

**MONTANORE PROJECT  
Continued Interim  
Aquatic Biological Monitoring  
1993**

For:  
**Noranda Minerals  
2501 Catlin, Suite 201  
Missoula, MT 59801**

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## I. INTRODUCTION

### A. Purpose

Baseline inventory of streams in the Montanore Project area was conducted in 1988-89 (McGuire, et al., 1989). The baseline studies were compiled into a draft environmental impact statement (DEIS) released to the public in October 1990 (U.S.F.S., et al., 1990). A supplement to the DEIS (U.S.F.S., et al., 1991) made recommendations for future aquatic monitoring and subsequently, an interim aquatic biological monitoring program was designed after discussions with state and federal agencies (Water Quality Bureau, Department of State Lands and Kootenai National Forest). The interim biological monitoring program was implemented in 1990, 1991, and 1992 (Farmer, 1991, 1992, 1993).

Because effects of nutrient loading to Libby Creek as the result of mine exploration were documented during interim monitoring (Farmer 1992), additional pre-mine monitoring of the Libby Creek stations was carried out in 1993. The objectives of this continued pre-mine interim monitoring of Libby Creek were to:

- document seasonal physical features of each sampling station;
- document the seasonal diversity and relative abundance of macroinvertebrate species present at each sampling station;
- document the seasonal diversity and abundance of periphyton populations at each sampling station;
- identify any indicator species, marker species, and species of special concern from the Libby Creek sites and document the annual population status of those species;

- assess the environmental condition of Libby Creek during the field season and document any noticeable characteristics;
- compare the 1993 monitoring data with the applicable baseline and previous monitoring data to assess the biological conditions of Libby Creek;
- summarize the impacts of nutrient loading to Libby Creek.

#### B. Acknowledgements

The Montanore Project's 1993 aquatic biological monitoring program was funded by Noranda, Inc. Doug Parker coordinated the project from the Missoula office. Mark Petersmeyer, Dan Meyers, and Lynn Haggerty administered the project from the Libby office. Dan Meyers provided snowmobiles and assisted with spring sampling. Erich Weber, PhycoLogic, Helena, conducted the periphyton analysis and interpretation and wrote the periphyton section of this report (Weber, 1994). Robert Wisseman, Oregon and Dr. Daniel Gustafson, Montana State University, provided taxonomic opinions. Kim Rieser assisted with field work and lab processing of samples. Lillian Yeshe and Maria Newcomb also assisted with lab processing of samples. Cathy Bonitz-Eakin assisted with sample and data analysis. People providing the senior author with support from a personal level were Patrick, Kim and Sandi. The contributions of all of these people to the Montanore aquatic biological monitoring program are recognized with gratitude.

#### II. DESCRIPTION OF SAMPLING STATIONS

The Montanore Project is located in the Cabinet Mountains south of Libby in Lincoln and Sanders Counties. Elevations at the sampling stations ranged from approximately 3200-4300'. Most of the project area is covered by coniferous forest comprised of seven

dominant tree species. In particular, a dense canopy of Engelmann spruce, western red cedar and western larch border Libby Creek. Average annual precipitation in the project area may vary from 10-100 inches. Water levels can vary dramatically from intense spring and fall discharges to minimum summer flows which confine benthic populations to the thalweg.

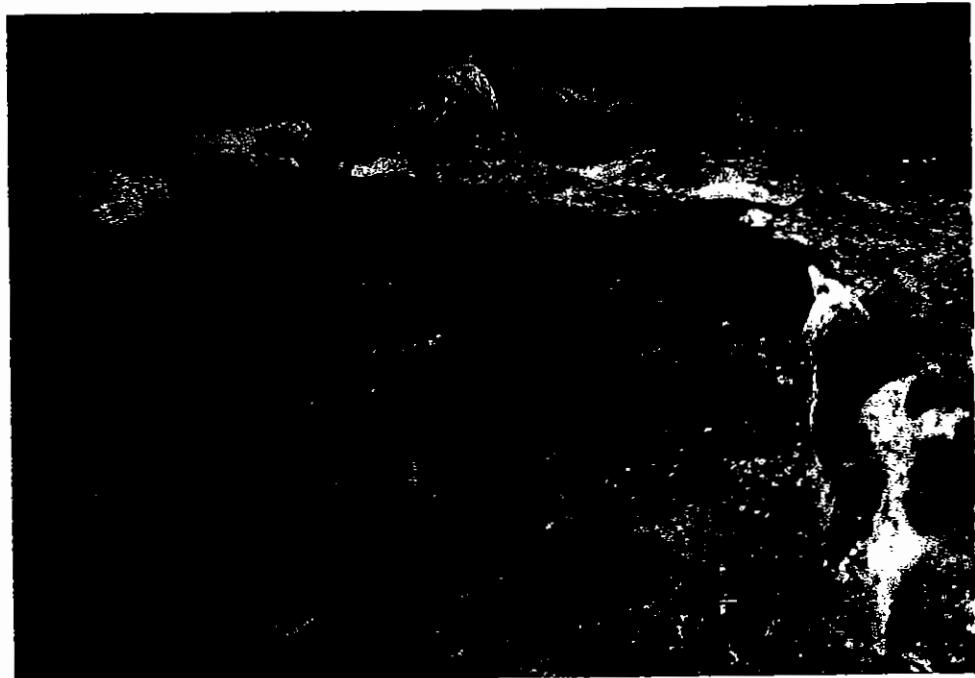
The headwaters of Libby Creek are alpine meadow creeks emerging from snow banks at high elevations in the Cabinet Mountain Wilderness area. These first order streams merge into second and third order tributaries of the Libby Creek system. Libby Creek is a perennial stream flowing northward for about 28 miles to its confluence with the Kootenai River.

Only the four Libby Creek stations (Figure 1) were sampled in 1993. The reader is referred to the DEIS (U.S.F.S. et al., 1990) for a more complete physical description of the project area and to Farmer (1993) for a specific description of each site. Photographs of each site appear in Figures 2-6.

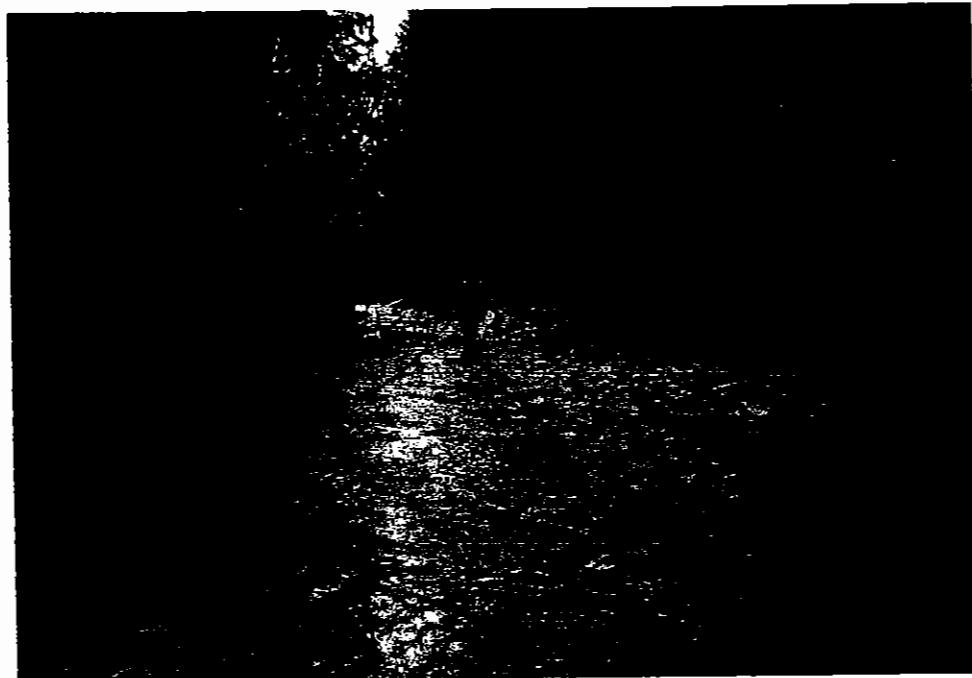
Physical and chemical data for the Libby Creek sites are contained in Table 1 (p. 8). For the most part, total suspended solids, major ions and nutrient concentrations are all very low and increase gradually downstream. In 1993, pH's ranged from 5.4 at L10 in August, which is slightly lower than the lowest reading in 1992 (5.7 at L9 in August) to 7.4 at L3 (7.1 in 1992) and L1 (8.0 in 1992). Highest specific conductance was reached at L1 in October (74.4 umhos/cm). Nitrates were again highest at L9 (0.29-0.76 mg/L), just below the mine, but were noticeably lower than the highest reading of 1.3 mg/L in 1992.



*Figure 2. Upper Libby Creek, L10 (LB-200), August 1993.*



*Figure 3. Upper Libby Creek, L10 (LB-200), August 1993.*



*Figure 4. Libby Creek, L9 (LB-300), October 1993.*



*Figure 5. Libby Creek, L3 (LB-1000), October 1993.*



*Figure 6. Libby Creek, L1 (LB-3000), August 1993.*

Embeddedness by fine sediment was always noticeably low at each of the four stations.

A conspicuous feature of the sampling stations in 1993 was the presence of a stringy, bright green algae which was most abundant at L10 (LB-200), appearing as a green carpet on the substrate in August (Figure 3, p. 5). The algae was noticeable in smaller quantities at L9 (LB-300) and L3 (LB-1000) and was virtually non-existent at L1 (LB-3000). The algae had diminished somewhat in quantity during the October sampling episode but was still most noticeable at L10.

**Table 1. Physical and chemical features at the Montanore Project aquatic biological sampling stations, 1993.**

	Air Temp. °F	Water Temp. °F[Time]	Width'(Mean')	Max. Depth"(Mean")	Embedd.	cfs*	pH*	sc*	N*	TDS*	TA*	TH*
<b>MARCH</b>												
L10(LB200)	50	39(12:45)	9-36(20)	24(18)	1-5%	6.16	6.5	16.0	0.26	19.0	3.0	7.0
L9(LB300)	45	39(15:30)	15-25(20)	24(20)	1-5%	11.43	6.8	30.0	0.76	22.0	4.0	9.0
L3(LB1000)	40	37(17:15)	15-35(25)	36(24)	1-5%	39.81	7.4	47.0	0.30	32.0	16.0	18.0
L1(LB3000)	40	38(18:50)	60-75(88)	40(26)	10%	96.32	7.4	63.0	0.23	43.0	23.0	25.0
<b>AUGUST</b>												
L10(LB200)	53	48(07:30)	10-35(21)	20(11)	<1%	11.39	5.4	14.8	0.08	20.0	3.0	7.0
L9(LB300)	60	49(08:40)	9-30(25)	18(9)	<1%	13.31	5.9	24.0	0.29	20.0	6.0	9.0
L3(LB1000)	72	54(11:00)	18-40(24)	16(9)	<5%	36.6	6.3	37.9	0.10	20.0	15.0	14.0
L1(LB3000)	74	58(12:30)	18-55(32)	18(10)	<5%	58.23	7.4	70.0	0.06	35.0	28.0	28.0
<b>OCTOBER</b>												
L10(LB200)	39	41(10:00)	10-24(12)	16(10)	1-5%	6.88	6.4	16.3	0.19	13.0	3.0	7.0
L9(LB300)	40	48(11:10)	30-45(33)	14(9)	1-5%	8.02	6.2	28.4	0.44	18.0	6.0	9.0
L3(LB1000)	50	48(12:50)	15-27(23)	14(9.5)	1-5%	19.20	6.9	43.6	0.18	32.0	19.0	21.0
L1(LB3000)	58	45(15:00)	40-55(48)	18(10)	1-5%	28.90	6.4	74.4	0.35	45.0	36.0	39.0

\*Chen-Northern, Inc. field date, pers. comm. January 1994. cfs = discharge in cubic feet/sec, sc = umhos/cm, N = nitrate+nitrite as mg/L of N, tds = total dissolved solids as mg/L, TA = total alkalinity, TH = total hardness

### III. PERIPHYTON

#### A. Introduction

This section examines the structure and composition of non-diatom and diatom algae associations in the periphyton from the four Libby Creek sites. It assesses similarities and differences between the sites on each of the seasonal sampling dates in 1993 and applies two new protocols to assess biological integrity and impairment of aquatic life. It also compares 1993 results with monitoring years 1992 and 1991 (Weber 1993 and 1992).

Algae typically dominate the assemblage of small, often microscopic organisms (invertebrates, bacteria, fungi and algae), known collectively as periphyton, that live attached to or in close association with submerged substrates. The algae can be conveniently divided into two major groups: the diatoms and the non-diatoms, based on the presence or absence of a rigid siliceous cell wall. The taxonomy of both groups has been well established, and both are of value in assessing water quality. However, due to cell wall ornamentation that is unique to individual taxa, diatoms are readily identifiable to species while it is much more difficult, and therefore generally impractical, to identify non-diatom algae below the genus level.

Because they are usually present in very large numbers, are highly sensitive to physical and chemical factors, and have known environmental requirements and pollution tolerances, algae are useful for establishing baseline water quality in streams and as biomonitorsof change. Generally, the algae present in a periphyton sample will reflect the environmental conditions that existed at a particular location for up to several weeks prior to sample collection. However, in addition to water quality, other factors such as

streamflow, substrate scour, recolonization rates, seasonal succession, and sloughing can effect the types and amount of algae present at a given time. These factors are considered when selecting sampling dates to minimize effects unrelated to water quality.

## B. Methods

Composite periphyton samples were collected at each Libby Creek site by Westech personnel following methods described by Bahls (1993). A conscious effort was made to sample all forms of algae present, in approximately the same proportion to one another as they occurred in the particular stream reach. Samples were preserved with Lugol's solution and kept cold until the time of analysis.

Each sample was processed and analyzed by PhycoLogic in the following manner: a subsample of the periphyton was examined under 200X and 400X with an Olympus BHT compound microscope, and all non-diatom algae present identified to genus. The relative abundance of cells of each genus was estimated using the following system:

- R (Rare): Fewer than one cell per microscope field at 200X, on the average;
- C (Common): At least one, but fewer than five cells per field of view;
- VC (Very Common): Between 5 and 25 cells per field of view;
- A (Abundant): Greater than 25 cells per field, but numbers within limits reasonably counted;
- VA (Very Abundant): Number of cells per field too numerous to count.

The relative abundance of diatom algae (all genera considered collectively) was estimated

for comparative purposes.

Each dominant (common or greater in relative abundance) non-diatom genus, as well as the diatom component if it met this criterion, was also ranked according to its estimated contribution to the total algal biovolume present in the sample. The genus estimated to have the greatest biovolume was ranked number 1; the second most number 2, and so on. These rankings were used to determine the dominant non-diatom *phylum* (see Non-Diatom Algae Metrics, below).

All organic matter was then chemically oxidized from each sample, leaving the siliceous cell walls (frustules) of diatoms and other inorganic matter. Permanent strewn mounts were prepared on glass microscope slides with Hyrax medium following Standard Methods (APHA et al. 1980). Each mounted sample was thoroughly scanned at 1000X with a high-numerical aperture oil immersion objective, and all diatoms encountered identified to species. A proportional count of approximately 400 (408 to 418) diatom frustules was performed on each sample, except on station L10 in the spring and summer and L3 in the spring, where about half as many were counted due to a sparsity of diatoms in the samples. The percent relative abundance of each diatom species was then calculated. Diatom species that were identified during a floristic scan but not tallied during the count were denoted as present with a letter "p".

Each diatom species was assigned to one of three pollution tolerance (PT) groups as originally determined by Lange-Bertalot (1979). Simply stated, PT group 1 taxa are most tolerant of pollution, group 2 less tolerant, and group 3 are sensitive to pollution. Bahls

(1993) published expanded autecological criteria for assigning diatom taxa to PT groups, along with an extensive listing of diatom taxa reported from Montana. Default PT group assignments (by genus) for taxa lacking sufficient autecological data were also published. A number of unlisted taxa were assigned to PT groups by the author, based on the latest autecological data published by Krammer and Lange-Bertalot (1986, 1988, 1991a, 1991b). The default PT values were used only as a last resort.

#### 1. non-diatom algae metrics

Metrics applied to non-diatom algae include: number of dominant, or "common" genera, dominant phylum, and to a lesser extent indicator taxa, as recommended by Bahls (1993).

The number of dominant non-diatom genera generally is inversely proportional to the level of pollution in western Montana streams. In least-impaired reference streams from mountain ecoregions in Montana, Bahls (1993) found from 1 to 10 "common" non-diatom genera, with a mean value of 5.

The dominant non-diatom *phylum* was determined by calculating the cumulative weighted rank of genera within each phylum as described by Bahls (1993). Diatoms were not included in this metric. Briefly, in a sample with  $x$  number of common or greater non-diatom genera, the genus ranking highest in biovolume scored  $x$  points, second highest,  $x-1$  points, and so on. The scores of all genera in each phylum were summed for each site to determine the dominant non-diatom phylum based on estimated relative biovolume.

Bahls et al. (1992) found that blue-green algae (phylum Cyanophyta), also known as

cyanobacteria, dominated the non-diatom algal flora of least-impaired reference streams in the Northern Rockies Ecoregion, which includes northwestern Montana and the Libby Creek drainage. He hypothesized that dominance by blue-green algae may be a function of relatively low inorganic nitrogen levels, and that higher nitrogen concentrations tend to favor dominance by green algae (phylum Chlorophyta).

## 2. diatom metrics

Metrics calculated for each diatom association include percent relative abundance (PRA) of the dominant diatom taxon, number of species counted (species richness), Shannon diversity index, pollution index and siltation index. The percentage similarity index of Whittaker and Fairbanks (1958) was calculated between stations L10 and L9 only, for use with Protocol II assessments.

The dominant diatom taxon in mountain reference streams averaged 31.6 percent relative abundance, with a range of 11.1 to 67.0. Bahls, et al. (1992) found values for this metric in the Northern Rockies Ecoregion to be at the high end of this range, possibly due to the more austere natural conditions of the streams there.

Diatom species richness is probably the most basic indicator of community health and, as a rule, correlates directly to water quality: as water quality declines, so does the number of diatom species present. However, the cold, nutrient-poor waters of pristine mountain streams often support naturally low numbers of species. Reference streams from mountain ecoregions in Montana had diatom species richness values of between 23 and 51 (mean 33) (Bahls 1993).

The Shannon Diversity Index (Weber 1973) incorporates elements of species richness with equitability, the distribution of individuals among the species present. High diversity index values occur in diatom communities where no taxa are strongly dominant in numbers, which is generally the case in healthy, unimpaired streams. Diatom communities under environmental stress will have a relatively small number of taxa that account for most of the individuals present, resulting in lower diversity index values. Diatom species diversity values of between 2.16 and 4.50 were found in 21 least-impaired reference streams from mountain ecoregions, with a mean value of 3.58 (Bahls 1993). Bahls also found unusually low diversity index values in some small, pristine mountain streams. These apparently were caused by naturally stressful conditions due to cold water, steep gradients, and low levels of nutrients and light. *Achnanthes minutissima* often dominates the diatom flora of these streams, resulting in Shannon diversity index values in the neighborhood of 2.00 (Bahls 1993; Water Quality Bureau, unpublished data). Some mountain streams with naturally low diversity values may actually display an increase in diversity in response to an increase in sediment and/or nutrients.

The pollution index was proposed by Bahls et al. (1992) as a shorthand method of summarizing the information contained in the three pollution tolerance groups of Lange-Bertalot (1979). The index is derived from the decimal fraction of the total percent relative abundance value of diatom taxa in each pollution tolerance group, multiplied by the respective group number. The sum of these three products is the pollution index. The index will range from 1.00 (all most tolerant taxa) to 3.00 (all most sensitive taxa). Pollution index values of between 2.45 and 2.94 (mean 2.72) were determined by Bahls (1993) for diatom communities in 21 reference streams from mountain ecoregions.

The siltation index is defined as the total percent relative abundance of species of *Navicula* and *Nitzschia* diatoms (Bahls 1993). These genera were chosen because they are highly motile biraphidean diatoms well adapted to an existence on unstable sediments. Values can range from 0 to 100; in mountain reference streams Bahls (1993) found siltation index values from 0.0 to 50.3 (mean 14.5).

The percentage similarity index (Whittaker and Fairbanks 1958) is simply the sum of the smaller of the two percent relative abundance values for each diatom species common to both the control site and the study site. Values for this index will range from 0.0 (totally different communities) to 100 (identical communities).

### 3. assessment protocols

Two protocols employing diatom metrics to assess biological integrity and aquatic life impairment in streams were proposed by Bahls (1993):

Protocol I compares metric values from a study site to metric values derived from least-impaired reference streams in the same physiographic province (ecoregion), and is intended for use when a local reference or control site is not available. Protocol I uses up to three of the diatom association indexes: Shannon diversity index, pollution index, and siltation index. It was developed with, and should be used only with, metrics calculated from data collected during the summer months. The lowest score establishes the overall biological integrity and impairment rating for the aquatic community at that site.

Protocol II compares metric values from a study site to metric values from a local

upstream or sidestream control site. The control site must be of the same stream order as the study site. The same three diatom association indexes used in Protocol I, plus the percent similarity index of Whittaker and Fairbanks (1958), are used in Protocol II. Again, the lowest score establishes the overall biological integrity and impairment rating. Because it compares against local reference conditions, Protocol II is more sensitive than Protocol I, and can be applied to data from year round.

Protocol II recognizes a possible two-way response by diatom diversity to different causes and degrees of impairment. As discussed under the Shannon diversity section, this is due to the increase in diversity known to occur in some mountain streams with an increase in sediment and/or nutrients. No intrinsic value is placed on this higher diversity, as it is a deviation from the undisturbed condition for that site.

The siltation rating method in Protocol II, which uses the ratio of the reference site siltation index to the study site index  $\times 100$ , puts a greater penalty on sediment increases at the lower end of the siltation scale. An increase of 0.25 units over a reference site siltation index of 0.00 results in a value of 0%, which is rated as a heavy siltation increase at the study site. However, the same increase (0.25 units) over a reference site value of 1.00 gives a value of 80%, which rates as no increase in siltation.

### C. Results and Discussion

#### 1. non-diatom algae

A total of 21 genera of non-diatom algae were identified from the Libby Creek stations in 1993 (Table 2). This compares to 25 in 1992, and 19 in 1991 (Weber, 1993 and 1992).

**Table 2.** Genera of non-diatom algae identified in periphyton samples from Libby Creek stations in the Montanore Project area, 1993.

**Phylum Chlorophyta**

- Order Chlorococcales
  - Family Chlorococcaceae
    - Trebouxia*
  - Family Scenedesmaceae
    - Crucigenia*
- Order Uotrichales
  - Family Ulotrichaceae
    - Ulothrix*
  - Family Microsporaceae
    - Microspora*
- Order Ulvales
  - Family Ulvaceae
    - Monostroma*
- Order Chaetophorales
  - Family Chaetophoraceae
    - Stigeoclonium*
- Order Oedogoniales
  - Family Oedogoniaceae
    - Oedogonium*
- Order Zygnematales
  - Family Zygnemataceae
    - Mougeotia*
    - Spirogyra*
    - Zygnema*
- Family Desmidiaceae
  - Cosmarium*
  - Staurastrum*

**Phylum Chrysophyta**

- Sub-Phylum Chrysophyceae
- Order Chromulinales
  - Family Thallochrysidaeae
    - Phaeodermatium*
  - Family Hydruraceae
    - Hydrurus*

**Phylum Cyanophyta**

- Order Chroococcales
  - Family Chroococcaceae
    - Aphanocapsa*
    - Merismopedia*
    - Microcystis*
- Order Chamaesiphonales
  - Family Chamaesiphonaceae
    - Chamaesiphon*
- Order Oscillatoriiales
  - Family Oscillatoriaceae
    - Oscillatoria*
    - Phormidium*
- Order Nostocales
  - Family Nostocaceae
    - Anabaena*

The estimated relative abundance values for all non-diatom genera at the four Libby Creek stations in March, August and October 1993 are listed in Appendix A.

Overall, there were 15 dominant non-diatom genera identified in Libby Creek in 1993 (Table 3). This compares to 18 genera in 1992, and 15 genera in 1991 (Weber, 1993 and 1992). The estimated relative abundance of dominant non-diatom algae at each Libby Creek site for the three monitoring periods in 1993 are listed in Table 3. The dominant non-diatom taxa at stations L10 and L9 were very similar; the downstream stations (L3 and L1) had less in common, both with each other and the upstream stations. Estimated relative abundance of each dominant taxa at L10 and L9 were also very similar.

The dominant non-diatom phylum and the number of dominant genera at each Libby Creek station during the spring, summer and autumn of 1993, as well as 1992 and 1991 for comparison, are listed in Table 4. The number of dominant genera at all Libby Creek stations in 1993 was lowest in the spring, and generally highest in the autumn. There were no dominant non-diatom algae present at L10 and L3 in the spring of 1993. Station L9 had the greatest number of genera between Libby Creek sites during all three seasons, particularly during spring and autumn. This trend was less obvious or absent during both 1992 and 1991 (Table 4).

Green algae (phylum Chlorophyta) were dominant at Libby Creek stations L10 and L3 in the summer and autumn of 1993 (Table 4). The dominant phylum at stations L9 and L1 varied seasonally, with green algae, blue-green algae (phylum Cyanophyta) and yellow-green algae (phylum Chrysophyta) each dominating during a single season. The relative

**Table 3.** Dominant non-diatom algae (common or greater in estimated relative abundance) for Libby Creek stations in the Montanore Project area, 1993.  
(C = common; VC = very common; A = abundant; VA = very abundant)

Algal Genera	Libby Cr. Station:			L10			L9			L3			L1		
	Mar	Aug	Oct	Mar	Aug	Oct	Mar	Aug	Oct	Mar	Aug	Oct	Mar	Aug	Oct
<b><u>Bacillariophyta (diatoms) (diatoms)</u></b>															
All genera collectively	C			C	A		C	C		VA	A		VC	VA	
<b><u>Chlorophyta (green algae)</u></b>															
<i>Cosmarium</i>													C		
<i>Crucigenia</i>													C		
<i>Microspora</i>				A			C	C					VC		
<i>Monostroma</i>													VC		
<i>Spirogyra</i>		C	C						VC						
<i>Staurastrum</i>													C		C
<i>Trebouxia</i>													C		
<i>Ulothrix</i>		C	C	C			C			C	C		VA		
<i>Zygnema</i>		VA	VC		A	A				A	C				
<b><u>Chrysophyta (yellow-green algae)</u></b>															
<i>Hydrurus</i>			VC		A	VA	VC						C	VC	
<i>Phaeodermatium</i>													C		
<b><u>Cyanophyta (blue-green algae)</u></b>															
<i>Chamaesiphon</i>				VC											
<i>Microcystis</i>									A						
<i>Oscillatoria</i>		VA		VA	VA	VA				A	VA		A	VA	
<i>Phormidium</i>									C				VC		

**Table 4.** Dominant phylum and number of dominant non-diatom algal genera at Libby Creek stations in the Montanore Project area, 1991-93.

Station	Year	<u>Dominant Phylum<sup>(a)</sup></u>			<u>Number of Dominant Genera<sup>(b)</sup></u>		
		Spring	Summer	Autumn	Spring	Summer	Autumn
<b>Libby Cr. L10</b>							
	1993	--	Chlor	Chlor	0	3	5
	1992	Chlor	Chlor	Chlor	4	7	7
	1991	Cyan	Chlor	Chlor	1	5	3
<b>Libby Cr. L9</b>							
	1993	Cyan	Chry	Chlor	4	4	8
	1992	Chlor	Chry	Chlor	6	3	8
	1991	Cyan	Cyan	Chlor	3	3	5
<b>Libby Cr. L3</b>							
	1993	--	Chlor	Chlor	0	3	5
	1992	Chlor	Chlor	Chlor	5	5	7
	1991	Chry	Chlor	Chlor	1	3	7
<b>Libby Cr. L1</b>							
	1993	Chry	Chlor	Cyan	3	4	4
	1992	Cyan	Chlor	Chlor	2	5	2
	1991	Chlor	Cyan	Chlor	3	3	4

<sup>(a)</sup>Based on estimated biovolume contribution of each dominant taxon; see Methods and Appendix A. Chlor = Chlorophyta; Chry = Chrysophyta; Cyan = Cyanophyta

<sup>(b)</sup>Common or greater in estimated relative abundance.

importance of the green algae in Libby Creek is somewhat of a departure from Northern Rockies reference streams, where blue-green algae generally are dominant in the nutrient-poor waters (Bahls et al. 1992). This suggests the possibility of elevated instream levels of dissolved inorganic nitrogen above, as well as below, the Montanore Project adit.

## 2. diatom algae

The estimated abundance values of diatoms (all genera considered collectively) relative to non-diatom algal genera at the four Libby Creek stations in March, August, and October 1993 are listed in Appendix A. Diatoms as a group are also ranked with non-diatom genera according to the estimated contribution each made to the total periphyton biovolume in each sample (Appendix A). Diatoms were "dominant algae" (common or greater in estimated relative abundance) at all sites except L3 and L1 in March, and L10 in August (Table 3). They ranked 1st in estimated biovolume relative to dominant non-diatom algae in three samples, 2nd and 4th in two samples each, and 5th and 8th in one sample each (Appendix A).

A total of 104 species of diatom algae belonging to 23 genera were identified in periphyton samples from the four Libby Creek stations in the Montanore Project area in 1993 (Table 5). This compares to 107 species and 26 genera in 1992, and 66 species and 21 genera in 1991 (Weber 1993 and 1992). All diatom species present at Libby Creek stations in March, August and October 1993 are listed in Appendix B, along with proportional count results and percent relative abundance (PRA) values for each species.

The dominant diatom species at each station, with its corresponding PRA value, is listed

**Table 5.** Diatom species (Phylum Chrysophyta: Class Bacillariophyceae) identified in periphyton samples from Libby Creek stations in the Montanore Project area, 1993.

Order Centrales	<i>A. subatomoides</i>	<i>Neidium alpinum</i>
<u>Family Cosciniodiscaceae</u>	<i>Coccconeis placentula</i>	<i>Pinnularia divergens</i>
<i>Aulacoseira alpigena</i>		<i>P. microstauron</i>
<i>A. distans</i>		<i>P. subcapitata</i>
<i>A. pfaffiana</i>	<u>Family Naviculaceae</u>	<i>Stauroneis kriegerii</i>
<i>Melosira varians</i>	<i>Amphora dusenii</i>	
	<i>A. libyca</i>	
<b>Order Pennales</b>	<i>A. pediculus</i>	<u>Family Bacillariaceae</u>
<u>Family Fragilariaeae</u>	<i>Anomoeneis brachysira</i>	<i>Nitzschia acidoclinata</i>
<i>Diatoma anceps</i>	<i>A. vitrea</i>	<i>N. alpina</i>
<i>D. hyemalis</i>	<i>Caloneis bacillum</i>	<i>N. dissipata</i>
<i>D. mesodon</i>	<i>Cymbella affinis</i>	<i>N. flexoides</i>
<i>Fragilaria capucina</i>	<i>C. cesatii</i>	<i>N. fonticola</i>
<i>F. construens</i>	<i>C. cistula</i>	<i>N. inconspicua</i>
<i>F. exigua</i>	<i>C. cymbiformis</i>	<i>N. linearis</i>
<i>F. leptostauron</i>	<i>C. gracilis</i>	<i>N. palea</i>
<i>F. pinnata</i>	<i>C. microcephala</i>	<i>N. perminuta</i>
<i>F. ulna</i>	<i>C. minuta</i>	<i>N. pumila</i>
<i>Hannaea arcus</i>	<i>C. naviculiformis</i>	<i>N. pura</i>
<i>Meridion circulare</i>	<i>C. silesiaca</i>	
<i>Tabellaria flocculosa</i>	<i>C. sinuata</i>	<i>N. recta</i>
	<i>Didymosphenia geminata</i>	
<u>Family Eunotiaceae</u>	<i>Diploneis elliptica</i>	
<i>Eunotia bilunaris</i>	<i>Frustulia rhomboides</i>	
<i>E. glacialis</i>	<i>Gomphonema acuminatum</i>	
<i>E. meisteri</i>	<i>G. bipunctatum</i>	
<i>E. minor</i>	<i>G. bohemicum</i>	
<i>E. musicola</i>	<i>G. clavatum</i>	
<i>E. paludosa</i>	<i>G. dichotomum</i>	
<i>E. septentrionalis</i>	<i>G. micropus</i>	
<i>E. subarcuatoides</i>	<i>G. minutum</i>	
	<i>G. olivaceum</i>	
<u>Family Achnanthaceae</u>	<i>G. parvulum</i>	
<i>Achnanthes biasoletiana</i>	<i>G. pumilum</i>	
<i>A. bioretii</i>	<i>G. rhombicum</i>	
<i>A. chlidanos</i>	<i>Navicula angusta</i>	
<i>A. daonensis</i>	<i>N. contenta</i>	
<i>A. grischuna</i>	<i>N. cryptocephala</i>	
<i>A. helvetica</i>	<i>N. cryptotenella</i>	
<i>A. kranzii</i>	<i>N. difficillima</i>	
<i>A. kriegeri</i>	<i>N. gallica</i>	
<i>A. laevis</i>	<i>N. harderii</i>	
<i>A. lanceolata</i>	<i>N. minima</i>	
<i>A. marginulata</i>	<i>N. minuscula</i>	
<i>A. minutissima</i>	<i>N. nivalis</i>	
<i>A. nodosa</i>	<i>N. pupula</i>	
<i>A. pusilla</i>	<i>N. radiosa</i>	
<i>A. rupestris</i>	<i>N. subalpina</i>	
	<i>Navicula suchlandii</i>	
<i>Achnanthes stolidia</i>	<i>N. tenelloides</i>	

in Table 6 for each station and monitoring period in 1993. Data from 1992 and 1991 are also presented for comparison. *Achnanthes minutissima* was the dominant species at all Libby Creek stations over all three monitoring periods in 1993. The PRA values for this taxon at stations L10 and L9 were within the range established for the dominant taxon in the Northern Rockies Ecoregion reference streams, but exceeded the high end of the range by a sizeable margin at L3 in August, and L1 in March.

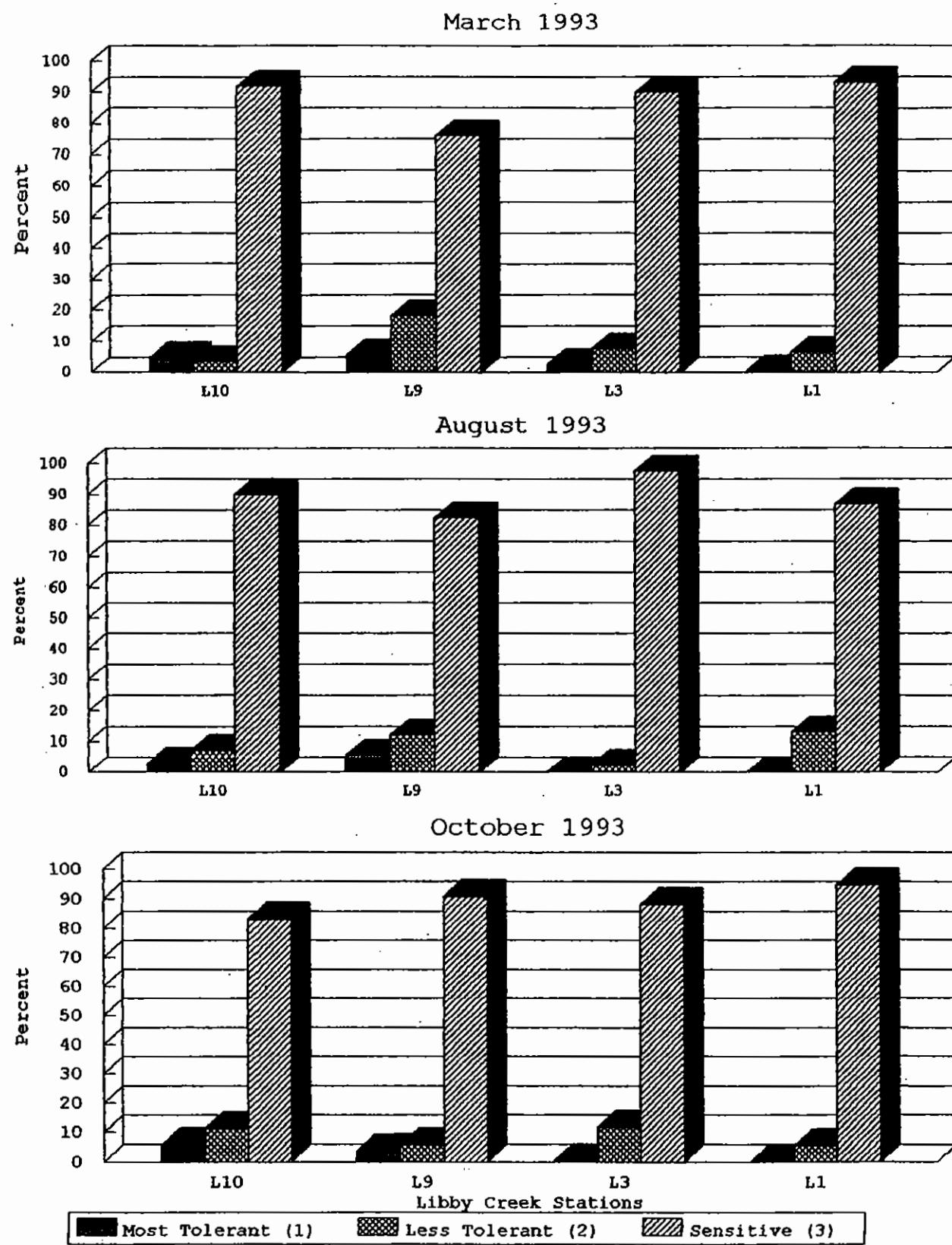
The total PRA of diatom species in each of the three pollution tolerance groups of Lange-Bertalot (1979) during March, August and October 1993 are presented in Figure 7. Pollution sensitive (group 3) taxa dominated at all four Libby Creek stations over the three monitoring periods, with only one station (L9 in March) having a PRA less than 80. Less tolerant (group 2) taxa never exceeded 20% at any site, while the most tolerant (group 1) taxa were well below 10% at all stations over the three monitoring periods.

Values for diatom community structure parameters (species richness, Shannon diversity index, pollution index and siltation index) for 1993 are tabulated in Appendix B, after the diatom species list for each sampling period. Diatom species richness, Shannon diversity index and pollution index values for each Libby Creek station over the three monitoring periods are presented graphically in Figure 8.

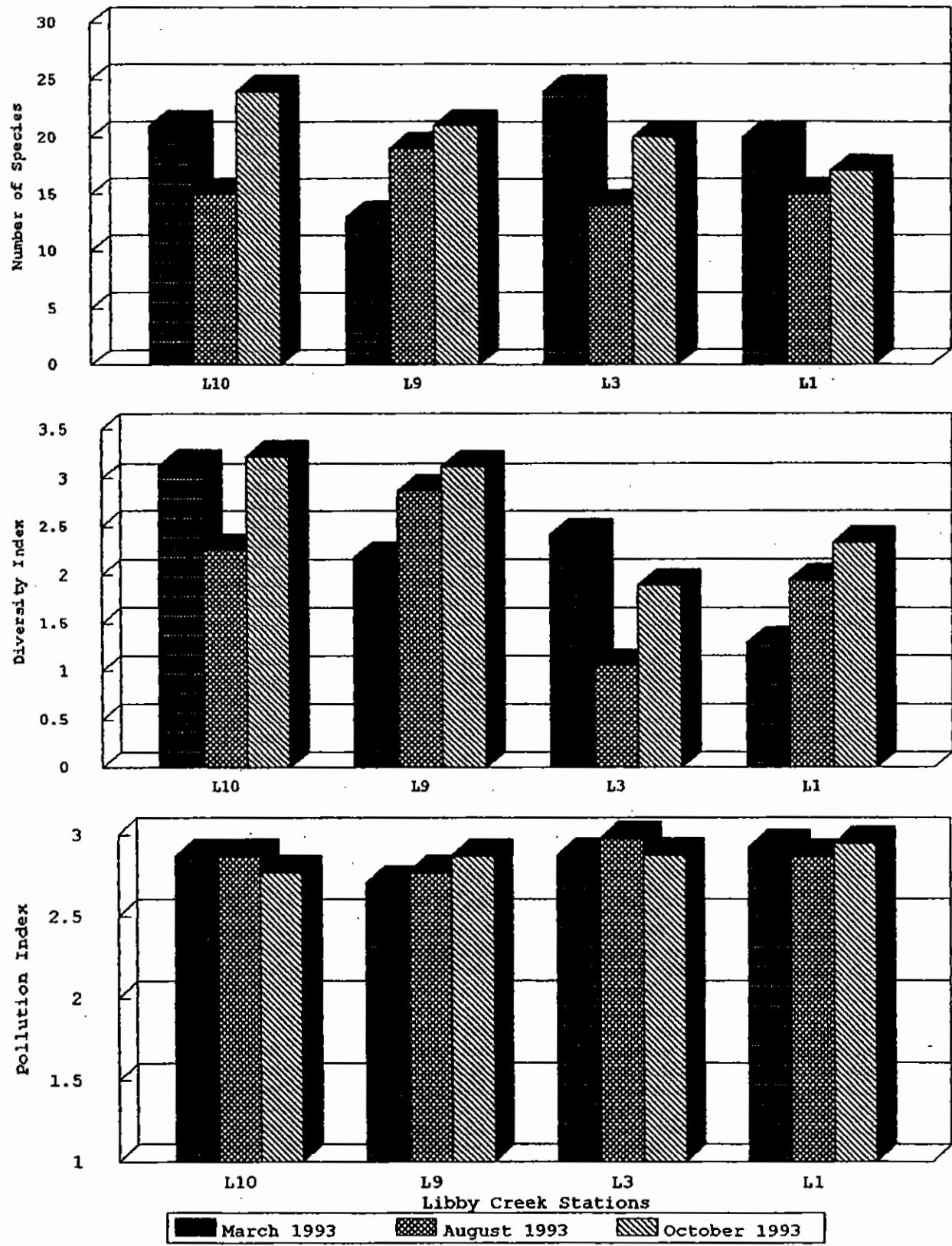
Species richness and Shannon diversity generally mirrored each other, although the stations with the lowest or highest species richness did not necessarily have the lowest or highest diversity (Figure 8). Diversity values at L10 and L9 tended to be higher than at the downstream stations, L3 and L1. Values at L10 and L9 during all three monitoring

Table 6. Dominant diatom taxon and corresponding percent relative abundance (PRA) value at Libby Creek stations in the Montanore Project area, for each sampling date 1991-93.

Station	Dominant Taxon	PRA	Dominant Taxon	PRA	Dominant Taxon	PRA
Date:	March 1993		August 1993		October 1993	
L10	<i>Achnanthes minutissima</i>	34.19	<i>Achnanthes minutissima</i>	60.56	<i>Achnanthes minutissima</i>	30.84
L9	<i>Achnanthes minutissima</i>	58.72	<i>Achnanthes minutissima</i>	36.12	<i>Achnanthes minutissima</i>	28.43
L3	<i>Achnanthes minutissima</i>	63.68	<i>Achnanthes minutissima</i>	85.47	<i>Achnanthes minutissima</i>	71.33
L1	<i>Achnanthes minutissima</i>	81.97	<i>Achnanthes minutissima</i>	63.61	<i>Achnanthes minutissima</i>	47.61
Date:	April 1992		August 1992		October 1992	
L10	<i>Achnanthes minutissima</i>	46.12	<i>Achnanthes minutissima</i>	40.63	<i>Achnanthes minutissima</i>	29.98
L9	<i>Diatoma mesodon</i>	51.49	<i>Achnanthes minutissima</i>	32.19	<i>Diatoma mesodon</i>	45.61
L3	<i>Achnanthes minutissima</i>	73.18	<i>Achnanthes minutissima</i>	77.37	<i>Achnanthes minutissima</i>	48.55
L1	<i>Achnanthes minutissima</i>	67.17	<i>Achnanthes minutissima</i>	51.95	<i>Achnanthes minutissima</i>	49.76
Date:	May 1991		August 1991		October 1991	
L10	—		<i>Diatoma mesodon</i>	40.48	<i>A. minutissima/D. mesodon</i>	16.67
L9	<i>Diatoma mesodon</i>	49.72	<i>Diatoma mesodon</i>	33.24	<i>Eunotia subarcuratoides</i>	35.87
L3	—		<i>Achnanthes minutissima</i>	81.45	<i>Achnanthes minutissima</i>	62.29
L1	<i>Achnanthes minutissima</i>	46.62	<i>Achnanthes minutissima</i>	79.49	<i>Achnanthes minutissima</i>	79.46



**Figure 7.** Total percent relative abundance of diatom taxa in three pollution tolerance groups at the four Libby Creek stations during March, August and October 1993.



**Figure 8.** Diatom species richness, Shannon diversity index and pollution index values for Libby Creek stations during March, August and October 1993.

periods in 1993 were within the range determined by Bahls et al. (1992) for least-impaired reference streams in the Northern Rockies Ecoregion. Two stations had Shannon diversity values well below 1.50: L3 in August with 1.06, and L1 in March with 1.30. Both of these very low diversity values resulted from the highest PRA values of *Achnanthes minutissima* seen in 1993. Additionally, the greatest change in Shannon diversity between "adjacent" stations occurred from L9 to L3 in August, with a drop of nearly two units. The same trend, while less pronounced, was observed between L9 and L3 in October. It is very likely that the biota at station L3 was under some stress, although a likely source is not clear.

Pollution index values were relatively high at all Libby Creek stations over the three sampling periods in 1993 (Figure 8). Values at L9 in March and August dropped slightly from those at L10, but remained well within the range for mountain reference streams. And farther downstream at L3 and L1, pollution index values were as high, or higher, than at L10 and L9. The high values at L3 and L1 are due, at least in part, to the high PRA of *Achnanthes minutissima*, a pollution sensitive (group 3) diatom. The actual sensitivity of this taxon to pollution in the form of dissolved nutrients is in question; it may be that the *A. minutissima* is somewhat of an opportunist with a broad ecological amplitude, that can readily fill gaps left when more sensitive species drop out (Bahls, personal communication). Nevertheless, the majority of taxa present at Libby Creek stations L10 and L9 in 1993 were pollution sensitive forms.

Bioassessment Protocol I was applied to diatom association indexes from the four Libby Creek stations in 1993 to determine biological integrity and overall impairment of aquatic

life. Additionally, pollution index values were calculated for 1992 and 1991 to allow the protocol to be applied to these data for comparison. Since Protocol I was developed with data collected during the summer months, it is valid only when applied to the August data from the three years. The criteria used to rate and score each of the indexes are presented in Table 7, as determined by Bahls (1993). The results for 1993, 1992, and 1991 are presented in Table 8.

In 1993, station L10 was rated as having good integrity with only minor impairment of aquatic life, while L9 had excellent biological integrity with no impairment. Farther downstream at station L3, biological integrity rated only fair, with moderate impairment of aquatic life indicated. At the lowermost site, station L1, integrity/impairment ratings improved to good/minor.

Biological integrity/impairment ratings for August of 1992 and 1991 were essentially the same for all stations as in 1993 (Table 8). Stations L10 and L9 rated excellent/none for both years, while L3 again rated only fair/moderate. Some downstream improvement was again indicated at station L1 in 1992 (good/minor), but not in 1991.

Protocol I bioassessment results again draw attention to Libby Creek station L3 as the site with the most serious problems. The reason for the poorer biological integrity ratings at this station for all three years was the relatively low Shannon diversity index value, which, as previously discussed, was due to the predominance of the diatom *Achnanthes minutissima*. Station L3 is apparently under stress related to upstream factors. Several major tributary streams enter Libby Creek between stations L9 and L3, and activities in

**Table 7.** Criteria for establishing impairment ratings and scores for diatom association indexes from mountain streams when a local reference or control site is not available (bioassessment Protocol I; Bahls 1993).

Score	Rating	Diversity Index	Pollution Index	Siltation Index
1	high stress .....	< 1.00		
	severe pollution .....		< 1.50	
	heavy siltation .....			> 60
2	moderate stress .....	1.00-1.75		
	moderate pollution .....		1.50-2.00	
	moderate siltation .....			40-60
3	minor stress .....	1.76-2.50		
	minor pollution .....		2.01-2.50	
	minor siltation .....			20-39
4	no stress .....	> 2.50		
	no pollution .....		> 2.50	
	no siltation .....			< 20

Lowest Score      Biological Integrity    Overall Impairment

1	poor	severe
2	fair	moderate
3	good	minor
4	excellent	none

**Table 8.** Biological integrity and impairment ratings for Libby Creek stations in the Montanore Project area during August 1991, 1992 and 1993, based on diatom association indexes using bioassessment Protocol I (Bahls 1993); see Table 6 for criteria.

Station	Sampling Period	Diversity Index (score)	Pollution Index (score)	Siltation Index (score)	Biological Integrity	Overall Impair.
<b>Libby Cr. L10</b>						
	August 1993	2.26 (3)	2.87 (4)	0.00 (4)	Good	Minor
	August 1992	2.73 (4)	2.74 (4)	0.00 (4)	Excellent	None
	August 1991	2.93 (4)	2.82 (4)	0.00 (4)	Excellent	None
<b>Libby Cr. L9</b>						
	August 1993	2.87 (4)	2.77 (4)	0.00 (4)	Excellent	None
	August 1992	3.27 (4)	2.73 (4)	0.00 (4)	Excellent	None
	August 1991	3.22 (4)	2.86 (4)	0.00 (4)	Excellent	None
<b>Libby Cr. L3</b>						
	August 1993	1.06 (2)	2.98 (4)	0.73 (4)	Fair	Mod.
	August 1992	1.57 (2)	2.91 (4)	0.73 (4)	Fair	Mod.
	August 1991	1.30 (2)	2.86 (4)	0.00 (4)	Fair	Mod.
<b>Libby Cr. L1</b>						
	August 1993	1.95 (3)	2.87 (4)	0.24 (4)	Good	Minor
	August 1992	2.49 (3)	2.74 (4)	0.00 (4)	Good	Minor
	August 1991	1.41 (2)	2.92 (4)	0.51 (4)	Fair	Mod.

those drainages may be impacting water quality. The Montanore Project could also be having an impact, although none is indicated by the excellent biological integrity rating at station L9.

Bioassessment Protocol II was applied to Libby Creek stations L10 and L9 for each of the three years. Station L10 served as the "upstream control" for station L9 which, because of its location downstream of the Montanore Project exploratory adit, was of primary interest as the "study site". Because Protocol II uses a local control for comparison, it is more sensitive than Protocol I, and can be applied year round. Protocol II requires that the control site be of the same stream order as the site(s) being assessed. Because Libby Creek at stations L3 and L1 is of higher stream order than its upper reach, L10 could not be used as a control.

The criteria used to establish ratings and scores for diatom association indexes under Protocol II are presented in Table 9. In addition to the three indexes used with Protocol I, a percent similarity index was calculated for the control and study sites (see Methods section). The system used to rate the Shannon diversity index provided two possible responses, which was explained in greater detail in the Methods section. Results for bioassessment Protocol II, applied to all three seasons of monitoring in 1993, 1992, and 1991, are presented in Table 10.

In March of 1993, Libby Creek station L9 had good biological integrity with minor impairment of aquatic life when compared to station L10. In August and October, biological integrity rated excellent, with no impairment indicated. The August result is the same as with Protocol I for station L9.

**Table 9.** Criteria for establishing impairment ratings and scores for diatom association indexes when a local reference or control site is available and used (bioassessment Protocol II; Bahls 1993).

Score Index <sup>(a)</sup>	Rating Index <sup>(a)</sup>	Diversity Index <sup>(b)</sup>	Pollution Index <sup>(c)</sup>	Siltation Index <sup>(c)</sup>	Similarity
1	high stress.....	<40% >160%			
	severe pollution.....	<50%			
	heavy siltation increase.....		<20%		
	very dissimilar communities.....				<20%
2	moderate stress.....	40-60% 140-160%			
	moderate pollution.....	50-70%			
	moderate siltation increase.....		20-40%		
	somewhat dissimilar communities.....				20-40%
3	minor stress.....	61-80% 120-139%			
	minor pollution.....	71-90%			
	small siltation increase.....		41-60%		
	somewhat similar communities.....				41-60%
4	no stress.....	>80% <120%			
	no pollution.....		>90%		
	no siltation increase.....			>60%	
	very similar communities.....				>60%

<sup>(a)</sup>Value is ratio of study site index to reference site index x 100.

<sup>(b)</sup>Value is ratio of reference site index to study site index x 100.

<sup>(c)</sup>Percent community similarity (Whittaker and Fairbanks 1958).

Lowest Score	Biological Integrity	Overall Impairment
1	poor	severe
2	fair	moderate
3	good	minor
4	excellent	none

Table 10. Application of diatom assessment Protocol II (Bahls 1993) to establish biological integrity and overall impairment of aquatic life at Libby Creek station L9 during monitoring years 1991, 1992 and 1993. (Libby Creek station L10 was used as the upstream control site for each monitoring event; see Table 8 for criteria.)

1993	March	August	October
Diversity Index Ratio (Score)	70% (3)	127% (4)	97% (4)
Pollution Index Ratio (Score)	94% (4)	96% (4)	104% (4)
Siltation Index Ratio (Score)	100% (4)	100% (4)	100% (4)
Similarity Index (Score)	58% (3)	68% (4)	67% (4)
Low Score Biological Integrity Overall Impairment	3 Good Minor	4 Excellent None	4 Excellent None

1992	April	August	October
Diversity Index Ratio (Score)	80% (3)	120% (4)	101% (4)
Pollution Index Ratio (Score)	102% (4)	100% (4)	102% (4)
Siltation Index Ratio (Score)	100% (4)	100% (4)	100% (4)
Similarity Index (Score)	34% (2)	71% (4)	67% (4)
Low Score Biological Integrity Overall Impairment	2 Fair Moderate	4 Excellent None	4 Excellent None

1991	May	August	October
Diversity Index Ratio (Score)	--	110% (4)	90% (4)
Pollution Index Ratio (Score)	--	101% (4)	107% (4)
Siltation Index Ratio (Score)	--	100% (4)	0% (1)*
Similarity Index (Score)	--	78% (4)	51% (3)
Low Score Biological Integrity Overall Impairment	-- NA NA	4 Excellent None	1 Poor Severe

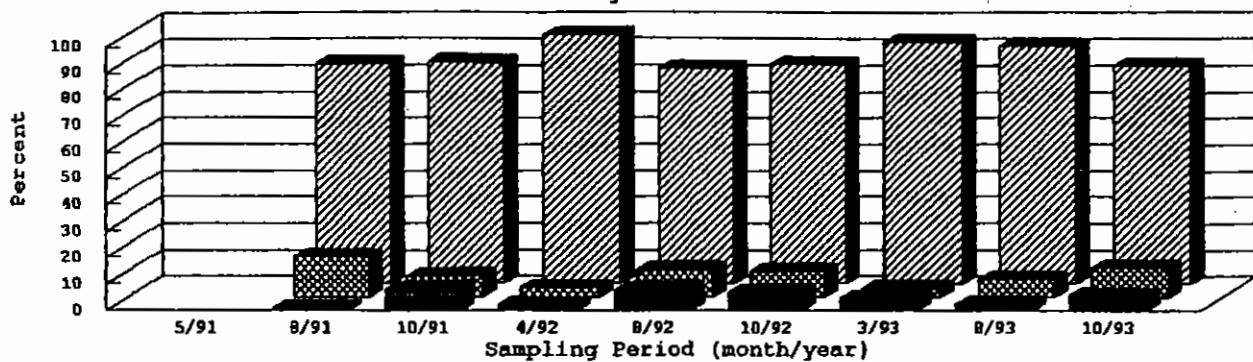
\*Siltation Index was 0.25 at L9, 0.00 at L10, hence the 0%. See Discussion section.

In 1992, the springtime biological integrity rating was only fair, with moderate impairment at L9 compared to L10. However, the August and October ratings were for excellent integrity, with no impairment of aquatic life.

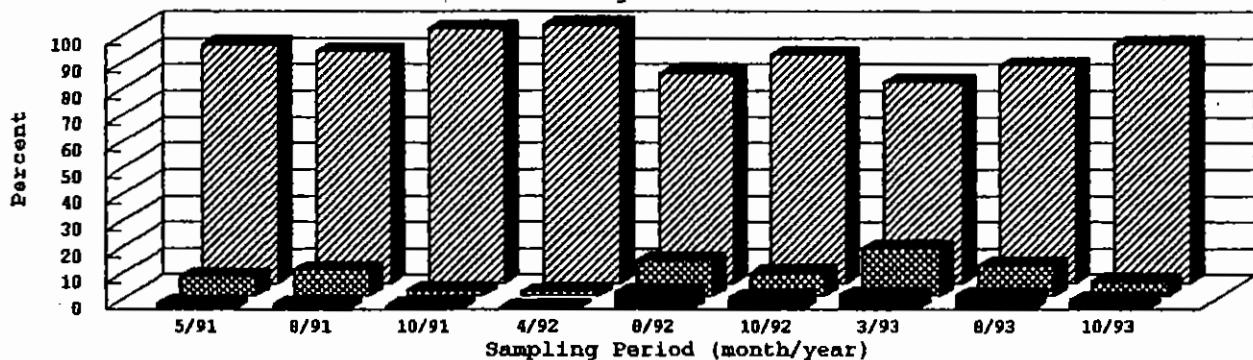
The May 1991 assessment could not be made due to the lack of index data for L10. Station L9 in August of 1991 once again rated as excellent in biological integrity, with no impairment indicated when compared to station L10. In October, the ratings for biological integrity/impairment plunged to poor/severe as the result of a siltation index ratio of 0%, which returned a score of 1 (see Table 9). Protocol II considered the increase in siltation index at station L9 (0.25) over that at L10 (0.00) to be indicative of a "heavy siltation increase". However, in reality the 0.25 represents a relative abundance value for silt-tolerant diatom genera of 1/4 of one percent, while the remaining 99.75% of the diatoms present were silt-intolerant. It appears that the siltation index ratio may suffer from a mathematical quirk when the control site siltation index value equals 0. The mean siltation index value for mountain reference streams in Montana was 14.5 (Bahls 1993). It seems reasonable to assume that the integrity/impairment ratings at L9 in October 1991 were at least good/minor.

For comparison, the total percent relative abundance of diatoms in each of the three pollution tolerance groups at each of the Libby Creek stations for all nine sampling periods, to date, are plotted in Figure 9. Figure 10 displays species richness, Shannon diversity index and pollution index values at the four Libby Creek stations during each of the nine sampling periods. Significant trends are not easily discerned from these figures. A slight increase in less tolerant (group 2) and more tolerant (group 3) diatoms at Libby Creek L9

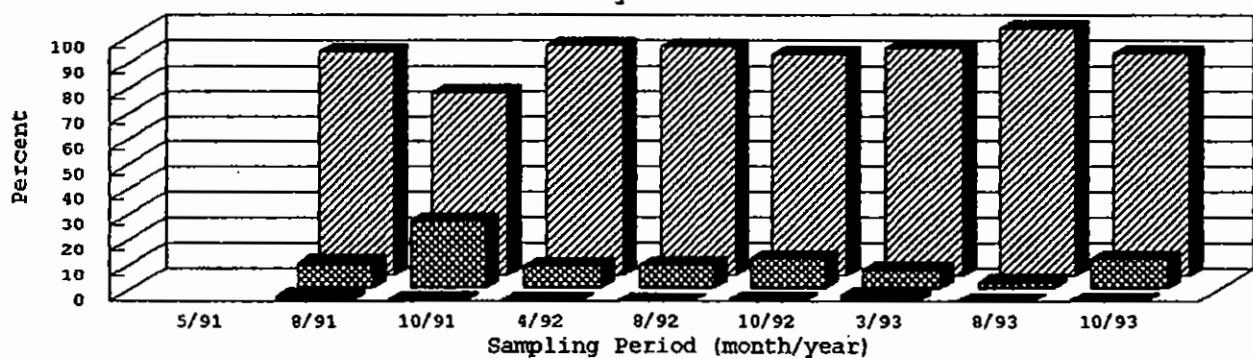
### Libby Creek - L10



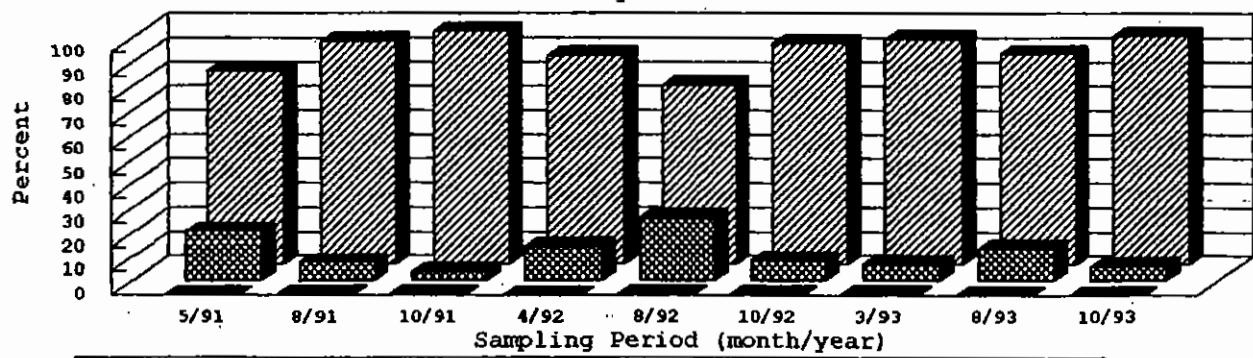
### Libby Creek - L9



### Libby Creek - L3



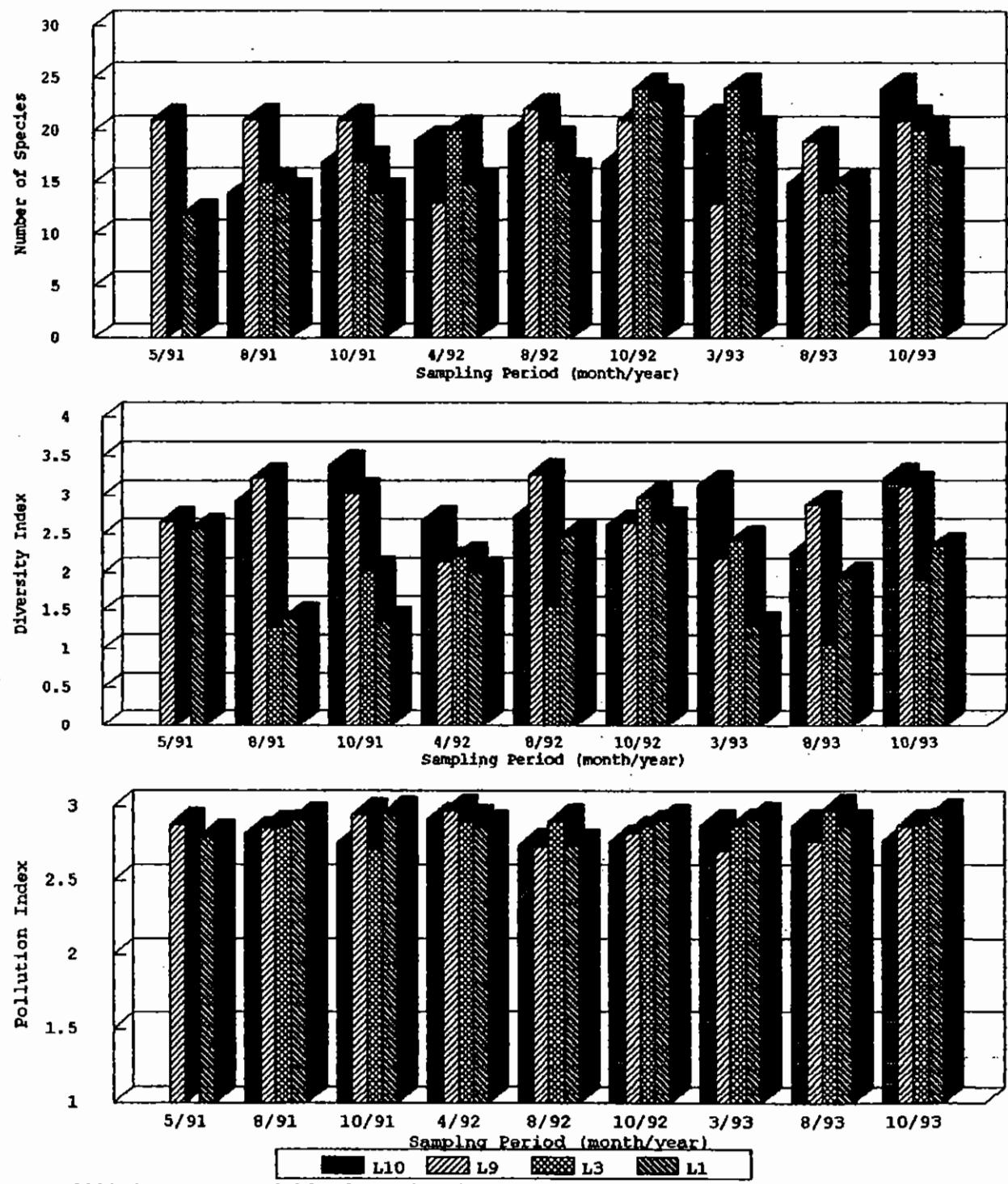
### Libby Creek - L1



■ Most Tolerant    ■ Less Tolerant    ■ Sensitive

May 1991 data not available for L10 and L3.

**Figure 9.** Total percent relative abundance of diatom taxa in three pollution tolerance groups at the four Libby Creek stations for each sampling period, May 1991 to October 1993.



**Figure 10.** Diatom species richness, Shannon diversity index and pollution index values at the four Libby Creek stations during each sampling period, May 1991 to October 1993.

may have occurred since August 1992. However, this trend is not readily apparent in the pollution index values over the same period of time (Figure 10). Diversity index appears to have been somewhat higher during the autumn of each year. It also appears to have generally decreased from upstream to downstream during most of the sampling periods, except August of all three years, when diversity at L9 exceeded that at L10.

#### D. Conclusions

1. There were only minor differences between non-diatom and diatom algae associations at Libby Creek stations L10 and L9 in 1993, based on community structure and composition metrics. Only the number of dominant non-diatom genera, which was higher at L9 than L10 over the three sampling periods, suggests the possibility of nutrient enrichment at L9.
2. Results of two bioassessment protocols developed by the Montana Water Quality Bureau utilizing diatom association metrics indicated that biological integrity was highest at Libby Creek stations L10 and L9, and decreased at downstream stations L3 and L1. Control station L10 had excellent biological integrity with no impairment of aquatic life on two of the three sampling dates in 1993, while station L9 was rated excellent with no impairment on all three dates.
3. Biological integrity was poorest, and impairment of aquatic life most severe, at Libby Creek station L3, with some improvement indicated at station L1. Possible explanations for the decline at L3 include impacts on water quality related to tributaries or activities in the Libby Creek drainage proper. The latter was not supported by conditions at station

L9, below the Montanore Project adit.

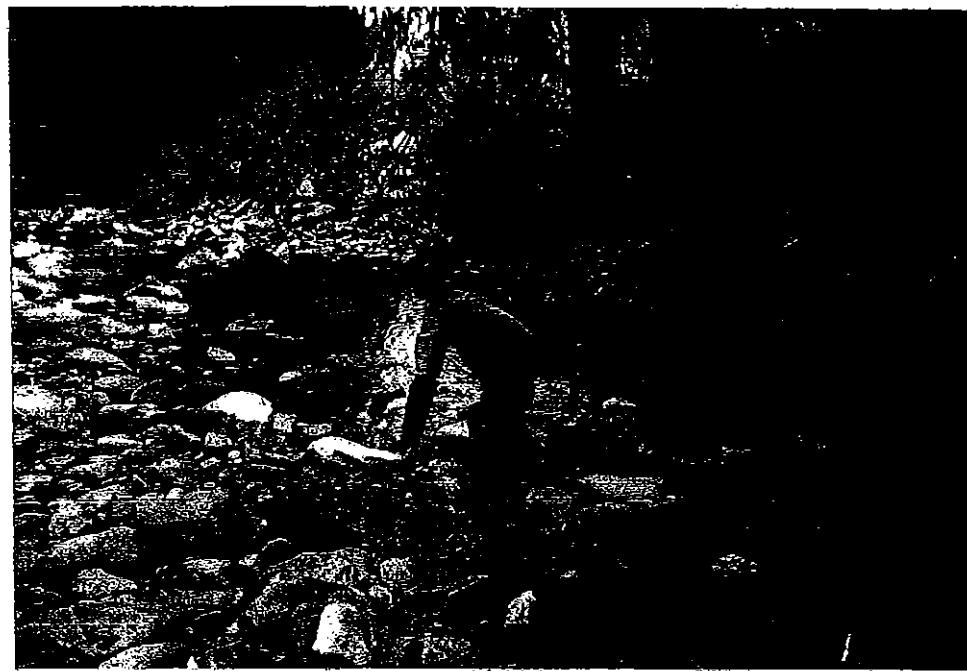
4. Reassessment of data from 1991 and 1992, using the same protocols applied to 1993 data, revealed that biological integrity and impairment of aquatic life was virtually unchanged at the four Libby Creek stations from 1991 to 1993. Excellent biological integrity with no impairment was indicated at station L9 in 1991 and 1992, using station L10 as a control.

#### IV. MACROINVERTEBRATES

##### A. Sampling

The four Libby Creek stations, L10(LB200), L9(LB300), L3(LB1000), and L1(LB3000), were again sampled for macroinvertebrates in 1993. Methods for collection and analysis used in previous years were duplicated in 1993. Macroinvertebrate sampling again consisted of four Hess and one kick net samples. Samples were collected from the riffle/run areas with an effort towards sampling as similar a depth, velocity and substrate as possible at each station. The same Hess net, modified with a Dolphin plankton bucket attached to the end of the net, was used (Figure 11). Mesh of the Hess net was 500 microns while the Dolphin collection bucket used a 147 micron mesh screen.

The Hess net was placed in a riffle area with a substrate of gravel to small/medium cobbles (0.6-6.0 inches in diameter). All removable rocks were scrubbed free of organisms and deposited outside the net frame. The remaining substrate was then stirred to a depth possible with the hands and a heavy screwdriver to capture organisms living in the upper hyporheic zone. The collector then stood and dipped the net in the stream



**Figure 11.** Hess net sampling for macroinvertebrates in the Montanore Project area, Little Cherry Creek (1992) and Libby Creek, L3 (1993).

and raised it quickly to flush macroinvertebrates into the Dolphin bucket. This washing technique was repeated until no visible organisms remained in the main Hess net. The Dolphin bucket was then unscrewed and emptied into a collection jar.

Because benthic communities in the project area tend to be sparse, a fifth sample was again collected using a 500 micron mesh bottom kick net. The net was held in place downstream of a gravel/cobble/small boulder area by one biologist while a second biologist overturned and rubbed the substrate to dislodge organisms for 20 seconds. The process was then repeated twice more at two other spots for a total of 60 seconds of collecting time. Attention was given to sampling consistency so the kick samples could be treated quantitatively relative to each other. All five samples were preserved with 10% formalin and transported to the Westech lab for processing.

During each collecting period, a physical habitat assessment was conducted. Notes on air and water temperature, substrate composition, streambank vegetation, stream width and depth, sediment embeddedness, and any other noteworthy characteristics were made. In addition, photographs and video film documented each site during the collection period.

#### B. Identification and Analysis

In the lab, macroinvertebrate samples were stained with rose bengal to facilitate the sorting process. The organisms acquired a bright pink color from the dye, making them much more readily visible within the sample debris. The samples were poured into a white nalgene pan and all organisms, visible first to the naked eye and then to an illuminated magnifying (.75x) lens, were separated from the debris and stored in 70% ethanol. The

organisms were then placed in a watch glass, examined under a Bausch and Lomb StereoZoom 7 microscope, identified, and counted. The entire sample was counted to eliminate subsampling which can overlook taxa and potentially add a source of undesirable data variation.

Specimens were identified to the lowest practical taxon possible depending on the stage of development and physical condition of the organisms. A number of keys, listed in the References section, were used in the identification process. Representative specimens were sent to taxonomic experts for verification. A reference collection is housed in the Westech lab.

Raw counts of macroinvertebrate taxa found in each sample were used in a Lotus program for several statistical calculations. Those metrics are presented in the Appendices and/or tables of this report and discussed in the following sections.

### C. Results and Discussion

#### 1. population composition and density

Table 11 presents the 96 taxa collected in 1993. Total numbers of organisms for each station during each sampling period appear in Appendices C-G.

A total of 39,264 organisms were collected with the 48 Hess and 12 kick samples. The Hess samples accounted for 49% (19,119 organisms) of the total for a mean of 398 specimens/sample. The kick samples contributed 51% (19,929 organisms) of the catch for a mean of 1661 organisms/sample.

Table 11. Aquatic macroinvertebrates collected from the Libby Creek stations in the Montanore Project area in 1993.

ORDER	FAMILY	GENUS/SPECIES
EPHEMEROPTERA	Baetidae	<i>Baetis</i> sp. <i>Diphetor</i> sp. <i>Caudatella</i> sp. <i>Caudatella hystrix</i>
	Ephemerellidae	<i>Drunella coloradensis/flavilinea</i> <i>Drunella doddsi</i> <i>Drunella grandis</i> <i>Drunella spinifera</i> <i>Drunella</i> sp. <i>Ephemerella</i> sp. <i>Serratella</i> sp.
	Hepatgeniidae	Immature <i>Cinygmulia</i> sp. <i>Epeorus</i> sp. <i>Rhithrogena</i> sp.
	Leptophlebiidae	<i>Paraleptophlebia</i> sp.
	Siphlonuridae	<i>Ameletus</i> sp.
	Capniidae	Immature
	Chloroperlidae	<i>Sweltsa/Suwalla</i> sp.
	Leuctridae	<i>Despaxia augusta</i>
	Capniidae/Leuctridae	Immature
	Nemouridae	<i>Amphinemura</i> sp. <i>Visoka cataractae</i> <i>Zapada cinctipes</i> <i>Zapada columbiana</i>
PLECOPTERA	Peltoperlidae	<i>Yoraperla brevis</i>
	Perlidae	<i>Doroneuria theodora</i> <i>Hesperoperla pacifica</i>
	Periodidae	Immature <i>Kogotus modestus</i> <i>Megarcys</i> sp. <i>Setvena bradleyi</i> <i>Skwala</i> sp.
	Taeniopterygidae	<i>Doddsia occidentalis</i> <i>Taenionema</i> sp.
	Brachycentridae	<i>Brachycentrus</i> sp.
	Glossosomatidae	<i>Micrasema</i> sp. <i>Glossosoma</i> sp.
TRICHOPTERA		

Table 11. (Continued).

ORDER	FAMILY	GENUS/SPECIES
	Hydropsychidae	<i>Arctopsyche grandis</i> <i>Hydropsyche</i> sp. <i>Parapsyche elsis</i> Immature
	Hydroptilidae	<i>Agraylea</i> sp.
	Lepidostomatidae	<i>Lepidostoma</i> sp.
	Limnephilidae	<i>Chyndra centralis</i> <i>Cryptochia</i> sp. <i>Ecclisomyia</i> sp. <i>Neophylax</i> sp. <i>Neothremma alicia</i> <i>Oligophlebodes</i> sp. <i>Psychoglypha</i> sp. Immature
	Philopotamidae	<i>Dolophilodes</i> sp.
	Rhyacophilidae	<i>Rhyacophila acropedes</i> <i>Rhyacophila Angelita</i> grp. <i>Rhyacophila Betteni</i> grp. <i>Rhyacophila Brunnea</i> grp. <i>Rhyacophila hyalinata</i> <i>Rhyacophila iranda</i> <i>Rhyacophila Sibirica</i> grp. <i>Rhyacophila tucula</i> <i>Rhyacophila vaccua</i> <i>Rhyacophila vepulsa</i> <i>Rhyacophila Verrula</i> grp. <i>Rhyacophila</i> sp.
	Pupae	
DIPTERA	Ceratopogonidae	
	Chironomidae	
	Empididae	<i>Chelifera</i> sp. <i>Oreogeton</i> sp.
	Pelecorhynchidae	<i>Glutops rossi</i>
	Psychodidae	
	Simuliidae	
	Tipulidae	<i>Antocha</i> sp. <i>Dicranota</i> sp. <i>Hexatoma</i> sp. <i>Tipula</i> sp. <i>Limnophilia</i> sp. Immature
COLEOPTERA	Curculionidae	
	Elmidae	<i>Heterlimnius</i> sp. <i>Lara</i> sp. <i>Narpus</i> sp. <i>Optioservus</i> sp.

Table 11. (Continued).

ORDER	FAMILY	GENUS/SPECIES
MISCELLANEOUS		<i>Zaitzevia</i> sp. Immature
	Annelida (Oligochaeta) Hydracarina Nematoda Ostracoda Turbellaria	

Mayflies (Ephemeroptera) were again the predominant group overall and accounted for 46.9% of the total organisms collected. *Cinygmulia* sp. (15.4%) and *Baetis* sp. (10.0%) were the most abundant mayflies. Stoneflies (Plecoptera) made up 20.2% of the total with *Taenionema* sp. being the most abundant taxa annually (6.3%). Caddisflies (Trichoptera) accounted for 12.2% of the total with *Neophylax* sp. being the greatest contributor (3.1%). The remaining miscellaneous taxa made up 20.8% of the total with Chironomidae (17.9%) being the most abundant taxa.

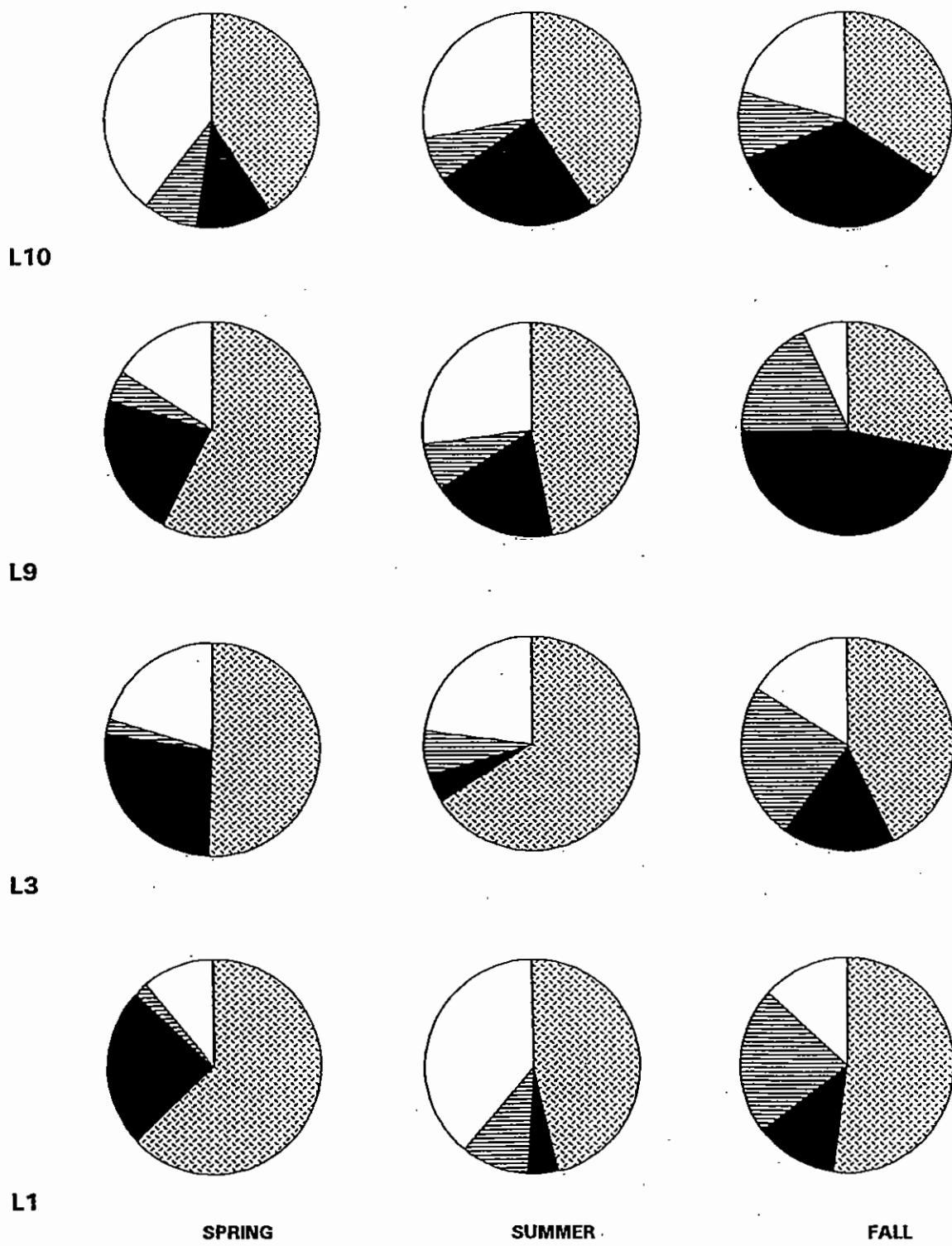
Table 12, Figure 12 and the Appendices show the seasonal occurrence of the major groups of macroinvertebrates. The highest total density of macroinvertebrates per station occurred in October. However, the L10 station yielded slightly more organisms in the spring Hess samples than in the summer ones and more organisms were collected with the kick sample at L3 in the summer than with the fall kick sample.

Mayflies were the dominant group at each station during all three collection periods, regardless of sampling method, except at L10 in the spring when the Hess samples collected more Other taxa, in particular, Chironomidae, and at L9 in the fall when both the kick and Hess sample sets collected more stoneflies. As in 1991 and 1992, the single most abundant taxa at L9 in October was the stonefly *Taenionema* sp. Although stoneflies were also present in nearly equal abundance with mayflies at L10 in the fall, the stonefly portion of the population was dominated by a predator, *Sweltsa/Suwalla* sp. and a shredder, *Zapada columbiana*, rather than the scraper, *Taenionema* sp.

The seasonal relative abundance of the most common benthic organisms collected in 1993

Table 12. Seasonal composition of macroinvertebrates from Libby Creek in the Montanore Project area, 1993.

Station	Total Organisms	Ephemeroptera	Plecoptera	Trichoptera	Other
<b>24 MARCH</b>					
L10	362(1108)	63.5(33.0)	18.2(9.8)	4.1(9.3)	14.1(47.9)
L9	933(746)	59.7(54.8)	25.0(18.0)	2.9(6.7)	12.4(20.5)
L3	1244(1223)	52.3(48.4)	30.1(24.1)	2.6(1.9)	15.0(25.6)
L1	980(804)	61.0(65.4)	26.5(21.3)	1.8(2.2)	10.6(11.1)
Totals = 3,519(3,881) = 7,400					
<b>2 AUGUST</b>					
L10	1945(986)	39.0(43.0)	23.7(28.3)	6.6(6.6)	30.6(22.1)
L9	1077(861)	47.4(46.1)	16.9(22.2)	4.9(9.5)	30.8(22.2)
L3	2261(2522)	62.6(68.9)	5.3(4.0)	8.5(5.2)	23.7(21.9)
L1	2131(2115)	48.2(45.0)	2.8(6.6)	7.9(12.3)	41.1(36.1)
Totals = 7,414(6,484) = 13,898					
<b>20 OCTOBER</b>					
L10	2621(1269)	30.6(40.5)	35.9(35.0)	9.7(10.4)	23.9(14.1)
L9	1886(2077)	27.1(29.9)	47.7(45.5)	17.3(18.8)	7.9(5.9)
L3	1910(2865)	46.6(40.4)	15.0(19.2)	29.8(19.5)	8.6(20.8)
L1	2795(2543)	50.7(53.4)	12.2(13.2)	20.4(23.8)	16.7(9.5)
Total = 9,212(8,754) = 17,966					
ANNUAL TOTALS = 19,929(19,119) = 39,264					



*Figure 12. Percent relative abundance of benthos (Hess and kicks combined) from Libby Creek in the Montanore Project area, 1993.*

[▨▨▨] = Ephemeroptera, [■■■] = Plecoptera, [▨▨▨▨] = Trichoptera,  
 [     ] = Other

are compared in Table 13. The dipteran Chironomidae was the most abundant and one of the most common organisms for the year and predominated the summer samples. The mayfly *Cinygmulia* sp. appeared in 39 samples and dominated the spring and fall collections. Though found in every sample, with dominance of some sample sets, the mayfly *Baetis* sp. never dominated a season.

The relative abundance of the major groups and numbers of taxa as well as ratios of certain groups or taxa are compared in Table 14. The presence of a large proportion of EPT taxa compared to the number of Chironomids is generally indicative of "healthy" waters while an abundance of Chironomids is usually characteristic of some degree of impairment. Also, baetid mayflies are considered to be more pollution tolerant than other mayflies and the ratio of baetids to the total number of Ephemeroptera can help characterize water quality (Plafkin et al., 1989, Wisseman, 1991, Bahls et al., 1992).

In Table 14, EPT Total is the number of Ephemeroptera, Plecoptera, and Trichoptera in the sample set. EPT% is the total percent of each of those groups in the sample set. EPT Taxa is the number of taxa in the sample set for each of those three groups. Baet/Ephem is the ratio of the number of Baetidae compared to the total number of Ephemeroptera in the sample set. Chir% refers to the percentage of chironomids in the sample set. EPT/Chir is the ratio of the number of EPT compared to the number of chironomids in the sample set.

The lowest EPT% of the 24 sample sets was 52.1% for the L10 Hess sample set in the spring. The majority of the sample sets had an EPT% of 70% or greater. In general, the

**Table 13. Relative abundance of the most common macroinvertebrates in the Libby Creek samples from the Montanore Project area, 1993.**

Taxa/Season	Group	No.	%of Total	Samples*
<b>SPRING</b>				
<i>Cinygmulia</i> sp.	E	2,125	28.7	20
Chironomidae	D	1,434	19.4	20
<i>Drunella</i> sp.	E	484	6.5	20
<i>Sweltsa/Suwallia</i> sp.	P	467	6.3	20
<i>Taenionema</i> sp.	P	416	5.6	15
<i>Baetis</i> sp.	E	212	2.9	20
<b>SUMMER</b>				
Chironomidae	D	3,603	25.9	20
<i>Baetis</i> sp.	E	2,175	15.6	20
<i>Epeorus</i> sp.	E	2,038	14.7	20
<i>Drunella doddsi</i>	E	973	7.0	20
<i>Rhithrogena</i> sp.	E	893	6.4	20
<i>Cinygmulia</i> sp.	E	433	3.1	19
<b>AUTUMN</b>				
<i>Cinygmulia</i> sp.	E	3,475	19.3	20
<i>Taenionema</i> sp.	P	2,032	11.3	20
Chironomidae	D	2,008	11.2	20
<i>Baetis</i> sp.	E	1,557	8.7	20
<i>Rhithrogena</i> sp.	E	1,214	6.8	20
<i>Neophylax</i> sp.	T	892	5.0	11
E = Ephemeroptera, P = Plecoptera, T = Trichoptera, D = Diptera				
*number out of 20 (spring), 20 (summer), and 20 (autumn) samples (kick and Hess)				

**Table 14. Relative composition of Libby Creek benthic sample sets from the Montanore Project area, 1993.**

STATION	EPT Total	EPT%	EPT Taxa	Baet/Ephem	Chir%	EPT/Chir
<b>SPRING</b>						
L10-k	311	85.91	24	0.22	11.6	7.40
L10-H	577	52.08	27	0.13	46.4	1.12
L9-k	817	87.57	28	0.07	10.7	8.17
L9-H	593	79.49	29	0.03	17.4	4.56
L3-k	1057	84.97	25	0.03	14.5	5.87
L3-H	910	74.41	28	0.03	25.3	2.94
L1-k	876	89.39	23	0.03	9.4	9.52
L1-H	715	88.93	21	0.02	8.3	10.67
<b>SUMMER</b>						
L10-k	768	77.89	29	0.16	17.0	4.57
L10-H	1349	69.36	29	0.30	27.5	2.53
L9-k	745	69.17	29	0.35	27.7	2.50
L9-H	670	77.82	26	0.24	17.7	4.41
L3-k	1725	76.29	32	0.55	20.2	3.78
L3-H	1969	78.07	30	0.25	18.8	4.15
L1-k	1255	58.89	30	0.29	38.3	1.54
L1-H	1362	63.92	31	0.12	33.2	1.92
<b>AUTUMN</b>						
L10-k	1996	76.15	36	0.36	21.2	3.60
L10-H	1090	85.89	27	0.12	11.2	7.68
L9-k	1737	92.10	30	0.23	5.6	16.54
L9-H	1955	94.13	31	0.11	2.8	33.14
L3-k	1745	91.36	30	0.34	5.8	15.86
L3-H	2266	79.09	38	0.27	17.7	4.46
L1-k	2329	83.33	38	0.12	14.1	5.91
L1-H	2301	90.48	40	0.17	5.3	17.04

k = 1 kick sample, H = 4 Hess samples combined

highest numbers of taxa were found in the autumn sample sets with the L1 Hess sample set collecting 40 taxa that were 90.5% EPT. The lowest number of EPT taxa (21) occurred also in the L1 Hess sample set but in the spring. Usually, as the EPT% increased the Chir% decreased. Only in the L10-H sample set from the spring period were the two groups almost equal.

The Baet/Ephem ratio ranged from 0.02 in the L1-H sample set from spring to 0.55 in the L3-k sample set collected during the summer. Usually, the kick samples had a higher Baet/Ephem ratio than did the Hess sample sets. Highest ratios were usually achieved in the summer sample sets.

The EPT/Chir ratio ranged from 1.12 in the spring L10-H sample set to 33.14 in the autumn L9-H sample set. The highest ratios were observed in the autumn L9-k, L9-H, L3-k, and L1-H sample sets.

## 2. functional feeding groups

Functional feeding group designations are based on the morphological structures and behaviors responsible for food acquisition (Merritt et al., 1978 and Cummins, 1988). Benthic taxa can be labeled as one of six possible trophic designations (Merritt et al., 1978 and Wisseman, 1991): shredders which are large particle detritivores, scrapers which feed on deposited detritus, filtering collectors which feed on particles in suspension, gathering collectors which feed on deposited detritus, predators which feed on other invertebrates, and omnivores which feed on a variety of materials. Organisms which do not fit one of these designations are grouped as an "unknown" feeder.

The relative abundance of some of the functional feeding groups can be useful in characterizing a stream's condition within the limits of these metrics (Cummins, 1988). A diverse and abundant scraper community is usually indicative of good water quality. Shredders and their microbial food base are sensitive to toxicants and modifications of the riparian zone (Plafkin et al., 1989) so abundance usually increases with increasing water quality. An increase in collector/filterers, such as Simuliidae, may be indicative of organic enrichment (Rosenberg et al., 1993), although some c/f, such as the caddisfly *Parapsyche elsis*, are highly sensitive to pollution. Collector/gatherers ingest organically enriched fine sediment. An increase in abundance of c/g taxa is [usually] indicative of a negative trend in habitat/water quality (Wisseman, 1991). However, once again there are some fairly pollution intolerant c/g such as the Dipteran Psychodidae.

Table 15 (see also Appendices) separates the macroinvertebrates collected from Libby Creek in 1993 according to percentage of functional feeding group.

Spring samples were mostly dominated by scrapers, in particular, *Cinygmulidae* sp. However, the L10 sample sets and the L9 Hess sample sets were mostly the collector/gatherers Chironomidae although the L9 samples also had an equal number of *Drunella* sp.

All summer sample sets were dominated by collector/gatherers, in particular the mayfly *Baetis* sp. and the Dipteran Chironomidae. By autumn, dominance had shifted to scrapers in most sample sets, and were represented by the mayfly *Cinygmulidae* sp. and the stonefly *Taenionema* sp. But, the L10 kick sample and the L3 Hess sample set were still

**Table 15. Relative percent abundance of functional feeding groups of macroinvertebrates from Libby Creek in the Montanore Project area, 1993.**

STATION	SC	SH	CG	CF	OM	P	UNK
<b>SPRING</b>							
L10-k	35.1	9.4	42.3	2.5	0.0	9.7	1.1
L10-H	25.0	6.6	61.0	1.1	0.0	4.6	1.7
L9-k	45.7	13.0	33.1	0.9	0.3	6.3	0.8
L9-H	37.9	8.3	42.0	0.5	0.1	10.7	0.4
L3-k	47.4	14.3	27.8	0.6	0.0	9.2	0.7
L3-H	39.7	11.9	37.4	0.2	0.0	10.1	0.8
L1-k	66.7	5.3	28.5	1.2	0.1	8.0	0.2
L1-H	49.5	9.5	29.9	1.1	0.1	9.0	1.0
<b>Totals</b>	<b>42.5</b>	<b>10.0</b>	<b>37.5</b>	<b>0.9</b>	<b>0.08</b>	<b>8.3</b>	<b>0.8</b>
<b>SUMMER</b>							
L10-k	15.4	15.2	53.0	0.8	0.0	15.6	0.0
L10-H	21.3	12.7	43.5	0.8	0.2	21.3	0.2
L9-k	18.6	9.7	60.1	1.7	0.0	9.8	0.2
L9-H	20.0	6.0	52.6	0.2	0.1	20.8	0.2
L3-k	20.9	3.5	67.9	2.8	0.04	4.4	0.4
L3-H	26.4	1.1	64.8	3.0	0.0	4.2	0.5
L1-k	19.7	0.6	71.1	2.2	0.05	4.3	2.2
L1-H	28.1	1.2	61.4	0.8	0.5	7.2	0.9
<b>Totals</b>	<b>21.8</b>	<b>6.2</b>	<b>61.5</b>	<b>1.8</b>	<b>0.1</b>	<b>9.0</b>	<b>0.7</b>
<b>AUTUMN</b>							
L10-k	17.8	21.4	43.2	2.1	0.0	15.1	0.4
L10-H	37.1	8.6	31.2	2.4	0.0	20.7	0.08
L9-k	60.5	9.7	18.9	4.8	0.0	5.4	0.7
L9-H	62.1	7.0	15.7	2.2	0.05	12.7	0.3
L3-k	66.5	2.6	31.8	2.4	0.1	5.6	0.9
L3-H	30.9	8.2	46.9	4.4	0.2	7.9	1.4
L1-k	37.0	8.8	34.7	14.1	0.3	4.3	0.8
L1-H	37.4	9.2	36.2	10.9	0.8	5.2	0.3
<b>Totals</b>	<b>40.8</b>	<b>9.8</b>	<b>33.7</b>	<b>5.9</b>	<b>0.2</b>	<b>9.1</b>	<b>0.6</b>
<b>ANNUAL TOT.</b>	<b>34.4</b>	<b>8.2</b>	<b>44.2</b>	<b>3.5</b>	<b>0.2</b>	<b>8.9</b>	<b>0.7</b>

predominately the collector/gatherer, Chironomidae.

Scrapers accounted for 34.4% of the total annual collection and made up 42.5%, 21.8%, and 40.8% of the spring, summer and fall collections, respectively. The most abundant scrapers during each of the three sampling periods were *Cinygmulidae* sp. (spring=29%), *Epeorus* sp. (summer=15%), and *Cinygmulidae* sp. (autumn=19%).

Shredders only accounted for 8.2% of the total annual collection and made up 10.0%, 5.2%, and 8.2% of the three collecting periods. The most abundant shredders were the Nemouridae stoneflies (spring=8%, summer=3%, autumn=6%).

Collectors/gatherers were the dominant group annually (44.2%) and accounted for 37.5%, 61.5%, and 33.7% of the three collecting periods. The most frequently collected c/g was Chironomidae (spring=19%, summer=26%, autumn=11%) although the mayfly *Baetis* sp. was relatively dominant in the summer (16%) and fall (9%).

Collector/filterers accounted for a relatively small portion of the annual collection (3.5%) and appeared only 0.9% of the time in spring samples, 1.8% of the time in the summer samples and 5.9% of the time in the autumn samples. The most abundant collector/filterers were the Hydropsychid caddisflies which made up almost 6% of the fall samples.

Omnivores (0.2% annually) and the unknown group (0.7% annually) were insignificant portions of the collections. Predators occurred 8.3% (spring), 9.0% (summer), and 9.1%

(fall) of the time for an annual abundance of 8.9%. The stonefly *Sialis/Suwallaia* sp. was always the most abundant predator (spring = 6%, summer = 5%, fall = 6%).

Table 16 presents three trophic group ratios commonly used in bioassessments: the ratio of scrapers to collector/filterers ( $sc/cf$  and  $sc/(sc + cf)$ ) and the ratio of shredders to the total number of organisms ( $sh/total$ ). A diverse and abundant scraper community is usually indicative of good water quality. Shredder abundance also usually increases with increasing water quality while an increase in collector/filterers generally means a stream is declining in quality (Rosenberg et al., 1993). The Shannon Diversity Index (SDI), a measure of environmental quality, is also presented in Table 16. The SDI will be discussed in more detail in a later section but a higher number is generally indicative of a less impaired environment.

The  $sc/cf$  ratio ranged from 2.63 in the fall L1 kick sample to 242.50 in the spring L3 Hess sample set (higher numbers = better water quality). The  $sc/(sc + cf)$  ratio ranged from 0.724 in the fall L1 kick sample to 0.996 in the spring L3 Hess sample set. The  $sc/(sc + cf)$  ratio ranged from 0.724 in the fall L1 kick sample to 0.996 in the spring L3 Hess sample set. The  $sh/total$  ratio ranged from 0.005 in the summer L1 kick sample to 0.214 in the autumn L10 kick sample. Although an abundance of shredders can be indicative of good water quality, their absence does not necessarily indicate poor quality because they require a food source, such as deciduous leaves, for survival and the Libby Creek drainage is predominantly coniferous forest with sufficient flow to mostly eliminate the accumulation of any deciduous leaf pack.

**Table 16. Functional feeding group ratios and Shannon Diversity Indexes for Libby Creek macroinvertebrate samples from the Montanore Project area, 1993.**

STATION	SC/CF	SC/(SC+CF)	SH/TOTAL	SDI
<b>SPRING</b>				
L10-k	14.11	0.934	0.094	3.59
L10-H	23.08	0.958	0.066	3.05
L9-k	53.25	0.982	0.130	3.58
L9-H	70.75	0.986	0.083	3.62
L3-k	73.63	0.987	0.143	3.25
L3-H	242.50	0.996	0.119	3.09
L1-k	46.33	0.979	0.053	3.13
L1-H	44.22	0.978	0.095	3.10
<b>SUMMER</b>				
L10-k	18.69	0.949	0.152	3.72
L10-H	26.25	0.963	0.127	3.83
L9-k	11.11	0.917	0.097	3.47
L9-H	86.00	0.989	0.060	3.83
L3-k	7.49	0.882	0.035	3.23
L3-H	8.88	0.899	0.011	3.24
L1-k	8.94	0.899	0.005	3.23
L1-H	37.13	0.974	0.012	3.44
<b>AUTUMN</b>				
L10-k	8.65	0.896	0.214	3.86
L10-H	15.70	0.940	0.086	3.59
L9-k	12.54	0.926	0.097	3.29
L9-H	28.67	0.966	0.070	3.47
L3-k	23.48	0.959	0.026	3.38
L3-H	6.97	0.875	0.082	4.03
L1-k	2.63	0.724	0.088	3.65
L1-H	3.44	0.775	0.092	3.93
<b>SPRING</b>	<b>49.08</b>	<b>0.980</b>	<b>0.100</b>	<b>3.64</b>
<b>SUMMER</b>	<b>12.38</b>	<b>0.925</b>	<b>0.052</b>	<b>3.76</b>
<b>AUTUMN</b>	<b>6.88</b>	<b>0.873</b>	<b>0.098</b>	<b>4.25</b>
<b>ANNUAL</b>	<b>9.83</b>	<b>0.908</b>	<b>0.082</b>	<b>4.31</b>

k = 1 kick sample, H = 4 Hess samples combined

### 3. diversity/pollution sensitivity values

The use of biological surveys to document environmental changes has resulted in a profusion of approaches to account for the variability of macroinvertebrate data (Rosenberg et al., 1993). This section presents the metrics used to interpret the macroinvertebrate population data from the Montanore Project area.

The tolerance quotient (TQ) assigned by Winget et al. (1979) and Wisseman (1991) and Hilsenhoff's Tolerance Value (TV) are presented with each taxa in the Appendices. The TQ is an indication of the relative tolerance of a taxon to levels of total alkalinity, substrate composition, sulfate concentration and percent gradient while TV's are intended to indicate a taxon's sensitivity to organic and nutrient pollution. The TV's have a scale from 0-10 while TQ's are more specific with a scale of 2-110.

Table 17 lists the indicator species and species of special concern in the project area and their respective TQ. Essentially, all taxa are indicator taxa but those listed in Table 17 as indicator species are the predominant organisms in the project area or are taxa which are relatively tolerant to perturbations within the aquatic system. Species of special concern are taxa known to be relatively sensitive to environmental disturbances and are relatively rare in the project area. Some taxa in Table 17 are listed as both species of special concern and indicators since they are relatively easily distressed and are also abundant in the project area. The total annual percentage for each taxa is listed in Table 17 as well as the single highest occurrence for each organism. Two taxa, Blephariceridae and Elmidae, were collected in previous years but were absent from the 1993 samples.

Table 17. Macroinvertebrate indicator species and species of special concern in Libby Creek in the Montanore Project area, 1993.

TAXA	ORDER	DESIGNATION	TQ	TOT. %--HIGHEST %
Blephariceridae	D	special concern	2	0.0-0.0
<i>Drunella doddsi</i>	E	special concern	4	3.4-18.5(L3-H, Aug)
<i>Zapada columbiana</i>	P	special concern	16	4.4-14.5(L10-k, Oct)
<i>Doroneuria theodora</i>	P	special concern	18	0.1-0.6(L10-k, Mar)
<i>Arctopsyche grandis</i>	T	special concern	18	0.3-4.3(L3-H, Oct)
<i>Rhyacophila</i> sp.	T	special concern	18	1.0-3.7(L10-k, Aug)
<i>Cinygmulia</i> sp.	E	spec. conc./indicator	21	15.6-41.8(L1-H, Mar)
<i>Epeorus</i> sp.	E	spec. conc./indicator	21	6.6-22.0(L3-H, Aug)
<i>Rhithrogena</i> sp.	E	spec. conc./indicator	21	3.7-14.3(L1-H, Oct)
<i>Sweltsa/Suwallia</i> sp.	P	spec. conc./indicator	24	4.4-15.2(L10-H, Oct)
<i>Glossosoma</i> sp.	T	special concern	24	1.8-11.5(L9-H, Oct)
<i>Oligophlebodes</i> sp.	T	special concern	24	0.1-1.5(L1-H, Oct)
<i>Paraleptophlebia</i> sp.	E	special concern	24	1.0-8.5(L1-H, Mar)
<i>Neophylax</i> sp.	T	special concern	24	3.2-24.5(L3-k, Oct)
<i>Taenionema</i> sp.	P	indicator	48	6.8-35.6(L9-k, Oct)
<i>Baetis</i> sp.	E	indicator	72	12.1-34.2(L3-k, Aug)
Elmidae	C	indicator	108	0.0-0.0
Chironomidae	D	indicator	108	17.7-46.4(L10-H, Mar)
Simuliidae	D	indicator	108	0.4-1.9(L10-k, Mar)
Turbellaria	Pl	indicator	108	0.6-1.7(L9-k, Aug)

E = Ephemeroptera, P = Plecoptera, T = Trichoptera, C = Coleoptera, Pl = Planariidae

k = 1 kick sample, H = 4 Hess samples combined

The Shannon Diversity Index (SDI) is a measure of community diversity which combines richness (number of taxa) and enumerations (abundance of taxa) in a statistic summary (Rosenberg et al., 1993). Originally designed for large streams, a SDI of less than three is considered indicative of organic pollution (Platts et al., 1983 and Worf, 1980). Although relative comparisons of the SDI can have some value in smaller streams which may be subjected to types of degradation other than organic pollution, discrepancies have been noted by the author in other studies and have been reported in the literature (Rosenberg et al., 1993). Thus, it is important in some cases, particularly in streams with low numbers of organisms, to use the SDI judiciously.

A Sensitivity Ratio (SR) has been used by the senior author in other similar studies to characterize the quality of streams sampled in western Montana (Farmer et al., 1993 and Farmer, 1994). The SR is arrived at by dividing the total number of sensitive organisms by the total number of organisms in the sample set. Sensitive organisms were arbitrarily designated as those taxa with a TQ of 48 or less. Ideally, the higher the percentage of sensitive organisms in the sample, the higher the quality of water from which the sample is retrieved. The SR is similar to the indicator assemblages recommended by Wisseman (1991).

The SDI, SR and EPT/Chir were then combined to give a numerical Biological Quality score and a rating for biological integrity and overall impairment of the stream based on that particular sample set. By definition, biological integrity reflects natural conditions (Karr et al., 1981). The BQ rating is similar to that developed by Bahls (1993) for periphyton (Table 18) and by McGuire (1992) for macroinvertebrates.

**Table 18. Biological integrity and overall impairment rating scheme used for the Libby Creek biological sampling sites in the Montanore Project area, 1993.**

<b>SDI</b>	<b>EPT/CHIR</b>	<b>SR</b>	<b>SCORE</b>
<1.50	<1.00	0.00-0.20	1
1.50-2.25	1.00-10.00	0.20-0.50	2
2.25-3.00	10.00-15.00	0.50-0.70	3
3.00-3.75	15.00-25.00	0.70-0.85	4
>3.75	>25.00	>0.85	5

SDI = Shannon Diversity Index (Weber, 1973)

EPT/Chir = total number of Ephemeroptera, Plecoptera, Trichoptera divided by the total number of Chironomidae (if no Chironomidae are present, sample set receives a 5 for this parameter)

SR = total number of sensitive organisms (TQ = <49) divided by the total number of organisms

SCORE = numbers arbitrarily assigned based on unpublished data

<b>COMBINED SCORE</b>	<b>BIOLOGICAL INTEGRITY</b>	<b>OVERALL IMPAIRMENT</b>
3-5	poor	severe
6-9	fair	moderate
10-12	good	minor
13-15	excellent	none

Table 19 presents a comparison of the 1993 Libby Creek sample sets based on the above impairment rating scheme. In some cases, there was a notable difference between the Hess and kick sample sets, i.e., L10 in the spring and summer, and L1 and L3 in the fall. Otherwise, the Hess sample set always received a higher score than did the kick sample with one exception, at L3 in the fall, when the reverse was true. The highest scoring samples in each season were the L1 Hess samples in spring, the L10 Hess samples in the summer and the L9 Hess samples in the fall. The lowest scoring samples each season were the L10 Hess samples in the spring, L3 and L1 kick samples in the summer and the L1 kick sample in the fall. In the spring and summer the L10 site above the mine scored higher than the L9 site below the mine; the reverse was true in the fall.

#### 4. comparison of the 1989-1993 data

Only the four Libby Creek stations were sampled in 1993 but methodologies used in 1991 and 1992 were duplicated. Table 20 and Figures 13-21 compare the data (kick and Hess sample sets combined) gathered for the last five years and illustrate the extremes of seasonal and annual variation possible for streams in the study area and the downstream changes in Libby Creek on an annual basis. Figure 13 on page 71 displays the mean number of organisms collected from streams in the project area during each of the fifteen sampling episodes conducted since August 1988. Both Table 20 and Figure 13 document the change in methodology with the addition of kick samples in 1991. The kick sample invariably collected more organisms than did the Hess samples. But, the enhanced populations were also undoubtedly in part due to the more "normal" annual discharge in 1991 and 1992 when the severe spring and fall flooding of previous years was absent. For example, the mean number of organisms collected in October 1992 was only slightly

Table 19. Diversity and sensitivity values for the Libby Creek sample sets from the Montanore Project area, 1993.

STATION	SDI	EPT/C	SEN. RATIO	SCORE	BIOL. INTEG.	OVERALL IMPAIR.
<b>March 1993</b>						
L10-k	3.59	7.40	0.713	11	good	minor
L10-H	3.05	1.12	0.464	8	fair	moderate
L10-k-H	3.33	1.60	0.525	9	fair	moderate
L9-k	3.58	8.17	0.826	10	good	minor
L9-H	3.62	4.56	0.792	10	good	minor
L9-k-H	3.70	6.13	0.811	10	good	minor
L3-k	3.25	5.87	0.824	10	good	minor
L3-H	3.09	2.94	0.718	10	good	minor
L3-k-H	3.21	4.02	0.771	10	good	minor
L1-k	3.13	9.52	0.862	11	good	minor
L1-H	3.10	10.67	0.863	12	good	minor
L1-k-H	3.18	10.01	0.863	12	good	minor
<b>August 1993</b>						
L10-k	3.72	2.53	0.567	9	fair	moderate
L10-H	3.83	4.57	0.720	11	good	minor
L10-k-H	3.84	3.02	0.624	10	good	minor
L9-k	3.47	2.50	0.525	9	fair	moderate
L9-H	3.83	4.41	0.664	10	good	minor
L9-k-H	3.72	3.14	0.587	9	fair	moderate
L3-k	3.23	3.78	0.396	8	fair	moderate
L3-H	3.24	4.15	0.590	9	fair	moderate
L3-k-H	3.33	3.97	0.498	8	fair	moderate
L1-k	3.23	1.54	0.423	8	fair	moderate
L1-H	3.44	1.92	0.574	9	fair	moderate
L1-k-H	3.41	1.72	0.498	8	fair	moderate
<b>October 1993</b>						
L10-k	3.86	3.60	0.602	10	good	minor
L10-H	3.59	7.68	0.757	10	good	minor

Table 19. (Continued).

STATION	SDI	EPT/C	SEN. RATIO	SCORE	BIOL. INTEG.	OVERALL IMPAIR.
L10-k-H	3.87	4.43	0.653	10	good	minor
L9-k	3.29	16.54	0.856	13	excellent	none
L9-H	3.47	33.14	0.890	14	excellent	none
L9-k-H	3.48	22.51	0.874	13	excellent	none
L3-k	3.38	15.86	0.750	12	good	minor
L3-H	4.03	4.46	0.672	10	good	minor
L3-k-H	3.89	6.49	0.708	11	excellent	none
L1-k	3.65	5.91	0.638	9	fair	moderate
L1-H	3.93	17.04	0.712	13	excellent	none
L1-k-H	3.89	8.75	0.673	10	good	minor
Spring-k	3.62	7.39	0.824	10	good	minor
Spring-H	3.53	2.74	0.690	9	fair	moderate
Spring-k-H	3.64	4.08	0.754	10	good	minor
Summer-k	3.64	2.41	0.470	8	fair	moderate
Summer-H	3.75	3.18	0.614	9	fair	moderate
Summer-k-H	3.76	2.73	0.537	10	good	minor
Fall-k	4.15	6.71	0.696	10	good	minor
Fall-H	4.28	9.02	0.751	11	good	minor
Fall-k-H	4.25	7.68	0.722	11	good	minor
Annual-k	4.27	4.49	0.642	10	good	minor
Annual-H	4.30	4.51	0.692	10	good	minor
Annual-k-H	4.31	4.42	0.663	10	good	minor

**Table 20. A comparison of some parameters from the 1988-1993 aquatic biological monitoring programs for the Montanore Project\*.**

months	L10	L9	L3	L1	LC1	Po1	Pa2	Ba2
Aug '88								
total coll.(tot. samp.)	631(3 Hess)	848(3 Hess)	1478(3 Hess)	1073(3 Hess)	291(3 Hess)	620(3 Hess)	486(3 Hess)	579(3 Hess)
group totals	E = 162(31%) P = 165(31%) T = 86(18%) O = 118(22%)	E = 245(38%) P = 200(31%) T = 47(7%) O = 158(24%)	E = 279(19%) P = 222(15%) T = 87(6%) O = 860(60%)	E = 339(32%) P = 132(12%) T = 144(13%) O = 458(43%)	E = 148(15%) P = 51(18%) T = 40(14%)	E = 89(14%) P = 274(44%) T = 112(18%) O = 145(23%)	E = 105(22%) P = 175(36%) T = 34(7%) O = 172(35%)	E = 156(27%) P = 166(29%) T = 99(17%) O = 156(27%)
mean no./sample	177	19%	216	493	358	97	207	193
chironomid abund.	14%	19%	57%	39%	6%	16%	32%	19%
taxe richness	37	41	46	49	43	51	44	37
dominant taxon								
EPT richness	25	25	25	49	32	51	44	37
EPT/C	6.75	4.00	0.70	1.45	14.41	4.69	2.04	3.92
mean SDI	4.03	4.05	3.90	4.08	4.38	4.48	4.26	4.12
collectors/gatherers	16.2	18.1	11.9	20.9	19.6	7.8	11.9	16.4
collectors/filterers	0.8	1.4	0.9	1.1	6.8	1.3	0.2	1.0
scrapers	22.1	30.7	15.6	23.2	8.6	13.6	12.8	19.7
shredders	10.2	6.1	1.1	1.7	4.2	31.0	12.8	16.8
Oct '88								
total coll.(tot. samp.)	484(3 Hess)	194(3 Hess)	224(3 Hess)	200(3 Hess)	426(3 Hess)	386(3 Hess)	577(3 Hess)	577(3 Hess)
group totals	E = 215(44%) P = 194(40%) T = 47(10%) O = 28(6%)	E = 103(53%) P = 67(35%) T = 13(7%) O = 11(6%)	E = 103(45%) P = 72(32%) T = 28(13%) O = 21(9%)	E = 183(36%) P = 168(28%) T = 99(16%) O = 156(28%)	E = 118(41%) P = 108(37%) T = 28(10%) O = 38(13%)	E = 148(35%) P = 125(34%) T = 84(13%) O = 46(11%)	E = 150(41%) P = 125(34%) T = 74(20%) O = 71(5%)	E = 163(28%) P = 285(49%) T = 99(17%) O = 30(5%)
mean no./sample	161	65	75	201	97	142	122	192
chironomid abund.	4%	3%	5%	18%	11%	7%	2%	3%
taxe richness	31	20	30	27	33	31	27	29
dominant taxon								
EPT richness	27	16	24	20	26	24	21	23
EPT/C	21.7	30.5	20.3	4.2	7.9	12.3	58.2	34.2
mean SDI	3.62	2.93	3.60	4.06	3.83	3.77	3.75	3.92
collectors/gatherers	22.1	16.0	19.6	17.6	20.7	1.2	24.0	18.2
collectors/filterers	2.3	2.6	3.6	0.7	1.2	5.2	4.9	
scrapers	31.0	65.5	48.2	23.8	24.2	36.1	23.9	
shredders	11.6	0.5	4.5	20.4	22.8	10.8	11.5	27.9
Oct '89								
total coll.(tot. samp.)	575(3 Hess)	307(3 Hess)	334(3 Hess)	321(3 Hess)	854(3 Hess)	1127(3 Hess)	456(3 Hess)	456(3 Hess)
group totals	E = 208(36%) P = 143(25%) T = 13(2%) O = 211(37%)	E = 169(65%) P = 81(20%) T = 7(2%) O = 70(23%)	E = 130(39%) P = 84(19%) T = 13(4%) O = 127(38%)	E = 55(9%) P = 71(11%) T = 60(9%) O = 119(19%)	E = 188(22%) P = 134(22%) T = 32(5%) O = 400(84%)	E = 188(22%) P = 139(16%) T = 25(3%) O = 604(69%)	E = 374(33%) P = 171(16%) T = 48(4%) O = 535(48%)	E = 162(36%) P = 116(25%) T = 14(3%) O = 184(36%)
mean no./sample	192	102	111	216	207	285	152	31%
chironomid abund.	34%	20%	34%	39%	39%	53%	45%	

Table 20. (Continued).

metrics	L10	L9	L8	L3	L1	LC1	Po1	Ra2	Ba2
taxe richness	27	24	31	38	24	29	34	27	27
dominant taxon	Chironomidae (34%)	Cinygmaula (26%)	Chironomidae (34%)	Cinygmaula (29%)	Chironomidae (39%)	Chironomidae (53%)	Chironomidae (45%)	Chironomidae (31%)	Chironomidae (21%)
EPT richness	21	18	24	26	20	23	27	21	21
EPT/C	1.8	3.9	1.9	6.92	0.92	0.77	1.16	2.09	2.09
mean SDI	3.07	3.13	3.26	3.89	2.92	2.75	3.00	3.33	3.33
collectors/gatherers	0.8%	14.3%	8.4	14.7%	30.3%	9.0%	11.0%	14.5%	14.5%
collectors/filterers	0.7%	1.0%	1.2	0.8%	0.6%	0.0%	0.4%	0.7%	0.7%
scrapers	28.4%	42.7%	34.4	62.9%	6.0%	17.9%	25.8%	26.5	26.5
shredders	9.9%	3.6%	7.2	10.7%	13.4%	11.0%	10.7%	9.4%	9.4%
<b>April '90</b>									
total coll.(tot. samp.)	203(5 Hess)	—	—	325(6 Hess)	348(6 Hess)	357(6 Hess)	195(5 Hess)	—	—
group totals	(E = 160(79%))	(E = 118(68%))	(E = 155(48%))	(E = 223(66%))	(P = 28(73%))	(E = 28(73%))	(E = 153(79%))	—	—
EPT richness	30(16%)	40(23%)	33(10%)	66(9%)	43(12%)	43(12%)	P = 23(12%)	—	—
T	4(2%)	2(1%)	10(3%)	7(2%)	7(2%)	7(2%)	T = 7(4%)	—	—
O	9(4%)	0 = 14(8%)	0 = 46(13%)	0 = 46(13%)	0 = 46(13%)	0 = 46(13%)	O = 12(5%)	—	—
mean no./sample	41	35	65	70	71	71	39	—	—
chironomid abund.	3%	2%	26%	4%	9%	9%	3%	—	—
taxe richness	18	22	24	26	24	22	22	—	—
dominant taxon	Epeorus (27%)	Cinygmaula (29%)	—	Chironomidae (26%)	Cinygmaula (37%)	Epeorus (49%)	Cinygmaula (33%)	—	—
EPT richness	12	14	17	19	19	18	18	—	—
EPT/C	32.33	40.0	2.33	21.57	9.36	36.6	36.6	—	—
mean SDI	2.99	3.24	3.51	3.16	2.81	2.95	2.95	—	—
collectors/gatherers	26%	19%	20%	16%	16%	13%	13%	—	—
collectors/filterers	3%	0.6%	6%	0.6%	0.8%	0%	0%	—	—
scrapers	55%	54%	37%	59%	61%	68%	68%	—	—
shredders	7%	11%	0.9%	8%	5%	7%	7%	—	—
<b>August '90</b>									
total coll.(tot. samp.)	380(5 Hess)	401(5 Hess)	601(5 Hess)	874(5 Hess)	611(5 Hess)	268(5 Hess)	—	—	—
group totals	(E = 249(65%))	(E = 275(69%))	(E = 387(77%))	(E = 728(83%))	(E = 397(78%))	(E = 189(63%))	(E = 189(63%))	—	—
EPT richness	P = 98(25%)	P = 66(17%)	P = 74(15%)	P = 78(9%)	P = 78(9%)	P = 89(3%)	P = 48(17%)	—	—
T	7(2%)	T = 15(4%)	T = 14(3%)	T = 32(4%)	T = 19(4%)	T = 19(4%)	T = 20(8%)	—	—
O	28(7%)	O = 46(11%)	O = 28(5%)	O = 38(4%)	O = 27(5%)	O = 27(5%)	O = 33(12%)	—	—
mean no./sample	76	80	100	175	102	54	54	—	—
chironomid abund.	2%	7%	4%	2%	5%	5%	5%	—	—
taxe richness	23	28	27	33	24	30	30	—	—
dominant taxon	Rhithrogena (31%)	Rhithrogena (19%)	Rhithrogena (23%)	Rhithrogena (23%)	D. dorsalis (23%)	Cinygmaula (27%)	Cinygmaula (27%)	—	—
EPT richness	19	18	22	24	21	24	24	—	—
EPT/C	50.29	13.99	26.39	64.30	19.36	15.67	15.67	—	—
mean SDI	3.23	3.58	3.21	2.97	3.10	3.74	3.74	—	—
collectors/gatherers	42%	31%	20%	68%	31%	21%	21%	—	—
collectors/filterers	0.3%	0.5%	0.8%	3%	2%	3%	3%	—	—
scrapers	27%	39%	39%	19%	19%	48%	48%	—	—

Table 20. (Continued).

metrics	L10	L9	L8	L3	L1	LC1	Po1	Pa2	Ba2	
shredders	4%	3%	2%	3%	—	10%	3%	—	—	
October '90										
total coll.(tot. samp.)	263(5 Hess)	589(5 Hess)	766(5 Hess)	1084(5 Hess)	1071(5 Hess)	676(5 Hess)	560(5 Hess)	—	—	
group totals	E = 197(75%) P = 39(15%) T = 14(5%) O = 13(5%)	E = 284(48%) P = 216(37%) T = 30(5%) O = 59(10%)	E = 41(54%) P = 28(38%) T = 44(6%) O = 13(2%)	E = 194(74%) P = 63(6%) T = 63(6%) O = 91(9%)	E = 684(62%) P = 205(19%) T = 111(10%) O = 91(9%)	E = 21(31%) P = 43(65%) T = 18(3%) O = 10(2%)	E = 283(51%) P = 248(44%) T = 16(3%) O = 13(2%)	—	—	
mean no./sample	53	35	151	213	214	135	112	—	—	
chromomid abund.	2%	4%	0.3%	0.3%	1%	0.3%	0%	—	—	
taxe richness	27	35	34	35	24	24	24	—	—	
dominant taxon	Cinygmulida (43%)	Cinygmulida (33%)	Cinygmulida (36%)	Cinygmulida (49%)	Beaufis (32%)	Taeniopterae (53%)	Taeniopterae (33%)	—	—	
EPT richness	23	28	27	28	21	19	19	—	—	
EPT/C	50.00	22.08	371.00	347.00	54.44	111.00	—	—	—	
mean SDI	2.99	3.27	2.94	2.80	3.49	2.58	2.87	—	—	
collectors/gatherers	33%	13%	17%	19%	43%	14%	23%	—	—	
collectors/filterers	1%	1%	0.6%	2%	3%	0.3%	0.9%	—	—	
scrapers	46%	72%	68%	69%	72%	62%	62%	—	—	
shredders	7%	6%	2%	2%	6%	3%	3%	—	—	
May '91										
total coll.(tot. samp.)	923(1 kick, 4 Hess)	190(1 kick, 4 Hess)	669(1 kick, 4 Hess)	873(1 kick, 4 Hess)	167(1 kick, 4 Hess)	669(1 kick, 4 Hess)	129(1 kick, 4 Hess)	1365(1 kick, 4 Hess)	—	
group totals	E = 670(69%) P = 120(15%) T = 23(3%) O = 110(13%)	E = 144(76%) P = 29(16%) T = 6(3%) O = 11(6%)	E = 513(77%) P = 86(4%) T = 4(1%) O = 56(8%)	E = 710(81%) P = 73(8%) T = 47(5%) O = 43(5%)	E = 118(71%) P = 34(20%) T = 7(4%) O = 8(5%)	E = 438(66%) P = 171(26%) T = 22(3%) O = 38(6%)	E = 939(73%) P = 194(16%) T = 35(3%) O = 123(10%)	E = 1124(62%) P = 165(11%) T = 35(4%) O = 33(2%)	—	
mean no./sample	165	38	134	176	42	134	258	273	—	
chromomid abund.	6%	1%	7%	0.8%	1%	2%	4%	1%	—	
taxe richness	29	19	25	34	24	25	28	31	—	
dominant taxon	Cinygmulida (29%)	Cinygmulida (25%)	Cinygmulida (31%)	Cinygmulida (30%)	Cinygmulida (23%)	Cinygmulida (25%)	Baetis (24%)	26	—	
EPT richness	22	17	19	20	22	23	23	26	—	
EPT/C	14.55	89.50	13.04	118.57	79.50	39.44	21.24	102.48	—	
mean SDI	3.3	3.2	3.1	3.3	3.4	3.8	3.3	3.1	—	
collectors/gatherers	20%	37%	66%	17%	25%	30%	29%	—	—	
collectors/filterers	0.6%	0%	0.6%	4%	3%	0.9%	1%	—	—	
scrapers	56%	48%	63%	87%	48%	44%	56%	—	—	
shredders	5%	4%	3%	4%	16%	17%	9%	7%	—	
August '91										
total coll.(tot. samp.)	1987(1 kick, 4 Hess)	1793(1 kick, 4 Hess)	2290(1 kick, 4 Hess)	2037(1 kick, 4 Hess)	580(1 kick, 4 Hess)	2137(1 kick, 4 Hess)	1483(1 kick, 4 Hess)	2439(1 kick, 4 Hess)	—	
group totals	E = 1085(54%) P = 457(23%) T = 56(3%) O = 389(20%)	E = 1428(80%) P = 208(12%) T = 39(2%) O = 120(7%)	E = 1873(82%) P = 139(8%) T = 120(5%) O = 158(7%)	E = 1693(83%) P = 123(6%) T = 82(4%) O = 139(7%)	E = 254(44%) P = 187(32%) T = 89(16%) O = 50(9%)	E = 1085(72%) P = 29(20%) T = 67(5%) O = 54(6%)	E = 1785(84%) P = 237(11%) T = 46(2%) O = 70(3%)	E = 2012(82%) P = 306(13%) T = 59(2%) O = 62(3%)	—	—

Table 20. (Continued).

metrics	L10	L9	L8	L3	L1	LC1	Po1	Rz2	Be
mean no./sample	393	359	458	407	630	427	297	488	
chironomid abund.	14%	4%	4%	6%	1%	2%	2%	2%	
taxa richness	30	34	33	35	24	31	33	35	
dominant taxon	Ephemera (21%)	Rhithrogena (34%)	Baetis (36%)	Baetis (33%)	Baetis (25%)	Rhithrogena (29%)	D. doddsi (21%)	D. doddsi (27%)	
EPT richness	22	27	28	28	19	24	26	28	
EPT/C	5.56	23.56	21.76	15.95	88.33	46.98	40.83	54.02	
mean SDI	3.4	3.1	3.0	3.2	3.4	2.9	3.3	2.9	
collectors/gatherers	29%	48%	63%	66%	41%	45%	30%	29%	
scrapers	0.8%	0.5%	3%	2%	18%	0.7%	2%	1%	
shredders	29%	32%	20%	19%	6%	39%	43%	56%	
	5%	5%	2%	0.9%	5%	5%	5%	5%	
October '91									
total col.(tot. samp.)	3083(1 kick, 4 Hess)	4455(1 kick, 4 Hess)	3689(1 kick, 4 Hess)	4454(1 kick, 4 Hess)	833(1 kick, 4 Hess)	4889(1 kick, 4 Hess)	2722(1 kick, 4 Hess)	4178(1 kick, 4 Hess)	
group totals	E = 1885(61%)	E = 668(13%)	E = 2282(62%)	E = 418(47%)	E = 1122(41%)	E = 1673(40%)	E = 1122(41%)	E = 1673(40%)	
	P = 786(25%)	P = 327(73%)	P = 1098(30%)	P = 1924(43%)	P = 2895(56%)	P = 2078(50%)	P = 1287(487%)	P = 2078(50%)	
	T = 325(11%)	T = 582(13%)	T = 278(8%)	T = 207(5%)	T = 133(15%)	T = 259(10%)	T = 372(9%)	T = 372(9%)	
	O = 107(4%)	O = 36(1%)	O = 48(1%)	O = 31(1%)	O = 116(13%)	O = 45(1%)	O = 54(2%)	O = 57(2%)	
mean no./samp	613	892	738	891	179	974	544	836	
chironomid abund	0.8%	0%	0.8%	0.1%	2.8%	0.3%	1%	0.4%	
taxa richness	39	32	36	37	38	36	34	37	
dominant taxon	Rhithrogena (20%)	Tanypus (84%)	Cinygmauta (24%)	Tanypus (36%)	Cinygmauta (31%)	Tanypus (46%)	Tanypus (31%)	Tanypus (30%)	
EPT richness	30	27	31	32	31	32	29	30	
EPT/C	113.69	125.55	737.17	33.78	344.57	80.85	228.94	228.94	
mean SDI	3.7	2.2	3.2	2.9	3.8	3.4	3.2	3.2	
collectors/gatherers	30%	3%	32%	29%	25%	16%	26%	25%	
scrapers	4%	8%	2%	4%	0%	7%	5%	3%	
shredders	41%	75%	53%	59%	41%	65%	49%	54%	
	7%	6%	4%	4%	9%	6%	7%	7%	
	3%	3%	3%	3%	3%	3%	3%	3%	
April '92									
total col.(tot. samp.)	1571(1 kick, 4 Hess)	1309(1 kick, 4 Hess)	2478(1 kick, 4 Hess)	1229(1 kick, 4 Hess)	3061(1 kick, 4 Hess)	3009(1 kick, 4 Hess)	3061(1 kick, 4 Hess)	3061(1 kick, 4 Hess)	
group totals	E = 986(63%)	E = 434(33%)	E = 1999(56%)	E = 2114(49%)	E = 703(57%)	E = 1585(52%)	E = 703(57%)	E = 1450(48%)	
	P = 312(20%)	P = 267(20%)	P = 1056(31%)	P = 1236(29%)	P = 628(25%)	P = 536(18%)	P = 333(27%)	P = 774(26%)	
	T = 69(4%)	T = 166(3%)	T = 138(4%)	T = 404(9%)	T = 181(7%)	T = 184(6%)	T = 73(8%)	T = 228(8%)	
	O = 205(13%)	O = 442(34%)	O = 346(10%)	O = 632(12%)	O = 662(27%)	O = 757(25%)	O = 120(10%)	O = 557(19%)	
mean no./samp	314	262	688	857	496	246	612	602	
chironomid abund	8%	30%	8%	6%	18%	8%	23%	18%	
taxa richness	38	37	44	46	40	38	40	46	
dominant taxon	Cinygmauta (38%)	Chironomidae (30%)	Cinygmauta (18%)	Chironomidae (18%)	Cinygmauta (19%)	Cinygmauta (24%)	Cinygmauta (24%)	Cinygmauta (20%)	
EPT richness	33	30	36	33	31	32	31	36	
EPT/C	10.19	2.23	11.13	4.17	10.87	3.26	5.22	5.22	
mean SDI	3.38	3.49	3.71	3.80	3.97	3.74	3.52	3.94	
collectors/gatherers	15%	8%	14%	22%	14%	17%	10%	8%	

Table 20. (Continued).

metrics	L10	L9	L8	L7	L6	L5	L4	Po1	Po2	Bs2
August '92 total coll.(tot. samp.)	1260(1 kick, 4 Hess)	1728(1 kick, 4 Hess)	3948(1 kick, 4 Hess)	3394(1 kick, 4 Hess)	1867(1 kick, 4 Hess)	1414(1 kick, 4 Hess)	1526(1 kick, 4 Hess)	1767(1 kick, 4 Hess)		
group totals	E = 85(15%) P = 262(20%)	E = 993(58%) P = 388(23%)	E = 2186(65%) P = 568(14%)	E = 1655(49%) P = 424(13%)	E = 1155(82%) P = 185(13%)	E = 892(83%) P = 435(29%)	E = 952(53%) P = 409(23%)	E = 93(45%) P = 43(29%)	E = 95(45%) P = 40(23%)	
	T = 79(8%) O = 278(22%)	T = 178(10%) O = 168(10%)	T = 783(20%) O = 434(11%)	T = 407(12%) O = 836(25%)	T = 25(118%) O = 222(12%)	T = 25(118%) O = 86(6%)	T = 258(17%) O = 141(9%)	T = 219(12%) O = 187(11%)	T = 219(12%) O = 187(11%)	
mean no./samp	252	346	790	679	373	283	305	353		
chironomid abund	13%	5%	10%	18%	6%	6%	8%	8%		
taxa richness	28	35	40	40	38	28	41	43		
dominant taxon	<i>Epeorus</i> (14%)	<i>Rhithrogena</i> (23%)	<i>D. dorsalis</i> (15%)	<i>Rhithrogena</i> (26%)	<i>Cinygmulae</i> (36%)	<i>Z. columnaria</i> (14%)	<i>Rhithrogena</i> (20%)	<i>Z. columnaria</i> (14%)	<i>Rhithrogena</i> (19%)	
EPT richness	20	27	31	32	30	23	32	35		
EPT/C	5.86	18.56	9.13	4.17	18.08	16.81	11.44	11.70		
mean SDI	3.82	3.70	3.83	3.65	3.34	3.41	3.91	3.96		
collectors/gatherers	28%	32%	33%	46%	20%	33%	26%	30%		
collectors/filterers	0.6%	6%	6%	6%	0.2%	16%	11%	3%		
scrapers	33%	31%	35%	47%	31%	23%	31%	31%		
shredders	9%	13%	9%	13%	7%	7%	21%	15%		
Octoer '92 total coll.(tot. samp.)	3444(1 kick, 4 Hess)	3187(1 kick, 4 Hess)	5454(1 kick, 4 Hess)	4471(1 kick, 4 Hess)	2186(1 kick, 4 Hess)	5113(1 kick, 4 Hess)	3559(1 kick, 4 Hess)	4824(1 kick, 4 Hess)		
group totals	E = 1484(43%) P = 1288(38%)	E = 937(30%) P = 1531(48%)	E = 2846(52%) P = 1002(19%)	E = 2278(61%) P = 1042(19%)	E = 1398(84%) P = 548(12%)	E = 2118(41%) P = 308(61%)	E = 1979(56%) P = 904(26%)	E = 2184(45%) P = 1242(26%)	E = 2184(45%) P = 1242(26%)	
	T = 313(9%) O = 369(11%)	T = 580(18%) O = 117(4%)	T = 1042(19%) O = 604(9%)	T = 1265(58%) O = 382(9%)	T = 233(11%) O = 247(11%)	T = 394(8%) O = 521(10%)	T = 298(8%) O = 388(11%)	T = 823(17%) O = 595(12%)	T = 823(17%) O = 595(12%)	
mean no./samp	689	633	1091	894	437	1023	714	966		
chironomid abund	9%	2%	8%	5%	5%	9%	10%	10%		
taxa richness	39	37	43	47	48	45	44	48		
dominant taxon	<i>Tanymulae</i> (18%)	<i>Baetidae</i> (21%)	<i>Rhithrogena</i> (22%)	<i>Cinygmulae</i> (27%)	<i>Tanymulae</i> (30%)	<i>Baetidae</i> (27%)	<i>Cinygmulae</i> (21%)	<i>Baetidae</i> (27%)	<i>Cinygmulae</i> (21%)	
EPT richness	29	30	33	36	40	35	35	37		
EPT/C	9.73	65.45	11.33	19.11	16.72	9.63	9.01	8.87		
mean SDI	3.79	3.09	3.81	3.73	4.08	3.48	3.47	3.95		
collectors/gatherers	21%	14%	28%	38%	24%	22%	34%	19%		
collectors/filterers	3%	0.5%	7%	23%	3%	2%	2%	0.8%		
scrapers	39%	71%	44%	41%	54%	54%	38%	61%		
shredders	16%	3%	6%	4%	11%	6%	10%	9%		
March '93 total coll.(tot samp)	1470(1 kick, 4 Hess)	1679(1 kick, 4 Hess)	2467(1 kick, 4 Hess)	1784(1 kick, 4 Hess)	—	—	—	—		
group totals	E = 596(41%) P = 174(12%)	E = 966(68%) P = 367(22%)	E = 1243(51%) P = 689(27%)	E = 1124(83%) P = 431(24%)	—	—	—	—		

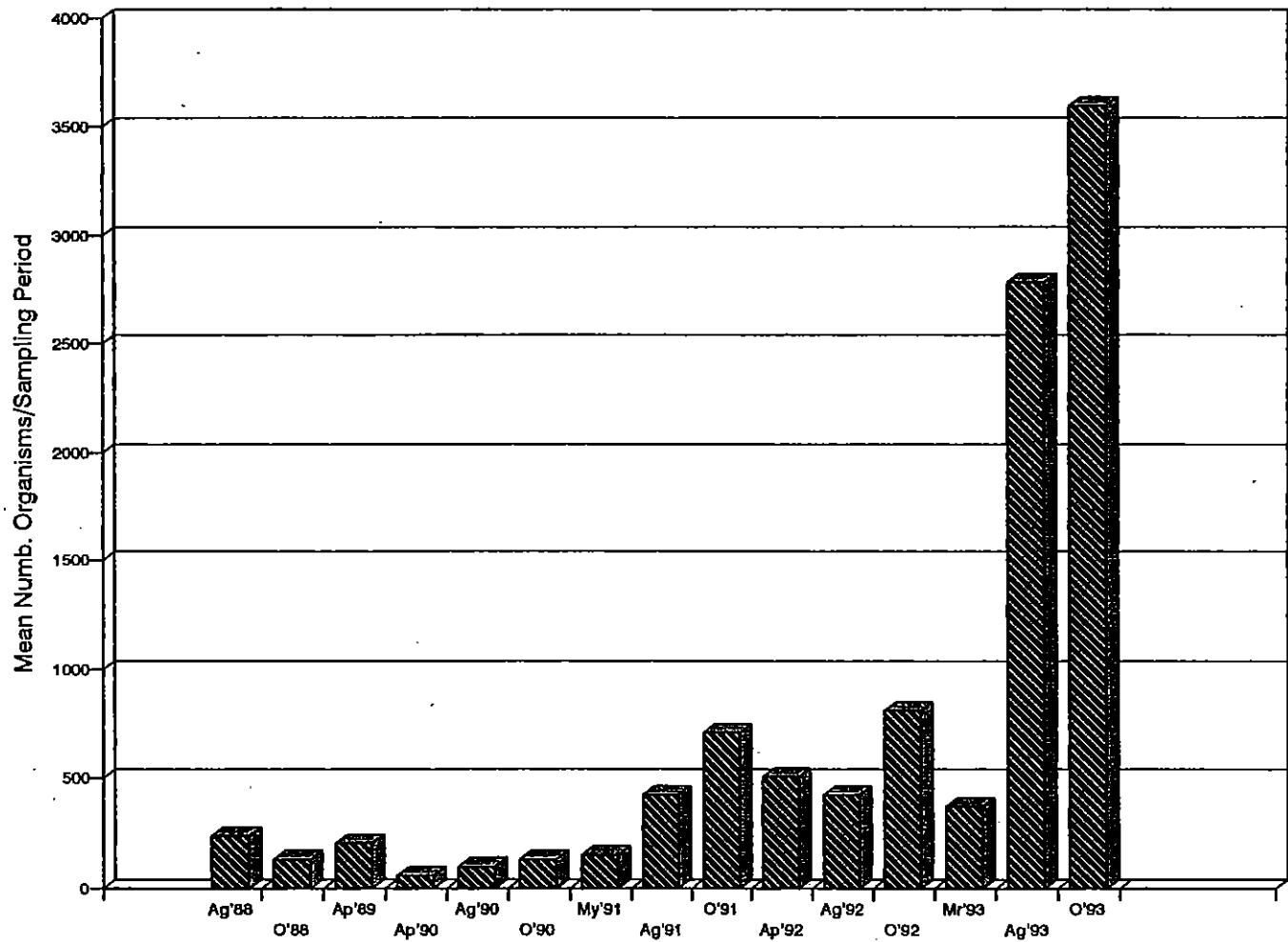
Table 20. (Continued).

metrics	L10	L9	L8	L3	L1	LC1	P01	P02	Ba2
mean no./sample chironomid abund.	T = 118(8%) O = 582(40%) 294	T = 77(6%) O = 289(16%) 336	T = 56(2%) O = 50(120%) 493	T = 38(2%) O = 193(11%) 357	--	--	--	--	--
taxa richness	38	14%	20%	9%	--	--	--	--	--
dominant taxon	Chironomidae (38%)	Cinygmulidae (22%)	Cinygmulidae (32%)	Cinygmulidae (40%)	--	--	--	--	--
EPT richness	31	34	31	28	--	--	--	--	--
EPT/C	1.60	6.13	4.02	10.01	--	--	--	--	--
mean SDI	3.33	3.70	3.21	3.18	--	--	--	--	--
collectors/gatherers	56.4	37.1	32.6	29.1	--	--	--	--	--
collectors/filterers	1.4	0.7	0.4	1.2	--	--	--	--	--
scrapers	27.5	42.2	43.5	53.6	--	--	--	--	--
shredders	7.3	10.9	13.1	7.2	--	--	--	--	--
 Aug '93									
total coll. (tot. samp.) group totals	2831(1 kick, 4 Hess) E = 1183(41%) P = 740(25%) T = 194(7%) O = 814(28%)	1938(1 kick, 4 Hess) E = 907(47%) P = 373(19%) T = 135(7%) O = 523(27%)	4783(1 kick, 4 Hess) E = 3153(68%) P = 2191(55%) T = 322(7%) O = 1089(23%)	4246(1 kick, 4 Hess) E = 1979(45%) P = 1981(55%) T = 430(10%) O = 1639(39%)	--	--	--	--	--
mean no./sample chironomid abund.	58.9	388	967	849	--	--	--	--	--
taxa richness	24%	23%	20%	36%	--	--	--	--	--
dominant taxon	Chironomidae (24%)	Chironomidae (23%)	Baetidae (25%)	Chironomidae (36%)	--	--	--	--	--
EPT richness	33	32	35	34	--	--	--	--	--
EPT/C	3.02	3.14	3.97	1.72	--	--	--	--	--
mean SDI	3.84	3.72	3.33	3.41	--	--	--	--	--
collectors/gatherers	49.8	58.8	66.3	86.3	--	--	--	--	--
collectors/filterers	0.8	1.0	2.9	1.5	--	--	--	--	--
scrapers	17.4	19.2	23.8	23.9	--	--	--	--	--
shredders	14.3	8.1	2.3	0.9	--	--	--	--	--
 Oct '93									
total coll. (tot. samp.) group totals	3890(1 kick, 4 Hess) E = 1317(34%) P = 1384(36%) T = 386(10%) O = 804(21%)	3963(1 kick, 4 Hess) E = 1131(29%) P = 1844(47%) T = 717(18%) O = 271(7%)	4775(1 kick, 4 Hess) E = 2048(43%) P = 836(18%) T = 1129(24%) O = 762(16%)	5338(1 kick, 4 Hess) E = 2775(52%) P = 678(13%) T = 1177(22%) O = 708(13%)	--	--	--	--	--
mean no./sample chironomid abund.	77.8	79.3	95.5	108.8	--	--	--	--	--
taxa richness	49	4%	13%	10%	--	--	--	--	--
dominant taxon	Chironomidae (18%)	Tanionemidae (34%)	Neophysetax (16%)	Chrysomidae (27%)	--	--	--	--	--
EPT richness	38	38	38	46	--	--	--	--	--
EPT/C	4.43	22.51	6.49	8.75	--	--	--	--	--

**Table 20. (Continued).**

metrics	L10	L9	L3	L1	LG1	Po1	Po2	Be2
mean SDI	3.87	3.48	3.89	3.89	—	—	—	—
collectors/gatherers	39.3	17.2	40.9	35.4	—	—	—	—
collectors/filterers	2.2	3.4	3.6	12.6	—	—	—	—
scrapers	24.1	61.3	41.2	37.2	—	—	—	—
shredders	17.2	8.3	6.0	9.0	—	—	—	—

\*kick and Hess samples combined



*Figure 13. Mean number of organisms collected during each sampling period from streams in the Montanore Project Area, 1988-93.*

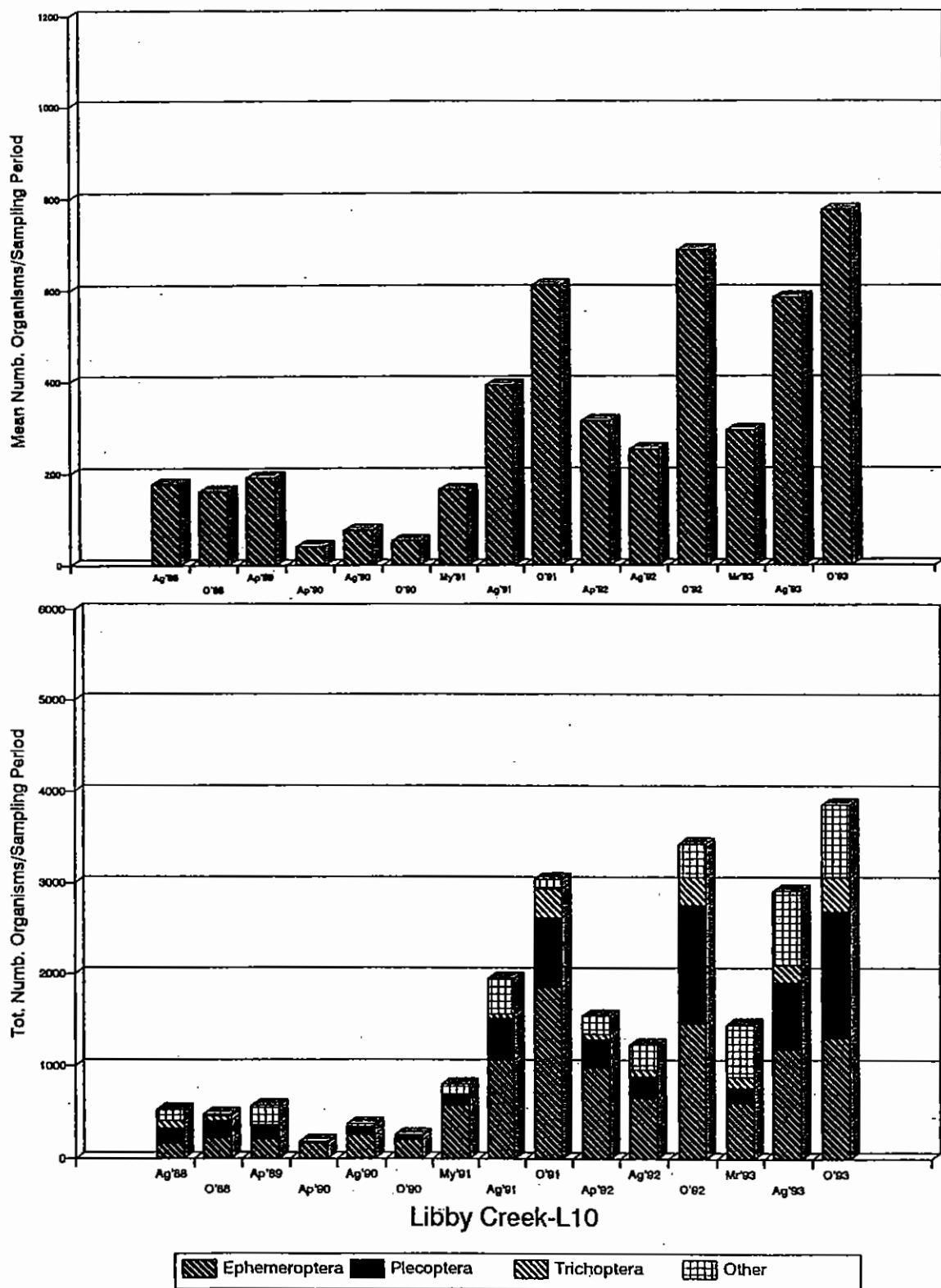


Figure 14. Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Libby Creek-L10, 1988-93.

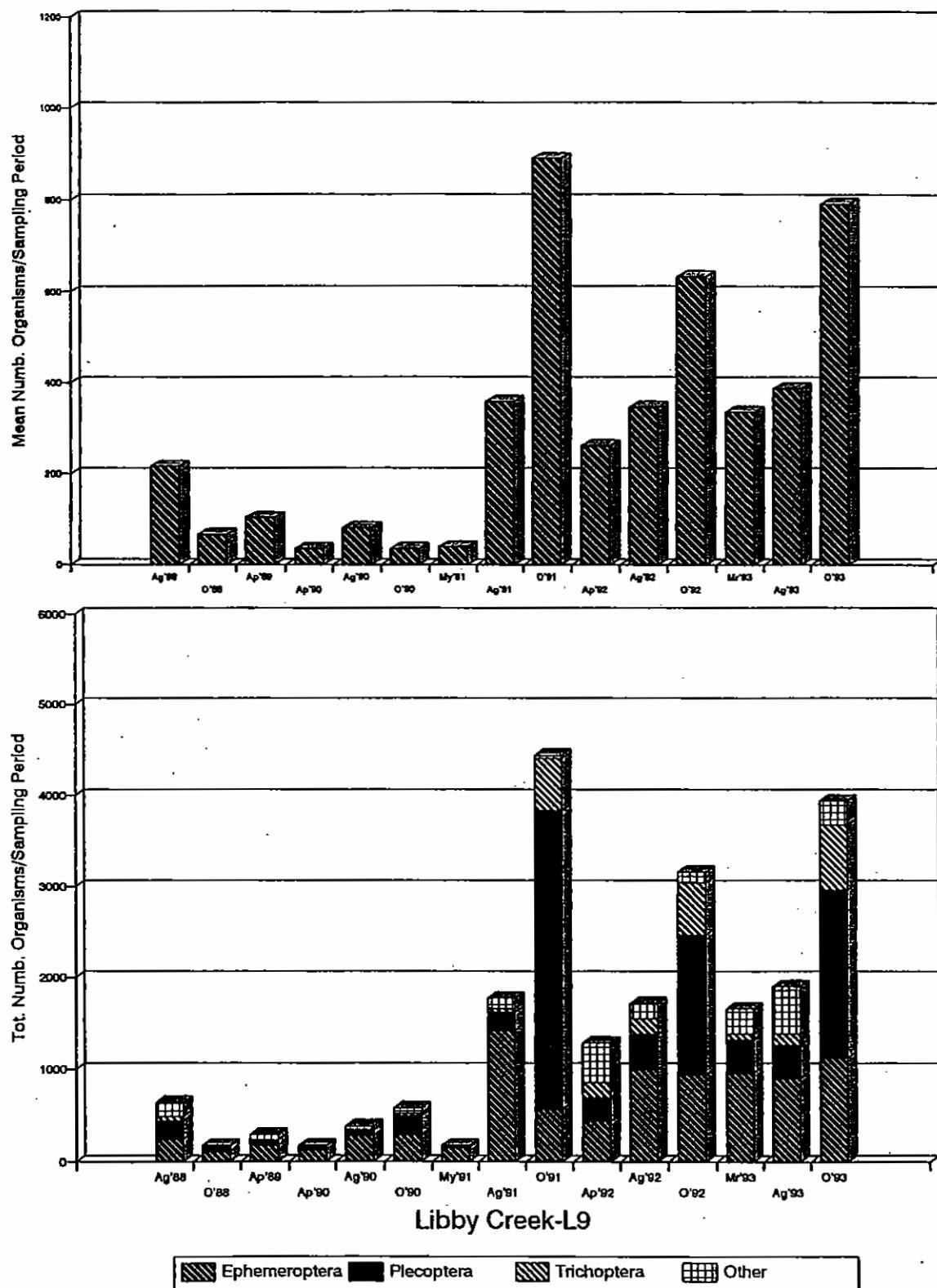


Figure 15. Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Libby Creek-L9, 1988-93.

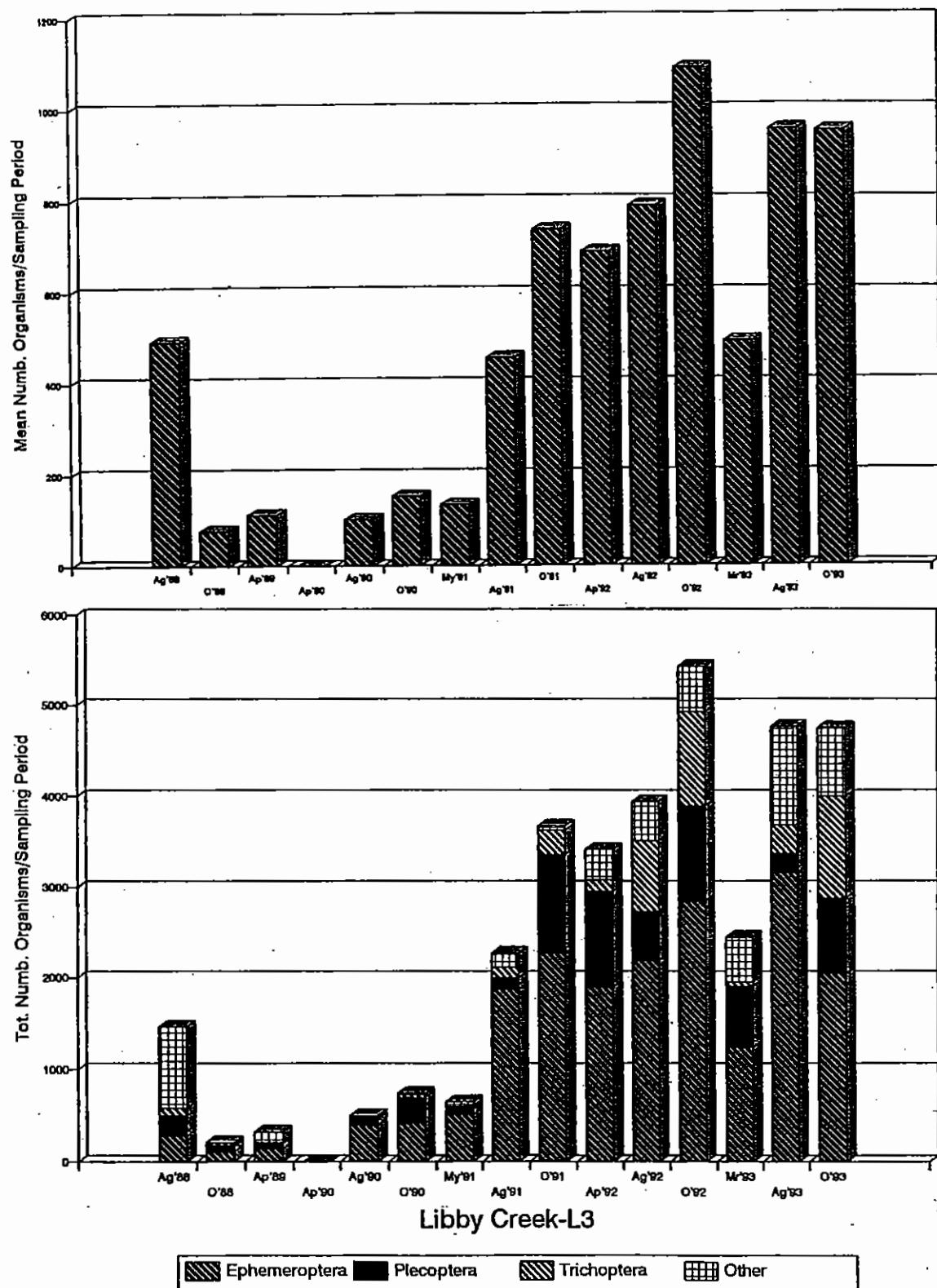
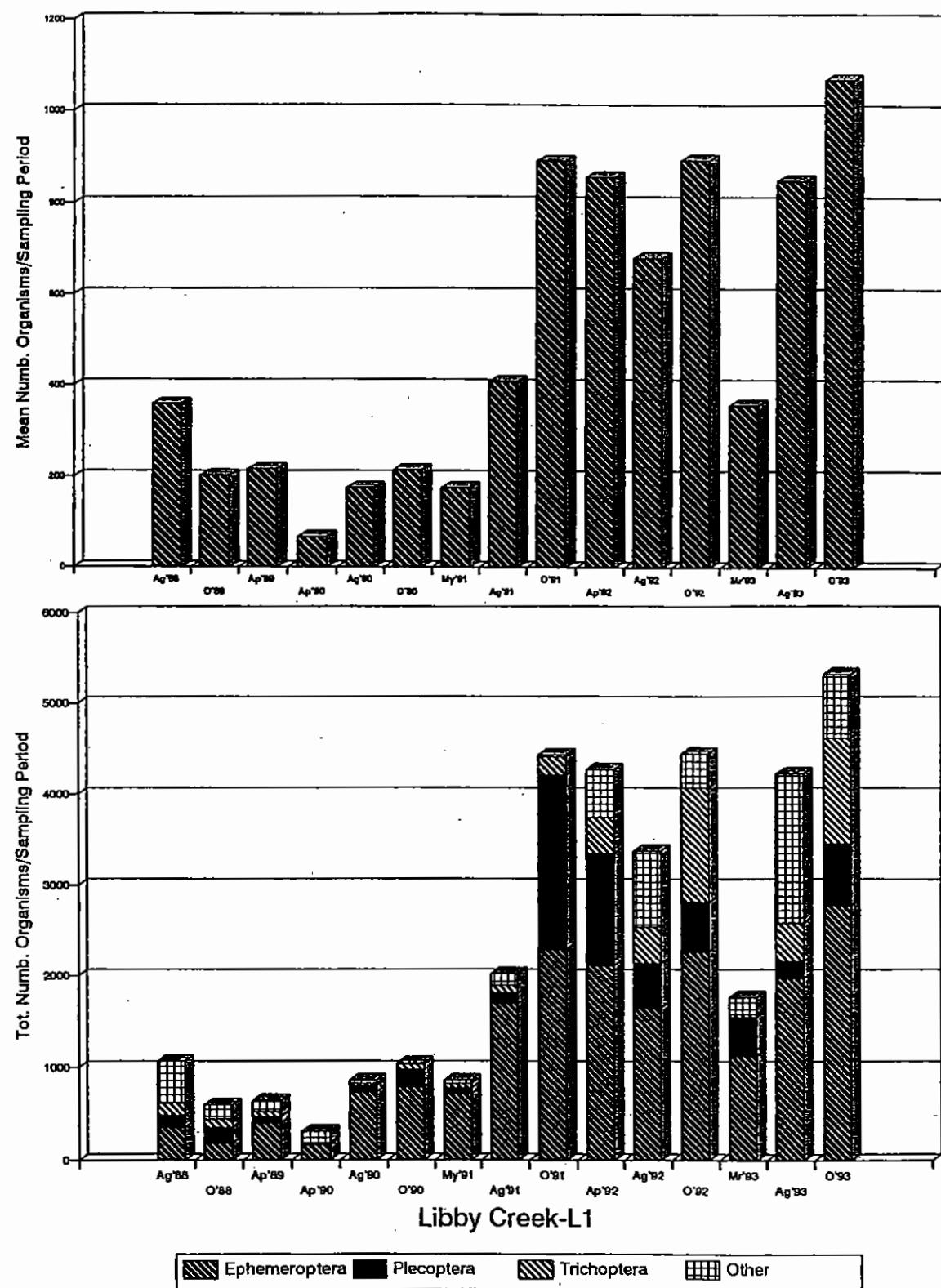
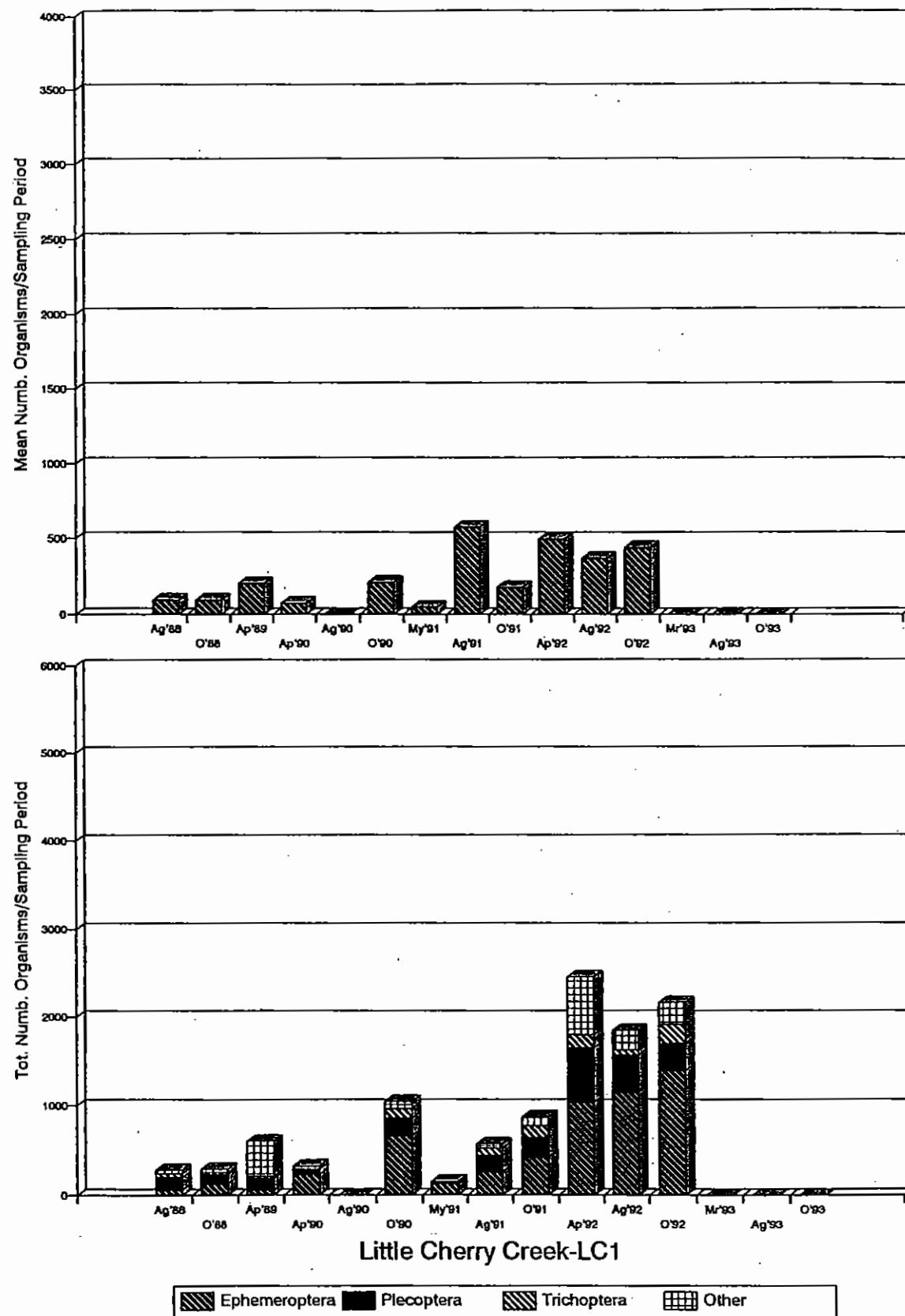


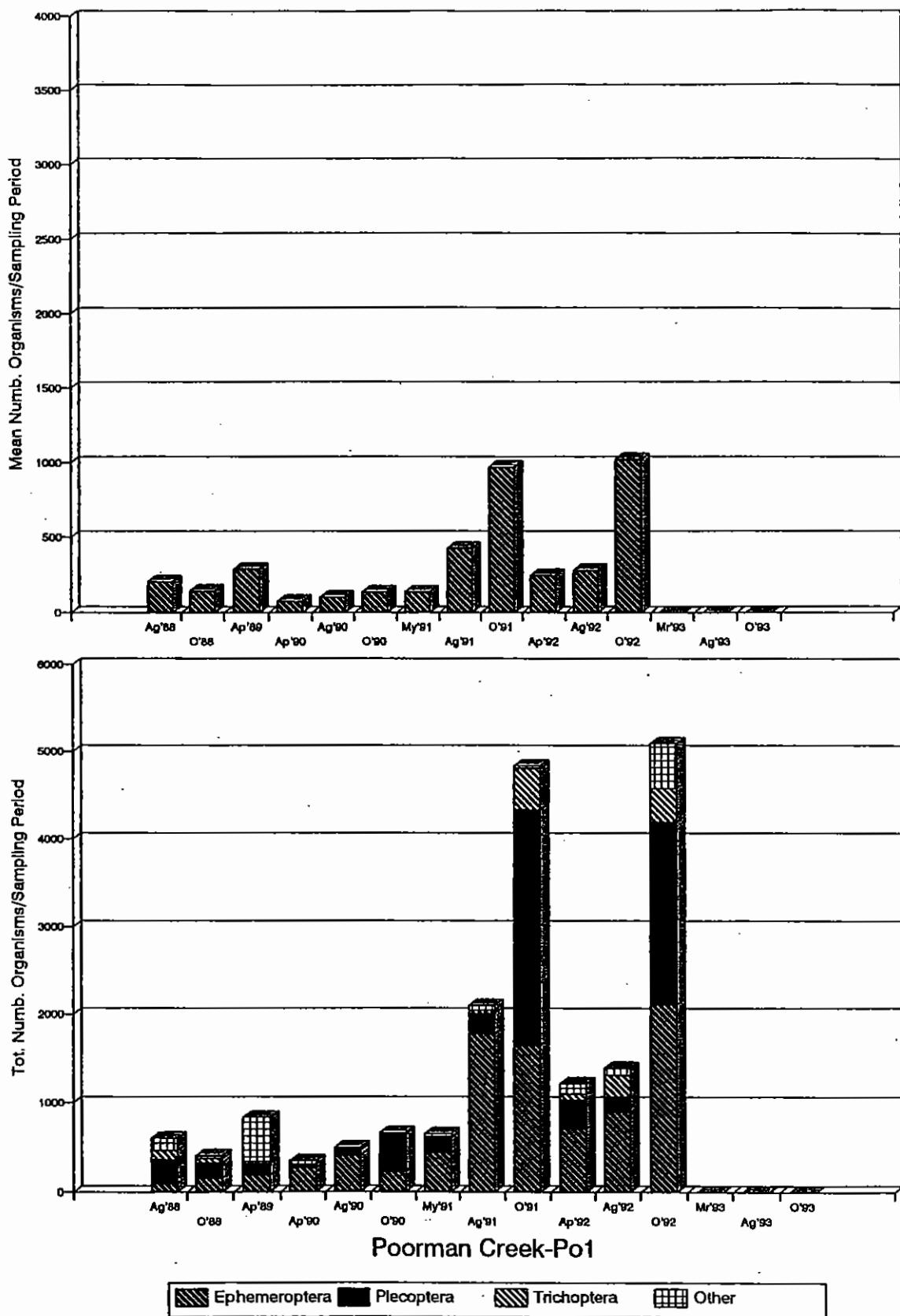
Figure 16. Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Libby Creek-L3, 1988-93.



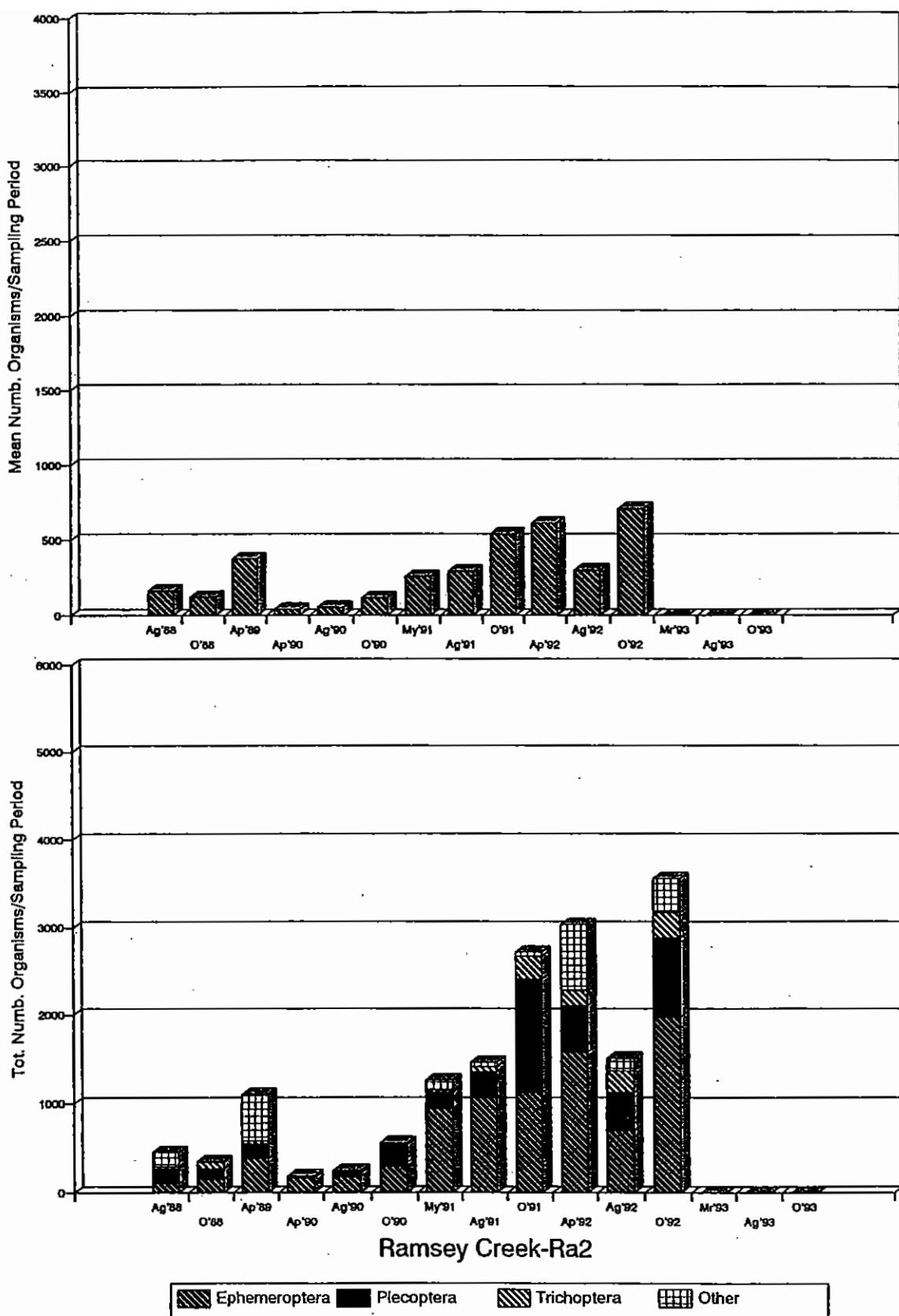
**Figure 17.** Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Libby Creek-L1, 1988-93.



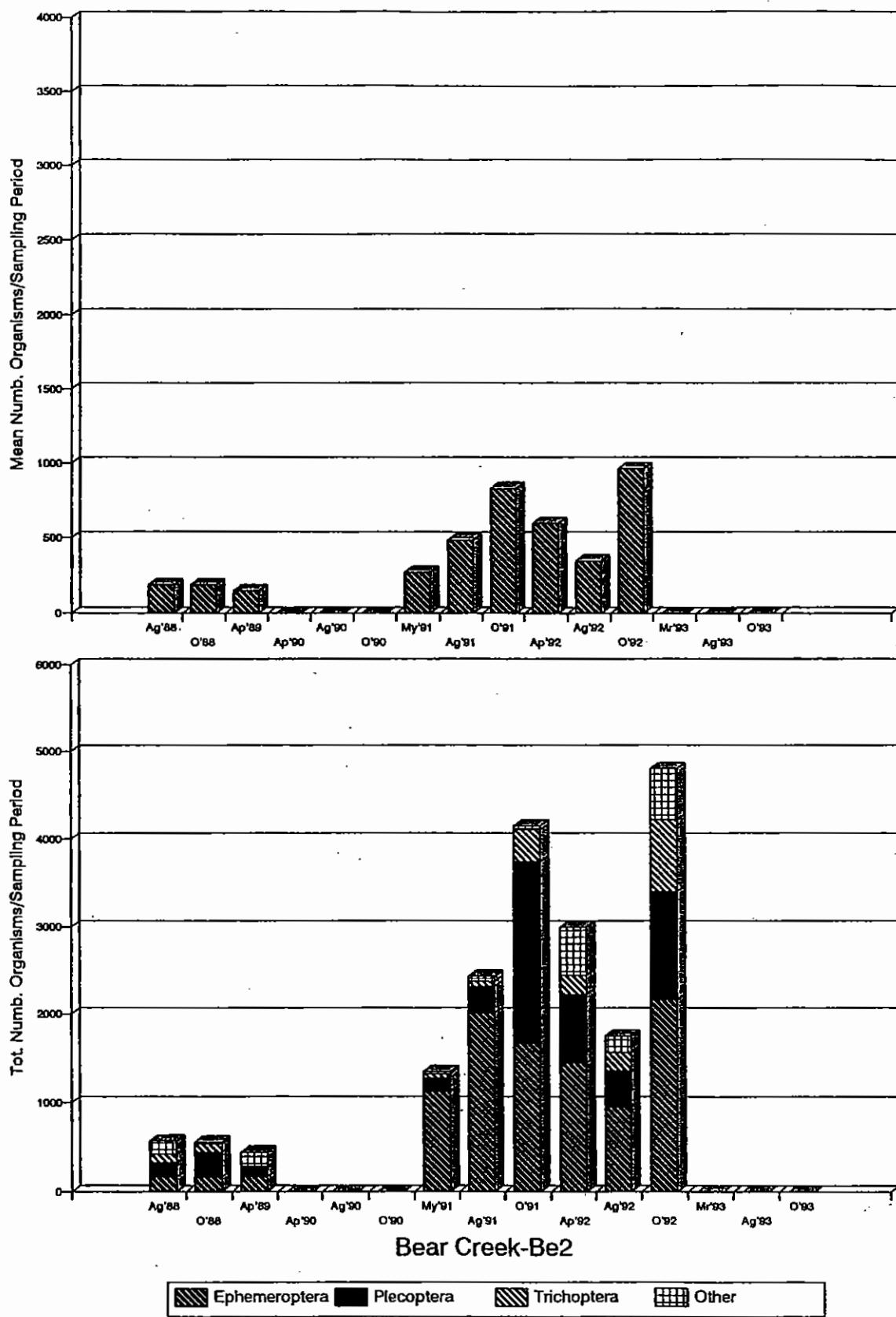
*Figure 18. Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Little Cherry Creek-LC1, 1988-93.*



**Figure 19.** Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Poorman Creek-Po1, 1988-93.



**Figure 20. Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Ramsey Creek-Ra2, 1988-93.**



**Figure 21.** Mean number of organisms and relative group abundance during each sampling period in the Montanore Project Area, Bear Creek-Be2, 1988-93.

higher than in October 1991 but was noticeably lower than in October 1993.

More specifically, all stations (Figures 14-21) have shown a gradual but steady increase in total populations since August 1988. In October 1991, the relative abundance of Plecopterans increased at all stations except Little Cherry Creek-LC1 but was most dramatic at Libby Creek-L9 where the highest mean number of organisms/sample was recorded in October 1991 and the Shannon Diversity Index dropped to 2.17. As indicated previously, this population boom was undoubtedly the result of nutrient enrichment due to mining activities (Farmer 1992, 1993a).

Though diminished relative to 1991, the Plecopteron abundance, consisting mostly of *Taenionema* sp., has persisted at Libby Creek-L9 and in October 1992 was similar to that seen at Poorman Creek-Po1 but was unique among the four Libby Creek stations in 1993 (Figures 22-25). Another noticeable population shift was relative increase of Chironomidae in 1993, particularly at L10 above the mine but also at L3 and L1 (Table 21).

Table 22 (p. 88) takes a closer look at the Libby Creek stations from the perspective of the Biological Quality Score discussed on page 59. The Sensitivity Ratio and BQ score were calculated for the 1990-93 Libby Creek data. Because populations tend to peak during the fall, each Libby Creek station is compared for that sampling period. The uppermost station, L10, received its lowest fall score, 10, in 1993. The station below the mine adit, L9, has retained a relatively high score all four years, either 13 or 14 and scored higher than L10 each fall except in 1991 when L10 scored one point higher. During these

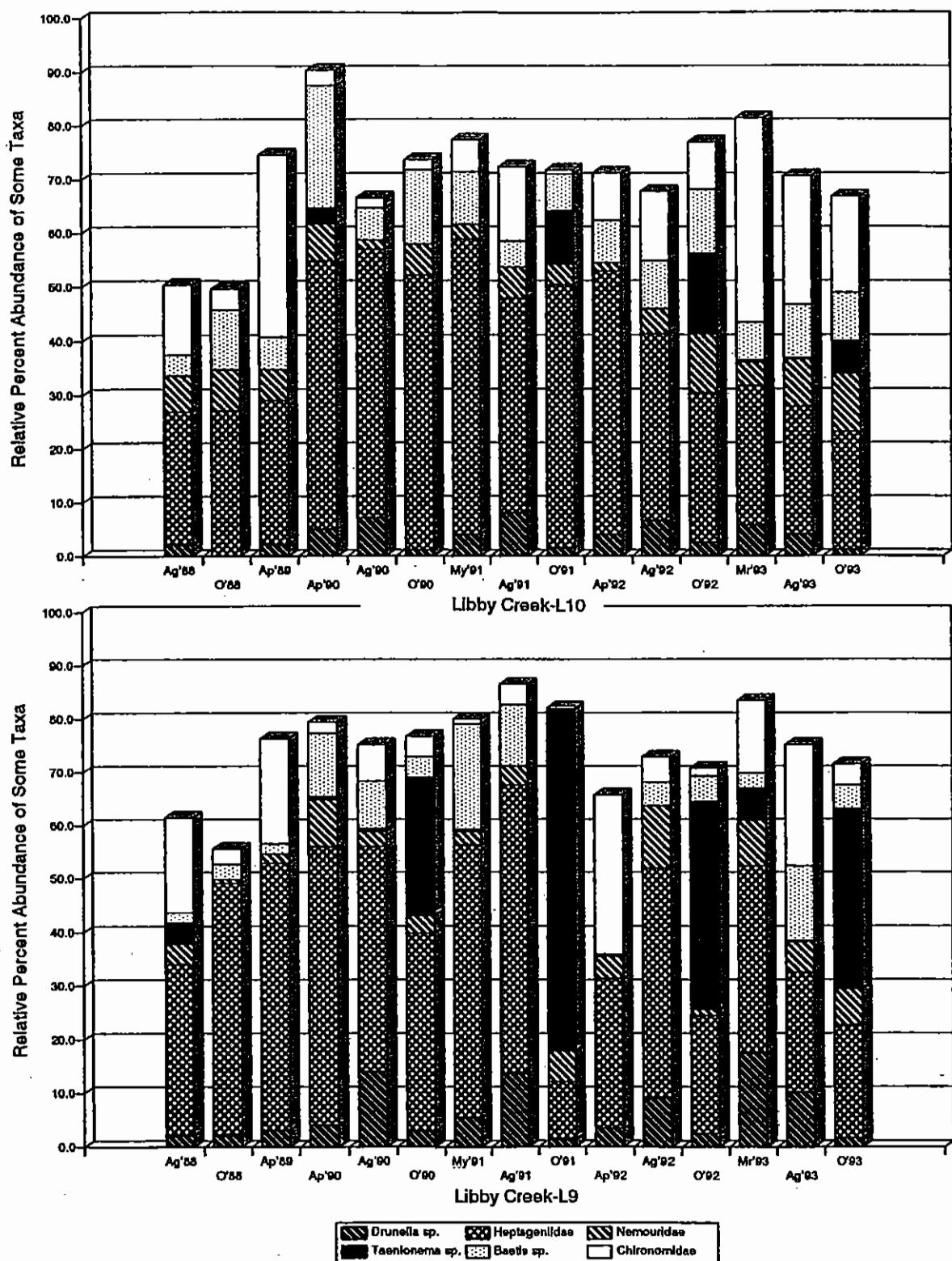


Figure 22. Relative abundance of some major taxa in the Montanore Project area, Libby Creek, L10 and L9, 1988-93.

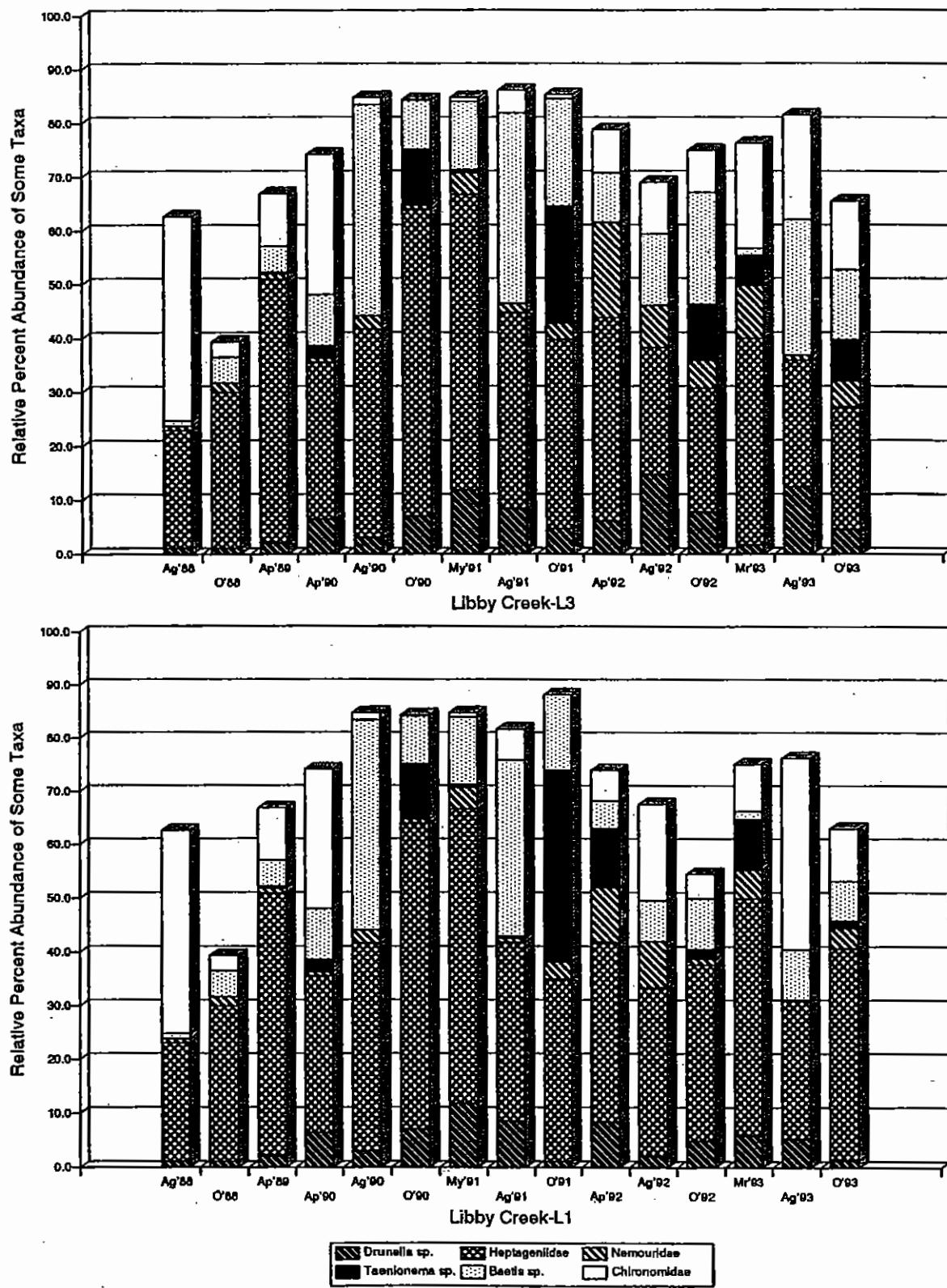


Figure 23. Relative abundance of some major taxa in the Montanore Project area, Libby Creek, L3 and L1, 1988-93.

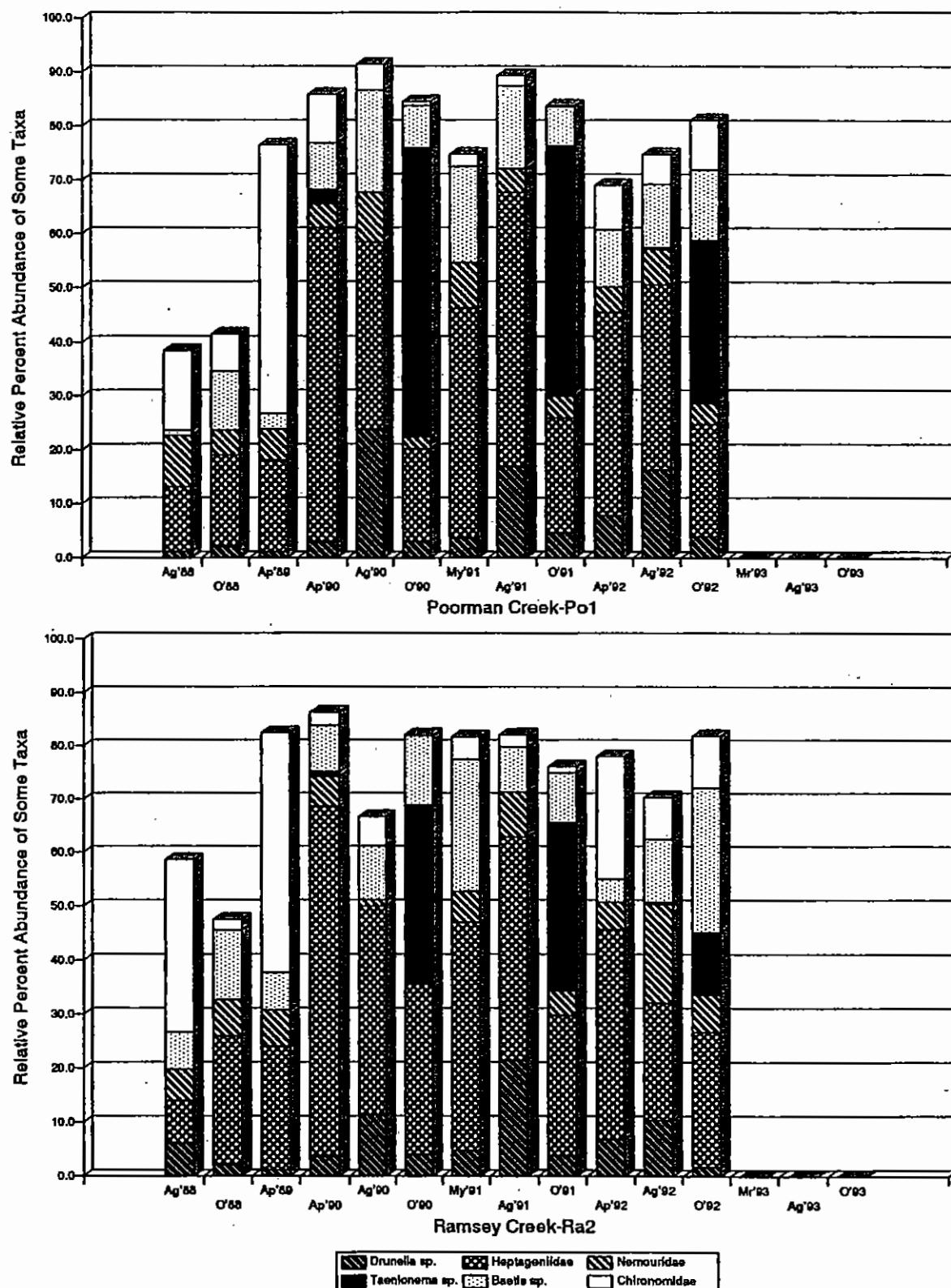


Figure 24. Relative abundance of some major taxa in the Montanore Project area, Poorman Creek-Po1 and Ramsey Creek-Ra2, 1988-93.

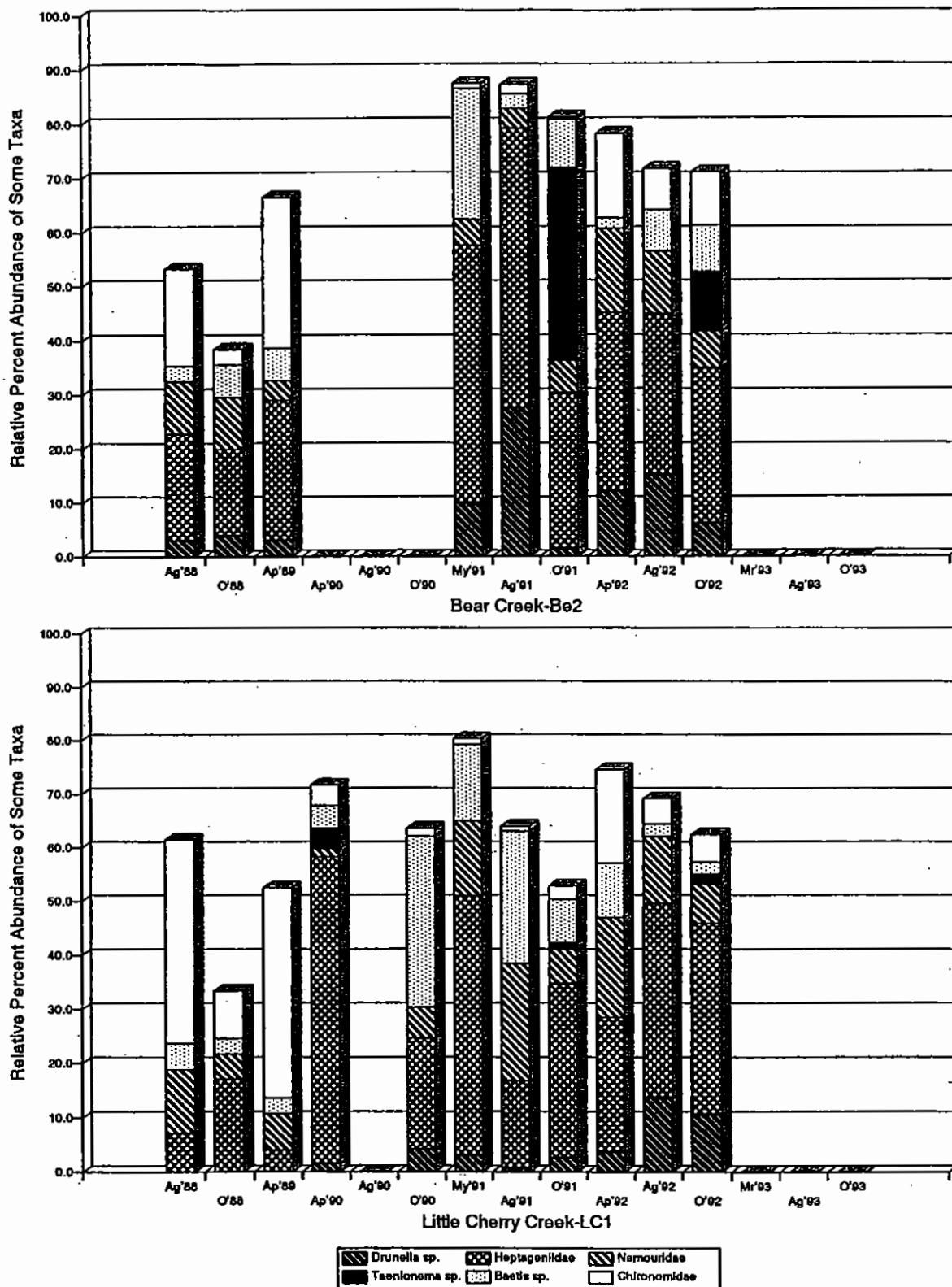


Figure 25. Relative abundance of some major taxa in the Montanore Project area, Bear Creek-Be2 and Little Cherry Creek-LC1, 1988-93.

Table 21. Comparison of predominant indicator and special concern species (% relative abundance) for aquatic macroinvertebrates in the Montanore Project area, 1988-1993.\*

STATION	SPECIES COMPOSITION
<b>Aug '88</b>	
L10	Chloroperlinae (20%), Chironomidae (14%), <i>Rhithrogena</i> sp. (11%)
L9	Chironomidae (19%), Chloroperlinae (18%), <i>Rhithrogena</i> sp. (12%), <i>Cinygmulia</i> sp. (10%)
L3	Chironomidae (57%), Chloroperlinae (12%), <i>Rhithrogena</i> sp. (5%)
L1	Chironomidae (39%), <i>Cinygmulia</i> sp. (11%), <i>Rhithrogena</i> sp. (10%), Chloroperlinae (10%)
LC1	<i>Yoraperla brevis</i> (21%), Chloroperlinae (11%), <i>Zapada columbiana</i> (8%)
Po1	Chironomidae (16%), <i>Perlomyia</i> sp. (15%), <i>Rhyacophila betteni</i> (11%), Chloroperlinae (10%)
Ra2	Chironomidae (32%), Chloroperlinae (22%), <i>Baetis</i> sp. (7%)
Be2	Chironomidae (19%), <i>Rhyacophila betteni</i> (12%), <i>Zapada columbiana</i> (10%), Chloroperlinae (9%)
<b>Oct '88</b>	
L10	Chloroperlinae (24%), <i>Cinygmulia</i> sp. (22%), <i>Baetis</i> sp. (11%)
L9	<i>Cinygmulia</i> sp. (36%), <i>Doddsia occidentalis</i> (26%), <i>Rhithrogena</i> sp. (11%)
L3	<i>Cinygmulia</i> sp. (27%), <i>Doddsia occidentalis</i> (16%), Chloroperlinae (13%)
L1	Chironomidae (18%), <i>Rhyacophila betteni</i> (12%), <i>Zapada columbiana</i> (9%)
LC1	<i>Cinygmulia</i> sp. (21%), Chloroperlinae (15%), <i>Yoraperla brevis</i> (11%), Chironomidae (11%)
Po1	Chloroperlinae (25%), <i>Cinygmulia</i> sp. (13%), <i>Baetis</i> sp. (12%)
Ra2	<i>Cinygmulia</i> sp. (16%), Chloroperlinae (16%), <i>Baetis</i> sp. (13%), <i>Glossosoma</i> sp. (12%)
Be2	Chloroperlinae (17%), <i>Perlomyia</i> sp. (16%)
<b>Ap '89</b>	
L10	Chironomidae (34%), <i>Cinygmulia</i> sp. (20%), Chloroperlinae (15%)
L9	<i>Cinygmulia</i> sp. (26%), Chironomidae (20%), Chloroperlinae (15%), <i>Epeorus</i> sp. (13%), <i>Rhithrogena</i> sp. (11%)
L3	Chironomidae (34%), <i>Cinygmulia</i> sp. (16%), <i>Epeorus</i> sp. (12%), Chloroperlinae (11%)
L1	<i>Cinygmulia</i> sp. (29%), <i>Epeorus</i> sp. (16%), Chironomidae (12%)
LC1	Chironomidae (39%), Simuliidae (23%), Chloroperlinae (9%)
Po1	Chironomidae (53%), <i>Epeorus</i> sp. (9%), <i>Cinygmulia</i> sp. (8%)
Ra2	Chironomidae (45%), <i>Cinygmulia</i> sp. (12%), <i>Epeorus</i> sp. (10%)
Be2	Chironomidae (31%), <i>Cinygmulia</i> sp. (16%), Chloroperlinae (16%)
<b>April '90</b>	
L10	<i>Epeorus</i> sp. (27%), <i>Baetis</i> sp. (23%), <i>Cinygmulia</i> sp. (21%)
L9	<i>Cinygmulia</i> sp. (29%), <i>Epeorus</i> sp. (19%), <i>Baetis</i> sp. (12%), Chloroperlinae (10%)
L3	not sampled
L1	Chironomidae (26%), <i>Cinygmulia</i> sp. (16%), <i>Epeorus</i> sp. (11%)
LC1	<i>Cinygmulia</i> sp. (37%), <i>Epeorus</i> sp. (21%)
Po1	<i>Epeorus</i> sp. (49%), <i>Cinygmulia</i> sp. (10%), Chironomidae (9%)
Ra2	<i>Cinygmulia</i> sp. (33%), <i>Epeorus</i> sp. (31%)
Be2	not sampled
<b>Aug '90</b>	
L10	<i>Rhithrogena</i> sp. (31%), Chloroperlinae (20%), <i>Cinygmulia</i> sp. (15%)
L9	<i>Rhithrogena</i> sp. (19%), <i>Cinygmulia</i> sp. (16%), <i>D. doddsi</i> (14%)
L3	<i>Rhithrogena</i> sp. (23%), <i>D. doddsi</i> (20%), <i>Baetis</i> sp. (14%)
L1	<i>Baetis</i> sp. (39%), <i>Rhithrogena</i> sp. (23%)
LC1	not sampled
Po1	<i>Epeorus</i> sp. (19%), <i>Baetis</i> sp. (19%), <i>Rhithrogena</i> sp. (12%)
Ra2	<i>Cinygmulia</i> sp. (27%), Chloroperlinae (12%), <i>D. doddsi</i> (9%)
Be2	not sampled

Table 21. (Continued).

STATION	SPECIES COMPOSITION
Oct '90	
L10	<i>Cinygmulia</i> sp. (44%), <i>Baetis</i> sp. (14%)
L9	<i>Cinygmulia</i> sp. (33%), <i>Taenionema</i> sp. (26%)
L3	<i>Cinygmulia</i> sp. (35%), <i>Taenionema</i> sp. (27%), <i>Baetis</i> sp. (19%)
L1	<i>Cinygmulia</i> sp. (49%), <i>Taenionema</i> sp. (11%)
LC1	<i>Baetis</i> sp. (32%), <i>Cinygmulia</i> sp. (20%)
Po1	<i>Taenionema</i> sp. (54%), <i>Cinygmulia</i> sp. (14%)
Ra2	<i>Taenionema</i> sp. (33%), <i>Cinygmulia</i> sp. (25%), <i>Baetis</i> sp. (13%)
Be2	not sampled
May '91	
L10	<i>Cinygmulia</i> sp. (29%), <i>Epeorus</i> sp. (23%), <i>Baetis</i> sp. (10%)
L9	<i>Cinygmulia</i> sp. (25%), <i>Baetis</i> sp. (20%), <i>Epeorus</i> sp. (13%), <i>Rhithrogena</i> sp. (12%)
L3	<i>Cinygmulia</i> sp. (31%), <i>Epeorus</i> sp. (21%), <i>Baetis</i> sp. (11%)
L1	<i>Cinygmulia</i> sp. (30%), <i>Epeorus</i> sp. (21%), <i>Baetis</i> sp. (13%)
LC1	<i>Cinygmulia</i> sp. (32%), <i>Baetis</i> sp. (14%), <i>Epeorus</i> sp. (13%)
Po1	<i>Cinygmulia</i> sp. (23%), <i>Baetis</i> sp. (18%), <i>Epeorus</i> sp. (16%)
Ra2	<i>Baetis</i> sp. (25%), <i>Epeorus</i> sp. (19%), <i>Cinygmulia</i> sp. (19%)
Be2	<i>Baetis</i> sp. (24%), <i>Epeorus</i> sp. (23%), <i>Cinygmulia</i> sp. (22%)
Aug '91	
L10	<i>Epeorus</i> sp. (21%), <i>Rhithrogena</i> sp. (19%), Chironomidae (14%), <i>Sweltsa/Suwallia</i> sp. (12%)
L9	<i>Rhithrogena</i> sp. (34%), <i>Epeorus</i> sp. (18%), <i>D. doddsi</i> (13%), <i>Baetis</i> sp. (12%)
L3	<i>Baetis</i> sp. (35%), <i>Rhithrogena</i> sp. (25%)
L1	<i>Baetis</i> sp. (33%), <i>Rhithrogena</i> sp. (24%)
LC1	<i>Baetis</i> sp. (25%), <i>Zapada columbiana</i> (22%), <i>Rhithrogena</i> sp. (10%)
Po1	<i>Rhithrogena</i> sp. (29%), <i>Epeorus</i> sp. (21%), <i>D. doddsi</i> (17%), <i>Baetis</i> sp. (16%)
Ra2	<i>D. doddsi</i> (21%), <i>Rhithrogena</i> sp. (20%), <i>Epeorus</i> sp. (18%)
Be2	<i>D. doddsi</i> (27%), <i>Rhithrogena</i> sp. (25%), <i>Epeorus</i> sp. (24%)
Oct '91	
L10	<i>Rhithrogena</i> sp. (20%), <i>Epeorus</i> sp. (15%), <i>Cinygmulia</i> sp. (15%), <i>Taenionema</i> sp. (10%)
L9	<i>Taenionema</i> sp. (64%)
L3	<i>Cinygmulia</i> sp. (24%), <i>Taenionema</i> sp. (22%), <i>Baetis</i> sp. (20%)
L1	<i>Taenionema</i> sp. (36%), <i>Cinygmulia</i> sp. (20%), <i>Baetis</i> sp. (14%), <i>Rhithrogena</i> sp. (12%)
LC1	<i>Cinygmulia</i> sp. (31%), <i>Sweltsa/Suwallia</i> sp. (13%), <i>Baetis</i> sp. (8%)
Po1	<i>Taenionema</i> sp. (46%), <i>Cinygmulia</i> sp. (9%), <i>Rhithrogena</i> sp. (8%)
Ra2	<i>Taenionema</i> sp. (31%), <i>Rhithrogena</i> sp. (15%), <i>Cinygmulia</i> sp. (11%), <i>Baetis</i> sp. (10%)
Be2	<i>Taenionema</i> sp. (36%), <i>Rhithrogena</i> sp. (15%), <i>Cinygmulia</i> sp. (11%)
April '92	
L10	<i>Cinygmulia</i> sp. (38%), <i>Epeorus</i> sp. (9%), Chironomidae (9%)
L9	Chironomidae (30%), <i>Cinygmulia</i> sp. (23%), <i>Sweltsa/Suwallia</i> sp. (13%)
L3	<i>Cinygmulia</i> sp. (18%), <i>Epeorus</i> sp. (18%), Nemouridae (12%)
L1	<i>Cinygmulia</i> sp. (28%), <i>Taenionema</i> sp. (11%), Nemouridae (10%)
LC1	Chironomidae (18%), <i>Cinygmulia</i> sp. (14%), <i>Epeorus</i> sp. (10%), <i>Baetis</i> sp. (10%)
Po1	<i>Cinygmulia</i> sp. (19%), <i>Epeorus</i> sp. (14%), <i>D. occidentalis</i> (12%), <i>Baetis</i> sp. (11%)
Ra2	<i>Cinygmulia</i> sp. (24%), Chironomidae (23%), <i>Epeorus</i> sp. (12%)
Be2	<i>Cinygmulia</i> sp. (20%), Chironomidae (16%), <i>Epeorus</i> sp. (11%)
Aug '92	
L10	<i>Epeorus</i> sp. (14%), Chironomidae (13%), <i>Cinygmulia</i> sp. (12%), <i>Sweltsa/Suwallia</i> sp. (11%)

Table 21. (Continued).

STATION	SPECIES COMPOSITION
L9	<i>Rhithrogena</i> sp. (23%), <i>Epeorus</i> sp. (18%), <i>Z. columbiana</i> (12%),
L3	<i>D. doddsi</i> (15%), <i>Rhithrogena</i> sp. (14%), <i>Baetis</i> sp. (13%), <i>Oligophlebodes</i> sp. (10%)
L1	<i>Rhithrogena</i> sp. (25%), Chironomidae (18%)
LC1	<i>Cinygmula</i> sp. (36%), <i>Z. columbiana</i> (11%), <i>Drunella</i> sp. (10%)
Po1	<i>Rhithrogena</i> sp. (20%), <i>D. doddsi</i> (16%), Hydropsychidae (14%), <i>Baetis</i> sp. (12%), <i>Epeorus</i> sp. (11%)
Ra2	<i>Z. columbiana</i> (14%), <i>Baetis</i> sp. (12%), <i>Rhithrogena</i> sp. (11%), Hydropsychidae (11%)
Be2	<i>Rhithrogena</i> sp. (19%), <i>D. doddsi</i> (15%)
Oct '92	
L10	<i>Cinygmula</i> sp. (18%), <i>Taenionema</i> sp. (15%), <i>Baetis</i> sp. (12%)
L9	<i>Taenionema</i> sp. (39%), <i>Cinygmula</i> sp. (15%), <i>Glossosoma</i> sp. (15%)
L3	<i>Baetis</i> sp. (21%), <i>Cinygmula</i> sp. (18%), <i>Taenionema</i> sp. (11%)
L1	<i>Rhithrogena</i> sp. (22%), Hydropsychidae (20%), <i>Cinygmula</i> sp. (11%), <i>Baetis</i> sp. (10%)
LC1	<i>Cinygmula</i> sp. (27%), <i>Diphetor</i> sp. (8%)
Po1	<i>Taenionema</i> sp. (30%), <i>Cinygmula</i> sp. (15%), <i>Baetis</i> sp. (13%)
Ra2	<i>Baetis</i> sp. (27%), <i>Cinygmula</i> sp. (19%), <i>Taenionema</i> sp. (12%)
Be2	<i>Cinygmula</i> sp. (21%), <i>Glossosoma</i> sp. (12%), <i>Taenionema</i> sp. (11%)
Mar '93	
L10	Chironomidae (38%), <i>Cinygmula</i> sp. (17%), <i>Baetis</i> sp. (7%)
L9	<i>Cinygmula</i> sp. (22%), <i>Drunella</i> sp. (16%), Chironomidae (14%), <i>Epeorus</i> sp. (13%)
L3	<i>Cinygmula</i> sp. (32%), Chironomidae (20%), <i>Sweltsa/Suwallia</i> sp. (9%)
L1	<i>Cinygmula</i> sp. (40%), <i>Taenionema</i> sp. (10%), <i>Sweltsa/Suwallia</i> sp. (8%), <i>Paraleptophlebia</i> sp. (8%)
LC1	not sampled
Po1	not sampled
Ra2	not sampled
Be2	not sampled
Aug '93	
L10	Chironomidae (24%), <i>Epeorus</i> sp. (13%), <i>Baetis</i> sp. (10%), <i>Rhithrogena</i> sp. (8%)
L9	Chironomidae (23%), <i>Baetis</i> sp. (14%), <i>Epeorus</i> sp. (13%), <i>Drunella doddsi</i> (7%)
L3	<i>Baetis</i> sp. (25%), Chironomidae (20%), <i>Epeorus</i> sp. (19%), <i>Drunella doddsi</i> (12%)
L1	Chironomidae (36%), <i>Epeorus</i> sp. (12%), <i>Baetis</i> sp. (10%)
LC1	not sampled
Po1	not sampled
Ra2	not sampled
Be2	not sampled
Oct '93	
L10	Chironomidae (18%), <i>Cinygmula</i> sp. (16%), <i>Sweltsa/Suwallia</i> sp. (11%), <i>Zapada columbiana</i> (11%), <i>Baetis</i> sp. (9%), <i>Taenionema</i> sp. (6%)
L9	<i>Taenionema</i> sp. (34%), <i>Cinygmula</i> sp. (16%), <i>Glossosoma</i> sp. (11%)
L3	<i>Neophylax</i> sp. (16%), <i>Cinygmula</i> sp. (16%), <i>Baetis</i> sp. (13%), Chironomidae (13%), <i>Taenionema</i> sp. (8%)
L1	<i>Cinygmula</i> sp. (27%), Hydropsychidae (11%), <i>Rhithrogena</i> sp. (11%), Chironomidae (10%), <i>Baetis</i> sp. (8%)
LC1	not sampled
Po1	not sampled
Ra2	not sampled
Be2	not sampled

\*kick and Hess sample sets combined

**Table 22.** A comparison of criteria and Biological Quality Scores from the aquatic macroinvertebrate samples collected from Libby Creek in the Montanore Project area, 1988-1993.

Station	Mean (No. of Samp.)	SDI	EPT/C	Sen. Ratio	EPT % (Rich.)	Dominant Taxon	BQ Score
<b>August 1988</b>							
L10	177(3H)	4.03	5.75	--	78(37)	Chloroperlinae (20%)	--
L9	216(3H)	4.06	4.00	--	76(41)	Chironomidae (19%)	--
L3	493(3H)	3.90	0.70	--	40(46)	Chironomidae (57%)	--
L1	358(3H)	4.08	1.45	--	57(49)	Chironomidae (39%)	--
<b>October 1988</b>							
L10	161(3H)	3.62	21.7	--	94(31)	Chloroperlinae (24%)	--
L9	65(3H)	2.93	30.5	--	94(20)	<i>Cinygmulia</i> sp. (36%)	--
L3	75(3H)	3.60	20.3	--	91(30)	<i>Cinygmulia</i> sp. (27%)	--
L1	201(3H)	4.06	4.2	--	74(27)	Chironomidae (18%)	--
<b>April 1989</b>							
L10	192(3H)	3.07	1.8	--	63(27)	Chironomidae (34%)	--
L9	102(3H)	3.13	3.9	--	77(24)	<i>Cinygmulia</i> sp. (26%)	--
L3	111(3H)	3.26	1.8	--	62(31)	Chironomidae (34%)	--
L1	215(3H)	3.89	6.92	--	81(38)	<i>Cinygmulia</i> sp. (29%)	--
<b>April 1990</b>							
L10	41(5H)	2.99	32.33	0.729	91(16)	<i>Ephorus</i> sp. (27%)	12
L9	35(5H)	3.24	40.0	0.810	92(22)	<i>Cinygmulia</i> sp. (29%)	13
L3	--	--	--	--	--	--	--
L1	65(5H)	3.51	2.33	0.511	61(24)	Chironomidae (26%)	9
<b>August 1990</b>							
L10	76(5H)	3.23	50.29	0.871	93(23)	<i>Rhithrogena</i> (31%)	14
L9	80(5H)	3.58	13.69	0.828	89(26)	<i>Rhithrogena</i> (19%)	11
L3	100(5H)	3.21	26.39	0.741	95(27)	<i>Rhithrogena</i> (23%)	13
L1	175(5H)	2.97	64.30	0.562	96(33)	<i>Rhithrogena</i> (23%)	11
<b>October 1990</b>							
L10	53(5H)	2.99	50.00	0.791	87(27)	<i>Cinygmulia</i> sp. (43%)	12
L9	35(5H)	3.27	22.08	0.886	90(35)	<i>Cinygmulia</i> sp. (33%)	13
L3	151(5H)	2.94	371.00	0.864	87(34)	<i>Cinygmulia</i> sp. (35%)	13
L1	213(5H)	2.80	347.00	0.863	77(34)	<i>Cinygmulia</i> sp. (49%)	13

Table 22. (Continued).

Station	Mean (No. of Samp.)	SDI	EPT/C	Sen. Ratio	EPT % (Rich.)	Dominant Taxon	BQ Score
<b>May 1991</b>							
L10	165(4H,1k)	3.28	14.55	0.779	77(22)	<i>Cinygmulia</i> sp. (29%)	11
L9	38(4H,1k)	3.19	89.50	0.747	94(38)	<i>Cinygmulia</i> sp. (25%)	13
L3	134(4H,1k)	3.13	13.04	0.812	92(25)	<i>Cinygmulia</i> sp. (31%)	11
L1	175(4H,1k)	3.30	118.57	0.800	95(34)	<i>Cinygmulia</i> sp. (30%)	13
<b>August 1991</b>							
L10	393(4H,1k)	3.45	5.56	0.757	80(30)	<i>Epeorus</i> sp. (21%)	10
L9	359(4H,1k)	3.10	23.56	0.819	83(34)	<i>Rhithrogena</i> (34%)	12
L3	458(4H,1k)	3.03	21.76	0.555	93(33)	<i>Baetis</i> sp. (35%)	11
L1	407(4H,1k)	3.17	15.95	0.567	93(35)	<i>Baetis</i> sp. (33%)	11
<b>October 1991</b>							
L10	613(4H,1k)	3.68	113.69	0.862	96(39)	<i>Rhithrogena</i> (20%)	14
L9	892(4H,1k)	2.17	4422.0	0.900	99(32)	<i>Taenionema</i> (64%)	14
L3	738(4H,1k)	3.22	125.55	0.733	99(36)	<i>Cinygmulia</i> sp. (24%)	13
L1	891(4H,1k)	2.90	737.17	0.816	99(37)	<i>Taenionema</i> (36%)	12
<b>April 1992</b>							
L10	314(4H,1k)	3.38	10.19	0.780	87(38)	<i>Cinygmulia</i> sp. (38%)	11
L9	262(4H,1k)	3.49	2.23	0.625	66(30)	Chironomidae (30%)	9
L3	688(4H,1k)	3.71	11.13	0.792	90(44)	<i>Cinygmulia</i> sp. (18%)	11
L1	857(4H,1k)	3.80	14.96	0.744	88(46)	<i>Cinygmulia</i> sp. (28%)	11
<b>August 1992</b>							
L10	252(4H,1k)	3.82	5.85	0.681	78(28)	<i>Epeorus</i> sp. (14%)	10
L9	346(4H,1k)	3.70	18.56	0.810	90(35)	<i>Rhithrogena</i> (23%)	12
L3	790(4H,1k)	3.83	9.13	0.582	89(40)	<i>D. doddsi</i> (15%)	10
L1	679(4H,1k)	3.65	4.17	0.580	75(32)	<i>Rhithrogena</i> (25%)	9
<b>October 1992</b>							
L10	689(4H,1k)	3.79	9.73	0.756	89(39)	<i>Cinygmulia</i> sp. (18%)	11
L9	633(4H,1k)	3.09	55.45	0.913	96(37)	<i>Taenionema</i> (35%)	14
L3	1091(4H,1k)	3.81	11.33	0.560	91(43)	<i>Baetis</i> sp. (21%)	11
L1	894(4H,1k)	3.73	19.11	0.599	91(47)	<i>Rhithrogena</i> (22%)	11

Table 22. (Continued).

Station	Mean (No. of Samp.)	SDI	EPT/C	Sen. Ratio	EPT % (Rich.)	Dominant Taxon	BQ Score
<b>March 1993</b>							
L10	294(4H,1k)	3.33	1.60	0.525	60(38)	Chironomidae (38%)	9
L9	336(4H,1k)	3.70	6.13	0.811	84(42)	<i>Cinygmulidae</i> sp. (22%)	10
L3	493(4H,1k)	3.21	4.02	0.771	80(31)	<i>Cinygmulidae</i> sp. 32%	10
L1	357(4H,1k)	3.18	10.01	0.863	89(38)	<i>Cinygmulidae</i> sp. 40%	11
<b>August 1993</b>							
L10	586(4H,1k)	3.84	3.02	0.624	72(46)	Chironomidae (24%)	10
L9	388(4H,1k)	3.72	3.14	0.587	73(44)	Chironomidae (23%)	9
L3	957(4H,1k)	3.33	3.97	0.498	77(53)	<i>Baetis</i> sp. (25%)	8
L1	849(4H,1k)	3.41	1.72	0.498	61(49)	Chironomidae (36%)	8
<b>October 1993</b>							
L10	778(4H,1k)	3.87	4.43	0.653	79(49)	Chironomidae (18%)	10
L9	793(4H,1k)	3.48	22.51	0.874	93(48)	<i>Taenionemata</i> (34%)	13
L3	955(4H,1k)	3.89	6.49	0.708	84(65)	<i>Neophyalex</i> (16%)	11
L1	1068(4H,1k)	3.89	8.75	0.673	87(46)	<i>Cinygmulidae</i> sp. (27%)	10

sampling periods the Shannon Diversity Index at L10 increased from 2.99 to 3.87 in 1993 but the Sensitivity Ratio (SR) diminished to 0.653 in October 1993. At L9 the SDI dropped to 2.17 in October 1991 and gradually increased back up to 3.48 in October 1993 while the SR remained relatively high during the fall sampling periods.

The next downstream station, L3, which is a little over four miles below L9, has diminished in quality from a score of 13 to 11 in the last two years although a score of 11 is still indicative of minor impairment. The SDI has stayed relatively high at L3, except in October 1990 (2.94) while the SR dropped to 0.550 in October 1992.

The BQ Score for the lowest downstream station, L1, has also decreased, from 13 in 1990 to a 10 in 1993. The SDI has gradually increased from 2.80 in 1990 to 3.89 in October 1993 but the SR fell to 0.599 in October 1992 and increased slightly to 0.673 in October 1993.

The peak total population that occurred at L9 in fall 1991 (Figure 15) appears to be gradually moving downstream. The spike was visible at Libby Creek-L3 in October 1992 (Figure 16) and at Libby Creek-L1 in October 1993 (Figure 17). Downstream conveyance of nutrients, resulting in shifts in population structure along the course of the transport, is in accordance with the River Continuum Concept (Resh et al., 1984 and Ward, 1992). Stream invertebrates reflect the shift in location and types of food resources available. Not only does a nutrient loading, such as seen at the L9 sampling station in 1991, enhance biological populations at that point but continues to modify populations farther downstream in a continuous cycle of utilization-release.

##### **5. statistical evaluation of the 1993 data**

The mean and standard deviation for each replicate set are presented in the Appendices. The mean, standard deviation, % coefficient of variation and % standard error of the mean for the four Hess samples appear in Table 23.

The coefficient of variation (%CV) indicates whether or not the sampling technique is adequate. The percent standard error of the mean (%SE) indicates when a sufficient number of samples have been taken to account for community variability. EPA recommends the coefficient of variation should be under 50 percent and the standard of error of the mean should be under 20 percent (Winget et al, 1979).

The 50%CV was exceeded only by the L10 and L9 spring replicate sets. The 20%SE was also exceeded by all of the spring sample sets, by the L10 set in August, and by the L9 and L3 sets in October.

The streams and their biological communities are in a state of transition in the spring prior to the dramatic scouring period typical in Libby Creek. Populations at all the stations tend to be spotty in the spring, depending on the degree of snow pack removal that has occurred prior to sampling, flow rates, riffle accessibility and water temperature, making it difficult to obtain samples which meet these statistical requirements. Conversely, summer samples, which are usually collected during minimal but adequate flows when biological populations are culminating, are statistically adequate. The exception at L10 in August of 1993 was due to the luxuriant growth of stringy green algae which virtually covered the entire substrate. Because macroinvertebrates are exceedingly difficult to

Table 23. Statistical evaluation of the 1993 Libby Creek Hess samples.

STATION	SAMPLE	TOTAL	MEAN	STAND. DEV.	%CV	%SE
<b>March '93</b>						
L10	1	91				
	2	249				
	3	499				
	4	269				
	Total	1108	277	145.5	52.5	30.9
L9	1	113				
	2	345				
	3	208				
	4	80				
	Total	746	187	102.9	55.2	32.5
L3	1	128				
	2	216				
	3	437				
	4	442				
	Total	1223	306	137.3	44.9	26.4
L1	1	69				
	2	257				
	3	243				
	4	235				
	Total	804	201	76.6	38.1	22.4
<b>August '93</b>						
L10	1	223				
	2	285				
	3	82				
	4	396				
	Total	986	247	113.4	46.0	27.1
L9	1	201				
	2	234				
	3	249				
	4	177				
	Total	861	215	28.1	13.1	7.7
L3	1	544				
	2	376				
	3	761				
	4	841				
	Total	2522	631	182.8	29.0	17.1
L1	1	505				
	2	532				

Table 23. (Continued).

		TOTAL	MEAN	STAND.DEV.	%CV	%SE
	3	674				
	4	404				
	Total	2115	529	98.5	18.3	10.7
<b>October '93</b>						
L10	1	256				
	2	294				
	3	379				
	4	340				
	Total	1269	317	48.4	14.6	8.6
L9	1	456				
	2	917				
	3	418				
	4	286				
	Total	2077	519	238.2	45.9	27.0
L3	1	147				
	2	199				
	3	57				
	4	194				
	Total	597	149	57.0	38.2	22.5
L1	1	748				
	2	322				
	3	584				
	4	889				
	Total	2543	636	210.9	33.2	19.5

separate from the algae for identification and enumeration, the acceptable sampling sites at L10 in August were limited as the net was placed where the algae was least dense which may have not been the most ideal macroinvertebrate sites.

The high variability between replicates at L9 and L3 in October could possibly be ameliorated by the addition of one or more replicates. However, it has been shown that increasing the number of replicates above five results in little reduction of minimum detectable differences between means because the variability of most taxa is so high (Rosenberg et al., 1993). Certainly, additional replicates/station never hurt but they do not always result in the most desireable statistical results either. Considering the relatively sterile nature of the biota in Libby Creek, a standard error of 30% or less seems reasonable.

#### D. Conclusions

1. The 1993 macroinvertebrate data collected from the four Libby Creek stations continued to document the variable seasonal and annual nature of this system and its relatively rapid response to natural and anthropogenic influences.
2. The two uppermost stations, L10 and L9, continue to exhibit higher water quality than the two downstream stations, L3 and L1, although all four stations are considered to have relatively high biological integrity and little overall impairment.
3. Although the station below the mine, L9, responded dramatically in October 1991 to increased nutrient loading via mining activities, these changes were exacerbated by normal

annual variation in stream conditions, and other stations such as Po1, indicated there was a concurrent similar biological shift that would have occurred at L9 even without the additional nitrate load.

4. The impact of excess nitrates at L9 seems to have been favorable for this reach of Libby Creek and the station exhibited high biological integrity both years after the "impact".

5. The enhancement of macroinvertebrate populations, which occurred at L9 in October 1991, is gradually being transferred downstream and was visible at L3 in 1992 and at L1 in 1993. Along with this amplification in numbers, there was a shift in population structure with an increased relative abundance of Chironomidae at L3 and L1. However, increased Chironomidae populations also occurred at L10 in 1993, indicating some congruity of natural variation among the four Libby Creek stations.

6. Although the 1991 nutrient loading was beneficial to the biota at L9, its effects appeared to be somewhat less desirable as part of the process of downstream accumulation of effects at the lower stations, L3 and L1.

#### E. Future Monitoring

Aquatic biological monitoring of streams in the Montanore Project area will resume during the operational phase of the project.

## V. SUMMARY

Interim biological monitoring of the four Libby Creek stations was continued in 1993 to document and evaluate the impacts of nutrient loading during mining operations in 1991. Four Hess, one kick and one composite periphyton sample was collected from each of the four stations in March, August and October 1993. Twenty-one genera of non-diatom algae, a 104 species of diatom algae and 95 macroinvertebrate taxa were recovered from the 1993 samples.

Periphyton results revealed minor differences between non-diatom and diatom algae associations at the two upper Libby Creek stations, L10 and L9. Biological integrity was highest at L10 and L9. The station below the Montanore adit, L9, was rated excellent with no impairment on all three sampling dates in 1993. Biological integrity decreased at the downstream stations, L3 and L1, and was poorest at L3. Reassessment of the 1991 and 1992 periphyton data in comparison to the 1993 data, revealed that biological integrity and impairment of aquatic life was virtually unchanged at the four Libby Creek stations from 1991 to 1993.

The macroinvertebrate data demonstrated natural as well as anthropogenic impacts to the Libby Creek system which have and are continuing to occur annually. Like the periphyton data, macroinvertebrate data also revealed that the two upper stations, L10 and L9, are of slightly higher quality than L3 and L1, although overall, the four stations exhibited high biological integrity and minor impairment.

The nutrient loading in 1991 via the Montanore mine was exacerbated by a concurrent

natural fluctuation in benthic populations documented at some of the other sampling stations. The effects of the loading on Libby Creek at the L9 site were dramatic but favorable. However, as part of a cumulative downstream process, the beneficial impacts seem to be somewhat reduced at the lower stations, L3 and L1.

Aquatic biological monitoring will be resumed during the operational phase of the Montanore Project.

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## **VIII. APPENDICES**

**Appendix A. Estimated relative abundance and biovolume contribution rank () of diatoms and genera of non-diatom algae in periphyton samples collected during 1993 Montanore Project biological monitoring.**

Appendix A . Estimated relative abundance and biovolume contribution rank ( ) of diatoms and genera of non-diatom algae in periphyton samples collected during 1993 Montanore Project biological monitoring.

R=rare; C=common; VC=very common; A=abundant; VA=very abundant

Sampling Date:	March 1993			
Stream Name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site Number:	L10	L9	L3	L1
ID Number:	P004G	P003G	P002G	P001G
<b>Bacillariophyta (diatoms)</b>				
All genera collectively	C(1)	A(2)	R	R
<b>Chlorophyta (green algae)</b>				
Cosmarium	R	R		
Crucigenia				C(3)
Microspora				
Monostroma				
Mougeotia				
Oedogonium				
Spirogyra				
Staurastrum		R		
Stigeoclonium				
Trebouxia				C(2)
Ulothrix		C(4)		
Zygneria	R	R		
<b>Chrysophyta (yellow-green algae)</b>				
Hydrurus		A(3)		C(1)
Phaeodermatium				
<b>Cyanophyta (blue-green algae)</b>				
Anabaena			R	
Aphanocapsa			R	
Chamaesiphon				
Merismopedia				
Microcystis				
Oscillatoria		VA(1)		
Phormidium			R	R
moss	A		C	

Appendix A . Estimated relative abundance and biovolume contribution rank ( ) of diatoms and genera of non-diatom algae in periphyton samples collected during 1993 Montanore Project biological monitoring.

R=rare; C=common; VC=very common; A=abundant; VA=very abundant

Sampling Date:	August 1993			
Stream Name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site Number:	L10	L9	L3	L1
ID Number:	P004H	P003H	P002H	P001H
<b>Bacillariophyta (diatoms)</b>				
All genera collectively	R	C(4)	VA(1)	VC(4)
<b>Chlorophyta (green algae)</b>				
Cosmarium				
Crucigenia				
Microspora		C(5)		
Monostroma				VC(3)
Mougeotia				
Oedogonium				
Spirogyra	C(4)	R	R	
Staurastrum				
Stigeoclonium				R
Trebouxia				
Ulothrix	C(5)		C(4)	VA(1)
Zygnema	VA(1)	A(3)	A(2)	
<b>Chrysophyta (yellow-green algae)</b>				
Hydrurus	VC(3)	VA(1)		VC(5)
Phaeodermatium				
<b>Cyanophyta (blue-green algae)</b>				
Anabaena				
Aphanocapsa				
Chamaesiphon				
Merismopedia				
Microcystis			R	
Oscillatoria	VA(2)	VA(2)	A(3)	A(2)
Phormidium				
moss	C	R		

Appendix A . Estimated relative abundance and biovolume contribution rank ( ) of diatoms and genera of non-diatom algae in periphyton samples collected during 1993 Montanore Project biological monitoring.

R=rare; C=common; VC=very common; A=abundant; VA=very abundant

Sampling Date:	October 1993			
Stream Name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site Number:	L10	L9	L3	L1
ID Number:	P004I	P003I	P002I	P001I
<b>Bacillariophyta (diatoms)</b>				
All genera collectively	C(5)	C(8)	A(2)	VA(1)
<b>Chlorophyta (green algae)</b>				
Cosmarium			C(6)	R
Crucigenia				
Microspora	A(1)	C(6)	VC(4)	
Monostroma				
Mougeotia	R			
Oedogonium	R			
Spirogyra	C(3)	VC(3)		
Staurastrum	R		R	C(5)
Stigeoclonium			R	R
Trebouxia				
Ulothrix	C(4)	C(7)	C(5)	R
Zygema	VC(2)	A(1)	C(3)	
<b>Chrysophyta (yellow-green algae)</b>				
Hydrurus		VC(4)		
Phaeodermatium			R	C(4)
<b>Cyanophyta (blue-green algae)</b>				
Anabaena				
Aphanocapsa				
Chamaesiphon		VC(6)		
Merismopedia				R
Microcystis			A(5)	
Oscillatoria	R	VA(2)	VA(1)	VA(2)
Phormidium		C(9)	R	VC(3)
moss	VC	VC	VC	

**Appendix B. Diatom proportional count data, 1993 Montanore periphyton monitoring.**

Appendix B. Diatom proportional count data, 1993 Montanore periphyton monitoring.  
 PT = Pollution Tolerance group number (Lange-Bertalot 1979); PRA = Percent Relative  
 Abundance. A "p" indicates species seen during floristic scan but not during count.

Sampling date: March 1993

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004G	P003G	P002G	P001G
<b>SPECIES</b>				
<i>Achnanthes biasolettiana</i>	3	0.00	0.00	4.98
<i>A. bioretii</i>	3	0.00	0.00	0.00
<i>A. chlidanos</i>	3	p	0.00	0.00
<i>A. daonensis</i>	3	0.43	0.25	1.49
<i>A. grischuna</i>	3	0.00	0.00	0.00
<i>A. helvetica</i>	3	0.43	0.00	0.00
<i>A. kranzii</i>	3	0.85	0.00	0.00
<i>A. kriegeri</i>	3	5.98	p	0.00
<i>A. laevis</i>	3	0.00	0.00	0.50
<i>A. lanceolata</i>	2	p	0.00	1.00
<i>A. marginulata</i>	3	0.00	0.00	0.00
<i>A. minutissima</i>	3	34.19	58.72	63.68
<i>A. nodosa</i>	3	0.85	0.00	0.00
<i>A. pusilla</i>	3	0.00	0.25	1.00
<i>A. rupestris</i>	3	0.00	0.00	0.00
<i>A. stolidia</i>	3	0.00	0.00	0.00
<i>A. subatomoides</i>	3	0.85	0.00	0.00
<i>Amphora dusenii</i>	2	0.00	0.00	0.00
<i>A. libyca</i>	3	0.00	p	0.00
<i>A. pediculus</i>	3	0.00	0.00	0.00
<i>Anomoeoneis brachysira</i>	3	0.00	0.00	0.00
<i>A. vitrea</i>	2	p	1.23	0.00
<i>Aulacoseira alpigena</i>	3	6.84	p	1.00
<i>A. distans</i>	3	0.00	0.00	0.00
<i>A. pfaffiana</i>	3	0.00	0.00	0.00
<i>Caloneis bacillum</i>	2	0.00	0.00	p
<i>Cocconeis placentula</i>	3	0.00	0.00	0.50
<i>Cymbella affinis</i>	3	0.00	0.00	0.00
<i>C. cesatii</i>	3	0.00	p	0.00
<i>C. cistula</i>	3	p	0.00	0.50
				0.24

Sampling date: March 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004G	P003G	P002G	P001G

SPECIES	P	PRA	PRA	PRA	PRA
<i>C. cymbiformis</i>	3				0.24
<i>C. gracilis</i>	3	p	p		
<i>C. microcephala</i>	2				
<i>C. minuta</i>	2		7.37	0.5	0.72
<i>C. naviculiformis</i>	3	p			
<i>C. silesiaca</i>	3	2.99	2.7	1.49	0.72
<i>C. sinuata</i>	3	0.00	0.00	2.99	3.13
<i>Diatoma anceps</i>	3	0.85	0.00	0.00	0.00
<i>D. hyemalis</i>	3	0.00	0.00	0.00	0.00
<i>D. mesodon</i>	3	23.08	8.11	3.48	0.24
<i>Didymosphenia geminata</i>	3	0.00	0.00	0.00	0.00
<i>Diploneis elliptica</i>	3	0.00	0.00	0.00	0.00
<i>Eunotia bilunaris</i>	3	p	0.00	0.00	0.00
<i>E. glacialis</i>	3	0.00	0.00	0.00	0.00
<i>E. meisteri</i>	3	0.00	0.00	0.00	0.00
<i>E. minor</i>	3	4.27	p	0.00	0.00
<i>E. muscicola</i>	3	1.71	1.47	0.50	0.00
<i>E. paludosa</i>	3	p	0.00	0.00	0.00
<i>E. septentrionalis</i>	3	p	0.00	0.00	0.00
<i>E. subarcuatooides</i>	3	2.99	0.25	0.50	0.00
<i>Fragilaria capucina</i>	2	3.42	9.58	1.99	0.72
<i>F. construens</i>	3	0.43	0.00	0.00	0.00
<i>F. exigua</i>	3	1.28	0.00	0.00	0.00
<i>F. leptostauron</i>	3	0.00	0.00	p	0.00
<i>F. pinnata</i>	3	0.00	0.00	0.00	0.00
<i>F. ulna</i>	2	0.00	0.00	0.50	0.24
<i>Frustulia rhomboides</i>	3	p	p	0.00	0.00
<i>Gomphonema acuminatum</i>	3	0.00	0.00	p	0.00
<i>G. bipunctatum</i>	3	0.43	0.00	p	0.00
<i>G. bohemicum</i>	3	0.00	0.00	0.00	0.24
<i>G. clavatum</i>	2	0.00	0.00	0.50	0.00
<i>Gomphonema dichotomum</i>	3	0.00	0.00	0.00	0.00
<i>G. micropus</i>	2	0.00	0.00	2.99	4.33
<i>G. minutum</i>	3	0.00	p	0.00	0.00
<i>G. olivaceum</i>	3	0.00	0.00	4.98	3.37

Sampling date: March 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004G	P003G	P002G	P001G
SPECIES	P	PRA	PRA	PRA
<i>G. parvulum</i>	1	4.70	5.65	1.99
<i>G. pumilum</i>	3	0.00	0.00	1.99
<i>G. rhombicum</i>	3	0.00	0.74	0.00
<i>Hannaea arcus</i>	3	2.99	3.69	p
<i>Melosira varians</i>	2	0.00	0.00	0.00
<i>Meridion circulare</i>	3	0.43	0.00	0.50
<i>Navicula angusta</i>	3			
<i>N. contenta</i>	2			
<i>N. cryptocephala</i>	3			
<i>N. cryptotenella</i>	2			
<i>N. difficillima</i>	3			
<i>N. gallica</i>	2			
<i>N. harderii</i>	2	0.00	0.00	p
<i>N. minima</i>	1	0.00	0.00	0.50
<i>N. minuscula</i>	1	0.00	0.00	0.00
<i>N. nivalis</i>	2	0.00	0.00	0.00
<i>N. pupula</i>	2	0.00	0.00	0.00
<i>N. radiosa</i>	3	0.00	0.00	0.00
<i>N. subalpina</i>	3	0.00	0.00	0.00
<i>N. suchlandtii</i>	3	p	0.00	0.00
<i>N. tenelloides</i>	1	0.00	0.00	0.00
<i>Neidium alpinum</i>	3	0.00	0.00	0.00
<i>Nitzschia acidoclinata</i>	3	0.00	0.00	p
<i>N. alpina</i>	3	0.00	0.00	0.00
<i>N. dissipata</i>	3	0.00	0.00	0.00
<i>N. flexoides</i>	2	0.00	0.00	0.00
<i>N. fonticola</i>	3	0.00	0.00	p
<i>N. inconspicua</i>	2	0.00	0.00	0.00
<i>N. linearis</i>	2	0.00	0.00	p
<i>N. palea</i>	1	0.00	0.00	0.00
<i>N. perminuta</i>	3	0.00	0.00	p
<i>N. pumila</i>	2	0.00	0.00	0.00
<i>N. pura</i>	2	0.00	0.00	0.00
<i>N. recta</i>	3	0.00	p	0.00
<i>Pinnularia divergens</i>	3	0.00	0.00	0.00

Sampling date: March 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004G	P003G	P002G	P001G
<hr/>				
SPECIES	P	PRA	PRA	PRA
P. microstauron	2	p	0.00	0.00
P. subcapitata	3	0.00	0.00	p
Stauroneis kriegerii	3	0.00	0.00	p
Tabellaria flocculosa	3	0.00	0.00	p
Frustules Counted:		234	407	201
Total Species:		33	22	37
Species Counted:		21	13	24
Shannon Diversity:		3.13	2.18	2.41
Siltation Index:		0.00	0.00	0.50
Pollution Index:		2.87	2.71	2.88

Appendix B. Diatom proportional count data, 1993 Montanore periphyton monitoring.  
 PT = Pollution Tolerance group number (Lange-Bertalot 1979); PRA = Percent Relative  
 Abundance. A "p" indicates species seen during floristic scan but not during count.

Sampling date: August 1993

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004H	P003H	P002H	P001H
<hr/>				
SPECIES	P	PRA	PRA	PRA
<i>Achnanthes biasolettiana</i>	3	0.00	0.00	4.60
<i>A. bioretii</i>	3	0.00	0.00	p
<i>A. chlidanos</i>	3	p	p	0.00
<i>A. daonensis</i>	3	0.00	p	0.24
<i>A. grischuna</i>	3	0.00	p	0.00
<i>A. helvetica</i>	3	p	0.48	0.00
<i>A. kranzii</i>	3	0.00	0.00	0.00
<i>A. kriegeri</i>	3	5.16	4.31	p
<i>A. laevis</i>	3	0.00	0.00	p
<i>A. lanceolata</i>	2	0.00	0.24	p
<i>A. marginulata</i>	3	0.00	0.00	0.00
<i>A. minutissima</i>	3	60.56	36.12	85.47
<i>A. nodosa</i>	3	2.82	0.72	0.00
<i>A. pusilla</i>	3	0.00	0.48	0.24
<i>A. rupestris</i>	3	0.00	0.00	0.00
<i>A. stolida</i>	3	0.00	0.00	0.00
<i>A. subatomoides</i>	3	0.00	0.24	p
<i>Amphora dusenii</i>	2	0.00	0.00	0.00
<i>A. libyca</i>	3	0.00	0.00	0.00
<i>A. pediculus</i>	3	0.00	0.00	0.00
<i>Anomoeoneis brachysira</i>	3	0.00	0.00	0.00
<i>A. vitrea</i>	2	0.00	0.00	0.00
<i>Aulacoseira alpigena</i>	3	0.94	2.39	0.73
<i>A. distans</i>	3	0.00	p	0.00
<i>A. pfaffiana</i>	3	0.00	0.00	0.00
<i>Caloneis bacillum</i>	2	0.00	0.00	0.00
<i>Coccconeis placentula</i>	3	0.00	0.00	p
<i>Cymbella affinis</i>	3	0.00	0.00	0.00
<i>C. cesatii</i>	3	p	p	0.00
<i>C. cistula</i>	3	0.00	0.00	p
				0.24

Sampling date: August 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004H	P003H	P002H	P001H
SPECIES	P	PRA	PRA	PRA
<i>C. cymbiformis</i>	3	0.00	0.00	0.00
<i>C. gracilis</i>	3	0.00	0.00	0.00
<i>C. microcephala</i>	2	0.00	0.00	0.00
<i>C. minuta</i>	2	0.00	1.20	1.45
<i>C. naviculiformis</i>	3	0.00	0.00	0.00
<i>C. silesiaca</i>	3	0.94	3.35	0.48
<i>C. sinuata</i>	3	0.00	0.00	p
<i>Diatoma anceps</i>	3	p	0.96	0.00
<i>D. hyemalis</i>	3	0.00	0.00	0.00
<i>D. mesodon</i>	3	10.33	24.64	1.45
<i>Didymosphenia geminata</i>	3	0.00	0.00	0.73
<i>Diploneis elliptica</i>	3	0.00	0.00	0.00
<i>Eunotia bilunaris</i>	3	0.00	0.00	0.00
<i>E. glacialis</i>	3	0.00	p	0.00
<i>E. meisteri</i>	3	p	p	0.00
<i>E. minor</i>	3	1.41	0.96	0.00
<i>E. muscicola</i>	3	0.94	p	0.00
<i>E. paludosa</i>	3	1.88	0.00	0.00
<i>E. septentrionalis</i>	3	0.00	0.00	0.00
<i>E. subarcuatooides</i>	3	3.76	3.11	p
<i>Fragilaria capucina</i>	2	6.10	10.53	0.48
<i>F. construens</i>	3	0.00	0.00	0.00
<i>F. exigua</i>	3	0.00	0.00	0.00
<i>F. leptostauron</i>	3	0.00	0.00	0.00
<i>F. pinnata</i>	3	0.00	0.00	p
<i>F. ulna</i>	2	0.00	p	0.00
<i>Frustulia rhomboides</i>	3	0.00	0.24	0.00
<i>Gomphonema acuminatum</i>	3	0.00	0.00	0.00
<i>G. bipunctatum</i>	3	0.00	0.00	0.00
<i>G. bohemicum</i>	3	0.00	0.00	0.00
<i>G. clavatum</i>	2	p	0.00	0.00
<i>Gomphonema dichotomum</i>	3	0.00	0.00	0.00
<i>G. micropus</i>	2	0.94	p	0.48
<i>G. minutum</i>	3	0.00	p	p
<i>G. olivaceum</i>	3	0.00	p	0.97
				2.89

Sampling date: August 1993 (continued)

Stream name:	Libby Cr.		Libby Cr.		Libby Cr.	
Site number:	L10		L9		L3	
ID number:	P004H		P003H		P002H	
SPECIES	P	PRA	PRA	PRA	PRA	PRA
<i>G. parvulum</i>	1	2.82	5.50		P	0.00
<i>G. pumilum</i>	3	0.00	0.00		0.00	0.24
<i>G. rhombicum</i>	3	0.00	0.00		0.00	0.00
<i>Hannaea arcus</i>	3	0.47	3.59		1.94	6.27
<i>Melosira varians</i>	2	0.00	0.00		0.00	0.00
<i>Meridion circulare</i>	3	0.94	0.96		0.00	0.00
<i>Navicula angusta</i>	3	0.00	0.00		0.00	0.00
<i>N. contenta</i>	2	P	0.00		0.00	0.00
<i>N. cryptocephala</i>	3	0.00	0.00		0.00	0.00
<i>N. cryptotenella</i>	2	0.00	0.00		0.00	0.24
<i>N. difficillima</i>	3	0.00	P		0.00	0.00
<i>N. gallica</i>	2	0.00	P		0.00	0.00
<i>N. harderii</i>	2	0.00	0.00		0.00	0.00
<i>N. minima</i>	1	0.00	0.00		0.00	0.00
<i>N. minuscula</i>	1	0.00	0.00		P	0.00
<i>N. nivalis</i>	2	0.00	0.00		0.00	0.00
<i>N. pupula</i>	2	0.00	0.00		0.00	0.00
<i>N. radiosa</i>	3	0.00	0.00		0.00	0.00
<i>N. subalpina</i>	3	0.00	0.00		0.00	0.00
<i>N. suchlandtii</i>	3	0.00	0.00		0.00	0.00
<i>N. tenelloides</i>	1	0.00	0.00		0.00	0.00
<i>Neidium alpinum</i>	3	0.00	0.00		P	0.00
<i>Nitzschia acidoclinata</i>	3	0.00	0.00		0.00	0.00
<i>N. alpina</i>	3	0.00	0.00		0.73	0.00
<i>N. dissipata</i>	3	0.00	P		0.00	0.00
<i>N. flexoides</i>	2	0.00	0.00		0.00	0.00
<i>N. fonticola</i>	3	0.00	0.00		0.00	0.00
<i>N. inconspicua</i>	2	0.00	0.00		0.00	0.00
<i>N. linearis</i>	2	0.00	0.00		0.00	0.00
<i>N. palea</i>	1	0.00	P		0.00	0.00
<i>N. perminuta</i>	3	0.00	0.00		P	0.00
<i>N. pumila</i>	2	0.00	0.00		0.00	0.00
<i>N. pura</i>	2	0.00	0.00		P	P
<i>N. recta</i>	3	0.00	0.00		0.00	0.00
<i>Pinnularia divergens</i>	3	0.00	0.00		0.00	0.00

Sampling date: August 1993 (continued)

Stream name:	Libby Cr.		Libby Cr.		Libby Cr.	
Site number:	L10		L9		L3	
ID number:	P004H		P003H		P002H	
SPECIES	P	PRA	PRA	PRA	PRA	PRA
P. microstauron	2	0.00	0.00	0.00	0.00	0.00
P. subcapitata	3	0.00	0.00	0.00	0.00	0.00
Stauroneis kriegerii	3	0.00	p	0.00	0.00	0.00
Tabellaria flocculosa	3	p	p	p	0.00	0.00
Frustules Counted:		213	418	413	415	
Total Species:		23	37	30	26	
Species Counted:		15	19	14	15	
Shannon Diversity:		2.26	2.87	1.06	1.95	
Siltation Index:		0.00	0.00	0.73	0.24	
Pollution Index:		2.87	2.77	2.98	2.87	

Appendix B. Diatom proportional count data, 1993 Montanore periphyton monitoring.  
 PT = Pollution Tolerance group number (Lange-Bertalot 1979); PRA = Percent Relative  
 Abundance. A "p" indicates species seen during floristic scan but not during count.

Sampling date: October 1993

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004I	P003I	P002I	P001I

SPECIES	P	PRA	PRA	PRA	PRA
<i>Achnanthes biasolettiana</i>	3	0.00	0.00	2.17	15.07
<i>A. bioretii</i>	3	0.00	0.00	p	0.00
<i>A. chlidanos</i>	3	0.24	0.00	0.00	0.00
<i>A. daonensis</i>	3	0.00	0.24	p	0.00
<i>A. grischuna</i>	3	0.00	0.00	0.00	0.00
<i>A. helvetica</i>	3	p	0.24	0.00	0.00
<i>A. kranzii</i>	3	0.00	2.89	0.00	0.00
<i>A. kriegeri</i>	3	12.05	1.93	0.00	0.00
<i>A. laevis</i>	3	0.00	0.00	0.00	p
<i>A. lanceolata</i>	2	0.00	p	0.48	p
<i>A. marginulata</i>	3	p	0.00	0.00	0.00
<i>A. minutissima</i>	3	30.84	28.43	71.33	47.61
<i>A. nodosa</i>	3	0.48	0.72	0.00	0.00
<i>A. pusilla</i>	3	0.00	0.00	0.00	0.00
<i>A. rupestris</i>	3	p	0.00	0.00	0.00
<i>A. stolida</i>	3	0.00	0.00	p	0.00
<i>A. subatomoides</i>	3	p	0.24	0.00	0.00
<i>Amphora dusenii</i>	2	0.00	0.00	0.00	p
<i>A. libyca</i>	3	0.00	p	0.00	0.00
<i>A. pediculus</i>	3	0.00	0.00	p	p
<i>Anomoeoneis brachysira</i>	3	p	0.00	0.00	0.00
<i>A. vitrea</i>	2	0.00	0.00	0.00	0.00
<i>Aulacoseira alpigena</i>	3	1.69	1.45	p	0.00
<i>A. distans</i>	3	0.00	0.72	0.00	0.00
<i>A. pfaffiana</i>	3	p	0.00	0.00	0.00
<i>Caloneis bacillum</i>	2	0.00	0.00	0.00	0.00
<i>Cocconeis placentula</i>	3	0.00	0.00	0.24	0.24
<i>Cymbella affinis</i>	3	0.00	0.00	0.00	0.96
<i>C. cesatii</i>	3	0.24	p	0.24	0.00
<i>C. cistula</i>	3	0.00	0.00	0.48	21.53

Sampling date: October 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004I	P003I	P002I	P001I
SPECIES	P	PRA	PRA	PRA
<i>C. cymbiformis</i>	3	0.00	0.00	0.00
<i>C. gracilis</i>	3	0.00	0.00	0.00
<i>C. microcephala</i>	2	0.00	0.00	0.00
<i>C. minuta</i>	2	0.00	1.20	5.30
<i>C. naviculiformis</i>	3	0.00	0.00	p
<i>C. silesiaca</i>	3	1.45	1.20	4.34
<i>C. sinuata</i>	3	0.00	0.00	1.93
<i>Diatoma anceps</i>	3	0.72	p	0.00
<i>D. hyemalis</i>	3	0.24	0.96	0.00
<i>D. mesodon</i>	3	14.70	21.93	1.93
<i>Didymosphenia geminata</i>	3	0.00	0.00	0.00
<i>Diploneis elliptica</i>	3	0.00	0.00	0.00
<i>Eunotia bilunaris</i>	3	0.00	p	0.00
<i>E. glacialis</i>	3	0.24	0.00	0.00
<i>E. meisteri</i>	3	0.00	0.00	0.00
<i>E. minor</i>	3	4.58	6.51	p
<i>E. muscicola</i>	3	0.48	15.90	p
<i>E. paludosa</i>	3	0.24	0.48	0.00
<i>E. septentrionalis</i>	3	0.00	0.00	0.00
<i>E. subarcuatooides</i>	3	3.86	6.02	p
<i>Fragilaria capucina</i>	2	10.60	4.58	2.89
<i>F. construens</i>	3	0.00	0.00	0.00
<i>F. exigua</i>	3	0.00	0.00	0.00
<i>F. leptostauron</i>	3	0.00	p	p
<i>F. pinnata</i>	3	0.00	0.00	0.00
<i>F. ulna</i>	2	p	0.00	0.48
<i>Frustulia rhomboides</i>	3	p	0.00	0.00
<i>Gomphonema acuminatum</i>	3	0.00	0.00	0.00
<i>G. bipunctatum</i>	3	0.72	p	0.00
<i>G. bohemicum</i>	3	0.00	0.00	0.00
<i>G. clavatum</i>	2	0.48	p	p
<i>Gomphonema dichotomum</i>	3	0.00	0.00	0.00
<i>G. micropus</i>	2	0.24	0.00	0.72
<i>G. minutum</i>	3	0.00	0.00	0.00
<i>G. olivaceum</i>	3	0.00	0.00	0.48
				1.67

Sampling date: October 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004I	P003I	P002I	P001I

SPECIES	P	PRA	PRA	PRA	PRA
<i>G. parvulum</i>	1	5.78	3.61	0.24	0.00
<i>G. pumilum</i>	3	0.00	0.00	0.24	0.72
<i>G. rhombicum</i>	3	0.00	0.00	0.00	0.24
<i>Hannaea arcus</i>	3	7.95	0.00	3.61	0.96
<i>Melosira varians</i>	2	0.00	0.00	0.00	0.00
<i>Meridion circulare</i>	3	1.69	0.48	0.00	0.00
<i>Navicula angusta</i>	3	p	0.00	0.00	0.00
<i>N. contenta</i>	2	0.00	0.00	0.00	0.00
<i>N. cryptocephala</i>	3	0.24	0.24	p	0.00
<i>N. cryptotenella</i>	2	0.00	0.00	p	0.00
<i>N. difficillima</i>	3	0.00	0.00	0.00	0.00
<i>N. gallica</i>	2	0.00	0.00	0.00	0.00
<i>N. harderii</i>	2	0.00	0.00	0.00	0.00
<i>N. minima</i>	1	0.00	0.00	0.00	0.00
<i>N. minuscula</i>	1	0.00	0.00	0.00	0.00
<i>N. nivalis</i>	2	0.00	0.00	0.00	0.00
<i>N. pupula</i>	2	0.00	0.00	0.00	0.00
<i>N. radiosa</i>	3	0.00	0.00	p	0.00
<i>N. subalpina</i>	3	0.00	0.00	0.00	0.00
<i>N. suchlandtii</i>	3	0.00	0.00	0.00	0.00
<i>N. tenelloides</i>	1	0.00	0.00	0.00	p
<i>Neidium alpinum</i>	3	0.00	0.00	0.00	0.00
<i>Nitzschia acidoclinata</i>	3	0.00	0.00	0.00	0.00
<i>N. alpina</i>	3	0.00	0.00	p	0.00
<i>N. dissipata</i>	3	p	p	p	0.00
<i>N. flexoides</i>	2	0.00	0.00	p	0.00
<i>N. fonticola</i>	3	0.00	0.00	0.72	p
<i>N. inconspicua</i>	2	0.00	0.00	p	p
<i>N. linearis</i>	2	0.00	0.00	p	p
<i>N. palea</i>	1	0.00	0.00	p	0.00
<i>N. perminuta</i>	3	0.00	0.00	0.00	0.00
<i>N. pumila</i>	2	0.00	0.00	0.00	p
<i>N. pura</i>	2	0.00	0.00	1.93	0.24
<i>N. recta</i>	3	0.00	p	0.00	0.00
<i>Pinnularia divergens</i>	3	0.00	0.00	0.24	0.00

Sampling date: October 1993 (continued)

Stream name:	Libby Cr.	Libby Cr.	Libby Cr.	Libby Cr.
Site number:	L10	L9	L3	L1
ID number:	P004I	P003I	P002I	P001I

SPECIES	P	PRA	PRA	PRA	PRA
P. microstauron	2	p	0.00	0.00	0.00
P. subcapitata	3	p	0.00	0.00	0.00
Stauroneis kriegerii	3	p	0.00	0.00	0.00
Tabellaria flocculosa	3	0.24	p	0.00	0.00
Frustules Counted:		415	415	415	418
Total Species:		37	32	40	30
Species Counted:		24	21	20	17
Shannon Diversity:		3.22	3.12	1.89	2.34
Siltation Index:		0.24	0.24	2.65	0.24
Pollution Index:		2.77	2.87	2.88	2.94



**Appendix C. Macroinvertebrate station totals, March 1993.**

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L10 (4 Hess), #1

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			366	33.03			
Baetis sp.	46	4.2			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	7	0.6			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	56	5.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	149	13.4			4	21	sc
Epeorus sp.	59	5.3			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	37	3.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	11	1.0			0	48	cg
Plecoptera			108	9.75			
Capniidae	11	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	28	2.5			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	16	1.4			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	21	1.9			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	16	1.4			2	16	sh
Nemouridae	3	0.3			2	36	sh
Yoraperla brevis	6	0.5			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	1	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	1	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	1	0.1			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	4	0.4			2	48	sc
Trichoptera			103	9.30			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	62	5.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	4	0.4			4	6	cf
Hydropsychidae	4	0.4			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0	1	18	sc	
Chyrandra centralis	0.0	1	18	sh	
Cryptochia sp.	0.0	0	108	sh	
Discosmoeus sp.	0.0	1	24	om	
Ecclisomyia sp.	0.0	2	108	om	
Hesperophylax sp.	0.0	3	108	om	
Limnephilus sp.	0.0	3	108	sh	
Neophylax sp.	0.0	4	24	sc	
Neothremma alicia	3	0.3	4	8	sc
Oligophlebodes sp.	0.0	4	24	sc	
Psychoglypha sp.	0.0	0	24	om	
Pycnopsyche guttifer	0.0	4	72	sh	
Limnephilidae	19	1.7	4	108	unk
Dolophilodes sp.	0.0	2	24	cf	
Wormaldia sp.	0.0	3	24	cf	
Rhyacophila acropedes	0.0	0	18	pr	
Rhyacophila Angelita grp.	0.0	0	18	pr	
Rhyacophila Bettani grp.	6	0.5	0	18	pr
Rhyacophila Bifila grp.	0.0	0	18	pr	
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata	0.0	0	18	pr	
Rhyacophila iranda	0.0	0	18	pr	
Rhyacophila Sibirica grp.	0.0	0	18	pr	
Rhyacophila tucula	0.0	0	18	pr	
Rhyacophila vaccua	0.0	0	18	pr	
Rhyacophila vepulsa	0.0	0	18	pr	
Rhyacophila Verrula grp.	0.0	0	18	pr	
Rhyacophila sp.	4	0.4	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other		531	47.92		
Diptera					
Atherix sp.	0.0	4	24	pr	
Agathon sp.	0.0	0	2	sc	
Dioptopsis sp.	0.0	0	2	sc	
Ceratopogonidae	0.0	6	108	pr	
Chironomidae	514	46.4	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifara sp.	0.0	6	95	pr	
Oreogeton sp.	2	0.2	6	95	pr
Limnophora sp.	0.0	6	108	pr	
Glutops rossi	0.0	3	110	pr	
Psychodidae		0.0	10	36	cg
Simuliidae	4	0.4	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	6	0.5	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae	0.0	--	--	sh	
Hydaticus sp.	0.0	5	72	pr	
Cleptelmis sp.	0.0	4	104	cg	
Heterlimnius sp.	0.0	4	104	cg	
Lara sp.	0.0	4	104	cg	
Narpus sp.	0.0	4	104	cg	
Optioservus sp.	0.0	4	104	cg	
Rhizelmis sp.	0.0	2	104	cg	
Stenelmis sp.	0.0	5	104	cg	
Zaitzevia sp.	0.0	4	104	cg	
Elmidae	0.0	4	104	cg	
Brychius sp.	0.0	5	54	sc	
Haliplus sp.	0.0	5	54	sc	
Hydrophilidae	0.0	5	72	pr	
Miscellaneous					
Corixidae	0.0	8	108	unk	
Gerridae	0.0	--	72	pr	
Archana oblonga	0.0	--	--	sh	

Annelida(Oligochaeta)	4	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Bellisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.1	4	108	cg

TOTAL NUMBER =	1108
TOTAL TAXA =	33
STD =	89.7
MEAN =	277
SDI =	3.05
SR =	0.464
B/E =	0.13
EPT Abund =	577
EPT/Chiron =	1.12
EPT % =	52.08
EPT taxa =	27
c/f tot =	12
c/f % =	1.08
c/g tot =	676
c/g % =	61.01
sh tot =	73
sh % =	6.59
sc tot =	277
sc % =	25.00
pr tot =	51
pr% =	4.60
om tot =	0
om % =	0.00
unk tot =	19
unk% =	1.71
sc/cf =	23.08
sc/(sc+cf) =	0.958
sh/total =	0.066

Macroinvertebrate Data--Montanore Project, March 1993  
Libby Creek, Li0 (1 kick), #2

	No.	Percent Total	Total Number 230	Percent Total 63.54	TV	TQ	FFG
Ephemeroptera							
<i>Baetis</i> sp.	50	13.8			5	72	cg
<i>Diphetor</i> sp.		0.0			4	72	cg
<i>Caudatella</i> sp.		0.0			1	48	cg
<i>Caudatella hystrix</i>		0.0			1	48	cg
<i>Drunella coloradensis/</i>							
<i>flavilinea</i>		0.0			0	18	cg
<i>Drunella doddsi</i>	6	1.7			0	4	cg
<i>Drunella grandis</i>		0.0			0	24	cg
<i>Drunella spinifera</i>		0.0			0	24	pr
<i>Drunella</i> sp.	12	3.3			0	48	cg
<i>Ephemerella</i> sp.	2	0.6			1	48	cg
<i>Serratella</i> sp.		0.0			2	48	cg
<i>Ephemerellidae</i>		0.0			1	48	cg
<i>Cinygmulia</i> sp.	104	28.7			4	21	sc
<i>Epeorus</i> sp.	15	4.1			0	21	sc
<i>Heptagenia</i> sp.		0.0			4	48	sc
<i>Leucrocuta</i> sp.		0.0			1	48	sc
<i>Nixe</i> sp.		0.0			2	48	sc
<i>Rhithrogena</i> sp.	13	3.6			0	21	cg
<i>Heptageniidae</i>		0.0			4	48	sc
<i>Paraleptophlebia</i> sp.	1	0.3			4	24	cg
<i>Ameletus</i> sp.	27	7.5			0	48	cg
Plecoptera			66	18.23			
<i>Capniidae</i>	4	1.1			1	32	sh
<i>Kathroperla perdita</i>		0.0			1	24	cg
<i>Sweltsa/Suwallia</i> sp.	27	7.5			0	24	pr
<i>Despaxia augusta</i>		0.0			0	18	sh
<i>Paraleuctra</i> sp.		0.0			0	18	sh
<i>Perlomyia</i> sp.		0.0			0	18	sh
<i>Lauctridae</i>	3	0.8			0	18	sh
<i>Capniidae/Lauctridae</i>		0.0			1	32	sh
<i>Amphinemura</i> sp.		0.0			2	6	sh
<i>Malenka</i> sp.		0.0			2	36	sh
<i>Nemoura</i> sp.		0.0			1	24	sh
<i>Visoka cataractae</i>	13	3.6			0	36	sh
<i>Zapada cinctipes</i>		0.0			2	16	sh
<i>Zapada columbiana</i>	9	2.5			2	16	sh
<i>Nemouridae</i>	4	1.1			2	36	sh
<i>Yoraperla brevis</i>	1	0.3			1	12	sh
<i>Claassenia sabulosa</i>		0.0			3	6	pr
<i>Doroneuria theodora</i>	2	0.6			1	18	pr
<i>Hesperoperla pacifica</i>		0.0			2	18	pr
<i>Perlidae</i>	1	0.3			1	24	pr
<i>Cultus</i> sp.		0.0			2	12	pr
<i>Isoperla</i> sp.		0.0			2	24	pr
<i>Kogotus modestus</i>		0.0			2	18	pr
<i>Megarcys</i> sp.		0.0			2	24	pr
<i>Setvena bradleyi</i>		0.0			2	48	pr
<i>Skwala</i> sp.		0.0			2	18	pr
<i>Perlodidae</i>		0.0			2	48	pr
<i>Doddsia occidentalalis</i>		0.0			2	24	sc
<i>Pteronarcella</i> sp.		0.0			0	24	sh
<i>Taenionema</i> sp.	2	0.6			2	48	sc
Trichoptera			15	4.14			
<i>Amiocentrus</i> sp.		0.0			3	24	cg
<i>Brachycentrus</i> sp.		0.0			1	24	cf
<i>Micrasema</i> sp.		0.0			1	24	sh
<i>Agapetus</i> sp.		0.0			0	24	sc
<i>Anagapetus</i> sp.		0.0			0	24	sc
<i>Glossosoma</i> sp.	6	1.7			1	24	sc
<i>Glossosomatidae</i>		0.0			0	24	sc
<i>Arctopsyche grandis</i>		0.0			4	18	cf
<i>Hydropsyche</i> sp.		0.0			4	108	cf
<i>Parapsyche elsis</i>	2	0.6			4	6	cf
<i>Hydropsychidae</i>		0.0			4	108	cf
<i>Agraylea</i> sp.		0.0			8	108	cg
<i>Hydroptila</i> sp.		0.0			6	108	cg
<i>Lepidostoma</i> sp.		0.0			1	18	sh

## L10 kick, Mar '93, #2

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoecus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnophilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnophilidae	4	1.1	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	0.0		0	18	pr
Rhyacophila Bettini grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	0.0		0	18	pr
Rhyacophila hyalinata	0.0		0	18	pr
Rhyacophila iranda	2	0.6	0	18	pr
Rhyacophila Sibirica grp.	0.0		0	18	pr
Rhyacophila tucula	0.0		0	18	pr
Rhyacophila vaccua	0.0		0	18	pr
Rhyacophila vepulsa	0.0		0	18	pr
Rhyacophila Verrula grp.	0.0		0	18	pr
Rhyacophila sp.	1	0.3	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			51	14.09	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	0.0		6	108	pr
Chironomidae	42	11.6	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chalifera sp.	0.0		6	95	pr
Oréogeton sp.	0.0		6	95	pr
Limnophora sp.	0.0		6	108	pr
Glutops rossi	0.0		3	110	pr
Psychodidae	0.0		10	36	cg
Simuliidae	7	1.9	6	108	cf
Antocha sp.	0.0		3	24	cg
Dicranota sp.	1	0.3	3	24	pr
Hexatomidae		0.0	2	36	pr
Pedicia sp.	0.0		6	72	pr
Molophilus sp.	0.0		3	72	unk
Tipula sp.	0.0		4	36	om
Limnophila sp.	0.0		3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae	0.0		--	--	sh
Hydaticus sp.	0.0		5	72	pr
Cleptelmis sp.	0.0		4	104	cg
Heterlimnius sp.	0.0		4	104	cg
Lara sp.	0.0		4	104	cg
Narpus sp.	0.0		4	104	cg
Optioservus sp.	0.0		4	104	cg
Rhizelmis sp.	0.0		2	104	cg
Stenelmis sp.	0.0		5	104	cg
Zaitzevia sp.	0.0		4	104	cg
Elmidae	0.0		4	104	cg
Brychius sp.	0.0		5	54	sc
Haliplus sp.	0.0		5	54	sc
Hydrophilidae	0.0		5	72	pr
Miscellaneous					
Corixidae	0.0		8	108	unk
Gerridae	0.0		--	72	pr
Archanaara oblonga	0.0		--	--	sh

Annelida(Oligochaeta)	0.0	5	108	cg	
Annelida (Hirudinea)	0.0	10	108	pr	
Mollusca-Sphaeriidae	0.0	8	108	cg	
Lymnaea sp.	0.0	6	108	cg	
Helisoma sp.	0.0	6	108	sc	
Physa sp.	0.0	8	108	cg	
Hydracarina	1	0.3	5	108	pr
Nematoda	0.0	5	108	om	
Ostracoda	0.0	8	108	cg	
Turbellaria	0.0	4	108	cg	

TOTAL NUMBER =	362
TOTAL TAXA =	28
STD =	21.4
MEAN =	91
SDI =	3.59
SR =	0.713
B/E =	0.22
EPT Abund =	311
EPT/Chiron =	7.40
EPT % =	85.91
EPT taxa =	24
c/f tot =	9
c/f % =	2.49
c/g tot =	153
c/g % =	42.27
sh tot =	34
sh % =	9.39
sc tot =	127
sc % =	35.08
pr tot =	35
pr% =	9.67
om tot =	0
om % =	0.00
unk tot =	4
unk% =	1.10
sc/cf =	14.11
sc/(sc+cf) =	0.934
sh/total =	0.094

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L10 (4 Hess, 1 kick), #3

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			596	40.54			
Baetis sp.	96	6.5			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	13	0.9			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	68	4.6			0	48	cg
Ephemerella sp.	2	0.1			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	253	17.2			4	21	sc
Epeorus sp.	74	5.0			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	50	3.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	1	0.1			4	24	cg
Ameletus sp.	38	2.6			0	48	cg
<b>Plecoptera</b>			174	11.84			
Capniidae	15	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	55	3.7			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	19	1.3			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	34	2.3			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	25	1.7			2	16	sh
Nemouridae	7	0.5			2	36	sh
Yoraperla brevis	7	0.5			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	1	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	1	0.1			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	6	0.4			2	48	sc
<b>Trichoptera</b>			118	8.03			
Amiocentrus sp.		0.0			3	24	cg
Brachycanthrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	68	4.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	6	0.4			4	6	cf
Hydropsychidae	4	0.3			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0	1	18	sc	
Chyrandra centralis	0.0	1	18	sh	
Cryptochia sp.	0.0	0	108	sh	
Discosmocetus sp.	0.0	1	24	om	
Ecclisomyia sp.	0.0	2	108	om	
Hesperophylax sp.	0.0	3	108	om	
Limnophilus sp.	0.0	3	108	sh	
Neophylax sp.	0.0	4	24	sc	
Neothremma alicia	3	0.2	4	8	
Oligophlebodes sp.	0.0	4	24	sc	
Psychoglypha sp.	0.0	0	24	om	
Pycnopsyche guttifer	0.0	4	72	sh	
Limnophilidae	23	1.6	4	108	unk
Dolophilodes sp.	0.0	2	24	cf	
Wormaldia sp.	0.0	3	24	cf	
Rhyacophila acropedes	0.0	0	18	pr	
Rhyacophila Angelita grp.	0.0	0	18	pr	
Rhyacophila Bettani grp.	6	0.4	0	18	pr
Rhyacophila Bifila grp.	0.0	0	18	pr	
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata	0.0	0	18	pr	
Rhyacophila iranda	2	0.1	0	18	pr
Rhyacophila Sibirica grp.	0.0	0	18	pr	
Rhyacophila tucula	0.0	0	18	pr	
Rhyacophila vaccua	0.0	0	18	pr	
Rhyacophila vepulsa	0.0	0	18	pr	
Rhyacophila Verrula grp.	0.0	0	18	pr	
Rhyacophila sp.	5	0.3	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other		582	39.59		
Diptera					
Atherix sp.	0.0	4	24	pr	
Agathon sp.	0.0	0	2	sc	
Dioptopsis sp.	0.0	0	2	sc	
Ceratopogonidae	0.0	6	108	pr	
Chironomidae	556	37.8	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	0.0	6	95	pr	
Oreogeton sp.	2	0.1	6	95	pr
Limnophora sp.	0.0	6	108	pr	
Glutops rossi	0.0	3	110	pr	
Psychodidae		0.0	10	36	cg
Simuliidae	11	0.7	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	7	0.5	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	4	0.3	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	1	0.1	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.1	4	108	cg

TOTAL NUMBER =	1470
TOTAL TAXA =	38
STD =	96.1
MEAN =	294
SDI =	3.33
SR =	0.525
B/E =	0.16
EPT Abund =	888
EPT/Chiron =	1.60
EPT % =	60.41
EPT taxa =	31
c/f tot =	21
c/f % =	1.43
c/g tot =	829
c/g % =	56.39
sh tot =	107
sh % =	7.28
sc tot =	404
sc % =	27.48
pr tot =	86
prt % =	5.85
om tot =	0
om % =	0.00
unk tot =	23
unk% =	1.56
sc/cf =	19.24
sc/(sc+cf) =	0.951
sh/total =	0.073

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L9 (4 Hess), #4

	No.	Percent Total	Total Number 409	Percent Total 54.83	TV	TQ	FFG
Ephemeroptera							
Baetis sp.	11	1.5			5	72	cg
Diphotor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	6	0.8			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.4			0	24	pr
Drunella sp.	144	19.3			0	48	cg
Ephemerella sp.	5	0.7			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	147	19.7			4	21	sc
Epeorus sp.	80	10.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	6	0.8			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	1	0.1			4	24	cg
Ameletus sp.	6	0.8			0	48	cg
Plecoptera			134	17.96			
Capniidae	14	1.9			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	40	5.4			0	24	pr
Despaxia augusta	6	0.8			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	10	1.3			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	11	1.5			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	18	2.4			2	16	sh
Nemouridae	3	0.4			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	3	0.4			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	5	0.7			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	24	3.2			2	48	sc
Trichoptera			50	6.70			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	30	4.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	2	0.3			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.	2	0.3			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.	1	0.1		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnophilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.		0.0		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.	2	0.3		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnophilidae</i>	3	0.4		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0		0	18	pr
<i>Rhyacophila Betteli</i> grp.	1	0.1		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	7	0.9		0	18	pr
<i>Rhyacophila hyalinata</i>		0.0		0	18	pr
<i>Rhyacophila iranda</i>		0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vespulsa</i>		0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	2	0.3		0	18	pr
<i>Trichopteran pupae</i>		0.0		--	--	unk
Other			153	20.51		
Diptera						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	1	0.1		6	108	pr
<i>Chironomidae</i>	130	17.4		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.		0.0		6	95	pr
<i>Oreogeton</i> sp.	2	0.3		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>		0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	2	0.3		6	108	cf
<i>Antocha</i> sp.	1	0.1		3	24	cg
<i>Dicranota</i> sp.	16	2.1		3	24	pr
<i>Hexatoma</i> sp.		0.0		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.		0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
Coleoptera						
<i>Curculionidae</i>		0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	1	0.1		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.		0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
Miscellaneous						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaara oblonga</i>		0.0		--	--	sh

Annelida(Oligochaeta)	0.0	5	108	cg
Annelida (Hirudinea)	0.0	10	108	pr
Mollusca-Sphaeriidae	0.0	8	108	cg
Lymnaea sp.	0.0	6	108	cg
Helisoma sp.	0.0	6	108	sc
Physa sp.	0.0	8	108	cg
Hydracarina	0.0	5	108	pr
Nematoda	0.0	5	108	om
Ostracoda	0.0	8	108	cg
Turbellaria	0.0	4	108	cg

TOTAL NUMBER =	746
TOTAL TAXA =	36
STD =	39.0
MEAN =	187
SDI =	3.62
SR =	0.792
B/E =	0.03
EPT Abund =	593
EPT/Chiron =	4.56
EPT % =	79.49
EPT taxa =	29
c/f tot =	4
c/f % =	0.54
c/g tot =	313
c/g % =	41.96
sh tot =	62
sh % =	8.31
sc tot =	283
sc % =	37.94
pr tot =	80
pr% =	10.72
om tot =	1
om % =	0.13
unk tot =	3
unk% =	0.40
sc/cf =	70.75
sc/(sc+cf) =	0.986
sh/total =	0.083

Macroinvertebrate Data--Montanora Project, March 1993  
 Libby Creek, L9 (1 kick), #5

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			557	59.70			
Baetis sp.	39	4.2			5	72	cg
Diphotor sp.	3	0.3			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddii	7	0.8			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.3			0	24	pr
Drunella sp.	129	13.8			0	48	cg
Ephemerella sp.	9	1.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	214	22.9			4	21	sc
Epesorus sp.	131	14.0			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	8	0.9			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	14	1.5			0	48	cg
<b>Plecoptera</b>			233	24.97			
Capniidae	2	0.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	23	2.5			0	24	pr
Despaxia augusta	1	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	2	0.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	8	0.9			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	71	7.6			2	16	sh
Nemouridae	37	4.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuriia theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	1	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	9	1.0			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	78	8.4			2	48	sc
<b>Trichoptera</b>			27	2.89			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae	3	0.3			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	1	0.1			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoecus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnephilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Naethremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	3	0.3	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	7	0.8	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.		0.0	0	18	pr
Rhyacophila Betteni grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	3	0.3	0	18	pr
Rhyacophila hyalinata	4	0.4	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vespulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	6	0.6	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			116	12.43	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae		0.0	6	108	pr
Chironomidae	100	10.7	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.	2	0.2	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	7	0.8	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	5	0.5	3	24	pr
Hexatomidae	2	0.2	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archana oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	0.0	5	108	cg
Annelida (Hirudinea)	0.0	10	108	pr
Mollusca-Sphaeriidae	0.0	8	108	cg
Lymnaea sp.	0.0	6	108	cg
Helisoma sp.	0.0	6	108	sc
Physa sp.	0.0	8	108	cg
Hydracarina	0.0	5	108	pr
Nematoda	0.0	5	108	om
Ostracoda	0.0	8	108	cg
Turbellaria	0.0	4	108	cg

TOTAL NUMBER =	933
TOTAL TAXA =	33
STD =	48.8
MEAN =	933
SDI =	3.58
SR =	0.826
B/E =	0.07
EPT Abund =	817
EPT/Chiron =	8.17
EPT % =	87.57
EPT taxa =	28
c/f tot =	8
c/f % =	0.86
c/g tot =	309
c/g % =	33.12
sh tot =	121
sh % =	12.97
sc tot =	426
sc % =	45.66
pr tot =	59
pr% =	6.32
om tot =	3
om % =	0.32
unk tot =	7
unk% =	0.75
sc/cf =	53.25
sc/(sc+cf) =	0.982
sh/total =	0.130

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L9 (4 Hess, 1 kick), #6

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			966	57.53			
Baetis sp.	50	3.0			5	72	cg
Diphetor sp.	3	0.2			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	13	0.8			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	6	0.4			0	24	pr
Drunella sp.	273	16.3			0	48	cg
Ephemerella sp.	14	0.8			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	361	21.5			4	21	sc
Epeorus sp.	211	12.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	14	0.8			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	1	0.1			4	24	cg
Ameletus sp.	20	1.2			0	48	cg
Plecoptera			367	21.86			
Capniidae	16	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	63	3.8			0	24	pr
Despaxia augusta	7	0.4			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	12	0.7			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	19	1.1			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	89	5.3			2	16	sh
Nemouridae	40	2.4			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	4	0.2			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	14	0.8			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	102	6.1			2	48	sc
Trichoptera			77	4.59			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	33	2.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elisia	2	0.1			4	6	cf
Hydropsychidae	1	0.1			4	108	cf
Agraylea sp.	2	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.		0.0	0	108	sh
<i>Discosmoecus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.	1	0.1	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnephilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.		0.0	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.	2	0.1	4	24	sc
<i>Psychoglypha</i> sp.	3	0.2	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnephilidae</i>	10	0.6	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bettani</i> grp.	1	0.1	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	10	0.6	0	18	pr
<i>Rhyacophila hyalinata</i>	4	0.2	0	18	pr
<i>Rhyacophila iranda</i>		0.0	0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vepulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	8	0.5	0	18	pr
<i>Trichopteran</i> pupae		0.0	--	--	unk
<b>Other</b>		<b>269</b>	<b>16.02</b>		
<b>Diptera</b>					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptopsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>	1	0.1	6	108	pr
<i>Chironomidae</i>	230	13.7	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.		0.0	6	95	pr
<i>Oreogeton</i> sp.	4	0.2	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>	9	0.5	6	108	cf
<i>Antocha</i> sp.	1	0.1	3	24	cg
<i>Dicranota</i> sp.	21	1.3	3	24	pr
<i>Hexatoma</i> sp.	2	0.1	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>		0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.	1	0.1	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.		0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archana</i> sp.		0.0	--	--	sh

Annelida(Oligochaeta)	0.0	5	108	cg
Annelida (Hirudinea)	0.0	10	108	pr
Mollusca-Sphaeriidae	0.0	8	108	cg
Lymnaea sp.	0.0	6	108	cg
Helisoma sp.	0.0	6	108	sc
Physa sp.	0.0	8	108	cg
Hydracarina	0.0	5	108	pr
Nematoda	0.0	5	108	om
Ostracoda	0.0	8	108	cg
Turbellaria	0.0	4	108	cg

TOTAL NUMBER =	1679
TOTAL TAXA =	42
STD =	79.5
MEAN =	336
SDI =	3.70
SR =	0.811
B/E =	0.05
EPT Abund =	1410
EPT/Chiron =	6.13
EPT % =	83.98
EPT taxa =	34
c/f tot =	12
c/f % =	0.71
c/g tot =	622
c/g % =	37.05
sh tot =	183
sh % =	10.90
sc tot =	709
sc % =	42.23
pr tot =	139
pr% =	8.28
om tot =	4
om % =	0.24
unk tot =	10
unk% =	0.60
sc/cf =	59.08
sc/(sc+cf) =	0.983
sh/total =	0.109

Macroinvertebrate Data--Montanore Project, March 1993  
Libby Creek, L3 (4 Hess), #7

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			592	48.41			
Baetis sp.	19	1.6			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi		0.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	20	1.6			0	48	cg
Ephemerella sp.	24	2.0			1	48	cg
Serratella sp.	31	2.5			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	386	31.6			4	21	sc
Epeorus sp.	60	4.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	5	0.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	44	3.6			4	24	cg
Ameletus sp.	2	0.2			0	48	cg
<b>Plecoptera</b>			295	24.12			
Capniidae	39	3.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	112	9.2			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	1	0.1			0	18	sh
Capniidae/Leuctridae	5	0.4			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	1	0.1			0	36	sh
Zapada cinctipes	1	0.1			2	16	sh
Zapada columbiana		0.0			2	16	sh
Nemouridae	95	7.8			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	4	0.3			2	18	pr
Perlodidae	1	0.1			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	36	2.9			2	48	sc
<b>Trichoptera</b>			23	1.88			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	1	0.1			1	24	cf
Micrasema sp.	4	0.3			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	1	0.1			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.	0.0		1	18	sc
<i>Chyrandra centralis</i>	0.0		1	18	sh
<i>Cryptochia</i> sp.	0.0		0	108	sh
<i>Discosmoecus</i> sp.	0.0		1	24	om
<i>Ecclisomyia</i> sp.	0.0		2	108	om
<i>Hesperophylax</i> sp.	0.0		3	108	om
<i>Limnophilus</i> sp.	0.0		3	108	sh
<i>Neophylax</i> sp.	0.0		4	24	sc
<i>Neothremma alicia</i>	0.0		4	8	sc
<i>Oligophlebodes</i> sp.	3	0.2	4	24	sc
<i>Psychoglypha</i> sp.	0.0		0	24	om
<i>Pycnopsyche guttifer</i>	0.0		4	72	sh
<i>Limnophilidae</i>	10	0.8	4	108	unk
<i>Dolophilodes</i> sp.	0.0		2	24	cf
<i>Wormaldia</i> sp.	0.0		3	24	cf
<i>Rhyacophila acropedes</i>	0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	0.0		0	18	pr
<i>Rhyacophila Bettani</i> grp.	0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.	0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	2	0.2	0	18	pr
<i>Rhyacophila hyalina</i>	1	0.1	0	18	pr
<i>Rhyacophila iranda</i>	0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	0.0		0	18	pr
<i>Rhyacophila tucula</i>	0.0		0	18	pr
<i>Rhyacophila vaccua</i>	0.0		0	18	pr
<i>Rhyacophila vespulsa</i>	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.	0.0		0	18	pr
<i>Rhyacophila</i> sp.	1	0.1	0	18	pr
<i>Trichopteran</i> pupae	0.0		--	--	unk
Other			313	25.59	
Diptera					
<i>Atherix</i> sp.	0.0		4	24	pr
<i>Agathon</i> sp.	0.0		0	2	sc
<i>Dioptopsis</i> sp.	0.0		0	2	sc
<i>Ceratopogonidae</i>	0.0		6	108	pr
<i>Chironomidae</i>	309	25.3	6	108	cg
<i>Culicidae</i>	0.0		8	108	cg
<i>Dixidae</i>	0.0		2	108	cg
<i>Chelifera</i> sp.	0.0		6	95	pr
<i>Oreogeton</i> sp.	0.0		6	95	pr
<i>Limnophora</i> sp.	0.0		6	108	pr
<i>Glutops rossi</i>	0.0		3	110	pr
<i>Psychodidae</i>	0.0		10	36	cg
<i>Simuliidae</i>	0.0		6	108	cf
<i>Antocha</i> sp.	0.0		3	24	cg
<i>Dicranota</i> sp.	1	0.1	3	24	pr
<i>Hexatoma</i> sp.	0.0		2	36	pr
<i>Pedicia</i> sp.	0.0		6	72	pr
<i>Molophilus</i> sp.	0.0		3	72	unk
<i>Tipula</i> sp.	0.0		4	36	om
<i>Limnophila</i> sp.	0.0		3	72	pr
<i>Tipulidae</i>	0.0		3	72	unk
Coleoptera					
<i>Curculionidae</i>	0.0		--	--	sh
<i>Hydaticus</i> sp.	0.0		5	72	pr
<i>Cleptelmis</i> sp.	0.0		4	104	cg
<i>Heterlimnius</i> sp.	0.0		4	104	cg
<i>Lara</i> sp.	0.0		4	104	cg
<i>Narpus</i> sp.	0.0		4	104	cg
<i>Optioservus</i> sp.	0.0		4	104	cg
<i>Rhizelmis</i> sp.	0.0		2	104	cg
<i>Stenelmis</i> sp.	0.0		5	104	cg
<i>Zaitzevia</i> sp.	0.0		4	104	cg
<i>Elmidae</i>	0.0		4	104	cg
<i>Brychius</i> sp.	0.0		5	54	sc
<i>Haliplus</i> sp.	0.0		5	54	sc
<i>Hydrophilidae</i>	0.0		5	72	pr
Miscellaneous					
<i>Corixidae</i>	0.0		8	108	unk
<i>Gerridae</i>	0.0		--	72	pr
<i>Archanaara oblonga</i>	0.0		--	--	sh

Annelida(Oligochaeta)	3	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria		0.0	4	108	cg

TOTAL NUMBER =	1223
TOTAL TAXA =	31
STD =	85.9
MEAN =	306
SDI =	3.09
SR =	0.718
B/E =	0.03
EPT Abund =	910
EPT/Chiron =	2.94
EPT % =	74.41
EPT taxa =	28
c/f tot =	2
c/f % =	0.16
c/g tot =	457
c/g % =	37.37
sh tot =	146
sh % =	11.94
sc tot =	485
sc % =	39.66
pr tot =	123
pr% =	10.06
om tot =	0
om % =	0.00
unk tot =	10
unk% =	0.82
sc/cf =	242.50
sc/(sc+cf) =	0.996
sh/total =	0.119

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L3 (1 kick), #8

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			651	52.33			
Baetis sp.	19	1.5			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi		0.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	19	1.5			0	48	cg
Ephemerella sp.	24	1.9			1	48	cg
Serratella sp.	36	2.9			2	48	cg
Ephemerellidae	1	0.1			1	48	cg
Cinygmula sp.	410	33.0			4	21	sc
Epsorus sp.	77	6.2			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	4	0.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	56	4.5			4	24	cg
Ameletus sp.	4	0.3			0	48	cg
<b>Plecoptera</b>			374	30.06			
Capniidae	12	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	98	7.9			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	2	0.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	6	0.5			2	16	sh
Zapada columbiana	1	0.1			2	16	sh
Nemouridae	144	11.6			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	8	0.6			2	18	pr
Perlodidae		0.0			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	102	8.2			2	48	sc
<b>Trichoptera</b>			32	2.57			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	13	1.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elisia		0.0			4	6	cf
Hydropsychidae	4	0.3			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoecus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnephilus sp.	0.0		3	108	sh
Necphylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnophilidae	9	0.7	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	0.0		0	18	pr
Rhyacophila Betteli grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	2	0.2	0	18	pr
Rhyacophila hyalinata	0.0		0	18	pr
Rhyacophila iranda	0.0		0	18	pr
Rhyacophila Sibirica grp.	0.0		0	18	pr
Rhyacophila tucula	0.0		0	18	pr
Rhyacophila vaccua	0.0		0	18	pr
Rhyacophila vepulsa	0.0		0	18	pr
Rhyacophila Verrula grp.	0.0		0	18	pr
Rhyacophila sp.	4	0.3	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			187	15.03	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	0.0		6	108	pr
Chironomidae	180	14.5	6	108	cg
Culicidae	0.0		8	108	cg
Dixidae	0.0		2	108	cg
Chelifera sp.	0.0		6	95	pr
Oreogeton sp.	0.0		6	95	pr
Limnophora sp.	0.0		6	108	pr
Glutops rossi	0.0		3	110	pr
Psychodidae	0.0		10	36	cg
Simuliidae	4	0.3	6	108	cf
Antocha sp.	0.0		3	24	cg
Dicranota sp.	0.0		3	24	pr
Hexatoma sp.	0.0		2	36	pr
Pedicia sp.	0.0		6	72	pr
Molophilus sp.	0.0		3	72	unk
Tipula sp.	0.0		4	36	om
Limnophila sp.	0.0		3	72	pr
Tipulidae	0.0		3	72	unk
Coleoptera					
Curculionidae	0.0		--	--	sh
Hydaticus sp.	0.0		5	72	pr
Cleptelmis sp.	0.0		4	104	cg
Heterlimnius sp.	0.0		4	104	cg
Lara sp.	0.0		4	104	cg
Narpus sp.	0.0		4	104	cg
Optioservus sp.	0.0		4	104	cg
Rhizelmis sp.	0.0		2	104	cg
Stenelmis sp.	0.0		5	104	cg
Zaitzevia sp.	0.0		4	104	cg
Elmidae	0.0		4	104	cg
Brychius sp.	0.0		5	54	sc
Haliplus sp.	0.0		5	54	sc
Hydrophilidae	0.0		5	72	pr
Miscellaneous					
Corixidae	0.0		8	108	unk
Gerridae	0.0		--	72	pr
Archana oblonga	0.0		--	--	sh

L3 kick, Mar '93, #8

Annelida(Oligochaeta)	3	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria		0.0	4	108	cg

TOTAL NUMBER = 1244  
TOTAL TAXA = 28  
STD = 84.1  
MEAN = 1244  
SDI = 3.25  
SR = 0.824  
B/E = 0.03  
EPT Abund = 1057  
EPT/Chiron = 5.87  
EPT % = 84.97  
EPT taxa = 25  
c/f tot = 8  
c/f % = 0.64  
c/g tot = 346  
c/g % = 27.81  
sh tot = 178  
sh % = 14.31  
sc tot = 589  
sc % = 47.35  
pr tot = 114  
pr% = 9.16  
om tot = 0  
om % = 0.00  
unk tot = 9  
unk% = 0.72  
sc/cf = 73.63  
sc/(sc+cf) = 0.987  
sh/total = 0.143

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L3 (4 Hess, 1 kick), #9

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1243	50.39			
Baetis sp.	38	1.5			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi		0.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	2	0.1			0	24	pr
Drunella sp.	39	1.6			0	48	cg
Ephemerella sp.	48	1.9			1	48	cg
Serratella sp.	67	2.7			2	48	cg
Ephemerellidae	1	0.0			1	48	cg
Cinygmulia sp.	796	32.3			4	21	sc
Epeorus sp.	137	5.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	9	0.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	100	4.1			4	24	cg
Ameletus sp.	6	0.2			0	48	cg
Plecoptera			669	27.12			
Capniidae	51	2.1			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	210	8.5			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	3	0.1			0	18	sh
Capniidae/Leuctridae	5	0.2			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	1	0.0			0	36	sh
Zapada cinctipes	7	0.3			2	16	sh
Zapada columbiana	1	0.0			2	16	sh
Nemouridae	239	9.7			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	12	0.5			2	18	pr
Perlodidae	1	0.0			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcalla sp.		0.0			0	24	sh
Taenionema sp.	138	5.6			2	48	sc
Trichoptera			55	2.23			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	1	0.0			1	24	cf
Micrasema sp.	17	0.7			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	5	0.2			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.		0.0	1	18	sc
Chyrandra centralis		0.0	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoeus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.		0.0	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.	3	0.1	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnophilidae	19	0.8	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.		0.0	0	18	pr
Rhyacophila Betteli grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	4	0.2	0	18	pr
Rhyacophila hyalinata	1	0.0	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila Sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	5	0.2	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other		500	20.27		
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae		0.0	6	108	pr
Chironomidae	489	19.8	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreoceton sp.		0.0	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	4	0.2	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	1	0.0	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidæ		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaara oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	6	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria		0.0	4	108	cg

TOTAL NUMBER =	2467
TOTAL TAXA =	35
STD =	156.9
MEAN =	493
SDI =	3.21
SR =	0.771
B/E =	0.03
EPT Abund =	1967
EPT/Chiron =	4.02
EPT % =	79.73
EPT taxa =	31
c/f tot =	10
c/f % =	0.41
c/g tot =	803
c/g % =	32.55
sh tot =	324
sh % =	13.13
sc tot =	1074
sc % =	43.53
pr tot =	237
pr% =	9.61
om tot =	0
om % =	0.00
unk tot =	19
unk% =	0.77
sc/cf =	107.40
sc/(sc+cf) =	0.991
sh/total =	0.131

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L1 (4 Hess), #10

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			526	65.42			
Baetis sp.	9	1.1			5	72	cg
Diphetor sp.	1	0.1			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddii		0.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	64	8.0			0	48	cg
Ephemerella sp.	3	0.4			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	336	41.8			4	21	sc
Epeorus sp.	30	3.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	4	0.5			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	68	8.5			4	24	cg
Ameletus sp.	11	1.4			0	48	cg
Plecoptera			171	21.27			
Capniidae	10	1.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Swaltsa/Suwallia sp.	67	8.3			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.1			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	5	0.6			2	16	sh
Zapada columbiana		0.0			2	16	sh
Nemouridae	55	6.8			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.1			2	18	pr
Perlodidae		0.0			2	48	pr
Doddia occidentalis	1	0.1			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	31	3.9			2	48	sc
Trichoptera			18	2.24			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	5	0.6			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elisia		0.0			4	6	cf
Hydropsychidae	4	0.5			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0	1	18	sc	
Chyrandra centralis	0.0	1	18	sh	
Cryptochia sp.	0.0	0	108	sh	
Discosmoecus sp.	0.0	1	24	sh	
Ecclisomyia sp.	0.0	2	108	om	
Hesperophylax sp.	0.0	3	108	om	
Limnophilus sp.	0.0	3	108	sh	
Neophylax sp.	0.0	4	24	sc	
Neothremma alicia	0.0	4	8	sc	
Oligophlebodes sp.	0.0	4	24	sc	
Psychoglypha sp.	1	0.1	0	24	
Pycnopsyche guttifer	0.0	4	72	sh	
Limnophilidae	8	1.0	4	108	unk
Dolophilodes sp.	0.0	2	24	cf	
Wormaldia sp.	0.0	3	24	cf	
Rhyacophila acropedes	0.0	0	18	pr	
Rhyacophila Angelita grp.	0.0	0	18	pr	
Rhyacophila Bettani grp.	0.0	0	18	pr	
Rhyacophila Bifila grp.	0.0	0	18	pr	
Rhyacophila Brunnea grp.	0.0	0	18	pr	
Rhyacophila hyalinata	0.0	0	18	pr	
Rhyacophila iranda	0.0	0	18	pr	
Rhyacophila Sibirica grp.	0.0	0	18	pr	
Rhyacophila tucula	0.0	0	18	pr	
Rhyacophila vaccua	0.0	0	18	pr	
Rhyacophila vepulsa	0.0	0	18	pr	
Rhyacophila Verrula grp.	0.0	0	18	pr	
Rhyacophila sp.	0.0	0	18	pr	
Trichopteran pupae	0.0	--	--	unk	
Other		89	11.07		
Diptera					
Atherix sp.	0.0	4	24	pr	
Agathon sp.	0.0	0	2	sc	
Dioptopsis sp.	0.0	0	2	sc	
Ceratopogonidae	1	0.1	6	108	pr
Chironomidae	67	8.3	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	0.0	6	95	pr	
Oreogeton sp.	1	0.1	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	5	0.6	6	108	cg
Antocha sp.		0.0	3	24	cg
Dicranota sp.	2	0.2	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	2	0.2	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaara oblonga		0.0	--	--	sh

Li Hess, Mar '93, #10

Annelida(Oligochaeta)	11	1.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria		0.0	4	108	cg

TOTAL NUMBER =	804
TOTAL TAXA =	28
STD =	63.5
MEAN =	201
SDI =	3.10
SR =	0.863
B/E =	0.02
EPT Abund =	715
EPT/Chiron =	10.67
EPT % =	88.93
EPT taxa =	21
c/f tot =	9
c/f % =	1.12
c/g tot =	240
c/g % =	29.85
sh tot =	76
sh % =	9.45
sc tot =	398
sc % =	49.50
pr tot =	72
pr% =	8.96
om tot =	1
om % =	0.12
unk tot =	8
unk% =	1.00
sc/cf =	44.22
sc/(sc+cf) =	0.978
sh/total =	0.095

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L1 (1 kick), #11

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			598	61.02			
<i>Baetis</i> sp.	19	1.9			5	72	cg
<i>Diphetor</i> sp.		0.0			4	72	cg
<i>Caudatella</i> sp.		0.0			1	48	cg
<i>Caudatella hystrix</i>		0.0			1	48	cg
<i>Drunella coloradensis/</i>							
<i>flavilinea</i>		0.0			0	18	cg
<i>Drunella doddii</i>		0.0			0	4	cg
<i>Drunella grandis</i>		0.0			0	24	cg
<i>Drunella spinifera</i>	1	0.1			0	24	pr
<i>Drunella</i> sp.	40	4.1			0	48	cg
<i>Ephemerella</i> sp.	15	1.5			1	48	cg
<i>Serratella</i> sp.	10	1.0			2	48	cg
<i>Ephemerellidae</i>		0.0			1	48	cg
<i>Cinygmulia</i> sp.	379	38.7			4	21	sc
<i>Epeorus</i> sp.	38	3.9			0	21	sc
<i>Heptagenia</i> sp.		0.0			4	48	sc
<i>Leucrocuta</i> sp.		0.0			1	48	sc
<i>Nixe</i> sp.		0.0			2	48	sc
<i>Rhithrogena</i> sp.		0.0			0	21	cg
<i>Heptageniidae</i>		0.0			4	48	sc
<i>Paraleptophlebia</i> sp.	70	7.1			4	24	cg
<i>Ameletus</i> sp.	26	2.7			0	48	cg
Plecoptera			260	26.53			
<i>Capniidae</i>	7	0.7			1	32	sh
<i>Kathroperla perdita</i>		0.0			1	24	cg
<i>Sweltsa/Suwallia</i> sp.	72	7.3			0	24	pr
<i>Despaxia augusta</i>	5	0.5			0	18	sh
<i>Paraleuctra</i> sp.		0.0			0	18	sh
<i>Perlomyia</i> sp.		0.0			0	18	sh
<i>Leuctridae</i>		0.0			0	18	sh
<i>Capniidae/Leuctridae</i>		0.0			1	32	sh
<i>Amphinemura</i> sp.		0.0			2	6	sh
<i>Malenka</i> sp.		0.0			2	36	sh
<i>Nemoura</i> sp.		0.0			1	24	sh
<i>Visoka cataractae</i>		0.0			0	36	sh
<i>Zapada cinctipes</i>	5	0.5			2	16	sh
<i>Zapada columbiana</i>	1	0.1			2	16	sh
<i>Nemouridae</i>	31	3.2			2	36	sh
<i>Yoraperla brevis</i>		0.0			1	12	sh
<i>Claassenia sebulosa</i>		0.0			3	6	pr
<i>Doroneuria theodora</i>		0.0			1	18	pr
<i>Hesperoperla pacifica</i>		0.0			2	18	pr
<i>Perlidae</i>		0.0			1	24	pr
<i>Cultus</i> sp.		0.0			2	12	pr
<i>Isoperla</i> sp.		0.0			2	24	pr
<i>Kogotus modestus</i>		0.0			2	18	pr
<i>Megarcys</i> sp.		0.0			2	24	pr
<i>Setvena bradleyi</i>		0.0			2	48	pr
<i>Skwala</i> sp.		0.0			2	18	pr
<i>Perlodidae</i>		0.0			2	48	pr
<i>Doddsia occidentalalis</i>		0.0			2	24	sc
<i>Pternonarcella</i> sp.		0.0			0	24	sh
<i>Taenionema</i> sp.	139	14.2			2	48	sc
Trichoptera			18	1.84			
<i>Amiocentrus</i> sp.		0.0			3	24	cg
<i>Brachycentrus</i> sp.		0.0			1	24	cf
<i>Micrasema</i> sp.	2	0.2			1	24	sh
<i>Agapetus</i> sp.		0.0			0	24	sc
<i>Anagapetus</i> sp.		0.0			0	24	sc
<i>Glossosoma</i> sp.		0.0			1	24	sc
<i>Glossosomatidae</i>		0.0			0	24	sc
<i>Arctopsyche grandis</i>		0.0			4	18	cf
<i>Hydropsyche</i> sp.		0.0			4	108	cf
<i>Parapsyche elsis</i>		0.0			4	6	cf
<i>Hydropsychidae</i>	10	1.0			4	108	cf
<i>Agraylea</i> sp.		0.0			8	108	cg
<i>Hydroptila</i> sp.		0.0			6	108	cg
<i>Lepidostoma</i> sp.		0.0			1	18	sh

LI kick, Mar '93, #11

Apatania sp.		0.0	1	18	sc
Chyrandra centralis	1	0.1	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoecus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.		0.0	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.	1	0.1	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnophilidae	1	0.1	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.		0.0	0	18	pr
Rhyacophila Betteni grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila Sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	2	0.2	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			104	10.61	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Diaptasis sp.		0.0	0	2	sc
Ceratopogonidae		0.0	6	108	pr
Chironomidae	92	9.4	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.		0.0	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	2	0.2	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.		0.0	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae	1	0.1	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	1	0.1	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae	2	0.2	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	5	0.5	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.1	4	108	cg

TOTAL NUMBER =	980
TOTAL TAXA =	30
STD =	71.9
MEAN =	980
SDI =	3.13
SR =	0.862
B/E =	0.03
EPT Abund =	876
EPT/Chiron =	9.52
EPT % =	89.39
EPT taxa =	23
c/f tot =	12
c/f % =	1.22
c/g tot =	279
c/g % =	28.47
sh tot =	52
sh % =	5.31
sc tot =	556
sc % =	56.73
pr tot =	78
pr% =	7.96
om tot =	1
om % =	0.10
unk tot =	2
unk% =	0.20
sc/cf =	46.33
sc/(sc+cf) =	0.979
sh/total =	0.053

Macroinvertebrate Data--Montanore Project, March 1993  
 Libby Creek, L1 (4 Hess, 1 kick), #12

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1124	63.00			
Baetis sp.	28	1.6			5	72	cg
Diphotor sp.	1	0.1			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi		0.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	104	5.8			0	48	cg
Ephemerella sp.	18	1.0			1	48	cg
Serratella sp.	10	0.6			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	715	40.1			4	21	sc
Epeorus sp.	68	3.8			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	4	0.2			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	138	7.7			4	24	cg
Ameletus sp.	37	2.1			0	48	cg
Plecoptera			431	24.16			
Capniidae	17	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	139	7.8			0	24	pr
Despaxia augusta	5	0.3			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.1			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	10	0.6			2	16	sh
Zapada columbiana	1	0.1			2	16	sh
Nemouridae	86	4.8			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.1			2	18	pr
Perlodidae		0.0			2	48	pr
Doddsia occidentalalis	1	0.1			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	170	9.5			2	48	sc
Trichoptera			36	2.02			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	7	0.4			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.		0.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	14	0.8			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.		0.0	1	18	sc
Chyrandra centralis	1	0.1	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoeus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnophilus sp.		0.0	3	108	sh
Neophylax sp.		0.0	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.	2	0.1	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	9	0.5	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.		0.0	0	18	pr
Rhyacophila Bettani grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila Sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	2	0.1	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			193	10.82	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptropsis sp.		0.0	0	2	sc
Ceratopogonidae	1	0.1	6	108	pr
Chironomidae	159	8.9	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.	1	0.1	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	7	0.4	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	2	0.1	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae	1	0.1	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	3	0.2	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae	2	0.1	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaara oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	16	0.9	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.1	4	108	cg

TOTAL NUMBER =	1784
TOTAL TAXA =	38
STD =	119.9
MEAN =	357
SDI =	3.18
SR =	0.863
B/E =	0.02
EPT Abund =	1591
EPT/Chiron =	10.01
EPT % =	89.18
EPT taxa =	28
c/f tot =	21
c/f % =	1.18
c/g tot =	519
c/g % =	29.09
sh tot =	128
sh % =	7.17
sc tot =	954
sc % =	53.48
pr tot =	150
pr% =	8.41
om tot =	2
om % =	0.11
unk tot =	10
unk% =	0.56
sc/cf =	45.43
sc/(sc+cf) =	0.978
sh/total =	0.072



**Appendix D. Macroinvertebrate station totals, August 1993.**

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L10 (4 Hess), #13

	<u>No.</u>	<u>Percent Total</u>	<u>Total Number</u>	<u>Percent Total</u>	<u>TV</u>	<u>TQ</u>	<u>FFG</u>
Ephemeroptera			424	43.00			
Baetis sp.	62	6.3			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	2	0.2			0	18	cg
Drunella doddai	22	2.2			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	41	4.2			4	21	sc
Epeorus sp.	145	14.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixea sp.		0.0			2	48	sc
Rhithrogena sp.	139	14.1			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	12	1.2			0	48	cg
Placoptera			279	28.30			
Capniidae	22	2.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	136	13.8			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	45	4.6			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	6	0.6			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	47	4.8			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	5	0.5			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	4	0.4			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	9	0.9			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	3	0.3			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1	0.1			2	48	sc
Trichoptera			65	6.59			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	23	2.3			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	5	0.5			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.	1	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.	0.0		1	18	sc
<i>Chyrandra centralis</i>	0.0		1	18	sh
<i>Cryptochia</i> sp.	0.0		0	108	sh
<i>Discosmoeus</i> sp.	0.0		1	24	om
<i>Ecclisomyia</i> sp.	0.0		2	108	om
<i>Hesperophylax</i> sp.	0.0		3	108	om
<i>Limnophilus</i> sp.	0.0		3	108	sh
<i>Neophylax</i> sp.	0.0		4	24	sc
<i>Neothremma alicia</i>	0.0		4	8	sc
<i>Oligophlebodes</i> sp.	0.0		4	24	sc
<i>Psychoglypha</i> sp.	0.0		0	24	om
<i>Pycnopsyche guttifer</i>	0.0		4	72	sh
<i>Limnephilidae</i>	0.0		4	108	unk
<i>Dolophilodes</i> sp.	0.0		2	24	cf
<i>Wormaldia</i> sp.	0.0		3	24	cf
<i>Rhyacophila acropedes</i>	0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	1	0.1	0	18	pr
<i>Rhyacophila Betteli</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	1	0.1	0	18	pr
<i>Rhyacophila hyalinata</i>	1	0.1	0	18	pr
<i>Rhyacophila iranda</i>	2	0.2	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	7	0.7	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vespulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	22	2.2	0	18	pr
<i>Trichopteran pupae</i>	2	0.2	--	--	unk
<b>Other</b>			218	22.11	
<b>Diptera</b>					
<i>Atherix</i> sp.	0.0		4	24	pr
<i>Agathon</i> sp.	0.0		0	2	sc
<i>Diptopsis</i> sp.	0.0		0	2	sc
<i>Ceratopogonidae</i>	0.0		6	108	pr
<i>Chironomidae</i>	168	17.0	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.	1	0.1	6	95	pr
<i>Oreogeton</i> sp.	12	1.2	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>	3	0.3	6	108	cf
<i>Antocha</i> sp.		0.0	3	24	cg
<i>Dicranota</i> sp.	6	0.6	3	24	pr
<i>Hexatoma</i> sp.	1	0.1	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.	1	0.1	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>	0.0		--	--	sh
<i>Hydaticus</i> sp.	0.0		5	72	pr
<i>Cleptelmis</i> sp.	0.0		4	104	cg
<i>Heterlimnius</i> sp.	0.0		4	104	cg
<i>Lara</i> sp.	0.0		4	104	cg
<i>Narpus</i> sp.	0.0		4	104	cg
<i>Optioservus</i> sp.	0.0		4	104	cg
<i>Rhizelmis</i> sp.	0.0		2	104	cg
<i>Stenelmis</i> sp.	0.0		5	104	cg
<i>Zaitzevia</i> sp.	0.0		4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.	0.0		5	54	sc
<i>Haliplus</i> sp.	0.0		5	54	sc
<i>Hydrophilidae</i>	0.0		5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>	0.0		8	108	unk
<i>Gerridae</i>	0.0		--	72	pr
<i>Archanaea oblonga</i>	0.0		--	--	sh

Annelida(Oligochaeta)	11	1.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	1	0.1	5	108	pr
Nematoda	2	0.2	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	12	1.2	4	108	cg

TOTAL NUMBER =	986
TOTAL TAXA =	40
STD =	43.4
MEAN =	247
SDI =	3.83
SR =	0.720
B/E =	0.15
EPT Abund =	768
EPT/Chiron =	4.57
EPT % =	77.89
EPT taxa =	29
c/f tot =	8
c/f % =	0.81
c/g tot =	429
c/g % =	43.51
sh tot =	125
sh % =	12.68
sc tot =	210
sc % =	21.30
pr tot =	210
pr% =	21.30
om tot =	2
om % =	0.20
unk tot =	2
unk% =	0.20
sc/cf =	26.25
sc/(sc+cf) =	0.963
sh/total =	0.127

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L10 (1 kick), #14

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			759	39.02			
Baetis sp.	227	11.7			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	10	0.5			0	18	cg
Drunella doddsi	86	4.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	51	2.6			4	21	sc
Epeorus sp.	227	11.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	100	5.1			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	6	0.3			4	24	cg
Ameletus sp.	52	2.7			0	48	cg
Plecoptera			461	23.70			
Capniidae	5	0.3			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	140	7.2			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	37	1.9			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	37	1.9			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	161	8.3			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	50	2.6			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	13	0.7			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	9	0.5			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	6	0.3			2	48	sc
Trichoptera			129	6.63			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	14	0.7			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	7	0.4			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptilia sp.		0.0			6	108	cg
Lepidostoma sp.	4	0.2			1	18	sh

<i>Apatania</i> sp.	0.0		1	18	sc
<i>Chyrandra centralis</i>	0.0		1	18	sh
<i>Cryptochia</i> sp.	0.1	2	0	108	sh
<i>Discosmoecus</i> sp.	0.0		1	24	om
<i>Ecclisomyia</i> sp.	0.0		2	108	om
<i>Hesperophylax</i> sp.	0.0		3	108	om
<i>Limnophilus</i> sp.	0.0		3	108	sh
<i>Neophylax</i> sp.	0.0		4	24	sc
<i>Neothremma alicia</i>	0.1	1	4	8	sc
<i>Oligophlebodes</i> sp.	0.0		4	24	sc
<i>Psychoglypha</i> sp.	0.0		0	24	om
<i>Pycnopasche guttifer</i>	0.0		4	72	sh
<i>Limnophilidae</i>	0.0		4	108	unk
<i>Dolophilodes</i> sp.	0.0		2	24	cf
<i>Wormaldia</i> sp.	0.0		3	24	cf
<i>Rhyacophila acropedes</i>	0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.	0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.	0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	0.2	3	0	18	pr
<i>Rhyacophila hyalinata</i>	0.3	5	0	18	pr
<i>Rhyacophila iranda</i>	0.3	6	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	0.8	16	0	18	pr
<i>Rhyacophila tucula</i>	0.0		0	18	pr
<i>Rhyacophila vaccua</i>	0.0		0	18	pr
<i>Rhyacophila vespulsa</i>	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.	0.0		0	18	pr
<i>Rhyacophila</i> sp.	3.7	71	0	18	pr
<i>Trichopteran</i> pupae	0.0		--	--	unk
Other			596	30.64	
Diptera					
<i>Atherix</i> sp.	0.0		4	24	pr
<i>Agathon</i> sp.	0.0		0	2	sc
<i>Dioptopsis</i> sp.	0.0		0	2	sc
<i>Ceratopogonidae</i>	0.1	1	6	108	pr
<i>Chironomidae</i>	27.5	534	6	108	cg
<i>Culicidae</i>	0.0		8	108	cg
<i>Dixidae</i>	0.0		2	108	cg
<i>Chelifera</i> sp.	0.3	6	6	95	pr
<i>Oreogeton</i> sp.	0.8	16	6	95	pr
<i>Limnophora</i> sp.	0.0		6	108	pr
<i>Glutops rossi</i>	0.1	1	3	110	pr
<i>Psychodidae</i>	0.0		10	36	cg
<i>Simuliidae</i>	0.5	9	6	108	cf
<i>Antocha</i> sp.	0.0		3	24	cg
<i>Dicranota</i> sp.	0.0		3	24	pr
<i>Hexatoma</i> sp.	0.0		2	36	pr
<i>Pedicia</i> sp.	0.0		6	72	pr
<i>Molophilus</i> sp.	0.0		3	72	unk
<i>Tipula</i> sp.	0.0		4	36	om
<i>Limnophila</i> sp.	0.0		3	72	pr
<i>Tipulidae</i>	0.0		3	72	unk
Coleoptera					
<i>Curculionidae</i>	0.0		--	--	sh
<i>Hydaticus</i> sp.	0.0		5	72	pr
<i>Cleptelmis</i> sp.	0.0		4	104	cg
<i>Heterlimnius</i> sp.	0.0		4	104	cg
<i>Lara</i> sp.	0.0		4	104	cg
<i>Narpus</i> sp.	0.0		4	104	cg
<i>Optioservus</i> sp.	0.0		4	104	cg
<i>Rhizelmis</i> sp.	0.0		2	104	cg
<i>Stenelmis</i> sp.	0.0		5	104	cg
<i>Zaitzevia</i> sp.	0.0		4	104	cg
<i>Elmidae</i>	0.0		4	104	cg
<i>Brychius</i> sp.	0.0		5	54	sc
<i>Haliplus</i> sp.	0.0		5	54	sc
<i>Hydrophilidae</i>	0.0		5	72	pr
Miscellaneous					
<i>Corixidae</i>	0.0		8	108	unk
<i>Gerridae</i>	0.0		--	72	pr
<i>Archanaea oblonga</i>	0.0		--	--	sh

L10 kick, Aug '93, #14

Annelida(Oligochaeta)	3	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	14	0.7	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	12	0.6	4	108	cg

TOTAL NUMBER = 1945  
TOTAL TAXA = 38  
STD = 98.5  
MEAN = 1945  
SDI = 3.72  
SR = 0.576  
B/E = 0.30  
EPT Abund = 1349  
EPT/Chiron = 2.53  
EPT % = 69.36  
EPT taxa = 29  
c/f tot = 16  
c/f % = 0.82  
c/g tot = 1030  
c/g % = 52.96  
sh tot = 296  
sh % = 15.22  
sc tot = 299  
sc % = 15.37  
pr tot = 304  
pr % = 15.63  
om tot = 0  
om % = 0.00  
unk tot = 0  
unk% = 0.00  
sc/cf = 18.69  
sc/(sc+cf) = 0.949  
sh/total = 0.152

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L10 (4 Hess, 1 kick), #15

	<u>No.</u>	<u>Percent</u> <u>Total</u>	<u>Total</u> <u>Number</u>	<u>Percent</u> <u>Total</u>	<u>TV</u>	<u>TQ</u>	<u>FFG</u>
<b>Ephemeroptera</b>			1183	40.36			
Baetis sp.	289	9.9			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	12	0.4			0	18	cg
Drunella doddsi	108	3.7			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.0			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	92	3.1			4	21	sc
Epeorus sp.	372	12.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	239	8.2			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	6	0.2			4	24	cg
Ameletus sp.	64	2.2			0	48	cg
<b>Plecoptera</b>			740	25.25			
Capniidae	27	0.9			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	276	9.4			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	82	2.8			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	43	1.5			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	208	7.1			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	55	1.9			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	6	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	22	0.8			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	12	0.4			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	7	0.2			2	48	sc
<b>Trichoptera</b>			194	6.62			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	37	1.3			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	12	0.4			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.	1	0.0			8	108	cg
Hydroptilia sp.		0.0			6	108	cg
Lepidostoma sp.	4	0.1			1	18	sh

<i>Apatania</i> sp.	0.0	1	18	sc
<i>Chyrandra centralis</i>	0.0	1	18	sh
<i>Cryptochia</i> sp.	0.1	0	108	sh
<i>Discosmoecus</i> sp.	0.0	1	24	om
<i>Ecclisomyia</i> sp.	0.0	2	108	om
<i>Hesperophylax</i> sp.	0.0	3	108	om
<i>Limnephilus</i> sp.	0.0	3	108	sh
<i>Neophylax</i> sp.	0.0	4	24	sc
<i>Neothremma alicia</i>	0.0	4	8	sc
<i>Oligophlebodes</i> sp.	0.0	4	24	sc
<i>Psychoglypha</i> sp.	0.0	0	24	om
<i>Pycnopsyche guttifer</i>	0.0	4	72	sh
<i>Limnephiliidae</i>	0.0	4	108	unk
<i>Dolophilodes</i> sp.	0.0	2	24	cf
<i>Wormaldia</i> sp.	0.0	3	24	cf
<i>Rhyacophila acropedes</i>	0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.	1	0	18	pr
<i>Rhyacophila Betteni</i> grp.	0.0	0	18	pr
<i>Rhyacophila Bifila</i> grp.	0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	4	0.1	0	18
<i>Rhyacophila hyalinata</i>	6	0.2	0	18
<i>Rhyacophila iranda</i>	8	0.3	0	18
<i>Rhyacophila Sibirica</i> grp.	23	0.8	0	18
<i>Rhyacophila tucula</i>	0.0	0	18	pr
<i>Rhyacophila vaccua</i>	0.0	0	18	pr
<i>Rhyacophila vespulsa</i>	0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.	0.0	0	18	pr
<i>Rhyacophila</i> sp.	93	3.2	0	18
Trichopteran pupae	2	0.1	--	--
Other		814	27.77	
Diptera				
<i>Atherix</i> sp.	0.0	4	24	pr
<i>Agathon</i> sp.	0.0	0	2	sc
<i>Dioptopsis</i> sp.	0.0	0	2	sc
<i>Ceratopogonidae</i>	1	0.0	6	108
<i>Chironomidae</i>	702	24.0	6	108
<i>Culicidae</i>		0.0	8	108
<i>Dixidae</i>		0.0	2	108
<i>Chelifera</i> sp.	7	0.2	6	95
<i>Oreoceton</i> sp.	28	1.0	6	95
<i>Limnophora</i> sp.		0.0	6	108
<i>Glutops rossi</i>	1	0.0	3	110
<i>Psychodidae</i>		0.0	10	36
<i>Simuliidae</i>	12	0.4	6	108
<i>Antocha</i> sp.		0.0	3	24
<i>Dicranota</i> sp.	6	0.2	3	24
<i>Hexatoma</i> sp.	1	0.0	2	36
<i>Pedicia</i> sp.		0.0	6	72
<i>Molophilus</i> sp.		0.0	3	72
<i>Tipula</i> sp.		0.0	4	36
<i>Limnophila</i> sp.	1	0.0	3	72
<i>Tipulidae</i>		0.0	3	72
Coleoptera				
<i>Curculionidae</i>	0.0	--	--	sh
<i>Hydaticus</i> sp.	0.0	5	72	pr
<i>Cleptelmis</i> sp.	0.0	4	104	cg
<i>Heterlimnius</i> sp.	0.0	4	104	cg
<i>Lara</i> sp.	0.0	4	104	cg
<i>Narpua</i> sp.	0.0	4	104	cg
<i>Optioservus</i> sp.	0.0	4	104	cg
<i>Rhizelmis</i> sp.	0.0	2	104	cg
<i>Stenelmis</i> sp.	0.0	5	104	cg
<i>Zaitzevia</i> sp.	0.0	4	104	cg
<i>Elmidae</i>	0.0	4	104	cg
<i>Brychius</i> sp.	0.0	5	54	sc
<i>Haliplus</i> sp.	0.0	5	54	sc
<i>Hydrophilidae</i>	0.0	5	72	pr
Miscellaneous				
<i>Corixidae</i>	0.0	8	108	unk
<i>Gerridae</i>	0.0	--	72	pr
<i>Archanaea oblonga</i>	0.0	--	--	sh

Annelida(Oligochaeta)	14	0.5	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	15	0.5	5	108	pr
Nematoda	2	0.1	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	24	0.8	4	108	cg

TOTAL NUMBER =	2931
TOTAL TAXA =	46
STD =	128.1
MEAN =	586
SDI =	3.84
SR =	0.624
B/E =	0.24
EPT Abund =	2117
EPT/Chiron =	3.02
EPT % =	72.23
EPT taxa =	33
c/f tot =	24
c/f % =	0.82
c/g tot =	1459
c/g % =	49.78
sh tot =	421
sh % =	14.36
sc tot =	509
sc % =	17.37
pr tot =	514
pr% =	17.54
om tot =	2
om % =	0.07
unk tot =	2
unk% =	0.07
sc/cf =	21.21
sc/(sc+cf) =	0.955
sh/total =	0.144

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L9 (4 Hess), #16

		Percent No.	Total Number	Percent Total	TV	TQ	FFG
			397	46.11			
Ephemeroptera							
Baetis sp.	97	11.3			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	13	1.5			0	18	cg
Drunella doddsi	87	10.1			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	1	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	22	2.6			4	21	sc
Epeorus sp.	94	10.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	80	9.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	2	0.2			0	48	cg
Plecoptera			191	22.18			
Capniidae	5	0.6			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	101	11.7			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	19	2.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	5	0.6			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	20	2.3			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	3	0.3			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	1	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	31	3.6			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	2	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	4	0.5			2	48	sc
Trichoptera			82	9.52			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	52	6.0			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	2	0.2			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoeus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnophilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnephilidae	1	0.1	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	1	0.1	0	18	pr
Rhyacophila Bettani grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	0.0		0	18	pr
Rhyacophila hyalinata	0.0		0	18	pr
Rhyacophila iranda	0.0		0	18	pr
Rhyacophila Sibirica grp.	4	0.5	0	18	pr
Rhyacophila tucula	0.0		0	18	pr
Rhyacophila vaccua	0.0		0	18	pr
Rhyacophila vepulsa	0.0		0	18	pr
Rhyacophila Verrula grp.	0.0		0	18	pr
Rhyacophila sp.	21	2.4	0	18	pr
Trichopteran pupae	1	0.1	--	--	unk
Other			191	22.18	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	6	0.7	6	108	pr
Chironomidae	152	17.7	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	1	0.1	6	95	pr
Oreogeton sp.	4	0.5	6	95	pr
Limnophora sp.	0.0		6	108	pr
Glutops rossi	0.0		3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae		0.0	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	1	0.1	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.	2	0.2	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae	0.0		--	--	sh
Hydaticus sp.	0.0		5	72	pr
Cleptelmis sp.	0.0		4	104	cg
Heterlimnius sp.	0.0		4	104	cg
Lara sp.	0.0		4	104	cg
Narpus sp.	0.0		4	104	cg
Optioservus sp.	0.0		4	104	cg
Rhizelmis sp.	0.0		2	104	cg
Stenelmis sp.	0.0		5	104	cg
Zaitzevia sp.	0.0		4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.	0.0		5	54	sc
Haliplus sp.	0.0		5	54	sc
Hydrophilidae	0.0		5	72	pr
Miscellaneous					
Corixidae	0.0		8	108	unk
Gerridae	0.0		--	72	pr
Archanaara oblonga	0.0		--	--	sh

Annelida(Oligochaeta)	8	0.9	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	3	0.3	5	108	pr
Nematoda	1	0.1	5	108	om
Ostracoda	2	0.2	8	108	cg
Turbellaria	11	1.3	4	108	cg

TOTAL NUMBER =	861
TOTAL TAXA =	37
STD =	37.3
MEAN =	215
SDI =	3.83
SR =	0.664
B/E =	0.24
EPT Abund =	670
EPT/Chiron =	4.41
EPT % =	77.82
EPT taxa =	26
c/f tot =	2
c/f % =	0.23
c/g tot =	453
c/g % =	52.61
sh tot =	52
sh % =	6.04
sc tot =	172
sc % =	19.98
pr tot =	179
pr% =	20.79
om tot =	1
om % =	0.12
unk tot =	2
unk% =	0.23
sc/cf =	86.00
sc/(sc+cf) =	0.989
sh/total =	0.060

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L9 (1 kick), #17

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			510	47.35			
Baetis sp.	177	16.4			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	36	3.3			0	18	cg
Drunella doddsi	56	5.2			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	3	0.3			1	48	cg
Cinygmulia sp.	32	3.0			4	21	sc
Epeorus sp.	150	13.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	55	5.1			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	1	0.1			0	48	cg
<b>Plecoptera</b>			182	16.90			
Capniidae	1	0.1			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	37	3.4			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	10	0.9			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	3	0.3			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	85	7.9			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	4	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	37	3.4			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	2	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1	0.1			2	48	sc
<b>Trichoptera</b>			53	4.92			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	17	1.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	15	1.4			4	6	cf
Hydropsychidae	1	0.1			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	1	0.1			1	18	sh

## L9 kick, Aug '93, #17

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoeus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnephilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnephilidae	2	0.2	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	1	0.1	0	18	pr
Rhyacophila Bettani grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata	0.0		0	18	pr
Rhyacophila iranda	1	0.1	0	18	pr
Rhyacophila Sibirica grp.	2	0.2	0	18	pr
Rhyacophila tucula	1	0.1	0	18	pr
Rhyacophila vaccua	0.0		0	18	pr
Rhyacophila vepulsa	0.0		0	18	pr
Rhyacophila Verrula grp.	0.0		0	18	pr
Rhyacophila sp.	11	1.0	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			332	30.83	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	0.0		6	108	pr
Chironomidae	298	27.7	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	0.0		6	95	pr
Oreogeton sp.	7	0.6	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	2	0.2	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.		0.0	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	3	0.3	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	4	0.4	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	18	1.7	4	108	cg

TOTAL NUMBER =	1077
TOTAL TAXA =	35
STD =	60.7
MEAN =	1077
SDI =	3.47
SR =	0.525
B/E =	0.35
EPT Abund =	745
EPT/Chiron =	2.50
EPT % =	69.17
EPT taxa =	29
c/f tot =	18
c/f % =	1.67
c/g tot =	647
c/g % =	60.07
sh tot =	104
sh % =	9.66
sc tot =	200
sc % =	18.57
pr tot =	106
prt % =	9.84
om tot =	0
om % =	0.00
unk tot =	2
unk% =	0.19
sc/cf =	11.11
sc/(sc+cf) =	0.917
sh/total =	0.097

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L9 (4 Hess, 1 kick), #18

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			907	46.80			
Baetis sp.	274	14.1			5	72	cg
Diphotor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	49	2.5			0	18	cg
Drunella doddsi	143	7.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.	1	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	3	0.2			1	48	cg
Cinygmula sp.	54	2.8			4	21	sc
Epeorus sp.	244	12.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	135	7.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	3	0.2			0	48	cg
Plecoptera			373	19.25			
Capniidae	6	0.3			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	138	7.1			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	29	1.5			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	8	0.4			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	105	5.4			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	7	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	3	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	68	3.5			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	4	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	5	0.3			2	48	sc
Trichoptera			135	6.97			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	69	3.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	17	0.9			4	6	cf
Hydropsychidae	1	0.1			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	1	0.1			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmocetus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnophilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnophilidae	3	0.2	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	2	0.1	0	18	pr
Rhyacophila Betteni grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata	0.0		0	18	pr
Rhyacophila iranda	1	0.1	0	18	pr
Rhyacophila Sibirica grp.	6	0.3	0	18	pr
Rhyacophila tucula	1	0.1	0	18	pr
Rhyacophila vaccua	0.0		0	18	pr
Rhyacophila vepulsa	0.0		0	18	pr
Rhyacophila Verrula grp.	0.0		0	18	pr
Rhyacophila sp.	32	1.7	0	18	pr
Trichopteran pupae	1	0.1	--	--	unk
Other			523	26.99	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	6	0.3	6	108	pr
Chironomidae	450	23.2	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	1	0.1	6	95	pr
Oreogeton sp.	11	0.6	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	2	0.1	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	1	0.1	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.	2	0.1	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	11	0.6	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	7	0.4	5	108	pr
Nematoda	1	0.1	5	108	om
Ostracoda	2	0.1	8	108	cg
Turbellaria	29	1.5	4	108	cg

TOTAL NUMBER =	1938
TOTAL TAXA =	44
STD =	87.8
MEAN =	388
SDI =	3.72
SR =	0.587
B/E =	0.30
EPT Abund =	1415
EPT/Chiron =	3.14
EPT % =	73.01
EPT taxa =	32
c/f tot =	20
c/f % =	1.03
c/g tot =	1100
c/g % =	56.76
sh tot =	156
sh % =	8.05
sc tot =	372
sc % =	19.20
pr tot =	285
pr % =	14.71
om tot =	1
om % =	0.05
unk tot =	4
unk % =	0.21
sc/cf =	18.60
sc/(sc+cf) =	0.949
sh/total =	0.080

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L3 (4 Hess), #19

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1738	68.91			
Baetis sp.	432	17.1			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.	2	0.1			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	6	0.2			0	18	cg
Drunella doddsi	467	18.5			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.1			0	24	pr
Drunella sp.	2	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	95	3.8			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	55	2.2			4	21	sc
Epeorus sp.	555	22.0			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	115	4.6			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	6	0.2			4	24	cg
Ameletus sp.		0.0			0	48	cg
Plecoptera			100	3.97			
Capniidae	21	0.8			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwalla sp.	60	2.4			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	1	0.0			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	6	0.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	4	0.2			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	6	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.		0.0			2	48	sc
Trichoptera			131	5.19			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	6	0.2			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	4	0.2			4	18	cf
Hydropsyche sp.	2	0.1			4	108	cf
Parapsyche olsis		0.0			4	6	cf
Hydropsychidae	43	1.7			4	108	cf
Agraylea sp.	3	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	50	2.0		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	9	0.4		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	4	0.2		0	18	pr
<i>Rhyacophila hyalinata</i>		0.0		0	18	pr
<i>Rhyacophila iranda</i>		0.0		0	18	pr
<i>Rhyacophila sibirica</i> grp.	1	0.0		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vepulsa</i>	1	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	4	0.2		0	18	pr
Trichopteran pupae	4	0.2	--	--	--	unk
Other			553	21.93		
Diptera						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>		0.0		6	108	pr
<i>Chironomidae</i>	475	18.8		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	3	0.1		6	95	pr
<i>Oreogeton</i> sp.	2	0.1		6	95	pr
<i>Limniophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	1	0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	26	1.0		6	108	cf
<i>Antocha</i> sp.	1	0.0		3	24	cg
<i>Dicranota</i> sp.		0.0		3	24	pr
<i>Hexatoma</i> sp.	10	0.4		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.	3	0.1		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
coleoptera						
<i>Curculionidae</i>		0.0	--	--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	7	0.3		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.	2	0.1		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
Miscellaneous						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0	--	72	pr	
<i>Archana</i> ra oblonga		0.0	--	--	sh	

Annelida(Oligochaeta)	1	0.0	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	3	0.1	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	19	0.8	4	108	cg

TOTAL NUMBER =	2522
TOTAL TAXA =	43
STD =	138.6
MEAN =	631
SDI =	3.24
SR =	0.590
B/E =	0.25
EPT Abund =	1969
EPT/Chiron =	4.15
EPT % =	78.07
EPT taxa =	30
c/f tot =	75
c/f % =	2.97
c/g tot =	1633
c/g % =	64.75
sh tot =	28
sh % =	1.11
sc tot =	666
sc % =	26.41
pr tot =	107
pr% =	4.24
om tot =	0
om % =	0.00
unk tot =	13
unk% =	0.52
sc/cf =	8.88
sc/(sc+cf) =	0.899
sh/total =	0.011

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L3 (1 kick), #20

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
<b>Ephemeroptera</b>			1415	62.58			
Baetis sp.	774	34.2			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.	2	0.1			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	28	1.2			0	18	cg
Drunella doddsi	91	4.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	101	4.5			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	35	1.5			4	21	sc
Epeorus sp.	350	15.5			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	21	0.9			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	10	0.4			4	24	cg
Ameletus sp.	3	0.1			0	48	cg
<b>Plecoptera</b>			119	5.26			
Capniidae	10	0.4			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	36	1.6			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capnidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	4	0.2			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	38	1.7			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	3	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	11	0.5			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	9	0.4			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	5	0.2			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	3	0.1			2	48	sc
<b>Trichoptera</b>			191	8.45			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	27	1.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	3	0.1			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	2	0.1			4	18	cf
Hydropsyche sp.	2	0.1			4	108	cf
Parapsyche elsie		0.0			4	6	cf
Hydropsychidae	37	1.6			4	108	cf
Agraylea sp.	3	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	81	3.6		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	8	0.4		4	108	unk
<i>Dolophilodes</i> sp.	4	0.2		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	14	0.6		0	18	pr
<i>Rhyacophila hyalinata</i>		0.0		0	18	pr
<i>Rhyacophila iranda</i>		0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vepulsa</i>	1	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	7	0.3		0	18	pr
<i>Trichopteran</i> pupae	2	0.1		--	--	unk
Other			536	23.71		
Diptera						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptropsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	1	0.0		6	108	pr
<i>Chironomidae</i>	456	20.2		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.		0.0		6	95	pr
<i>Oreogeton</i> sp.	6	0.3		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	3	0.1		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	18	0.8		6	108	cf
<i>Antocha</i> sp.		0.0		3	24	cg
<i>Dicranota</i> sp.		0.0		3	24	pr
<i>Bexatoma</i> sp.		0.0		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.	1	0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
Coleoptera						
<i>Curculionidae</i>	1	0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	11	0.5		4	104	cg
<i>Lara</i> sp.	3	0.1		4	104	cg
<i>Narpus</i> sp.		0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
Miscellaneous						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaara oblonga</i>		0.0		--	--	sh

Annelida(Oligochaeta)	0.0	5	108.	cg
Annelida (Hirudinea)	0.0	10	108	pr
Mollusca-Sphaeriidae	0.0	8	108	cg
Lymnaea sp.	0.0	6	108	cg
Helisoma sp.	0.0	6	108	sc
Physa sp.	0.0	8	108	cg
Hydracarina	2	5	108	pr
Nematoda	1	5	108	om
Ostracoda	1	8	108	cg
Turbellaria	32	4	108	cg

TOTAL NUMBER =	2261
TOTAL TAXA =	45
STD =	137.5
MEAN =	2261
SDI =	3.23
SR =	0.396
B/E =	0.55
EPT Abund =	1725
EPT/Chiron =	3.78
EPT % =	76.29
EPT taxa =	32
c/f tot =	63
c/f % =	2.79
c/g tot =	1536
c/g % =	67.93
sh tot =	80
sh % =	3.54
sc tot =	472
sc % =	20.88
pr tot =	99
pr% =	4.38
om tot =	1
om % =	0.04
unk tot =	10
unk% =	0.44
sc/cf =	7.49
sc/(sc+cf) =	0.882
sh/total =	0.035

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L3 (4 Hess, 1 kick), #21

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
			3153	65.92			
Ephemeroptera							
Baetis sp.	1206	25.2			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.	4	0.1			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea	34	0.7			0	18	cg
Drunella doddsi	558	11.7			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.1			0	24	cg
Drunella sp.	2	0.0			0	48	pr
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	196	4.1			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	90	1.9			4	21	sc
Epeorus sp.	905	18.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	136	2.8			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	16	0.3			4	24	cg
Ameletus sp.	3	0.1			0	48	cg
Plecoptera			219	4.58			
Capniidae	31	0.6			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	96	2.0			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	5	0.1			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	44	0.9			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	3	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	13	0.3			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	13	0.3			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	11	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	3	0.1			2	48	sc
Trichoptera			322	6.73			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	27	0.6			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	9	0.2			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	6	0.1			4	18	cf
Hydropsyche sp.	4	0.1			4	108	cf
Parapsyche elisia		0.0			4	6	cf
Hydropsychidae	80	1.7			4	108	cf
Agraylea sp.	6	0.1			8	108	cg
Hydroptilia sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.		0.0	0	108	sh
<i>Discosmoeus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.		0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnephilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.	131	2.7	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.		0.0	4	24	sc
<i>Psychoglypha</i> sp.		0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnephilidae</i>	17	0.4	4	108	unk
<i>Dolophilodes</i> sp.	4	0.1	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bettani</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	18	0.4	0	18	pr
<i>Rhyacophila hyalinata</i>		0.0	0	18	pr
<i>Rhyacophila iranda</i>		0.0	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	1	0.0	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vepulsa</i>	2	0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	11	0.2	0	18	pr
Trichopteran pupae	6	0.1	--	--	unk
Other			1089	22.77	
Diptera					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptopsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>	1	0.0	6	108	pr
<i>Chironomidae</i>	931	19.5	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.	3	0.1	6	95	pr
<i>Oreogeton</i> sp.	8	0.2	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>	4	0.1	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>	44	0.9	6	108	cf
<i>Antocha</i> sp.	1	0.0	3	24	cg
<i>Dicranota</i> sp.		0.0	3	24	pr
<i>Hexatoma</i> sp.	10	0.2	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.	4	0.1	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
Coleoptera					
<i>Curculionidae</i>	1	0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.	18	0.4	4	104	cg
<i>Lara</i> sp.	3	0.1	4	104	cg
<i>Narpus</i> sp.	2	0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
Miscellaneous					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archana</i> sp.		0.0	--	--	sh

Annelida(Oligochaeta)	1	0.0	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	5	0.1	5	108	pr
Nematoda	1	0.0	5	108	om
Ostracoda	1	0.0	8	108	cg
Turbellaria	51	1.1	4	108	cg

TOTAL NUMBER =	4783
TOTAL TAXA =	53
STD =	243.0
MEAN =	957
SDI =	3.33
SR =	0.498
B/E =	0.38
EPT Abund =	3694
EPT/Chiron =	3.97
EPT % =	77.23
EPT taxa =	35
c/f tot =	138
c/f % =	2.89
c/g tot =	3169
c/g % =	66.26
sh tot =	108
sh % =	2.26
sc tot =	1138
sc % =	23.79
pr tot =	206
pr% =	4.31
om tot =	1
om % =	0.02
unk tot =	23
unk% =	0.48
sc/cf =	8.25
sc/(sc+cf) =	0.892
sh/total =	0.023

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L1 (4 Hess), #22

		Percent No.	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			952	45.01			
Baetis sp.	112	5.3			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	23	1.1			0	18	cg
Drunella doddsi	72	3.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	3	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	75	3.5			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	135	6.4			4	21	sc
Epeorus sp.	242	11.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	276	13.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	14	0.7			4	24	cg
Ameletus sp.		0.0			0	48	cg
Plecoptera			139	6.57			
Capniidae	17	0.8			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwalla sp.	92	4.3			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	5	0.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			-1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	2	0.1			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	4	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	6	0.3			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	10	0.5			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.		0.0			2	48	sc
Trichoptera			261	12.34			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	1	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	87	4.1			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.	2	0.1			4	108	cf
Parapsyche alsis	2	0.1			4	6	cf
Hydropsychidae	8	0.4			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoeus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnephilus sp.	0.0		3	108	sh
Neophylax sp.	130	6.1	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	11	0.5	4	108	unk
Dolophilodes sp.	1	0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.	3	0.1	0	18	pr
Rhyacophila Bettani grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	5	0.2	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila Sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	3	0.1	0	18	pr
Trichopteran pupae	8	0.4	--	--	unk
Other			763	36.08	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptrisia sp.		0.0	0	2	sc
Ceratopogonidae	14	0.7	6	108	pr
Chironomidae	703	33.2	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.	2	0.1	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	3	0.1	6	108	cf
Antocha sp.	1	0.0	3	24	cg
Dicranota sp.		0.0	3	24	pr
Hexatoma sp.	3	0.1	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	8	0.4	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.	2	0.1	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaara oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	4	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physe sp.		0.0	8	108	cg
Hydracarina	8	0.4	5	108	pr
Nematoda	10	0.5	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	5	0.2	4	108	cg

TOTAL NUMBER =	2115
TOTAL TAXA =	43
STD =	118.3
MEAN =	529
SDI =	3.44
SR =	0.574
B/E =	0.12
EPT Abund =	1352
EPT/Chiron =	1.92
EPT % =	63.92
EPT taxa =	31
c/f tot =	16
c/f % =	0.76
c/g tot =	1298
c/g % =	61.37
sh tot =	26
sh % =	1.23
sc tot =	594
sc % =	28.09
pr tot =	152
pr% =	7.19
om tot =	10
om % =	0.47
unk tot =	19
unk% =	0.90
sc/cf =	37.13
sc/(sc+cf) =	0.974
sh/total =	0.012

Macroinvertebrate Data--Montanore Project, August 1993  
Libby Creek, L1 (1 kick), #23

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1027	48.19			
Baetis sp.	294	13.8			5	72	cg
Diphator sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	31	1.5			0	18	cg
Drunella doddsi	92	4.3			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	3	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	130	6.1			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	62	2.9			4	21	sc
Epeorus sp.	275	12.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	107	5.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	24	1.1			4	24	cg
Ameletus sp.	9	0.4			0	48	cg
Plecoptera			59	2.77			
Capniidae	1	0.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	31	1.5			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	5	0.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	5	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	3	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	12	0.6			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.		0.0			2	48	sc
Trichoptera			169	7.93			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	4	0.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	36	1.7			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	1	0.0			4	18	cf
Hydropsyche sp.	6	0.3			4	108	cf
Parapsyche elisia		0.0			4	6	cf
Hydropsychidae	12	0.6			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

## L1 kick, Aug '93, #23

Apatania sp.		0.0	1	18	sc
Chyrandra centralis		0.0	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoeus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.	47	2.2	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	45	2.1	4	108	unk
Dolophilodes sp.	1	0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.		0.0	0	18	pr
Rhyacophila Betteni grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	10	0.5	0	18	pr
Rhyacophila hyalinata	1	0.0	0	18	pr
Rhyacophila iranda		0.0	0	18	pr
Rhyacophila Sibirica grp.		0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	5	0.2	0	18	pr
Trichopteran pupae	1	0.0	--	--	unk
Other		876	41.11		
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae	4	0.2	6	108	pr
Chironomidae	817	38.3	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreoceton sp.	2	0.1	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	27	1.3	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.		0.0	3	24	pr
Hexatoma sp.	4	0.2	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.	1	0.0	4	36	om
Limnophila sp.	1	0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	5	0.2	4	104	cg
Lara sp.	1	0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidæ		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	0.0	5	108	cg	
Annelida (Hirudinea)	0.0	10	108	pr	
Mollusca-Sphaeriidae	0.0	8	108	cg	
Lymnaea sp.	0.0	6	108	cg	
Helisoma sp.	0.0	6	108	sc	
Physa sp.	0.0	8	108	cg	
Hydracarina	12	0.6	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	2	0.1	4	108	cg

TOTAL NUMBER =	2131
TOTAL TAXA =	41
STD =	137.0
MEAN =	2131
SDI =	3.23
SR =	0.423
B/E =	0.29
EPT Abund =	1255
EPT/Chiron =	1.54
EPT % =	58.89
EPT taxa =	30
c/f tot =	47
c/f % =	2.21
c/g tot =	1515
c/g % =	71.09
sh tot =	10
sh % =	0.47
sc tot =	420
sc % =	19.71
pr tot =	92
pr% =	4.32
om tot =	1
om % =	0.05
unk tot =	46
unk% =	2.16
sc/cf =	0.94
sc/(sc+cf) =	0.899
sh/total =	0.005

Macroinvertebrate Data--Montanore Project, August 1993  
 Libby Creek, L1 (4 Hess, 1 kick), #24

	No.	Percent Total	Total Number 1979	Percent Total 46.61	TV	TQ	FFG
Ephemeroptera							
Baetis sp.	406	9.6			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea	54	1.3			0	18	cg
Drunella doddsi	164	3.9			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	6	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	205	4.8			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	197	4.6			4	21	sc
Epeorus sp.	517	12.2			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	383	9.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	38	0.9			4	24	cg
Ameletus sp.	9	0.2			0	48	cg
Plecoptera			198	4.66			
Capniidae	18	0.4			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	123	2.9			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	5	0.1			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	7	0.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	9	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	2	0.0			2	18	pr
Megarcys sp.	9	0.2			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	22	0.5			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.		0.0			2	48	sc
Trichoptera			430	10.13			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	5	0.1			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	123	2.9			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	1	0.0			4	18	cf
Hydropsyche sp.	8	0.2			4	108	cf
Parapsyche elsis	2	0.0			4	6	cf
Hydropsychidae	20	0.5			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnophilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	177	4.2		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnophilidae</i>	56	1.3		4	108	unk
<i>Dolophilodes</i> sp.	2	0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	3	0.1		0	18	pr
<i>Rhyacophila Bettini</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	15	0.4		0	18	pr
<i>Rhyacophila hyalinata</i>	1	0.0		0	18	pr
<i>Rhyacophila iranda</i>		0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vespulsa</i>		0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	8	0.2		0	18	pr
<i>Trichopteran</i> pupae	9	0.2	--	--	--	unk
Other			1639	38.60		
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	18	0.4		6	108	pr
<i>Chironomidae</i>	1520	35.8		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.		0.0		6	95	pr
<i>Oreogenet on</i> sp.	4	0.1		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>		0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	30	0.7		6	108	cf
<i>Antocha</i> sp.	1	0.0		3	24	cg
<i>Dicranota</i> sp.		0.0		3	24	pr
<i>Hexatoma</i> sp.	7	0.2		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.	1	0.0		4	36	om
<i>Limnophila</i> sp.	1	0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0	--	--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	13	0.3		4	104	cg
<i>Lara</i> sp.	1	0.0		4	104	cg
<i>Narpus</i> sp.	2	0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0	--	72	pr	
<i>Archana ra oblonga</i>		0.0	--	--	--	sh

Annelida(Oligochaeta)	4	0.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	20	0.5	5	108	pr
Nematoda	10	0.2	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	7	0.2	4	108	cg

TOTAL NUMBER =	4246
TOTAL TAXA =	49
STD =	234.8
MEAN =	849
SDI =	3.41
SR =	0.498
B/E =	0.21
EPT Abund =	2607
EPT/Chiron =	1.72
EPT % =	61.40
EPT taxa =	34
c/f tot =	63
c/f % =	1.48
c/g tot =	2813
c/g % =	66.25
sh tot =	36
sh % =	0.85
sc tot =	1014
sc % =	23.88
pr tot =	244
pr% =	5.75
om tot =	11
om % =	0.26
unk tot =	65
unk% =	1.53
sc/cf =	16.10
sc/(sc+cf) =	0.942
sh/total =	0.008



**Appendix E. Macroinvertebrate station totals, October 1993.**

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L10 (4 Hess), #25

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			514	40.50			
Baetis sp.	62	4.9			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	11	0.9			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	1	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	317	25.0			4	21	sc
Epsorus sp.	8	0.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	110	8.7			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	5	0.4			0	48	cg
Plecoptera			444	34.99			
Capniidae	7	0.6			1	32	sh
Kathroperla pardita		0.0			1	24	cg
Sweltsa/Suwallia sp.	193	15.2			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	46	3.6			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	37	2.9			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	19	1.5			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	3	0.2			2	24	pr
Setyena bradleyi	1	0.1			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	2	0.2			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	134	10.6			2	48	sc
Trichoptera			132	10.40			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	12	0.9			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	2	0.2			4	6	cf
Hydropsychidae	28	2.2			4	108	cf
Agraylea sp.	41	3.2			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoeus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnephilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnephilidae	1	0.1	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	0.0		0	18	pr
Rhyacophila Betteni grp.	0.0		0	18	pr
Rhyacophila Bifila grp.	0.0		0	18	pr
Rhyacophila Brunnea grp.	1	0.1	0	18	pr
Rhyacophila hyalinata	1	0.1	0	18	pr
Rhyacophila iranda	2	0.2	0	18	pr
Rhyacophila Sibirica grp.	15	1.2	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vespulsa		0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	29	2.3	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			179	14.11	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	0.0		6	108	pr
Chironomidae	142	11.2	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	1	0.1	6	95	pr
Oreogeton sp.	9	0.7	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae		0.0	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	3	0.2	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.		0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	8	0.6	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	16	1.3	4	108	cg

TOTAL NUMBER =	1269
TOTAL TAXA =	33
STD =	67.7
MEAN =	317
SDI =	3.59
SR =	0.757
B/E =	0.12
EPT Abund =	1090
EPT/Chiron =	7.68
EPT % =	85.89
EPT taxa =	27
c/f tot =	30
c/f % =	2.36
c/g tot =	396
c/g % =	31.21
sh tot =	109
sh % =	8.59
sc tot =	471
sc % =	37.12
pr tot =	262
pr% =	20.65
om tot =	0
om % =	0.00
unk tot =	1
unk% =	0.08
sc/cf =	15.70
sc/(sc+cf) =	0.940
sh/total =	0.086

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L10 (1 kick), #26

	No.	Percent Total	Total Number 803	Percent Total 30.64	TV	TQ	FFG
<b>Ephemeroptera</b>							
Baetis sp.	292	11.1			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	2	0.1			0	18	cg
Drunella doddsi	21	0.8			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.1			0	24	pr
Drunella sp.	2	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmula sp.	303	11.6			4	21	sc
Epsorus sp.	38	1.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	83	3.2			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	3	0.1			4	24	cg
Ameletus sp.	56	2.1			0	48	cg
<b>Plecoptera</b>			940	35.86			
Capniidae	34	1.3			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	243	9.3			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	67	2.6			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	17	0.6			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	380	14.5			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	56	2.1			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.1			1	18	pr
Hesperoperla pacifica	9	0.3			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	13	0.5			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	6	0.2			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	113	4.3			2	48	sc
<b>Trichoptera</b>			253	9.65			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	12	0.5			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	9	0.3			4	6	cf
Hydropsychidae	43	1.6			4	108	cf
Agraylea sp.	76	2.9			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	6	0.2			1	18	sh

Apatania sp.		0.0		1	18	sc
Chyrandra centralis		0.0		1	18	sh
Cryptochia sp.	1	0.0	0	108	sh	
Discosmoecus sp.		0.0	1	24	om	
Ecclisomyia sp.		0.0	2	108	om	
Hesperophylax sp.		0.0	3	108	om	
Limnephilus sp.		0.0	3	108	sh	
Neophylax sp.		0.0	4	24	sc	
Neothremma alicia		0.0	4	8	sc	
Oligophlebodes sp.	1	0.0	4	24	sc	
Psychoglypha sp.		0.0	0	24	om	
Pycnopsyche guttifer		0.0	4	72	sh	
Limnephilidae	8	0.3	4	108	unk	
Dolophilodes sp.		0.0	2	24	cf	
Wormaldia sp.		0.0	3	24	cf	
Rhyacophila acropedes		0.0	0	18	pr	
Rhyacophila Angelita grp.	1	0.0	0	18	pr	
Rhyacophila Betténi grp.		0.0	0	18	pr	
Rhyacophila Bifila grp.		0.0	0	18	pr	
Rhyacophila Brunnea grp.	12	0.5	0	18	pr	
Rhyacophila hyalinata	3	0.1	0	18	pr	
Rhyacophila iranda	9	0.3	0	18	pr	
Rhyacophila Sibirica grp.	16	0.6	0	18	pr	
Rhyacophila tucula		0.0	0	18	pr	
Rhyacophila vaccua		0.0	0	18	pr	
Rhyacophila vepulsa		0.0	0	18	pr	
Rhyacophila Verrula grp.		0.0	0	18	pr	
Rhyacophila sp.	53	2.0	0	18	pr	
Trichopteran pupae	3	0.1	--	--	unk	
Other			625	23.85		
Diptera						
Atherix sp.		0.0	4	24	pr	
Agathon sp.		0.0	0	2	sc	
Dioptopsis sp.		0.0	0	2	sc	
Ceratopogonidae	3	0.1	6	108	pr	
Chironomidae	555	21.2	6	108	cg	
Culicidae		0.0	8	108	cg	
Dixidae		0.0	2	108	cg	
Chelifera sp.	2	0.1	6	95	pr	
Oreogeton sp.	9	0.3	6	95	pr	
Limnophora sp.		0.0	6	108	pr	
Glutops rossi		0.0	3	110	pr	
Psychodidae		0.0	10	36	cg	
Simuliidae	2	0.1	6	108	cf	
Antocha sp.		0.0	3	24	cg	
Dicranota sp.	4	0.2	3	24	pr	
Hexatoma sp.	2	0.1	2	36	pr	
Pedicia sp.		0.0	6	72	pr	
Molophilus sp.		0.0	3	72	unk	
Tipula sp.		0.0	4	36	om	
Limnophila sp.		0.0	3	72	pr	
Tipulidae		0.0	3	72	unk	
Coleoptéra						
Curculionidae		0.0	--	--	sh	
Hydaticus sp.		0.0	5	72	pr	
Cleptelmis sp.		0.0	4	104	cg	
Heterlimnius sp.	1	0.0	4	104	cg	
Lara sp.		0.0	4	104	cg	
Narpus sp.		0.0	4	104	cg	
Opticservus sp.		0.0	4	104	cg	
Rhizelmis sp.		0.0	2	104	cg	
Stenelmis sp.		0.0	5	104	cg	
Zaitzevia sp.		0.0	4	104	cg	
Elmidæ		0.0	4	104	cg	
Brychius sp.		0.0	5	54	sc	
Haliplus sp.		0.0	5	54	sc	
Hydrophilidae		0.0	5	72	pr	
Miscellaneous						
Corixidae		0.0	8	108	unk	
Gerridae		0.0	--	72	pr	
Archanaea oblonga		0.0	--	--	sh	

Annelida(Oligochaeta)	6	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	5	0.2	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	36	1.4	4	108	cg

TOTAL NUMBER =	2621
TOTAL TAXA =	47
STD =	112.0
MEAN =	2621
SDI =	3.86
SR =	0.602
B/E =	0.36
EPT Abund =	1996
EPT/Chiron =	3.60
EPT % =	76.15
EPT taxa =	36
c/f tot =	54
c/f % =	2.06
c/g tot =	1133
c/g % =	43.23
sh tot =	561
sh % =	21.40
sc tot =	467
sc % =	17.82
pr tot =	395
prt =	15.07
om tot =	0
om % =	0.00
unk tot =	11
unk% =	0.42
sc/cf =	8.65
sc/(sc+cf) =	0.896
sh/total =	0.214

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L10 (4 Hess, 1 kick), #27

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1317	33.86			
Baetis sp.	354	9.1			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	2	0.1			0	18	cg
Drunella doddsi	32	0.8			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	3	0.1			0	24	pr
Drunella sp.	3	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	620	15.9			4	21	sc
Epeorus sp.	46	1.2			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	193	5.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	3	0.1			4	24	cg
Ameletus sp.	61	1.6			0	48	cg
Plecoptera			1384	35.58			
Capniidae	41	1.1			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	436	11.2			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	113	2.9			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	17	0.4			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	417	10.7			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	75	1.9			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.1			1	18	pr
Hesperoperla pacifica	9	0.2			2	18	pr
Perlidae	2	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	16	0.4			2	24	pr
Setvena bradleyi	1	0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	8	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	247	6.3			2	48	sc
Trichoptera			385	9.90			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	24	0.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	11	0.3			4	6	cf
Hydropsychidae	71	1.8			4	108	cf
Agraylea sp.	117	3.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	6	0.2			1	18	sh

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.	1	0.0	0	108	sh
<i>Discosmoecus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.		0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnephilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.		0.0	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.	1	0.0	4	24	sc
<i>Psychoglypha</i> sp.		0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnophilidae</i>	9	0.2	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.	1	0.0	0	18	pr
<i>Rhyacophila Batteni</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	13	0.3	0	18	pr
<i>Rhyacophila hyalinata</i>	4	0.1	0	18	pr
<i>Rhyacophila iranda</i>	11	0.3	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	31	0.8	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vepulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	82	2.1	0	18	pr
<i>Trichopteran</i> pupae	3	0.1	--	--	unk
Other			804	20.67	
Diptera					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptopsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>	3	0.1	6	108	pr
<i>Chironomidae</i>	697	17.9	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.	3	0.1	6	95	pr
<i>Oreogenetan</i> sp.	18	0.5	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>	2	0.1	6	108	cf
<i>Antocha</i> sp.		0.0	3	24	cg
<i>Dicranota</i> sp.	7	0.2	3	24	pr
<i>Hexatoma</i> sp.	2	0.1	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
Coleoptera					
<i>Curculionidae</i>		0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.	1	0.0	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.		0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
Miscellaneous					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archanaara oblonga</i>		0.0	--	--	sh

Annelida(Oligochaeta)	14	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	5	0.1	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	52	1.3	4	108	cg

TOTAL NUMBER = 3890  
 TOTAL TAXA = 49  
 STD = 157.0  
 MEAN = 778  
 SDI = 3.87  
 SR = 0.653  
 B/E = 0.27  
 EPT Abund = 3086  
 EPT/Chiron = 4.43  
 EPT % = 79.33  
 EPT taxa = 38  
 c/f tot = 84  
 c/f % = 2.16  
 c/g tot = 1529  
 c/g % = 39.31  
 sh tot = 670  
 sh % = 17.22  
 sc tot = 938  
 sc % = 24.11  
 pr tot = 657  
 pr% = 16.89  
 om tot = 0  
 om % = 0.00  
 unk tot = 12  
 unk% = 0.31  
 sc/cf = 11.17  
 sc/(sc+cf) = 0.918  
 sh/total = 0.172

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L9 (4 Hess), #28

		Percent No.	Total Number	Percent Total	TV	TQ	FPG
Ephemeroptera			620	29.85			
Baetis sp.	66	3.2			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	35	1.7			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.0			0	24	pr
Drunella sp.	7	0.3			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	2	0.1			1	48	cg
Cinygmulia sp.	380	18.3			4	21	sc
Epeorus sp.	9	0.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	87	4.2			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.		0.0			4	24	cg
Ameletus sp.	33	1.6			0	48	cg
Plecoptera			944	45.45			
Capniidae	1	0.0			1	32	sh
Kathroperla pardita		0.0			1	24	cg
Sweltsa/Suwallia sp.	110	5.3			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	25	1.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	5	0.2			0	36	sh
Zapada cinctipes	1	0.0			2	16	sh
Zapada columbiana	105	5.1			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	8	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	13	0.6			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	7	0.3			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	6	0.3			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	663	31.9			2	48	sc
Trichoptera			391	18.83			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	238	11.5			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	7	0.3			4	6	cf
Hydropsychidae	38	1.8			4	108	cf
Agraylea sp.	2	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoecus sp.	0.0		1	24	om
Ecclisomyia sp.	0.0		2	108	om
Hesperophylax sp.	0.0		3	108	om
Limnophilus sp.	0.0		3	108	sh
Neophylax sp.	0.0		4	24	sc
Neothremma alicia	0.0		4	8	sc
Oligophlebodes sp.	0.0		4	24	sc
Psychoglypha sp.	0.0		0	24	om
Pycnopsyche guttifer	0.0		4	72	sh
Limnophilidae	7	0.3	4	108	unk
Dolophilodes sp.	0.0		2	24	cf
Wormaldia sp.	0.0		3	24	cf
Rhyacophila acropedes	0.0		0	18	pr
Rhyacophila Angelita grp.	21	1.0	0	18	pr
Rhyacophila Bettani grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	2	0.1	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda	2	0.1	0	18	pr
Rhyacophila Sibirica grp.	6	0.3	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vacua		0.0	0	18	pr
Rhyacophila vepulsa	11	0.5	0	18	pr
Rhyacophila Verrula grp.	57	2.7	0	18	pr
Rhyacophila sp.		0.0	0	18	pr
Trichopteran pupae		0.0	--	--	unk
Other			122	5.87	
Diptera					
Atherix sp.	0.0		4	24	pr
Agathon sp.	0.0		0	2	sc
Dioptopsis sp.	0.0		0	2	sc
Ceratopogonidae	2	0.1	6	108	pr
Chironomidae	59	2.8	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	1	0.0	6	95	pr
Oreogeton sp.	15	0.7	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi		0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae		0.0	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.	7	0.3	3	24	pr
Hexatoma sp.		0.0	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae	0.0		--	--	sh
Hydaticus sp.	0.0		5	72	pr
Cleptelmis sp.	0.0		4	104	cg
Heterlimnius sp.	1	0.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae	0.0		8	108	unk
Gerridae	0.0		--	72	pr
Archanaea oblonga	0.0		--	--	sh

Annelida(Oligochaeta)	12	0.6	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	2	0.1	5	108	pr
Nematoda	1	0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	22	1.1	4	108	cg

TOTAL NUMBER =	2077
TOTAL TAXA =	41
STD =	119.3
MEAN =	519
SDI =	3.47
SR =	0.890
B/E =	0.11
EPT Abund =	1955
EPT/Chiron =	33.14
EPT % =	94.13
EPT taxa =	31
c/f tot =	45
c/f % =	2.17
c/g tot =	326
c/g % =	15.70
sh tot =	145
sh % =	6.98
sc tot =	1290
sc % =	62.11
pr tot =	263
prt % =	12.66
om tot =	1
om % =	0.05
unk tot =	7
unk% =	0.34
sc/cf =	28.67
sc/(sc+cf) =	0.966
sh/total =	0.070

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L9 (1 kick), #29

	No.	Percent Total	Total Number 511	Percent Total 27.09	TV	TQ	FFG
Ephemeroptera							
Baetis sp.	115	6.1			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	18	1.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.3			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	5	0.3			1	48	cg
Cinygmulia sp.	267	14.2			4	21	sc
Epeorus sp.	17	0.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	72	3.8			0	21	cg
Heptageniidae	1	0.1			4	48	sc
Paraleptophlebia sp.	1	0.1			4	24	cg
Ameletus sp.	10	0.5			0	48	cg
Plecoptera			900	47.72			
Capniidae	8	0.4			1	32	sh
Kathroperala perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	44	2.3			0	24	pr
Despaxia augusta	3	0.2			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	3	0.2			0	36	sh
Zapada cinctipes	4	0.2			2	16	sh
Zapada columbiana	158	8.4			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	6	0.3			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Rogotus modestus		0.0			2	18	pr
Megarcys sp.	2	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae		0.0			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	671	35.6			2	48	sc
Trichoptera			326	17.29			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	181	9.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elisia	91	4.8			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.	5	0.3			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.		0.0	0	108	sh
<i>Discosmoecus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.		0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnophilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.	4	0.2	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.		0.0	4	24	sc
<i>Psychoglypha</i> sp.		0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnophilidae</i>	10	0.5	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.	2	0.1	0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	7	0.4	0	18	pr
<i>Rhyacophila hyalinata</i>		0.0	0	18	pr
<i>Rhyacophila iranda</i>		0.0	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	15	0.8	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vepulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	8	0.4	0	18	pr
<i>Trichopteran</i> pupae	3	0.2	--	--	unk
<b>Other</b>			149	7.90	
<b>Diptera</b>					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptopsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>		0.0	6	108	pr
<i>Chironomidae</i>	105	5.6	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.		0.0	6	95	pr
<i>Oreogenetan</i> sp.	5	0.3	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>		0.0	6	108	cf
<i>Antocha</i> sp.		0.0	3	24	cg
<i>Dicranota</i> sp.	10	0.5	3	24	pr
<i>Hexatoma</i> sp.		0.0	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>		0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.		0.0	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.		0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archanaea oblonga</i>		0.0	--	--	sh

Annelida(Oligochaeta)	4	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	3	0.2	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	22	1.2	4	108	cg

<b>TOTAL NUMBER =</b>	<b>1886</b>
<b>TOTAL TAXA =</b>	<b>36</b>
STD =	120.4
MEAN =	1886
SDI =	3.29
SR =	0.856
B/E =	0.23
EPT Abund =	1737
EPT/Chiron =	16.54
EPT % =	92.10
EPT taxa =	30
c/f tot =	91
c/f % =	4.83
c/g tot =	357
c/g % =	18.93
sh tot =	182
sh % =	9.65
sc tot =	1141
sc % =	60.50
pr tot =	102
pr% =	5.41
om tot =	0
om % =	0.00
unk tot =	13
unk% =	0.69
sc/cf =	12.54
sc/(sc+cf) =	0.926
sh/total =	0.097

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L9 (4 Hess, 1 kick), #30

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1131	28.54			
Baetis sp.	181	4.6			5	72	cg
Diphotor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	53	1.3			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	6	0.2			0	24	pr
Drunella sp.	7	0.2			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	7	0.2			1	48	cg
Cinygmulia sp.	647	16.3			4	21	sc
Epeorus sp.	26	0.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	159	4.0			0	21	cg
Heptageniidae	1	0.0			4	48	sc
Paraleptophlebia sp.	1	0.0			4	24	cg
Ameletus sp.	43	1.1			0	48	cg
Placoptera			1844	46.53			
Capniidae	9	0.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	154	3.9			0	24	pr
Despaxia augusta	3	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	25	0.6			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	8	0.2			0	36	sh
Zapada cinctipes	5	0.1			2	16	sh
Zapada columbiana	263	6.6			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	14	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	13	0.3			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	9	0.2			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	6	0.2			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1334	33.7			2	48	sc
Trichoptera			717	18.09			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	419	10.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	98	2.5			4	6	cf
Hydropsychidae	38	1.0			4	108	cf
Agraylea sp.	7	0.2			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	4	0.1		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	17	0.4		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	23	0.6		0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	9	0.2		0	18	pr
<i>Rhyacophila hyalinata</i>		0.0		0	18	pr
<i>Rhyacophila iranda</i>	2	0.1		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	21	0.5		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vespula</i>	11	0.3		0	18	pr
<i>Rhyacophila Verrula</i> grp.	57	1.4		0	18	pr
<i>Rhyacophila</i> sp.	8	0.2		0	18	pr
<i>Trichopteran</i> pupae	3	0.1		--	--	unk
Other			271	6.84		
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	2	0.1		6	108	pr
<i>Chironomidae</i>	164	4.1		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	1	0.0		6	95	pr
<i>Oreogeton</i> sp.	20	0.5		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>		0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>		0.0		6	108	cf
<i>Antocha</i> sp.		0.0		3	24	cg
<i>Dicranota</i> sp.	17	0.4		3	24	pr
<i>Hexatoma</i> sp.		0.0		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.		0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	1	0.0		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.		0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archana</i> sp.		0.0		--	--	sh

Annelida(Oligochaeta)	16	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	5	0.1	5	108	pr
Nematoda	1	0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	44	1.1	4	108	cg

TOTAL NUMBER =	3963
TOTAL TAXA =	48
STD =	216.5
MEAN =	793
SDI =	3.48
SR =	0.874
B/E =	0.16
EPT Abund =	3692
EPT/Chiron =	22.51
EPT % =	93.16
EPT taxa =	38
c/f tot =	136
c/f % =	3.43
c/g tot =	683
c/g % =	17.23
sh tot =	327
sh % =	8.25
sc tot =	2431
sc % =	61.34
pr tot =	365
pr% =	9.21
om tot =	1
om % =	0.03
unk tot =	20
unk% =	0.50
sc/cf =	17.68
sc/(sc+cf) =	0.947
sh/total =	0.083

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L3 (4 Hess), #31

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1158	40.42			
Baetis sp.	316	11.0			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddai	135	4.7			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	4	0.1			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	80	2.8			1	48	cg
Cinygmulia sp.	332	11.6			4	21	sc
Epeorus sp.	40	1.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	240	8.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	3	0.1			4	24	cg
Ameletus sp.	8	0.3			0	48	cg
Plecoptera			550	19.20			
Capniidae	14	0.5			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	87	3.0			0	24	pr
Despaxia augusta	2	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae	23	0.8			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	1	0.0			0	36	sh
Zapada cinctipes	81	2.8			2	16	sh
Zapada columbiana	113	3.9			2	16	sh
Nemouridae	1	0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	4	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	3	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.0			2	18	pr
Perlodidae	26	0.9			2	48	pr
Doddia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	192	6.7			2	48	sc
Trichoptera			558	19.48			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	1	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	23	0.8			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	124	4.3			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	3	0.1			4	108	cf
Agraylea sp.	2	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.		0.0	1	18	sc
Chyrandra centralis		0.0	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoeus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesparophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.	298	10.4	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	18	0.6	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes	22	0.8	0	18	pr
Rhyacophila Angelita grp.	2	0.1	0	18	pr
Rhyacophila Betteni grp.	6	0.2	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	32	1.1	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda	1	0.0	0	18	pr
Rhyacophila Sibirica grp.	1	0.0	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vespulse		0.0	0	18	pr
Rhyacophila Verrula grp.	2	0.1	0	18	pr
Rhyacophila sp.		0.0	0	18	pr
Trichopteran pupae	23	0.8	--	--	unk
Other	2		597	20.84	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae	7	0.2	6	108	pr
Chironomidae	508	17.7	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.	1	0.0	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi	1	0.0	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae		0.0	6	108	cf
Antocha sp.	5	0.2	3	24	cg
Dicranota sp.	8	0.3	3	24	pr
Hexatoma sp.	9	0.3	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	23	0.8	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.	2	0.1	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.	1	0.0	4	104	cg
Elmidae	1	0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaara oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	4	0.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	7	0.2	5	108	pr
Nematoda	5	0.2	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	15	0.5	4	108	cg

TOTAL NUMBER =	2865
TOTAL TAXA =	53
STD =	103.1
MEAN =	716
SDI =	4.03
SR =	0.672
B/E =	0.27
EPT Abund =	2266
EPT/Chiron =	4.46
EPT % =	79.09
EPT taxa =	38
c/f tot =	127
c/f % =	4.43
c/g tot =	1343
c/g % =	46.88
sh tot =	236
sh % =	8.24
sc tot =	885
sc % =	30.89
pr tot =	226
pr% =	7.89
om tot =	5
om % =	0.17
unk tot =	41
unk% =	1.43
sc/cf =	6.97
sc/(sc+cf) =	0.875
sh/total =	0.082

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L3 (1 kick), #32

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			890	46.60			
Baetis sp.	304	15.9			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	79	4.1			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	1	0.1			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	16	0.8			1	48	cg
Cinygmulia sp.	422	22.1			4	21	sc
Epeorus sp.	7	0.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	44	2.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	10	0.5			4	24	cg
Ameletus sp.	7	0.4			0	48	cg
Plecoptera			286	14.97			
Capniidae		0.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	33	1.7			0	24	pr
Despaxia augusta	10	0.5			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae	3	0.2			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	2	0.1			0	36	sh
Zapada cinctipes	32	1.7			2	16	sh
Zapada columbiana	3	0.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	1	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	5	0.3			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	10	0.5			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	5	0.3			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	182	9.5			2	48	sc
Trichoptera			569	29.79			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.		0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	2	0.1			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	46	2.4			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae		0.0			4	108	cf
Agraylea sp.	1	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.		0.0		1	18	sc
Chyrandra centralis		0.0		1	18	sh
Cryptochia sp.		0.0		0	108	sh
Discosmoecus sp.		0.0		1	24	om
Ecclisomyia sp.		0.0		2	108	om
Hesperophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.	467	24.5		4	24	sc
Neothremma alicia		0.0		4	8	sc
Oligophlebodes sp.		0.0		4	24	sc
Psychoglypha sp.		0.0		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnophilidae	15	0.8		4	108	unk
Dolophilodes sp.		0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes		0.0		0	18	pr
Rhyacophila Angelita grp.		0.0		0	18	pr
Rhyacophila Bettenei grp.	3	0.2		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	16	0.8		0	18	pr
Rhyacophila hyalinata		0.0		0	18	pr
Rhyacophila iranda		0.0		0	18	pr
Rhyacophila Sibirica grp.	3	0.2		0	18	pr
Rhyacophila tucula		0.0		0	18	pr
Rhyacophila vaccua		0.0		0	18	pr
Rhyacophila vepulsa		0.0		0	18	pr
Rhyacophila Verrula grp.		0.0		0	18	pr
Rhyacophila sp.	14	0.7		0	18	pr
Trichopteran pupae	2	0.1		--	--	unk
Other			165	8.64		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Dioptopsis sp.		0.0		0	2	sc
Ceratopogonidae	2	0.1		6	108	pr
Chironomidae	110	5.8		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chelifera sp.		0.0		6	95	pr
Oreogeton sp.		0.0		6	95	pr
Limnophora sp.		0.0		6	108	pr
Giutops rossi	2	0.1		3	110	pr
Psychodidae		0.0		10	36	cg
Simuliidae		0.0		6	108	cf
Antocha sp.		0.0		3	24	cg
Dicranota sp.	6	0.3		3	24	pr
Hexatoma sp.	4	0.2		2	36	pr
Pedicia sp.		0.0		6	72	pr
Mölophilus sp.		0.0		3	72	unk
Tipula sp.		0.0		4	36	om
Limnophila sp.		0.0		3	72	pr
Tipulidae		0.0		3	72	unk
Coleoptera						
Curculionidae		0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptelmis sp.		0.0		4	104	cg
Heterlimnius sp.	25	1.3		4	104	cg
Lara sp.		0.0		4	104	cg
Narpus sp.	1	0.1		4	104	cg
Optioservus sp.		0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.		0.0		4	104	cg
Elmidae		0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae		0.0		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archana oblonga		0.0		--	--	sh

Annelida(Oligochaeta)	1	0.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	2	0.1	5	108	pr
Nematoda	2	0.1	5	108	om
Ostracoda	2	0.1	8	108	cg
Turbellaria	8	0.4	4	108	cg

TOTAL NUMBER =	1910
TOTAL TAXA =	42
STD =	104.8
MEAN =	1910
SDI =	3.38
SR =	0.750
B/E =	0.34
EPT Abund =	1745
EPT/Chiron =	15.86
EPT % =	91.36
EPT taxa =	30
c/f tot =	46
c/f % =	2.41
c/g tot =	608
c/g % =	31.83
sh tot =	50
sh % =	2.62
sc tot =	1080
sc % =	56.54
pr tot =	107
pr% =	5.60
om tot =	2
om % =	0.10
unk tot =	17
unk% =	0.89
sc/cf =	23.48
sc/(sc+cf) =	0.959
sh/total =	0.026

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, L3 (4 Hess, 1 kick), #33

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FPG
Ephemeroptera			2048	42.89			
Baetis sp.	620	13.0			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	214	4.5			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.1			0	24	pr
Drunella sp.		0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.		0.0			2	48	cg
Ephemerellidae	96	2.0			1	48	cg
Cinygmulia sp.	754	15.8			4	21	sc
Epeorus sp.	47	1.0			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	284	5.9			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	13	0.3			4	24	cg
Ameletus sp.	15	0.3			0	48	cg
Plecoptera			836	17.51			
Capniidae	14	0.3			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	120	2.5			0	24	pr
Despaxia augusta	12	0.3			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae		0.0			0	18	sh
Capniidae/Leuctridae	26	0.5			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	3	0.1			0	36	sh
Zapada cinctipes	113	2.4			2	16	sh
Zapada columbiana	116	2.4			2	16	sh
Nemouridae	1	0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	5	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	7	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	13	0.3			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.0			2	18	pr
Perlodidae	31	0.6			2	48	pr
Doddzia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	374	7.8			2	48	sc
Trichoptera			1129	23.64			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	1	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	25	0.5			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	170	3.6			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	3	0.1			4	108	cf
Agraylea sp.	3	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Apatania sp.		0.0	1	18	sc
Chyrandra centralis		0.0	1	18	sh
Cryptochia sp.		0.0	0	108	sh
Discosmoeetus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.	765	16.0	4	24	sc
Neothremma alicia		0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephiliidae	33	0.7	4	108	unk
Dolophilodes sp.		0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes	22	0.5	0	18	pr
Rhyacophila Angelita grp.	2	0.0	0	18	pr
Rhyacophila Bettini grp.	9	0.2	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	48	1.0	0	18	pr
Rhyacophila hyalinata		0.0	0	18	pr
Rhyacophila iranda	1	0.0	0	18	pr
Rhyacophila Sibirica grp.	4	0.1	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa	2	0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	37	0.8	0	18	pr
Trichopteran pupae	4	0.1	--	--	unk
Other			762	15.96	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae	9	0.2	6	108	pr
Chironomidae	618	12.9	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.		0.0	6	95	pr
Oreogeton sp.	1	0.0	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi	3	0.1	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae		0.0	6	108	cf
Antocha sp.	5	0.1	3	24	cg
Dicranota sp.	14	0.3	3	24	pr
Hexatoma sp.	13	0.3	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.		0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	48	1.0	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.	3	0.1	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.	1	0.0	4	104	cg
Elmidæ	1	0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Annelida(Oligochaeta)	5	0.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnasa sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	9	0.2	5	108	pr
Nematoda	7	0.1	5	108	om
Ostracoda	2	0.0	8	108	cg
Turbellaria	23	0.5	4	108	cg

TOTAL NUMBER =	4775
TOTAL TAXA =	55
STD =	184.1
MEAN =	955
SDI =	3.89
SR =	0.708
B/E =	0.30
EPT Abund =	4013
EPT/Chiron =	6.49
EPT % =	84.04
EPT taxa =	39
c/f tot =	173
c/f % =	3.62
c/g tot =	1951
c/g % =	40.86
sh tot =	286
sh % =	5.99
sc tot =	1965
sc % =	41.15
pr tot =	356
pr% =	7.46
om tot =	7
om % =	0.15
unk tot =	37
unk% =	0.77
sc/cf =	11.36
sc/(sc+cf) =	0.919
sh/total =	0.060

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, Ll (4 Hess), #34

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
			1359	53.44			
Ephemeroptera							
Baetis sp.	227	8.9			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix	2	0.1			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	30	1.2			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	2	0.1			0	24	pr
Drunella sp.	6	0.2			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	38	1.5			2	48	cg
Ephemerellidae	26	1.0			1	48	cg
Cinygmula sp.	610	24.0			4	21	sc
Epeorus sp.	35	1.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	364	14.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	18	0.7			4	24	cg
Ameletus sp.	1	0.0			0	48	cg
Plecoptera			336	13.21			
Capniidae	154	6.1			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sveltsa/Suwallia sp.	73	2.9			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	23	0.9			0	18	sh
Capniidae/Leuctridae	8	0.3			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	28	1.1			2	16	sh
Zapada columbiana	1	0.0			2	16	sh
Nemouridae	4	0.2			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	3	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	6	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.		0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.0			2	18	pr
Perlodidae	4	0.2			2	48	pr
Doddsia occidentalalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	31	1.2			2	48	sc
Trichoptera			606	23.83			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	5	0.2			1	24	cf
Micrasema sp.	1	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	158	6.2			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	15	0.6			4	18	cf
Hydropsyche sp.	8	0.3			4	108	cf
Parapsyche elsis	1	0.0			4	6	cf
Hydropsychidae	248	9.8			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	15	0.6			1	18	sh

Apatania sp.		0.0		1	18	sc
Chyrandra centralis		0.0		1	18	sh
Cryptochia sp.		0.0		0	108	sh
Discosmoecus sp.		0.0		1	24	om
Ecclisomyia sp.		0.0		2	108	om
Hesperophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.	80	3.1		4	24	sc
Neothremma alicia		0.0		4	8	sc
Oligophlebodes sp.	38	1.5		4	24	sc
Psychoglypha sp.		0.0		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnophilidae	3	0.1		4	108	unk
Dolophilodes sp.		0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes		0.0		0	18	pr
Rhyacophila Angelita grp.	1	0.0		0	18	pr
Rhyacophila Betteli grp.		0.0		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	20	0.8		0	18	pr
Rhyacophila hyalinata	4	0.2		0	18	pr
Rhyacophila iranda		0.0		0	18	pr
Rhyacophila Sibirica grp.		0.0		0	18	pr
Rhyacophila tucula		0.0		0	18	pr
Rhyacophila vaccua		0.0		0	18	pr
Rhyacophila vepulsa		0.0		0	18	pr
Rhyacophila Verrula grp.		0.0		0	18	pr
Rhyacophila sp.	4	0.2		0	18	pr
Trichopteran pupae	5	0.2		--	--	unk
Other			242	9.52		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Bioptopsis sp.		0.0		0	2	sc
Ceratopogonidae	5	0.2		6	108	pr
Chironomidae	135	5.3		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chelifera sp.		0.0		6	95	pr
Oreogeton sp.		0.0		6	95	pr
Limnophora sp.		0.0		6	108	pr
Glutops rossi		0.0		3	110	pr
Psychodidae	1	0.0		10	36	cg
Simuliidae		0.0		6	108	cf
Antocha sp.	30	1.2		3	24	cg
Dicranota sp.	2	0.1		3	24	pr
Hexatoma sp.	6	0.2		2	36	pr
Pedicia sp.		0.0		6	72	pr
Molophilus sp.		0.0		3	72	unk
Tipula sp.		0.0		4	36	om
Limnophila sp.		0.0		3	72	pr
Tipulidae		0.0		3	72	unk
Coleoptera						
Curculionidae		0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptelmis sp.		0.0		4	104	cg
Heterlimnius sp.	17	0.7		4	104	cg
Lara sp.		0.0		4	104	cg
Narpus sp.	1	0.0		4	104	cg
Optioservus sp.	1	0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.		0.0		4	104	cg
Elmidae		0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae		0.0		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archanaea oblonga		0.0		--	--	sh

L1 Hess, Oct '93, #34

Annelida(Oligochaeta)	5	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physe sp.		0.0	8	108	cg
Hydracarina	1	0.0	5	108	pr
Nematoda	20	0.8	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	18	0.7	4	108	cg

TOTAL NUMBER =	2543
TOTAL TAXA =	53
STD =	105.1
MEAN =	636
SDI =	3.93
SR =	0.712
B/E =	0.17
EPT Abund =	2301
EPT/Chiron =	17.04
EPT % =	90.48
EPT taxa =	40
c/f tot =	277
c/f % =	10.89
c/g tot =	920
c/g % =	36.18
sh tot =	234
sh % =	9.20
sc tot =	952
sc % =	37.44
pr tot =	132
pr% =	5.19
om tot =	20
om % =	0.79
unk tot =	8
unk% =	0.31
sc/cf =	3.44
sc/(sc+cf) =	0.775
sh/total =	0.092

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, Li (1 kick), #35

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			1416	50.66			
Baetis sp.	175	6.3			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	18	0.6			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	3	0.1			0	24	pr
Drunella sp.	6	0.2			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	10	0.4			2	48	cg
Ephemerellidae	74	2.6			1	48	cg
Cinygmulia sp.	844	30.2			4	21	sc
Epeorus sp.	43	1.5			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	214	7.7			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	22	0.8			4	24	cg
Ameletus sp.	6	0.2			0	48	cg
Plecoptera			342	12.24			
Capniidae	48	1.7			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallis sp.	25	0.9			0	24	pr
Despaxia augusta	4	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	9	0.3			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	149	5.3			2	16	sh
Zapada columbiana	32	1.1			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	12	0.4			1	18	pr
Hesperoperla pacifica	6	0.2			2	18	pr
Perlidae		0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	6	0.2			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	5	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	46	1.6			2	48	sc
Trichoptera			571	20.43			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	16	0.6			1	24	cf
Micrasema sp.	3	0.1			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	48	1.7			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	9	0.3			4	18	cf
Hydropsyche sp.	2	0.1			4	108	cf
Parapsyche elsis		0.0			4	6	cf
Hydropsychidae	360	12.9			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.		0.0	0	108	sh
<i>Discosmoecus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.		0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnephilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.	43	1.5	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.	11	0.4	4	24	sc
<i>Psychoglypha</i> sp.		0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnephilidae</i>	20	0.7	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.	1	0.0	0	18	pr
<i>Rhyacophila Betteni</i> grp.	6	0.2	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	46	1.6	0	18	pr
<i>Rhyacophila hyalinata</i>		0.0	0	18	pr
<i>Rhyacophila iranda</i>		0.0	0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>	3	0.1	0	18	pr
<i>Rhyacophila vepulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	2	0.1	0	18	pr
<i>Trichopteran</i> pupae	1	0.0	--	--	unk
Other			466	16.67	
<b>Diptera</b>					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptropsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>	3	0.1	6	108	pr
<i>Chironomidae</i>	394	14.1	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.		0.0	6	95	pr
<i>Oreogeton</i> sp.		0.0	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>	1	0.0	10	36	cg
<i>Simuliidae</i>	7	0.3	6	108	cf
<i>Antocha</i> sp.	21	0.8	3	24	cg
<i>Dicranota</i> sp.		0.0	3	24	pr
<i>Hexatoma</i> sp.	2	0.1	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>		0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.	21	0.8	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.		0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archanaea oblonga</i>		0.0	--	--	sh

Annelida(Oligochaeta)	6	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	1	0.0	5	108	pr
Nematoda	8	0.3	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	2	0.1	4	108	cg

TOTAL NUMBER =	2795
TOTAL TAXA =	49
STD =	139.9
MEAN =	2795
SDI =	3.65
SR =	0.638
B/E =	0.12
EPT Abund =	2329
EPT/Chiron =	5.91
EPT % =	83.33
EPT taxa =	38
c/f tot =	394
c/f % =	14.10
c/g tot =	971
c/g % =	34.74
sh tot =	245
sh % =	8.77
sc tot =	1035
sc % =	37.03
pr tot =	121
pr% =	4.33
om tot =	8
om % =	0.29
unk tot =	21
unk% =	0.75
sc/cf =	2.63
sc/(sc+cf) =	0.724
sh/total =	0.088

Macroinvertebrate Data--Montanore Project, October 1993  
 Libby Creek, Li (4 Hess, 1 kick), #36

		Percent	Total	Percent			
	No.	Total	Number	Total	TV	TQ	
			2775	51.99			
Ephemeroptera							
Baetis sp.	402	7.5			5	72	cg
Diphotor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix	2	0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	48	0.9			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	5	0.1			0	24	pr
Drunella sp.	12	0.2			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	48	0.9			2	48	cg
Ephemerellidae	100	1.9			1	48	cg
Cinygmulia sp.	1454	27.2			4	21	sc
Epeorus sp.	78	1.5			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	578	10.8			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	40	0.7			4	24	cg
Ameletus sp.	7	0.1			0	48	cg
Plecoptera			678	12.70			
Capniidae	202	3.8			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	98	1.8			0	24	pr
Despaxia augusta	4	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	32	0.6			0	18	sh
Capniidae/Leuctridae	8	0.1			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae		0.0			0	36	sh
Zapada cinctipes	177	3.3			2	16	sh
Zapada columbiana	33	0.6			2	16	sh
Nemouridae	4	0.1			2	36	sh
Yoraperla brevis		0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	15	0.3			1	18	pr
Hesperoperla pacifica	6	0.1			2	18	pr
Perlidae	6	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	6	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	1	0.0			2	18	pr
Perlodidae	9	0.2			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	77	1.4			2	48	sc
Trichoptera			1177	22.05			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	21	0.4			1	24	cf
Micrasema sp.	4	0.1			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	206	3.9			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	24	0.4			4	18	cf
Hydropsyche sp.	10	0.2			4	108	cf
Parapsyche elsis	1	0.0			4	6	cf
Hydropsychidae	608	11.4			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	15	0.3			1	18	sh

Apatania sp.		0.0		1	18	sc
Chyrandra centralis		0.0		1	18	sh
Cryptochia sp.		0.0		0	108	sh
Discosmoecus sp.		0.0		1	24	om
Ecclisomyia sp.		0.0		2	108	om
Hesperophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.	123	2.3		4	24	sc
Neothremma alicia		0.0		4	8	sc
Oligophlebodes sp.	49	0.9		4	24	sc
Psychoglypha sp.		0.0		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnephilidae	23	0.4		4	108	unk
Dolophilodes sp.		0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes		0.0		0	18	pr
Rhyacophila Angelita grp.	2	0.0		0	18	pr
Rhyacophila Betteli grp.	6	0.1		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	66	1.2		0	18	pr
Rhyacophila hyalinata	4	0.1		0	18	pr
Rhyacophila iranda		0.0		0	18	pr
Rhyacophila Sibirica grp.		0.0		0	18	pr
Rhyacophila tucula		0.0		0	18	pr
Rhyacophila vaccua	3	0.1		0	18	pr
Rhyacophila vepulsa		0.0		0	18	pr
Rhyacophila Verrula grp.		0.0		0	18	pr
Rhyacophila sp.	6	0.1		0	18	pr
Trichopteran pupae	6	0.1		--	--	unk
Other			708	13.26		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Dioptopsis sp.		0.0		0	2	sc
Ceratopogonidae	8	0.1		6	108	pr
Chironomidae	529	9.9		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chelifera sp.		0.0		6	95	pr
Oreogeton sp.		0.0		6	95	pr
Limnophora sp.		0.0		6	108	pr
Glutops rossi		0.0		3	110	pr
Psychodidae	2	0.0		10	36	cg
Simuliidae	7	0.1		6	108	cf
Antocha sp.	51	1.0		3	24	cg
Dicranota sp.	2	0.0		3	24	pr
Hexatomidae	8	0.1		2	36	pr
Pedicia sp.		0.0		6	72	pr
Molophilus sp.		0.0		3	72	unk
Tipula sp.		0.0		4	36	om
Limnophila sp.		0.0		3	72	pr
Tipulidae		0.0		3	72	unk
Coleoptera						
Curculionidae		0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptalmis sp.		0.0		4	104	cg
Heterlimnius sp.	38	0.7		4	104	cg
Lara sp.		0.0		4	104	cg
Narpus sp.	1	0.0		4	104	cg
Optioservus sp.	1	0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.		0.0		4	104	cg
Elmidae		0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae		0.0		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archana oblonga		0.0		--	--	sh

Annelida(Oligochaeta)	11	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	2	0.0	5	108	pr
Nematoda	28	0.5	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	20	0.4	4	108	cg

TOTAL NUMBER =	5338
TOTAL TAXA =	60
STD =	222.5
MEAN =	1068
SDI =	3.89
SR =	0.673
B/E =	0.14
EPT Abund =	4630
EPT/Chiron =	8.75
EPT % =	86.74
EPT taxa =	46
c/f tot =	671
c/f % =	12.57
c/g tot =	1891
c/g % =	35.43
sh tot =	479
sh % =	8.97
sc tot =	1987
sc % =	37.22
pr tot =	253
pr % =	4.74
om tot =	28
om % =	0.52
unk tot =	29
unk% =	0.54
sc/cf =	2.96
sc/(sc+cf) =	0.748
sh/total =	0.090



**Appendix F. Macroinvertebrate seasonal totals, 1993.**

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Spring 1993 (16 Hess), #37

	No.	Percent Total	Total Number 1893	Percent Total	TV	TQ	FFG
Ephemeroptera							
Baetis sp.	85	2.2			5	72	cg
Diphetor sp.	1	0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	13	0.3			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.1			0	24	pr
Drunella sp.	284	7.3			0	48	cg
Ephemerella sp.	32	0.8			1	48	cg
Serratella sp.	31	0.8			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	1018	26.2			4	21	sc
Epeorus sp.	229	5.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	52	1.3			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	113	2.9			4	24	cg
Ameletus sp.	30	0.8			0	48	cg
Plecoptera			708	18.24			
Capniidae	74	1.9			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	247	6.4			0	24	pr
Despaxia augusta	6	0.2			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	27	0.7			0	18	sh
Capniidae/Leuctridae	5	0.1			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	33	0.9			0	36	sh
Zapada cinctipes	6	0.2			2	16	sh
Zapada columbiana	34	0.9			2	16	sh
Nemouridae	156	4.0			2	36	sh
Yoraperla brevis	6	0.2			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora		0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	1	0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	4	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	5	0.1			2	18	pr
Perlodidae	7	0.2			2	48	pr
Doddsia occidentalis	1	0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	95	2.4			2	48	sc
Trichoptera			194	5.00			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	1	0.0			1	24	cf
Micrasema sp.	9	0.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	92	2.4			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	6	0.2			4	6	cf
Hydropsychidae	9	0.2			4	108	cf
Agraylea sp.	2	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

<i>Apatania</i> sp.	0.0		1	18	sc
<i>Chyrandra centralis</i>	0.0		1	18	sh
<i>Cryptochia</i> sp.	0.0		0	108	sh
<i>Discosmocetus</i> sp.	0.0		1	24	om
<i>Ecclysiomyia</i> sp.	1	0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnophilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.		0.0	4	24	sc
<i>Neothremma alicia</i>	3	0.1	4	8	sc
<i>Oligophlebodes</i> sp.	5	0.1	4	24	sc
<i>Psychoglypha</i> sp.	1	0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnephilidae</i>	40	1.0	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>		0.0	0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0	0	18	pr
<i>Rhyacophila Betteni</i> grp.	7	0.2	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	10	0.3	0	18	pr
<i>Rhyacophila hyalinata</i>	1	0.0	0	18	pr
<i>Rhyacophila iranda</i>		0.0	0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>		0.0	0	18	pr
<i>Rhyacophila vespulsa</i>		0.0	0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0	0	18	pr
<i>Rhyacophila</i> sp.	7	0.2	0	18	pr
<i>Trichopteran</i> pupae		0.0	--	--	unk
Other			1086	27.98	
<b>Diptera</b>					
<i>Atherix</i> sp.	0.0		4	24	pr
<i>Agathon</i> sp.	0.0		0	2	sc
<i>Dioctropsis</i> sp.	0.0		0	2	sc
<i>Ceratopogonidae</i>	2	0.1	6	108	pr
<i>Chironomidae</i>	1020	26.3	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.		0.0	6	95	pr
<i>Oreogeton</i> sp.	5	0.1	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>		0.0	3	110	pr
<i>Psychodidae</i>		0.0	10	36	cg
<i>Simuliidae</i>	11	0.3	6	108	cf
<i>Antocha</i> sp.	1	0.0	3	24	cg
<i>Dicranota</i> sp.	25	0.6	3	24	pr
<i>Hexatoma</i> sp.		0.0	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>	0.0		--	--	sh
<i>Hydaticus</i> sp.	0.0		5	72	pr
<i>Cleptelmis</i> sp.	0.0		4	104	cg
<i>Heterlimnius</i> sp.	3	0.1	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.		0.0	4	104	cg
<i>Optioservus</i> sp.		0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.		0.0	4	104	cg
<i>Elmidae</i>		0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archanaea oblonga</i>		0.0	--	--	sh

Annelida(Oligochaeta)	18	0.5	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina		0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.0	4	108	cg

TOTAL NUMBER =	3881
TOTAL TAXA =	53
STD =	197.4
MEAN =	243
SDI =	3.53
SR =	0.690
B/E =	0.04
EPT Abund =	2795
EPT/Chiron =	2.74
EPT % =	72.02
EPT taxa =	44
c/f tot =	27
c/f % =	0.70
c/g tot =	1686
c/g % =	43.44
sh tot =	357
sh % =	9.20
sc tot =	1443
sc % =	37.18
pr tot =	326
pr% =	8.40
om tot =	2
om % =	0.05
unk tot =	40
unk% =	1.03
sc/cf =	53.44
sc/(sc+cf) =	0.982
sh/total =	0.092

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Spring 1993 (4 kicks), #38

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
			2036	57.86			
Ephemeroptera							
Baetis sp.	127	3.6			5	72	cg
Diphetor sp.	3	0.1			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea		0.0			0	18	cg
Drunella doddsi	13	0.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.1			0	24	pr
Drunella sp.	200	5.7			0	48	cg
Ephemerella sp.	50	1.4			1	48	cg
Serratella sp.	46	1.3			2	48	cg
Ephemerellidae	1	0.0			1	48	cg
Cinygmula sp.	1107	31.5			4	21	sc
Epeorus sp.	261	7.4			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	25	0.7			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	127	3.6			4	24	cg
Ameletus sp.	71	2.0			0	48	cg
Plecoptera			933	26.51			
Capniidae	25	0.7			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	220	6.3			0	24	pr
Despaxia augusta	6	0.2			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	7	0.2			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	21	0.6			0	36	sh
Zapada cinctipes	11	0.3			2	16	sh
Zapada columbiana	82	2.3			2	16	sh
Nemouridae	216	6.1			2	36	sh
Yoraperla brevis	1	0.0			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	4	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	1	0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	1	0.0			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	8	0.2			2	18	pr
Perlodidae	9	0.3			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	321	9.1			2	48	sc
Trichoptera			92	2.61			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	15	0.4			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	9	0.3			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	2	0.1			4	6	cf
Hydropsychidae	15	0.4			4	108	cf
Agraylea sp.		0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

## Spring '93 (4 kicks), #38

Apatania sp.		0.0		1	18	sc
Chyrandra centralis	1	0.0		1	18	sh
Cryptochia sp.		0.0		0	108	sh
Discosmoecus sp.		0.0		1	24	om
Ecclisomyia sp.		0.0		2	108	om
Hesparophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.		0.0		4	24	sc
Neothremma alicia		0.0		4	8	sc
Oligophlebodes sp.		0.0		4	24	sc
Psychoglypha sp.	4	0.1		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnephilidae	21	0.6		4	108	unk
Dolophilodes sp.		0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes		0.0		0	18	pr
Rhyacophila Angelita grp.		0.0		0	18	pr
Rhyacophila Bettani grp.		0.0		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	6	0.2		0	18	pr
Rhyacophila hyalinata	4	0.1		0	18	pr
Rhyacophila iranda	2	0.1		0	18	pr
Rhyacophila Sibirica grp.		0.0		0	18	pr
Rhyacophila tucula		0.0		0	18	pr
Rhyacophila vaccua		0.0		0	18	pr
Rhyacophila vepulsa		0.0		0	18	pr
Rhyacophila Verrula grp.		0.0		0	18	pr
Rhyacophila sp.	13	0.4		0	18	pr
Trichopteran pupae		0.0		--	--	unk
Other			458	13.02		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Bioptopsis sp.		0.0		0	2	sc
Ceratopogonidae		0.0		6	108	pr
Chironomidae	414	11.8		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chalifera sp.		0.0		6	95	pr
Oreogeton sp.	2	0.1		6	95	pr
Limnophora sp.		0.0		6	108	pr
Glutops rossi		0.0		3	110	pr
Psychodidae		0.0		10	36	cg
Simuliidae	20	0.6		6	108	cf
Antocha sp.		0.0		3	24	cg
Dicranota sp.	6	0.2		3	24	pr
Hexatoma sp.	2	0.1		2	36	pr
Pedicia sp.		0.0		6	72	pr
Molophilus sp.		0.0		3	72	unk
Tipula sp.		0.0		4	36	om
Limnophila sp.		0.0		3	72	pr
Tipulidae	1	0.0		3	72	unk
Coleoptera						
Curculionidae		0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptelmis sp.		0.0		4	104	cg
Heterlimnius sp.	1	0.0		4	104	cg
Lara sp.		0.0		4	104	cg
Narpus sp.		0.0		4	104	cg
Optioservus sp.		0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.		0.0		4	104	cg
Elmidæ		0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae	2	0.1		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archanaea oblonga		0.0		--	--	sh

## Spring '93 (4 kicks), #38

Annelida(Oligochaeta)	8	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	1	0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	1	0.0	4	108	cg

TOTAL NUMBER =	3519
TOTAL TAXA =	50
STD =	173.7
MEAN =	880
SDI =	3.62
SR =	0.824
B/E =	0.06
EPT Abund =	3061
EPT/Chiron =	7.39
EPT % =	86.98
EPT taxa =	39
c/f tot =	37
c/f % =	1.05
c/g tot =	1087
c/g % =	30.89
sh tot =	385
sh % =	10.94
sc tot =	1698
sc % =	48.25
pr tot =	286
pr% =	8.13
om tot =	4
om % =	0.11
unk tot =	22
unk% =	0.63
sc/cf =	45.89
sc/(sc+cf) =	0.979
sh/total =	0.109

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Spring 1993 (16 Hess, 4 kicks), #39

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			3929	53.09			
Baetis sp.	212	2.9			5	72	cg
Diphetor sp.	4	0.1			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	26	0.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	10	0.1			0	24	pr
Drunella sp.	484	6.5			0	48	cg
Ephemerella sp.	82	1.1			1	48	cg
Serratella sp.	77	1.0			2	48	cg
Ephemerellidae	1	0.0			1	48	cg
Cinygmulia sp.	2125	28.7			4	21	sc
Epeorus sp.	490	6.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	77	1.0			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	240	3.2			4	24	cg
Ameletus sp.	101	1.4			0	48	cg
Plecoptera			1641	22.18			
Capniidae	99	1.3			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	467	6.3			0	24	pr
Despaxia augusta	12	0.2			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	34	0.5			0	18	sh
Capniidae/Leuctridae	5	0.1			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	54	0.7			0	36	sh
Zapada cinctipes	17	0.2			2	16	sh
Zapada columbiana	116	1.6			2	16	sh
Nemouridae	372	5.0			2	36	sh
Yoraperla brevis	7	0.1			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	4	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	2	0.0			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	5	0.1			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	13	0.2			2	18	pr
Perlodidae	16	0.2			2	48	pr
Doddsia occidentalis	1	0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	416	5.6			2	48	sc
Trichoptera			286	3.86			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	1	0.0			1	24	cf
Micrasema sp.	24	0.3			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	101	1.4			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis		0.0			4	18	cf
Hydropsyche sp.		0.0			4	108	cf
Parapsyche elsis	8	0.1			4	6	cf
Hydropsychidae	24	0.3			4	108	cf
Agraylea sp.	2	0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

## Spring '93 (16 Hess, 4 kicks), #39

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>	1	0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.	1	0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.		0.0		4	24	sc
<i>Neothremma alicia</i>	3	0.0		4	8	sc
<i>Oligophlebodes</i> sp.	5	0.1		4	24	sc
<i>Psychoglypha</i> sp.	5	0.1		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephiliidae</i>	61	0.8		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.		0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.	7	0.1		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	16	0.2		0	18	pr
<i>Rhyacophila hyalinata</i>	5	0.1		0	18	pr
<i>Rhyacophila iranda</i>	2	0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.		0.0		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vespulsa</i>		0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	20	0.3		0	18	pr
<i>Trichopteran</i> pupae		0.0		--	--	unk
Other		1544	20.86			
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptropsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	2	0.0		6	108	pr
<i>Chironomidae</i>	1434	19.4		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.		0.0		6	95	pr
<i>Oreoceton</i> sp.	7	0.1		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>		0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	31	0.4		6	108	cf
<i>Antocha</i> sp.	1	0.0		3	24	cg
<i>Dicranota</i> sp.	31	0.4		3	24	pr
<i>Hexatoma</i> sp.	2	0.0		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.		0.0		3	72	pr
<i>Tipulidae</i>	1	0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	4	0.1		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.		0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>	2	0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaara oblonga</i>		0.0		--	--	sh

Spring '93 (16 Hess, 4 kicks), #39

Annelida(Oligochaeta)	26	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	1	0.0	5	108	pr
Nematoda		0.0	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	2	0.0	4	108	cg

TOTAL NUMBER =	7400
TOTAL TAXA =	61
STD =	335.3
MEAN =	370
SDI =	3.64
SR =	0.754
B/E =	0.05
EPT Abund =	5856
EPT/Chiron =	4.08
EPT % =	79.14
EPT taxa =	48
c/f tot =	64
c/f % =	0.86
c/g tot =	2773
c/g % =	37.47
sh tot =	742
sh % =	10.03
sc tot =	3141
sc % =	42.45
pr tot =	612
prt % =	8.27
om tot =	6
om % =	0.08
unk tot =	62
unk% =	0.84
sc/cf =	49.08
sc/(sc+cf) =	0.980
sh/total =	0.100

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Summer 1993 (16 Hems), #40

	No.	Percent Total	Total Number 3511	Percent Total 54.15	TV	TQ	FFG
Ephemeroptera							
Baetis sp.	703	10.8			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.	2	0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	44	0.7			0	18	cg
Drunella doddsi	648	10.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.1			0	24	pr
Drunella sp.	6	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	170	2.6			2	48	cg
Ephemerellidae		0.0			1	48	cg
Cinygmulia sp.	253	3.9			4	21	sc
Epeorus sp.	1036	16.0			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	610	9.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	20	0.3			4	24	cg
Ameletus sp.	14	0.2			0	48	cg
Plecoptera			709	10.93			
Capniidae	65	1.0			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	389	6.0			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	69	1.1			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	12	0.2			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	75	1.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	8	0.1			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	2	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	11	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	50	0.8			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	21	0.3			2	48	pr
Doddsia occidentalensis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	5	0.1			2	48	sc
Trichoptera			539	8.31			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	1	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	168	2.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	4	0.1			4	18	cf
Hydropsyche sp.	4	0.1			4	108	cf
Parapsyche elsis	9	0.1			4	6	cf
Hydropsychidae	51	0.8			4	108	cf
Agraylea sp.	4	0.1			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.		0.0			1	18	sh

Summer 1993 (16 Hess), #40

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	180	2.8		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	sc
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	21	0.3		4	108	unk
<i>Dolophilodes</i> sp.	1	0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	5	0.1		0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	10	0.2		0	18	pr
<i>Rhyacophila hyalinata</i>	1	0.0		0	18	pr
<i>Rhyacophila iranda</i>	2	0.0		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	12	0.2		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vacua</i>		0.0		0	18	pr
<i>Rhyacophila vepulsa</i>	1	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	50	0.8		0	18	pr
<i>Trichopteran</i> pupae	15	0.2		--	--	unk
<b>Other</b>			1725	26.60		
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	20	0.3		6	108	pr
<i>Chironomidae</i>	1498	23.1		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	5	0.1		6	95	pr
<i>Oreogeton</i> sp.	20	0.3		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	1	0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	32	0.5		6	108	cf
<i>Antocha</i> sp.	2	0.0		3	24	cg
<i>Dicranota</i> sp.	7	0.1		3	24	pr
<i>Hexatoma</i> sp.	14	0.2		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.	6	0.1		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	15	0.2		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.	4	0.1		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaea oblonga</i>		0.0		--	--	sh

Summer 1993 (16 Hess), #40

Annelida(Oligochaeta)	24	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	15	0.2	5	108	pr
Nematoda	13	0.2	5	108	om
Ostracoda	2	0.0	8	108	cg
Turbellaria	47	0.7	4	108	cg

<b>TOTAL NUMBER =</b>	<b>6484</b>
<b>TOTAL TAXA =</b>	<b>60</b>
STD =	265.8
MEAN =	405
SDI =	3.75
SR =	0.614
B/E =	0.20
EPT Abund =	4759
EPT/Chiron =	3.18
EPT % =	73.40
EPT taxa =	43
c/f tot =	101
c/f % =	1.56
c/g tot =	3813
c/g % =	58.81
sh tot =	231
sh % =	3.56
sc tot =	1642
sc % =	25.32
pr tot =	648
pr% =	9.99
om tot =	13
om % =	0.20
unk tot =	36
unk% =	0.56
sc/cf =	16.26
sc/(sc+cf) =	0.942
sh/total =	0.036

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Summer 1993 (4 kicks), #41

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			3711	50.05			
Baetis sp.	1472	19.9			5	72	cg
Diphlebia sp.		0.0			4	72	cg
Caudatella sp.	2	0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/ flavilinea	105	1.4			0	18	cg
Drunella doddsi	325	4.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera		0.0			0	24	pr
Drunella sp.	3	0.0			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	231	3.1			2	48	cg
Ephemerellidae	3	0.0			1	48	cg
Cinygmulia sp.	180	2.4			4	21	sc
Epeorus sp.	1002	13.5			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	283	3.8			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	40	0.5			4	24	cg
Ameletus sp.	65	0.9			0	48	cg
Plecoptera			821	11.07			
Capniidae	17	0.2			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	244	3.3			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	47	0.6			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	44	0.6			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	289	3.9			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	54	0.7			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	5	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	20	0.3			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	62	0.8			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	28	0.4			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	10	0.1			2	48	sc
Trichoptera			542	7.31			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	31	0.4			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	70	0.9			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	3	0.0			4	18	cf
Hydropsyche sp.	8	0.1			4	108	cf
Parapsyche elisia	22	0.3			4	6	cf
Hydropsychidae	50	0.7			4	108	cf
Agraylea sp.	3	0.0			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	5	0.1			1	18	sh

## Summer 1993 (4 kicks), #41

Apatania sp.		0.0	1	18	sc
Chyrandra centralis		0.0	1	18	sh
Cryptochia sp.	2	0.0	0	108	sh
Discosmoecus sp.		0.0	1	24	om
Ecclisomyia sp.		0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.	128	1.7	4	24	sc
Neothremma alicia	1	0.0	4	8	sc
Oligophlebodes sp.		0.0	4	24	sc
Psychoglypha sp.		0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	55	0.7	4	108	unk
Dolophilodes sp.	5	0.1	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes		0.0	0	18	pr
Rhyacophila Angelita grp.	1	0.0	0	18	pr
Rhyacophila Bettenei grp.		0.0	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	28	0.4	0	18	pr
Rhyacophila hyalinata	6	0.1	0	18	pr
Rhyacophila iranda	7	0.1	0	18	pr
Rhyacophila Sibirica grp.	18	0.2	0	18	pr
Rhyacophila tucula	1	0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vespulsa	1	0.0	0	18	pr
Rhyacophila Verrula grp.		0.0	0	18	pr
Rhyacophila sp.	94	1.3	0	18	pr
Trichopteran pupae	3	0.0	--	--	unk
Other			2340	31.56	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Caratopogonidae	6	0.1	6	108	pr
Chironomidae	2105	28.4	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	6	0.1	6	95	pr
Oreogeton sp.	31	0.4	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi	4	0.1	3	110	pr
Psychodidae		0.0	10	36	cg
Simuliidae	56	0.8	6	108	cf
Antocha sp.		0.0	3	24	cg
Dicranota sp.		0.0	3	24	pr
Hexatoma sp.	4	0.1	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.	1	0.0	4	36	om
Limnophila sp.	2	0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae	1	0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	16	0.2	4	104	cg
Lara sp.	4	0.1	4	104	cg
Narpus sp.		0.0	4	104	cg
Optioservus sp.		0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.		0.0	4	104	cg
Elmidae		0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archanaea oblonga		0.0	--	--	sh

Summer 1993 (4 kicks), #41

Annelida(Oligochaeta)	6	0.1	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	32	0.4	5	108	pr
Nematoda	1	0.0	5	108	om
Ostracoda	1	0.0	8	108	cg
Turbellaria	64	0.9	4	108	cg

TOTAL NUMBER =	7414
TOTAL TAXA =	63
STD =	338.6
MEAN =	1854
SDI =	3.64
SR =	0.470
B/E =	0.40
EPT Abund =	5074
EPT/Chiron =	2.41
EPT % =	68.44
EPT taxa =	46
c/f tot =	144
c/f % =	1.94
c/g tot =	4728
c/g % =	63.77
sh tot =	490
sh % =	6.61
sc tot =	1391
sc % =	18.76
pr tot =	601
pr% =	8.11
om tot =	2
om % =	0.03
unk tot =	58
unk% =	0.78
sc/cf =	9.66
sc/(sc+cf) =	0.906
sh/total =	0.066

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
Summer 1993 (16 Hess, 4 kicks), #42

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
			7222	51.96			
Ephemeroptera							
Baetis sp.	2175	15.6			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.	4	0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	149	1.1			0	18	cg
Drunella doddsi	973	7.0			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	5	0.0			0	24	pr
Drunella sp.	9	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	401	2.9			2	48	cg
Ephemerellidae	3	0.0			1	48	cg
Cinygmulia sp.	433	3.1			4	21	sc
Epeorus sp.	2038	14.7			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	893	6.4			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	60	0.4			4	24	cg
Ameletus sp.	79	0.6			0	48	cg
Plecoptera			1530	11.01			
Capniidae	82	0.6			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	633	4.6			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	116	0.8			0	18	sh
Capniidae/Leuctridae		0.0			1	32	sh
Amphinemura sp.	1	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	56	0.4			0	36	sh
Zapada cinctipes		0.0			2	16	sh
Zapada columbiana	364	2.6			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	62	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	7	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	31	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	2	0.0			2	18	pr
Megarcys sp.	112	0.8			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	49	0.4			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	15	0.1			2	48	sc
Trichoptera			1081	7.78			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.		0.0			1	24	cf
Micrasema sp.	32	0.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	238	1.7			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	7	0.1			4	18	cf
Hydropsyche sp.	12	0.1			4	108	cf
Parapsyche elsis	31	0.2			4	6	cf
Hydropsychidae	101	0.7			4	108	cf
Agraylea sp.	7	0.1			8	108	cg
Hydroptilia sp.		0.0			6	108	cg
Lepidostoma sp.	5	0.0			1	18	sh

## Summer 1993 (16 Hess, 4 kicks), #42

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.	2	0.0		0	108	sh
<i>Discosmoecus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	308	2.2		4	24	sc
<i>Neothremma alicia</i>	1	0.0		4	8	sc
<i>Oligophlebodes</i> sp.		0.0		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	76	0.5		4	108	unk
<i>Dolophilodes</i> sp.	6	0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	6	0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.		0.0		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	38	0.3		0	18	pr
<i>Rhyacophila hyalinata</i>	7	0.1		0	18	pr
<i>Rhyacophila iranda</i>	9	0.1		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	30	0.2		0	18	pr
<i>Rhyacophila tucula</i>	1	0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vepulsa</i>	2	0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	144	1.0		0	18	pr
<i>Trichopteran</i> pupae	18	0.1		--	--	unk
Other			4065	29.25		
Diptera						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratoppgonidae</i>	26	0.2		6	108	pr
<i>Chironomidae</i>	3603	25.9		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	11	0.1		6	95	pr
<i>Oreogenet</i> sp.	51	0.4		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	5	0.0		3	110	pr
<i>Psychodidae</i>		0.0		10	36	cg
<i>Simuliidae</i>	88	0.6		6	108	cf
<i>Antocha</i> sp.	2	0.0		3	24	cg
<i>Dicranota</i> sp.	7	0.1		3	24	pr
<i>Hexatomidae</i>	18	0.1		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.	1	0.0		4	36	om
<i>Limnophila</i> sp.	8	0.1		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
Coleoptera						
<i>Curculionidae</i>	1	0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptalmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	31	0.2		4	104	cg
<i>Lara</i> sp.	4	0.0		4	104	cg
<i>Narpus</i> sp.	4	0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
Miscellaneous						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaara oblonga</i>		0.0		--	--	sh

## Summer 1993 (16 Hess, 4 kicks), #42

Annelida(Oligochaeta)	30	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	47	0.3	5	108	pr
Nematoda	14	0.1	5	108	om
Ostracoda	3	0.0	8	108	cg
Turbellaria	111	0.8	4	108	cg

TOTAL NUMBER =	13898
TOTAL TAXA =	68
STD =	568.1
MEAN =	695
SDI =	3.76
SR =	0.537
B/E =	0.30
EPT Abund =	9833
EPT/Chiron =	2.73
EPT % =	70.75
EPT taxa =	48
c/f tot =	245
c/f % =	1.76
c/g tot =	8541
c/g % =	61.45
sh tot =	721
sh % =	5.19
sc tot =	3033
sc % =	21.82
pr tot =	1249
pr % =	8.99
om tot =	15
om % =	0.11
unk tot =	94
unk% =	0.68
sc/cf =	12.38
sc/(sc+cf) =	0.925
sh/total =	0.052

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
 Fall 1993 (16 Hess), #43

	No.	Percent Total	Total Number	Percent Total	TV	TO	FFG
Ephemeroptera			3651	41.71			
Baetis sp.	671	7.7			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix	2	0.0			1	48	cg
Drunella coloradensis/ flavilinea		0.0			0	18	cg
Drunella doddsi	211	2.4			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	7	0.1			0	24	pr
Drunella sp.	14	0.2			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	38	0.4			2	48	cg
Ephemerellidae	108	1.2			1	48	cg
Cinygmulia sp.	1639	18.7			4	21	sc
Epeorus sp.	92	1.1			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	801	9.2			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	21	0.2			4	24	cg
Ameletus sp.	47	0.5			0	48	cg
Plecoptera			2274	25.98			
Capniidae	176	2.0			1	32	sh
Kathroperla perdita	463	5.3			1	24	cg
Sweltsa/Suwalla sp.	2	0.0			0	24	pr
Despaxia augusta		0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	94	1.1			0	18	sh
Capniidae/Leuctridae	31	0.4			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	6	0.1			0	36	sh
Zapada cinctipes	110	1.3			2	16	sh
Zapada columbiana	256	2.9			2	16	sh
Nemouridae	5	0.1			2	36	sh
Yoraperla brevis	27	0.3			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	7	0.1			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	23	0.3			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	13	0.1			2	24	pr
Setvena bradleyi	1	0.0			2	48	pr
Skwala sp.	2	0.0			2	18	pr
Perlodidae	38	0.4			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1020	11.7			2	48	sc
Trichoptera			1689	19.29			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	5	0.1			1	24	cf
Micrasema sp.	2	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	431	4.9			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	139	1.6			4	18	cf
Hydropsyche sp.	8	0.1			4	108	cf
Parapsyche elisia	10	0.1			4	6	cf
Hydropsychidae	317	3.6			4	108	cf
Agraylea sp.	45	0.5			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	15	0.2			1	18	sh

Fall 1993 (16 Hess), #43

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.		0.0		0	108	sh
<i>Discosmocetus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	378	4.3		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.	38	0.4		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	29	0.3		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>	22	0.3		0	18	pr
<i>Rhyacophila Angelita</i> grp.	24	0.3		0	18	pr
<i>Rhyacophila Betteni</i> grp.	6	0.1		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	55	0.6		0	18	pr
<i>Rhyacophila hyalinata</i>	5	0.1		0	18	pr
<i>Rhyacophila iranda</i>	5	0.1		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	22	0.3		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>		0.0		0	18	pr
<i>Rhyacophila vepulsa</i>	13	0.1		0	18	pr
<i>Rhyacophila Verrula</i> grp.	57	0.7		0	18	pr
<i>Rhyacophila</i> sp.	56	0.6		0	18	pr
<i>Trichopteran</i> pupae	7	0.1		--	--	unk
<b>Other</b>			1140	13.02		
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dioptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	14	0.2		6	108	pr
<i>Chironomidae</i>	844	9.6		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	2	0.0		6	95	pr
<i>Oreogaston</i> sp.	25	0.3		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	1	0.0		3	110	pr
<i>Psychodidae</i>	1	0.0		10	36	cg
<i>Simuliidae</i>		0.0		6	108	cf
<i>Antocha</i> sp.	35	0.4		3	24	cg
<i>Dicranota</i> sp.	20	0.2		3	24	pr
<i>Hexatoma</i> sp.	15	0.2		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.		0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0		--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	41	0.5		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.	3	0.0		4	104	cg
<i>Optioservus</i> sp.	1	0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.	1	0.0		4	104	cg
<i>Elmidae</i>	1	0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0		--	72	pr
<i>Archanaara oblonga</i>		0.0		--	--	sh

Annelida(Oligochaeta)	29	0.3	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	10	0.1	5	108	pr
Nematoda	26	0.3	5	108	om
Ostracoda		0.0	8	108	cg
Turbellaria	71	0.8	4	108	cg

TOTAL NUMBER =	8754
TOTAL TAXA =	70
STD =	275.6
MEAN =	547
SDI =	4.28
SR =	0.751
B/E =	0.18
EPT Abund =	7614
EPT/Chiron =	9.02
EPT % =	86.98
EPT taxa =	52
c/f tot =	479
c/f % =	5.47
c/g tot =	3448
c/g % =	39.39
sh tot =	722
sh % =	8.25
sc tot =	3598
sc % =	41.10
pr tot =	445
pr% =	5.08
om tot =	26
om % =	0.30
unk tot =	36
unk% =	0.41
sc/cf =	7.51
sc/(sc+cf) =	0.883
sh/total =	0.082

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
 Fall 1993 (4 kicks), #44

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
			3620	39.30			
Ephemeroptera							
Baetis sp.	886	9.6			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	2	0.0			0	18	cg
Drunella doddsi	136	1.5			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	12	0.1			0	24	pr
Drunella sp.	8	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	10	0.1			2	48	cg
Ephemerellidae	95	1.0			1	48	cg
Cinygmulia sp.	1836	19.9			4	21	sc
Epeorus sp.	105	1.1			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	413	4.5			0	21	cg
Heptageniidae	1	0.0			4	48	sc
Paraleptophlebia sp.	36	0.4			4	24	cg
Ameletus sp.	79	0.9			0	48	cg
Plecoptera			2468	26.79			
Capniidae	90	1.0			1	32	sh
Kathroperla pardita		0.0			1	24	cg
Sweltsa/Suwallia sp.	345	3.7			0	24	pr
Despaxia augusta	17	0.2			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	76	0.8			0	18	sh
Capniidae/Leuctridae	3	0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	22	0.2			0	36	sh
Zapada cinctipes	185	2.0			2	16	sh
Zapada columbiana	573	6.2			2	16	sh
Nemouridae		0.0			2	36	sh
Yoraperla brevis	62	0.7			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	16	0.2			1	18	pr
Hesperoperla pacifica	15	0.2			2	18	pr
Perlidae	5	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	31	0.3			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.		0.0			2	18	pr
Perlodidae	16	0.2			2	48	pr
Doddsia occidental		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1012	11.0			2	48	sc
Trichoptera			1719	18.66			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	16	0.2			1	24	cf
Micrasema sp.	3	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	243	2.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	55	0.6			4	18	cf
Hydropsyche sp.	2	0.0			4	108	cf
Parapsyche elsis	100	1.1			4	6	cf
Hydropsychidae	403	4.4			4	108	cf
Agraylea sp.	82	0.9			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	6	0.1			1	18	sh

Fall 1993 (4 kicks), #44

<i>Apatania</i> sp.		0.0		1	18	sc
<i>Chyrandra centralis</i>		0.0		1	18	sh
<i>Cryptochia</i> sp.	1	0.0		0	108	sh
<i>Discosmoeus</i> sp.		0.0		1	24	om
<i>Ecclisomyia</i> sp.		0.0		2	108	om
<i>Hesperophylax</i> sp.		0.0		3	108	om
<i>Limnephilus</i> sp.		0.0		3	108	sh
<i>Neophylax</i> sp.	514	5.6		4	24	sc
<i>Neothremma alicia</i>		0.0		4	8	sc
<i>Oligophlebodes</i> sp.	12	0.1		4	24	sc
<i>Psychoglypha</i> sp.		0.0		0	24	om
<i>Pycnopsyche guttifer</i>		0.0		4	72	sh
<i>Limnephilidae</i>	53	0.6		4	108	unk
<i>Dolophilodes</i> sp.		0.0		2	24	cf
<i>Wormaldia</i> sp.		0.0		3	24	cf
<i>Rhyacophila acropedes</i>		0.0		0	18	pr
<i>Rhyacophila Angelita</i> grp.	4	0.0		0	18	pr
<i>Rhyacophila Betteni</i> grp.	9	0.1		0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0		0	18	pr
<i>Rhyacophila Brunnea</i> grp.	81	0.9		0	18	pr
<i>Rhyacophila hyalinata</i>	3	0.0		0	18	pr
<i>Rhyacophila iranda</i>	9	0.1		0	18	pr
<i>Rhyacophila Sibirica</i> grp.	34	0.4		0	18	pr
<i>Rhyacophila tucula</i>		0.0		0	18	pr
<i>Rhyacophila vaccua</i>	3	0.0		0	18	pr
<i>Rhyacophila vepulsa</i>		0.0		0	18	pr
<i>Rhyacophila Verrula</i> grp.		0.0		0	18	pr
<i>Rhyacophila</i> sp.	77	0.8		0	18	pr
<i>Trichopteran</i> pupae	9	0.1	--	--	--	unk
<b>Other</b>			1405	15.25		
<b>Diptera</b>						
<i>Atherix</i> sp.		0.0		4	24	pr
<i>Agathon</i> sp.		0.0		0	2	sc
<i>Dieptopsis</i> sp.		0.0		0	2	sc
<i>Ceratopogonidae</i>	8	0.1		6	108	pr
<i>Chironomidae</i>	1164	12.6		6	108	cg
<i>Culicidae</i>		0.0		8	108	cg
<i>Dixidae</i>		0.0		2	108	cg
<i>Chelifera</i> sp.	2	0.0		6	95	pr
<i>Oreogeton</i> sp.	14	0.2		6	95	pr
<i>Limnophora</i> sp.		0.0		6	108	pr
<i>Glutops rossi</i>	2	0.0		3	110	pr
<i>Psychodidae</i>	1	0.0		10	36	cg
<i>Simuliidae</i>	9	0.1		6	108	cf
<i>Antocha</i> sp.	21	0.2		3	24	cg
<i>Dicranota</i> sp.	20	0.2		3	24	pr
<i>Hexatoma</i> sp.	8	0.1		2	36	pr
<i>Pedicia</i> sp.		0.0		6	72	pr
<i>Molophilus</i> sp.		0.0		3	72	unk
<i>Tipula</i> sp.		0.0		4	36	om
<i>Limnophila</i> sp.		0.0		3	72	pr
<i>Tipulidae</i>		0.0		3	72	unk
<b>Coleoptera</b>						
<i>Curculionidae</i>		0.0	--	--	--	sh
<i>Hydaticus</i> sp.		0.0		5	72	pr
<i>Cleptelmis</i> sp.		0.0		4	104	cg
<i>Heterlimnius</i> sp.	47	0.5		4	104	cg
<i>Lara</i> sp.		0.0		4	104	cg
<i>Narpus</i> sp.	1	0.0		4	104	cg
<i>Optioservus</i> sp.		0.0		4	104	cg
<i>Rhizelmis</i> sp.		0.0		2	104	cg
<i>Stenelmis</i> sp.		0.0		5	104	cg
<i>Zaitzevia</i> sp.		0.0		4	104	cg
<i>Elmidae</i>		0.0		4	104	cg
<i>Brychius</i> sp.		0.0		5	54	sc
<i>Haliplus</i> sp.		0.0		5	54	sc
<i>Hydrophilidae</i>		0.0		5	72	pr
<b>Miscellaneous</b>						
<i>Corixidae</i>		0.0		8	108	unk
<i>Gerridae</i>		0.0	--	72	pr	
<i>Archanaea oblonga</i>		0.0	--	--	--	sh

Fall 1993 (4 kicks), #44

Annelida(Oligochaeta)	17	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	11	0.1	5	108	pr
Nematoda	10	0.1	5	108	om
Ostracoda	2	0.0	8	108	cg
Turbellaria	68	0.7	4	108	cg

<b>TOTAL NUMBER =</b>	<b>9212</b>
<b>TOTAL TAXA =</b>	<b>68</b>
<b>STD =</b>	<b>310.1</b>
<b>MEAN =</b>	<b>2303</b>
<b>SDI =</b>	<b>4.15</b>
<b>SR =</b>	<b>0.696</b>
<b>B/E =</b>	<b>0.24</b>
<b>EPT Abund =</b>	<b>7807</b>
<b>EPT/Chiron =</b>	<b>6.71</b>
<b>EPT % =</b>	<b>84.75</b>
<b>EPT taxa =</b>	<b>51</b>
<b>c/f tot =</b>	<b>585</b>
<b>c/f % =</b>	<b>6.35</b>
<b>c/g tot =</b>	<b>3069</b>
<b>c/g % =</b>	<b>33.32</b>
<b>sh tot =</b>	<b>1038</b>
<b>sh % =</b>	<b>11.27</b>
<b>sc tot =</b>	<b>3723</b>
<b>sc % =</b>	<b>40.41</b>
<b>pr tot =</b>	<b>725</b>
<b>pr% =</b>	<b>7.87</b>
<b>om tot =</b>	<b>10</b>
<b>om % =</b>	<b>0.11</b>
<b>unk tot =</b>	<b>62</b>
<b>unk% =</b>	<b>0.67</b>
<b>sc/cf =</b>	<b>6.36</b>
<b>sc/(sc+cf) =</b>	<b>0.864</b>
<b>sh/total =</b>	<b>0.113</b>

Macroinvertebrate Data--Montanore Project, Seasonal Totals  
 Fall 1993 (16 Hess, 4 kicks), #45

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			7271	40.47			
Baëtis sp.	1557	8.7			5	72	cg
Diphetor sp.		0.0			4	72	cg
Caudatella sp.		0.0			1	48	cg
Caudatella hystrix	2	0.0			1	48	cg
Drunella coloradensis/ flavilinea	2	0.0			0	18	cg
Drunella doddsi	347	1.9			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	19	0.1			0	24	pr
Drunella sp.	22	0.1			0	48	cg
Ephemerella sp.		0.0			1	48	cg
Serratella sp.	48	0.3			2	48	cg
Ephemerellidae	203	1.1			1	48	cg
Cinygmulia sp.	3475	19.3			4	21	sc
Epeorus sp.	197	1.1			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	1214	6.8			0	21	cg
Heptageniidae	1	0.0			4	48	sc
Paraleptophlebia sp.	57	0.3			4	24	cg
Ameletus sp.	126	0.7			0	48	cg
Plecoptera			4742	26.39			
Capniidae	266	1.5			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	808	4.5			0	24	pr
Despaxia augusta	19	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	170	0.9			0	18	sh
Capniidae/Leuctridae	34	0.2			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	28	0.2			0	36	sh
Zapada cinctipes	295	1.6			2	16	sh
Zapada columbiana	829	4.6			2	16	sh
Nemouridae	5	0.0			2	36	sh
Yoraperla brevis	89	0.5			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	23	0.1			1	18	pr
Hesperoperla pacifica	15	0.1			2	18	pr
Perlidae	28	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus		0.0			2	18	pr
Megarcys sp.	44	0.2			2	24	pr
Setvena bradleyi	1	0.0			2	48	pr
Skwala sp.	2	0.0			2	18	pr
Perlodidae	54	0.3			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	2032	11.3			2	48	sc
Trichoptera			3408	18.97			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	21	0.1			1	24	cf
Micrasema sp.	5	0.0			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	674	3.8			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	194	1.1			4	18	cf
Hydropsyche sp.	10	0.1			4	108	cf
Parapsyche elsis	110	0.6			4	6	cf
Hydropsychidae	720	4.0			4	108	cf
Agraylea sp.	127	0.7			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	21	0.1			1	18	sh

Fall 1993 (16 Hess, 4 kicks), #45

<i>Apatania</i> sp.		0.0	1	18	sc
<i>Chyrandra centralis</i>		0.0	1	18	sh
<i>Cryptochia</i> sp.	1	0.0	0	108	sh
<i>Discosmoeus</i> sp.		0.0	1	24	om
<i>Ecclisomyia</i> sp.		0.0	2	108	om
<i>Hesperophylax</i> sp.		0.0	3	108	om
<i>Limnephilus</i> sp.		0.0	3	108	sh
<i>Neophylax</i> sp.	892	5.0	4	24	sc
<i>Neothremma alicia</i>		0.0	4	8	sc
<i>Oligophlebodes</i> sp.	50	0.3	4	24	sc
<i>Psychoglypha</i> sp.		0.0	0	24	om
<i>Pycnopsyche guttifer</i>		0.0	4	72	sh
<i>Limnephilidae</i>	82	0.5	4	108	unk
<i>Dolophilodes</i> sp.		0.0	2	24	cf
<i>Wormaldia</i> sp.		0.0	3	24	cf
<i>Rhyacophila acropedes</i>	22	0.1	0	18	pr
<i>Rhyacophila Angelita</i> grp.	28	0.2	0	18	pr
<i>Rhyacophila Bettani</i> grp.	15	0.1	0	18	pr
<i>Rhyacophila Bifila</i> grp.		0.0	0	18	pr
<i>Rhyacophila Brunnea</i> grp.	136	0.8	0	18	pr
<i>Rhyacophila hyalinata</i>	8	0.0	0	18	pr
<i>Rhyacophila iranda</i>	14	0.1	0	18	pr
<i>Rhyacophila Sibirica</i> grp.	56	0.3	0	18	pr
<i>Rhyacophila tucula</i>		0.0	0	18	pr
<i>Rhyacophila vaccua</i>	3	0.0	0	18	pr
<i>Rhyacophila vepulsa</i>	13	0.1	0	18	pr
<i>Rhyacophila Verrula</i> grp.	57	0.3	0	18	pr
<i>Rhyacophila</i> sp.	133	0.7	0	18	pr
<i>Trichopteran</i> pupae	16	0.1	--	--	unk
Other		2545	14.17		
<b>Diptera</b>					
<i>Atherix</i> sp.		0.0	4	24	pr
<i>Agathon</i> sp.		0.0	0	2	sc
<i>Dioptopsis</i> sp.		0.0	0	2	sc
<i>Ceratopogonidae</i>	22	0.1	6	108	pr
<i>Chironomidae</i>	2008	11.2	6	108	cg
<i>Culicidae</i>		0.0	8	108	cg
<i>Dixidae</i>		0.0	2	108	cg
<i>Chelifera</i> sp.	4	0.0	6	95	pr
<i>Oreogeton</i> sp.	39	0.2	6	95	pr
<i>Limnophora</i> sp.		0.0	6	108	pr
<i>Glutops rossi</i>	3	0.0	3	110	pr
<i>Psychodidae</i>	2	0.0	10	36	cg
<i>Simuliidae</i>	9	0.1	6	108	cf
<i>Antocha</i> sp.	56	0.3	3	24	cg
<i>Dicranota</i> sp.	40	0.2	3	24	pr
<i>Hexatoma</i> sp.	23	0.1	2	36	pr
<i>Pedicia</i> sp.		0.0	6	72	pr
<i>Molophilus</i> sp.		0.0	3	72	unk
<i>Tipula</i> sp.		0.0	4	36	om
<i>Limnophila</i> sp.		0.0	3	72	pr
<i>Tipulidae</i>		0.0	3	72	unk
<b>Coleoptera</b>					
<i>Curculionidae</i>		0.0	--	--	sh
<i>Hydaticus</i> sp.		0.0	5	72	pr
<i>Cleptelmis</i> sp.		0.0	4	104	cg
<i>Heterlimnius</i> sp.	88	0.5	4	104	cg
<i>Lara</i> sp.		0.0	4	104	cg
<i>Narpus</i> sp.	4	0.0	4	104	cg
<i>Optioservus</i> sp.	1	0.0	4	104	cg
<i>Rhizelmis</i> sp.		0.0	2	104	cg
<i>Stenelmis</i> sp.		0.0	5	104	cg
<i>Zaitzevia</i> sp.	1	0.0	4	104	cg
<i>Elmidae</i>	1	0.0	4	104	cg
<i>Brychius</i> sp.		0.0	5	54	sc
<i>Haliplus</i> sp.		0.0	5	54	sc
<i>Hydrophilidae</i>		0.0	5	72	pr
<b>Miscellaneous</b>					
<i>Corixidae</i>		0.0	8	108	unk
<i>Gerridae</i>		0.0	--	72	pr
<i>Archanaea oblonga</i>		0.0	--	--	sh

Annelida(Oligochaeta)	46	0.3	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	21	0.1	5	108	pr
Nematoda	36	0.2	5	108	om
Ostracoda	2	0.0	8	108	cg
Turbellaria	139	0.8	4	108	cg

TOTAL NUMBER =	17966
TOTAL TAXA =	78
STD =	551.1
MEAN =	698
SDI =	4.25
SR =	0.722
B/E =	0.21
EPT Abund =	15421
EPT/Chiron =	7.68
EPT % =	85.83
EPT taxa =	58
c/f tot =	1064
c/f % =	5.92
c/g tot =	6054
c/g % =	33.70
sh tot =	1762
sh % =	9.81
sc tot =	7321
sc % =	40.75
pr tot =	1631
pr% =	9.08
om tot =	36
om % =	0.20
unk tot =	98
unk% =	0.55
sc/cf =	6.88
sc/(sc+cf) =	0.873
sh/total =	0.098

**Appendix G. Macroinvertebrate annual totals, 1993.**

Macroinvertebrate Data--Montanore Project, Annual Totals  
 Spring, Summer, Fall 1993 (48 Hess), #46

	No.	Percent Total	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			9055	47.36			
Baetis sp.	1459	7.6			5	72	cg
Diphetor sp.	1	0.0			4	72	cg
Caudatella sp.	2	0.0			1	48	cg
Caudatella hystrix	2	0.0			1	48	cg
Drunella coloradensis/ flavilinea	44	0.2			0	18	cg
Drunella doddsi	872	4.6			0	4	cg
Drunella grandis		0.0			0	24	cg
Drunella spinifera	17	0.1			0	24	pr
Drunella sp.	304	1.6			0	48	cg
Ephemerella sp.	32	0.2			1	48	cg
Serratella sp.	239	1.3			2	48	cg
Ephemerellidae	108	0.6			1	48	cg
Cinygmulia sp.	2910	15.2			4	21	sc
Epeorus sp.	1357	7.1			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	1463	7.7			0	21	cg
Heptageniidae		0.0			4	48	sc
Paraleptophlebia sp.	154	0.8			4	24	cg
Ameletus sp.	91	0.5			0	48	cg
Plecoptera			3691	19.31			
Capniidae	315	1.6			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwalla sp.	1099	5.7			0	24	pr
Despaxia augusta	8	0.0			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	190	1.0			0	18	sh
Capniidae/Leuctridae	36	0.2			1	32	sh
Amphinemura sp.	2	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	51	0.3			0	36	sh
Zapada cinctipes	116	0.6			2	16	sh
Zapada columbiana	365	1.9			2	16	sh
Nemouridae	161	0.8			2	36	sh
Yoraperla brevis	41	0.2			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	9	0.0			1	18	pr
Hesperoperla pacifica		0.0			2	18	pr
Perlidae	35	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	67	0.4			2	24	pr
Setvena bradleyi	1	0.0			2	48	pr
Skwala sp.	7	0.0			2	18	pr
Perlodidae	66	0.3			2	48	pr
Doddsia occidentalis	1	0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1120	5.9			2	48	sc
Trichoptera			2422	12.67			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	6	0.0			1	24	cf
Micrasema sp.	12	0.1			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	691	3.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	143	0.7			4	18	cf
Hydropsyche sp.	12	0.1			4	108	cf
Parapsyche elsis	25	0.1			4	6	cf
Hydropsychidae	377	2.0			4	108	cf
Agraylea sp.	51	0.3			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	15	0.1			1	18	sh

## Total Hess, 1993, #46

Apatania sp.	0.0		1	18	sc
Chyrandra centralis	0.0		1	18	sh
Cryptochia sp.	0.0		0	108	sh
Discosmoeus sp.	0.0		1	24	om
Ecclisomyia sp.	1	0.0	2	108	om
Hesperophylax sp.		0.0	3	108	om
Limnephilus sp.		0.0	3	108	sh
Neophylax sp.	558	2.9	4	24	sc
Neothremma alicia	3	0.0	4	8	sc
Oligophlebodes sp.	43	0.2	4	24	sc
Psychoglypha sp.	1	0.0	0	24	om
Pycnopsyche guttifer		0.0	4	72	sh
Limnephilidae	90	0.5	4	108	unk
Dolophilodes sp.	1	0.0	2	24	cf
Wormaldia sp.		0.0	3	24	cf
Rhyacophila acropedes	22	0.1	0	18	pr
Rhyacophila Angelita grp.	29	0.2	0	18	pr
Rhyacophila Betteni grp.	13	0.1	0	18	pr
Rhyacophila Bifila grp.		0.0	0	18	pr
Rhyacophila Brunnea grp.	75	0.4	0	18	pr
Rhyacophila hyalinata	7	0.0	0	18	pr
Rhyacophila iranda	7	0.0	0	18	pr
Rhyacophila Sibirica grp.	34	0.2	0	18	pr
Rhyacophila tucula		0.0	0	18	pr
Rhyacophila vaccua		0.0	0	18	pr
Rhyacophila vepulsa	14	0.1	0	18	pr
Rhyacophila Verrula grp.	57	0.3	0	18	pr
Rhyacophila sp.	113	0.6	0	18	pr
Trichopteran pupae	22	0.1	--	--	unk
Other			3951	20.67	
Diptera					
Atherix sp.		0.0	4	24	pr
Agathon sp.		0.0	0	2	sc
Dioptopsis sp.		0.0	0	2	sc
Ceratopogonidae	36	0.2	6	108	pr
Chironomidae	3362	17.6	6	108	cg
Culicidae		0.0	8	108	cg
Dixidae		0.0	2	108	cg
Chelifera sp.	7	0.0	6	95	pr
Oreogeton sp.	50	0.3	6	95	pr
Limnophora sp.		0.0	6	108	pr
Glutops rossi	2	0.0	3	110	pr
Psychodidae	1	0.0	10	36	cg
Simuliidae	43	0.2	6	108	cf
Antocha sp.	38	0.2	3	24	cg
Dicranota sp.	52	0.3	3	24	pr
Hexatoma sp.	29	0.2	2	36	pr
Pedicia sp.		0.0	6	72	pr
Molophilus sp.		0.0	3	72	unk
Tipula sp.		0.0	4	36	om
Limnophila sp.	6	0.0	3	72	pr
Tipulidae		0.0	3	72	unk
Coleoptera					
Curculionidae		0.0	--	--	sh
Hydaticus sp.		0.0	5	72	pr
Cleptelmis sp.		0.0	4	104	cg
Heterlimnius sp.	59	0.3	4	104	cg
Lara sp.		0.0	4	104	cg
Narpus sp.	7	0.0	4	104	cg
Optioservus sp.	1	0.0	4	104	cg
Rhizelmis sp.		0.0	2	104	cg
Stenelmis sp.		0.0	5	104	cg
Zaitzevia sp.	1	0.0	4	104	cg
Elmidae	1	0.0	4	104	cg
Brychius sp.		0.0	5	54	sc
Haliplus sp.		0.0	5	54	sc
Hydrophilidae		0.0	5	72	pr
Miscellaneous					
Corixidae		0.0	8	108	unk
Gerridae		0.0	--	72	pr
Archana oblonga		0.0	--	--	sh

Total Hess, 1993, #46

Annelida(Oligochaeta)	71	0.4	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	25	0.1	5	108	pr
Nematoda	39	0.2	5	108	om
Ostracoda	2	0.0	8	108	cg
Turbellaria	119	0.6	4	108	cg

<b>TOTAL NUMBER =</b>	<b>19119</b>
<b>TOTAL TAXA =</b>	<b>84</b>
STD =	559.5
MEAN =	398
SDI =	4.30
SR =	0.692
B/E =	0.16
EPT Abund =	15168
EPT/Chiron =	4.51
EPT % =	79.33
EPT taxa =	63
c/f tot =	607
c/f % =	3.17
c/g tot =	8484
c/g % =	44.37
sh tot =	1312
sh % =	6.86
sc tot =	6683
sc % =	34.95
pr tot =	1880
pr% =	9.83
om tot =	41
om % =	0.21
unk tot =	112
unk% =	0.59
sc/cf =	11.01
sc/(sc+cf) =	0.917
sh/total =	0.069

Macroinvertebrate Data--Montanore Project, Annual Totals  
 Spring, Summer, Fall 1993 (12 kicks), #47

		Percent No.	Total Number	Percent Total	TV	TQ	FFG
Ephemeroptera			9254	46.43			
Baetis sp.	2405	12.1			5	72	cg
Diphetor sp.	3	0.0			4	72	cg
Caudatella sp.	2	0.0			1	48	cg
Caudatella hystrix		0.0			1	48	cg
Drunella coloradensis/							
flavilinea	84	0.4			0	18	cg
Drunella doddsi	505	2.5			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	18	0.1			0	24	pr
Drunella sp.	212	1.1			0	48	cg
Ephemerella sp.	50	0.3			1	48	cg
Serratella sp.	287	1.4			2	48	cg
Ephemerellidae	96	0.5			1	48	cg
Cinygmulidae	3113	15.6			4	21	sc
Epeorus sp.	1312	6.6			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	746	3.7			0	21	cg
Heptageniidae	1	0.0			4	48	sc
Paraleptophlebia sp.	203	1.0			4	24	cg
Ameletus sp.	216	1.1			0	48	cg
Plecoptera			4231	21.23			
Capniidae	136	0.7			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	873	4.4			0	24	pr
Despaxia augusta	23	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Perlomyia sp.		0.0			0	18	sh
Leuctridae	139	0.7			0	18	sh
Capniidae/Leuctridae	3	0.0			1	32	sh
Amphinemura sp.		0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	89	0.4			0	36	sh
Zapada cinctipes	196	1.0			2	16	sh
Zapada columbiana	879	4.4			2	16	sh
Nemouridae	216	1.1			2	36	sh
Yoraperla brevis	116	0.6			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	25	0.1			1	18	pr
Hesperoperla pacifica	15	0.1			2	18	pr
Perlidae	25	0.1			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	1	0.0			2	18	pr
Megarcys sp.	88	0.4			2	24	pr
Setvena bradleyi		0.0			2	48	pr
Skwala sp.	8	0.0			2	18	pr
Perlodidae	53	0.3			2	48	pr
Doddsia occidentalis		0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	1346	6.8			2	48	sc
Trichoptera			2382	11.95			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	16	0.1			1	24	cf
Micrasema sp.	49	0.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	357	1.8			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	58	0.3			4	18	cf
Hydropsyche sp.	10	0.1			4	108	cf
Parapsyche elsis	111	0.6			4	6	cf
Hydropsychidae	467	2.3			4	108	cf
Agraylea sp.	85	0.4			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	10	0.1			1	18	sh

Total kicks, 1993, #47

Apatania sp.		0.0		1	18	sc
Chyrandra centralis	1	0.0		1	18	sh
Cryptochia sp.	3	0.0		0	108	sh
Discosmoecus sp.		0.0		1	24	om
Ecclisomyia sp.		0.0		2	108	om
Hesperophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.	642	3.2		4	24	sc
Neothremma alicia	1	0.0		4	8	sc
Oligophlebodes sp.	12	0.1		4	24	sc
Psychoglypha sp.	4	0.0		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnephilidae	128	0.6		4	108	unk
Dolophilodes sp.	5	0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes		0.0		0	18	pr
Rhyacophila Angelita grp.	5	0.0		0	18	pr
Rhyacophila Betteni grp.	9	0.0		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	114	0.6		0	18	pr
Rhyacophila hyalinata	13	0.1		0	18	pr
Rhyacophila irena	17	0.1		0	18	pr
Rhyacophila Sibirica grp.	54	0.3		0	18	pr
Rhyacophila tucula		0.0		0	18	pr
Rhyacophila vaccua	3	0.0		0	18	pr
Rhyacophila vepulsa	1	0.0		0	18	pr
Rhyacophila Verrula grp.		0.0		0	18	pr
Rhyacophila sp.	194	1.0		0	18	pr
Trichopteran pupae	13	0.1		--	--	unk
Other			4062	20.38		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Dioptopsis sp.		0.0		0	2	sc
Ceratopogonidae	20	0.1		6	108	pr
Chironomidae	3537	17.7		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chelifera sp.	9	0.0		6	95	pr
Oreoceton sp.	44	0.2		6	95	pr
Limnophora sp.		0.0		6	108	pr
Glutops rossi	6	0.0		3	110	pr
Psychodidae	1	0.0		10	36	cg
Simuliidae	83	0.4		6	108	cf
Antocha sp.	21	0.1		3	24	cg
Dicranota sp.	27	0.1		3	24	pr
Hexatoma sp.	14	0.1		2	36	pr
Pedicia sp.		0.0		6	72	pr
Molophilus sp.		0.0		3	72	unk
Tipula sp.	1	0.0		4	36	om
Limnophila sp.	4	0.0		3	72	pr
Tipulidae	1	0.0		3	72	unk
Coleoptera						
Curculionidae	1	0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptelmis sp.		0.0		4	104	cg
Heterlimnius sp.	64	0.3		4	104	cg
Lara sp.	4	0.0		4	104	cg
Narpus sp.	1	0.0		4	104	cg
Optioservus sp.		0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.		0.0		4	104	cg
Elmidae		0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae	2	0.0		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archana oblonga		0.0		--	--	sh

Total Kicks, 1993, #47

Annelida(Oligochaeta)	36	0.2	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	43	0.2	5	108	pr
Nematoda	12	0.1	5	108	om
Ostracoda	5	0.0	8	108	cg
Turbellaria	126	0.6	4	108	cg

TOTAL NUMBER =	19929
TOTAL TAXA =	85
STD =	598.7
MEAN =	1661
SDI =	4.27
SR =	0.642
B/E =	0.26
EPT Abund =	15867
EPT/Chiron =	4.49
EPT % =	79.62
EPT taxa =	62
c/f tot =	750
c/f % =	3.76
c/g tot =	8690
c/g % =	43.60
sh tot =	1861
sh % =	9.34
sc tot =	6784
sc % =	34.04
pr tot =	1685
pr% =	8.46
om tot =	17
om % =	0.09
unk tot =	142
unk% =	0.71
sc/cf =	9.05
sc/(sc+cf) =	0.900
sh/total =	0.093

Macroinvertebrate Data--Montanore Project, Annual Totals  
Spring, Summer, Fall 1993 (48 Hess, 12 kicks), #48

		Percent	Total	Percent			
	No.	Total	Number	Total	TV	TQ	FFG
			18422	46.92			
Ephemeroptera							
Baetis sp.	3944	10.0			5	72	cg
Diphotor sp.	4	0.0			4	72	cg
Caudatella sp.	4	0.0			1	48	cg
Caudatella hystrix	2	0.0			1	48	cg
Drunella coloradensis/							
flavilinea	151	0.4			0	18	cg
Drunella doddsi	1346	3.4			0	4	cg
Drunella grandis	1	0.0			0	24	cg
Drunella spinifera	34	0.1			0	24	pr
Drunella sp.	515	1.3			0	48	cg
Ephemerella sp.	82	0.2			1	48	cg
Serratella sp.	526	1.3			2	48	cg
Ephemerellidae	207	0.5			1	48	cg
Cinygmulia sp.	6033	15.4			4	21	sc
Epeorus sp.	2725	6.9			0	21	sc
Heptagenia sp.		0.0			4	48	sc
Leucrocuta sp.		0.0			1	48	sc
Nixe sp.		0.0			2	48	sc
Rhithrogena sp.	2184	5.6			0	21	cg
Heptageniidae	1	0.0			4	48	sc
Paraleptophlebia sp.	357	0.9			4	24	cg
Ameletus sp.	306	0.8			0	48	cg
Plecoptera			7913	20.15			
Capniidae	447	1.1			1	32	sh
Kathroperla perdita		0.0			1	24	cg
Sweltsa/Suwallia sp.	1908	4.9			0	24	pr
Despaxia augusta	31	0.1			0	18	sh
Paraleuctra sp.		0.0			0	18	sh
Parlomyia sp.		0.0			0	18	sh
Leuctridae	320	0.8			0	18	sh
Capniidae/Leuctridae	39	0.1			1	32	sh
Amphinemura sp.	2	0.0			2	6	sh
Malenka sp.		0.0			2	36	sh
Nemoura sp.		0.0			1	24	sh
Visoka cataractae	138	0.4			0	36	sh
Zapada cinctipes	312	0.8			2	16	sh
Zapada columbiana	1309	3.3			2	16	sh
Nemouridae	377	1.0			2	36	sh
Yoraperla brevis	158	0.4			1	12	sh
Claassenia sabulosa		0.0			3	6	pr
Doroneuria theodora	34	0.1			1	18	pr
Hesperoperla pacifica	15	0.0			2	18	pr
Perlidae	61	0.2			1	24	pr
Cultus sp.		0.0			2	12	pr
Isoperla sp.		0.0			2	24	pr
Kogotus modestus	2	0.0			2	18	pr
Megarcys sp.	161	0.4			2	24	pr
Setvena bradleyi	1	0.0			2	48	pr
Skwala sp.	15	0.0			2	18	pr
Perlodidae	119	0.3			2	48	pr
Doddsia occidentalis	1	0.0			2	24	sc
Pternonarcella sp.		0.0			0	24	sh
Taenionema sp.	2463	6.3			2	48	sc
Trichoptera			4775	12.16			
Amiocentrus sp.		0.0			3	24	cg
Brachycentrus sp.	22	0.1			1	24	cf
Micrasema sp.	61	0.2			1	24	sh
Agapetus sp.		0.0			0	24	sc
Anagapetus sp.		0.0			0	24	sc
Glossosoma sp.	1013	2.6			1	24	sc
Glossosomatidae		0.0			0	24	sc
Arctopsyche grandis	201	0.5			4	18	cf
Hydropsyche sp.	22	0.1			4	108	cf
Parapsyche elsis	149	0.4			4	6	cf
Hydropsychidae	845	2.2			4	108	cf
Agraylea sp.	136	0.3			8	108	cg
Hydroptila sp.		0.0			6	108	cg
Lepidostoma sp.	26	0.1			1	18	sh

Total Hess/kicks, 1993, #48

Apatania sp.		0.0		1	18	sc
Chyrandra centralis	1	0.0		1	18	sh
Cryptochia sp.	3	0.0		0	108	sh
Discosmoeus sp.		0.0		1	24	om
Ecclisomyia sp.	1	0.0		2	108	om
Hesperophylax sp.		0.0		3	108	om
Limnephilus sp.		0.0		3	108	sh
Neophylax sp.	1200	3.1		4	24	sc
Neothremma alicia	4	0.0		4	8	sc
Oligophlebodes sp.	55	0.1		4	24	sc
Psychoglypha sp.	5	0.0		0	24	om
Pycnopsyche guttifer		0.0		4	72	sh
Limnephilidae	219	0.6		4	108	unk
Dolophilodes sp.	6	0.0		2	24	cf
Wormaldia sp.		0.0		3	24	cf
Rhyacophila acropedes	22	0.1		0	18	pr
Rhyacophila Angelita grp.	34	0.1		0	18	pr
Rhyacophila Betteni grp.	22	0.1		0	18	pr
Rhyacophila Bifila grp.		0.0		0	18	pr
Rhyacophila Brunnea grp.	190	0.5		0	18	pr
Rhyacophila hyalinata	20	0.1		0	18	pr
Rhyacophila iranda	25	0.1		0	18	pr
Rhyacophila Sibirica grp.	86	0.2		0	18	pr
Rhyacophila tucula	1	0.0		0	18	pr
Rhyacophila vaccua	3	0.0		0	18	pr
Rhyacophila vepulsa	15	0.0		0	18	pr
Rhyacophila Verrula grp.	57	0.1		0	18	pr
Rhyacophila sp.	297	0.8		0	18	pr
Trichopteran pupae	34	0.1		--	--	unk
Other			8154	20.77		
Diptera						
Atherix sp.		0.0		4	24	pr
Agathon sp.		0.0		0	2	sc
Dioctriopsis sp.		0.0		0	2	sc
Ceratopogonidae	50	0.1		6	108	pr
Chironomidae	7045	17.9		6	108	cg
Culicidae		0.0		8	108	cg
Dixidae		0.0		2	108	cg
Chelifera sp.	15	0.0		6	95	pr
Oreogeton sp.	97	0.2		6	95	pr
Limnophora sp.		0.0		6	108	pr
Glutops rossi	8	0.0		3	110	pr
Psychodidae	2	0.0		10	36	cg
Simuliidae	128	0.3		6	108	cf
Antocha sp.	59	0.2		3	24	cg
Dicranota sp.	78	0.2		3	24	pr
Hexatoma sp.	43	0.1		2	36	pr
Pedicia sp.		0.0		6	72	pr
Molophilus sp.		0.0		3	72	unk
Tipula sp.	1	0.0		4	36	om
Limnophila sp.	8	0.0		3	72	pr
Tipulidae	1	0.0		3	72	unk
Coleoptera						
Curculionidae	1	0.0		--	--	sh
Hydaticus sp.		0.0		5	72	pr
Cleptelmis sp.		0.0		4	104	cg
Heterlimnius sp.	123	0.3		4	104	cg
Lara sp.	4	0.0		4	104	cg
Narpus sp.	8	0.0		4	104	cg
Optioservus sp.	1	0.0		4	104	cg
Rhizelmis sp.		0.0		2	104	cg
Stenelmis sp.		0.0		5	104	cg
Zaitzevia sp.	1	0.0		4	104	cg
Elmidae	1	0.0		4	104	cg
Brychius sp.		0.0		5	54	sc
Haliplus sp.		0.0		5	54	sc
Hydrophilidae	2	0.0		5	72	pr
Miscellaneous						
Corixidae		0.0		8	108	unk
Gerridae		0.0		--	72	pr
Archanaea oblonga		0.0		--	--	sh

Total Hess/kicks, 1993, #48

Annelida(Oligochaeta)	102	0.3	5	108	cg
Annelida (Hirudinea)		0.0	10	108	pr
Mollusca-Sphaeriidae		0.0	8	108	cg
Lymnaea sp.		0.0	6	108	cg
Helisoma sp.		0.0	6	108	sc
Physa sp.		0.0	8	108	cg
Hydracarina	69	0.2	5	108	pr
Nematoda	50	0.1	5	108	om
Ostracoda	5	0.0	8	108	cg
Turbellaria	252	0.6	4	108	cg

TOTAL NUMBER =	39264
TOTAL TAXA =	96
STD =	1099.3
MEAN =	654
SDI =	4.31
SR =	0.663
B/E =	0.21
EPT Abund =	31110
EPT/Chiron =	4.42
EPT % =	79.23
EPT taxa =	70
c/f tot =	1373
c/f % =	3.50
c/g tot =	17368
c/g % =	44.23
sh tot =	3225
sh % =	8.21
sc tot =	13495
sc % =	34.37
pr tot =	3492
pr% =	8.89
om tot =	57
om % =	0.15
unk tot =	254
unk% =	0.65
sc/cf =	9.83
sc/(sc+cf) =	0.908
sh/total =	0.082