WATER QUALITY MONITORING PROTOCOLS REPORT NO. 5

PROTOCOLS FOR ASSESSMENT OF BIOTIC INTEGRITY (MACROINVERTEBRATES) FOR WADABLE IDAHO STREAMS

DRAFT

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Division of Environmental Quality
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Tradenames are mentioned in this publication solely to identify materials and equipment that have been successfully used in assessment of macroinvertebrates. Mentioning tradenames does not imply endorsement by DEQ or suggest superiority over other comparable products.

PROTOCOLS FOR ASSESSMENT OF BIOTIC INTEGRITY (MACROINVERTEBRATES) FOR WADABLE IDAHO STREAMS

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ABSTRACT

To help foster consistency in water quality monitoring in Idaho, we present the following protocols. Reconnaissance level monitoring with a kick net and intensive level monitoring with a Hess or Surber Sampler are described. Mesh size for all nets has been standardized at 0.5 mm. We have adopted the Caton method of subsampling. Data analysis involves the use of the following metrics: taxa richness, Ephemeroptera-Plecoptera-Trichoptera, Hilsenhoff biotic index, abundance, percent scrapers, percent filterers, percent shredders and Jaccards coefficient of similarity. In addition, we use a method of making comparisons of study streams to reference streams. A brief description of the Idaho Bioassessment Analysis Program which can be used to calculate these metrics is enclosed. Quality assurance methods are suggested for field, laboratory and data analysis aspects of macroinvertebrate monitoring. Suggestions are made for basic identification literature for Idaho macroinvertebrates and equipment and supplies required to conduct such monitoring. A selected list of macroinvertebrate taxa for Idaho is presented including tolerance value and functional feeding group information.

INTRODUCTION

The Federal Clean Water Act and its amendments (Water Pollution Control Federation 1987) require the gathering of information on the potential fish or biological community that can be supported in a stream (termed aquatic life "use designations") for setting "benchmarks" of community expectations to compare against actual stream performance. Unfortunately, to date few states have measured aquatic community performance directly but rely on physicochemical surrogates to measure performance.

In order to begin developing effective bioassessment tools and biocriteria for the various stream types in Idaho, it will be essential to characterize reference conditions which will be based, in part, on ecoregions (Omernik and Gallant 1986). This will require building a database of information from "least impacted" streams. This data will be made up of various fish and macroinvertebrate community metrics which are indicative of the attainable conditions for the various stream types and regions of Idaho. In addition, habitat variables measured jointly with the biological collections will provide insights on how biological potential relates to habitat quality. This process will require a long term commitment to monitor reference conditions and developing a database which can be used to provide the information necessary to develop mean expected condition over a range of stream types. A key component of developing these metric and scoring criteria is consistency in field protocols and data assessment. Standardization of methods is a fundamental prerequisite for any monitoring program. Without it, the utility of environmental monitoring data can and will be challenged. This approach will also allow data to be compared between ecoregions and stream types to begin identifying similarities in community types. This will facilitate the development of regional expectations for development of biocriteria.

It is our hope to develop biological monitoring protocols that are consistent with those of other states in the U.S. Environmental Protection Agency Region 10, especially with Oregon and Washington since we share common watersheds, basins, and streams. Oregon has recently prepared protocols for macroinvertebrates and habitat assessment (Mulvey et al. 1992). In addition, Hayslip (1992) has prepared an overview of in-stream biological monitoring techniques for the Pacific Northwest.

This protocol is one in a series intended to help provide consistency in water quality monitoring methods in Idaho resulting from the state's Antidegradation Agreement (Office of the Governor 1988; Clark 1990). Other protocols in this series include "Protocols for assessment of dissolved oxygen, fine sediment, and salmonid embryo survival in an artificial redd" (Burton, et al. 1990); "Estimating intergravel salmonid living space using the cobble embeddedness sampling procedure" (Burton and Harvey 1990); "Monitoring stream substrates, pool volumes, and general habitat diversity" (Burton 1990); "Protocols for evaluation and monitoring of stream/riparian habitats associated with aquatic communities in rangeland streams" (Burton 1991); "Protocols for assessment of biotic integrity (Fish) in Idaho streams" (Chandler et al. 1993); "Protocols for conductiong use attainability assessments for determining beneficial uses to be designated on Idaho stream segments" (Maret and Jensen 1991) "Protocols for classifying, monitoring, and evaluating stream/riparian vegetation on Idaho rangeland streams" (Cowley 1992), and "Groundwater and soils quailty assurance project plan (QAPP) development manual" (Winter 1993)

Benthic macroinvertebrates are animals that inhabit the substratum of streams and lakes. Macroinvertebrates are visible to the unaided eye and are retained on a U.S. Standard No. 30 sieve (0.595 mm openings) (Weber 1973; American Public Health Association 1992; Klemm et al. 1991). These invertebrates may construct attached cases, tubes or nets that they live in, or roam freely over rocks, organic debris, and other substrates during all or part of their life cycle.

According to Plafkin et al. (1989) there are many advantages of using macroinvertebrates, these include:

1. This community integrates the effects of short term environmental variations and watershed health.

2. Macroinvertebrate sampling is relatively easy, requiring few people.

3. Benthic macroinvertebrates serve as a food source for recreational and commercially important fish.

4. Benthic macroinvertebrates are found in most streams.

5. This community is sessile and are good indicators of localized conditions.

6. Macroinvertebrates species are sensitive to a wide array of environmental degradation which can be used to evaluate the health of the aquatic community.

The Idaho Department of Health and Welfare, Division of Environmental Quality (DEQ) is charged with coordination of all nonpoint source water quality monitoring in the state under the Antidegradation Agreement (Clark 1990). Stream segments of concern (SSOC) designations have resulted from antidegradation and DEQ has defined three levels of monitoring for those streams: Basic Reconnaissance and Intensive Monitoring Levels (IDHW 1990). These levels are additive with methodology and expected outcomes discussed below. Field level evaluations must include a habitat assessment to be completed in conjunction with the macroinvertebrate collections. Burton (1990; 1991) has outline detailed qualitative and quantitative procedures for evaluating habitat for streams of the northwest region.

METHODS

FIELD SAMPLING

Basic Monitoring

An exhaustive review of the literature, compilation of existing data, STORET/BIOS (Environmental Protection Agency national data base) information, and any other pertinent data will be used to estimate the condition of the aquatic biota beneficial use. All information collected at this level should be completed in-house with no field work involved. A one page table summarizing the stream sites collected, dates and taxa collected is all that is needed at this level.

Reconnaissance

This level of intensity is intended to provide an estimated condition through qualitative assessments or quantitative assessments that are limited in scope. Reconnaissance monitoring is used for prioritizing stations for intensive monitoring and does not require a comparison to reference conditions. An on-site visit is required at this level of monitoring. A trained aquatic biologist must be present when performing this level of monitoring. Table 1 is a brief Checklist of field sampling equipment and supplies. Table 2 lists the equipment necessary to conduct macroinvertebrate sampling.

Collection time: July 1 - October 15 (during the low/stable flow period)

Methods: D-frame net (0.5 mm mesh)

Sample collection: The collection should be qualitative and sampling performed within a riffle habitat. Riffle habitat usually supports the richest community in benthic invertebrates. In streams lacking riffles collections should be made by sweeping or hand picking available habitat structures. At least three traveling kick samples for one minute duration each or a three minute traveling kick sample should be taken if the habitat is very long and narrow. If a three minute kick gives too much sample to work with a shorter time can be used. That same time should then be used on all sample sites for this stream/study.

Subsampling should follow Caton (1991). Briefly this method involves taking the sample from the D-frame net is placed into a rectangular gridded stainless steel sieve (each grid square is 6 x 6 cm). The sieve is placed in a slightly larger plastic pan with enough water to allow through mixing and distribution of the sample on the grid. Once the sample is evenly distributed, lift the sieve out of the water. Select the first grid with a random numbers table (Table 3). The sample from the selected grid is collected with the use of a 6 x 6 cm "cookie-cutter", a flat 6 cm wide scoop and a soft 2 inch (ca. 5 cm) paint brush. The subsample can then be placed in a small white pan with enough water for the organisms to move. The plan can be placed on a tripod with a platform for easy macroinvertebrate removal. Remove all organisms. We recommend saving the 100 or more organisms in a vial of 70% ethyl alcohol for future reference. Be sure and properly label the vial. If 100 individuals are not obtained from the first square, pick another square again using the random numbers table. All individuals from a square must be collected and recorded on the

Biosurvey Field Data Sheet (Table 4). Repeat as often as necessary to reach the minimum 100 individual organisms. Be sure to note the total size and the number of grids used in the subsample to estimate total numbers. Large/rare organisms that might be lost during subsampling should be identified and enumerated prior to splitting.

This level of effort involves minimal taxonomic identifications down to the order and/or family in the field, Ward and Kondratieft (1992); Lehmkuhl (1979). The counts of each major group are recorded on the field form (Table 4). Habitat must also be assessed with each site visit. At a minimum, the impairment assessment data form (Table 5) and a qualitative habitat assessment (Plafkin et al. 1989, Table 6) should be completed to summarize observations of stream health. Documentation of the site using slides is also required at this level. In order to meet the requirements of STORET a confidence identification code must accompany the species counts. The four categories are as follows: A = 99.9% confident; b = 99% confident; C = 90% confident; and, D = percent confidence unknown. Appendix B lists many of the macroinvertebrate taxa found in Idaho with appropriate numeric codes, functional feeding groups and tolerance values. Funcitonal feeding groups and tolerance values were determined using available literature sources and best professional judgement. These are subject to change as more information becomes available on specific taxa. Tolerance values reflect primarily tolerances to organic sediment and thermal pollution.

Intensive Monitoring

This level of monitoring is intended to provide population information, density, and statistically defensible results. These assessments will determine the status of the beneficial uses as well as the use attainability of SSOCs. Station locations will generally be revisited at least annually over a long period (5-10 years) to assess trends and evaluate BMP effectiveness. This level of monitoring requires a comparison to a reference or expected attainable condition for similar stream types in the ecoregion or drainage. A comparison to a regionally expected condition for each metric is preferred but not mandatory. A comparison to only one upstream or paired reference station is acceptable, until other data become available.

Collection time: July 1 - October 15 (during the low/stable flow period)

Methods: Hess sampler with mesh of 0.5 mm mesh (see Table 2 for examples). A Surber sampler may be used only if a Hess sampler can not be used in a specific situation. Selection of gear for sampling will be based upon best professional judgement and intent of the monitoring. These methods are designed to be intensive site-specific impact studies where quantitative sampling and statistical data is needed.

Sample collection: Riffles will be the target habitat to sample. At a minimum at least three equally spaced samples should be taken across a riffle and composited into a gridded pan. If an estimate of precision is desired (coefficient of variation) then samples should be processed separately. It may also be desired to estimate the number of samples required based on variability of the population, precision and level of probability. Elliott (1977) discusses the appropriate methods for estimating sample numbers required for the level of precision desired. Depending on the amount of debris and density of organisms, the samples may have to be worked up separately due to the amount of material gathered. The area within the sampler device should be disturbed

for at least one minute with the level of effort remaining the same for each sample. It may also be appropriate to measure microhabitat variables at sample locations including water velocity, depth and substrate type.

Each sample should be randomly subsampled using the method described above in the Field Reconnaissance section, following Caton (1991). Large/rare organisms that might be lost during subsampling should be identified and enumerated prior to splitting. Organisms will be picked from the squares until at least 100 and no more than 200 individuals have been counted. Be sure to note the total size and the number of grids used in the subsample to estimate total numbers. Either a rapid field assessment of taxa present and counts can be performed on-site (if a regional taxonomist is available) or samples are taken back to the lab where further taxonomic work is performed. In most cases samples should be taken back to the lab for more detailed analysis. The collector will need to properly label samples (see Figure 1). A label with complete collection data should be placed inside the sample container and one attached to the outside of the container. In the case of the use of plastic bags a permanent marker can be used on the outside. Samples must be preserved in 70% ethanol or 10% formalin for transport back to the lab for identification. The samples may be placed in either glass jars, plastic jars, or Whirl-Pak plastic bags.

Macroinvertebrates should be identified to genus and/or species when possible. Organisms too small to identify to a consistent taxonomic level should not be included in the data assessment. It is the general consensus of most biologists in U.S. EPA Region 10 that midges should be identified to subfamily. This is due to the difficulties with taxonomy and lab analysis costs. Taxonomic keys utilized by the various labs/field offices should be similar to insure identifications are consistent.

Table 8 lists some basic taxonomic references that will allow for at least generic level identifications of most Idaho macroinvertebrates. Clark (1991) gives a more complete list of references which allows for species level identifications of the majority of Idaho's macroinvertebrates.

Quality Assurance

Quality assurance should be a continuous process throughout the entire bioassessment program and include all aspects of the program including sample design, field collection, habitat assessment, lab processing, and data analysis (EA Engineering, Science, and Technology, Inc. 1991).

Peer review of monitoring plans and included sample design is a good means of applying quality assurance to this phase of the study. Monitoring plans should be consistent with the Idaho Coordinated NPS Monitoring Program (Clark 1990). The field portion of quality assurance involves following the proper protocols. Precision can be measured by the use of split samples. In order to verify subsampling is within acceptabe limits, a random 10% of the samples should include the remainder (entire sample) for QA/QC analysis. Accuracy can be measured by having taxonomic specialists verify the identification of certain samples and/or problem taxa. The laboratory processing the samples should maintain a sample log including sample identification, collection date, type of sample, collectors and disposition of voucher specimens.

The Collector and identifier must use the standard form (Table 9) for reporting counts and pertinent information about the station. Documentation of the sites using slides is also required at this level.

In order to meet the requirements of STORET a confidence identification code must accompany the species counts. The four categories are as follows: A = 99.9% confident; b = 99% confident; C = 90% confident; and, D = percent confidence unknown. Appendix B lists the macroinvertebrate taxa found in Idaho with appropriate numeric codes, functional feeding groups and tolerance values.

Voucher specimens are essential for any research project to provide permanent reference material and for validating results (Francoeur 1976; Yoshimoto 1978). Voucher specimens of each species from each collection site and date should be retained. DEQ currently deposits its voucher specimens at two locations: Idaho Department of Health and Welfare, Bureau of Laboratories, 2220 Old Penitentiary Road, Boise, ID 83712; and the Orma J. Smith Museum of Natural History, Albertson College of Idaho, Caldwell, ID 83605 (CIDA).

DATA ANALYSIS

Basic

Expected outcomes from the basic monitoring is a literature review and data compilation. Various agencies should be contacted who perform macroinvertebrate sampling to find out if information is available on the stream of interest or to assist in identifying reference sites. These data will give direction on the appropriate beneficial use designation(s) for a particular stream segment and data needs.

Reconnaissance

Reconnaissance monitoring will add qualitative as well as limited quantitative data to the database. Information gathered at this level include relative abundances of the macroinvertebrate community present; absences of pollution sensitive indicator groups such as Ephemeroptera, Trichoptera and Plecoptera (EPT); excess dominance of specific forms such as Chironomidae and Oligochaeta taxa; and low overall taxa richness. These data combined with the habitat information will better refine the beneficial use designation(s) and give some insight into use attainability. Data collected with this level of monitoring cannot be analyzed statistically as there is no way of determining sampling bias or error. Information obtained at this level is intended to be used to prioritize areas for BMP treatment and/or more intensive monitoring.

Intensive Monitoring

Data obtained during intense monitoring is intended to be statistically summarized and carried through the Rapid Bioassessment Procedure (RBP) III (Plafkin et al. 1989). Generally, it is recommended to apply nonparametric statistical analysis to population data which is often described by percentages or proportional scores and frequently does not fit a normal distribution.

The summarized data will be scored following the theory of Plafkin et al. (1989). Suggested metrics for characterizing biotic integrity in Idaho using macroinvertebrate data are listed in Table 10. Each metric will be scored to reflect a comparison to appropriate regional reference site(s). Other more appropriate metrics are certain to be developed as we gather more information on aquatic life in the Northwest. Most of these metrics will vary with region and must be calibrated to regional reference expectations. Scoring will have to be based on a single control or reference until data becomes available to formulate regional expectations for Idaho. Metric values

approximating, deviating slightly from, or deviating greatly from values occurring at the reference sites are scores 5, 3, or 1, respectively. The scores of each metric are added for the station to give an overall Invertebrate Community Integrity (ICI). Best professional judgement is involved in choosing the most appropriate population or community metric and in scoring criteria. Additional reference data as it becomes available will facilitate and validate the appropriate metrics to characterize biotic integrity. Macroinvertebrate data in concert with the habitat component both expressed as a percent of reference will determine the support status of the stream segment (Figure 2) and give the use attainability estimate.

Quality Assurance

Quality assurance in relation to data analysis includes data review (data editing and storage), data evaluation and data reporting. Quality assurance includes the quality control functions and involves a totally integrated program for ensuring the reliability of the monitoring data. Quality control refers to the routine application of procedures to achieve a level of performance standards acceptable in the monitoring process.

Probably no single component is more important to the success of a monitoring program than ensuring data integrity. This will require a screening of the data before it is input into the system. This can be accomplished by rigorous QA/QC protocol including data review by the collector, double entry of data and review of data using canned programs to detect outliers which are then flagged for the user to investigate.

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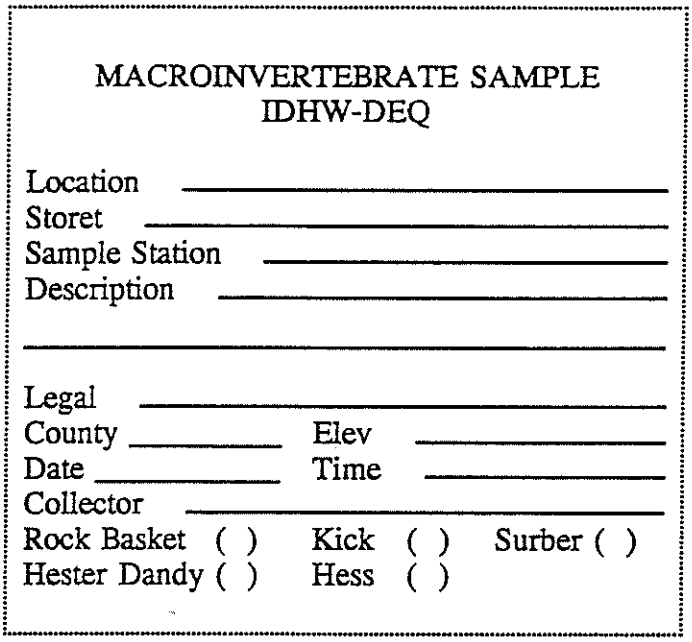

Figure 1 Example macroinvertebrate field sample label.

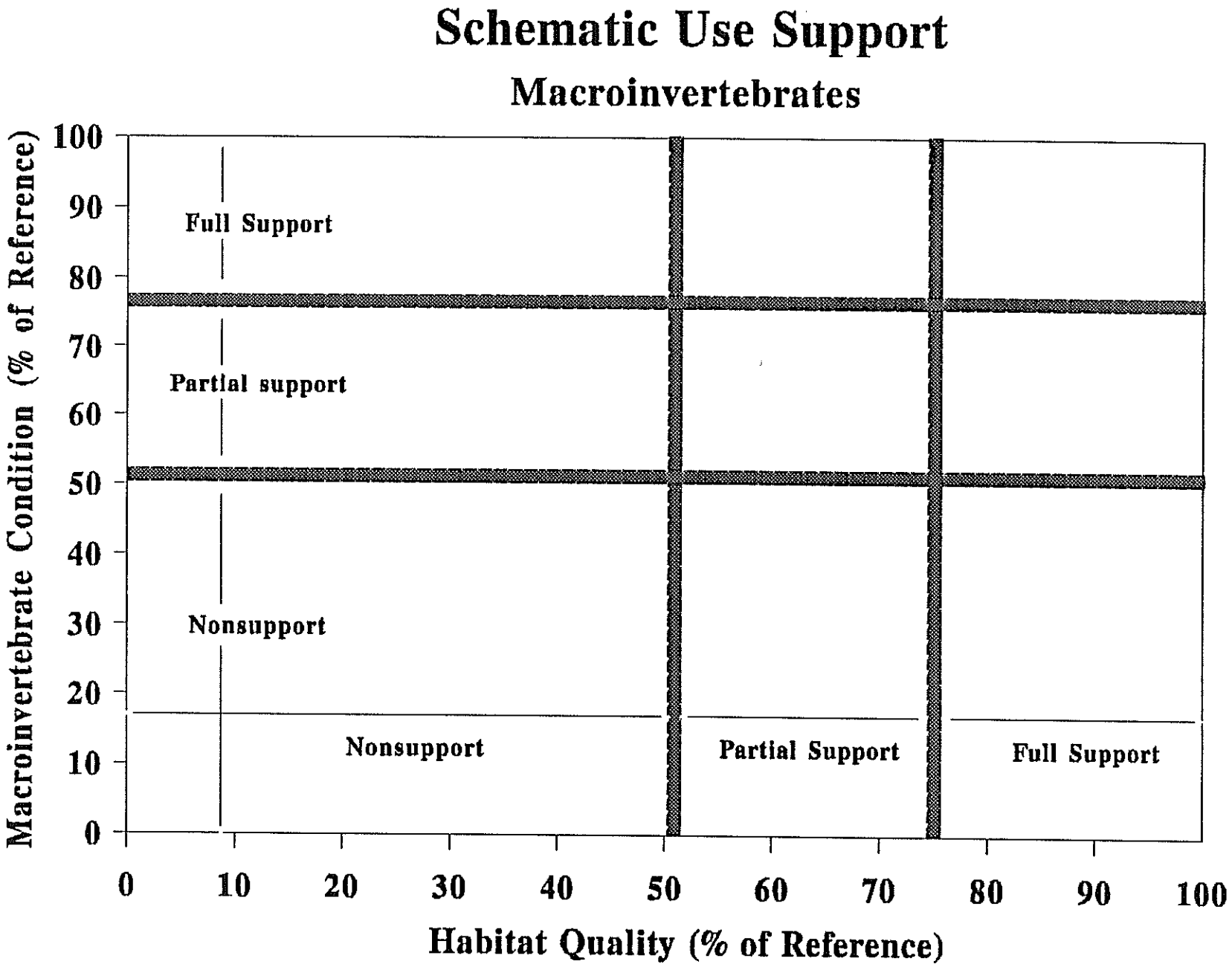

Figure 2. Schematic use Support for Macroinvertebrates.

Table 1. Checklist of Sampling Equipment and Suppliers

Equipment required for reconnaissance and intensive monitoring of macroinvertebrates (field checksheet) and example field label.

1. _____ Kick net
2. _____ Hess sampler or Surber sampler
3. _____ Stainless steel rectangular gridded sieve (with "cookie cutter", scoop, paintbrush, tripod and stage)
4. _____ White pans
5. _____ Forceps and small plastic pipette
6. _____ Hand lens
7. _____ Preservative and sample containers
8. _____ Field labels
9. _____ Marker pens/pencils
10. _____ Data sheets
11. _____ Waders
12. _____ Rubber gloves
13. _____ Clipboard/field notebook/random numbers table
14. _____ Wash bottles (water & alcohol)
15. _____ Scissors
16. _____ Scrub brush
17. _____ Field keys

Table 2. Suggested suppliers for macroinvertebrate equipment.

EQUIPMENT/ SUPPLIES	SOURCE	APPROXIMATE COST
Kick net (Frame) (12" X 12" X 22") (0.5 mm	Research Nets, Inc. 14207 100th N.E. Bothell, WA 98011 (206) 821-7345	$41.00 $17.00 (net)
Hess Sampler (Cat. #16-A10) with Bucket (0.5 mm) (Cat. #47-D60) Same, with carrying case (Cat. #16-A15) Netting (0.5 mm) (Cat. #16-B20) Bucket (0.5 mm) (Cat. #47-D60)	Wildlife Supply Company 301 Cass Street Saginaw, MI 48602 (517) 799-8100	 $354.30 ea. $408.90 ea. $22.50 additional
Netting various meshes	Tetko, Inc. 333 South Highland Ave. Briarcliff Manor, NY 10510 (914) 941-7767	
Forceps, larval (Cat. #4750)	BioQuip Products Box 61 Santa Monica, CA 90406 (213) 324-0620	$2.25
Magnifier (10x, 14x or 20x) (Cat. #1128B, 1128C, 1128D)	BioQuip Products Box 61 Santa Monica, CA 90406 (213) 324-0620	$23.00
Gloves, shoulder length (Cat. #BB350)	Eagar, Inc. 526 North 700 West Box 476 North Salt Lake, UT 84054 (800) 423-6249	$38.58 pair

Table 2. Suggested suppliers for macroinvertebrate equipment.

EQUIPMENT/ SUPPLIES	SOURCE	APPROXIMATE COST
Sorting trays (9.75 x 7.75 x 1.5") (Cat. #1426A) 13.5 x 10 x 1.75" (Cat. #1426B)	BioQuip Products Box 61 Santa Monica, CA 90406 (213) 324-0620	 $7.95 $9.50
Plastic tray for rectangular sieve (16" x 12" x 2.75") (Cat. #D461052)	J & H Berge, Inc. 4111 S. Clinton Ave. South Plainfield, NJ 07080 (908) 561-1234	$29.90
Tripod	Photographic suppliers	$40 - $60
Rectangular sieve	Machine shop	$70 - $90
Cookie cutter & scoop	Homemade	$1.00
Wash bottle	Scientific Suppliers	$2 - $3 ea.
Ethyl Alcohol (Cat. #1183C)	BioQuip Products Box 61 Santa Monica, CA 90406 (213) 324-0620	$10.50 gal.
Jars (specimen)	Grocers	$5 - $6 doz.
Whirl-Paks 4.5 x 9" 5.5 x 9" other sizes avail.	Cole-Parmer Instrument Co. 7425 N. Oak Park Ave. Chicago, IL 60648 (800) 323-4340	 $57.70/500 $76.15/500
Vials with polyseal caps Various	Scientific Suppliers	
Field labels (110 lb. card stock)	DEQ	
Data sheets	DEQ	
Field notebook, hardbound	Engineering Suppliers	$8 - $15
Pen w/ indelible ink	Engineering Suppliers	Various

Table 3. Random numbers table for use with the rectangular subsampling sieve and grid.

15	13	22	9	29	3	4	24	21	14	30	12	20	1
9	29	3	4	24	21	24	26	7	20	1	1	30	4
4	24	21	24	26	7	2	22	29	30	4	11	11	9
24	26	7	2	22	29	16	25	26	11	9	8	19	15
2	22	29	16	25	26	3	18	13	19	15	15	13	22
16	25	26	3	18	13	17	16	27	13	22	9	29	3
3	18	13	17	16	27	26	4	20	29	3	4	24	21
17	16	27	26	4	20	23	7	19	24	21	24	26	7
26	4	20	23	7	19	10	14	30	26	7	2	22	29
23	7	19	10	14	30	12	20	1	22	29	16	25	26
10	14	30	12	20	1	1	30	4	25	26	3	18	13
12	20	1	1	30	4	11	11	9	18	13	17	16	27
1	30	4	11	11	9	8	19	15	16	27	26	4	20
11	11	9	8	19	15	15	13	22	4	20	23	7	19
8	19	15	15	13	22	9	29	3	7	19	10	14	30
6	12	16	9	29	3	4	24	21	14	30	12	20	1
27	27	24	4	24	21	24	26	7	20	1	1	30	4
22	1	25	24	26	7	2	22	29	29	3	4	24	21
5	17	2	2	22	29	16	25	26	24	21	24	26	7
19	8	14	16	25	26	3	18	13	26	7	2	22	29
29	2	11	3	18	13	17	16	27	22	29	16	25	26
7	23	10	17	16	27	26	4	20	25	26	3	18	13
18	28	12	26	4	20	23	7	19	18	13	17	16	27
25	3	28	23	7	19	10	14	30	16	27	26	4	20
14	15	6	10	14	30	12	20	1	4	20	23	7	19
28	10	17	12	20	1	1	30	4	7	19	10	14	30
20	6	18	1	30	4	11	11	9	11	9	8	19	15
21	5	5	11	11	98	8	19	15	19	15	16	12	16
13	21	23	8	19	15	6	12	16	12	16	27	27	24
30	9	8	6	12	16	27	27	24	27	24	22	1	25
6	12	16	27	27	24	22	1	25	1	25	5	17	2
27	27	24	22	1	25	5	17	2	17	2	19	8	14
22	1	25	5	17	2	19	8	14	8	14	29	2	11
5	17	2	19	8	14	29	2	11	2	11	7	23	10
19	8	14	29	2	11	7	23	10	23	10	18	28	12
29	2	11	7	23	10	18	28	12	28	12	25	3	28
7	23	10	18	28	12	25	3	28	3	28	14	15	6
18	28	12	25	3	28	14	15	6	14	15	6	10	14
25	3	28	14	15	6	28	10	17	28	10	17	12	20
14	15	6	28	10	17	20	6	18	21	5	5	11	11
28	10	17	20	6	18	21	5	5	13	21	23	8	19
20	6	18	21	5	5	13	21	23	30	9	8	6	12
21	5	5	13	21	23	30	9	8	6	12	16	27	27
13	21	23	30	9	8	15	13	22	27	24	22	1	25
30	9	8	15	13	22	9	29	3	1	25	5	17	2

Table 4. Reconnaissance and Impairment Assessment Sheet For Macroinvertebrates (Biosurvey Field Data Sheet)

Biosurvey Field Data Sheet

Location:	Date:	Observer(s):

Macrobenthos Qualitative Sample List		List Families Present/Indicate Abundance
Turbellaria	Odonata	Trichoptera
Oligochaeta	Anisoptera	Hydropsychidae
Hirundinea	Zygoptera	Limnephilidae
Crustacea	Plecoptera	Brachycentridae
Amphipoda	Perlidae	
	Perlodidae	
Hydroacarina		Lepidoptera
Ephemeroptera		Diptera
Baetidae		Chironomidae
Heptageniidae	Hemiptera	Simuliidae
Ephemerellidae	Coleoptera	
	Elmidae	
		Mollusca
		Gastropoda
		Pelecypoda

Riffle Sample - Functional Feeding Groups	(Indicate No. of Individuals Representing Group)
Scrapers	Filtering Collectors

CPOM Sample Functional Feeding Groups		(Indicate No. of Individuals Representing Group)
Shredders	Total Squares Counted	Total Organisms in Sample

Relative Abundance of Aquatic Biota											
Periphyton	0	1	2	3	4	Slimes	0	1	2	3	4
Filamentous Algea	0	1	2	3	4	Macroinvertebrates	0	1	2	3	4
Macrophytes	0	1	2	3	4	Fish	0	1	2	3	4

0 = Absent/Not Observed 1 = Rare 2 = Common 3 = Abundant 4 = Dominant

Other observations:

Table 5. Impairment Assessment Form

IMPAIRMENT ASSESSMENT

1. Detection of impairment:

Impairment detected . . . . . (Complete items 2-6)

No impairment detected . . . . . .(Stop here)

2. Biological impairment indicator:

_____	Benthic macroinvertebrates	_____	Other aquatic communities
_____	Absence of EPT taxa	_____	Periphyton
_____	Dominance of tolerant groups	_____	Filamentous
_____	Low benthic abundance	_____	Other
_____	Low taxa richness	_____	Macrophytes
_____	Other	_____	Slimes
		_____	Fish

3. Brief description of problems: _____

Year and date of previous surveys: _____

Survey data available in:

4. Cause: (Indicate major cause)

_____	organic enrichment	_____	toxicants
_____	habitat limitations	_____	flow
		_____	other

5. Estimated areal extent of problem (m^2) and length of stream reach affected (m), where applicable:

6. Suspected source (s) of problem:

_____	Point source discharge (name, type of facility, location)	_____	Construction site runoff
_____	Combined sewer outfall	_____	Animal feedlot
_____	Silviculture runoff	_____	Agricultural runoff
_____	Ground water	_____	Urban runoff
_____	Other	_____	Unknown

Briefly explain:

Date: Location: Observed:

Photographs:

Table 6. Habitat Assessment, Riffle/Run Prevalence(modified after Plafkin et al., 1989).

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality** HABITAT ASSESSMENT FIELD DATA SHEET RIFFLE RUN PREVALENCE				
	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
1. Bottom substrate/ instream cover	Greater than 50% mix of rubble, gravel, submerged logs undercut banks, or other stable habitat. 16-20 ___	30-50% mix of rubble, gravel, or other stable habitat. Adequate habitat. 11-15 ___	10-30% mix of 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	Gravel, cobble and boulder particles are between 0-25% surrounded by fine sediment. 16-20 ___	Gravel, cobble and boulder particles are between 25-50% surrounded by fine sediment. 11-15 ___	Gravel, cobble and boulder particles are between 50-75% surrounded by fine sediment. 6-10 ___	Gravel, cobble and boulder particles are over 75% surrounded by fine sediment. 0-5 ___
3. 40.15 cms (5 cfs) at rep. low flow	Cold > 0.05 cms (2 cfs), Warm > 0.15 cms (5 cfs) 16-20 ___	0.03-0.05 cms (1-2 cfs) 0.05-0.15 cms (2-5 cfs) 11-15 ___	0.01-0.03 cms (0.5-1 cfs) 0.03-0.05 cms (1-2 cfs) 6-10 ___	< 0.01 cms(0.5 cfs) < 0.3 cms (1 cfs) 0-5 ___
OR >0.15 cms (5 cfs) velocity/ depths	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 or runs receive lower score) 6-10 ___	Dominated by 1 velocity/depth category (usually pools) 0-5 ___

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
RIFFLE RUN PREVALENCE

HABITAT PARAMETER	CATEGORY			
	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
4. Canopy cover (shading)	A mixture of conditions where some areas of water surface fully exposed to sunlight, and other receiving various degrees of filtered light. 16-20 ___	Covered by sparse canopy; entire water surface receiving filtered light. 11-15 ___	Completely covered by dense canopy; water surface completely shaded or nearly full sunlight reaching water surface. Shading limited to < 3 hours per day. 6-10 ___	Lack of canopy, full sunlight reaching water surface. 0-5 ___
5. Channel alteration	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. 6-11 ___	Moderate deposition of new gravel, coarse sand no old and new bars; and/or embankments on both banks. 4-7 ___	Heavy deposits of fine material, increased bar development; and/or extensive channelization. 0-3 ___
6. Bottom scouring and deposition	Less than 5% of the bottom affected by scouring and/or deposition. 12-15 ___	5-30% affected . Scour at constrictions and where grades steepen. Some channelization. 8-11 ___	Moderate deposition of new gravel, coarse sand no old and new bars; and/or embankments on both banks. 4-7 ___	Heavy deposits of fine material, increased bar development; and/or extensive channelization. 0-3 ___

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
RIFFLE RUN PREVALENCE

	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
7. Pool/riffle run /bed ration (distance between riffles divided by stream width).	Ratio: 5-7 Variety of habitat. Repeat pattern of sequence relatively frequent. 12-15 ___	7-15 Infrequent repeat pattern. Variety of macrohabital less than optimal. 8-11 ___	15-25 Occasional riffle or bend. Bottom contours provide some habitat. 4-7 ___	Essentially a straight stream. Generally all flat water or shallow riffle. Poor Habitat. 0-3 ___
8. Lower bank channel capacity	Overbank (lower flows rare. Lower bank W/D ration < 7. (channel width divided by depth or height of lower bank.) 12-15 ___	Overbank (lower) flows occasional. W/D ration: 8-15. 8-11 ___	Overbank (lower) flows occasional. W/D ratio: 15-25 4-7 ___	Peak flows not contained or contained trrough channelization. W/D ratio >25 0-3 ___
9. Upper bank stability	Upperbank Stable. No evidence of erosion or bank failure. Side slopes generally < 30°. Little potential for future problems. 9-10 ___	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40° on one bank. Slight potential in extreme floods. 6-8 ___	Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60° on some banks. High erosion potential during extreme high flow. 3-5 ___	Unstable. Many eroded areas. "Raw" areas frequent along straight sections and bends. Side slopes > 60° common. 0-2 ___

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
RIFFLE RUN PREVALENCE

	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
10 Bank vegetation protection OR Grazing or other disruptive pressure	Over 90% of the streambank surfaces covered by vegetation. 9-10 ___ Vegetative disruption minimal or not efficient. Almost all potential plan biomass at present stage of development remains. 9-10 ___	70-89% of the stream bank surfaces covered by vegetation. 6-8 ___ Disruption evident but not affecting communtiy vigor. Vegetative use is moderate, and at the potential plant biomass remains. 6-8 ___	50-79% of the stream bank surfaces covered by vegetation. 3-5 ___ Disruption obvious; some patches of bare soil or closely cropped vegetation present. Less than one half of the potential plant biomass remains. 3-5 ___	Less than 50% of the streambank surfaces covered by vegetation. 0-2 ___ Disruption of streambank vegetation is very high. Vegetation has been removed to 2 inches or less in average stubble height. 0-2 ___
11. Streamside cover	Dominant vegetation is shrub. 9-10 ___	Dominant vegetation is of tree form. 6-8 ___	Dominant vegetation is grass or forbes. 3-5 ___	Over 50% of the stream bank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 0-2 ___
12. Riparian vege tative zone width (least buffered side)	> 18 meters 9-10 ___	Between 12 and 18 meters. 6-8 ___	Between 6 and 12 meters. 3-5 ___	< 6 meters. 0-2 ___
Column Totals:	___	___	___	___
SCORE				

Table 7. Habitat Assessment, Glide/Pool Prevalence (modified after Plafkin et al., 1989).

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality** HABITAT ASSESSMENT FIELD DATA SHEET GLIDE/POOL PREVALENCE				
	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
1. Bottom substrate/ instream cover	Greater than 50% mix of rubble, gravel, submerged logs, undercut banks, or other stable habitat. 16-20 ___	30-50% mix of rubble, gravel, or other stable habitat. Adequate habitat. 11-15 ___	10-30% mix of 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. Pool substrate characterization	Mixture of substrate materials with gravel and firm sand prevalent, root mats and submerged vegetation common. 16-20 ___	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present. 11-15 ___	All mud or clay or channelized with sand bottom; little or no root mat; no submerged vegetation. 6-10 ___	Hard-pan clay or bedrock; no root mat or vegetation. 0-5 ___
3. Pool variability	Even mix of deep/shallow/ large/small pools present. 16-20 ___	Majority of pools large and deep; very few shallow. 11-15 ___	Shallow pools much more prevalent than deep pools. 6-10 ___	Majority of pools small and shallow or pools absent. 0-5 ___
4. Canopy cover (shading)	A mixture of conditions where some areas of water surface fully exposed to sunlight, and other receiving various degrees of filtered light. 16-20 ___	Covered by sparse canopy; entire water surface receiving filtered light. 11-15 ___	Completely covered by dense canopy; water surface completely shaded. OR nearly full sunlight reaching water surface. Shading limited to < 3 hours per day. 6-10 ___	Lack of canopy, full sunlight reaching water surface. 0-5 ___

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
GLIDE/POOL PREVALENCE

	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
5. Channel alteration	Little or no enlargement of islands or point pars, 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; and/or embankments on both banks. 6-10 ___	Heavy deposits of fine material, increased bar development; and/or extensive channelization 0-3 ___
6. Deposition	Less than 5 % of bottom affected; minor accumulation of coarse sand and pebbles as snags and submerged vegetation. 12-15 ___	5-30% affected; moderate accumulation of sand at snags and submerged vegetation. 8-11 ___	30-50% affected; major deposition of sand at snags and submerged vegetation; pools shallow, heavily silted. 4-7 ___	Channelized; mud, silt and/or sand in braided or nonbraided channels; pools almost absent due to deposition. 0-3 ___
7. Channel sinuosity	Instream channel length 3 to 4 times straight line distance. 12-15 ___	Instream channel length 2 to 3 times straight line distance. 8-11 ___	Instream channel length 1 to 2 times straight line distance. 4-7 ___	Channel straight; channelized waterway. 0-3 ___
8. Lower bank channel capacity	Overbank (lower) flows rare. Lower bank W/D ratio < 7. (Channel width divided by depth or height of lower bank.) 12-15 ___	Overbank (lower) flows occasional. W/D ratio: 8-15 8-11 ___	Overbank (lower) flows occasional. W/D ratio: 15-25 4-7 ___	Peak flows not contained or contained through channelization. W/D ratio > 25 0-3 ___

Stream Name: _____ Station : _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
GLIDE/POOL PREVALENCE

HABITAT PARAMETER	CATEGORY OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
9. Upper bank stability	Upper bank stable, No evidence of erosion or bank failures. Side slopes generally < 30°. Little potential for future problems. 9-10 ___	Moderately stable. Infrequent, small areas of erosion mostly healed over. Side slopes up to 40° on one bank. Slight potential in extreme floods. 6-8 ___	Moderately stable. Moderate frequency and size of erosional areas. Side slopes up to 60° on some banks. High erosion potential during extreme high flow. 3-5 ___	Unstable. Many eroded areas. "Raw" areas frequent along straight sections and bends. Side slopes 60° common. 0-2 ___
10. Bank vegetation protection OR Grazing or other disruptive pressure	Over 90% of the streambank surfaces covered by vegetation. 9-10 ___ Vegetative disruption minimal or not efficient. Almost all potential plant biomass at present stage of development remains. 9-10 ___	70-89% of the streambank surfaces covered by vegetation. 6-8 ___ Disruption evident but not affecting community vigor. Vegetative use is moderate, and at least one-half of the potential plant biomass remains. 6-8 ___	50-79% of the streambank surfaces covered by vegetation. 3-5 ___ Disruption obvious; some patches of bare soil or closely cropped vegetation present. Less than one half of the potential plant biomass remains. 3-5 ___	Less than 50% of the streambank surfaces covered by vegetation. 0-2 ___ Disruption of streambank vegetation is very high. Vegetation has been removed to 2 inches or less in average stubble height. 0-2 ___

Stream Name: _____ Station: _____ Date: _____ Location Description: _____

Idaho Department of Health and Welfare - **Division of Environmental Quality**
HABITAT ASSESSMENT FIELD DATA SHEET
GLIDE/POOL PREVALENCE

	CATEGORY			
HABITAT PARAMETER	OPTIMAL	SUB-OPTIMAL	MARGINAL	POOR
11. Streamside cover	Dominant vegetation is shrub. 9-10 ___	Dominant vegetation is of tree form. 6-8 ___	Dominant vegetation is grass or forbes. 3-5 ___	Over 50% of the stream bank has no vegetation and dominant material is soil, rock, bridge materials, culverts, or mine tailings. 0-2 ___
12. Riparian vegetative zone width (least buffered side)	> 18 meters 9-10 ___	Between 12 and 18 meters. 6-8 ___	Between 6 and 12 meters. 3-5 ___	< 6 meters. 0-2 ___
Column Totals	___	___	___	___
Score				

Table 8. Basic literature for identification of macroinvertebrates in Idaho. For a more detailed list, see Clark (1991).

INSECTS

Lehmkuhl, D.M. 1979. How to Know the Aquatic Insects. Wm. C. Brown Co., Dubuque, IA. 168 pp.

Merritt, R.W. and K.W. Cummins (eds). 1984. An introduction to the aquatic insects of North America (2nd ed.). Kendall/Hunt Publ. Co., Dubuque, IA. 722 pp.

Ward, J.V. and B.C. Kondratieff. 1992. An illustrated guide to the mountain stream insects of Colorado. University Press of Colorado, Niwot. 191 pp.

ALL OTHER GROUPS

Pennak, R.W. 1989. Freshwater Invertebrates of the United States, Protozoa to Mollusca (3rd ed.) John Wiley and Sons, NY. 628 pp.

SPECIFIC GROUPS

Turbellaria

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

Nematoda

Tarjan, A.C., R.P. Esser, and S.L. Chang. 1977. An illustrated key to nematodes found in fresh water. J. Water Poll. Control Fed. 49:2318-2337.

Annelida

Klemm, D.J. 1985. A guide to the Annelida (Polychaeta, Naidid and Tubificid Oligochaeta, and Hirudinea) of North America. Kendall/Hunt Publ. Co., Dubuque, IA. 198 pp.

Crustacea

Fitzpatrick, J.F., Jr. 1983. How to know the freshwater Crustacea. Wm. C. Brown Co. Publ., Dubuque, IA. 227 pp.

Collembola

Waltz, R.D., and W.P. McCafferty. 1979. Freshwater Springtails of North America. Research Bull. No. 960. Purdue University Agricultural Experimental Station, West Lafayette, Ind. 32 pp.

Ephemeroptera

Jensen, S. 1966. Mayflies of Idaho. Master's Thesis, Univ. UT. Salt Lake City, UT. 367 pp.

Odonata

Logan, E.R. 1967. The Odonata of Idaho. MS Thesis, Univ. ID, Moscow, ID. 164 pp.

Plecoptera

Stewart, K.W., and B.P. Stark. 1988. Nymphs of North American stonefly genera (Plecoptera). The Thomas Say Foundation. 12:1-461.

Hemiptera

Slater, J.A., and R.M. Baranowski. 1978. How to know the true bugs (Hemiptera-Heteroptera). Wm. C. Brown Co., Dubuque, IA. 256 pp.

Coleoptera

Arnett, R.H., Jr. 1968. The beetles of the United States. (A manual for identification). Ann Arbor, Mich., Amer. Entomol. Inst. 1112 pp.

Brown, H.P. 1972. Aquatic dryopoid beetles (Coleoptera) of the United States. Biota of Freshwater Ecosystems Identification. Manual No. 6. U.S. EPA, Washington, D.C. 82 pp.

Tricoptera

Wiggins, G.B. 1977. The larvae of the North American caddisfly genera. (tricoptera) Univ. of Toronto Press. 401 pp.

Diptera

Cole, F.R., and E.I. Schlinger. 1969. The flies of western North America. Univ. of Calif. Press, Berkeley. 693 pp.

Mollusca

Burch, J.B. 1972. Freshwater sphaeriacaean clams (Mollusca: Pelecypoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 3. U.S. EPA, Washington, D.C. 31 pp.

Burch, J.B. 1973. Freshwater unionacean clams (Mollusca: Pelecypoda) of North America. Biota of Freshwater Ecosystems Identification Manual No. 11. U.S. EPA, Washington, D.C. 176 pp.

Burch, J.B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA-600/3-82-026. U.S. Environ. Protect. Agency, Cincinnati, OH. 294 pp.

TABLE 9. Macroinvertebrate Data Sheet for Laboratory use.

State of Idaho - Department of Health and Welfare
Division of Environmental Quality
MACROINVERTEBRATE DATA SHEET (STREAM)

Field Information

*Name of Water Body	*Station	Reference Site (Y/N)	STORET

*Elevation	*County	*Township	*Range	*Section	Quarter

*Location Description			

*Collector(s)	*Collection Date (YY/MM/DD)	Collection Time	*Sample Method

Sample Effort (min.)	Sample Area (m^2)	*Replicate Number

Habitat Sampled	Flow Conditions	Weather Conditions	Total Grids

Grids Sampled	Est. Abundance	Remarks

Lab Information

Lab Name	Date into Lab (YY/MM/DD)	Lab Log Number

Sorted by	Taxonomist	Date Reported (YY/MM/DD)	Report Results to: Name

Method	Address

Remarks	City State Zip

Taxon	Taxon Code	Total No.	Id Conf	Taxon	Taxon Code	Total No.	Id Conf
DIPTERA				TRICHOPTERA			

* This information must be furnished when sample is submitted to the lab.

TABLE 9. Macroinvertebrate Data Sheet for Laboratory use.

State of Idaho - Department of Health and Welfare
Division of Environmental Quality
MACROINVERTEBRATE DATA SHEET (STREAM)

Name of Water Body	Station	STORET	Replicate	Collection Date

ID Log Number

Taxon	Taxon Code	Total No.	Id Conf	Taxon	Taxon Code	Total No.	Id Conf
PLECOPTERA				HIRUDINEA			
				TURBELLARIA			
				GASTROPODA			
EPHEMEROPTERA							
				CRUSTACEA			
				OTHER			
COLEOPTERA							

Table 10. List of macroinverterbrate metrics used when analyzing stream health

Metric Category	Metric Description
Community Structure and Abundance	
Taxa Richness	This metric indicates the health of the community through a measurement of the variety of distinct taxa. Identification will be to genus except Chironomidae which will be to subfamily. Regional refinement in scoring will be required with this metric (i.e. stream type, ecoregion and longitudinal/stream size.).
EPT	This metric summarizes the taxa richness within the orders Ephemeroptera, Plecoptera, and Trichoptera (groups considered to be pollution sensitive). EPT also reflects structural complexities of microhabitat found in a particular stream.
Hilsenhoff Biotic Index (HBI)	HBI is an index which is widely used which summarizes the overall pollution tolerance to organic and sediment pollution. This index can detect nutrient enrichment (point and nonpoint), high sediment loads, low dissolved oxygen and thermal impacts. (Hilsenhoff, 1987)
Abundance-Catch/Unit Effort	No. per minute or No. per M^2 is an indicator of habitat availability and fish food abundance. Estimate numbers by extrapolating the numbers counted in the subunits to the total available.
Trophic Structure	
Percent Scrapers	This metric reflects the riffle community food base. This metric indicates the availability of periphyton. Scrapers decrease in relative abundance following sedimentation and organic pollution.
Percent Filterers	Filter feeders increase in abundance in response to increased fine particulate organic matter (FPOM). Filtering collectors can also be sensitive to toxicants bound to FPOM. Toxicants readily absorb to FPOM.
Percent Shredders	This group is sensitive to riparian damage and a good indicator of toxic impacts
Similarity Index	
Jaccards Coefficient of Similarity	This measures the degree of similarity in Community taxonomic composition between two stream communities. Coefficients range from 0 to 1.0 and increase as the degree of similarity with a reference increases. (Jaccard 1912).

APPENDIX A

Idaho Bioassessment
Analysis Program
Description

APPENDIX A. Idaho Bioassessment Analysis Program Description.

APPENDIX B

Selected List of
Macroinvertebrate Taxa
for Idaho

MACROINVERTEBRATE TAXA LIST

TAXON CODE	*SCIENTIFIC NAME*	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
459	*Acamptocladius*	DIPTERA	CHIRONOMIDAE	GEN	11	CG
453	Acari	ACARI		ORD	11	PR
4	Aeshnidae	ODONATA	AESHNIDAE	FAM	3	PR
171	*Agapetus*	TRICHOPTERA	GLOSSOSOMATIDAE	GEN	0	SC
181	*Agrylea*	TRICHOPTERA	HYDROPTILIDAE	GEN	8	PH
201	*Allocosmoecus partitus*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	0	SC
131	*Alloperla*	PLECOPTERA	CHLOROPERLIDAE	GEN	0	PR
14	*Ameletus velox*	EPHEMEROPTERA	SIPHLONURIDAE	GENSPE	0	CG
13	*Ameletus*	EPHEMEROPTERA	SIPHLONURIDAE	GEN	0	CG
579	*Ameletus cooki*	EPHEMEROPTERA	SIPHLONURIDAE	GENSPE	0	CG
501	*Amiocentrus aspilus*	TRICHOPTERA	BRACHYCENTRIDAE	GENSPE	2	CG
232	*Amiocentrus*	TRICHOPTERA	BRACHYCENTRIDAE	GEN	1	CG
7	*Amphiagrion*	ODONATA	PROTONEURIDAE	GEN	5	PR
82	*Amphinemura*	PLECOPTERA	NEMOURIDAE	GEN	2	SH
443	Amphipoda	AMPHIPODA		ORD	4	CG
249	*Amphizoa*	COLEOPTERA	AMPHIZOIDAE	GEN	1	PR
257	*Ampumixis dispar*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
172	*Anagapetus*	TRICHOPTERA	GLOSSOSOMATIDAE	GEN	0	SC
5	*Anax*	ODONATA	AESHNIDAE	GEN	8	PR
428	Ancylidae	BASOMMATOPHORA	ANCYLIDAE	FAM	6	SC
444	*Anisogammarus*	AMPHIPODA	GAMMARIDAE	GEN	4	CG
419	Annelida			PHY	5	CG
574	*Anodonta nuttalliana idahoensis*	PELECYPODA	UNIONIDAE	GENSPE	8	CF
454	*Anodonta*	PELECYPODA	UNIONIDAE	GEN	8	CF
284	*Antocha*	DIPTERA	TIPULIDAE	GEN	3	CG
212	*Apatania*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SC
211	Apataniinae	TRICHOPTERA	LIMNEPHILIDAE	SUBFAM	1	SC
192	*Arctopsyche grandis*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	2	CF
191	*Arctopsyche*	TRICHOPTERA	HYDROPSYCHIDAE	GEN	1	CF
190	Arctopsychinae	TRICHOPTERA	HYDROPSYCHIDAE	SUBFAM	2	CF
8	*Argia*	ODONATA	COENAGRIONIDAE	GEN	7	PR
476	Asellidea	ISOPODA	ASELLIDAE	FAM	6	CG
449	*Asellus occidentalis*	ISOPODA	ASELLIDAE	GENSPE	8	CG
448	*Asellus*	ISOPODA	ASELLIDAE	GEN	8	CG
474	Astacidae	DECAPODA	ASTACIDAE	FAM	8	SC

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MACROINVERTEBRATE TAXA LIST

TAXON CODE	*SCIENTIFIC NAME*	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
311	*Atherix*	DIPTERA	ATHERICIDAE	GEN	2	PR
312	*Atherix variagata*	DIPTERA	ATHERICIDAE	GENSPE	2	PR
258	*Atractelmis*	COLEOPTERA	ELMIDAE	GEN	4	CG
37	*Attenella*	EPHEMEROPTERA	EPHEMERELLIDAE	GEN	3	CG
38	*Attenella delantala*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	3	CG
16	Baetidae	EPHEMEROPTERA	BAETIDAE	FAM	4	CG
481	*Baetis insignificans*	EPHEMEROPTERA	BAETIDAE	GENSPE	6	CG
17	*Baetis*	EPHEMEROPTERA	BAETIDAE	GEN	5	CG
18	*Baetis bicaudatus*	EPHEMEROPTERA	BAETIDAE	GENSPE	2	CG
19	*Baetis intermedius*	EPHEMEROPTERA	BAETIDAE	GENSPE	6	CG
20	*Baetis tricaudatus*	EPHEMEROPTERA	BAETIDAE	GENSPE	5	CG
105	*Beloneuria*	PLECOPTERA	PERLIDAE	GEN	3	PR
542	*Bezzia*	DIPTERA	CERATOPOGONIDAE	GEN	6	CG
292	Blephariceridae	DIPTERA	BLEPHARICERIDAE	FAM	0	SC
320	*Boreochlus*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
321	*Boreoheptagyia*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
500	*Brachycentridae*	TRICHOPTERA	BRACHYCENTRIDAE	FAM	1	CF
233	*Brachycentrus*	TRICHOPTERA	BRACHYCENTRIDAE	GEN	1	CF
234	*Brachycentrus americanus*	TRICHOPTERA	BRACHYCENTRIDAE	GENSPE	1	CF
235	*Brachycentrus occidentalis*	TRICHOPTERA	BRACHYCENTRIDAE	GENSPE	1	CF
465	Branchiobdellidae	BRANCHIOBDELLIDA	BRANCHIOBDELLIDAE	FAM	6	CG
324	*Brillia retifinis*	DIPTERA	CHIRONOMIDAE	GENSPE	5	SH
322	*Brillia*	DIPTERA	CHIRONOMIDAE	GEN	5	SH
323	*Brillia flavifrons*	DIPTERA	CHIRONOMIDAE	GENSPE	5	SH
325	*Brundiniella*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
536	*Brychius*	COEOPTERA	HALIPLIDAE	GEN	11	SC
477	*Caecidotea communis*	ISOPODA	ASELLIDAE	GENSPE	6	CG
59	Caenidae	EPHEMEROPTERA	CAENIDAE	FAM	7	CG
60	*Caenis*	EPHEMEROPTERA	CAENIDAE	GEN	7	CG
109	*Calineuria californica*	PLECOPTERA	PERLIDAE	GENSPE	1	PR
106	*Calineuria*	PLECOPTERA	PERLIDAE	GEN	3	PR
21	*Callibaetis*	EPHEMEROPTERA	BAETIDAE	GEN	9	CG
137	*Callicorixa*	HEMIPTERA	CORIXIDAE	GEN	11	PR
11	*Calopteryx*	ODONATA	CALOPTERYGIDAE	GEN	6	PR
101	*Capnia*	PLECOPTERA	CAPNIIDAE	GEN	1	SH
100	Capniidae	PLECOPTERA	CAPNIIDAE	FAM	1	SH

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TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
280	Carabidae	COLEOPTERA	CARABIDAE	FAM	11	PR
326	*Cardiocladius*	DIPTERA	CHIRONOMIDAE	GEN	5	PR
120	*Cascadoperla*	PLECOPTERA	PERLODIDAE	GEN	2	PR
42	*Caudatella hystrix*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	CG
39	*Caudatella*	EPHEMEROPTERA	EPHEMERELLIDAE	GEN	1	CG
40	*Caudatella edmundsi*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	CG
41	*Caudatella heterocaudata*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	CG
497	*Cenocorixa bifida hungerfordi*	HEMIPTERA	CORIXIDAE	GENSPE	11	PR
138	*Cenocorixa*	HEMIPTERA	CORIXIDAE	GEN	11	PR
22	*Centroptilum*	EPHEMEROPTERA	BAETIDAE	GEN	2	CG
291	Ceratopogonidae	DIPTERA	CERATOPOGONIDAE	FAM	6	PR
327	*Chaetocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
306	*Chelifera*	DIPTERA	EMPIDIDAE	GEN	6	PR
509	*Cheumatopsyche enonis*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	6	CF
510	*Cheumatopsyche pettiti*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	6	CF
197	*Cheumatopsyche*	TRICHOPTERA	HYDROPSYCHIDAE	GEN	5	CF
508	*Cheumatopsyche campyla*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	6	CF
319	Chironomidae	DIPTERA	CHIRONOMIDAE	FAM	6	CG
543	Chironomini	DIPTERA	CHIRONOMIDAE	SUPGEN	6	CG
328	*Chironomus*	DIPTERA	CHIRONOMIDAE	GEN	10	CG
130	Chloroperlidae	PLECOPTERA	CHLOROPERLIDAE	FAM	1	PR
215	*Chyranda centralis*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	1	SH
214	*Chyranda*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SH
25	*Cinygma*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	4	SC
26	*Cinygmula*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	4	SC
108	*Claassenia sabulosa*	PLECOPTERA	PERLIDAE	GENSPE	4	PR
107	*Claassenia*	PLECOPTERA	PERLIDAE	GEN	3	PR
440	Cladocera	CLADOCERA		ORD	8	CF
329	*Cladotanytarsus*	DIPTERA	CHIRONOMIDAE	GEN	7	CG
259	*Cleptelmis*	COLEOPTERA	ELMIDAE	GEN	4	CG
260	*Cleptelmis ornata*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
307	*Clinocera*	DIPTERA	EMPIDIDAE	GEN	6	PR
6	Coenagrionidae	ODONATA	COENAGRIONIDAE	FAM	9	PR
533	Coleoptera	COLEOPTERA		ORD	11	PR
330	*Conchapelopia*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
331	*Constempellina*	DIPTERA	CHIRONOMIDAE	GEN	6	CG

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TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
441	Copepoda			SUBCLA	8	CG
139	*Corisella*	HEMIPTERA	CORIXIDAE	GEN	11	PR
136	Corixidae	HEMIPTERA	CORIXIDAE	FAM	11	PH
551	*Corticacarus delicatus*	HYDRACARINA	HYGROBATIDAE	GENSPE	8	PR
150	Corydalidae	MEGALOPTERA	CORYDALIDAE	FAM	0	PR
332	Corynoneura	DIPTERA	CHIRONOMIDAE	GEN	7	CG
277	*Crenitis*	COLEOPTERA	HYDROPHILIDAE	GEN	5	PR
338	*Cricotopus tremulus*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
335	*Cricotopus festivellus*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
337	*Cricotopus nostococladius*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
336	*Cricotopus isocladius*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
339	*Cricotopus trifasciata*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
334	*Cricotopus bicinctus*	DIPTERA	CHIRONOMIDAE	GENSPE	7	SH
333	*Cricotopus*	DIPTERA	CHIRONOMIDAE	GEN	7	SH
472	Crustacea			CLA	8	CG
202	*Cryptochia*	TRICHOPTERA	LIMNEPHILIDAE	GEN	0	SH
340	*Cryptochironomus*	DIPTERA	CHIRONOMIDAE	GEN	8	PR
293	Culicidae	DIPTERA	CULICIDAE	FAM	8	CG
503	*Culoptila cantha*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
116	*Cultus*	PLECOPTERA	PERLODIDAE	GEN	2	PR
450	Decapoda	DECAPODA		ORD	8	SH
94	*Despaxia augusta*	PLECOPTERA	LEUCTRIDAE	GENSPE	0	SH
578	*Despaxia*	PLECOPTERA	LEUCTRIDAE	GEN	0	SH
294	*Deuterophlebia*	DIPTERA	DEUTEROPHLEBIIDAE	GEN	0	SC
341	*Diamesa*	DIPTERA	CHIRONOMIDAE	GEN	5	CG
575	Diamesinae	DIPTERA	CHIRONOMIDAE	SUBFAM	11	CG
458	*Diaptomus pribilofensis*	EUCOPEPODA	DIAPTOMIDAE	GENSPE	11	UN
200	Dicosmoecinae	TRICHOPTERA	LIMNEPHILIDAE	SUBFAM	1	SC
205	*Dicosmoecus gilvipes*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	2	SC
203	*Dicosmoecus*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SH
204	*Dicosmoecus atripes*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	1	PR
285	*Dicranota*	DIPTERA	TIPULIDAE	GEN	3	PR
342	*Dicrotendipes*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
468	*Dina*	PHARYNGODELLIDA	ERPOBDELLIDAE	GENSPE	8	PR
281	Diptera	DIPTERA		ORD	7	UN
117	*Diura knowltoni*	PLECOPTERA	PERLODIDAE	GENSPE	2	SC

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296	*Dixa*	DIPTERA	DIXIDAE	GEN	1	CG
295	Dixidae	DIPTERA	DIXIDAE	FAM	1	CG
78	*Doddsia occidentalis*	PLECOPTERA	TAENIOPTERYGIDAE	GENSPE	2	SC
188	*Dolophilodes*	TRICHOPTERA	PHILOPOTAMIDAE	GEN	3	CF
110	*Doroneuria*	PLECOPTERA	PERLIDAE	GEN	1	PR
111	*Doroneuria baumanni*	PLECOPTERA	PERLIDAE	GENSPE	1	PR
112	*Doroneuria theodora*	PLECOPTERA	PERLIDAE	GENSPE	1	PR
44	*Drunella coloradensis*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	0	PR
43	*Drunella doddsi*	EPHEMEROPTERA	EPHEMERELLIDAE	GEN	0	SC
48	*Drunella spinifera*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	0	PR
45	*Drunella*	EPHEROPTERA	EPHEMERELLIDAE	GENSPE	0	PR
46	*Drunella flavilinea*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	SC
47	*Drunella pelosa*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	0	SC
534	Dryopidae	COLEOPTERA	DRYOPIDAE	FAM	5	SH
261	*Dubiraphia*	COLEOPTERA	ELMIDAE	GEN	4	CG
251	Dytiscidae	COLEOPTERA	DYTISCIDAE	FAM	5	PR
206	*Ecclisocosmoecus scylla*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	0	SH
207	*Ecclisomyia*	TRICHOPTERA	LIMNEPHILIDAE	GEN	2	CG
343	*Einfeldia*	DIPTERA	CHIRONOMIDAE	GEN	9	CG
253	Elmidae	COLEOPTERA	ELMIDAE	FAM	4	CG
305	Empididae	DIPTERA	EMPIDIDAE	FAM	6	PR
9	*Enallagma*	ODONATA	COENAGRIONIDAE	GEN	9	PR
344	*Endochironomus*	DIPTERA	CHIRONOMIDAE	GEN	10	SH
478	Entocytheridae	PODOCOPA	ENTOCYTHERIDAE	FAM	11	UN
27	*Epeorus*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	0	SC
28	*Epeorus albertae*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	SC
30	*Epeorus iron*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	SC
31	*Epeorus longimanus*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	SC
32	*Epeorus grandis*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	SC
29	*Epeorus deceptivus*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	SC
50	*Ephemerella aurivillii*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	0	CG
52	*Ephemerella inermis*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	SH
49	*Ephemerella*	EPHEMEROPTERA	EPHEMERELLIDAE	GEN	1	CG
51	*Ephemerella grandis*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	1	CG
36	Ephemerellidae	EPHEMEROPTERA	EPHEMERELLIDAE	FAM	1	CG
480	Ephemeroptera	EPHEMEROPTERA		ORD	11	CG

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TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
488	*Ephoron*	EPHEMEROPTERA	POLYMITARCYIDAE	GENSPE	2	CG
314	Ephydridae	DIPTERA	EPHYDRIDAE	FAM	6	CG
467	Erpobdellidae	PHARYNGODELLIDA	ERPOBDELLIDAE	FAM	8	PR
423	Eubranchiopoda			DIV	8	CF
279	*Eubrianix*	COLEOPTERA	PSEPHENIDAE	GENSPE	4	SC
103	*Eucapnopsis brevicauda*	PLECOPTERA	CAPNIIDAE	GENSPE	1	SH
351	*Eukiefferiella pseudomontana*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
347	*Eukiefferiella brevicalcar*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
345	*Eukiefferiella*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
348	*Eukiefferiella claripennis*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
346	*Eukiefferiella brehmi*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
349	*Eukiefferiella devonica*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
350	*Eukiefferiella gracei*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
548	*Euparyphus*	DIPTERA	STRATIOMYIDAE	GEN	11	CG
429	*Ferrissia*	BASOMMATOPHORA	ANCYLIDAE	GEN	6	SC
561	*Fluminicola*	MESOGASTROPODA	HYDROBIDAE	GEN	8	SC
437	*Fluminicola*	MESOGASTROPODA	BITHYNIIDAE	GEN	5	SC
562	*Fontelicella*	MESOGASTROPODA	HYDROBIIDAE	GEN	8	SC
563	*Fossaria*	LIMNOPHILA	LYMNAEIDAE	GEN	8	SC
118	*Frisonia picticeps*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
445	*Gammarus*	AMPHIPODA	GAMMARIDAE	GEN	4	CG
427	Gastropoda			CLA	7	SC
495	Gelastocoridae	HEMIPTERA	GELASTOCORIDAE	FAM	11	PR
496	*Gelastocoris*	HEMIPTERA	GELASTOCORIDAE	GEN	11	PR
143	Gerridae	HEMIPTERA	GERRIDAE	FAM	5	PR
144	*Gerris*	HEMIPTERA	GERRIDAE	GEN	11	PR
145	*Gerris buenoi*	HEMIPTERA	GERRIDAE	GENSPE	5	PR
146	*Gerris remigis*	HEMIPTERA	GERRIDAE	GENSPE	5	PR
470	*Glossiphonia complanta*	RHYNCHOBDELLIDA	GLOSSIPHONIIDAE	GENSPE	8	PR
469	Glossiphoniidae	RHYNCHOBDELLIDA	GLOSSIPHONIIDAE	FAM	8	PR
177	*Glossosoma penitum*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
176	*Glossosoma oregonense*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
175	*Glossosoma intermedium*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
174	*Glossosoma alascense*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
173	*Glossosoma*	TRICHOPTERA	GLOSSOSOMATIDAE	GEN	0	SC
504	*Glossosoma montana*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC

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178	*Glossosoma wenatchee*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	0	SC
170	Glossosomatidae	TRICHOPTERA	GLOSSOSOMATIDAE	FAM	0	SC
316	*Glutops*	DIPTERA	PELECORHYNCHIDAE	GEN	3	PR
224	*Goera archaon*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	1	SC
223	Goerinae	TRICHOPTERA	LIMNEPHILIDAE	SUBFAM	1	SC
1	Gomphidae	ODONATA	GOMPHIDAE	FAM	1	PR
425	*Gonidea*	UNIONOIDA	UNIONIDAE	GEN	4	CF
575	*Gonidea angulata*	PELECYPODA	UNIONIDAE	GENSPE	8	CF
254	*Gonielmis*	COLEOPTERA	ELMIDAE	GEN	5	CG
140	*Graptocorixa*	HEMIPTERA	CORIXIDAE	GEN	11	PR
246	*Grensia*	TRICHOPTERA	LIMNEPHILIDAE	GEN	6	SH
240	*Gumaga*	TRICHOPTERA	SERICOSTOMATIDAE	GEN	3	SH
431	*Gyraulus*	BASOMMATOPHORA	PLANORBIDAE	GEN	8	SC
274	*Gyrinus*	COLEOPTERA	GYRINIDAE	GEN	5	PR
275	Haliplidae	COLEOPTERA	HALIPLIDAE	FAM	7	MH
352	*Heleniella*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
535	*Helichus striatus foveatus*	COLEOPTERA	DRYOPIDAE	GENSPE	5	SH
250	*Helichus*	COLEOPTERA	DRYOPIDAE	GEN	5	SH
239	*Helicopsyche borealis*	TRICHOPTERA	HELICOPSYCHIDAE	GENSPE	3	SC
238	*Helicopsyche*	TRICHOPTERA	HELICOPSYCHIDAE	GEN	3	SC
507	Helicopsychidae	TRICHOPTERA	HELICOPSYCHIDAE	FAM	3	SC
422	*Helobdella stagnalis*	RHYCHOBDELLIDA	GLOSSIPHONIIDAE	GENSPE	10	PR
308	*Hemerodromia*	DIPTERA	EMPIDIDAE	GEN	6	PR
494	Hemiptera	HEMIPTERA		ORD	11	PR
482	*Heptagenia elegantula*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	4	SC
34	*Heptagenia*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	4	SC
24	Heptageniidae	EPHEMEROPTERA	HEPTAGENIIDAE	FAM	4	SC
287	*Hesperoconopa*	DIPTERA	TIPULIDAE	GEN	1	CG
141	*Hesperocorixa*	HEMIPTERA	CORIXIDAE	GEN	11	PH
113	*Hesperoperla pacifica*	PLECOPTERA	PERLIDAE	GENSPE	1	PR
216	*Hesperophylax*	TRICHOPTERA	LIMNEPHILIDAE	GEN	5	SH
262	*Heterlimnius*	COLEOPTERA	ELMIDAE	GEN	4	CG
263	*Heterlimnius corpulentus*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
241	*Heteroplectron californicum*	TRICHOPTERA	CALAMOCERATIDAE	GENSPE	1	SH
353	*Heterotrissocladius subpilosus*	DIPTERA	CHIRONOMIDAE	GENSPE	0	CG
286	*Hexatoma*	DIPTERA	TIPULIDAE	GEN	2	PR

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421	Hirudinea			CLA	10	PR
420	Hirudinidae	GNATHOBDELLIDA	HIRUDINIDAE	FAM	7	PR
217	*Homophylax*	TRICHOPTERA	LIMNEPHILIDAE	GEN	0	SH
455	Homoptera	HEMIPTERA		SUBORD	8	UN
446	*Hyallela azteca*	AMPHIPODA	TALITRIDAE	GENSPE	8	CG
218	*Hydatophylax*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SH
456	Hydracarina	HYDRACARINA		ORD	8	PR
354	*Hydrobaenus*	DIPTERA	CHIRONOMIDAE	GEN	8	SC
560	Hydrobiidae	MESOGASTROPODA	HYDROBIIDAE	FAM	11	SC
276	Hydrophilidae	COLEOPTERA	HYDROPHILIDAE	FAM	5	PR
513	*Hydropsyche oslari*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	4	CF
511	*Hydropsyche californica*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	4	CF
512	*Hydropsyche occidentalis*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	4	CF
198	*Hydropsyche*	TRICHOPTERA	HYDROPSYCHIDAE	GEN	4	CF
196	Hydropsychidae	TRICHOPTERA	HYDROPSYCHIDAE	FAM	4	CF
182	*Hydroptila*	TRICHOPTERA	HYDROPTILIDAE	GEN	6	PH
514	*Hydroptila ajax*	TRICHOPTERA	HYDROPTILIDAE	GENSPE	6	SC
515	*Hydroptila arctia*	TRICHOPTERA	HYDROPTILIDAE	GENSPE	6	SC
516	*Hydroptila argosa*	TRICHOPTERA	HYDROPTILIDAE	GENSPE	6	SC
180	Hydroptilidae	TRICHOPTERA	HYDROPTILIDAE	FAM	4	PH
552	*Hygrobates occidentalis*	HYDRACARINA	HYGROBATIDAE	GENSPE	8	PR
550	Hygrobatidae	HYDRACARINA	HYGROBATIDAE	FAM	8	PR
457	Hymenoptera	HYMENOPTERA		ORD	8	PA
479	Insecta			CLA	11	UN
33	*Ironodes*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	4	SC
491	*Ischnura*	ODONATA	COENAGRIONIDAE	GEN	9	PR
493	*Isogenus*	PLECOPTERA	PERLODIDAE	GEN	2	PR
127	*Isoperla*	PLECOPTERA	PERLODIDAE	GEN	2	PR
128	*Isoperla fulva*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
129	*Isoperla fusca*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
447	Isopoda	ISOPODA		ORD	8	CG
438	*Juga*	MESOGASTROPODA	PLEUROCERIDAE	GEN	7	SC
132	*Kathroperla perdita*	PLECOPTERA	CHLOROPERLIDAE	GENSPE	1	CG
119	*Kogotus*	PLECOPTERA	PERLODIDAE	GEN	2	PR
264	*Lara avara*	COLEOPTERA	ELMIDAE	GENSPE	4	SH
355	*Larsia*	DIPTERA	CHIRONOMIDAE	GEN	6	PR

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MACROINVERTEBRATE TAXA LIST

TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
554	*Lebertia*	HYDRACARINA	LEBERTIIDAE	GEN	8	PR
553	Lebertiidae	HYDRACARINA	LEBERTIIDAE	FAM	8	PR
532	Lepidoptera	LEPIDOPTERA		ORD	11	SH
522	*Lepidostoma cinereum*	TRICHOPTERA	LEPIDOSTOMATIDAE	GENSPE	3	SH
237	*Lepidostoma*	TRICHOPTERA	LEPIDOSTOMATIDAE	GEN	1	SH
521	Lepidostomatidae	TRICHOPTERA	LEPIDOSTOMATIDAE	FAM	3	SH
242	Leptoceridae	TRICHOPTERA	LEPTOCERIDAE	FAM	4	CG
62	*Leptophlebia*	EPHEMEROPTERA	LEPTOPHLEBIIDAE	GEN	2	CG
61	Leptophlebiidae	EPHEMEROPTERA	LEPTOPHLEBIIDAE	FAM	2	CG
135	*Lethocerus*	HEMIPTERA	BELOSTOMATIDAE	GEN	11	PR
517	*Leucotrichia*	TRICHOPTERA	HYDROPTILIDAE	GEN	6	SC
93	Leuctridae	PLECOPTERA	LEUCTRIDAE	FAM	0	SH
199	Limnephilidae	TRICHOPTERA	LIMNEPHILIDAE	FAM	4	SH
213	Limnephilinae	TRICHOPTERA	LIMNEPHILIDAE	SUBFAM	4	SH
219	*Limnephilus*	TRICHOPTERA	LIMNEPHILIDAE	GEN	5	SH
283	*Limnophila*	DIPTERA	TIPULIDAE	GEN	4	PR
356	*Limnophyes*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
288	*Limonia*	DIPTERA	TIPULIDAE	GEN	6	SH
357	*Lopescladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
564	*Lymnae*	LIMNOPHILA	LYMNAEIDAE	GEN	8	SC
430	Lymnaeidae	BASOMMATOPHORA	LYMNAEIDAE	FAM	6	SC
460	*Macronema*	TRICHOPTERA	HYDROPSYCHIDAE	GEN	3	CF
358	*Macropelopia*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
83	*Malenka*	PLECOPTERA	NEMOURIDAE	GEN	2	SH
576	*Margaritifera margaritifera falcata*	PELECYPODA	MARGARITIFERIDAE	GENSPE	8	CF
426	*Margaritifera*	UNIONIDA	UNIONIDAE	GEN	4	CF
298	*Maruina*	DIPTERA	PSYCHODIDAE	GEN	1	SC
95	*Megaleuctra*	PLECOPTERA	LEUCTRIDAE	GEN	0	SH
121	*Megarcys*	PLECOPTERA	PERLODIDAE	GEN	2	PR
236	*Micrasema*	TRICHOPTERA	BRACHYCENTRIDAE	GEN	1	MH
537	*Microcylloepus similis*	COLEOPTERA	ELMIDAE	GENSPE	2	CG
538	*Microcylloepus*	COLEOPTERA	ELMIDAE	GEN	2	CG
360	*Micropsectra*	DIPTERA	CHIRONOMIDAE	GEN	7	CG
361	*Microtendipes*	DIPTERA	CHIRONOMIDAE	GEN	6	CF
147	*Microvelia*	HEMIPTERA	VELIIDAE	GEN	11	PR
559	Mollusks			PHY	11	SC

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362	*Monodiamesa*	DIPTERA	CHIRONOMIDAE	GEN	7	CG
359	*Monopelopia*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
96	*Moselia infuscata*	PLECOPTERA	LEUCTRIDAE	GENSPE	0	SH
208	*Moselyana*	TRICHOPTERA	LIMNEPHILIDAE	GEN	4	CG
313	Muscidae	DIPTERA	MUSCIDAE	FAM	6	PR
243	*Mystacides*	TRICHOPTERA	LEPTOCERIDAE	GEN	4	CG
463	Naididae	HAPLOTAXIDA	NAIDIDAE	FAM	11	CG
363	*Nanocladius*	DIPTERA	CHIRONOMIDAE	GEN	3	CG
266	*Narpus concolor*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
265	*Narpus*	COLEOPTERA	ELMIDAE	GEN	4	CG
148	Naucoridae	HEMIPTERA	NAUCORIDAE	FAM	5	PR
526	*Nectopsyche stigmatica*	TRICHOPTERA	LEPTOCERIDAE	GENSPE	3	SC
525	*Nectopsyche lahontanensis*	TRICHOPTERA	LEPTOCERIDAE	GENSPE	3	SC
523	*Nectopsyche gracilis*	TRICHOPTERA	LEPTOCERIDAE	GENSPE	3	SC
524	*Nectopsyche halia*	TRICHOPTERA	LEPTOCERIDAE	GENSPE	3	SC
417	Nematoda			PHY	5	PA
81	Nemouridae	PLECOPTERA	NEMOURIDAE	FAM	2	SH
226	*Neophylax occidentalis*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	3	SC
225	*Neophylax*	TRICHOPTERA	LIMNEPHILIDAE	GEN	3	SC
227	*Neophylax rickeri*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	3	SC
228	*Neophylax splendens*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	3	SC
229	*Neothremma*	TRICHOPTERA	UENOIDAE	GEN	0	SC
230	*Neothremma alicia*	TRICHOPTERA	UENOIDAE	GENSPE	0	SC
520	*Neotrichia halia*	TRICHOPTERA	HYDROPTILIDAE	GENSPE	4	SH
364	*Nilotanypus*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
365	*Nimbocera*	DIPTERA	CHIRONOMIDAE	GEN	6	CP
484	*Nixe simplicioides*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	2	SH
483	*Nixe criddlei*	EPHEMEROPTERA	HEPTAGENIIDAE	GENCPE	2	SH
183	*Ochrotrichia*	TRICHOPTERA	HYDROPTILIDAE	GEN	4	CG
518	*Ochrotrichia*	TRICHOPTERA	HYDROPTILIDAE	GEN	4	PR
2	*Octogomphus*	ODONATA	GOMPHIDAE	GEN	1	PR
490	Odonata	ODONATA		ORD	11	PR
366	*Odontomesa*	DIPTERA	CHIRONOMIDAE	GEN	4	CG
244	*Oecetis*	TRICHOPTERA	LEPTOCERIDAE	GEN	8	PR
418	Oligochaeta			CLA	5	CG
231	*Oligophlebodes*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SC

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502	*Oligoplectrum*	TRICHOPTERA	BRACHYCENTRIDAE	GEN	1	CG
367	*Oliveridia*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
209	*Onocosmoecus*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	SH
527	*Onocusmoecus unicolor*	TRICHOPTERA	LIMNEPHILIDAE	GEN	2	SH
3	*Ophiogomphus*	ODONATA	GOMPHIDAE	GEN	1	PR
269	*Optioservus seriatus*	COLEOPTERA	ELMIDAE	GENSPE	4	SC
268	*Optioservus quadrimaculatus*	COLEOPTERA	ELMIDAE	GENSPE	4	SC
267	*Optioservus*	COLEOPTERA	ELMIDAE	GEN	4	SC
539	*Optioservus castanipennis*	COLEOPTERA	ELMIDAE	GENSPE	4	SC
540	*Optioservus divergens*	COLEOPTERA	ELMIDAE	GENSPE	4	SC
270	*Ordobrevia nubrifera*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
252	*Oreodytes*	COLEOPTERA	DYTISCIDAE	GEN	5	PR
580	*Oreogeton*	DIPTERA	EMPIDIDAE	GEN	11	PA
309	*Oreothalia*	DIPTERA	EMPIDIDAE	GEN	6	PR
151	*Orohermes*	MEGALOPTERA	CORYDALIDAE	GEN	0	PR
122	*Oroperla*	PLECOPTERA	PERLODIDAE	GEN	2	PR
544	Orthocladini	DIPTERA	CHIRONOMIDAE	SUPGEN	6	CG
369	*Orthocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
372	*Orthocladius pogonocladius*	DIPTERA	CHIRONOMIDAE	GENPSE	6	CG
368	*Orthocladius complex*	DIPTERA	CHIRONOMIDAE	GENSPE	6	CG
370	*Orthocladius eudactylocladius*	DIPTERA	CHIRONOMIDAE	GENSPE	6	CG
371	*Orthocladius exorthocladius*	DIPTERA	CHIRONOMIDAE	GENSPE	6	CG
519	*Orthotrichia*	TRICHOPTERA	HYDROPTILIDAE	GEN	6	PI
442	Ostracoda			SUBCLA	8	CG
452	*Pacifastacus leniusculus*	DECAPODA	ASTACIDAE	GENSPE	6	SH
451	*Pacifastacus connectens*	DECAPODA	ASTACIDAE	GENSPE	6	SH
475	*Pacifastacus cambilii*	DECAPODA	ASTACIDAE	GENSPE	6	SH
373	*Pagastia*	DIPTERA	CHIRONOMIDAE	GEN	1	CG
102	*Paracapnia*	PLECOPTERA	CAPNIIDAE	GEN	1	SH
374	*Parachaetocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
375	*Parakiefferiella*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
64	*Paraleptophlebia bicornuta*	EPHEMEROPTERA	LEPTOPHLEBIIDAE	GENSPE	4	CG
63	*Paraleptophlebia*	EPHEMEROPTERA	LEPTOPHLEBIIDAE	GEN	1	CG
486	*Paraleptophlebia heteronea*	EPHEMEROPTERA	LEPTOPHLEBIIDAE	GENSPE	2	CG
98	*Paraleuctra occidentalis*	PLECOPTERA	LEUCTRIDAE	GENSPE	0	SH
97	*Paraleuctra*	PLECOPTERA	LEUCTRIDAE	GEN	0	SH

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376	*Paramerina*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
377	*Parametriocnemus*	DIPTERA	CHIRONOMIDAE	GEN	5	CG
133	*Paraperla*	PLECOPTERA	CHLOROPERLIDAE	GEN	1	PR
378	*Paraphaenocladius*	DIPTERA	CHIRONOMIDAE	GEN	5	CG
194	*Parapsyche almota*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	3	PR
193	*Parapsyche*	TRICHOPTERA	HYDROPSYCHIDAE	GEN	1	PR
195	*Parapsyche elsis*	TRICHOPTERA	HYDROPSYCHIDAE	GENSPE	1	PR
549	*Parasitengona*			GEN	11	UN
379	*Paratanytarsus*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
380	*Paratendipes*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
381	*Paratrichocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
382	*Parorthocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
530	Psychomyiidae	TRICHOPTERA	PSYCHOMYIIDAE	FAM	6	CG
289	*Pedicia*	DIPTERA	TIPULIDAE	GEN	6	PR
210	*Pedomoecus sierra*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	0	SC
315	Pelecorhynchidae	DIPTERA	PELECORHYNCHIDAE	FAM	3	PR
566	Pelecypoda	PELECYPODA		ORD	8	CF
72	Peltoperlidae	PLECOPTERA	PELTOPERLIDAE	FAM	2	SH
384	*Pentaneura*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
383	Pentaneurini	DIPTERA	CHIRONOMIDAE	SUBFAM	6	PR
299	*Pericoma*	DIPTERA	PSYCHODIDAE	GEN	4	CG
104	Perlidae	PLECOPTERA	PERLIDAE	FAM	1	PR
123	*Perlinodes aurea*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
114	Perlodidae	PLECOPTERA	PERLODIDAE	FAM	2	PR
99	*Periomvia*	PLECOPTERA	LEUCTRIDAE	GEN	0	SH
248	*Petrophila*	LEPIDOPTERA	PYRALIDAE	GEN	5	SC
385	*Phaenopsectra*	DIPTERA	CHIRONOMIDAE	GEN	7	SC
187	Philopotamidae	TRICHOPTERA	PHILOPOTAMIDAE	FAM	3	CF
433	*Physa*	BASOMMATOPHORA	PHYSIDAE	GEN	8	SC
434	*Physella*	BASOMMATOPHORA	PHYSIDAE	GEN	8	SC
432	Physidae	BASOMMATOPHORA	PHYSIDAE	FAM	8	SC
124	*Pictetiella expansa*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
555	Piersigiidae	HYDRACARINA	PIERSIGIIDAE	FAM	8	PR
471	*Piscicola salmositica*	RHYNCHOBDELLIDA	PISCICOLIDAE	GENSPE	7	PR
424	Pisidiidae	VENEROIDA	PISIDIIDAE	FAM	8	CG
435	*Pisidium*	VENEROIDA	PISIDIIDAE	GEN	8	CF

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568	*Pisidium casertanum*	PELECYPODA	SPHAERIIDAE	GENSPE	8	SC
570	*Pisidium compressum*	PELECYPODA	SPHAERIIDAE	GENSPE	8	CF
569	*Pisidium idahoense*	PELECYPODA	SPHAERIIDAE	GENSPE	8	CF
462	Planariidae	TRICLADIDA	PLANARIIDAE	FAM	11	OM
436	Planorbidae	BASOMMATOPHORA	PLANORBIDAE	FAM	7	SC
492	Plecoptera	PLECOPTERA		ORD	11	PR
84	*Podmosta*	PLECOPTERA	NEMOURIDAE	GEN	2	SH
529	Polycentropidae	TRICHOPTERA	POLYCENTROPIDAE	FAM	6	CF
185	*Polycentropus*	TRICHOPTERA	POLYCENTROPODIDAE	GEN	6	PR
487	Polymitarcidae	EPHEMEROPTERA	POLYMITARCYIDAE	FAM	2	CG
387	*Polypedilum pentapedilum*	DIPTERA	CHIRONOMIDAE	GENSPE	6	SH
386	*Polypedilum*	DIPTERA	CHIRONOMIDAE	GEN	6	SH
389	*Posthastia longimana*	DIPTERA	CHIRONOMIDAE	GENSPE	2	CG
388	*Posthastia gaedii*	DIPTERA	CHIRONOMIDAE	GENSPE	6	CG
390	*Procladius*	DIPTERA	CHIRONOMIDAE	GEN	9	PR
391	*Prodiamesa*	DIPTERA	CHIRONOMIDAE	GEN	3	CG
439	*Promenus*	BASOMMATOPHORA	PLANORBIDAE	GEN	6	CG
302	*Prosimulium*	DIPTERA	SIMULIIDAE	GEN	3	CF
85	*Prostoia besametsa*	PLECOPTERA	NEMOURIDAE	GENSPE	2	SH
179	*Protoptila*	TRICHOPTERA	GLOSSOSOMATIDAE	GEN	1	SC
506	*Protoptila tenebrosa*	TRICHOPTERA	GLOSSOMATIDAE	GENSPE	1	SC
505	*Protoptila coloma*	TRICHOPTERA	GLOSSOSOMATIDAE	GENSPE	1	SC
556	*Protzia californensis*	HYDRACARINA	PIERSIGIIDAE	GENSPE	8	PR
394	*Psectrocladius limbatellus*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
392	*Psectrocladius*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
393	*Psectrocladius allopsectroclad*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
395	*Psectrocladius sordidellus*	DIPTERA	CHIRONOMIDAE	GENSPE	8	CG
396	*Psectrotanypus*	DIPTERA	CHIRONOMIDAE	GEN	10	PR
278	Psephenidae	COLOEPTERA	PSEPHENIDAE	FAM	4	SC
541	*Psephenus falli*	COLEOPTERA	PSEPHENIDAE	GENSPE	4	SC
397	*Pseudochironomus*	DIPTERA	CHIRONOMIDAE	GEN	5	CG
23	*Pseudocloeon*	EPHEMEROPTERA	BAETIDAE	GEN	4	SC
398	*Pseudodiamesa*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
399	*Pseudorthocladius*	DIPTERA	CHIRONOMIDAE	GEN	0	CG
297	Psychodidae	DIPTERA	PSYCHODIDAE	FAM	10	CG
221	*Psychoglypha bella*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	2	CG

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220	*Psychoglypha*	TRICHOPTERA	LIMNEPHILIDAE	GEN	1	CG
222	*Psychoglypha subborealis*	TRICHOPTERA	LIMNEPHILIDAE	GENSPE	2	CG
186	*Psychomyia lumina*	TRICHOPTERA	PSYCHOMYIIDAE	GENSPE	2	SC
67	*Pteronarcella badia*	PLECOPTERA	PTERONARCYDAE	GENSPE	0	SH
68	*Pteronarcella regularis*	PLECOPTERA	PTERONARCYDAE	GENSPE	0	SH
66	*Pteronarcella*	PLECOPTERA	PTERONARCYDAE	GEN	0	SH
65	Pteronarcydae	PLECOPTERA	PTERONARCYDAE	FAM	0	SH
71	*Pteronarcys princeps*	PLECOPTERA	PTERONARCYDAE	GENSPE	0	SH
70	*Pteronarcys californica*	PLECOPTERA	PTERONARCYDAE	GENSPE	0	SH
69	*Pteronarcys*	PLECOPTERA	PTERONARCYDAE	GEN	0	SH
300	Ptychopteridae	DIPTERA	PTYCHOPTERYDAE	FAM	7	CG
247	*Pyralidae*	LEPIDOPTERA	PYRALIDAE	FAM	5	SH
400	*Rheocricotopus*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
401	*Rheotanytarsus*	DIPTERA	CHIRONOMIDAE	GEN	6	CF
35	*Rhithrogena*	EPHEMEROPTERA	HEPTAGENIIDAE	GEN	0	SC
485	*Rhithrogena hageni*	EPHEMEROPTERA	HEPTAGENIIDAE	GENSPE	0	CG
255	*Rhizelmis*	COLEOPTERA	ELMIDAE	GEN	7	SC
464	*Rhyacodrilus sodalis*	HAPLOTAXIDA	TUBIFICIDAE	GENSPE	10	CG
155	*Rhyacophila alberta*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
168	*Rhyacophila vagrita*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
162	*Rhyacophila arnaudi*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
169	*Rhyacophila verrula*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	MH
159	*Rhyacophila coloradensis*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
154	*Rhyacophila acropedes*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	1	PR
161	*Rhyacophila iranda*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
160	*Rhyacophila hyalinata*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
166	*Rhyacophila narvae*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
164	*Rhyacophila sibirica*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
153	*Rhyacophila*	TRICHOPTERA	RHYACOPHILIDAE	GEN	0	PR
156	*Rhyacophila angelita*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
157	*Rhyacophila betteni*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
158	*Rhyacophila brunnea*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
163	*Rhyacophila rotunda*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
165	*Rhyacophila blarina*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
167	*Rhyacophila pellisa*	TRICHOPTERA	RHYACOPHILIDAE	GENSPE	0	PR
152	Rhyacophilidae	TRICHOPTERA	RHYACOPHILIDAE	FAM	0	PR

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MACROINVERTEBRATE TAXA LIST

TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
53	*Serratella*	EPHEMEROPTERA	EPHEMERELLIDAE	GEN	2	CG
54	*Serratella tibialis*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	2	CG
125	*Setvena bradleyi*	PLECOPTERA	PERLODIDAE	GENSPE	2	PR
149	*Sialis*	MEGALOPTERA	SIALIDAE	GEN	4	PR
142	*Sigara*	HEMIPTERA	CORIXIDAE	GEN	11	PH
498	*Sigara alternata*	HEMIPTERA	CORIXIDAE	GENSPE	11	PH
301	Simuliidae	DIPTERA	SIMULIIDAE	FAM	6	CF
303	*Simulium*	DIPTERA	SIMULIIDAE	GEN	6	CF
547	*Simulium vittatum*	DIPTERA	SIMULIDAE	GENSPE	6	CF
546	*Simulium bivittatum*	DIPTERA	SIMULIDAE	GENSPE	6	CF
12	Siphlonuridae	EPHEMEROPTERA	SIPHLONURIDAE	FAM	7	CG
15	*Siphlonurus*	EPHEMEROPTERA	SIPHLONURIDAE	GEN	7	CG
126	*Skwala*	PLECOPTERA	PERLODIDAE	GEN	2	PR
73	*Soliperla*	PLECOPTERA	PELTOPERLIDAE	GEN	2	SH
86	*Soyedina*	PLECOPTERA	NEMOURIDAE	GEN	2	SH
558	*Sperchon pseudoplumifer*	HYDRACARINA	SPERCHONIDAE	GENSPE	8	PR
557	Sperchonidae	HYDRACARINA	SPERCHONIDAE	FAM	8	PR
571	*Sphaerium patella*	PELECYPODA	SPHAERIIDAE	GENSPE	8	CF
572	*Sphaerium striatum*	PELECYPODA	SPHAERIIDAE	GENSPE	8	CF
567	Sphaeriidae	PELECYPODA	SPHAERIIDAE	FAM	8	CF
184	*Stactobiella*	TRICHOPTERA	HYDROPTILIDAE	GEN	2	SH
402	*Stempellina*	DIPTERA	CHIRONOMIDAE	GEN	2	CG
403	*Stempellinella*	DIPTERA	CHIRONOMIDAE	GEN	4	CG
256	*Stenelmis*	COLEOPTERA	ELMIDAE	GEN	7	SC
317	Stratiomyidae	DIPTERA	STRATIOMYIDAE	FAM	8	CG
405	*Sublette*	DIPTERA	CHIRONOMIDAE	GEN	6	CF
577	*Suwallia*	PLECOPTERA	CHLOROPERLIDAE	GEN	1	PR
134	*Sweltsa complex*	PLECOPTERA	CHLOROPERLIDAE	GENSPE	1	PR
404	*Symbiocladius*	DIPTERA	CHIRONOMIDAE	GEN	6	PA
406	*Sympothastia*	DIPTERA	CHIRONOMIDAE	GEN	2	CG
407	*Synorthocladius*	DIPTERA	CHIRONOMIDAE	GEN	2	CG
318	Tabanidae	DIPTERA	TABANIDAE	FAM	8	PR
80	*Taeniopteryx pallidum*	PLECOPTERA	TAENIOPTERYGIDAE	GENSPE	2	SC
79	*Taeniopteryx*	PLECOPTERA	TAENIOPTERYGIDAE	GEN	2	SC
77	Taeniopterygidae	PLECOPTERA	TAENIOPTERYGIDAE	FAM	2	SH
473	Talitridae	AMPHIPODA	TALITRIDAE	FAM	8	CG

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TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
545	Tanytarsini	DIPTERA	CHIRONOMIDAE	SUPGEN	6	CF
408	*Tanytarsus*	DIPTERA	CHIRONOMIDAE	GEN	6	CF
410	*Thienemannimyia*	DIPTERA	CHIRONOMIDAE	GEN	6	PR
409	*Thienemanniola*	DIPTERA	CHIRONOMIDAE	GEN	6	CG
55	*Timpanoga hecuba*	EPHEMEROPTERA	EPHEMERELLIDAE	GENSPE	7	CG
290	*Tipula*	DIPTERA	TIPULIDAE	GEN	4	SH
282	Tipulidae	DIPTERA	TIPULIDAE	FAM	3	SH
245	*Triaenodes*	TRICHOPTERA	LEPTOCERIDAE	GEN	6	MH
461	Tricladida	TRICLADIDA		ORD	11	UN
56	Tricorythidae	EPHEMEROPTERA	TRICORYTHIDAE	FAM	4	CG
57	*Tricorythodes*	EPHEMEROPTERA	TRICORYTHIDAE	GEN	5	CG
58	*Tricorythodes minutus*	EPHEMEROPTERA	TRICORYTHIDAE	GENSPE	4	CG
576	*Trissopelopia*	DIPTERA	CHIRONOMIDAE	GEN	11	PR
466	*Tubifex*	TUBIFICIDA	TUBIFICIDAE	GEN	10	CG
489	Tubificidae	TUBIFICIDA	TUBIFICIDAE	FAM	10	CG
416	Turbellaria			CLA	4	PR
413	*Tvetenia discoloripes*	DIPTERA	CHIRONOMIDAE	GENSPE	5	CG
412	*Tvetenia bavarica*	DIPTERA	CHIRONOMIDAE	GENSPE	5	CG
411	*Tvetenia*	DIPTERA	CHIRONOMIDAE	GEN	5	CG
304	*Twinnia*	DIPTERA	SIMULIIDAE	GEN	6	CF
573	Unionidae	PELECYPODA	UNIONIDAE	FAM	8	CF
87	*Visoka cataractae*	PLECOPTERA	NEMOURIDAE	GENSPE	1	SH
565	*Vorticifex*	LIMNOPHILA	PLANORBIDAE	GEN	8	SC
310	*Wiedemannia*	DIPTERA	EMPIDIDAE	GEN	6	PR
189	*Wormaldia*	TRICHOPTERA	PHILOPOTAMIDAE	GEN	3	CF
528	*Wormaldia gabriella*	TRICHOPTERA	RHYCOPHILIDAE	GENSPE	3	CF
76	*Yoraperla mariana*	PLECOPTERA	PELTOPERLIDAE	GENSPE	2	SH
75	*Yoraperla brevis*	PLECOPTERA	PELTOPERLIDAE	GENSPE	2	SH
74	*Yoraperla*	PLECOPTERA	PELTOPERLIDAE	GEN	2	SH
115	*Yugus*	PLECOPTERA	PERLODIDAE	GEN	2	PR
273	*Zaitzevia parvula*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
272	*Zaitzevia milleri*	COLEOPTERA	ELMIDAE	GENSPE	4	CG
271	*Zaitzevia*	COLEOPTERA	ELMIDAE	GEN	4	CG
92	*Zapada oregonensis*	PLECOPTERA	NEMOURIDAE	GENSPE	2	SH
91	*Zapada frigida*	PLECOPTERA	NEMOURIDAE	GENSPE	2	SH
89	*Zapada cinctipes*	PLECTOPTERA	NEMOURIDAE	GENSPE	2	SH

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TAXON CODE	SCIENTIFIC NAME	ORDER	FAMILY	TAXON LEVEL	T/V*	FFG*
90	*Zapada columbiana*	PLECOPTERA	NEMOURIDAE	GENSPE	2	SH
88	*Zapada*	PLECOPTERA	NEMOURIDAE	GEN	2	SH
414	*Zavrelia*	DIPTERA	CHIRONOMIDAE	GEN	8	CG
415	*Zavreliimyia*	DIPTERA	CHIRONOMIDAE	GEN	8	PR
10	*Zoniagrion*	ODONATA	COENAGRIONIDAE	GEN	9	PR

Functional Feeding Groups

CG = Collector - Gather
CF = Collector - Filter
PR = Predator
SH = Shredder
SC = Scraper
MH = Macrophyte Herbivore
UN = Unknown
PA = Parasite
OM = Omnivore

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*FFG = Functional Feeding Group (Merrit and Cummins, 1988; Pennak, 1989; and Wisseman, 1990)
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USER'S COMMENTS

After using Protocol 5 (1993) we would like to hear of any errors you encounter or any suggestions you care to make on improving the document. These will be considered when the document is revised.

Please send comments to: Monitoring and Technical Support Bureau, Attn: Bill Clark, Idaho Division of Environmental Quality, 1410 N. Hilton St. Boise, ID 83706

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