

MONTANORE PROJECT
Aquatic Macroinvertebrate Monitoring Study
1990

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I. INTRODUCTION

A. Purpose

This aquatic macroinvertebrate monitoring program was initiated by Noranda Minerals Corp. (Noranda) as part of its requirements for ongoing environmental assessment of the Montanore mining project in northwestern Montana. Environmental studies in the project area began in 1988 with an aquatics baseline inventory for what was then called the Montana Project. The macroinvertebrate monitoring program Plan of Study (POS) was prepared by Western Technology and Engineering, Inc. (WESTECH) and submitted to Noranda in November 1989. The program was intended to serve as an interim aquatics monitoring program until agency and peer review of the baseline report provided an appraisal of monitoring needs. The objectives of the 1990 macroinvertebrate monitoring program were:

- o document the abundance, diversity and seasonal variation of macroinvertebrate species present in the project area's streams;
- o identify indicator and/or marker species to be closely observed as the potential for impacts increases;
- o compare, where possible, the monitoring data with the baseline data and delineate significant differences;

- o and evaluate the efficacy of the benthic monitoring program and provide recommendations for changes if necessary.

B. Description of the project area

The Montanore Project is located south of Libby in Lincoln and Sanders Counties. Streams of concern in the project area include Libby Creek, Ramsey Creek, Poorman Creek and Little Cherry Creek. A complete description of the project area is contained in the baseline report. A specific description of sites sampled in 1990 appears in a later section of this report.

C. Acknowledgements and personnel

The Montanore Project 1990 aquatic macroinvertebrate monitoring program was funded by Noranda. Brent Bailey, Manager of Environmental Services for Noranda, provided input on the benthic monitoring study plan. Joe Scheuering (Noranda) also assisted with development of the benthic monitoring plan and administered the contract from the Libby office. Mark Petersmeyer later replaced Joe Scheuering as project manager in the Libby office. Doug Parker (Noranda) reviewed and commented on this report. Jack Stanford, University of Montana Biological Station, provided his opinions and insights on benthic monitoring in general and verified some taxonomic identifications. Bob Wisseman, Oregon, also provided opinion on some species identifications and reviewed this report.

II. METHODS

A. Sampling

Seven stations were established on four streams in the project area (Figure 1). In April and October 1990 all seven stations were sampled, however the sample set from L3 was lost when field personnel forgot to preserve the samples with formalin. The Little Cherry Creek station contained insufficient flow in August and was not sampled.

Five macroinvertebrate samples were collected at each station with a Hess stream bottom sampler equipped with a 500 micron mesh net and a Dolphin plankton bucket attached to the end of the net. In addition, physical characteristics including air and water temperature and stream width and depth, were also noted at the time of sampling and a photograph was taken of each site. Although the abundance of boulders at some stations restricted the available sampling habitat, an effort was made to standardize the sampling sites to approximately the same depth, substrate size, flow, etc.

Samples were preserved in the field with 10% formalin and transported to the WESTECH lab for analysis.

B. Identification and analysis

In the lab, samples were poured into a white enamel pan and all organisms, visible first to the naked eye and then to a hand-held two power Bausch and Lomb magnifying lens, were separated from the debris

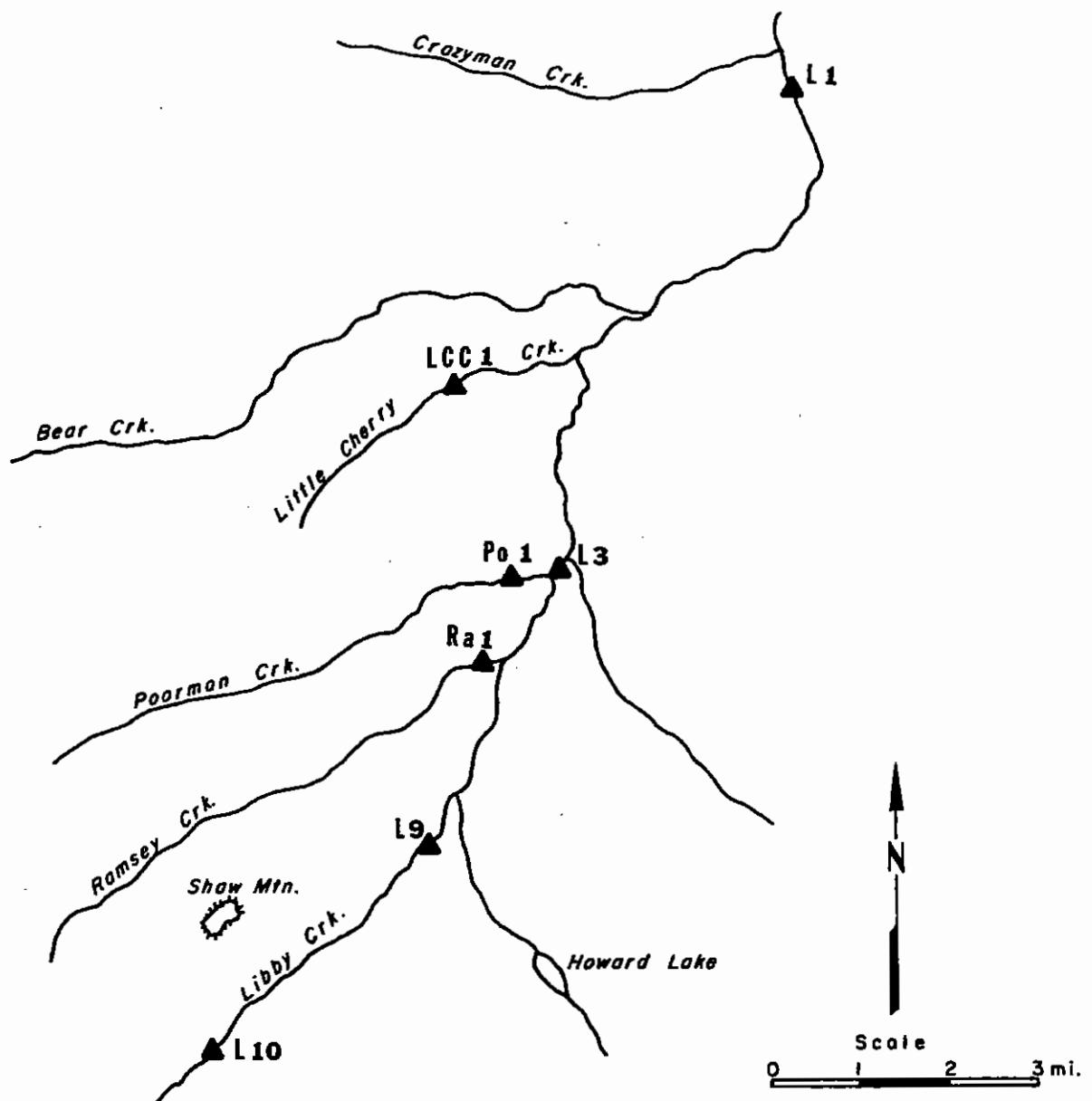


Figure 1. Biological sampling stations in the Montanore project area, 1990.

and stored in 70% ethanol and a couple of drops of glycerin. Later, the organisms were placed into a watch glass and examined under a Bausch and Lomb StereoZoom 7 dissecting microscope, identified and counted. Specimens were identified to the lowest practical taxon possible depending on stage of development and physical condition of the organisms. Keys used for identification included Merritt and Cummins (1978), Wiggins (1977), Pennak (1978, 1989), and Stewart and Stark (1988). Representative specimens of taxonomically questionable species were sent to Bob Wissemann, Oregon and Jack Stanford, University of Montana Biological Station for verification of identifications.

III. RESULTS

A. Description of sampling stations

Elevation at the sampling stations is approximately 3500'. The streams are fed by runoff from the Cabinet Mountains in which average annual precipitation is 80-90 inches. Streamside vegetation is relatively dense at all the stations and consists mostly of Douglas fir, grand fir, red cedar, lodgepole pine, subalpine fir and western larch with some cottonwood, alder and willow and a dense understory of shrubs and grasses.

Photos of the sites were taken each sampling period. The October photos are contained in Appendix A. With the exception of the Little Cherry Creek station, all the other sites are characterized by cool, clear water flowing over a boulder/cobble substrate, by stream widths

of 10-65' and stream depths of 3-40", and by a fairly persistent discharge rate, even during "low water" periods, due to a moderate to high stream gradient. Water temperatures varied from +41°F in April to +61°F in August.

The Little Cherry Creek station is located below the culvert where the stream is split by a small island. The section sampled was 3' wide, 1-5" deep, and had a gravel/cobble substrate. Stream gradient and flow at this station was minimal compared to the other stations.

B. Macroinvertebrates

1. populationn composition and density

Mayflies (Ephemeroptera) were the predominant group in the project area and accounted for 64.3% of the total organisms collected. The most abundant mayfly was Cinygmulia sp. (23.3%). Stoneflies (Plecoptera) made up 24.0% of the total with Taenionema sp. (11.2%) being the most abundant. Caddisflies (Trichoptera) accounted for only 4.6% of the total and Arctopsyche grandis (1.1%) occurred most frequently. The Other category consisted of a variety of miscellaneous organisms and made up 7.1% of the total with Chironomidae occurring 3.2% of the time. The total number of benthic organisms found in the project area is listed in Appendix B.

A total of 67 distinct taxa were found in the project area (Table 1). Relative abundance of the most common organisms in the project area are listed in Table 2; five of these are mayflies and two are stoneflies. Several exceptionally rare (less than 10 specimens found) benthic organisms were found in the 95 samples. These taxa are listed in Table 3. Identification of some of these macroinvertebrates, particularly where only one or two specimens were found, is tentative.

Total number of macroinvertebrates found at each station is listed in Appendix C for April, Appendix D for August, and Appendix E for October. A total of 9,515 benthic organisms were collected with the 95 samples for a mean number of 100.2 organisms/sample.

Seasonal occurrence of the four major groups of benthic organisms is presented in Table 4. Mayflies were the dominant group at each station for each sampling period except in October at the Poorman Creek station where almost twice as many stoneflies (64.5%) as mayflies (31.4%) were found. The majority of these stoneflies were Taenionema sp., a species which typically emerges in the spring. In April at the lower Libby Creek station (L1), 32% of the organisms collected were midges (Chironomidae) and blackfly larvae (Simuliidae). These were the only samples with significant numbers of these two typically pollution tolerant organisms.

Table 1. Aquatic macroinvertebrates collected in the Montanore project area, 1990.

Ephemeroptera	RHYACOPHILIDAE
BAETIDAE	<i>Rhyacophila</i> sp. <i>Rhyacophila Betteni</i> Grp. <i>Rhyacophila Brunnea</i> Grp. <i>Rhyacophila Hyalinata</i> Grp. <i>Rhyacophila Iranda</i> Grp. <i>Rhyacophila Sibirica</i> Grp. <i>Rhyacophila Vaccua</i> Grp.
<i>Baetis bicaudatus</i>	
<i>Baetis tricaudatus</i>	
EPHEMERELLIDAE	IMMATURE
<i>Caudatella hystrix</i>	
<i>Drunella coloradensis</i>	
<i>Drunella doddsi</i>	
<i>Drunella flaviginea</i>	
<i>Drunella spinifera</i>	
<i>Drunella</i> sp.	PUPA
<i>Serratella levis</i>	
<i>Serratella tibialis</i>	
HEPTAGENIIDAE	OTHER
<i>Cinygma</i> sp.	ANNELEIDA
<i>Cinygmulia</i> sp.	LUMBRICIDAE
<i>Epeorus</i> sp.	ARACHNIDA
<i>Rhithrogena</i> sp.	COLEOPTERA
LEPTOPHLEBIIDAE	ELMIDAE
<i>Paraleptophlebia</i> sp.	<i>Cleptelmis</i> sp. <i>Heterlimnius</i> sp.
SIPHONURIDAE	<i>Narpus</i> sp. <i>Zaitzevia</i> sp.
<i>Ameletus</i> sp.	Immature
PLECOPTERA	COLLEMBOLA
CAPNIIDAE	DIPTERA
CHLOROPERLIDAE	BLEPHARICERIDAE
<i>Kathroperla perdita</i>	<i>Agathon</i> sp.
<i>Sweltsa/Suwallia</i> sp.	CHIRONOMIDAE
LEUCTRIDAE	EMPIDIDAE
<i>Paraleuctra</i> sp.	<i>Oreoceton</i> sp.
<i>Perlimnia</i> sp.	SIMULIIDAE
Immature	TIPULIDAE
NEMOURIDAE	<i>Antocha</i> sp. <i>Dicranota</i> sp. <i>Hexatoma</i> sp. <i>Tipula</i> sp.
<i>Visoka cataractae</i>	MOLLUSCA
<i>Zapada cinctipes</i>	PLANORBIDAE
<i>Zapada columbiana</i>	NEMATODA
PELTOPERLIDAE	TURBELLARIA
<i>Xoraperla brevis</i>	
PERLIDAE	
<i>Acroneuria abnormis</i>	
<i>Hesperoperla pacifica</i>	
Immature	
PERLODIDAE	
<i>Isoperla</i> sp.	
<i>Megarcya</i> sp.	
<i>Setvena bradleyi</i>	
Immature	
TAEINIOPTERYGIDAE	
<i>Taenionema</i> sp.	
TRICHOPTERA	
BRACHYCENTRIDAE	
<i>Micrasema</i> sp.	
GLOSSOSOMATIDAE	
<i>Anagapetus</i> sp.	
<i>Glossosoma</i> sp.	
HYDROPSYCHIDAE	
<i>Arctopsyche grandis</i>	
<i>Parapsyche elsis</i>	
Immature	
LEPIDOSTOMATIDAE	
<i>Lepidostoma</i> sp.	
LIMNEPHILIDAE	
<i>Apatania</i> sp.	
<i>Ecclisomyia</i> sp.	
<i>Moselyana</i> sp.	
<i>Neothremma</i> sp.	
<i>Oligophlebodes</i> sp.	
Immature	

Table 2. Relative abundance of the most common benthic organisms in the Montanore project area, 1990.

TAXA	NO.	% OF TOTAL	SAMPLES*
<i>Cinygmulidae</i> sp.	2213	23.3	92
<i>Baetis bicaudatus</i>	1168	12.3	87
<i>Taenionema</i> sp.	1061	11.2	41
<i>Rhithrogena</i> sp.	844	8.9	73
<i>Epeorus</i> sp.	696	7.3	60
<i>Sweltsa/Suwallia</i>	626	6.6	84
<i>Drunella doddsii</i>	438	4.6	60

*Out of a total of 95 samples

Table 3. Exceptionally rare benthic organisms collected from the Montanore project area, 1990.

ORGANISM	TOTAL COLLECTED
Ephemeroptera	
<i>Cinygma</i> sp.	1
<i>Drunella</i> sp.	6
<i>Serratella tibialis</i>	3
Plecoptera	
<i>Kethroperla perdita</i>	1
<i>Paraleuctra</i> sp.	2
<i>Setvena bradlevi</i>	2
Trichoptera	
<i>Parapsyche elsis</i>	3
<i>Lepidostoma</i> sp.	10
<i>Apatania</i> sp.	4
<i>Ecclysmomyia</i> sp.	4
<i>Moselyana</i> sp.	1
<i>Neothremma</i> sp.	3
<i>Rhyacophila betteni</i> Grp.	3
<i>Rhyacophila hyalinata</i> Grp.	10
<i>Rhyacophila iranda</i> Grp.	3
Other-Arachnida	
Elmidae	
<i>Narceus</i> sp.	1
<i>Zaitzevia</i> sp.	2
Collembola	
Diptera	
<i>Agathon</i> sp.	2
<i>Antocha</i> sp.	1
<i>Tipula</i> sp.	2
Planorbidae	
Nematoda	

Table 4. Seasonal percentage composition of macroinvertebrates from the Montanore project area, 1990.

<u>Station</u>	<u>Total Organisms</u>	Percent of Total			
		<u>Ephemeroptera</u>	<u>Plecoptera</u>	<u>Trichoptera</u>	<u>Other</u>
Spring					
L10	203	78.8	14.8	2.0	4.4
L9	174	67.8	23.0	1.1	8.0
L3*	-	-	-	-	-
L1	325	47.7	10.2	3.1	39.1
RA1	195	78.5	11.8	3.6	6.2
PO1	357	72.8	12.0	1.7	13.4
LCC1	<u>348</u>	65.8	19.0	2.0	13.2
	<u>1602</u>				
August					
L10	380	65.5	25.3	1.8	7.4
L9	401	68.6	16.5	3.7	11.2
L3	501	77.2	14.8	2.8	5.2
L1	874	83.3	8.7	3.7	4.3
RA1	268	63.1	17.2	7.5	12.3
PO1	511	77.7	13.3	3.7	5.3
LCC1	<u>-</u>	-	-	-	-
	<u>2935</u>				
October					
L10	263	74.9	14.8	5.3	4.9
L9	589	48.2	36.7	5.1	10.0
L3	755	54.4	38.0	5.8	1.7
L1	1064	73.7	18.2	5.9	2.2
RA1	560	50.5	44.3	2.9	2.3
PO1	676	31.4	64.5	2.7	1.5
LCC1	<u>1071</u>	62.0	19.1	10.4	8.5
	<u>4978</u>				

*samples lost

The highest density of macroinvertebrates/station occurred in October at all stations except the upper Libby Creek station (L10) where population density peaked in the August samples.

2. functional feeding groups

Evaluating pollution effects has traditionally emphasized changes in biotic structure, e.g., community diversity, increases in tolerant species and loss of sensitive species. Alterations in ecosystem function can also be used to evaluate stress on aquatic systems.

Periphyton populations and deciduous leaves and other terrestrial litter added to the stream each year provide the majority of the nutritional energy for benthic populations in headwater streams such as those found in the project area. In addition, a certain percentage of the macroinvertebrates are predators feeding on other benthic organisms. Shifts in percentages of functional feeding groups of benthic populations occur naturally in response to seasonal changes and life cycles of the organisms as well as in response to man-induced stress.

Benthic organisms in the project area fall into one of five major functional feeding groups: shredders which are large particle detritivores, scrapers which feed on periphyton, filtering collectors which feed on particles in suspension, gathering collectors which feed on deposited detritus and predators which feed upon other invertebrates. Table 5 shows the seasonal relative abundance of

Table 5. Relative numbers of functional feeding groups at each station in the Montanore project area, 1990.

	STATIONS						
APRIL	LC10	LC9	LC3	LC1	RA1	PO1	LCC1
Shredders	15	20	-	3	14	19	28
Collectors/ Gatherers	53	33	-	64	25	55	54
Collectors/ Filterers	6	1	-	19	0	3	2
Scrapers	114	94	-	119	133	217	204
Predators	9	22	-	31	17	19	32
Others	6	4	-	89	6	44	28
<hr/>							
AUGUST							
Shredders	15	13	8	26	9	53	-
Collectors/ Gatherers	161	125	101	574	57	159	-
Collectors/ Filterers	1	2	3	30	7	11	-
Scrapers	103	155	174	166	123	243	-
Predators	93	76	76	64	56	20	-
Others	7	30	139	14	16	25	-
<hr/>							
OCTOBER							
Shredders	18	33	13	17	18	38	140
Collectors/ Gatherers	87	78	131	205	126	96	461
Collectors/ Filterers	3	6	5	18	5	2	32
Scrapers	120	366	513	737	347	485	301
Predators	29	79	81	81	64	46	119
Others	6	27	12	6	0	9	18

benthic organisms in the project area based on their feeding adaptations. In April and October, scrapers predominated the populations at nearly every station. In August, gathering collectors were also relatively abundant and in October they were the most abundant group at the Little Cherry Creek station; in both cases, the predominant organisms were mayflies of the family Baetidae.

3. diversity index/pollution sensitivity values

Since environmental stress tends to reduce species diversity, the Shannon-Weaver Index (SDI) is frequently used as a measurement of perturbations in aquatic ecosystems. An SDI of less than three is considered indicative of pollution (Platts, et al., 1983). SDI's are presented for each station in Appendices C, D, and E as a routine part of the statistical program. None of the stations had an SDI greater than 2.6 but it should be remembered that this index is most applicable to larger streams and is indicative only of organic pollution. This index is best used on smaller, relatively sterile streams, like those in the project area, as a comparison between stations and sampling periods for each station. SDI's for streams in the Montanore area were consistently in the 2.1-2.6 range which is a typical SDI for smaller headwater streams in northwestern Montana.

Winget et al. (1979) assigned a tolerance quotient (TQ) to macroinvertebrates based on their tolerance to alkalinity, sulfate and sedimentation. TQ's range from 2 to 108 with the lowest numbers representing reduced tolerance to environmental changes. Many of the

benthic organisms collected in the project area have low TQ's (Appendices B-E). The most abundant organisms were scrapers and in general, the predominant scrapers (TQ = 4-48) in the project area are somewhat more pollution sensitive than the next predominant group, the gathering collectors with a TQ of 72.

4. comparison of 1989 and 1990 data

Several more stations were sampled in the baseline report than in the 1990 macroinvertebrate monitoring program. The baseline report characterized the entire project area while the monitoring program selected those stations that would mostly likely show the effects of impacts and that would provide control data.

Table 6 is a comparison of some parameters for the two studies. Methodology was essentially the same except that the baseline samples were collected with a much smaller mesh net but were then sieved through a 600 micron mesh strainer. That process was eliminated in the 1989 study to avoid damaging specimens with the sieve and samples were collected with a 500 micron mesh net. Also, five samples were collected from each station in 1990 compared to only three samples in 1989. The number of organisms per sample varied significantly from 230 in the baseline study to 100 in the 1990 study. The mean number of organisms per sample, taxa richness, and seasonal means all differed likewise between the two years. Biotic and diversity indices were lower for the baseline data than for the 1990 data.

Table 6. A comparison of some parameters from the 1989 and 1990 macroinvertebrate sampling programs for the Montanore project.

	1989	1990
Net type/size	Hess 250 micron(but sieved to 600 microns)	Hess 500 microns, not sieved
Samples/station	3	5
Sample frequency	3 seasons-spring, summer, fall	3 seasons-spring, summer, fall
Mean no./samp.	230	100
Seasonal mean no./samp.	Apr = 240 Aug = 250 Oct = 180	Apr = 53 Aug = 99 Oct = 142
Taxa richness (mean no./sample)	Apr = 28 Aug = 29 Oct = 24	Apr = 5 Aug = 5 Oct = 6
EPT richness (total taxa)	E = 15 P = 18 T = 33	E = 14 P = 14 T = 18
Seasonal mean EPT	Apr = 15 Aug = 16 Oct = 17	Apr = 4 Aug = 4 Oct = 5
Mean Hilsenoff Biotic Index	2.3	3.1
Mean SDI	3.7	2.8

Table 7 compares the total annual abundance of several indicator (abundant) and/or marker (special notice) species between the two years. Some notable differences are the increase in Baetis sp. at five of the stations in 1990, the increase of Drunella doddsi at all stations in 1990, the increase of Cinygmulia sp. at six of the stations in 1990, the decline of the number of Epeorus sp. at four of the stations in 1990, relatively little change in the numbers of Rhithrogena sp. between the two years, a noticeable decrease in the number of Sweltsa/Suwallia sp. at all stations in 1990, and significant increase in the number of Taenionema sp. at all stations in 1990.

IV. DISCUSSION

Headwaters of the Libby Creek system are alpine meadow creeks emerging from snow banks at high elevations. These first order streams merge into second and third order tributaries of the Libby Creek system and are cold, rushing conifer forest streams that reach summer maximum temperatures of about 50° F. Primary productivity is low, periphyton provides most of the biological energy to the system, and scrapers dominate the aquatic insect community.

Density of benthic populations and taxa richness is relatively low compared to larger, more nutritionally rich streams in western Montana. Species composition is dominated by mayflies which are represented by taxa characteristically found in clean waters. Mayflies were usually the predominant organism during each sampling period. Stoneflies were

Table 7. Annual abundance of benthic indicator and/or marker species in the Montanore project area.*

	STATIONS						
	Lc10	Lc9	Lc3	Lc1	Fa1	Fo1	Lc11
<i>Bacillus sp.</i>	116-106	23-187	92-173	70-471	160-119	77-183	31-356
<i>Dumetella_doddii</i>	5-19	13-64	58-122	15-48	41-45	15-133	1-7
<i>Cinygmulidae sp.</i>	244-212	215-308	158-291	460-639	208-274	144-150	100-339
<i>Eucotus sp.</i>	31-74	101-63	84-36	113-107	113-75	97-271	1-70
<i>Rhithrogena sp.</i>	88-142	132-104	84-155	180-294	62-59	50-82	9-8
<i>Smeltsa/Suwallia sp. #</i>	306-100	173-85	243-109	219-108	212-79	224-50	130-95
<i>Doroneuriad. theodora</i>	2-0	12-3	7-13	5-8	14-6	20-12	0-3
<i>Taenionema sp.</i>	0-7	30-158	27-202	2-120	0-188	0-372	0-14
<i>Arctopsyche_grandis</i>	0-5	7-4	21-5	20-36	1-10	0-14	0-30

*First number = 1989, second number = 1990

#Chloroperlinea in 1989

only about a third as abundant as mayflies but about twice as abundant as caddisflies. Stoneflies were particularly abundant at the Poorman Creek station in October, 1990. Very few dipterans, particularly Chironomidae which are characteristically pollution tolerant, were collected in 1990.

The predominant group of aquatic insects were scrapers. Relatively little deciduous material and low mean annual temperatures probably limit the density of shredders. The abundance of scrapers reflects an unbalanced population that is taking advantage of the major food source, i.e., periphyton.

Diversity and biotic indices would seem to indicate the streams in the project area are polluted but these indices have been developed for more productive streams and are really an indication of the sterility of the project area streams.

A number of abundant (indicator) species and marker species have been identified. The variation in density of these species from the baseline study to the 1990 study has also been documented. Some population shifts were notable and are to be expected in streams with such extreme interannual variation.

In summary, these are nutritionally poor waters which produce relatively low numbers of a few dominant species that are characteristically pollution sensitive. Diversity and abundance is

actually good considering the nutritionally depauperate nature of these streams.

The ideal intent of an aquatic biological monitoring program is to collect quantitative samples that can be statistically compared annually in an effort to identify impacts to the aquatic systems. Unfortunately, such a monitoring program is essentially unattainable in the project area for a couple of reasons: first, the streams are relatively small with a coarse substrate consisting mostly of boulders and cobbles. It is virtually impossible to obtain a quantitative sample because the abundant habitat under and around the immovable substrate never gets sampled with conventional means. Second, the streams in the project area are subjected to extreme flow events which dramatically affect benthic populations. Because of extreme interannual variation statistical comparison of the annual data is unreliable. For example, the number of organisms/sample in 1990 was only about half of that total in the baseline study. These figures would seem to indicate that there had been some dramatic impact to the system. Actually, such is the case as higher than average precipitation in fall 1989 resulted in extensive flooding in the project area. Such an event would dramatically affect the benthic population.

Another example of the difficulty of statistically comparing data annually is found in the very high numbers of stoneflies (Taenionema sp.) collected in October 1990 while very few Taenionema were collected

in the baseline study. Interpretation of these data is speculative but can probably be explained by sampling timing; the October 1990 sampling period was ideal to notice the abundance of this species but timing of the fall sampling in the baseline study missed this population peak.

Thus, the data collected in 1990 is presented in detail and differences and similarities with the baseline data are noted. No statistical comparisons are made for the reasons discussed above. Instead, the emphasis is on a visual comparison of population characteristics while paying particular attention to indicator/marker species and comparisons between control stations and stations within the impact zone.

V. FUTURE MONITORING NEEDS

Future monitoring efforts will be discussed at length in the 1991 Plan of Study.

VI. REFERENCES

- Cummins, K.W. and M.J. Klug. 1979. Feeding ecology of stream invertebrates. *Ann. Rev. Ecol. Syst.* 10:147-172.
- Farmer, C.E. and P.J. Farmer. 1989. Rock Creek project aquatic macroinvertebrate study, 1988. WESTECH Tech. Rpt., Helena, MT.
- Hilsenoff, W.L. 1988. Rapid field assessment of organic pollution with a family-level biotic index. *J.N.Am. Benthol. Soc.* 7(1):65-68.
- Merritt, R.W. and K.W. Cummins. 1978. An Introduction to the Aquatic Insects of North America. Kendall/Hunt Pub. Co., Dubuque.

- Pennak, R.W. 1978. Fresh-water Invertebrates of the United States. John Wiley and Sons, New York.
- Pennak, R.W. 1989. Fresh-water Invertebrates of the United States. Protozoa to Mollusca. John Wiley and Sons, New York.
- Platts, W.S., W.F. Megahan and G.W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. USFS Gen. Tech. Rpt. INT-138.
- Resh, V.H. and D.M. Rosenberg. 1984. The Ecology of Aquatic Insects. Praeger Special Studies, New York.
- Stewart, K.W. and B.P. Stark. 1988. Nymphs of North American Stonefly Genera (Plecoptera). Thomas Say Found. Vol. XII.
- U.S. Forest Service, Mont. Dept. State Lands, Mont. Dept. Health and Env. Sci., Mont. Dept. Nat. Res. and Cons. 1990. Draft Environmental Impact Statement, Noranda Minerals Corp., Montanore Project.
- Western Resource Dev. Corp. 1989. Aquatic biology study, Montana project. Boulder, Colo.
- Winget, R.N. and F.A. Mangum. 1979. Biotic condition index: integrated biological, physical, and chemical stream parameters for management. U.S.D.A., For. Serv., Ogden, Utah.
- Worf, D.L. 1980. Biological monitoring for environmental effects. Lexington Books, Mass.

APPENDICES

Appendix A. Photos of the Montanore sampling stations, October 1990.

**Appendix B. Montanore project area totals of macroinvertebrates
collected in 1990.**

Montane Macroinvertebrate Totals-1990				For Each Organism			Major Group		
	No.	TV	TQ	Mean No./m ²	Percent of Total	Feeding Habit	Total Number	Percent of Total	
Ephemeroptera							6115	64.3	
Suctidae		4							
<i>Suctia bicaudata</i>	1160	72	2522.60	12.3	c-g				
<i>Suctia tricaudata</i>	321	72	693.36	3.4	c-g				
Ephemerellidae		1							
<i>Caudatella hystrix</i>	17	48	36.72	0.2	c-g				
<i>Drunella coloradensis</i>	20	18	13.2	0.2	scr				
<i>Drunella doddsi</i>	438	4	944.00	4.6	scr				
<i>Drunella fuscilines</i>	137	48	295.92	1.4	scr				
<i>Drunella spinifera</i>	31	24	66.36	0.3	scr				
<i>Drunella sp.</i>	6	48	12.96	0.1	scr				
<i>Serratella levis</i>	10	48	21.6	0.1	c-g				
<i>Serratella tibialis</i>	3	24	6.48	0.0	c-g				
Heptageniidae		4							
<i>Cinygmulia sp.</i>	2713	21	4780.00	23.1	scr				
<i>Eporus sp.</i>	696	21	1503.36	7.2	scr				
<i>Shithrogena sp.</i>	844	21	1823.04	8.9	c-g				
Leptophlebiidae		2							
<i>Paraleptophlebia sp.</i>	74	24	159.84	0.8	c-g				
Siphlonuridae		7							
<i>Anelitus sp.</i>	137	48	295.92	1.4	c-g				
Plecoptera							2286	24.0	
Capniidae		1							
Immature	93			200.00	1.0	shr			
Chloroperlidae		1							
<i>Kathropora perdita</i>	1	24	2.16	0.0	c-g				
<i>Sveltaea/Suvelia sp.</i>	626	24	1352.16	6.4	prd				
Leuctridae		0							
<i>Paraleuctra sp.</i>	2	18	4.32	0.0	shr				
<i>Perlaonias sp.</i>	30	18	16.8	0.3	shr				
Immature	27	18	58.32	0.3	shr				
Membracidae		2							
<i>Vimoka cataractae</i>	52	36	112.32	0.5	shr				
<i>Zapada cinctipes</i>	81	16	174.96	0.9	shr				
<i>Zapada columbiensis</i>	174	16	375.84	1.8	shr				
Peltoperlidae		2							
<i>Norapepla brevirostris</i>	15	24	32.4	0.2	shr				
Perlidae		1							
<i>Sororesuria theodora</i>	28	24	60.48	0.3	prd				
Immature	17	-	36.72	0.2	prd				
Perlodidae		2							
<i>Isoperla sp.</i>	32	48	69.12	0.3	prd				
<i>Mesocycya sp.</i>	34	24	73.44	0.4	prd				
<i>Satvena bradleyi</i>	2	48	4.32	0.0	prd				
Immature	11	-	23.76	0.1	prd				
Taeniopterygidae		2							
<i>Taenionemus sp.</i>	1061	48	2291.76	11.2	scr		639	6.6	
Trichoptera									
Brachycentridae		1							
<i>Micropterna sp.</i>	15	24	32.4	0.2	shr				
Glossosomatidae		0							
<i>Anagpetus sp.</i>	34	24	73.44	0.4	scr				
<i>Glossosoma sp.</i>	45	24	97.2	0.5	scr				
Hydropsychidae		4							
<i>Arctopeche grandis</i>	104	18	224.64	1.1	c-f				
<i>Parapsyche elisia</i>	3	6	6.48	0.0	c-f				
Immature	9	-	19.44	0.1	c-f				
Lepidostomatidae		1							
<i>Lepidostoma sp.</i>	10	18	21.6	0.1	shr				
Limnephilidae		4							
<i>Apatania sp.</i>	4	18	8.64	0.0	scr				
<i>Ecdyonurilla sp.</i>	4	24	8.64	0.0	c-g				
<i>Mesolynx sp.</i>	1	-	2.16	0.0	c-g				
<i>Neothremma sp.</i>	3	8	6.48	0.0	scr				
<i>Oligophlebiodes sp.</i>	47	24	101.52	0.5	scr				
Immature	17	-	36.72	0.2	-				
<i>Rhyacophilidae</i>	0								
<i>Rhyacophila (bettenei)</i>	3	18	6.48	0.0	prd				
<i>Rhyacophila (brunnata)</i>	11	18	23.76	0.1	prd				
<i>Rhyacophila (hyalinata)</i>	10	18	21.6	0.1	prd				
<i>Rhyacophila (iranda)</i>	3	18	6.48	0.0	prd				
<i>Rhyacophila (sibirica)</i>	48	18	103.68	0.5	prd				
<i>Rhyacophila (vacca)</i>	49	18	105.84	0.5	prd				
<i>Rhyacophila sp.</i>	14	18	30.24	0.1	prd				
Immature	3	-	6.48	0.0	-				
Pupa	2	-	4.32	0.0	-				
Other							675	7.1	
Annelida									
Tubificidae									
<i>Tubifex sp.</i>	96	- 108	207.36	1.0	c-g				
Arachnida		1	- 108	2.16	0.0	prd			
Coleoptera									
Elmidae		4							
<i>Cleptelmis sp.</i>	32	108	69.12	0.1	c-g				
<i>Heterlimnius sp.</i>	50	108	108	0.5	c-g				
<i>Narpus sp.</i>	1	108	2.16	0.0	c-g				
<i>Zeitzevia sp.</i>	2	108	4.32	0.0	c-g				
Immature	6	108	12.96	0.1	c-g				
Collembola		2	- 108	4.32	0.0	-			
Diptera									
Aeolopleridae		0							
<i>Agathon sp.</i>	2	2	4.32	0.0	scr				
Chironomidae		309	7 108	667.64	3.2	c/prd			
Empididae		6							
<i>Oreogeten sp.</i>	18	108	41.04	0.2	prd				
Simuliidae		40	6 108	86.4	0.4	c-f			
Tabanidae		3							
<i>Antocha sp.</i>	1	24	2.16	0.0	prd				
<i>Dicranota sp.</i>	19	24	105.84	0.5	prd				
<i>Haematoma sp.</i>	14	36	30.24	0.1	prd				
<i>Tipula sp.</i>	2	36	4.32	0.0	shr				
Mollusca									
Planorbidae		1	6 108	2.16	0.0	scr			
Resedida		1	- 108	2.16	0.0	-			
Turbellaria		47	4 108	101.52	0.5	prd			
Total number =	9515			20552.4	100.0				
Total taxa =	71								
SD=	7.6								
STD=	338.7								
Mean=	1903.0								
TV= Tolerance Value (Millsenoff, 1988)									
TQ=Tolerance Quotient (Winget et al., 1979)									

Appendix C. Macroinvertebrate station totals, April 1990.

	For Each Organism					Major Group	
	No.	TV	TQ	Mean	Percent	Feeding	Total
				No./m ⁻²	of Total		
Ephemeroptera							160 78.8
Baetidae	4						
<i>Baetis bicuspidatus</i>	46	72	99.36	22.7	c-g		
<i>Baetis tricuspidatus</i>	0	72	0	0.0	c-g		
Ephemerellidae	1						
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g		
<i>Drunella coloradensis</i>	0	16	0	0.0	scr		
<i>Drunella doddi</i>	1	4	2.16	0.3	scr		
<i>Drunella flavillina</i>	10	48	21.6	4.3	scr		
<i>Drunella spinifera</i>	0	24	0	0.0	scr		
<i>Drunella sp.</i>	0	48	0	0.0	scr		
<i>Serrataella levis</i>	0	48	0	0.0	c-g		
<i>Serrataella tibialis</i>	0	24	0	0.0	c-g		
Heptageniidae	6						
<i>Cinygmaea sp.</i>	42	21	90.72	20.7	scr		
<i>Epeorus sp.</i>	34	21	116.64	26.4	scr		
<i>Stictrognathus sp.</i>	6	21	12.96	3.0	c-g		
Leptophlebiidae	2						
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g		
Siphlonuridae	7						
<i>Aesletus sp.</i>	1	48	2.16	0.5	c-g	30 14.8	
Plecoptera							
Capniidae	1						
Immature	0			0	0.0	shr	
Chloroperlidae	1						
<i>Korthoperla perdita</i>	0	24	0	0.0	c-g		
<i>Sweiles/Suwallia sp.</i>	8	24	17.28	3.9	prd		
Leuctridae	0						
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr		
<i>Parleyo sp.</i>	0	18	0	0.0	shr		
Immature	0	18	0	0.0	shr		
Mesocricetidae	2						
<i>Vizache cataractae</i>	4	36	8.64	2.0	shr		
<i>Zapada cinctipes</i>	1	16	2.16	0.5	shr		
<i>Zapada columbiensis</i>	10	16	21.6	4.9	shr		
Peltoperlidae	2						
<i>Toropera brevia</i>	0	24	0	0.0	shr		
Perlidae	1						
<i>Boronaperla theodora</i>	0	6	0	0.0	prd		
Immature	0	-	0	0.0	prd		
Perlodidae	2						
<i>Isonoperla sp.</i>	0	48	0	0.0	prd		
<i>Nemarcys sp.</i>	0	24	0	0.0	prd		
<i>Suturus bradleyi</i>	0	48	0	0.0	prd		
Immature	0	-	0	0.0	prd		
Taeniopterygidae	2						
<i>Taenionema sp.</i>	7	48	15.12	3.4	scr	4 2.0	
Trichoptera							
Brachycentridae	1						
<i>Micrasema sp.</i>	0	24	0	0.0	shr		
Glossosomatidae	0						
<i>Anaspaeetus sp.</i>	0	24	0	0.0	scr		
<i>Glossosoma sp.</i>	0	24	0	0.0	scr		
Hydropsychidae	4						
<i>Arctopsycha grandis</i>	3	18	6.48	1.5	c-f		
<i>Parapsycha elata</i>	0	6	0	0.0	c-f		
Immature	0	-	0	0.0	c-f		
Lepidostomatidae	1						
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr		
Limnephilidae	4						
<i>Apatania sp.</i>	0	18	0	0.0	scr		
<i>Ecciliosyria sp.</i>	0	24	0	0.0	c-g		
<i>Mesylagena sp.</i>	0	-	0	0.0	c-g		
<i>Neothremma sp.</i>	0	6	0	0.0	scr		
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr		
Immature	0	-	0	0.0	-		
Rhyacophilidae	0						
<i>Rhyacophilus (battenii)</i>	1	18	2.16	0.5	prd		
<i>Rhyacophilus (brunnescens)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (hyselina)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (irlanda)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (sibirica)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (vaccuum)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus sp.</i>	0	18	0	0.0	prd		
Immature	0	-	0	0.0	-		
Pupa	0	-	0	0.0	-		
Other						9	4.6
Annelida							
Lumbricidae	0	- 108	0	0.0	c-g		
Arachnida	0	- 108	0	0.0	prd		
Coleoptera							
Gyrinidae	4						
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g		
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g		
<i>Narpus sp.</i>	0	108	0	0.0	c-g		
<i>Taftevia sp.</i>	0	108	0	0.0	c-g		
Immature	0	108	0	0.0	c-g		
Collembola	0	- 108	0	0.0	-		
Diptera	0						
Acalyptratae							
Agathomyia sp.	0	2	0	0.0	scr		
Chironomidae	6	7 108	12.96	3.0	c/prd		
Empididae	6						
<i>Oreopson sp.</i>	0	108	0	0.0	prd		
Sialidae	3	6 108	6.48	1.5	c-f		
Tephritidae	3						
<i>Antocha sp.</i>	0	24	0	0.0	prd		
<i>Dicranota sp.</i>	0	24	0	0.0	prd		
<i>Mesactona sp.</i>	0	36	0	0.0	prd		
<i>Tipula sp.</i>	0	36	0	0.0	shr		
Mollusca							
Planorbidae	0	6 108	0	0.0	scr		
Nematoda	0	- 108	0	0.0	-		
Turbellaria	0	4 108	0	0.0	prd		
Total number =	203		438.48	100.0			
Total taxa =	16						
SD=	2.1						
STD=	9.6						
Mean=	10.6						
TV=Tolerance Value (Millsnoff, 1988)							
TQ=Tolerance Quotient (Winget et al., 1979)							

	For Each Organism					Major Group		
	No.	TV	TQ	Mean	Percent	Feeding Habit	Total Number	Percent of Total
				No./m²	Percent			
Ephemeroptera							118	67.8
Baetidae	4							
<i>Baetis bicaudatus</i>	20	72	43.2	11.5	0.0	c-g		
<i>Baetis tricudatus</i>	0	72	0	0.0	0.0	c-g		
Ephemerellidae	1							
<i>Caudatella hystrix</i>	0	48	0	0.0	0.0	c-g		
<i>Brunella coloradensis</i>	0	18	0	0.0	0.0	scr		
<i>Brunella doddi</i>	1	4	2.16	0.6	0.0	scr		
<i>Brunella flavilines</i>	5	48	12.96	3.4	0.0	scr		
<i>Brunella spinifera</i>	0	24	0	0.0	0.0	scr		
<i>Brunella sp.</i>	0	48	0	0.0	0.0	scr		
<i>Serratella levis</i>	0	48	0	0.0	0.0	c-g		
<i>Serratella tibialis</i>	0	24	0	0.0	0.0	c-g		
Heptageniidae	4							
<i>Chrygmaea sp.</i>	50	21	108	28.7	0.0	scr		
<i>Epcorus sp.</i>	33	21	71.28	19.0	0.0	scr		
<i>Rhithrogena sp.</i>	7	21	15.12	4.0	0.0	c-g		
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	0.0	c-g		
Siphlonuridae	7							
<i>Aesletus sp.</i>	1	48	2.16	0.6	0.0	c-g	40	23.0
Plecoptera								
Capniidae	1							
<i>Immature</i>	0	-	0	0.0	0.0	shr		
Chloroperlidae	1							
<i>Kethroperla perdita</i>	0	24	0	0.0	0.0	c-g		
<i>Sialis/Suwallia sp.</i>	18	24	38.88	10.3	0.0	prd		
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18	0	0.0	0.0	shr		
<i>Parleyolla sp.</i>	0	18	0	0.0	0.0	shr		
<i>Immature</i>	4	18	8.64	2.3	0.0	shr		
Mesouridae	2							
<i>Vlasoka cataractae</i>	0	36	0	0.0	0.0	shr		
<i>Zapada cinctipes</i>	0	16	0	0.0	0.0	shr		
<i>Zapada columbiensis</i>	16	16	34.56	9.2	0.0	shr		
Peltoperlidae	2							
<i>Noraperla bravia</i>	0	24	0	0.0	0.0	shr		
Perlidae	1							
<i>Opronuria theodora</i>	0	6	0	0.0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	0.0	prd		
Perlodidae	2							
<i>Isonychia sp.</i>	1	48	2.16	0.6	0.0	prd		
<i>Megarcys sp.</i>	0	24	0	0.0	0.0	prd		
<i>Setevia bradleyi</i>	0	48	0	0.0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	0.0	prd		
Taeniopterygidae	2							
<i>Taenionema sp.</i>	1	48	2.16	0.6	0.0	scr	2	1.1
Trichoptera								
Brachycentridae	1							
<i>Micrasemus sp.</i>	0	24	0	0.0	0.0	shr		
Glossosomatidae	0							
<i>Anagesetus sp.</i>	0	24	0	0.0	0.0	scr		
<i>Glossosoma sp.</i>	0	24	0	0.0	0.0	scr		
Hydropsychidae	4							
<i>Arctopsyche grandis</i>	0	18	0	0.0	0.0	c-f		
<i>Parapsyche elisia</i>	0	6	0	0.0	0.0	c-f		
<i>Immature</i>	0	-	0	0.0	0.0	c-f		
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	0.0	shr		
Limnephilidae	4							
<i>Apertenia sp.</i>	0	18	0	0.0	0.0	scr		
<i>Ecclesomyia sp.</i>	0	24	0	0.0	0.0	c-g		
<i>Hoseilyana sp.</i>	0	-	0	0.0	0.0	c-g		
<i>Neothremma sp.</i>	0	6	0	0.0	0.0	scr		
<i>Oligophlebia sp.</i>	0	24	0	0.0	0.0	scr		
<i>Immature</i>	0	-	0	0.0	0.0	-		
<i>Pupa</i>	0	-	0	0.0	0.0	-		
Other							14	8.0
 Annelida								
 Lumbricidae	1	-	108	2.16	0.6	c-g		
 Arachnida	0	-	108	0	0.0	prd		
 Coleoptera								
 Elmidae	4							
<i>Cleptelmis sp.</i>	3	108	6.48	1.7	0.6	c-g		
<i>Metaclemis sp.</i>	0	108	0	0.0	0.0	c-g		
<i>Marpus sp.</i>	0	108	0	0.0	0.0	c-g		
<i>Taenivius sp.</i>	0	108	0	0.0	0.0	c-g		
<i>Immature</i>	1	108	2.16	0.6	0.0	c-g		
 Collembola	0	-	108	0	0.0	-		
 Diptera								
 Aldrovidae	0							
<i>Agathon sp.</i>	2	2	4.32	1.1	0.0	scr		
 Chironomidae	4	7	108	8.64	2.3	c/prd		
 Ephydidae	4							
<i>Ornogoton sp.</i>	0	108	0	0.0	0.0	prd		
 Simuliidae	1	6	108	2.16	0.6	c-f		
 Tiltulidae	3							
<i>Antocha sp.</i>	0	24	0	0.0	0.0	prd		
<i>Dicranota sp.</i>	0	24	0	0.0	0.0	prd		
<i>Maxstoma sp.</i>	1	36	2.16	0.6	0.0	prd		
<i>Tipula sp.</i>	0	36	0	0.0	0.0	shr		
 Mollusca								
 Planorbidae	1	6	108	2.16	0.6	scr		
 Nematoda	0	-	108	0	0.0	-		
 Turbellaria	0	4	108	0	0.0	prd		
Total number =	174		375.84	100.0				
Total taxa =	22							
SDI=	2.2							
STD=	7.7							
Mean=	34.8							
TV= Tolerance Value (Hillemanoff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	No.	TV	TQ	For Each Organism			Major Group	
				No./m ²	Percent of Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							155	47.7
Baetidae	4							
<i>Baetis bicaudatus</i>	18	72	38.86	5.5	c-g			
<i>Baetis tricaudatus</i>	13	72	28.08	4.0	c-g			
Ephemerellidae	1							
<i>Caudatella hystrica</i>	0	48	0	0.0	c-g			
<i>Drunella coloradensis</i>	0	18	0	0.0	scr			
<i>Drunella doddi</i>	9	4	17.28	2.5	scr			
<i>Drunella flexilines</i>	13	48	28.08	4.0	scr			
<i>Drunella spinifera</i>	0	24	0	0.0	scr			
<i>Drunella sp.</i>	0	18	0	0.0	scr			
<i>Hesperella levii</i>	6	48	12.96	1.8	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae	4							
<i>Cinygmulia sp.</i>	53	21	114.48	16.3	scr			
<i>Epsorus sp.</i>	37	21	79.92	11.4	scr			
<i>Rhithrogena sp.</i>	5	21	10.8	1.5	c-g			
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g			
Siphlonuridae								
<i>Anisostus sp.</i>	2	48	4.32	0.6	c-g	33	10.2	
Plecoptera								
Capniidae	1							
Immature	0		0	0.0	shr			
Chloroperlidae	1							
<i>Kathroperla perdita</i>	0	24	0	0.0	c-g			
<i>Aneuites/Aneutelia sp.</i>	20	24	43.7	6.2	prd			
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr			
<i>Parionyx sp.</i>	0	18	0	0.0	shr			
Immature	0	18	0	0.0	shr			
Mesoceridae	2							
<i>Vinacka cataractae</i>	1	36	2.16	0.3	shr			
<i>Zapada cinctipes</i>	0	18	0	0.0	shr			
<i>Zapada columbiana</i>	2	18	4.32	0.6	shr			
Feltoperlidae	2							
<i>Toropetra bravia</i>	0	24	0	0.0	shr			
Perlidae	1							
<i>Acronemura abnormis</i>	0	6	0	0.0	prd			
<i>Hesperoperla pacifica</i>	0	18	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Perlodidae	2							
<i>Isonoperla sp.</i>	2	48	4.32	0.6	prd			
<i>Magarops sp.</i>	0	24	0	0.0	prd			
<i>Setodes bradleyi</i>	0	48	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae	2							
<i>Taenionema sp.</i>	8	48	17.28	2.5	scr	10	3.1	
Trichoptera								
Brachycentridae	1							
<i>Microtendipes sp.</i>	0	24	0	0.0	shr			
Glossosomatidae	0							
<i>Anagesetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae	4							
<i>Arctopsyche grandis</i>	0	18	0	0.0	c-f			
<i>Parapsyche elisia</i>	0	6	0	0.0	c-f			
Immature	0	-	0	0.0	c-f			
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr			
Lispenphilidae	4							
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Ecclesonia sp.</i>	0	24	0	0.0	c-g			
<i>Neselyana sp.</i>	0	-	0	0.0	c-g			
<i>Neothranma sp.</i>	0	6	0	0.0	scr			
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr			
Immature	1	-	2.16	0.3	-			
Rhyacophilidae	0							
<i>Rhyacophila (batteni)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (brunnescens)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (hyalinata)</i>	1	18	2.16	0.3	prd			
<i>Rhyacophila (liranda)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (ibirical)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (vaccua)</i>	0	18	0	0.0	prd			
<i>Rhyacophila sp.</i>	5	18	10.8	1.5	prd			
Immature	2	-	4.32	0.6	-			
Pupa	1	-	2.16	0.3	-			
Other							127	39.1
Annelida								
Lumbricidae	12	-	108	25.92	3.7	c-g		
Archichida	0	-	108	0	0.0	prd		
Coleoptera								
Elmidae	4							
<i>Cleptoleia sp.</i>	7	108	15.12	2.1	c-g			
<i>Heterlanicus sp.</i>	0	108	0	0.0	c-g			
<i>Marpus sp.</i>	0	108	0	0.0	c-g			
<i>Tuitzevia sp.</i>	0	108	0	0.0	c-g			
Immature	1	108	2.16	0.3	c-g			
Collembola	0	-	108	0	0.0	-		
Diptera								
Elephantomyidae	0							
<i>Agathon sp.</i>	0	2	0	0.0	scr			
Chironomidae	85	7	108	183.4	26.2	c/prd		
Empididae	4							
<i>Ornogaton sp.</i>	0	108	0	0.0	prd			
Simuliidae	19	5	108	61.04	5.6	c-f		
Tabanidae	3							
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	2	24	4.32	0.6	prd			
<i>Hexatom sp.</i>	1	36	2.16	0.3	prd			
<i>Tipula sp.</i>	0	36	0	0.0	scr			
Mollusca								
Planorbidae	0	6	108	0	0.0	scr		
Nematoda	0	-	108	0	0.0	-		
Turbellaria	0	4	108	0	0.0	prd		
Total number =	325		702	100.0				
Total taxa =	24							
SDI=	2.5							
SDR=	12.7							
Mean=	65.0							
TV=Tolerance Value (Milleenoff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	For Each Organism					Major Group		
	No.	TV	TQ	Mean No./m ²	Percent of Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera								
Festidae								
<i>Sauvagea bicaudatus</i>	17	72	36.72	8.7	c-g		153	78.5
<i>Sauvagea tricaudatus</i>	0	72	0	0.0	c-g			
Ephemerellidae								
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g			
<i>Drunella coloradensis</i>	1	18	2.16	0.5	scr			
<i>Drunella doddi</i>	1	4	2.16	0.5	scr			
<i>Drunella flavilinea</i>	5	48	10.8	2.6	scr			
<i>Drunella spinifera</i>	0	24	0	0.0	scr			
<i>Drunella sp.</i>	0	48	0	0.0	scr			
<i>Serratella loriai</i>	0	48	0	0.0	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae								
<i>Chironomus sp.</i>	64	21	128.24	32.8	scr			
<i>Epuraea sp.</i>	60	21	129.6	30.8	scr			
<i>Rhithrogena sp.</i>	1	21	6.48	1.5	c-g			
Leptophlebiidae								
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g			
Siphlonuridae								
<i>Anelatus sp.</i>	2	48	4.32	1.0	c-g		23	11.8
Placoptera								
Caphidae								
<i>Immature</i>	1		2.16	0.5	shr			
Chloroperlidae								
<i>Kethroperla perdita</i>	0	24	0	0.0	c-g			
<i>Sveltessa/Suwallia sp.</i>	6	24	12.96	3.1	prd			
Leuctridae								
<i>Pareuctrula sp.</i>	2	18	4.32	1.0	shr			
<i>Perleucrula sp.</i>	0	18	0	0.0	shr			
<i>Immature</i>	0	18	0	0.0	shr			
Membridae								
<i>Vlaecke cataractae</i>	2	36	4.32	1.0	shr			
<i>Zapada cinctipes</i>	0	16	0	0.0	shr			
<i>Zapada columbiana</i>	9	16	19.44	4.6	shr			
Peltoperlidae								
<i>Toroperla brevis</i>	0	24	0	0.0	shr			
Perlidae								
<i>Boronaria theodora</i>	1	6	2.16	0.5	prd			
<i>Immature</i>	0	-	0	0.0	prd			
Perlodidae								
<i>Isoperla sp.</i>	0	48	0	0.0	prd			
<i>Megarcys sp.</i>	0	24	0	0.0	prd			
<i>Salvens bradleyi</i>	0	48	0	0.0	prd			
<i>Immature</i>	0	-	0	0.0	prd			
Taeniopterygidae								
<i>Taenionema sp.</i>	2	48	4.32	1.0	scr		7	3.6
Trichoptera								
Brachycentridae								
<i>Micrasemus sp.</i>	0	24	0	0.0	shr			
Glossosomatidae								
<i>Anagesetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae								
<i>Arctopsyche grandis</i>	0	18	0	0.0	c-f			
<i>Perapsyche elisia</i>	0	6	0	0.0	c-f			
<i>Immature</i>	0	-	0	0.0	c-f			
Lepidostomatidae								
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr			
Limnephilidae								
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Eccilisomyia sp.</i>	0	24	0	0.0	c-g			
<i>Moasylana sp.</i>	0	-	0	0.0	c-g			
<i>Neothremma sp.</i>	0	8	0	0.0	scr			
<i>Oligophlebiae sp.</i>	0	16	0	0.0	scr			
<i>Immature</i>	0	-	0	0.0	-			
Hydropsychidae								
<i>Rhyacophilus (batteni)</i>	0	18	0	0.0	prd			
<i>Rhyacophilus (brunnescens)</i>	0	18	0	0.0	prd			
<i>Rhyacophilus (hyalinata)</i>	2	18	4.32	1.0	prd			
<i>Rhyacophilus (randalli)</i>	0	18	0	0.0	prd			
<i>Rhyacophilus (sibirica)</i>	1	18	6.48	1.5	prd			
<i>Rhyacophilus (waccus)</i>	1	18	2.16	0.5	prd			
<i>Rhyacophilus sp.</i>	0	18	0	0.0	prd			
<i>Immature</i>	1	-	2.16	0.5	-			
Polycentropidae								
<i>Polycentropus sp.</i>	0	-	0	0.0	-			
Other								
Annelida								
Lumbricidae								
<i>Immature</i>	3	- 108	6.48	1.5	c-g		12	6.2
Arachnida								
Coleoptera								
Elmidae								
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g			
<i>Heterelmis sp.</i>	0	108	0	0.0	c-g			
<i>Narpus sp.</i>	0	108	0	0.0	c-g			
<i>Saitzavina sp.</i>	0	108	0	0.0	c-g			
<i>Immature</i>	0	- 108	0	0.0	-			
Collembola								
Diptera								
Elephastomidae								
<i>Agathon sp.</i>	0	2	0	0.0	scr			
Chironomidae								
<i>Immature</i>	5	- 108	10.8	2.4	c/prd			
Epididae								
<i>Oreogoton sp.</i>	0	108	0	0.0	prd			
Simuliidae								
<i>Immature</i>	0	6 108	0	0.0	c-f			
Tipulidae								
<i>Antochus sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	3	24	6.48	1.5	prd			
<i>Hexatomia sp.</i>	1	36	2.16	0.5	prd			
<i>Tipula sp.</i>	0	- 36	0	0.0	shr			
Mollusca								
Planorbidae								
<i>Immature</i>	0	6 108	0	0.0	scr			
Turbellaria								
Total number =	195		421.2	100.0				
Total Tens =	22							
SDT=	2.1							
STD=	10.3							
Mean=	39.0							
TV= Tolerance Value (Millsenoff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	No.	IV	TQ	For Each Organism			Major Group		
				No./m ²	Percent	Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera								260	72.8
 Sialidae	4								
<i>Sialis bicaudatus</i>	31	72	66.96	8.7	c-g				
<i>Sialis tricaudatus</i>	0	72	0	0.0	c-g				
 Ephemerellidae	1								
<i>Caudatella hystris</i>	0	48	0	0.0	c-g				
<i>Grunella coloradensis</i>	0	18	0	0.0	scr				
<i>Grunella doddsii</i>	0	4	0	0.0	scr				
<i>Grunella flavilimes</i>	9	48	19.44	2.5	scr				
<i>Grunella spinifera</i>	1	24	2.16	0.3	scr				
<i>Grunella sp.</i>	0	48	0	0.0	scr				
<i>Serratella lavis</i>	1	48	2.16	0.3	c-g				
<i>Serratella tibialis</i>	0	24	0	0.0	c-g				
 Heptageniidae	4								
<i>Cinygmulia sp.</i>	34	21	73.44	9.5	scr				
<i>Ephorus sp.</i>	173	21	373.68	46.5	scr				
<i>Mithracina sp.</i>	1	21	2.16	0.3	c-g				
 Leptophlebiidae	2								
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g				
 Siphlonuridae	7								
<i>Amaletus sp.</i>	10	48	21.6	2.8	c-g			43	12.0
 Plecoptera									
 Corydalidae	1								
<i>Imature</i>	2			4.32	0.6	shr			
 Chloroperlidae	1								
<i>Kathroparia perdita</i>	0	24	0	0.0					
<i>Baetis/Suwallia sp.</i>	12	24	25.92	3.4	prd				
 Taeniopterygidae	0								
<i>Paraluctreia sp.</i>	0	18	0	0.0	shr				
<i>Parlomyia sp.</i>	0	18	0	0.0	shr				
<i>Imature</i>	0	18	0	0.0	shr				
 Membrionidae	2								
<i>Vivipara ceteractae</i>	2	36	4.32	0.6	shr				
<i>Zapada cinctipes</i>	0	16	0	0.0	shr				
<i>Zapada columbiana</i>	14	16	30.24	3.9	shr				
 Peltoperlidae	2								
<i>Vorasperla brevis</i>	0	24	0	0.0	shr				
 Perlidae									
<i>Doroneurius theodora</i>	2	6	4.32	0.6	prd				
<i>Imature</i>	0	-	0	0.0	prd				
 Perlodidae	2								
<i>Isoparia sp.</i>	0	48	0	0.0	prd				
<i>Megarcys sp.</i>	0	24	0	0.0	prd				
<i>Metaneura bradleyi</i>	0	48	0	0.0	prd				
<i>Imature</i>	1	-	2.16	0.3	prd				
 Taeniopterygidae	2								
<i>Taenionema sp.</i>	10	48	21.6	2.8	scr			6	1.7
Trichoptera									
 Brachycentridae	1								
<i>Micrasemus sp.</i>	0	24	0	0.0	shr				
 Glossosomatidae	0								
<i>Anagapetus sp.</i>	0	24	0	0.0	scr				
<i>Glossosoma sp.</i>	0	24	0	0.0	scr				
 Hydropsychidae	4								
<i>Arctopsyche grandis</i>	3	18	6.48	0.8	c-f				
<i>Parapsyche elisia</i>	0	6	0	0.0	c-f				
<i>Imature</i>	0	-	0	0.0	c-f				
 Lepidostomatidae	1								
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr				
 Limnephilidae	4								
<i>Apatania sp.</i>	0	18	0	0.0	scr				
<i>Eccleciaecia sp.</i>	0	24	0	0.0	c-g				
<i>Moselyana sp.</i>	0	-	0	0.0	c-g				
<i>Neothremma sp.</i>	0	8	0	0.0	scr				
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr				
<i>Imature</i>	1	-	2.16	0.3	-				
 Rhyacophilidae	0								
<i>Rhyacophilis (batteni)</i>	0	18	0	0.0	prd				
<i>Rhyacophilis (brunnescens)</i>	0	18	0	0.0	prd				
<i>Rhyacophilis (hyalinata)</i>	0	18	0	0.0	prd				
<i>Rhyacophilis (irlande)</i>	0	18	0	0.0	prd				
<i>Rhyacophilis (albitrice)</i>	1	18	2.16	0.3	prd				
<i>Rhyacophilis (vacca)</i>	0	18	0	0.0	prd				
<i>Rhyacophilis sp.</i>	1	18	2.16	0.3	prd				
<i>Imature</i>	0	-	0	0.0	-				
<i>Pups</i>	0	-	0	0.0	-				
Other								45	13.4
 Annelida									
 Tubificidae	12	- 108	25.91	3.4	c-g				
 Arachnida	0	- 108	0	0.0	prd				
 Coleoptera									
 Elmidae	4								
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g				
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g				
<i>Nerpus sp.</i>	0	108	0	0.0	c-g				
<i>Raitlesia sp.</i>	0	108	0	0.0	c-g				
<i>Imature</i>	0	108	0	0.0	c-g				
 Collembola									
 Diptera									
 Acalyptridae	0								
<i>Agathon sp.</i>	0	2	0	0.0	scr				
<i>Chironomidae</i>	33	7 108	71.28	9.2	c/prd				
 Empididae	6								
<i>Oreogeron sp.</i>	1	108	2.16	0.3	prd				
 Sciomyzidae	0	6 108	0	0.0	c-f				
 Tabanidae	3								
<i>Antocha sp.</i>	0	24	0	0.0	prd				
<i>Dicranota sp.</i>	1	24	2.16	0.3	prd				
<i>Hexatomia sp.</i>	0	36	0	0.0	prd				
<i>Tipula sp.</i>	1	36	2.16	0.3	scr				
 Mollusca									
 Planorbidae	0	6 108	0	0.0	scr				
 Nematoda	0	- 108	0	0.0	-				
 Turbellaria	0	6 108	0	0.0	prd				
Total number =	257		771.12	100.0					
Total taxa =	24								
BDI=	1.9								
SDI=	21.1								
Mean=	75.4								
TV=Tolerance Value (Millsenoff, 1988)									
TQ=Tolerance Quotient (Winget et al., 1979)									

Little Cherry Creek, LCC 1--April 1990

	For Each Organism				Major Group		
	No.	TV	TQ	Mean % of Total	Feeding Habit	Total	Percent
						Number	of Total
Ephemeroptera						229	65.6
 Beetidae	4						
<i>Baetis bicaudatus</i>	14	72	30.24	4.0	c-g		
<i>Baetis tricaudatus</i>	1	72	2.16	0.3	c-g		
 Ephemerellidae	1						
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g		
<i>Drunella coloradensis</i>	0	18	0	0.0	scr		
<i>Drunella doddi</i>	0	4	0	0.0	scr		
<i>Drunella flexilines</i>	3	48	6.48	0.9	scr		
<i>Drunella spinifera</i>	2	24	4.32	0.6	scr		
<i>Drunella sp.</i>	0	48	0	0.0	scr		
<i>Harrastella lavis</i>	0	48	0	0.0	c-g		
<i>Harrastella tibialis</i>	0	24	0	0.0	c-g		
 Heptageniidae	4						
<i>Chironomus sp.</i>	127	21	274.32	36.5	scr		
<i>Sporophorus sp.</i>	70	21	151.3	20.1	scr		
<i>Abithronius sp.</i>	1	21	2.16	0.3	c-g		
 Leptophlebiidae	2						
<i>Paraleptophlebia sp.</i>	3	24	6.48	0.9	c-g		
 Siphlonuridae	7						
<i>Aeschnostom sp.</i>	8	48	17.28	2.3	c-g	66	19.0
Plecoptera							
 Cenopidae	1						
<i>Immature</i>	0		0	0.0	shr		
 Chloroperlidae	1						
<i>Euthroperla perdita</i>	0	24	0	0.0	c-g		
<i>Buwallia sp.</i>	25	24	54	7.2	prd		
 Leuctridae	0						
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr		
<i>Perinayla sp.</i>	15	18	32.4	4.3	shr		
<i>Immature</i>	1	18	2.16	0.3	shr		
 Nemouridae	2						
<i>Viechia cateractae</i>	2	36	4.32	0.6	shr		
<i>Isopoda cinctipes</i>	0	18	0	0.0	shr		
<i>Zapada columbiana</i>	0	18	8.64	1.1	shr		
 Peltoperlidae	2						
<i>Yoraperla brevia</i>	5	24	10.8	1.4	shr		
 Perlidae	1						
<i>Doronurius theodora</i>	0	6	0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	prd		
 Periodidae	2						
<i>Isoperla sp.</i>	0	48	0	0.0	prd		
<i>Megarcys sp.</i>	0	24	0	0.0	prd		
<i>Suturus bradleyi</i>	0	48	0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	prd		
 Taeniopterygidae	2						
<i>Tensionema sp.</i>	14	48	30.24	4.0	scr	7	2.0
Trichoptera							
 Brachycentridae	1						
<i>Microcressa sp.</i>	0	24	0	0.0	shr		
 Glossosomatidae	0						
<i>Anagapetus sp.</i>	2	24	4.32	0.6	scr		
<i>Olossonoma sp.</i>	0	24	0	0.0	scr		
 Hydropsychidae	4						
<i>Acteopsycha grandis</i>	0	18	0	0.0	c-f		
<i>Parapsyche alisia</i>	0	6	0	0.0	c-f		
<i>Immature</i>	0	-	0	0.0	c-f		
 Lepidostomatidae	1						
<i>Lepidostoma sp.</i>	1	18	2.16	0.3	shr		
 Limnephilidae	4						
<i>Apatania sp.</i>	0	18	0	0.0	scr		
<i>Eccoptomyia sp.</i>	0	24	0	0.0	c-g		
<i>Moerlyana sp.</i>	0	-	0	0.0	c-g		
<i>Neothremma sp.</i>	0	6	0	0.0	scr		
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr		
<i>Immature</i>	0	-	0	0.0	-		
 Rhyacophilidae	0						
<i>Rhyacophilis (bettani)</i>	0	18	0	0.0	prd		
<i>Rhyacophilis (brunnalis)</i>	0	18	0	0.0	prd		
<i>Rhyacophilis (hyalinata)</i>	0	18	0	0.0	prd		
<i>Rhyacophilis (liranda)</i>	0	18	0	0.0	prd		
<i>Rhyacophilis (sibirica)</i>	4	18	8.64	1.1	prd		
<i>Rhyacophilis (vacca)</i>	0	18	0	0.0	prd		
<i>Rhyacophilis sp.</i>	0	18	0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	-		
 Pupa	0	-	0	0.0	-		
Other						46	13.2
 Annelida							
 Lumbricidae	24	- 108	51.84	6.9	c-g		
 Arachnida	0	- 108	0	0.0	prd		
 Coleoptera							
 Elmidae	4						
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g		
<i>Heterlimnius sp.</i>	1	108	2.16	0.3	c-g		
<i>Harpus sp.</i>	0	108	0	0.0	c-g		
<i>Kaitsevia sp.</i>	0	108	0	0.0	c-g		
<i>Immature</i>	2	108	4.32	0.6	c-g		
 Collombola	0	- 108	0	0.0	-		
 Diptera							
 Siphonacaridae	0						
<i>Apatanion sp.</i>	0	2	0	0.0	scr		
 Chironomidae	14	7 108	30.24	4.0	c/prd		
 Empididae	6						
<i>Oreogeton sp.</i>	0	108	0	0.0	prd		
 Simuliidae	2	6 108	4.32	0.6	c-f		
 Tabanidae	3						
<i>Antocha sp.</i>	0	24	0	0.0	prd		
<i>Pteronota sp.</i>	1	24	2.16	0.3	prd		
<i>Metatoma sp.</i>	0	36	0	0.0	prd		
<i>Tipula sp.</i>	0	36	0	0.0	shr		
 Mollusca							
 Planorbidae	0	6 108	0	0.0	scr		
 Nematoda	0	- 108	0	0.0	-		
 Turbellaria	2	6 108	4.32	0.6	prd		
Total number =	348		751.68	100.0			
Total taxa =	26						
BDI=	2.2						
BPD=	17.3						
Mean=	69.6						
TV=Tolerance Value (Hillemanoff, 1988)							
TQ=Tolerance Quotient (Winget et al., 1979)							

Appendix D. Macroinvertebrate station totals, August 1990.

	For Each Organism					Major Group		
	No.	TV	TQ	Mean	Percent	Feeding Habit	Total Number	Percent of Total
				No./m ²	of total			
Ephemeroptera							249	65.5
Beetidae	4							
<i>Baetis bicuspidatus</i>	20	72		43.2	5.3	c-g		
<i>Baetis tricaudatus</i>	2	72		4.32	0.5	c-g		
Ephemerellidae	1							
<i>Caudatella hystrix</i>	0	48		0	0.0	c-g		
<i>Drunella coloradensis</i>	7	18		15.12	1.6	scr		
<i>Drunella doddsii</i>	16	4		34.56	4.1	scr		
<i>Drunella flavolineata</i>	0	48		0	0.0	scr		
<i>Drunella spinifera</i>	0	24		0	0.0	scr		
<i>Drunella sp.</i>	5	48		10.8	1.3	scr		
<i>Serratella levis</i>	0	48		0	0.0	c-g		
<i>Serratella tibialis</i>	0	24		0	0.0	c-g		
Heptageniidae	4							
<i>Cinygma sp.</i>	56	21		120.96	14.7	scr		
<i>Epaetus sp.</i>	19	21		41.04	5.0	scr		
<i>Rhithrogena sp.</i>	116	21		250.56	30.5	c-g		
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	0	24		0	0.0	c-g		
Siphlonuridae	7							
<i>Ameletus sp.</i>	0	48		17.28	2.1	c-g	96	25.3
Plecoptera								
Cenoplectidae	1							
<i>Immature</i>	0			0	0.0	scr		
Chloroperlidae	1							
<i>Kathroperla perdita</i>	0	24		0	0.0	c-g		
<i>Sialis/Buella sp.</i>	74	24		159.84	19.5	prd		
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18		0	0.0	scr		
<i>Perileuctra sp.</i>	0	18		0	0.0	scr		
<i>Immature</i>	2	18		4.32	0.5	scr		
Nemouridae	2							
<i>Viechia cataractae</i>	1	36		2.16	0.3	scr		
<i>Zapada cinctipes</i>	0	16		0	0.0	scr		
<i>Zapada columbianae</i>	8	16		17.28	2.1	scr		
Peltoperlidae	2							
<i>Toroperla bravis</i>	4	24		8.64	1.1	scr		
Perlidae	1							
<i>Boronostoma theodora</i>	0	6		0	0.0	prd		
<i>Immature</i>	0	-		0	0.0	prd		
Perlidiidae	1							
<i>Isoperla sp.</i>	0	48		0	0.0	prd		
<i>Megarcys sp.</i>	7	24		15.12	1.8	prd		
<i>Betvens bradleyi</i>	0	48		0	0.0	prd		
<i>Immature</i>	0	-		0	0.0	prd		
Taeniopterygidae	2							
<i>Tanionemus sp.</i>	0	48		0	0.0	scr	7	1.8
Trichoptera								
Brachycentridae	1							
<i>Nicrasma sp.</i>	0	24		0	0.0	scr		
Glossosomatidae	0							
<i>Anagapetus sp.</i>	0	24		0	0.0	scr		
<i>Glossosoma sp.</i>	0	24		0	0.0	scr		
Hydropsychidae	4							
<i>Arctopsycha grandis</i>	1	18		2.16	0.3	c-f		
<i>Parapsyche elisia</i>	0	6		0	0.0	c-f		
<i>Immature</i>	0	-		0	0.0	c-f		
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18		0	0.0	scr		
Limnephilidae	4							
<i>Apatania sp.</i>	0	18		0	0.0	scr		
<i>Ecclesomyia sp.</i>	0	24		0	0.0	c-g		
<i>Moselyana sp.</i>	0	-		0	0.0	c-g		
<i>Neothremma sp.</i>	0	8		0	0.0	scr		
<i>Oligophlebodes sp.</i>	0	24		0	0.0	scr		
<i>Immature</i>	0	-		0	0.0	-		
Rhyacophilidae	0							
<i>Rhyacophilus (batteni)</i>	0	18		0	0.0	prd		
<i>Rhyacophilus (brunnnei)</i>	0	18		0	0.0	prd		
<i>Rhyacophilus (hyalinata)</i>	0	18		0	0.0	prd		
<i>Rhyacophilus (irlande)</i>	0	18		0	0.0	prd		
<i>Rhyacophilus (ibirica)</i>	1	18		2.16	0.3	prd		
<i>Rhyacophilus (vaccus)</i>	3	18		6.48	0.8	prd		
<i>Rhyacophilus sp.</i>	2	18		4.32	0.5	prd		
<i>Immature</i>	0	-		0	0.0	-		
<i>Pupa</i>	0	-		0	0.0	-		
Other							28	7.4
Annelida								
Lumbricidae	15	- 108		32.4	3.9	c-g		
Arachnida	0	- 108		0	0.0	prd		
Coleoptera								
Elmidae	4							
<i>Cleptelmis sp.</i>	0	108		0	0.0	c-g		
<i>Heterlimnius sp.</i>	0	108		0	0.0	c-g		
<i>Marpus sp.</i>	0	108		0	0.0	c-g		
<i>Taenisevia sp.</i>	0	108		0	0.0	c-g		
<i>Immature</i>	0	108		0	0.0	c-g		
Collembola	0	- 108		0	0.0	-		
Diptera								
Blephariceridae	0							
<i>Agathon sp.</i>	0	2		0	0.0	scr		
<i>Chironomidae</i>	7	7 108		15.12	1.8	c/prd		
<i>Ephydidae</i>	6							
<i>Ormosiopsis sp.</i>	0	108		0	0.0	prd		
<i>Sciaridae</i>	0	6 108		0	0.0	c-f		
<i>Tabanidae</i>	3							
<i>Anochea sp.</i>	0	24		0	0.0	prd		
<i>Dicranota sp.</i>	1	24		2.16	0.3	prd		
<i>Hexatomidae</i>	0	36		0	0.0	prd		
<i>Tipula sp.</i>	0	36		0	0.0	scr		
Mollusca								
Planorbidae	0	6 108		0	0.0	scr		
Nematoda	0	- 108		0	0.0	-		
Turbellaria	5	4 108		10.8	1.3	prd		
Total number =	380			820.8	100.0			
Total taxa =	23							
STD=	2.3							
Mean=	17.4							
TV= Tolerance Value (Hilsenhoff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	For Each Organism					Major Group		
	No.	IV	TQ	Mean No./m ²	Percent of total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							275	68.6
Baetidae	4							
<i>Baetis biceudatus</i>	36	72	77.76	9.0	c-g			
<i>Baetis tricaudatus</i>	0	72	0	0.0	c-g			
Ephemerellidae	1							
<i>Caudatella hyatrix</i>	0	48	0	0.0	c-g			
<i>Brumella coloradensis</i>	1	18	2.16	0.2	scr			
<i>Brumella doddi</i>	56	4	120.95	14.0	scr			
<i>Brumella flexilimna</i>	0	48	0	0.0	scr			
<i>Brumella spinifera</i>	0	24	0	0.0	scr			
<i>Brumella sp.</i>	0	48	0	0.0	scr			
<i>Burriatella laevia</i>	3	48	6.48	0.7	c-g			
<i>Burriatella tibialis</i>	3	24	6.48	0.7	c-g			
Heptageniidae	4							
<i>Cingpaula sp.</i>	65	21	140.4	16.2	scr			
<i>Spectrus sp.</i>	30	21	64.0	7.5	scr			
<i>Rhithrogena sp.</i>	75	21	142	16.7	c-g			
Leptophlebiidae	3							
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g			
Siphlonuridae	7							
<i>Ameletus sp.</i>	6	48	12.76	1.5	c-g	66	16.5	
Plecoptera								
Capniidae	1							
<i>Immature</i>	0		0	0.0	scr			
Chloroperlidae	1							
<i>Katoproperla perdita</i>	0	24	0	0.0	c-g			
<i>Sveltina/Suvallia sp.</i>	36	24	77.76	9.0	prd			
Cauctridae	0							
<i>Paraluctra sp.</i>	0	18	0	0.0	scr			
<i>Perlimnia sp.</i>	0	18	0	0.0	scr			
<i>Immature</i>	0	18	0	0.0	scr			
Mesoviridae	2							
<i>Visiae cataractae</i>	1	36	2.16	0.2	scr			
<i>Ispada cinctipes</i>	0	16	0	0.0	scr			
<i>Ispada columbiana</i>	12	16	25.92	3.0	scr			
Peltoperlidae	2							
<i>Toroparla brevis</i>	0	24	0	0.0	scr			
Perlidae	1							
<i>Boreoneuria theodora</i>	0	18	0	0.0	prd			
<i>Immature</i>	0	-	0	0.0	prd			
Periodidae	2							
<i>Isoperla sp.</i>	0	48	0	0.0	prd			
<i>Hegarcys sp.</i>	14	24	30.24	3.5	prd			
<i>Setevana bradleyi</i>	0	48	0	0.0	prd			
<i>Immature</i>	0	-	0	0.0	prd			
Taeniopterygidae	2							
<i>Taenionema sp.</i>	3	48	6.48	0.7	scr	15	3.7	
Trichoptera								
Brachycentridae	1							
<i>Microsesia sp.</i>	0	24	0	0.0	scr			
Glossosomatidae	0							
<i>Anagapetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae	4							
<i>Arctopeche grandis</i>	0	18	0	0.0	c-f			
<i>Parapeche elais</i>	1	6	2.16	0.2	c-f			
<i>Immature</i>	0	-	0	0.0	c-f			
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	scr			
Limnephilidae	4							
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Ecclesomyia sp.</i>	0	24	0	0.0	c-g			
<i>Moesslysia sp.</i>	0	-	0	0.0	c-g			
<i>Koethreuma sp.</i>	0	6	0	0.0	scr			
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr			
<i>Immature</i>	0	-	0	0.0	-			
Rhyacophilidae	0							
<i>Rhyacophila (batteni)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (brunnea)</i>	2	18	4.32	0.5	prd			
<i>Rhyacophila (hyalinata)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (franck)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (mibirice)</i>	9	18	19.44	2.2	prd			
<i>Rhyacophila (vacca)</i>	3	18	6.48	0.7	prd			
<i>Rhyacophila sp.</i>	0	18	0	0.0	prd			
<i>Immature</i>	0	-	0	0.0	-			
Pupa	0	-	0	0.0	-			
Other							45	11.2
Annelida								
Lumbricidae	1	- 108	2.16	0.2	c-g			
Arachnida	0	- 108	0	0.0	prd			
Coleoptera								
Kiidae	4							
<i>Cleptolemis sp.</i>	0	108	0	0.0	c-g			
<i>Heterlieinius sp.</i>	0	108	0	0.0	c-g			
<i>Neritus sp.</i>	0	108	0	0.0	c-g			
<i>Zaitzevia sp.</i>	0	108	0	0.0	c-g			
<i>Immature</i>	1	108	2.16	0.2	c-g			
Collembola	0	- 108	0	0.0	-			
Diptera								
<i>Siphonoperidae</i>	0							
<i>Agathion sp.</i>	0	2	0	0.0	scr			
<i>Chironomidae</i>	26	7 108	56.16	6.5	c/prd			
<i>Ephydidae</i>	6							
<i>Ornogiton sp.</i>	3	108	6.48	0.7	prd			
<i>Simuliidae</i>	1	6 108	2.16	0.2	c-f			
<i>Tabanidae</i>	3							
<i>Antocha sp.</i>	0	26	0	0.0	prd			
<i>Dicranota sp.</i>	9	24	19.44	2.2	prd			
<i>Hexatom sp.</i>	3	36	6.48	0.7	prd			
<i>Tipula sp.</i>	0	36	0	0.0	scr			
Mollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	1	- 108	3.16	0.2	-			
Turbellaria	0	4 108	0	0.0	prd			
Total number =	401		866.16	100.0				
Total taxa =	26							
SD1=	2.5							
STD=	14.7							
Mean=	60.2							
IV=Tolerance Value (Milnerhoff, 1988)								
TQ=Tolerance Quotient (Vingst et al., 1979)								

	For Each Organism					Major Group		
	No.	TU	TQ	Mean No./m ²	Percent of Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							387	77.2
Sialidae	4							
<i>Sialis bicaudatus</i>	69	72	149.06	13.8	c-g			
<i>Sialis tricaudatus</i>	28	72	60.46	5.6	c-g			
Ephemerellidae	1							
<i>Caudatella hystric</i>	0	48	0	0.0	c-g			
<i>Bruneella coloradensis</i>	3	18	6.48	0.4	scr			
<i>Bruneella doddi</i>	101	4	218.16	20.2	scr			
<i>Bruneella flavilimes</i>	0	48	0	0.0	scr			
<i>Bruneella spinifera</i>	1	24	2.16	0.3	scr			
<i>Bruneella sp.</i>	0	48	0	0.0	scr			
<i>Burstellella levia</i>	0	48	0	0.0	c-g			
<i>Burstellella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae	4							
<i>Cinygula sp.</i>	28	21	60.46	5.6	scr			
<i>Zwicknia sp.</i>	36	21	77.76	7.2	scr			
<i>Whithrogenia sp.</i>	117	21	252.72	23.4	c-g			
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	2	24	4.32	0.4	c-g			
Siphlonuridae	7							
<i>Amaletus sp.</i>	2	48	4.32	0.4	c-g			
Placoptera							74	14.8
Cephalidae	1							
<i>Immature</i>	0		0	0.0	shr			
Chloroperlidae	1							
<i>Kathroperla perdita</i>	0	24	0	0.0	c-g			
<i>Sialis/Suwallia sp.</i>	50	24	102	10.0	prd			
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr			
<i>Parleygia sp.</i>	0	18	0	0.0	shr			
<i>Immature</i>	1	18	2.16	0.2	shr			
Mouridae	2							
<i>Visoke cataractae</i>	0	36	0	0.0	shr			
<i>Sapada cinctipes</i>	2	16	4.32	0.4	shr			
<i>Sapada columbiana</i>	5	16	10.8	1.0	shr			
Paltoperlidae	2							
<i>Voroparia bravis</i>	0	24	0	0.0	shr			
Perlidae	1							
<i>Doroneurius theodora</i>	1	18	6.48	0.6	prd			
<i>Immature</i>	3	-	6.48	0.6	prd			
Perlodidae	2							
<i>Isoperla sp.</i>	5	48	10.8	1.0	prd			
<i>Megarcys sp.</i>	0	24	0	0.0	prd			
<i>Setebena bradleyi</i>	0	18	0	0.0	prd			
<i>Immature</i>	5	-	10.8	1.0	prd			
Taeniopterygidae	2							
<i>Taenionemus sp.</i>	0	48	0	0.0	scr			
Trichoptera							14	2.8
Brachycentridae	1							
<i>Micrasemus sp.</i>	0	24	0	0.0	shr			
Glossosomatidae	0							
<i>Anagesetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae	4							
<i>Arctopsyche grandis</i>	0	18	0	0.0	c-f			
<i>Parapsyche aleut</i>	0	6	0	0.0	c-f			
<i>Immature</i>	3	-	6.48	0.6	c-f			
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr			
Limnephilidae	4							
<i>Apertania sp.</i>	0	18	0	0.0	scr			
<i>Zecclisomyia sp.</i>	0	24	0	0.0	c-g			
<i>Modilyana sp.</i>	0	-	0	0.0	c-g			
<i>Psothrama sp.</i>	0	8	0	0.0	scr			
<i>Oligophlebodes sp.</i>	5	24	10.8	1.0	scr			
<i>Immature</i>	0	-	0	0.0	-			
Rhycophilidae	0							
<i>Rhycophilus (bettenei)</i>	0	18	0	0.0	prd			
<i>Rhycophilus (brunnescens)</i>	0	18	0	0.0	prd			
<i>Rhycophilus (hyalinate)</i>	1	18	1.16	0.2	prd			
<i>Rhycophilus (liranda)</i>	0	18	0	0.0	prd			
<i>Rhycophilus (sibirica)</i>	5	18	10.8	1.0	prd			
<i>Rhycophilus (vaccua)</i>	0	18	0	0.0	prd			
<i>Rhycophilus sp.</i>	0	18	0	0.0	prd			
<i>Immature</i>	0	-	0	0.0	-			
<i>Pupa</i>	0	-	0	0.0	-			
Other							26	5.2
Annelida								
Lumbricidae	0	-	108	0	0.0	c-g		
Arenicolidae	0	-	108	0	0.0	prd		
Arachnida								
Coleoptera								
Elmidae	4							
<i>Cleptelmis sp.</i>	3	108	6.48	0.6	c-g			
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g			
<i>Narpus sp.</i>	0	108	0	0.0	c-g			
<i>Taitzevia sp.</i>	1	108	2.16	0.2	c-g			
<i>Immature</i>	0	108	0	0.0	c-g			
Collembola	0	-	108	0	0.0	-		
Diptera								
Blephariceridae	0							
<i>Anasthon sp.</i>	0	2	0	0.0	scr			
Chironomidae	18	7	108	38.88	3.6	c/prd		
Ephydidae	0	6	0	0.0	-			
Oscinidae	0	108	0	0.0	prd			
Simuliidae	0	6	108	0	0.0	c-f		
Tephritidae	3							
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Olcronota sp.</i>	1	24	2.16	0.2	prd			
<i>Hexatomus sp.</i>	0	36	0	0.0	prd			
<i>Tipula sp.</i>	0	36	0	0.0	shr			
Mollusca								
Planorbidae	0	6	108	0	0.0	scr		
Nematoda	0	-	108	0	0.0	-		
Turbellaria	3	4	108	4.48	0.4	prd		
Total number =	501		1082.16	100.0				
Total taxa =	27							
SD=	2.3							
STD=	20.8							
Mean=	100.2							
TU=Tolerance Value (Hillemanoff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	No.	TV	TQ	For Each Organism			Major Group	
				No./m ²	Mean Percent of Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							720	63.3
Baetidae	4							
<i>Baetis bicaudatus</i>	179	72	386.66	20.5	c-g			
<i>Baetis tricaudatus</i>	164	72	356.26	18.8	c-g			
Ephemerellidae	1							
<i>Caudatella hystris</i>	15	48	32.6	1.7	c-g			
<i>Drunella coloradensis</i>	5	18	10.8	0.6	scr			
<i>Drunella doddi</i>	18	4	38.88	2.1	scr			
<i>Drunella flavidinea</i>	1	48	2.16	0.1	scr			
<i>Drunella spinifera</i>	2	24	4.32	0.2	scr			
<i>Drunella sp.</i>	0	48	0	0.0	scr			
<i>Serratella lutea</i>	0	48	0	0.0	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae	4							
<i>Cingulella sp.</i>	67	21	144.72	7.7	scr			
<i>Epeorus sp.</i>	70	21	151.2	8.0	scr			
<i>Mithrogenes sp.</i>	201	21	434.16	23.0	c-g			
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	6	24	12.96	0.7	c-g			
Siphlonuridae								
<i>Ameletus sp.</i>	0	48	0	0.0	c-g		76	6.7
Plecoptera								
Capniidae	1							
Immature	0		0	0.0	shr			
Chloroperlidae	1							
<i>Kethroparia perdita</i>	0	24	0	0.0	c-g			
<i>Sialis/Sauvillia sp.</i>	32	24	69.12	3.7	prd			
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr			
<i>Perlonyx sp.</i>	0	18	0	0.0	shr			
Immature	2	18	4.32	0.2	shr			
Membracidae	2							
<i>Viacula cataractae</i>	0	36	0	0.0	shr			
<i>Zepada cinctipes</i>	6	18	12.96	0.7	shr			
<i>Zepada columbiana</i>	18	18	38.88	2.1	shr			
Feltioperlidae	2							
<i>Yoraperla brevia</i>	0	24	0	0.0	shr			
Perlidae	1							
<i>Boreoneurus theodora</i>	4	18	8.44	0.5	prd			
Immature	1	-	2.16	0.1	prd			
Perlodidae	2							
<i>Isonychia sp.</i>	11	48	23.76	1.3	prd			
<i>Negarcyia sp.</i>	2	24	4.32	0.2	prd			
<i>Syrneches bradleyi</i>	0	48	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae	2							
<i>Taenionemus sp.</i>	0	48	0	0.0	scr		32	3.7
Trichoptera								
Brachycnemidae	1							
<i>Micrasema sp.</i>	0	24	0	0.0	shr			
Glossosomatidae	0							
<i>Anagapetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae	4							
<i>Arctopsyche grandis</i>	18	18	38.88	2.1	c-f			
<i>Parapsyche elisia</i>	0	6	0	0.0	c-f			
Immature	0	-	0	0.0	c-f			
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr			
Limnephilidae	4							
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Eccidionymus sp.</i>	0	24	0	0.0	c-g			
<i>Mostlayana sp.</i>	0	-	0	0.0	c-g			
<i>Neothremma sp.</i>	0	6	0	0.0	scr			
<i>Oligophlebiae sp.</i>	3	24	6.48	0.3	scr			
Immature	0	-	0	0.0	-			
Rhyacophilidae	0							
<i>Rhyacophila (batteni)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (brunnnea)</i>	5	18	10.8	0.6	prd			
<i>Rhyacophila (hyalinata)</i>	1	18	2.16	0.1	prd			
<i>Rhyacophila (liranda)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (sibirica)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (veccus)</i>	5	18	10.8	0.6	prd			
<i>Rhyacophila sp.</i>	0	18	0	0.0	prd			
Immature	0	-	0	0.0	-			
Pupa	0	-	0	0.0	-			
Other							38	4.3
Annelida								
Lumbricidae	1	- 108	2.16	0.1	c-g			
Arachnida	1	- 108	2.16	0.1	prd			
Coleoptera								
Elmidae	4							
<i>Cleptelmis sp.</i>	3	108	6.48	0.3	c-g			
<i>Heteriliumen sp.</i>	5	108	10.8	0.6	c-g			
<i>Harpus sp.</i>	0	108	0	0.0	c-g			
<i>Zeitkrauis sp.</i>	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Collembola	1	- 108	2.16	0.1	-			
Diptera								
Bibionidae	0							
<i>Agathon sp.</i>	0	2	0	0.0	scr			
Chironomidae	13	7 108	28.08	1.5	c/prd			
Ephydidae	5	108	0	0.0	-			
Oscinidae	0	108	0	0.0	prd			
Simuliidae	12	5 108	25.92	1.4	c-f			
Tabanidae	3							
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	0	24	0	0.0	prd			
<i>Haematoma sp.</i>	1	36	2.16	0.1	prd			
<i>Tipula sp.</i>	0	36	0	0.0	shr			
Mollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	0	- 108	0	0.0	-			
Turbellaria	1	4 108	2.16	0.1	prd			
Total number =	874		1867.84	100.0				
Total taxa =	33							
SD=	2.3							
STD=	37.5							
Mean=	174.6							
TV=Tolerance Value (Kilzenoff, 1986)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	No.	TV	TO	For Each Organism			Major Group	
				Mean No./m ²	Percent of total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							189	63.1
Baetidae			4					
<i>Baetis bicaudatus</i>	14	22	30.24	5.2	c-g			
<i>Baetis tricaudatus</i>	13	22	28.08	4.7	c-g			
Ephemerellidae			1					
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g			
<i>Drunella doloradensis</i>	2	18	4.32	0.7	scr			
<i>Drunella doddsi</i>	23	4	49.68	8.6	scr			
<i>Drunella flavilimna</i>	1	48	2.16	0.4	scr			
<i>Drunella spinifera</i>	4	24	8.64	1.5	scr			
<i>Drunella sp.</i>	0	48	0	0.0	scr			
<i>Serratella loria</i>	0	48	0	0.0	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae			4					
<i>Cinygma sp.</i>	72	21	155.52	26.9	scr			
<i>Esoorus sp.</i>	15	21	32.4	5.6	scr			
<i>Rhithrogena sp.</i>	17	21	36.72	6.3	c-g			
Leptophlebiidae			2					
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g			
Siphlonuridae			7					
<i>Ameletus sp.</i>	8	48	17.28	3.0	c-g		16	17.2
Plecoptera								
Capniidae			1					
Immature	0		0	0.0	shb			
Chloroperlidae			1					
<i>Kathroparia pardita</i>	0	24	0	0.0	c-g			
<i>Sweltsa/muvelite sp.</i>	32	24	69.12	11.9	prd			
Leuctridae			0					
<i>Paraleuctra sp.</i>	0	18	0	0.0	shb			
<i>Perlaonyia sp.</i>	0	18	0	0.0	shb			
Immature	5	18	10.8	1.9	shb			
Nemouridae			2					
<i>Vinacka cataractae</i>	1	36	2.16	0.4	shb			
<i>Zapada cinctipes</i>	1	16	2.16	0.4	shb			
<i>Zapada columbiana</i>	2	16	4.32	0.7	shb			
Peltoperlidae			2					
<i>Vorasperla brevis</i>	0	24	0	0.0	shb			
Perlidae			1					
<i>Doronuriia theodora</i>	3	18	6.48	1.1	prd			
Immature	1	-	2.16	0.4	prd			
Periodidae			2					
<i>Isonychia sp.</i>	0	48	0	0.0	prd			
<i>Macrocyclops sp.</i>	1	24	2.16	0.4	prd			
<i>Satvana bradleyi</i>	0	48	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae			2					
<i>Taenionema sp.</i>	0	48	0	0.0	scr		20	7.3
Trichoptera								
Brachycentridae			1					
<i>Micrasemus sp.</i>	0	24	0	0.0	shb			
Glossosomatidae			0					
<i>Hesgepetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae			4					
<i>Arctopsyche grandis</i>	5	18	10.8	1.9	c-f			
<i>Parapsyche elisia</i>	0	6	0	0.0	c-f			
Immature	1	-	2.16	0.4	c-f			
Lepidostomatidae			1					
<i>Lepidostoma sp.</i>	0	18	0	0.0	shb			
Limnephilidae			4					
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Exclisisoma sp.</i>	0	24	0	0.0	c-g			
<i>Moselyana sp.</i>	0	-	0	0.0	c-g			
<i>Scuthecaena sp.</i>	0	8	0	0.0	scr			
<i>Oligophlebodes sp.</i>	6	24	12.96	2.2	scr			
Immature	0	-	0	0.0	-			
Pupa	1	-	2.16	0.4	-			
Other							33	12.3
Annelida								
Lumbricidae	0	-	108	0	0.0	c-g		
Arachnida			0	-	108	0	0.0	prd
Coleoptera								
Elmidae			4					
<i>Cleptelmis sp.</i>	4	108	8.64	1.5	c-g			
<i>Heterlimnius sp.</i>	1	108	2.16	0.4	c-g			
<i>Meropus sp.</i>	0	108	0	0.0	c-g			
<i>Saitzevia sp.</i>	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Culicidae	0	-	108	0	0.0	-		
Diptera								
Elephantomyidae			0					
<i>Agathon sp.</i>	0	2	0	0.0	scr			
Chironomidae	15	7 108	32.4	5.6	c/prd			
Empididae			6					
<i>Oreogoton sp.</i>	0	108	0	0.0	prd			
Sisulidae	1	6 108	2.16	0.4	c-f			
Tiphidae			3					
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	0	24	0	0.0	prd			
<i>Hesotoma sp.</i>	1	36	2.16	0.4	prd			
<i>Tipula sp.</i>	0	36	0	0.0	shb			
Mollusca								
Planorbidae			0	6 108	0	0.0	scr	
Nematoda			0	-	108	0	0.0	-
Turbellaria	11	4 108	23.76	4.1	prd			
Total number =		268	578.88	100.0				
Total taxa =		30						
SD=		2.7						
STD=		10.0						
Mean=		53.6						
TV=Tolerance Value (Milneroff, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	No.	TV	TQ	For Each Organism			Major Group	
				No./% of Total	Percent	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							397	77.7
Baetidae	4							
<i>Baetis bicaudatus</i>	60	72	146.88	13.3	0.0	c-g		
<i>Baetis tricaudatus</i>	30	72	64.8	5.9	0.0	c-g		
Ephemerellidae	1							
<i>Caudatella hystris</i>	0	48	0	0.0	0.0	c-g		
<i>Drunella coloradensis</i>	1	18	3.16	0.2	scr			
<i>Drunella doddsi</i>	119	4	257.04	23.3	scr			
<i>Drunella flavillina</i>	1	48	2.16	0.2	scr			
<i>Drunella spinifera</i>	0	24	0	0.0	scr			
<i>Drunella sp.</i>	0	48	0	0.0	scr			
<i>Harratella lewis</i>	0	48	0	0.0	c-g			
<i>Harratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae	4							
<i>Cinygmulia sp.</i>	20	21	43.2	3.9	scr			
<i>Speorus sp.</i>	98	21	215.68	19.2	scr			
<i>Thithrogena sp.</i>	60	21	129.6	11.7	c-g			
Leptophlebiidae	2							
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g			
Diploconuridae	7							
<i>Aeschnetum sp.</i>	0	48	0	0.0	c-g		68	13.3
Plecoptera								
Capniidae	1							
Immature	0		0	0.0	shb			
Chloroperlidae	1							
<i>Kathroperla perdita</i>	0	24	0	0.0	c-g			
<i>Sialis/Suwelli sp.</i>	10	24	21.6	2.0	prd			
Leuctridae	0							
<i>Paraleuctra sp.</i>	0	18	0	0.0	shb			
<i>Perlonia sp.</i>	0	18	0	0.0	shb			
Immature	2	18	4.32	0.4	shb			
Mesouridae	2							
<i>Vinacka catactes</i>	6	36	12.96	1.2	shb			
<i>Zapada cinctipes</i>	0	16	0	0.0	shb			
<i>Zapada columbiana</i>	43	16	92.68	8.4	shb			
Peltoperlidae	2							
<i>Vorasperla brevula</i>	2	24	6.32	0.4	shb			
Perlidae	1							
<i>Doroneuria theodora</i>	3	18	6.48	0.6	prd			
Immature	1	-	2.16	0.2	prd			
Perlidiidae	2							
<i>Isoneris sp.</i>	0	48	0	0.0	prd			
<i>Neoparceps sp.</i>	1	24	2.16	0.2	prd			
<i>Setevana bradleyi</i>	0	48	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae	2							
<i>Taenionemaa sp.</i>	0	48	0	0.0	scr		19	3.7
Trichoptera								
Brachycentridae	1							
<i>Micrasema sp.</i>	0	24	0	0.0	shb			
Glossosomatidae	0							
<i>Anagapetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	4	24	8.64	0.8	scr			
Hydropsychidae	4							
<i>Arctopepschya grandis</i>	11	18	23.76	2.2	c-f			
<i>Persepepschya visiae</i>	0	6	0	0.0	c-f			
Immature	0	-	0	0.0	c-f			
Lepidozosteridae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	shb			
Limnephilidae	4							
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Ecclesomyia sp.</i>	0	24	0	0.0	c-g			
<i>Moerisiana sp.</i>	0	-	0	0.0	c-g			
<i>Neothremma sp.</i>	0	8	0	0.0	scr			
<i>Oligophobetes sp.</i>	0	24	0	0.0	scr			
Immature	0	-	0	0.0	-			
Pupa	0							
Other							27	5.3
Annelida								
Lumbricidae	0	- 108	0	0.0	c-g			
Arachnida	0	- 108	0	0.0	prd			
Coleoptera								
Cleidae	6							
<i>Cleptalmus sp.</i>	0	108	0	0.0	c-g			
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g			
<i>Kerpus sp.</i>	0	108	0	0.0	c-g			
<i>Taeniorhynchus sp.</i>	1	108	2.16	0.2	c-g			
Immature	0	108	0	0.0	c-g			
Collemboidea	0	- 108	0	0.0	-			
Diptera								
Acalyptratae	0							
Aleyrodiidae	0							
<i>Aphytton sp.</i>	0	2	0	0.0	scr			
Chironomidae	25	7 108	54	4.9	c/prd			
Empididae	6							
Oscinellidae	0	108	0	0.0	prd			
Sialidae	0	6 108	0	0.0	c-f			
Tabanidae	3							
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	0	24	0	0.0	prd			
<i>Heratoneura sp.</i>	0	36	0	0.0	prd			
<i>Tipula sp.</i>	0	36	0	0.0	shb			
Mollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	0	- 108	0	0.0	-			
Turbellaria	1	4 108	2.16	0.2	prd			
Total number =	511		1103.74	100.0				
Total Taxis =	24							
SD1=	3.3							
STD=	21.2							
Mean=	102.2							
TVs Tolerance Value (Williamson, 1988)								
TQ=Tolerance Quotient (Winget et al., 1979)								

Appendix E. Macroinvertebrate station totals, October 1990.

	No.	TV	TQ	For Each Organism			Major Group	
				No./m ²	Percent of Total	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							197	74.9
Beetidae	4							
<i>Beetia bicaudatus</i>	38	72	82.08	14.4	c-g			
<i>Beetia tricaudatus</i>	0	72	0	0.0	c-g			
Ephemerellidae	1							
<i>Caudatella hystris</i>	0	48	0	0.0	c-g			
<i>Brunella coloradensis</i>	0	16	0	0.0	scr			
<i>Brunella doddsii</i>	2	4	4.21	0.0	scr			
<i>Brunella flavilinea</i>	0	48	0	0.0	scr			
<i>Brunella spinifera</i>	0	24	0	0.0	scr			
<i>Brunella sp.</i>	0	48	0	0.0	scr			
<i>Serratella loriai</i>	0	48	0	0.0	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae	4							
<i>Cinygma sp.</i>	114	21	246.24	43.3	scr			
<i>Epsorus sp.</i>	1	21	2.16	0.4	scr			
<i>Rhithrogena sp.</i>	20	21	43.2	7.6	c-g			
Leptophlebiidae	2							
<i>Paraluctophlebia sp.</i>	0	24	0	0.0	c-g			
Miphonuridae	7							
<i>Maeletus sp.</i>	22	68	47.52	8.4	c-g		39	14.8
Flecoptera								
Capniidae	1							
Immature	0		0	0.0	shr			
Chloroperlidae	1							
<i>Xanthoperla perdita</i>	0	24	0	0.0	c-g			
<i>Suevitas/Suevallis sp.</i>	18	24	38.88	6.8	prd			
Leuctridae	0							
<i>Paraleuctre sp.</i>	0	18	0	0.0	shr			
<i>Perlospioya sp.</i>	0	18	0	0.0	shr			
Immature	2	18	4.32	0.8	shr			
Mesouridae	2							
<i>Viacka cataractae</i>	4	36	8.64	1.5	shr			
<i>Repda cinctipes</i>	0	16	0	0.0	shr			
<i>Repda columbiana</i>	11	16	23.76	4.2	shr			
Peltoperlidae								
<i>Yoroparia brevis</i>	1	24	2.16	0.4	shr			
Perlidae	1							
<i>Doroneurius theodora</i>	0	18	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Perlodidae	2							
<i>Isoperla sp.</i>	1	48	2.16	0.4	prd			
<i>Hegarcyta sp.</i>	1	24	2.16	0.4	prd			
<i>Setevans bradleyi</i>	1	48	2.16	0.4	prd			
Immature	0	-	0	0.0	prd			
<i>Taeniopterygidae</i>	1							
<i>Taenionemus sp.</i>	0	48	0	0.0	scr		14	5.3
Trichoptera								
Brachycentridae	1							
<i>Micrasemus sp.</i>	0	24	0	0.0	shr			
Glossosomatidae	0							
<i>Anagapetus sp.</i>	0	24	0	0.0	scr			
<i>Glossosoma sp.</i>	0	24	0	0.0	scr			
Hydropsychidae	4							
<i>Actiopsycha grandis</i>	1	18	2.16	0.4	c-f			
<i>parapsyche elisia</i>	0	6	0	0.0	c-f			
Immature	2	-	4.32	0.8	c-f			
Lepidostomatidae	1							
<i>Lepidostoma sp.</i>	0	18	0	0.0	shr			
Lisnephilidae	4							
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Eccidomyia sp.</i>	1	24	2.16	0.4	c-g			
<i>Nasicyana sp.</i>	1	-	2.16	0.4	c-g			
<i>Neothremma sp.</i>	3	8	6.48	1.1	scr			
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr			
Immature	1	-	2.16	0.4	-			
Rhyacophilidae	0							
<i>Rhyacophila (batteni)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (brunnescens)</i>	1	18	2.16	0.4	prd			
<i>Rhyacophila (halinata)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (liranda)</i>	0	18	0	0.0	prd			
<i>Rhyacophila (sibirica)</i>	1	18	2.16	0.4	prd			
<i>Rhyacophila (vecacea)</i>	3	18	6.48	1.1	prd			
<i>Rhyacophila sp.</i>	0	18	0	0.0	prd			
Immature	0	-	0	0.0	-			
Pupa	0	-	0	0.0	-			
Other							13	4.9
Annelida								
Lumbricidae	5	- 108	10.8	1.9	c-g			
Arachnida	0	- 108	0	0.0	prd			
Coleoptera								
Elmidae	4							
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g			
<i>Heterelmis sp.</i>	0	108	0	0.0	c-g			
<i>Marpus sp.</i>	0	108	0	0.0	c-g			
<i>Zaitzevia sp.</i>	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Collembola	0	- 108	0	0.0	-			
Diptera								
Elephastomidae	0							
<i>Agathon sp.</i>	0	2	0	0.0	scr			
<i>Chironomidae</i>	5	7 108	10.8	1.9	c/prd			
Empididae	6							
<i>Oscrogeton sp.</i>	0	108	0	0.0	prd			
Sialidae	0	6 108	0	0.0	c-f			
Tephritidae	3							
<i>Antocha sp.</i>	0	.24	0	0.0	prd			
<i>Dicranota sp.</i>	1	.24	2.16	0.4	prd			
<i>Nezotoma sp.</i>	0	.36	0	0.0	prd			
<i>Tipula sp.</i>	0	.36	0	0.0	shr			
Hollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	0	- 108	0	0.0	-			
Turbellaria	2	4 108	4.32	0.8	prd			

Total number = 263 Mean = 568.08 SD = 100.0

Total taxa = 27 STD = 14.4

Mean = 52.8 TV = Tolerance Value (Hilsmanoff, 1988)

TQ = Tolerance Quotient (Winget et al., 1979)

	For Each Organism					Major Group	
	No.	TV	TQ	Mean	Percent	Feeding	Total
				No./m ²	of Total		
Ephemeroptera							264
Sialidae	4						46.2
<i>Sialis biocaudata</i>	25	72	54	4.2	c-g		
<i>Sialis tricaudata</i>	0	72	0	0.0	c-g		
Ephemerellidae	1						
<i>Caudatella hystris</i>	0	48	0	0.0	c-g		
<i>Bruneella coloradensis</i>	0	18	0	0.0	scr		
<i>Bruneella doddi</i>	7	8	15.12	1.2	scr		
<i>Bruneella flavilinna</i>	6	48	17.28	1.4	scr		
<i>Bruneella spinifera</i>	1	24	2.16	0.2	scr		
<i>Bruneella sp.</i>	0	48	0	0.0	scr		
<i>Serratella lavis</i>	0	18	0	0.0	c-g		
<i>Serratella tibialis</i>	0	24	0	0.0	c-g		
Heptageniidae	4						
<i>Cinygma sp.</i>	193	21	416.88	32.8	scr		
<i>Epeorus sp.</i>	0	21	0	0.0	scr		
<i>Bithrognathus sp.</i>	22	21	47.52	3.7	c-g		
Leptophlebiidae	2						
<i>Paraleptophlebia sp.</i>	1	24	2.16	0.2	c-g		
Biphlorenidae	7						
<i>Analestes sp.</i>	27	48	58.32	4.6	c-g		
Plecoptera							216
Cenopidae	1						36.7
Imature	0		0	0.0	shr		
Chloroperlidae	1						
<i>Kethroperla perdita</i>	0	24	0	0.0	c-g		
<i>Sialis/Buania sp.</i>	31	24	66.96	5.3	prd		
Leuctridae	0						
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr		
<i>Parleylla sp.</i>	0	18	0	0.0	shr		
<i>Immature</i>	3	18	6.48	0.3	shr		
Nemouridae	2						
<i>Viechia cataractae</i>	4	36	8.64	0.7	shr		
<i>Zapada cinctipes</i>	7	16	15.12	1.2	shr		
<i>Zapada columbiensis</i>	9	16	19.44	1.5	shr		
Peltoperlidae	2						
<i>Tropaperla brevis</i>	1	24	2.16	0.2	shr		
Perlidae	1						
<i>Boromorpha theodora</i>	3	18	6.48	0.3	prd		
<i>Immature</i>	0	-	0	0.0	prd		
Perlodidae	2						
<i>Isoperla sp.</i>	0	48	0	0.0	prd		
<i>Megarcys sp.</i>	1	24	2.16	0.2	prd		
<i>Setsvana bradleyi</i>	0	48	0	0.0	prd		
<i>Immature</i>	3	-	6.48	0.3	prd		
Taeniopterygidae	2						
<i>Taenionema sp.</i>	154	48	332.64	26.1	scr		
Trichoptera							30
Brachycentridae	1						5.1
<i>Microsissa sp.</i>	0	24	0	0.0	shr		
Glossosomatidae	0						
<i>Anagapetus sp.</i>	0	24	0	0.0	scr		
<i>Oligosoma sp.</i>	2	24	4.32	0.3	scr		
Hydropsychidae	4						
<i>Arctoperys grandis</i>	4	18	8.64	0.7	c-f		
<i>Paraperys elisia</i>	0	6	0	0.0	c-f		
<i>Immature</i>	1	-	4.32	0.3	c-f		
Lepidostomatidae	1						
<i>Lepidostoma sp.</i>	9	18	19.44	1.5	shr		
Limnephilidae	4						
<i>Apatania sp.</i>	0	18	0	0.0	scr		
<i>Eccidomyia sp.</i>	0	24	0	0.0	c-g		
<i>Monelytra sp.</i>	0	-	0	0.0	c-g		
<i>Neothrauma sp.</i>	0	8	0	0.0	scr		
<i>Oligophlebodes sp.</i>	1	24	2.16	0.2	scr		
<i>Immature</i>	1	-	2.16	0.2	-		
Rhycophilidae	0						
<i>Rhyacophilus (batteni)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (brunnescens)</i>	0	18	0	0.0	prd		
<i>Rhyacophilus (hyalinata)</i>	3	28	6.48	0.5	prd		
<i>Rhyacophilus (liranda)</i>	1	18	2.16	0.2	prd		
<i>Rhyacophilus (sibirica)</i>	6	18	12.96	1.0	prd		
<i>Rhyacophilus (vaccus)</i>	1	18	2.16	0.2	prd		
<i>Rhyacophilus sp.</i>	0	18	0	0.0	prd		
<i>Immature</i>	0	-	0	0.0	-		
<i>Pupa</i>	0	-	0	0.0	-		
Other							59
Annelida							10.0
<i>Lumbricidae</i>	0	-	108	0	0.0	c-g	
Arachnida	0	-	108	0	0.0	prd	
Coleoptera							
Elmidae	4						
<i>Cleptelmis sp.</i>	2	108	4.32	0.3	c-g		
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g		
<i>Marpus sp.</i>	0	108	0	0.0	c-g		
<i>Zaitzevia sp.</i>	0	108	0	0.0	c-g		
Immature	1	108	2.16	0.2	c-g		
Collembola	1	-	108	2.16	0.2	-	
Diptera							
Blephariceridae	0						
<i>Agythia sp.</i>	0	2	0	0.0	scr		
Chironomidae	24	7	108	51.84	6.1	c/prd	
Empididae	6						
<i>Oreogaster sp.</i>	11	108	23.76	1.9	prd		
Sialidae	0	6	108	0	0.0	c-f	
Tipulidae	3						
<i>Antocha sp.</i>	0	28	0	0.0	prd		
<i>Dicranota sp.</i>	19	24	41.04	3.1	prd		
<i>Hexatom sp.</i>	0	36	0	0.0	prd		
<i>Tipula sp.</i>	1	36	2.16	0.2	scr		
Mollusca							
Planorbidae	0	6	108	0	0.0	scr	
Nematoda	0	-	108	0	0.0	-	
Turbellaria	0	4	108	0	0.0	prd	
Total number =	589		1272.24	100.0			
Total taxa =	35						
SDI=	2.3						
STD=	29.0						
Mean=	117.8						
TV= Tolerance Value (Hilsenhoff, 1988)							
TQ=Tolerance Quotient (Winget et al., 1979)							

	No.	TV	TQ	For Each Organism			Major Group	
				Mean No./m ²	Percent of Total	Feeding Habit	Total	Percent of Total
Ephemeroptera							411	54.4
Beetidae			4					
Baeotis bicaudatus	76	72	144.16	10.1	c-g			
Baeotis tricuspidatus	0	72	0	0.0	c-g			
Ephemerellidae		1						
Caudatella hystrix	0	16	0	0.0	c-g			
Brunnella coloradensis	0	16	0	0.0	scr			
Brunnella doddi	21	4	45.36	3.8	scr			
Brunnella flavilimes	1	48	2.16	0.1	scr			
Brunnella spinifera	2	24	4.32	0.3	scr			
Brunnella sp.	1	16	2.16	0.1	scr			
Serrataella levis	0	16	0	0.0	c-g			
Serrataella tibialis	0	24	0	0.0	c-g			
Heptageniidae		4						
Cinygmulia sp.	263	21	568.08	34.8	scr			
Epaore sp.	0	21	0	0.0	scr			
Whithrogenia sp.	38	21	82.08	5.0	c-g			
Leptophlebiidae		2						
Paraleptophlebia sp.	0	24	0	0.0	c-g			
Siphlonuridae		7						
Amelitus sp.	9	48	19.44	1.2	c-g			
Plecoptera							287	38.0
Capniidae		1						
Imature	4		8.64	0.5	scr			
Chloroperlidae		1						
Bathroperla perdita	0	24	0	0.0	c-g			
Sweltsa/Suwallia sp.	59	24	127.44	7.8	prd			
Leuctridae		0						
Paraleuctra sp.	0	18	0	0.0	scr			
Parlongvia sp.	1	18	2.16	0.1	scr			
Immature	0	18	0	0.0	scr			
Nemouridae		2						
Viacka cataractae	5	36	10.8	0.7	scr			
Zapada cinctipes	1	16	2.16	0.1	scr			
Zapada columbiana	2	16	4.32	0.3	scr			
Palopteridae		2						
Yoraperla brevis	0	24	0	0.0	scr			
Perlidae		1						
Doroneurius theodora	3	24	8.48	0.4	prd			
Immature	4	-	8.64	0.5	prd			
Perlodidae		2						
Isoperla sp.	3	48	6.48	0.4	prd			
Meyercyra sp.	2	24	4.32	0.3	prd			
Setodes bradleyi	1	48	2.16	0.1	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae		2						
Taenionema sp.	202	48	436.32	26.8	scr			
Trichoptera							44	5.8
Brachyceridae		1						
Micrasemus sp.	0	24	0	0.0	scr			
Glossosomatidae		0						
Anagastus sp.	0	24	0	0.0	scr			
Glossosoma sp.	18	24	18.08	2.4	scr			
Hydropsychidae		4						
Arctopsycha grandis	5	18	10.8	0.7	c-f			
Perapsycha elata	0	6	0	0.0	c-f			
Immature	0	-	0	0.0	c-f			
Lepidostomatidae		1						
Lepidozostoma sp.	0	18	0	0.0	scr			
Limnephilidae		4						
Apatenia sp.	0	18	0	0.0	scr			
Ecclisomyia sp.	2	24	4.32	0.3	c-g			
Moseleyana sp.	0	-	0	0.0	c-g			
Neothremma sp.	0	6	0	0.0	scr			
Oligoglyphebodus sp.	5	24	10.8	0.7	scr			
Immature	10	-	21.6	1.1	-			
Rhyscophilidae		0						
Rhyscophila (bettenei)	0	18	0	0.0	prd			
Rhyscophila (brunnescens)	0	18	0	0.0	prd			
Rhyscophila (hyalinata)	0	18	0	0.0	prd			
Rhyscophila (franckei)	1	18	2.16	0.1	prd			
Rhyscophila (albirufa)	0	18	0	0.0	prd			
Rhyscophila (vaccaea)	3	18	6.48	0.4	prd			
Rhyscophila sp.	0	18	0	0.0	prd			
Immature	0	-	0	0.0	-			
Pupa	0	-	0	0.0	-			
Other							13	1.7
Annelids								
Lumbricidae	0	- 108	0	0.0	c-g			
Arachnids		0	- 108	0	0.0	prd		
Coleoptera								
Elmidae		4						
Cleptelmis sp.	5	108	10.8	0.7	c-g			
Meterianus sp.	1	108	2.16	0.1	c-g			
Marpus sp.	0	108	0	0.0	c-g			
Zaitzevia sp.	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Collombidae		0	- 108	0	0.0	-		
Diptera								
Sphaeroceridae		0						
Agathon sp.	0	2	0	0.0	scr			
Chironomidae	2	7 108	4.32	0.3	c/prd			
Empididae		6						
Oreoceton sp.	1	108	2.16	0.1	prd			
Staullidae	0	6 108	0	0.0	c-f			
Tipulidae		1						
Antocha sp.	0	26	0	0.0	prd			
Dicranota sp.	2	24	4.32	0.3	prd			
Mesatona sp.	1	36	2.16	0.1	prd			
Tipula sp.	0	36	0	0.0	scr			
Mollusca								
Planorbidae		6 108	0	0.0	scr			
Nematoda		0	- 108	0	0.0	-		
Turbellaria		1	4 108	2.16	0.1	prd		
	Total number =	755	1630.8	100.0				
	Total taxa =	34						
	SDT=	2.0						
	STDs	39.8						
	Means	151.0						
	TV= Tolerance Value (Millsenoff, 1980)							
	TQ=Tolerance Quotient (Winget et al., 1979)							

	No.	TV	TQ	For Each Organism			Major Group	
				No./s'2	Percent	Feeding Habit	Total Number	Percent of Total
Ephemeroptera							784	73.7
Suctidae			4					
Suctis bicuspidatus	68	72	190.06	8.3	c-g			
Suctis tricuspidatus	9	72	19.44	0.8	c-g			
Ephemerellidae			1					
Ephemerella hystricis	2	48	4.32	0.2	c-g			
Brunneella coloradensis	0	18	0	0.0	scr			
Brunneella doddi	22	4	47.52	1.1	scr			
Brunneella flavolineata	52	48	112.32	4.9	scr			
Brunneella spinifera	1	24	2.16	0.1	scr			
Brunneella sp.	0	48	0	0.0	scr			
Serratella laevia	0	48	0	0.0	scr			
Serratella tibialis	0	24	0	0.0	c-g			
Heptageniidae			4					
Cinygmaea sp.	519	21	1121.04	48.8	scr			
Epeorus sp.	0	21	0	0.0	scr			
Rhithrogena sp.	88	21	190.08	8.3	c-g			
Leptophlebiidae			2					
Perleptophlebia sp.	2	24	4.32	0.2	c-g			
Biphionuridae			7					
Amietta sp.	1	48	2.16	0.1	c-g			
Plecoptera							194	18.2
Capniidae			1					
Immature	2	-	4.32	0.2	scr			
Chloroperlidae			1					
Kethroperla perdita	0	24	0	0.0	c-g			
Sweltsa/Suwallia sp.	56	24	120.96	5.3	prd			
Leuctridae			0					
Paraleuctra sp.	0	18	0	0.0	scr			
Perleuctra sp.	0	18	0	0.0	scr			
Immature	3	18	6.48	0.3	scr			
Membracidae			2					
Visoka cataractae	0	36	0	0.0	scr			
Zapada cinctipes	7	16	15.12	0.7	scr			
Zapada columbiana	2	16	4.32	0.2	scr			
Peltoperlidae			2					
Voraperla brevis	1	24	2.16	0.1	scr			
Perlidae			1					
Dorconuria theodora	3	24	6.48	0.3	prd			
Immature	0	-	0	0.0	prd			
Perlodidae			2					
Isoperla sp.	5	48	10.8	0.5	prd			
Megarcys sp.	1	24	6.48	0.3	prd			
Setodes bradleyi	0	48	0	0.0	prd			
Immature	0	-	0	0.0	prd			
Taeniopterygidae			2					
Taenionemus sp.	112	48	241.92	10.5	scr			
Trichoptera							63	5.9
Brachycentridae			1					
Micrasema sp.	2	24	4.32	0.2	scr			
Glossosomatidae			0					
Anagapetus sp.	0	24	0	0.0	scr			
Glossosoma sp.	0	24	0	0.0	scr			
Hydropsychidae			4					
Arctopasche grandis	18	18	36.88	1.7	c-f			
Parapsche elisia	0	6	0	0.0	c-f			
Immature	0	-	0	0.0	c-f			
Lepidostomatidae			1					
Lepidostoma sp.	0	18	0	0.0	scr			
Limnephilidae			4					
Apatania sp.	4	18	8.64	0.4	scr			
Ecclisomyia sp.	1	24	2.16	0.1	c-g			
Mosselyana sp.	0	-	0	0.0	c-g			
Nothremna sp.	0	8	0	0.0	scr			
Oligophlebodes sp.	27	24	58.32	2.5	scr			
Immature	3	-	6.48	0.3	-			
Rhyacophilidae			0					
Rhyacophilus (battani)	0	18	0	0.0	prd			
Rhyacophilus (brunneal)	0	18	0	0.0	prd			
Rhyacophilus (hyalinata)	0	18	0	0.0	prd			
Rhyacophilus (irlande)	0	18	0	0.0	prd			
Rhyacophilus (sibirica)	0	18	0	0.0	prd			
Rhyacophilus (vacca)	8	18	17.28	0.8	prd			
Rhyacophilus sp.	0	18	0	0.0	prd			
Immature	0	-	0	0.0	-			
Pupa			0					
Other							23	2.2
Annelida								
Lumbricidae	4	- 108	8.64	0.4	c-g			
Arachnida	0	- 108	0	0.0	prd			
Coleoptera			:					
Elmidae			4					
Cleptelmis sp.	0	108	0	0.0	c-g			
Heterelmis sp.	9	108	19.44	0.8	c-g			
Marpus sp.	1	108	2.16	0.1	c-g			
Zaitzevia sp.	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Collembola	0	- 108	0	0.0	-			
Diptera								
Sphaericeridae			0					
Agathon sp.	0	2	0	0.0	scr			
Chironomidae	3	7 108	6.68	0.3	c/prd			
Empididae			6					
Ornatostylum sp.	0	108	0	0.0	prd			
Sciuliidae	0	6 108	0	0.0	c-f			
Tipulidae			3					
Antocha sp.	1	24	2.16	0.1	prd			
Dicranota sp.	0	- 24	0	0.0	prd			
Neotanysa sp.	4	36	8.64	0.4	prd			
Tipula sp.	0	36	0	0.0	scr			
Mollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	0	- 108	0	0.0	-			
Turbellaria	1	4 108	2.16	0.1	prd			
	total number =	1066	2298.24	100.0				
	total taxa =	34						
	API=	2.0						
	STD=	83.6						
	Mean*	212.8						
	TV=Tolerance Value (Milneroff, 1988)							
	TQ=Tolerance Quotient (Winget et al., 1979)							

	No.	IV	TQ	For Each Organism			Major Group	
				Mean No./m ²	Percent of Total	Feeding Habit	Total	Percent
							Number	of Total
Ephemeroptera							283	50.5
Sialidae	4							
Baetis bicaudatus	75	72		162	13.4	c-g		
Baetis tricaudatus	0	72		0	0.0	c-g		
Ephemerellidae	1							
Caudatella hystrix	0	48		0	0.0	c-g		
Drunella coloradensis	0	18		0	0.0	scr		
Drunella doddi	21	4		45.36	3.6	scr		
Drunella fuscilineata	0	48		0	0.0	scr		
Drunella spinifera	1	24		2.16	0.2	scr		
Drunella sp.	0	48		0	0.0	scr		
Serratella levata	0	48		0	0.0	c-g		
Serratella tibialis	0	24		0	0.0	c-g		
Heptageniidae	4							
Cinygmulia sp.	138	21		298.08	24.6	scr		
Speorus sp.	0	21		0	0.0	scr		
Athyrogone sp.	39	21		84.24	7.0	c-g		
Leptophlebiidae	2							
Paraleptophlebia sp.	0	24		0	0.0	c-g		
Highlonuridae	7							
Amelitus sp.	9	48		19.44	1.6	c-g	248	44.3
Plecoptera								
Capniidae	1							
Imature	13			28.08	2.3	shr		
Chloroperlidae		1						
Kathroperla perdita	0	24		0	0.0	c-g		
Maltesa/Suwallia sp.	41	24		88.56	7.3	prd		
Leuctridae	0							
Paraleuctra sp.	0	18		0	0.0	shr		
Perleucyle sp.	4	18		6.64	0.7	shr		
Immature	0	18		0	0.0	shr		
Nemouridae	2							
Visoka cataractae	1	36		2.16	0.2	shr		
Isopoda cinctipes	0	16		0	0.0	shr		
Isopoda columbiana	0	16		0	0.0	shr		
Peltoperlidae	2							
Yoraperla brevis	0	24		0	0.0	shr		
Perlidae	1							
Barombia theodore	0	24		0	0.0	prd		
Immature	1	-		2.16	0.1	prd		
Perlodidae	2							
Isoperla sp.	0	48		0	0.0	prd		
Megarcys sp.	1	24		2.16	0.2	prd		
Setwangia bradleyi	0	48		0	0.0	prd		
Immature	1	-		2.16	0.2	prd		
Taeniopterygidae	2							
Taenionema sp.	186	48		401.76	33.2	scr	16	2.9
Trichoptera								
Brachycentridae	1							
Micrasemma sp.	0	24		0	0.0	shr		
Glossosomatidae	0							
Anagapetus sp.	0	24		0	0.0	scr		
Glossosoma sp.	1	24		2.16	0.2	scr		
Hydropsychidae	4							
Arctopsycha grandis	5	18		10.8	0.9	c-f		
Parapsycha elisia	0	6		0	0.0	c-f		
Immature	0	-		0	0.0	c-f		
Lepidostomatidae	1							
Lepidostoma sp.	0	18		0	0.0	shr		
Limnephilidae	4							
Apatenia sp.	0	18		0	0.0	scr		
Ecclisomyia sp.	0	24		0	0.0	c-g		
Hesolytia sp.	0	-		0	0.0	c-g		
Neothremma sp.	0	8		0	0.0	scr		
Oligophlebiodes sp.	0	24		0	0.0	scr		
Immature	0	-		0	0.0	-		
Rhyacophilidae	0							
Rhyacophila (betti) (betti)	0	18		0	0.0	prd		
Rhyacophila (brunnescens)	0	18		0	0.0	prd		
Rhyacophila (hyalinata)	2	18		4.32	0.4	prd		
Rhyacophila (iranda)	0	18		0	0.0	prd		
Rhyacophila (sibirica)	4	18		8.64	0.7	prd		
Rhyacophila (veccus)	4	18		6.64	0.7	prd		
Rhyacophila sp.	0	18		0	0.0	prd		
Immature	0	-		0	0.0	-		
Pupa	0	-		0	0.0	-		
Other							13	2.3
Annelida								
Lubricidae	0	- 108		0	0.0	c-g		
Arachnida	0	- 108		0	0.0	prd		
Coleoptera								
Elmidae	4							
Cleptesia sp.	0	108		0	0.0	c-g		
Heterlimnius sp.	3	108		6.48	0.5	c-g		
Marpus sp.	0	108		0	0.0	c-g		
Xistrella sp.	0	108		0	0.0	c-g		
Immature	0	108		0	0.0	c-g		
Collembola	0	- 108		0	0.0	-		
Diptera								
Blephariceridae	0							
Agython sp.	0	2		0	0.0	scr		
Chironomidae	0	7 108		0	0.0	c/prd		
Empididae	4							
Dreogonion sp.	1	108		2.16	0.2	prd		
Simuliidae	0	6 108		0	0.0	c-f		
Tabanidae	3							
Antocha sp.	0	24		0	0.0	prd		
Dicranota sp.	5	24		10.8	0.9	prd		
Hexatom sp.	1	36		2.16	0.2	prd		
Tipula sp.	0	36		0	0.0	shr		
Mollusca								
Planorbidae	0	6 108		0	0.0	scr		
Nematoda	0	- 108		0	0.0	-		
Turbellaria	3	4 108		6.48	0.5	prd		
Total number =	560			1209.6	100.0			
Total taxa =	24							
SD=	7.0							
STD=	28.6							
Mean=	112.0							
TV= Tolerance Value (Millsenoff, 1986)								
TQ=Tolerance Quotient (Winget et al., 1979)								

	For Each Organism					Major Group	
	No.	TV	TQ	Mean	Percent	Feeding	Total
				No./m ²	of Total		
Ephemeroptera							212
Baetidae	4						31.4
<i>Baetis bicuspidatus</i>	54	72	116.64	8.0	c-g		
<i>Baetis tricaudatus</i>	0	72	0	0.0	c-g		
Ephemerellidae	1						
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g		
<i>Grunella coloradensis</i>	0	16	0	0.0	scr		
<i>Grunella doddi</i>	14	4	30.24	2.1	scr		
<i>Grunella flavidinea</i>	5	48	10.8	0.7	scr		
<i>Grunella spinifera</i>	1	24	2.16	0.1	scr		
<i>Grunella sp.</i>	0	48	0	0.0	scr		
<i>Serratella levis</i>	0	48	0	0.0	c-g		
<i>Serratella tibialis</i>	0	24	0	0.0	c-g		
Heptageniidae	4						
<i>Chrygaula sp.</i>	96	21	207.36	14.2	scr		
<i>Epeorus sp.</i>	0	21	0	0.0	scr		
<i>Rhithrogena sp.</i>	21	21	45.36	3.1	c-g		
Leptophlebiidae	2						
<i>Paraleptophlebia sp.</i>	0	24	0	0.0	c-g		
Siphlonuridae	7						
<i>Ameletus sp.</i>	21	48	45.36	3.1	c-g	436	64.5
Placoptera							
Cepnidae	1						
<i>Imature</i>	11		23.76	1.6	shr		
Chloroperlidae	1						
<i>Kathaperla perdita</i>	1	24	2.16	0.1	c-g		
<i>Svelta/Suwallia sp.</i>	28	24	50.48	4.1	prd		
Leuctridae	0						
<i>Paraleuctra sp.</i>	0	16	0	0.0	shr		
<i>Perleutria sp.</i>	10	16	21.6	1.5	shr		
<i>Imature</i>	0	16	0	0.0	shr		
Nemouridae	2						
<i>Vlaoka cataractae</i>	16	36	34.56	2.4	shr		
<i>Zapada cinctipes</i>	1	16	2.16	0.1	shr		
<i>Zapada columbiana</i>	0	16	0	0.0	shr		
Peltoperlidae	2						
<i>Toroperla brevis</i>	0	24	0	0.0	shr		
Perlidae	1						
<i>Boronuria theodore</i>	1	24	2.16	0.1	prd		
<i>Imature</i>	5	-	10.8	0.7	prd		
Perlodidae	2						
<i>Isoperla sp.</i>	0	48	0	0.0	prd		
<i>Hegarcyia sp.</i>	1	24	2.16	0.1	prd		
<i>Autenaea bradleyi</i>	0	48	0	0.0	prd		
<i>Imature</i>	0	-	0	0.0	prd		
Taeniopterygidae	2						
<i>Taenionema sp.</i>	362	48	781.92	53.6	scr	18	2.7
Trichoptera							
Brachycnemidae	1						
<i>Microcena sp.</i>	0	24	0	0.0	shr		
Glossosomatidae	0						
<i>Anagapetus sp.</i>	0	24	0	0.0	scr		
<i>Glossosoma sp.</i>	7	24	15.12	1.0	scr		
Hydropsychidae	4						
<i>Arctopeyche grandis</i>	0	16	0	0.0	c-f		
<i>Parapeyche elaeis</i>	2	6	4.32	0.3	c-f		
<i>Imature</i>	0	-	0	0.0	c-f		
Lepidostomatidae	1						
<i>Lepidostome sp.</i>	0	16	0	0.0	shr		
Limnephilidae	4						
<i>Aptenia sp.</i>	0	16	0	0.0	scr		
<i>Ecclisomyia sp.</i>	0	24	0	0.0	c-g		
<i>Neolyneia sp.</i>	0	-	0	0.0	scr		
<i>Neothremma sp.</i>	0	8	0	0.0	scr		
<i>Oligophlebodes sp.</i>	0	24	0	0.0	scr		
<i>Imature</i>	0	-	0	0.0	-		
Rhyacophilidae	0						
<i>Rhyacophilis (batteni)</i>	0	16	0	0.0	prd		
<i>Rhyacophilis (brunnea)</i>	0	16	0	0.0	prd		
<i>Rhyacophilis (hyalinata)</i>	0	16	0	0.0	prd		
<i>Rhyacophilis (iridea)</i>	0	16	0	0.0	prd		
<i>Rhyacophilis (sibirica)</i>	2	16	4.32	0.3	prd		
<i>Rhyacophilis (vancue)</i>	6	16	12.96	0.9	prd		
<i>Rhyacophilis sp.</i>	1	16	2.16	0.1	prd		
<i>Imature</i>	0	-	0	0.0	-		
Pupa	0	-	0	0.0	-		
Other						10	1.5
Annelida							
Lumbricidae	0	-	108	0	0.0	c-g	
Arachnida	0	-	108	0	0.0	prd	
Coleoptera							
Elmidae	6						
<i>Cleptelmis sp.</i>	0	108	0	0.0	c-g		
<i>Heterlimnius sp.</i>	0	108	0	0.0	c-g		
<i>Narpus sp.</i>	0	108	0	0.0	c-g		
<i>Isotrichia sp.</i>	0	108	0	0.0	c-g		
<i>Imature</i>	0	108	0	0.0	-		
Collembola	0	-	108	0	0.0	-	
Diptera							
Blephariceridae	0						
<i>Agathon sp.</i>	0	2	0	0.0	scr		
Chironomidae	6	7	108	12.16	0.9	c/prd	
Empididae	6						
<i>Dreogonon sp.</i>	2	108	4.32	0.3	prd		
<i>Simuliidae</i>	0	6	108	0	0.0	c-f	
<i>Tipulidae</i>	3						
<i>Antocha sp.</i>	0	24	0	0.0	prd		
<i>Dicranota sp.</i>	2	-	24	4.32	0.3	prd	
<i>Hexatom sp.</i>	0	-	36	0	0.0	prd	
<i>Tipula sp.</i>	0	36	0	0.0	shr		
Mollusca							
Planorbidae	0	6	108	0	0.0	scr	
Nematoda	0	-	108	0	0.0	-	
Turbellaria	0	6	108	0	0.0	prd	
Total number =	676		1460.16	100.0			
Total taxa =	24						
SD=	1.8						
STD=	44.0						
Mean=	135.2						
TV= Tolerance Value (Hillemanoff, 1968)							
TQ=Tolerance Quotient (Winget et al., 1979)							

	No.	IV	TO	For Each Organism			Major Group	
				Mean No./m ²	Percent of Total	Feeding Habit	Total	Percent
							Number	of Total
Ephemeroptera							664	62.0
Suctidae			4					
<i>Suctis bicaudatus</i>	280	72	604.8	26.1	c-g			
<i>Suctis tricaudatus</i>	61	72	131.76	5.7	c-g			
Ephemerellidae			1					
<i>Caudatella hystrix</i>	0	48	0	0.0	c-g			
<i>Brunnella coloradensis</i>	0	18	0	0.0	scr			
<i>Brunnella doddsii</i>	7	4	15.12	0.7	scr			
<i>Brunnella flavilinea</i>	22	48	47.52	2.1	scr			
<i>Brunnella spinifera</i>	15	24	32.4	1.4	scr			
<i>Brunnella sp.</i>	0	48	0	0.0	scr			
<i>Serratella lata</i>	0	48	0	0.0	c-g			
<i>Serratella tibialis</i>	0	24	0	0.0	c-g			
Heptageniidae			4					
<i>Cinygma sp.</i>	212	21	457.92	19.6	scr			
<i>Eporus sp.</i>	0	21	0	0.0	scr			
<i>Hythrogenes sp.</i>	7	21	15.12	0.7	c-g			
Leptophlebiidae			2					
<i>Paraleptophlebia sp.</i>	60	24	129.6	5.6	c-g			
Siphlonuridae			7					
<i>Ameletus sp.</i>	0	48	0	0.0	c-g			
Plecoptera							205	19.1
Capniidae			1					
Immature	60	-	129.6	5.6	shr			
Chloroperlidae			1					
<i>Kathroperla perdita</i>	0	24	0	0.0	c-g			
<i>Sveltia/Suvelia sp.</i>	70	24	151.2	6.5	prd			
Leuctridae			0					
<i>Paraleuctra sp.</i>	0	18	0	0.0	shr			
<i>Perlogeia sp.</i>	0	18	0	0.0	shr			
Immature	2	18	4.32	0.2	shr			
Nemouridae			2					
<i>Visia cataractae</i>	2	36	4.32	0.2	shr			
<i>Zapada cinctipes</i>	55	16	118.8	5.1	shr			
<i>Zapada columbiana</i>	7	16	15.12	0.7	shr			
Peltoperlidae			2					
<i>Voreperla brevis</i>	1	24	2.16	0.1	shr			
Perlidae			1					
<i>Doroneuria theodora</i>	2	24	4.32	0.2	prd			
Immature	1	-	2.16	0.1	prd			
Perlidiidae			2					
<i>Isoneria sp.</i>	4	48	8.64	0.4	prd			
<i>Hegarcyza sp.</i>	0	24	0	0.0	prd			
<i>Satvana bradleyi</i>	0	48	0	0.0	prd			
Immature	1	-	2.16	0.1	prd			
Taeniopterygidae			2					
<i>Taenionema sp.</i>	0	48	0	0.0	scr			
Trichoptera							111	10.4
Brachycentridae			1					
<i>Micrasemus sp.</i>	13	24	28.08	1.1	shr			
Glossosomatidae			0					
<i>Anaspetus sp.</i>	32	24	69.12	3.0	scr			
<i>Glossosoma sp.</i>	13	24	28.08	1.2	scr			
Hydropsychidae			4					
<i>Arctopsyche grandis</i>	30	16	64.8	2.8	c-g			
<i>Perapsyche eleja</i>	0	6	0	0.0	c-g			
Immature	1	-	2.16	0.1	c-g			
Lepidostomatidae			1					
<i>Lepidostoma sp.</i>	0	16	0	0.0	shr			
Limnephilidae			4					
<i>Apatania sp.</i>	0	18	0	0.0	scr			
<i>Occlisomyia sp.</i>	0	24	0	0.0	c-g			
<i>Moselyana sp.</i>	0	-	0	0.0	c-g			
<i>Neothrauma sp.</i>	0	8	0	0.0	scr			
<i>Oligophlebedes sp.</i>	0	24	0	0.0	scr			
Immature	0	-	0	0.0	-			
Rhycophilidae			0					
<i>Rhycophila (batteni)</i>	0	18	0	0.0	prd			
<i>Rhycophila (brunnescens)</i>	1	18	2.16	0.1	prd			
<i>Rhycophila (hyalinata)</i>	0	18	0	0.0	prd			
<i>Rhycophila (iranda)</i>	0	18	0	0.0	prd			
<i>Rhycophila (sibirica)</i>	9	16	19.44	0.8	prd			
<i>Rhycophila (vaccaea)</i>	10	16	21.6	0.9	prd			
<i>Rhycophila sp.</i>	2	18	4.32	0.2	prd			
Immature	0	-	0	0.0	-			
Pupa	0	-	0	0.0	-			
Other							91	8.5
Annelida								
Lumbricidae	18	- 108	38.88	1.7	c-g			
Arachnida			0	0.0	prd			
Coleoptera								
Cimidae			4					
<i>Cleptesmia sp.</i>	5	108	10.8	0.5	c-g			
<i>Heterlimnia sp.</i>	30	108	64.8	2.8	c-g			
<i>Serpis sp.</i>	0	108	0	0.0	c-g			
<i>Saitzevia sp.</i>	0	108	0	0.0	c-g			
Immature	0	108	0	0.0	c-g			
Collembola			0					
Diptera			0					
Blephariceridae			0					
<i>Ngathon sp.</i>	0	2	0	0.0	scr			
Chironomidae	16	7 108	38.88	1.7	c/prd			
Empididae			6					
Oscopetan sp.	0	108	0	0.0	prd			
Sciomyzidae	1	6 108	2.16	0.1	c-f			
Tabanidae			1					
<i>Antocha sp.</i>	0	24	0	0.0	prd			
<i>Dicranota sp.</i>	2	24	4.32	0.2	prd			
<i>Hexatom sp.</i>	0	36	0	0.0	prd			
<i>Tipula sp.</i>	0	36	0	0.0	shr			
Mollusca								
Planorbidae	0	6 108	0	0.0	scr			
Nematoda	0	- 108	0	0.0	-			
Turbellaria	17	4 108	36.72	1.6	prd			
Total number =	1071		3313.86	100.0				
Total taxa =	35							
BDI=	2.6							
SDI=	42.0							
Mean=	214.2							
TV=Tolerance Value (Klimekoff, 1988)								
TG=Tolerance Quotient (Winget et al., 1979)								