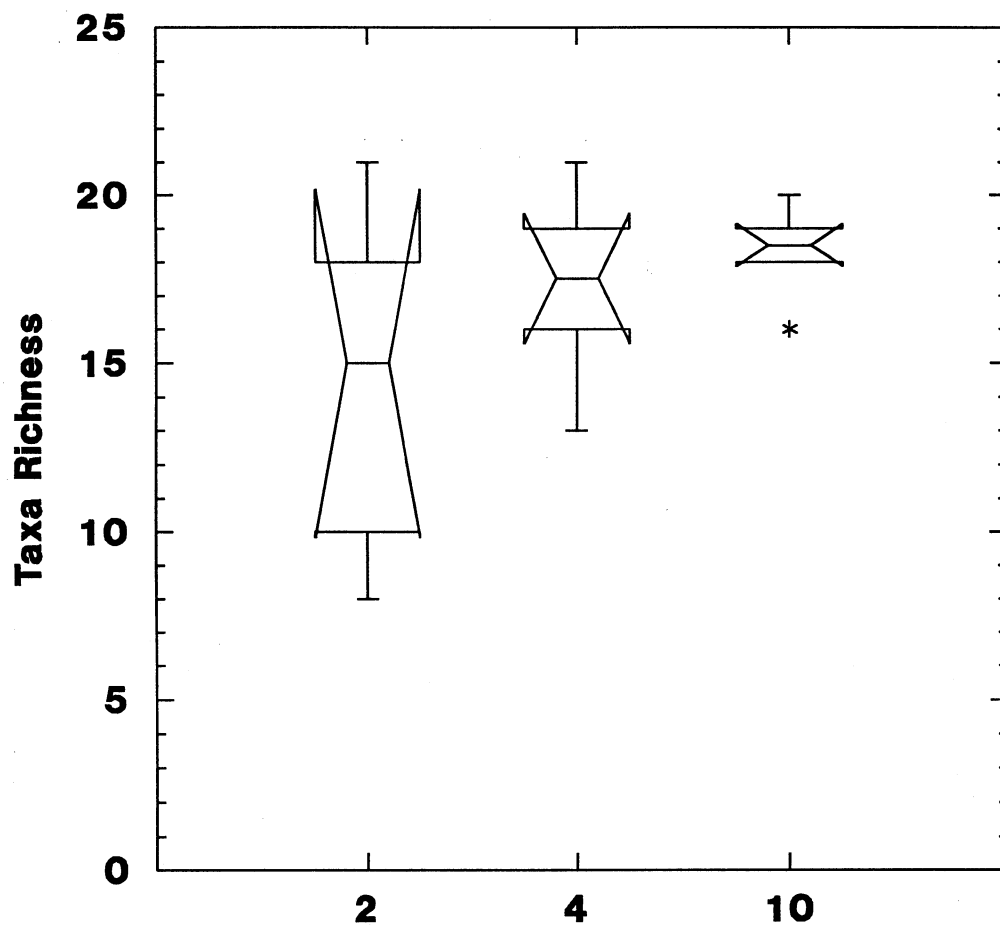
* Data outlier (within 1.5-3.0 times the interquartile range)



(notches in the box indicate 95% confidence intervals about the median)

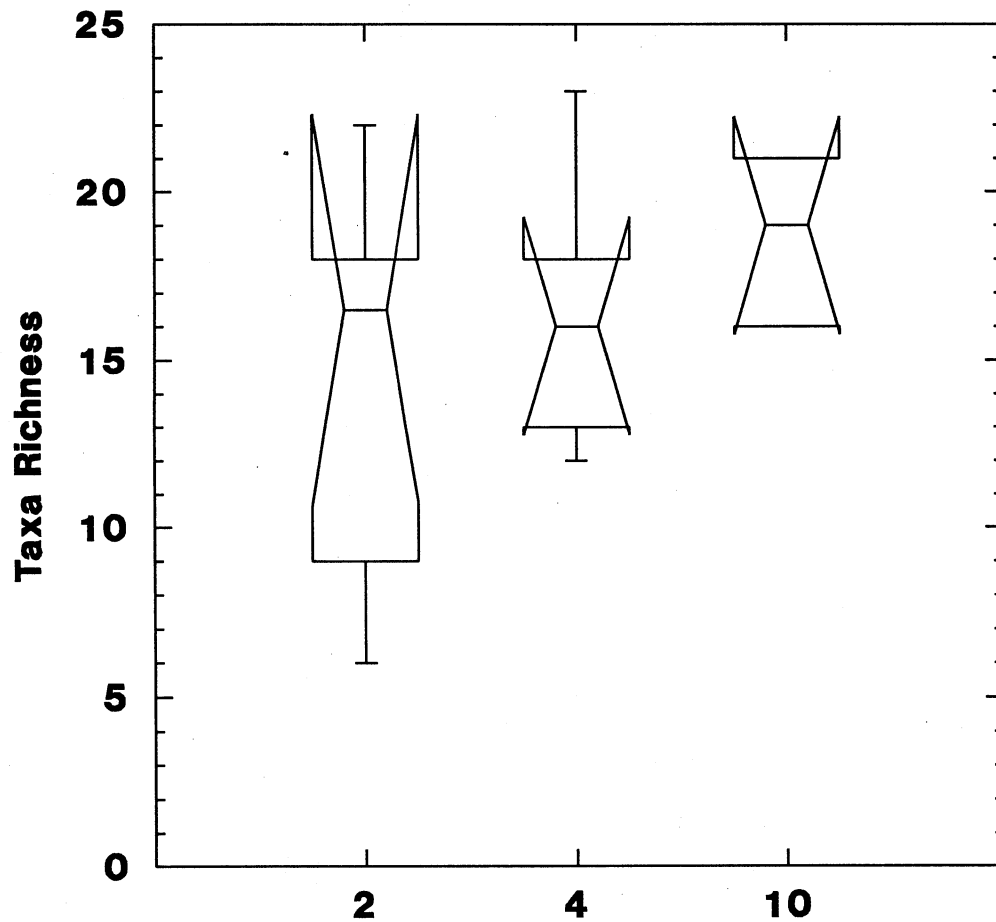
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Appendix I1. RBP II (Fall 1990)



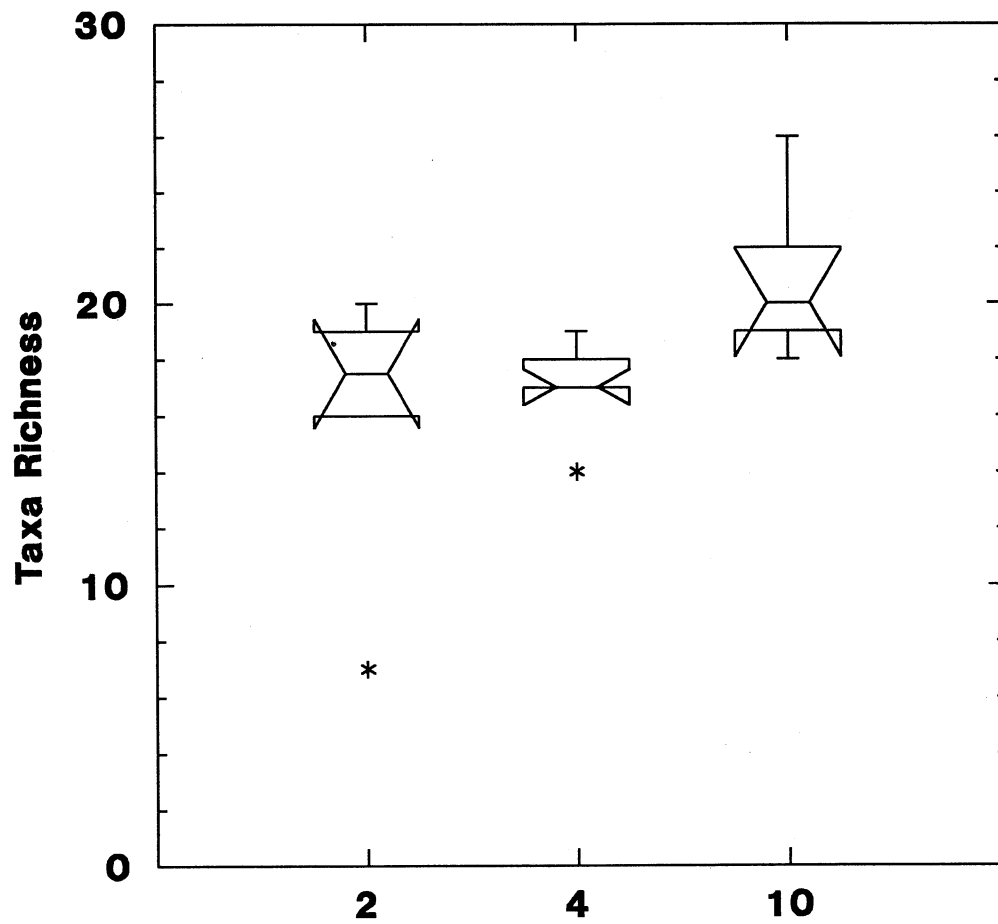
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I2. RBP II (Winter 1991)



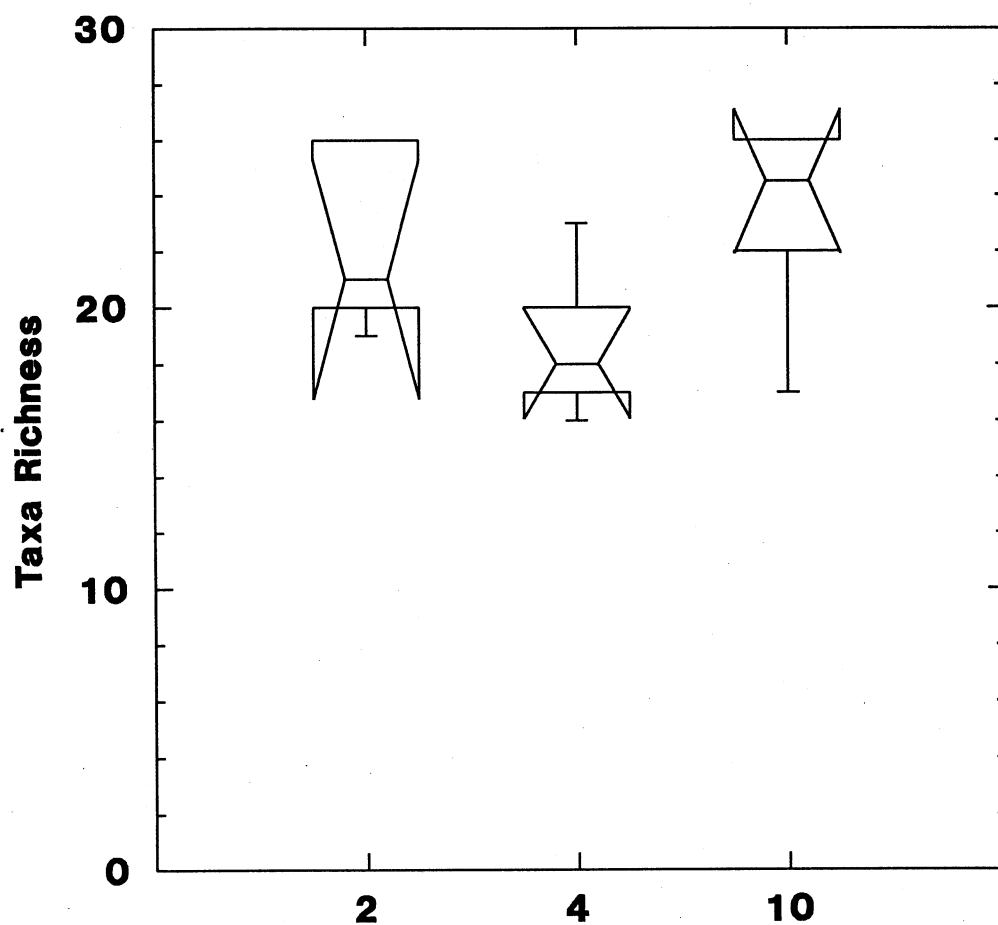
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I3. RBP II (Spring 1991)



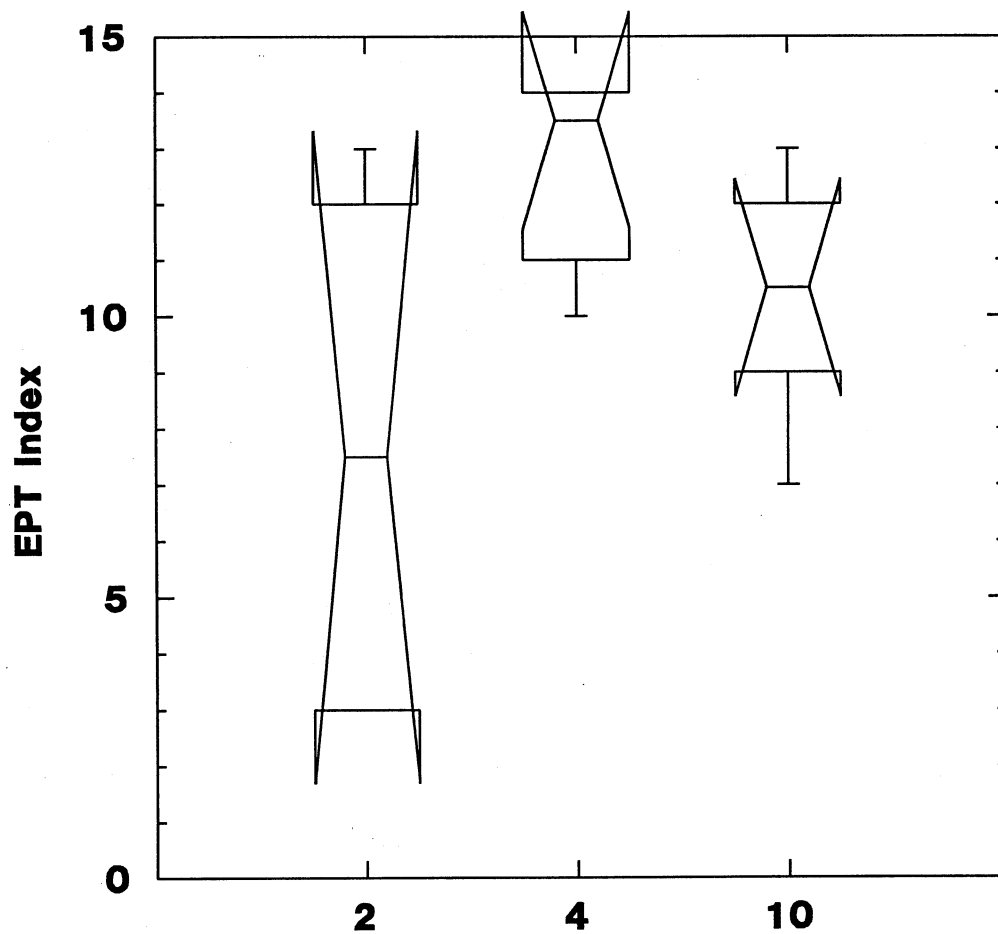
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I4. RBP II (Summer 1991)



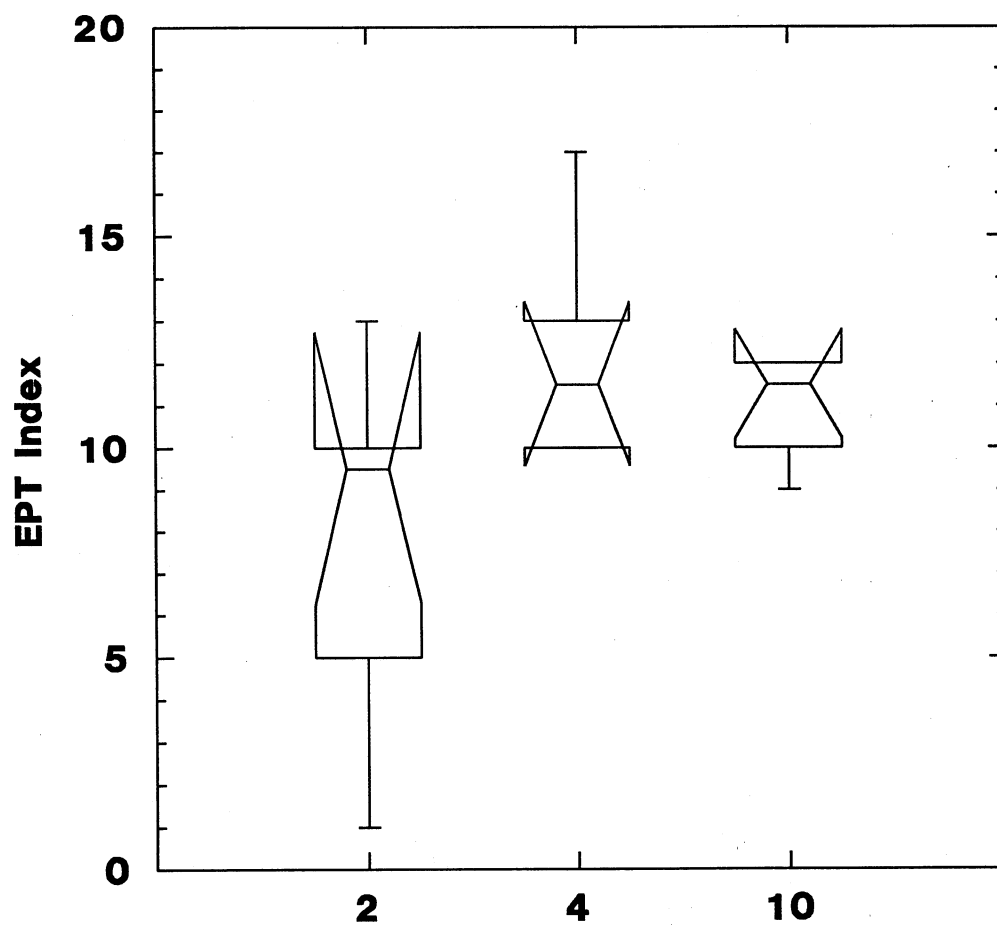
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I5. RBP II (Fall 1990)



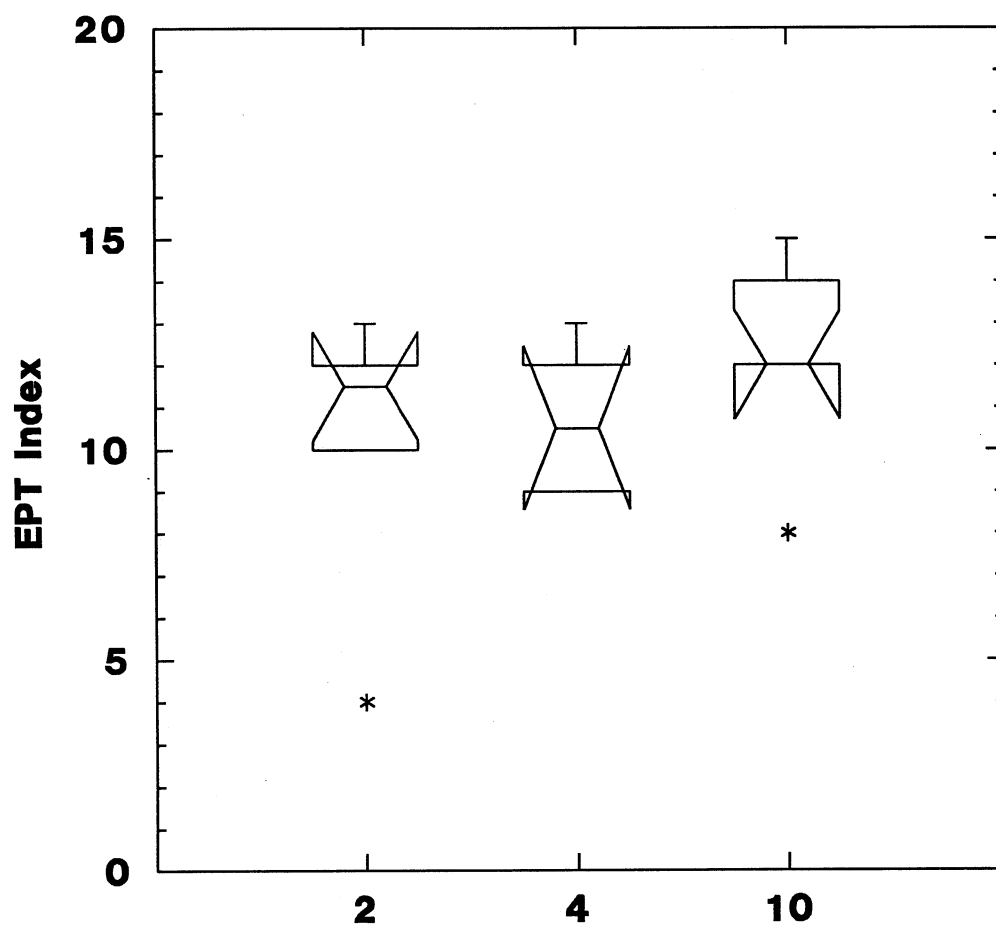
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I6. RBP II (Winter 1991)



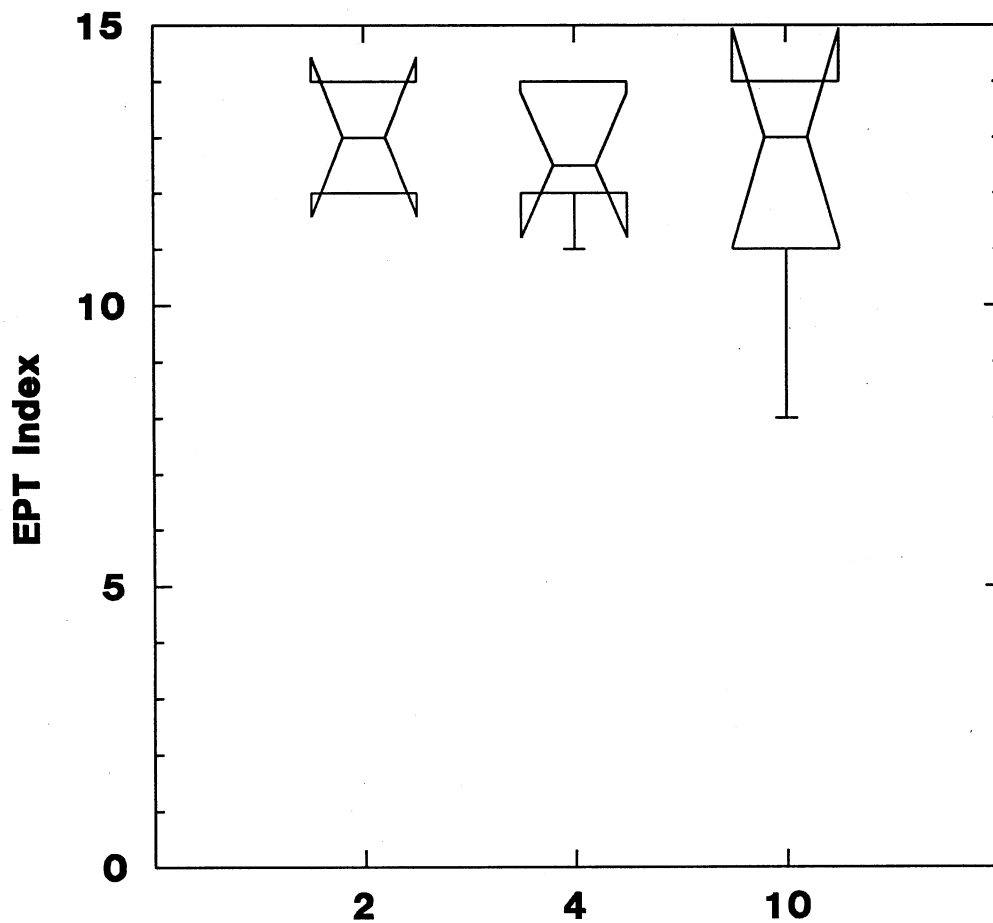
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix 17. RBP II (Spring 1991)



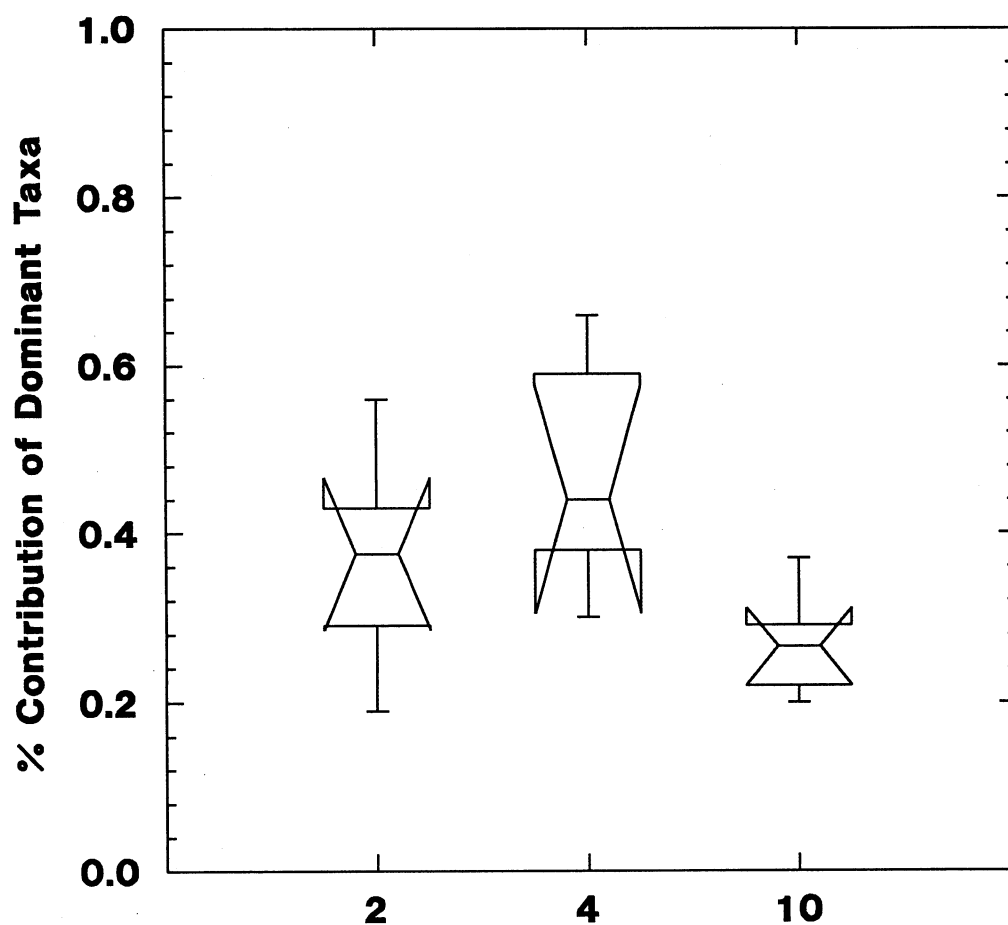
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I8. RBP II (Summer 1991)



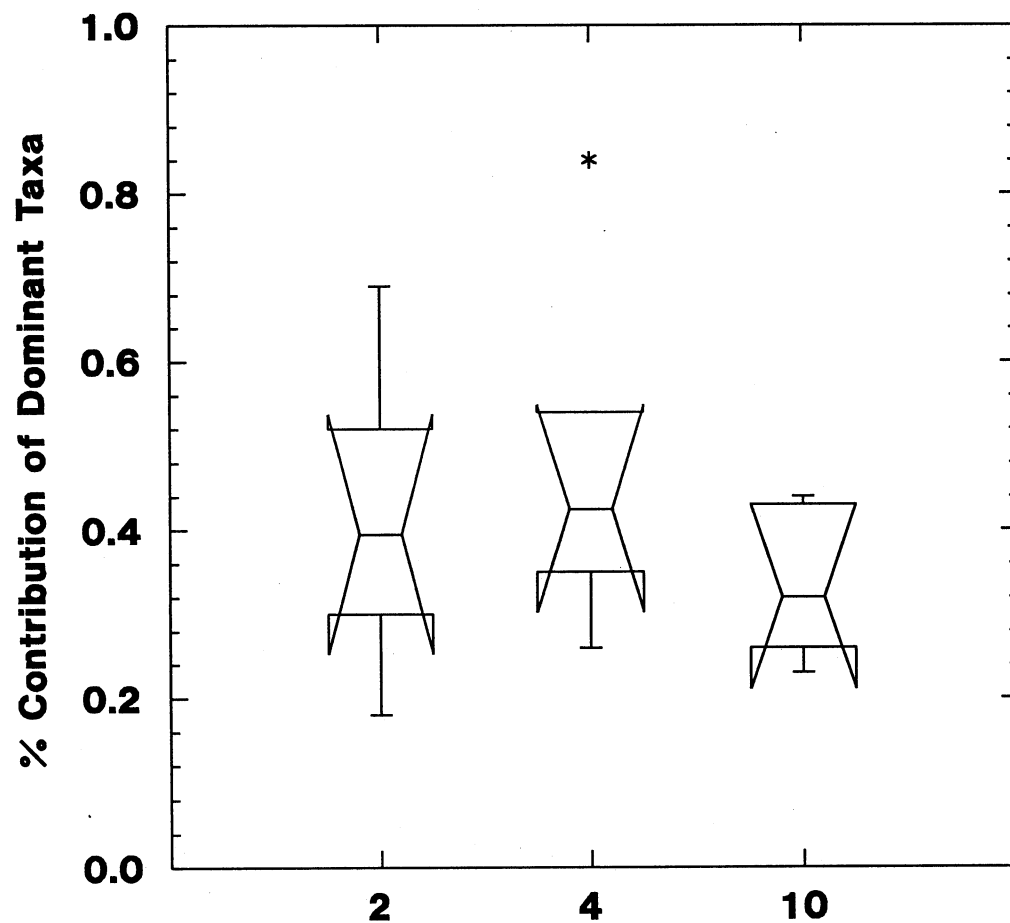
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I9. RBP II (Fall 1990)



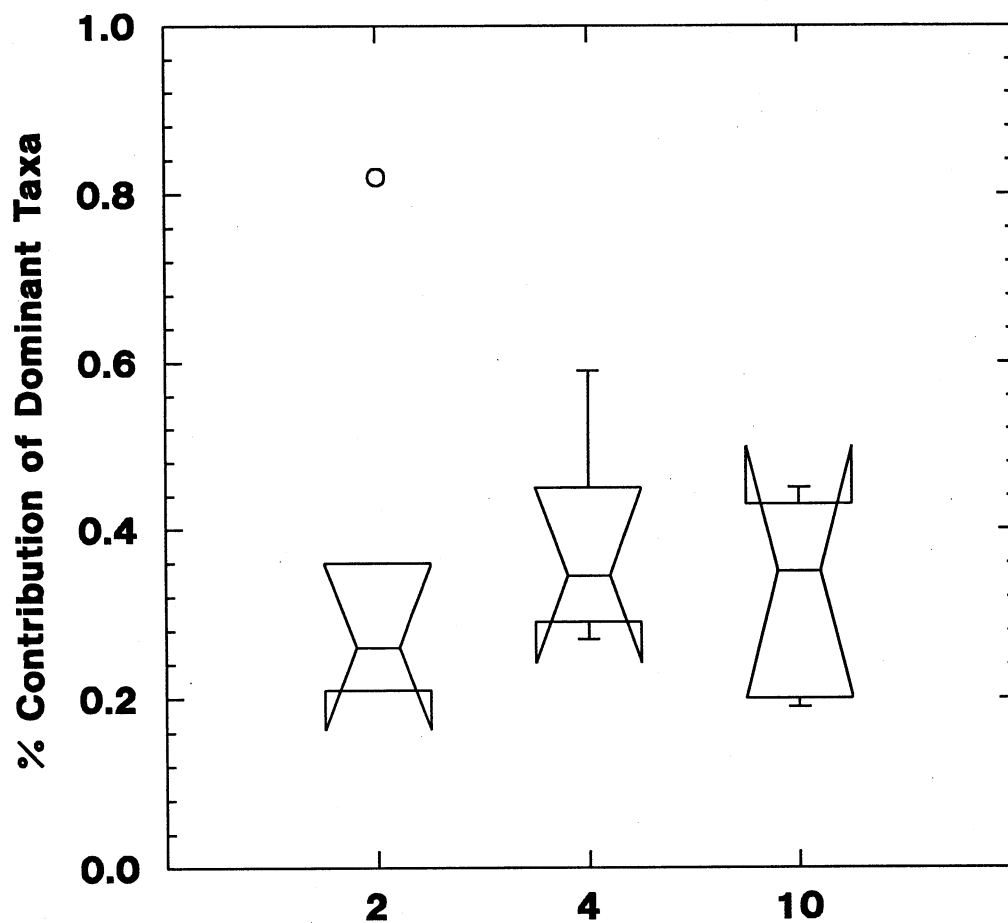
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I10. RBP II (Winter 1991)



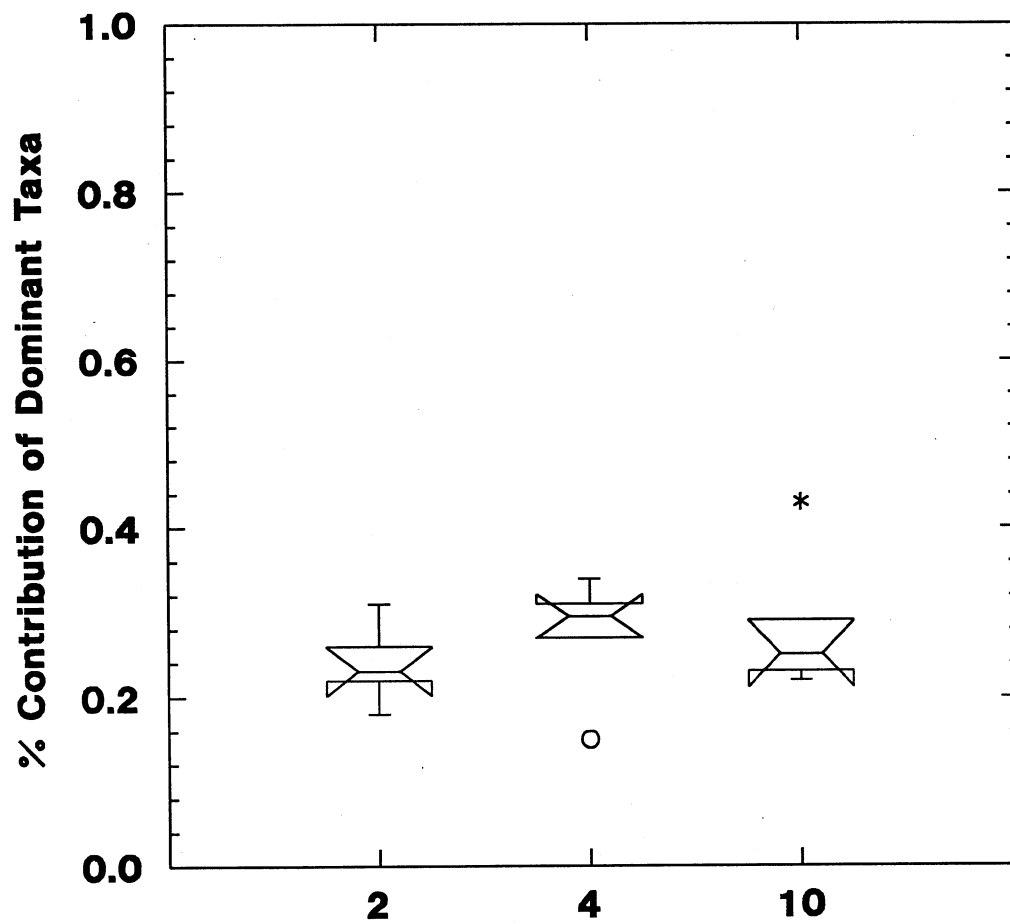
(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I11. RBP II (Spring 1991)



(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix I12. RBP II (Summer 1991)



(Ecoregion: 2=Puget Lowland, 4=Cascades, 10=Columbia Basin)

Appendix J

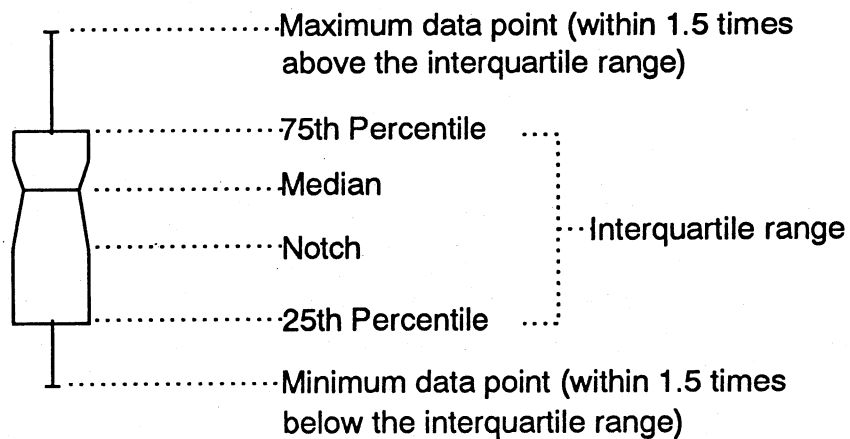
Surface Water Parameter Ecoregion Distributions Boxplot Figures

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Box Plot Example

□ Data outlier (greater than 3.0 times the interquartile range)

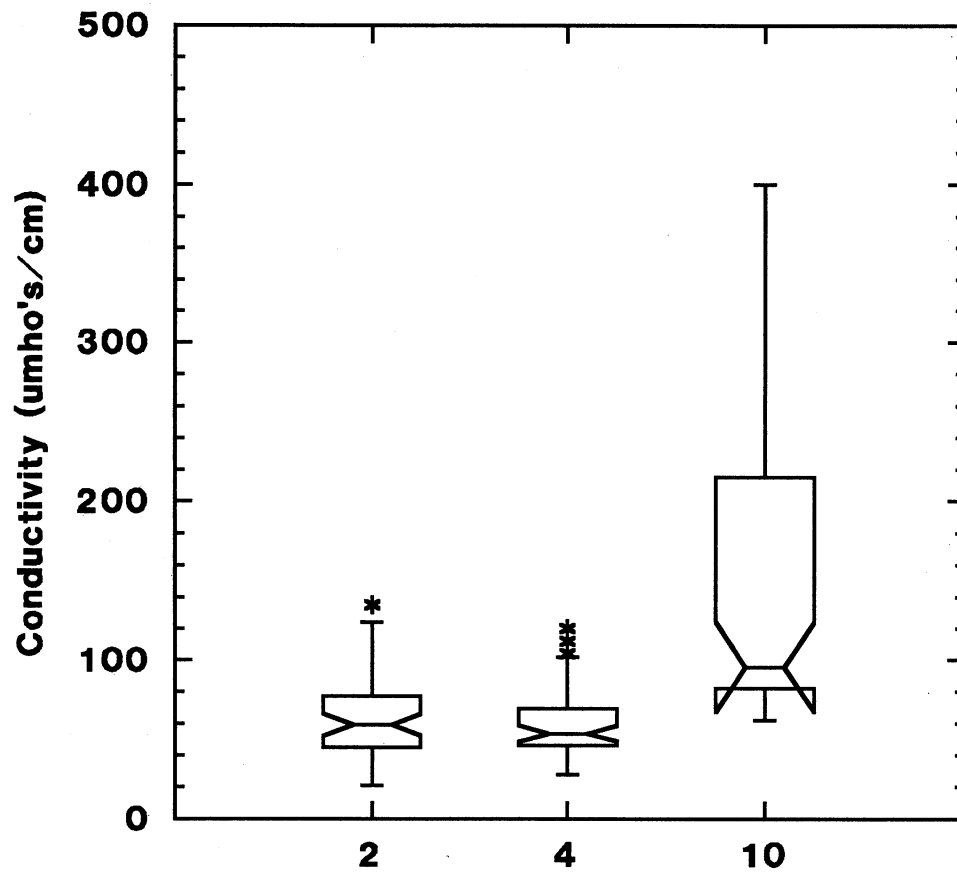
* Data outlier (within 1.5-3.0 times the interquartile range)



(notches in the box indicate 95% confidence intervals about the median)

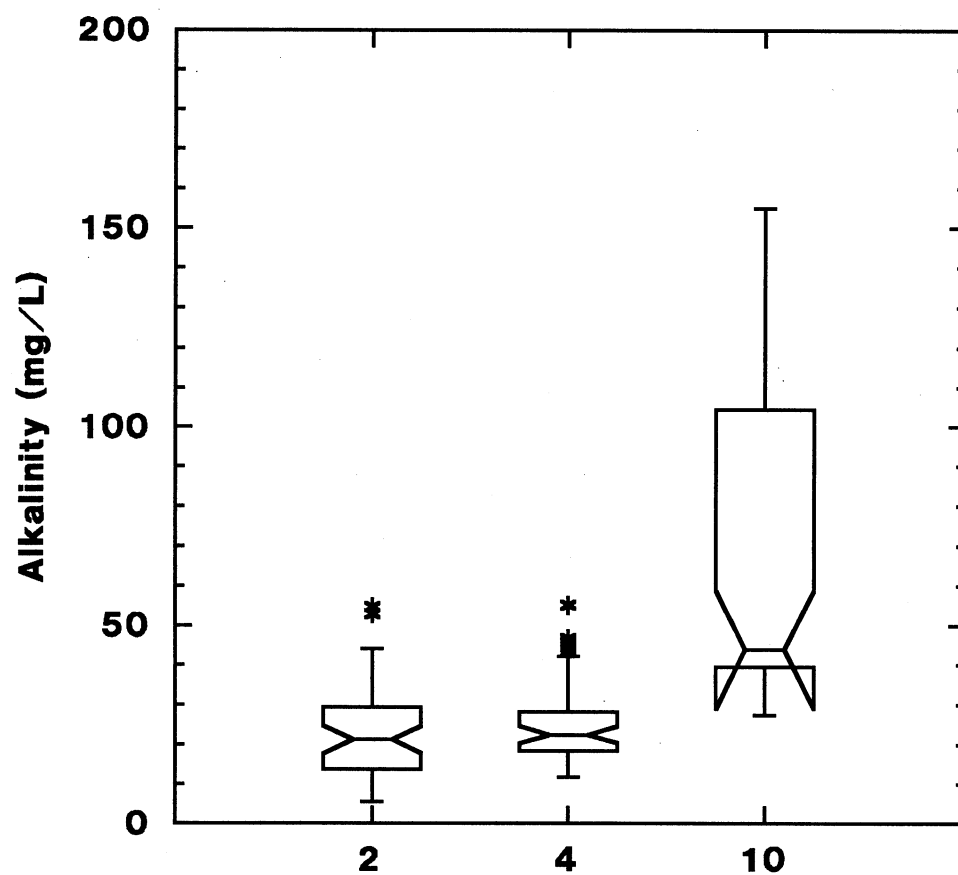
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Appendix J1. Ecoregion Conductivity



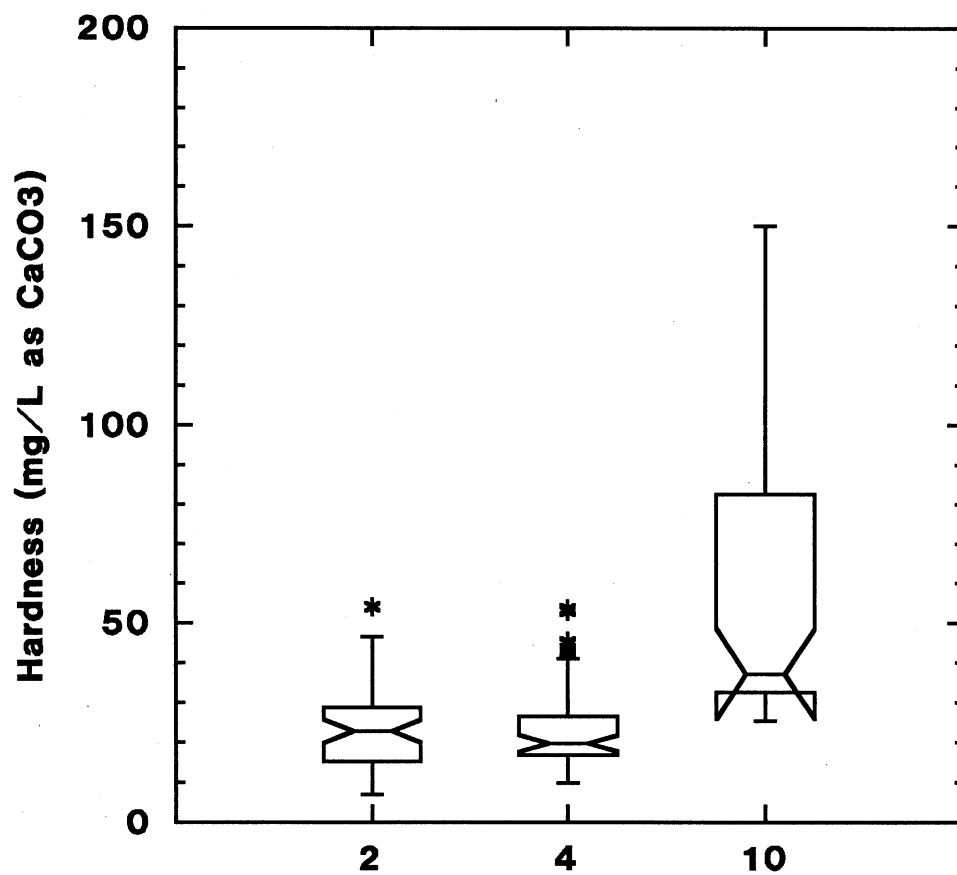
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J2. Ecoregion Alkalinity



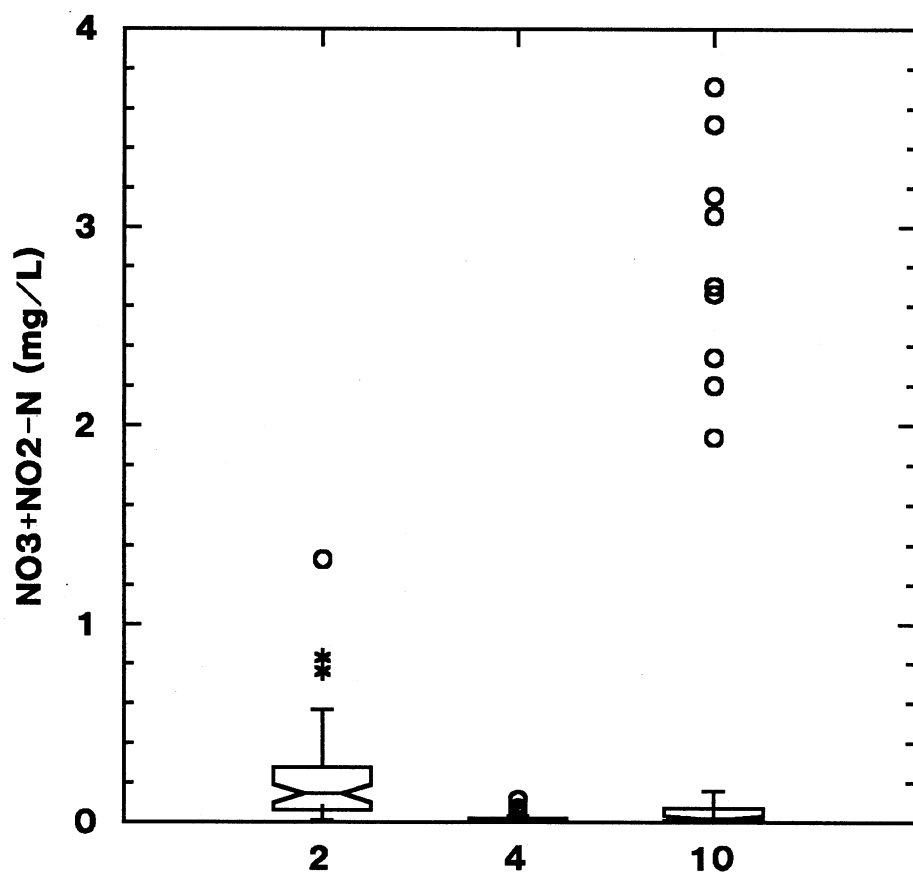
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J3. Ecoregion Hardness



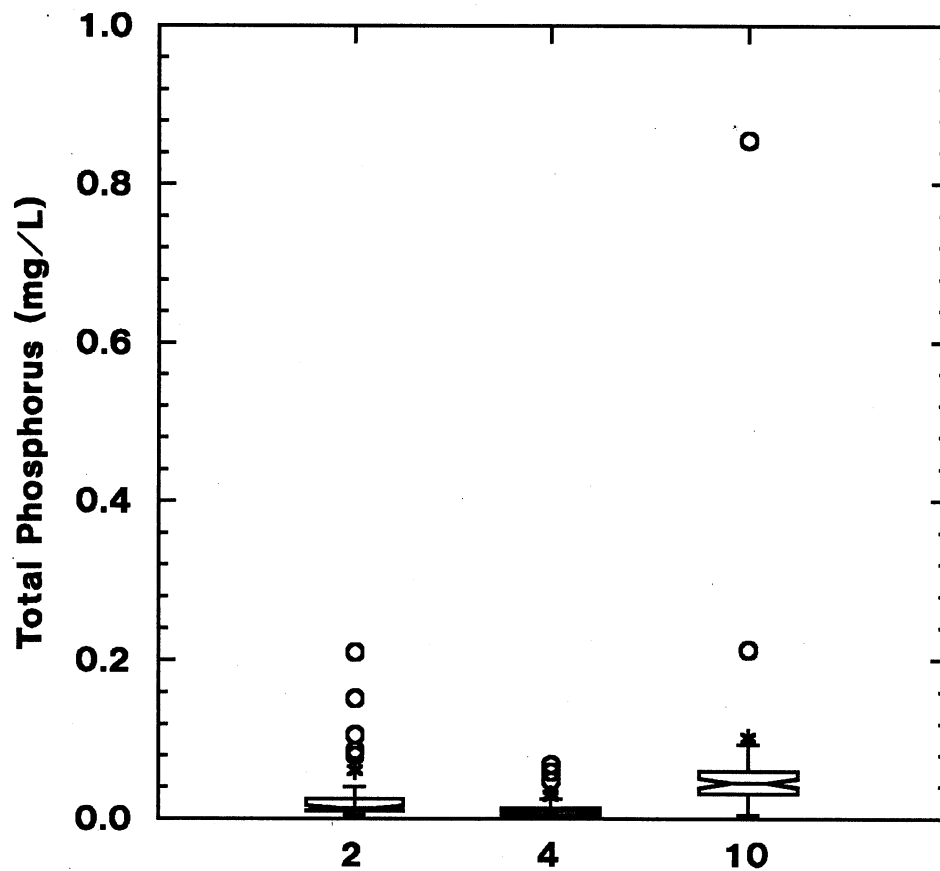
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J4. Ecoregion Nitrate+Nitrite-Nitrogen



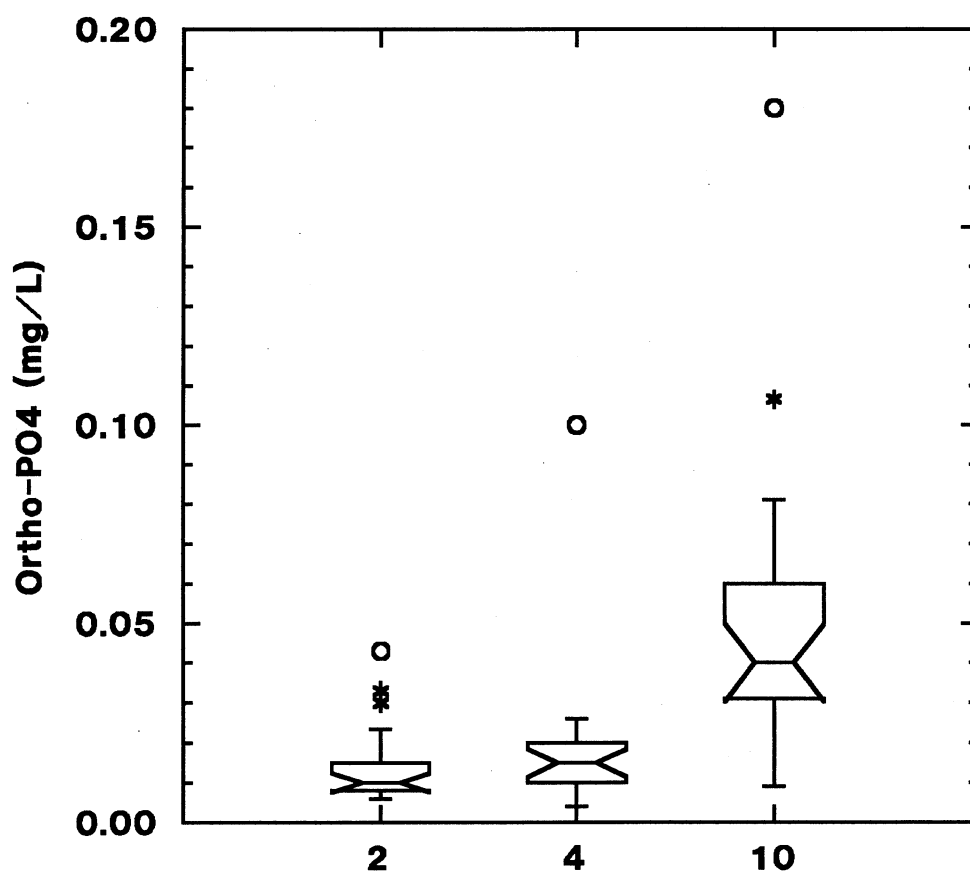
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J5. Ecoregion Total Phosphorus



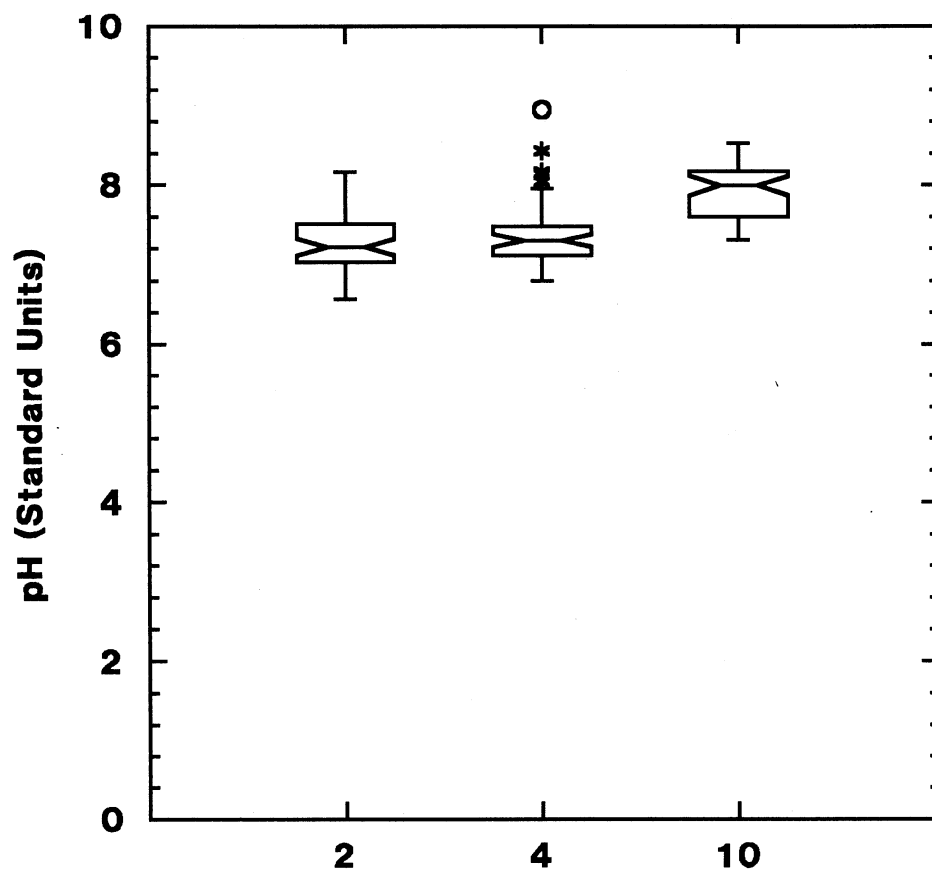
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J6. Ecoregion Ortho-Phosphate



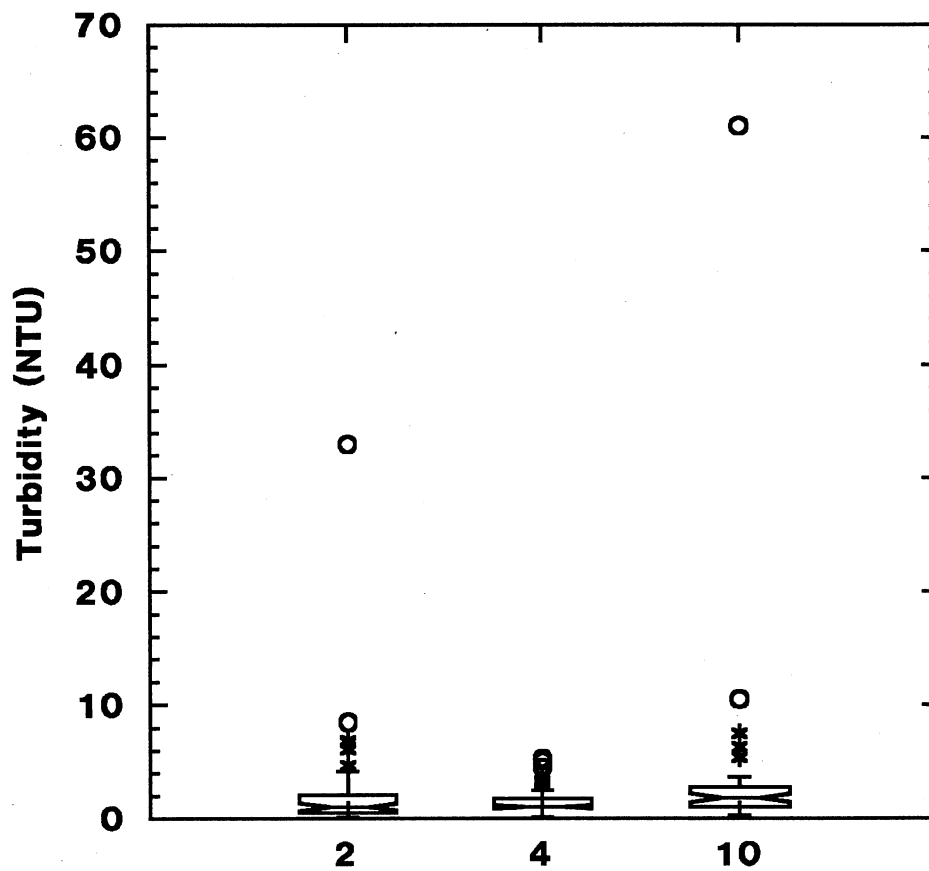
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J7. Ecoregion pH



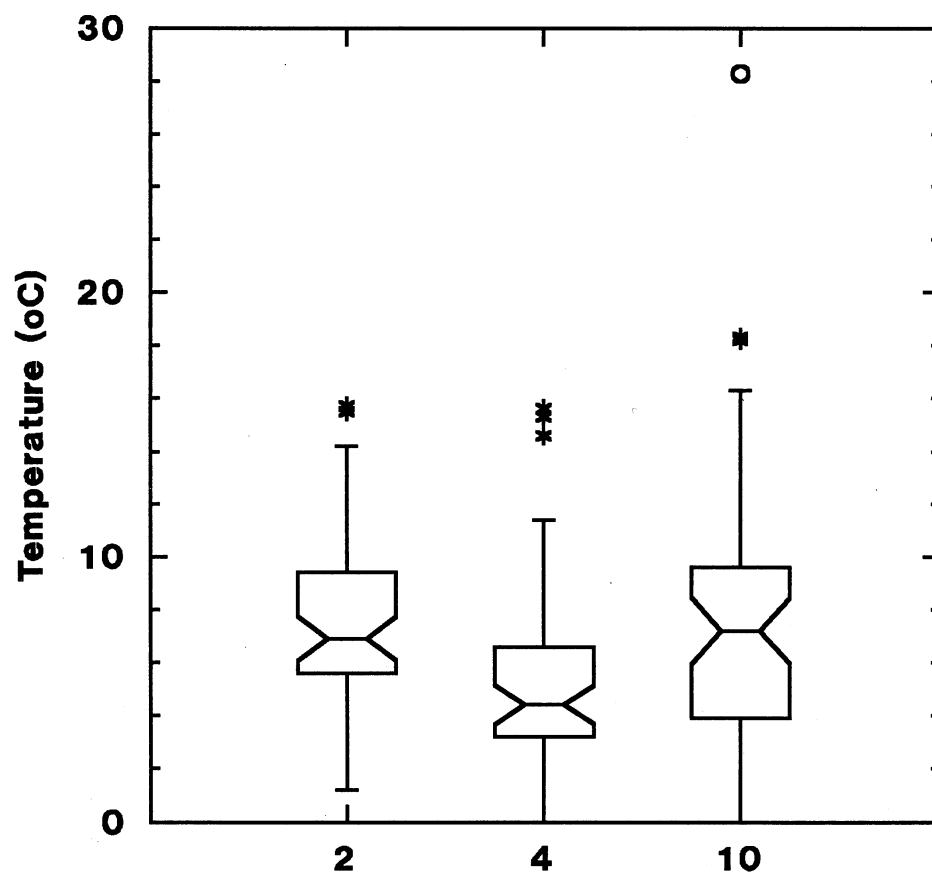
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J8. Ecoregion Turbidity



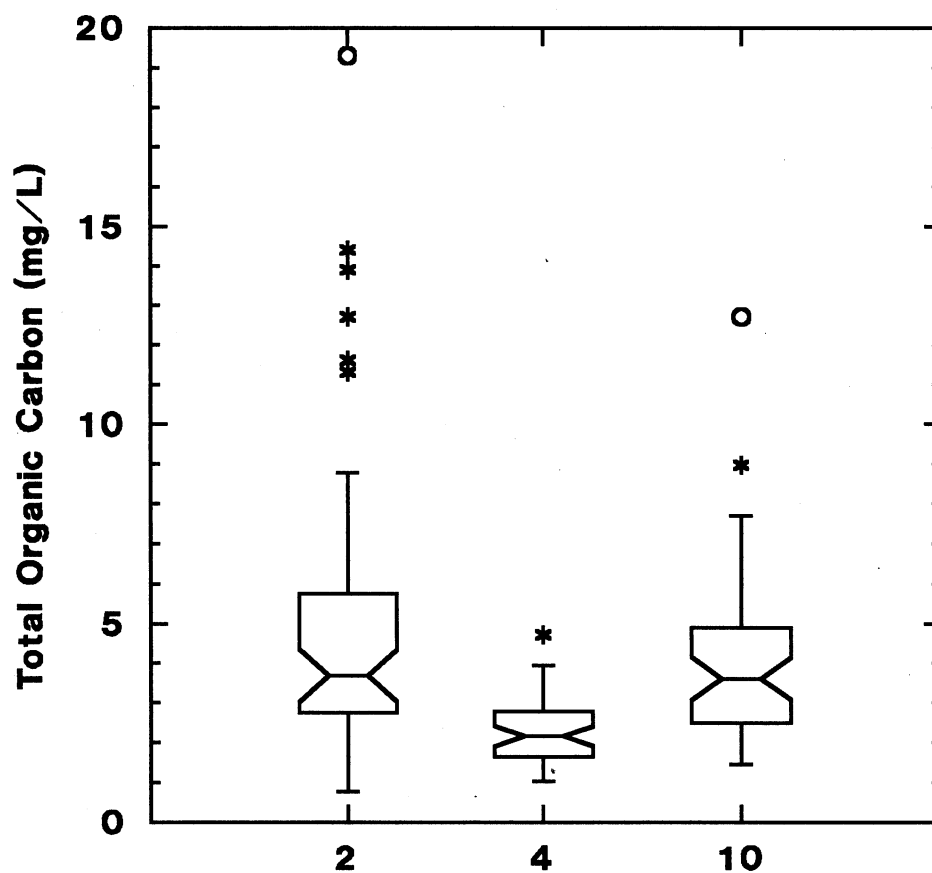
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J9. Ecoregion Temperature



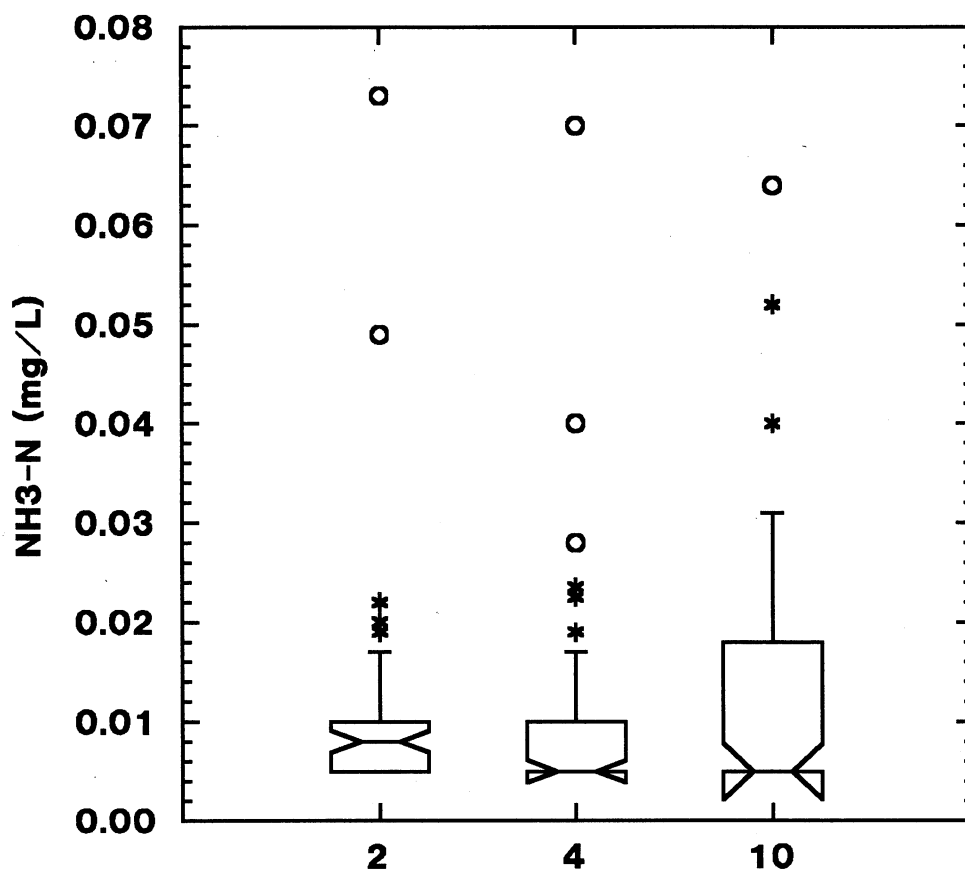
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J10. Ecoregion Total Organic Carbon



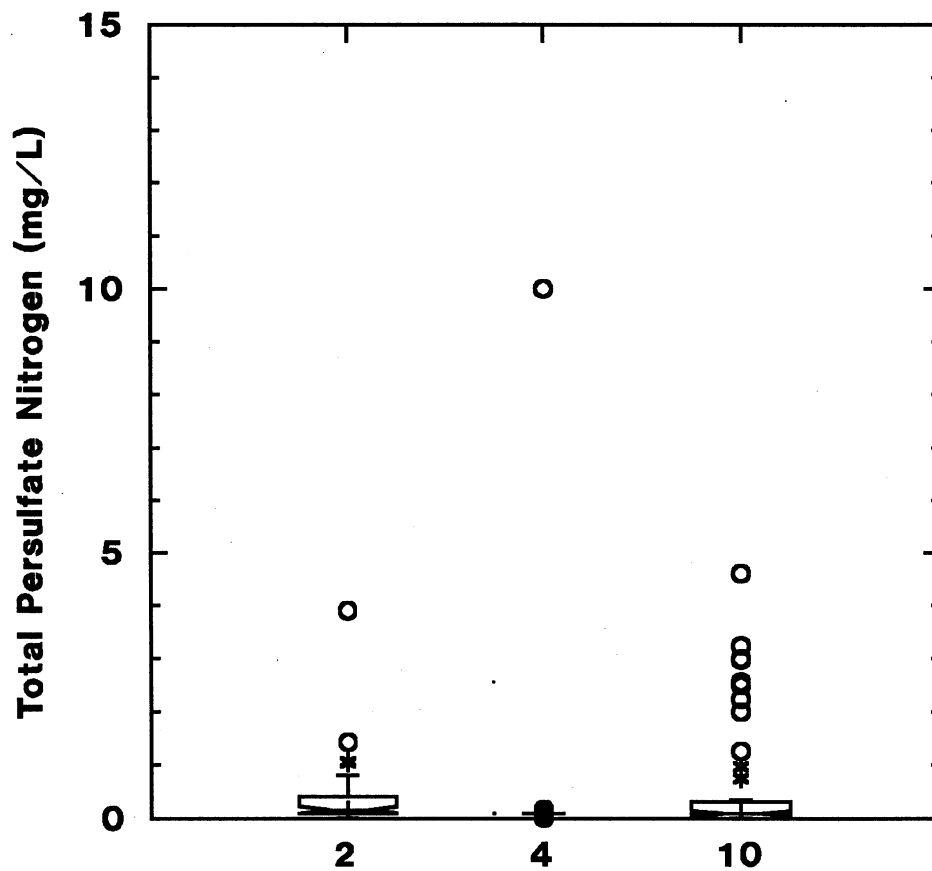
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J11. Ecoregion Ammonia-Nitrogen



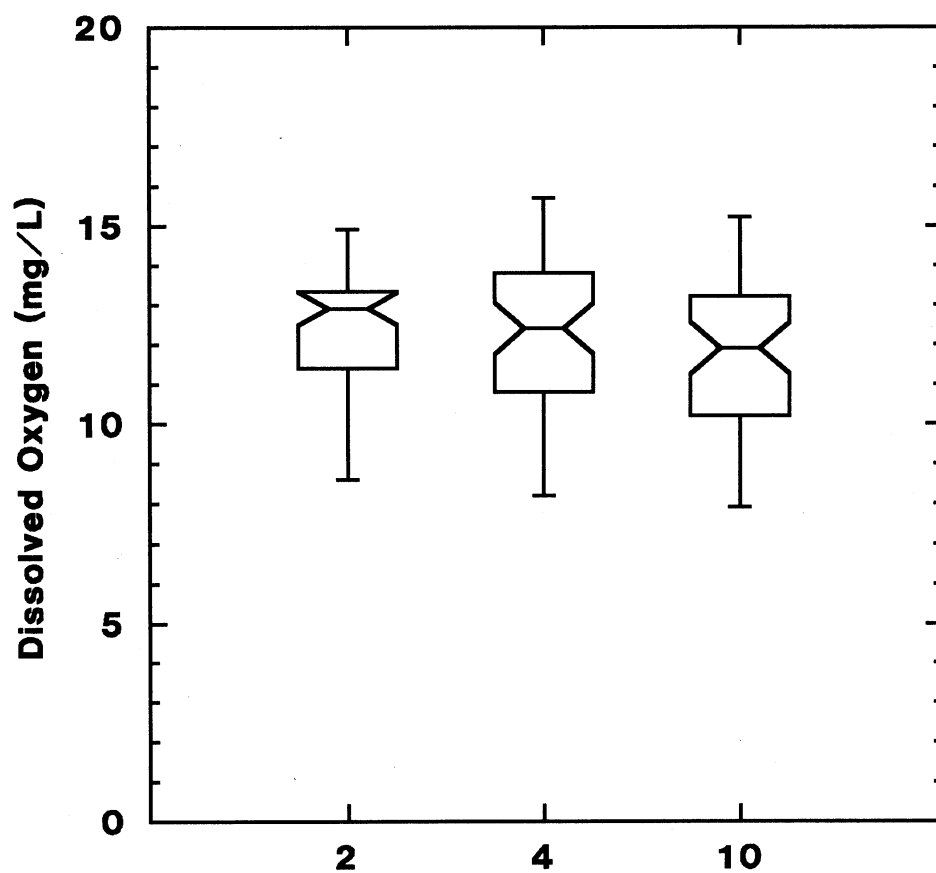
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J12. Ecoregion Total Persulfate Nitrogen



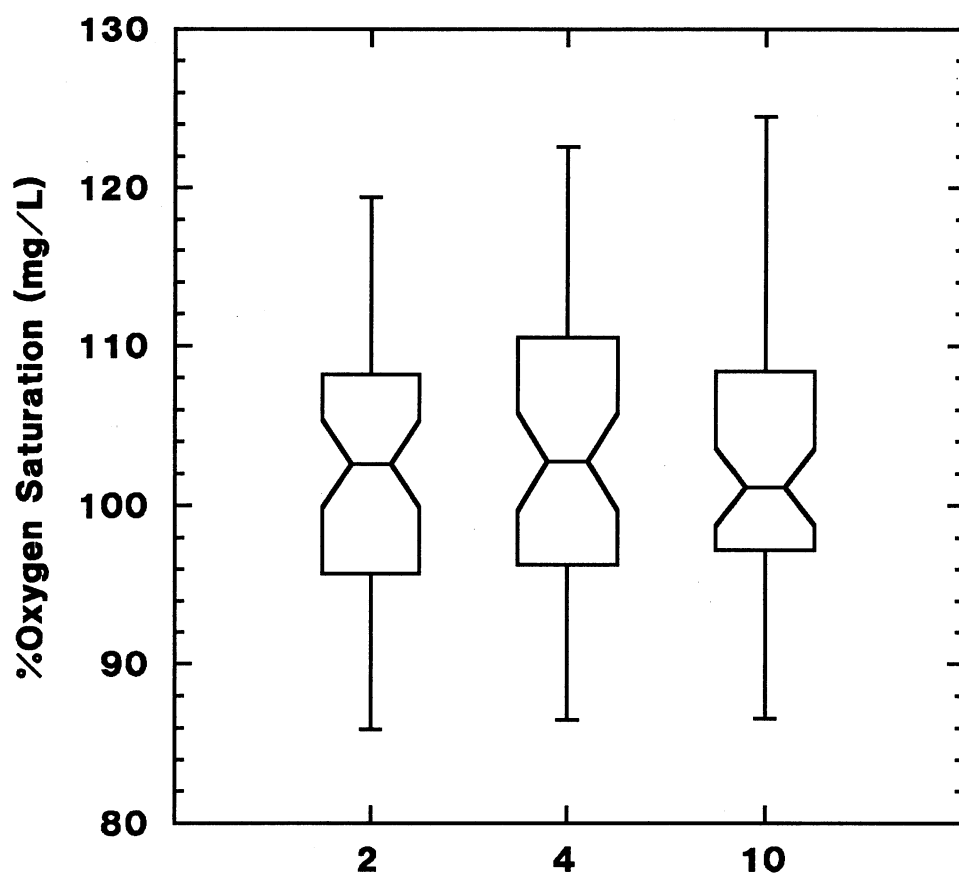
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J13. Ecoregion Dissolved Oxygen



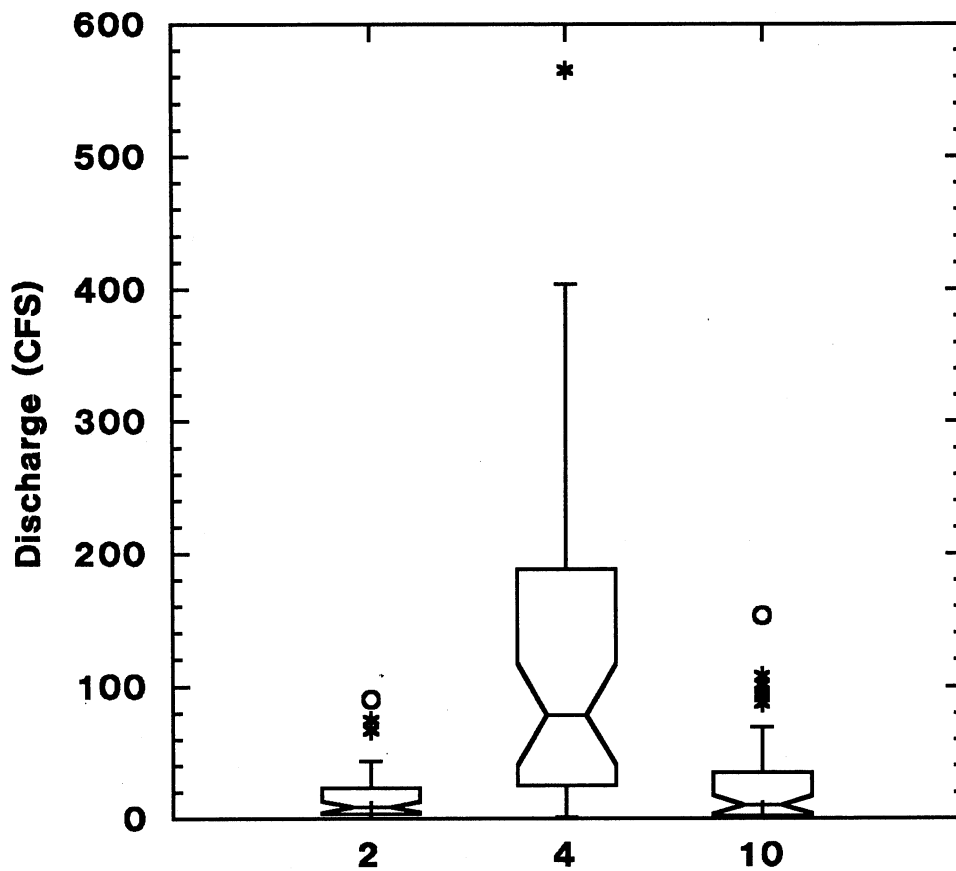
(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J14. Ecoregion Oxygen Saturation



(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)

Appendix J15. Ecoregion Discharge



(Ecoregion: 2=Puget Lowlands, 4=Cascades, 10=Columbia Basin)