

FEBRUARY 2009

BIOLOGICAL ASSESSMENT
OF SITES IN THE
GALLATIN RIVER DRAINAGE,
GALLATIN COUNTY,
MONTANA:
MACROINVERTEBRATE ASSEMBLAGES

A REPORT TO THE
BLUE WATER TASK FORCE



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INTRODUCTION

With increased development in the watershed, the integrity of the Gallatin River and its tributaries may be threatened by impacts to channel structure and riparian zones as well as by degradation of water quality. Monitoring and assessment of biological assemblages may help to detect changes suggesting that impacts and degradation may in fact be occurring. For the past several years, the Blue Water Task Force (BWTF) has sampled benthic macroinvertebrates for monitoring and assessment of the waters of the Gallatin River drainage. Benthic macroinvertebrates are a useful tool for evaluating the effects of stressors that may be associated with the accelerating human influences on the River. Such stressors may include pollutants, sediment, thermal and hydrologic impacts, and changes to the natural morphology of river channels and riparian zones.

In September 2008, replicated samples were collected at three sites on the Gallatin River and at one site on the West Fork of the Gallatin River. All four of these sites had been previously sampled in April 2008, although only single samples were collected during that event. This report describes the methods for processing and identifying the macroinvertebrates in the September samples. Data resulting from that work were translated into a multimetric index, and scores were calculated. In addition, narrative interpretations of the ecological condition of the macroinvertebrate assemblages were composed. These narratives use the taxonomic and functional composition, tolerance and sensitivity characteristics, and habits of the benthic invertebrates to describe probable water quality and habitat influences on the assemblages. Interpretations maximize the information available in the data by not relying solely on a single cumulative index score which may mask the effects of stressors on the biota.

METHODS

Sample processing

Eight macroinvertebrate samples, which were paired replicate samples collected at 4 sites in the Gallatin River drainage, were delivered to Rhithron's laboratory facility in Missoula, Montana. All samples arrived in good condition. Habitat assessment forms were also provided by BWTF.

Subsamples of a minimum of 300 organisms were obtained using methods consistent with Montana Department of Environmental Quality (MDEQ) standard procedures (MDEQ 2006): Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm were used. Each individual sample was thoroughly mixed in its jar(s), poured out and evenly spread into the Caton tray, and individual grids were randomly selected. Grid contents were examined under stereoscopic microscopes using 10x – 30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. Grid selection, examination, and sorting continued until at least 300 organisms were sorted. The final grid was completely sorted of all organisms.

Organisms were individually examined using 10x – 80x dissecting scopes (Leica S8E and S6E) and identified to the lowest practical level consistent with

MDEQ (MDEQ 2006) data requirements, using appropriate published taxonomic references and keys. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified in MDEQ protocols were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory. Midges were morphotyped using 10x – 80x dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope. Slide mounted organisms were archived at the Rhithron laboratory along with the other identified invertebrates.

Quality control procedures

Quality control (QC) procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent observers who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_{1+2}} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage, n_1 is the total number of specimens in the first sort, and n_{1+2} is the total number of specimens in the first and second sorts combined.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. One sample was randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957) for the selected sample.

Data analysis

Taxa and counts for each sample were entered into Rhithron’s database application (RIALIS v.2.1). Life stages, “unique” designations, and the condition of specimens were also entered. Bioassessment metrics were calculated by the database application and a multimetric index developed for montane ecoregions of Montana (Bollman 1998) was calculated and scored.

Narrative interpretations of the taxonomic and functional composition of the aquatic invertebrate assemblages are based on demonstrated associations between assemblage components and habitat and water quality variables gleaned from the published literature, the writer’s own research (especially Bollman 1998) and professional judgment, and those of other expert sources (especially Wisseman 1996). These interpretations are not intended to replace

canonical procedures for stressor identification, since such procedures require substantial surveys of habitat, and historical and current data related to water quality, land use, point and non-point source influences, soils, hydrology, geology, and other resources that were not readily available for this study. Instead, attributes of invertebrate taxa that are well-substantiated in diverse literature, published and unpublished research, and that are generally accepted by regional aquatic ecologists, are combined into descriptions of probable water quality and instream and reach-scale habitat conditions.

The approach to this analysis uses some assemblage attributes that are interpreted as evidence of water quality and other attributes that are interpreted as evidence of habitat integrity. Attributes are considered individually, so information is maximized by not relying on a single cumulative score, which may mask stress on the biota.

Water quality variables are estimated by examining mayfly taxa richness and the Hilsenhoff Biotic Index (HBI) value. Other indicators of water quality include the richness and abundance of hemoglobin-bearing taxa and the richness of sensitive taxa. Mayfly taxa richness has been demonstrated to be significantly correlated with chemical measures of dissolved oxygen, pH, and conductivity (e.g. Bollman 1998, Fore et al. 1996, Wisseman 1996). The Hilsenhoff Biotic Index (HBI) (Hilsenhoff 1987) has a long history of use and validation (Cairns and Pratt 1993). In Montana foothills, the HBI was demonstrated to be significantly associated with conductivity, pH, water temperature, sediment deposition, and the presence of filamentous algae (Bollman 1998). The presence of filamentous algae is also suspected when macroinvertebrates associated or dependent on it (e.g. LeSage and Harrison 1980, Anderson 1976) are abundant. Nutrient enrichment in Montana streams often results in large crops of filamentous algae (Watson 1988). Sensitive taxa exhibit intolerance to a wide range of stressors (e.g. Wisseman 1996, Hellawell 1986, Friedrich 1990, Barbour et al. 1999), including nutrient enrichment, acidification, thermal stress, sediment deposition, habitat disruption, and others. These taxa are expected to be present in predictable numbers in functioning montane and foothills streams (e.g. Bollman 1998).

Thermal characteristics of the sampled site are predicted by the richness and abundance of cold stenotherm taxa (Clark 1997), and by calculation of the temperature preference of the macroinvertebrate assemblage (Brandt 2001). Hemoglobin-bearing taxa are also indicators of warm water temperatures (Walshe 1947), since dissolved oxygen is directly associated with water temperature; oxygen concentrations can also vary with the degree of nutrient enrichment. Increased temperatures and high nutrient concentrations can, alone or in concert, create conditions favorable to hypoxic sediments, habitats preferred by hemoglobin-bearers.

The condition of instream and streamside habitats is estimated by characteristics of the macroinvertebrate assemblages. Stress from sediment is evaluated by caddisfly richness and by "clinger" richness (Kleindl 1996, Bollman 1998, Karr and Chu 1999). A newer tool, the Fine Sediment Biotic Index (FSBI) (Relyea et al. 2000) shows promise when applied to the montane and foothills regions.

The functional characteristics of macroinvertebrate assemblages are based on the morphology and behaviors associated with feeding, and are interpreted in terms of the River Continuum Concept (Vannote et al. 1980) in

the narratives. Alterations from predicted patterns in montane and foothills streams may be interpreted as evidence of water quality or habitat disruption. For example, shredders and the microbes they depend on are sensitive to modifications of the riparian zone (Plafkin et al. 1989).

Narrative interpretations of September 2008 data are made on the basis of the combined results of replicated samples. Since single, unreplicated samples were collected in April 2008, direct comparison of these narratives with those reported for April 2008 samples may be misleading. It would be expected that richness measures would return higher values for the September analyses, since sample size is approximately doubled by the combination of the data from the replicates.

The results of habitat assessments are reported. These assessments were made by BWTF personnel using a method recommended by the Montana Department of Environmental Quality (MDEQ 1998). Instream, streambank, and reach-scale parameters were evaluated. The relationship of bioassessment scores and habitat assessment scores is investigated graphically.

RESULTS

Quality Control Procedures

Results of quality control procedures for subsampling and taxonomy are given in Table 1. Sorting efficiency averaged 98.44% for all samples, taxonomic precision for identification and enumeration was 95.8% for the randomly selected sample, and data entry efficiency averaged 100% for the project.

Table 1. Results of quality control procedures for subsampling and taxonomy.

Site name	Site Identifier	Rep	Sorting efficiency	Bray-Curtis similarity for taxonomy and enumeration
Gallatin River at Park Boundary (North)	PARK	1	100.00%	95.8%
		2	100.00%	
Gallatin River just upstream of West Fork confluence	UPSTREAM	1	98.00%	95.8%
		2	100.00%	
Gallatin River above Jack Smith bridge	DOWN2	1	98.47%	95.8%
		2	96.97%	
West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge	WEST	1	95.60%	95.8%
		2	98.47%	

Bioassessment

Table 2 summarizes values and scores for metrics in the bioassessment index (Bollman 1998) used to evaluate the aquatic invertebrate assemblages. Results for each replicate are reported. Total scores and impairment classifications are also given.

When this index is applied to the Gallatin watershed invertebrate data, results indicate slight impairment at two sites: UPSTREAM and DOWN2. Metric scores indicate that the percent filterers metric was the most influential measure limiting the overall scores at these sites. Figure 1 graphs total scores for spring-collected (April 14) samples and for replicated fall-collected (September 12) samples.

Table 2. Bioassessment index (Bollman 1998) and individual metrics and scores for replicated samples taken at 4 sites in the Gallatin River drainage, September 12, 2008.

	PARK		UPSTREAM		DOWN2		WEST	
METRICS	METRIC VALUES							
Ephemeroptera richness	7	8	4	5	6	10	8	6
Plecoptera richness	3	3	4	4	3	3	2	2
Trichoptera richness	6	4	7	6	5	10	4	7
Number of sensitive taxa	5	4	3	3	4	4	4	6
Percent filterers	14.6	9.0	39.9	43.8	36.1	9.9	0.6	1.0
Percent tolerant taxa	1.5	0.3	7.6	5.5	7.2	13.7	4.3	3.9
	METRIC SCORES							
Ephemeroptera richness	3	3	2	2	3	3	3	3
Plecoptera richness	2	2	3	3	2	2	2	2
Trichoptera richness	3	2	3	3	3	3	2	3
Number of sensitive taxa	3	3	2	2	3	3	3	3
Percent filterers	1	2	0	0	0	2	3	3
Percent tolerant taxa	3	3	2	2	2	1	3	3
TOTAL SCORE (max.=18)	15	15	12	12	13	14	16	17
PERCENT OF MAX.	83.3	83.3	66.7	66.7	72.2	77.8	88.9	94.4
Average of replicates	83.3		66.7		75.0		91.7	
Impairment classification*	NON		SLI		SLI		NON	

* Impairment classifications: (NON) non-impaired, (SLI) slightly impaired, (MOD) moderately impaired, (SEV) severely impaired.

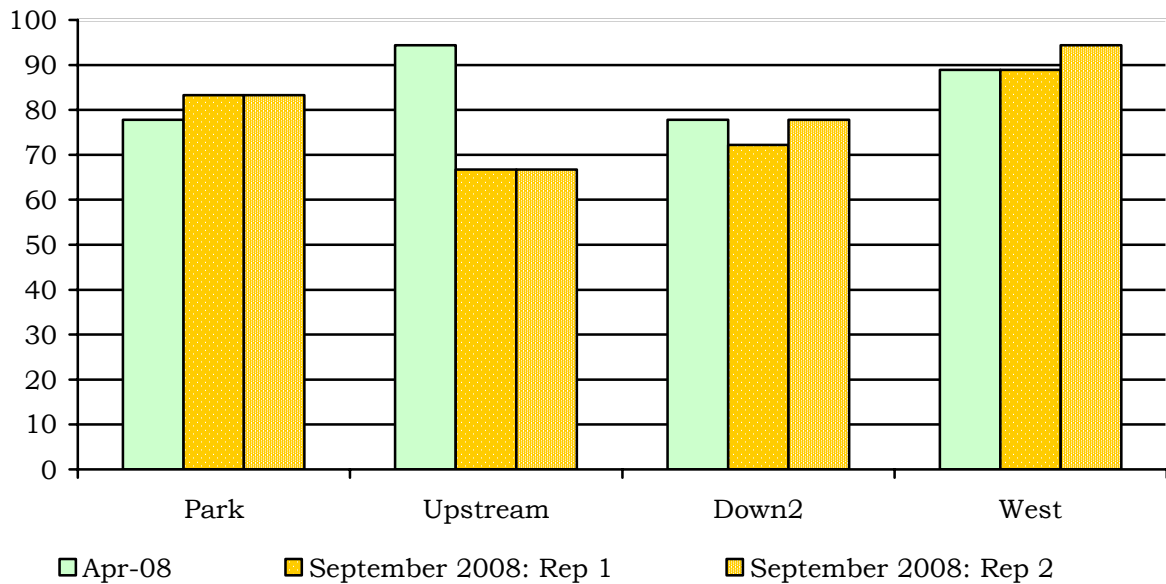


Figure 1. Bioassessment scores for four sites in the Gallatin River drainage. Scores are given for single samples collected in April 2008 (green bars) and for sample replicates collected in September 2008 (yellow bars).

Aquatic invertebrate assemblages: combined replicates

1. Gallatin River

Park Boundary (PARK)

Ten mayfly taxa were collected at this site in September 2008. High richness in this group is associated with good water quality. Five sensitive taxa were collected, including the mayfly *Drunella doddsii* and the caddisfly *Oligophlebodes* sp. The biotic index value (3.07) was within expectations for a riverine system. These findings strongly suggest that water quality was good in this reach. The calculated thermal preference for the assemblage was 13.8°C. Four obligate cold stenotherm taxa were among the organisms collected here.

Nineteen “clinger” taxa and 6 caddisfly taxa were counted, suggesting that fine sediment deposition did not substantially compromise colonization of stony substrates. The FSBI value (5.68) was high, indicating a moderately sediment-intolerant assemblage. At least 51 unique taxa were supported at this site; the diversity of invertebrates is probably related to the integrity of instream habitats. Stonefly taxa richness (4) was within expectations for a stream with unaltered morphology, intact riparian function, and stable streambanks. Seven long-lived taxa were collected; this finding indicates that surface flow persisted year-round in this reach, and that catastrophes such as thermal stress, toxic pollutants, or scouring sediment pulses were not influential. All expected functional components were represented at this site, and the proportions of each group were appropriate for a low-to-mid order riverine environment.

Upstream of West Fork confluence (UPSTREAM)

Five unique mayfly taxa were collected at this site: this was the lowest mayfly taxa richness of any of the 4 sampled sites. The biotic index value (3.90), however, was within expectations for a riverine environment in the Middle Rockies ecoregion. Three sensitive taxa were counted in the replicate samples taken here, including *Drunella doddsii* and flies in the family Blephariceridae. The large proportion of filterers (especially the blackfly *Simulium* sp. and *Hydropsyche* sp.) suggests that organic material in fine suspended particulates was a major source of energy in the reach; mild nutrient enrichment may be implicated. The thermal preference of the assemblage was calculated to be 14.8°C.

“Clingers” were represented by 20 taxa, and caddisflies (6 taxa) were also well-represented. The FSBI value (4.91) was near the median value for mid-order streams in the Middle Rockies ecoregion. Bouldery substrates are indicated by the presence of blepharicerid flies, and some sandy fractions are indicated by the psammophilic *Protanyderus* sp. The variety of instream habitats is reflected in the high overall taxa richness (44). Four stonefly taxa were present in replicates; it seems likely that reach-scale habitat features such as streambanks, channel morphological features, and riparian vegetation were in good condition. No fewer than 9 semivoltine taxa were supported in the reach, indicating stable conditions year-round. All expected functional groups were accounted for, but filterers were more abundant than expected, and shredders were relatively scarce.

Above Jack Smith bridge (DOWN2)

Ten mayfly taxa were counted in the replicates taken at this site. The biotic index value (4.60) was higher than expected for a montane river, suggesting that the assemblage was more tolerant than anticipated. Midges were the most abundant group, accounting for 30% of sampled organisms. Although mayfly taxa richness was very high, mild nutrient enrichment could account for the other findings. The midge *Orthocladius* sp., which was the dominant taxon, is frequently associated with filamentous algae. Large crops of filamentous algae may be a further indication of nutrient enrichment. Sensitive taxa did persist at this site, suggesting that any pollution was very mild. These taxa included the caddisfly *Ceraclea* sp. and the mayfly *Drunella doddsii*; neither of these taxa was abundant, however. The thermal preference of this assemblage was calculated to be 14.5°C.

Stony substrate habitats were apparently not excessively contaminated by fine sediment deposition, since at least 26 “clinger” taxa and 10 caddisfly taxa were present in the samples. The FSBI value (5.08) was slightly higher than the median value for mid-to-high order streams in the Middle Rockies ecoregion; this finding supports the hypothesis that sediment deposition was not a severe problem in this reach. Overall taxa richness (56) was high and suggestive of diverse and intact instream habitats. Three unique stonefly taxa were present. Reach-scale habitat features may have suffered from some minor degradation. Year-round surface flow and the absence of catastrophic thermal stress are indicated by the presence of 7 semivoltine taxa. The functional

composition of the invertebrate assemblage was dominated by gatherers. This pattern is sometimes interpreted as an indication of nutrient enrichment. All other expected components were represented.

2. West Fork Gallatin River

Upstream of Big Sky Spur Bridge (WEST)

Ten mayfly taxa were collected in replicates from this site, but the biotic index value (5.09) indicated a moderately tolerant assemblage. Midges overwhelmed the taxonomic composition of the samples collected here, accounting for 52% of the sampled animals. Dominant among this group was *Orthocladius* sp., which is often associated with filamentous algae. It seems likely that mild nutrient enrichment influenced the composition of this assemblage. The thermal preference calculated for these organisms is 13.7°C. Groundwater may contribute to surface flow in the reach; this is suggested by a small number of specimens of the flatworm *Polycelis coronata*.

Six caddisfly taxa and 18 “clinger” taxa were collected, indicating that fine sediment deposition did not substantially limit colonization of stony substrate habitats. At least 51 taxa were supported at this site, implying diverse instream habitats. Stoneflies were represented by only 3 taxa, none of which were abundant. Low richness in this group may be related to unstable streambanks, altered channel morphology, or disturbed riparian vegetation. Semivoltine taxa were well-represented; 5 such taxa were counted in the replicates. This indicates that surface flow persisted here year-round, and that catastrophic scours or thermal stresses were not influential. The functional composition of the assemblage was overwhelmed by gatherers. Dominance by this feeding group is sometimes interpreted as an indication of nutrient enrichment.

Habitat assessment

Table 3 gives the results of habitat assessment at each of the 4 sampled sites. Most habitat measures were rated optimal or sub-optimal, but there were exceptions, which are described here:

At the Gallatin River site above the Jack Smith bridge (DOWN2), bank stability and bank vegetation on the left bank were both rated marginal, and the width of the riparian zone on the right side was judged to be poor.

In spite of the marginal and poor ratings for some of the habitat features at these sites, cumulative scores indicated optimal habitat conditions at all four sites visited in September 2008.

Relating bioassessment to habitat assessment

When habitat assessment scores are plotted against bioassessment scores, the resulting figure provides an opportunity to evaluate the hypothetical relationship between habitat integrity and water quality. Both factors are critical and interactive determinants of the composition and functional integrity of aquatic invertebrate assemblages. Presumably, high quality habitat, in the absence of impairments to water quality, supports functional, diverse, and

sensitive invertebrate assemblages; these are assemblages that attain high bioassessment scores. Barbour and Stribling (1991) have hypothesized that diminishing habitat quality should produce predictable diminishment of bioassessment scores, when water quality is not a further insult. Figure 2 is a plot of habitat assessment scores against bioassessment scores for the sampled assemblages of the Gallatin River and West Fork Gallatin River. The red line superimposed on the plot roughly represents the hypothetical relationship between habitat quality and biotic integrity given good water quality. Symbols for each of the sites sampled for this study fall in the upper right area of the plot, suggesting good water quality and intact habitats at all locations.

Table 3. Stream and riparian habitat assessment. Sites were assessed based upon criteria developed by Montana DEQ for streams with riffle/run prevalence (MDEQ 1998). Gallatin River drainage, September, 2008.

Max. possible score	Parameter	PARK	UPSTREAM	DOWN2	WEST
10	Riffle development	8	10	10	10
10	Benthic substrate	10	10	9	9
20	Embeddedness	20	20	20	20
20	Channel alteration	20	20	20	20
20	Sediment deposition	20	15	20	20
20	Channel flow status	20	18	18	20
20	Bank stability	10 / 10	6 / 8	3 / 10	9 / 10
20	Bank vegetation	10 / 10	10 / 10	5 / 10	10 / 10
20	Vegetated zone	10 / 8	8 / 10	10 / 2	8 / 10
160	Total	156	145	137	156
	Percent of maximum	97.5%	90.6%	85.6%	97.5%
	CONDITION*	OPTIMAL	OPTIMAL	OPTIMAL	OPTIMAL

* Condition categories: Optimal > 80% of maximum score; Sub-optimal 75 - 56%; Marginal 49 - 29%; Poor <23%. Plafkin et al. 1989.

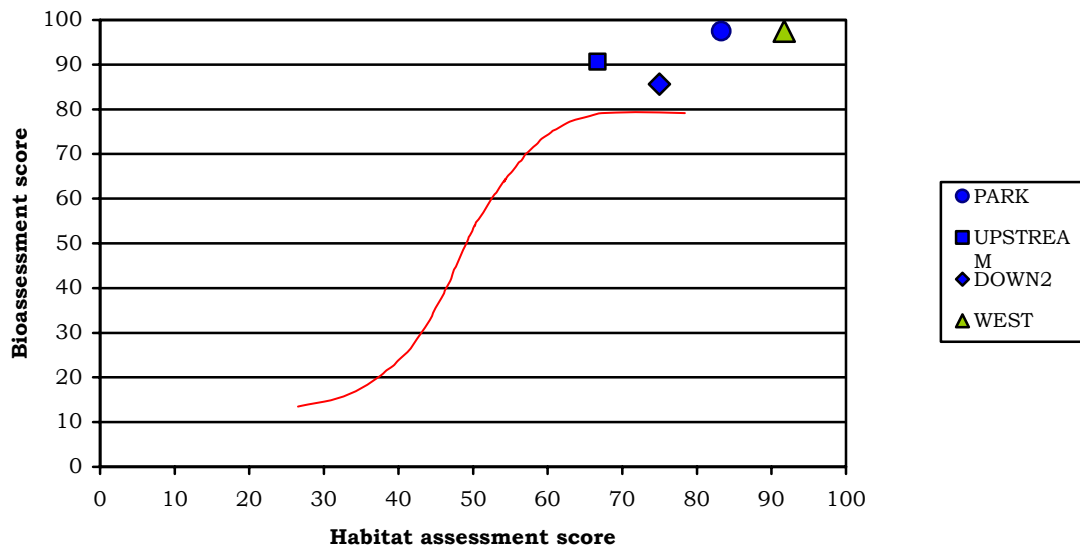


Figure 2. Average bioassessment scores plotted against habitat assessment scores (Barbour and Stribling 1991) for 4 sites in the Gallatin River drainage, September 12, 2008.

DISCUSSION

The revised assessment tool used in this report for scoring biotic integrity was developed for small-to-medium sized streams in Strahler orders 2 – 4, and may overestimate impairment in higher-linkage systems. Bioassessment scores indicate slight impairment at the UPSTREAM and DOWN2 sites. Evidence for possible nutrient enrichment, though slight, can be discerned in the aquatic invertebrate assemblages collected at these sites, as well as at the WEST site.

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APPENDIX

Taxa lists and metric summaries

**Blue Water Task Force
Gallatin River Watershed**

September 12, 2008

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2001

RAI No.: BWTF08GR2001

Sta. Name: Gallatin River above Jack Smith bridge REP 1

Client ID: DOWN2

Date Coll.: 9/12/2008

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	1	0.31%	Yes	Unknown		5	PR
Nematoda	1	0.31%	Yes	Unknown		5	PA
Enchytraeidae							
<i>Enchytraeus</i> sp.	1	0.31%	Yes	Unknown		4	CG
<i>Mesenchytraeus</i> sp.	8	2.51%	Yes	Unknown		4	CG
Naididae							
<i>Nais</i> sp.	8	2.51%	Yes	Unknown		8	CG
Ephemeroptera							
Baetidae							
<i>Baetis tricaudatus</i>	37	11.60%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	4	1.25%	Yes	Larva		1	SC
<i>Drunella grandis</i>	17	5.33%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	4	1.25%	Yes	Larva		4	SH
<i>Serratella tibialis</i>	1	0.31%	Yes	Larva		2	CG
Heptageniidae							
<i>Rhithrogena</i> sp.	5	1.57%	Yes	Larva		0	CG
Plecoptera							
Perlidae							
<i>Hesperoperla pacifica</i>	7	2.19%	Yes	Larva		1	PR
Perlodidae							
<i>Skwala</i> sp.	1	0.31%	Yes	Larva		3	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	1	0.31%	No	Larva	Early Instar	2	SH
<i>Pteronarcys californica</i>	1	0.31%	Yes	Larva		2	SH
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	1	0.31%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus</i> sp.	1	0.31%	No	Larva	Early Instar	1	CF
<i>Brachycentrus occidentalis</i>	16	5.02%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	20	6.27%	Yes	Larva		0	SC
Glossosomatidae	1	0.31%	No	Pupa		0	SC
Hydropsychidae							
<i>Hydropsyche</i> sp.	36	11.29%	Yes	Larva		5	CF
Hydropsychidae	20	6.27%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.31%	Yes	Larva		1	SH
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	8	2.51%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	9	2.82%	No	Larva		5	SC

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2001

RAI No.: BWTF08GR2001

Sta. Name: Gallatin River above Jack Smith bridge REP 1

Client ID: DOWN2

Date Coll.: 9/12/2008

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	3	0.94%	Yes	Larva		5	PR
Simuliidae							
Simuliidae	10	3.13%	No	Pupa		6	CF
<i>Simulium</i> sp.	32	10.03%	Yes	Larva		6	CF
Chironomidae							
Chironomidae							
<i>Cardiocladius</i> sp.	2	0.63%	Yes	Larva		5	PR
Chironomidae	7	2.19%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	2	0.63%	Yes	Larva		7	CG
<i>Corynoneura</i> sp.	1	0.31%	Yes	Larva		7	CG
<i>Cricotopus (Nostococladius)</i> sp.	2	0.63%	Yes	Larva		6	SH
Eukiefferiella Devonica Gr.	23	7.21%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	2	0.63%	Yes	Larva		8	CG
<i>Orthocladius</i> sp.	21	6.58%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	1	0.31%	Yes	Larva		1	CG
<i>Parametriocnemus</i> sp.	1	0.31%	Yes	Larva		5	CG
<i>Stictochironomus</i> sp.	1	0.31%	Yes	Larva		5	CG
Tvetenia Bavarica Gr.	1	0.31%	Yes	Larva		5	CG
Sample Count	319						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2002

RAI No.: BWTF08GR2002

Sta. Name: Gallatin River above Jack Smith bridge REP 2

Client ID: DOWN2

Date Coll.: 9/12/2008

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	4	1.24%	Yes	Unknown		5	PR
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	5	1.55%	Yes	Unknown		4	CG
Naididae							
Naididae (Tubificinae) - with capillary setae	2	0.62%	Yes	Immature	Damaged	11	CG
Naididae (Tubificinae) - without capillary setae	1	0.31%	Yes	Immature	Damaged	11	CG
<i>Nais</i> sp.	4	1.24%	Yes	Unknown		8	CG
Ephemeroptera							
Ameletidae							
<i>Ameletus</i> sp.	2	0.62%	Yes	Larva		0	CG
Baetidae							
<i>Acentrella</i> sp.	1	0.31%	Yes	Larva		4	CG
<i>Baetis tricaudatus</i>	18	5.59%	Yes	Larva		4	CG
Ephemerellidae							
<i>Attenella margarita</i>	7	2.17%	Yes	Larva		3	CG
<i>Drunella doddsii</i>	1	0.31%	Yes	Larva		1	SC
<i>Drunella grandis</i>	35	10.87%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	1	0.31%	Yes	Larva		4	SH
<i>Serratella tibialis</i>	3	0.93%	Yes	Larva		2	CG
Heptageniidae							
<i>Rhithrogena</i> sp.	3	0.93%	Yes	Larva		0	CG
Leptophlebiidae							
<i>Paraleptophlebia bicornuta</i>	1	0.31%	Yes	Larva		2	CG
Plecoptera							
Perlidae							
<i>Hesperoperla pacifica</i>	1	0.31%	Yes	Larva		1	PR
Perlodidae							
Perlodidae	1	0.31%	Yes	Larva	Early Instar	2	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	1	0.31%	Yes	Larva	Early Instar	2	SH

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2002

RAI No.: BWTF08GR2002 Sta. Name: Gallatin River above Jack Smith bridge REP 2
Client ID: DOWN2
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	2	0.62%	Yes	Larva		3	SC
Brachycentridae							
<i>Amiocentrus aspilus</i>	1	0.31%	Yes	Larva		3	CG
<i>Brachycentrus</i> sp.	1	0.31%	No	Larva	Early Instar	1	CF
<i>Brachycentrus occidentalis</i>	14	4.35%	Yes	Larva		2	CF
<i>Micrasema</i> sp.	1	0.31%	Yes	Larva		1	SH
Glossosomatidae							
<i>Glossosoma</i> sp.	10	3.11%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	3	0.93%	Yes	Larva		2	PR
<i>Hydropsyche</i> sp.	10	3.11%	Yes	Larva		5	CF
Hydropsychidae	5	1.55%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.31%	Yes	Larva		1	SH
Leptoceridae							
<i>Ceraclea</i> sp.	3	0.93%	Yes	Larva		3	CG
Rhyacophilidae							
Rhyacophila Oreia Gr.	1	0.31%	Yes	Larva		11	PR
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	19	5.90%	No	Larva		5	SC
<i>Optioservus</i> sp.	24	7.45%	Yes	Adult		5	SC
Diptera							
Athericidae							
<i>Atherix</i> sp.	1	0.31%	Yes	Larva		5	PR
Simuliidae							
<i>Simulium</i> sp.	2	0.62%	Yes	Larva		6	CF
Tipulidae							
<i>Antocha</i> sp.	1	0.31%	Yes	Larva		3	CG
<i>Hexatoma</i> sp.	3	0.93%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
Chironomidae	14	4.35%	No	Pupa		10	CG
<i>Cricotopus (Nostococladius)</i> sp.	1	0.31%	Yes	Larva		6	SH
Eukiefferiella Devonica Gr.	21	6.52%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	5	1.55%	Yes	Larva		8	CG
Eukiefferiella Pseudomontana Gr.	2	0.62%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	2	0.62%	Yes	Larva		8	SC
<i>Orthocladus</i> sp.	77	23.91%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	2	0.62%	Yes	Larva		1	CG
<i>Polypedilum</i> sp.	2	0.62%	Yes	Larva		6	SH
Tvetenia Bavarica Gr.	3	0.93%	Yes	Larva		5	CG
Sample Count	322						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2003

RAI No.: BWTF08GR2003 Sta. Name: Gallatin River at Park Boundary (North) REP 1
Client ID: PARK
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	7	2.13%	Yes	Unknown		5	PR
Nematoda	1	0.30%	Yes	Unknown		5	PA
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	27	8.21%	Yes	Unknown		4	CG
Naididae							
<i>Nais</i> sp.	1	0.30%	Yes	Unknown		8	CG
Sphaeriidae							
Sphaeriidae	2	0.61%	Yes	Unknown		8	CF
Ephemeroptera							
Baetidae							
<i>Acentrella</i> sp.	9	2.74%	Yes	Larva		4	CG
<i>Baetis flavistriga</i>	7	2.13%	Yes	Larva		4	CG
<i>Baetis tricaudatus</i>	1	0.30%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	3	0.91%	Yes	Larva		1	SC
<i>Drunella grandis</i>	22	6.69%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	43	13.07%	Yes	Larva		4	SH
Heptageniidae							
<i>Rhithrogena</i> sp.	1	0.30%	Yes	Larva		0	CG
Plecoptera							
Perlidae							
<i>Hesperoperla pacifica</i>	1	0.30%	Yes	Larva		1	PR
Perlodidae							
Perlodidae	2	0.61%	Yes	Larva	Early Instar	2	PR
<i>Skwala</i> sp.	6	1.82%	Yes	Larva		3	PR
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	12	3.65%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus</i> sp.	1	0.30%	No	Larva	Early Instar	1	CF
<i>Brachycentrus americanus</i>	4	1.22%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	37	11.25%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	50	15.20%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	7	2.13%	Yes	Larva		2	PR
Hydropsychidae	2	0.61%	No	Larva	Early Instar	4	CF
Uenoidae							
<i>Oligophlebodes</i> sp.	2	0.61%	Yes	Larva		3	SC
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	1	0.30%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	1	0.30%	No	Larva		5	SC

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2003

RAI No.: BWTF08GR2003 Sta. Name: Gallatin River at Park Boundary (North) REP 1
Client ID: PARK
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	1	0.30%	Yes	Larva		5	PR
Empididae							
Empididae	2	0.61%	Yes	Pupa		6	PR
Simuliidae							
<i>Simulium</i> sp.	1	0.30%	Yes	Larva		6	CF
Tipulidae							
<i>Hexatoma</i> sp.	11	3.34%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
Chironomidae	3	0.91%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	2	0.61%	Yes	Larva		7	CG
<i>Corynoneura</i> sp.	1	0.30%	Yes	Larva		7	CG
<i>Cricotopus (Nostococladus)</i> sp.	6	1.82%	Yes	Larva		6	SH
<i>Eukiefferiella</i> sp.	2	0.61%	No	Larva	Early Instar	8	CG
<i>Eukiefferiella</i> Devonica Gr.	2	0.61%	Yes	Larva		8	CG
<i>Eukiefferiella</i> Gracei Gr.	3	0.91%	Yes	Larva		8	CG
<i>Micropsectra</i> sp.	4	1.22%	Yes	Larva		4	CG
<i>Orthocladus</i> sp.	36	10.94%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	2	0.61%	Yes	Larva		1	CG
Tanytarsini	1	0.30%	No	Larva	Early Instar	6	CF
<i>Tvetenia</i> Bavarica Gr.	2	0.61%	Yes	Larva		5	CG
Sample Count	329						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2004

RAI No.: BWTF08GR2004 Sta. Name: Gallatin River at Park Boundary (North) REP 2
Client ID: PARK
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	5	1.55%	Yes	Unknown		5	PR
Enchytraeidae							
<i>Enchytraeus</i> sp.	1	0.31%	Yes	Unknown		4	CG
<i>Mesenchytraeus</i> sp.	31	9.63%	Yes	Unknown		4	CG
Naididae							
<i>Nais</i> sp.	2	0.62%	Yes	Unknown		8	CG
Ephemeroptera							
Baetidae							
<i>Acentrella</i> sp.	7	2.17%	Yes	Larva		4	CG
Baetidae	1	0.31%	No	Larva	Damaged	4	CG
<i>Baetis tricaudatus</i>	6	1.86%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	11	3.42%	Yes	Larva		1	SC
<i>Drunella grandis</i>	21	6.52%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	36	11.18%	Yes	Larva		4	SH
<i>Serratella tibialis</i>	2	0.62%	Yes	Larva		2	CG
Heptageniidae							
<i>Cinygmula</i> sp.	1	0.31%	Yes	Larva		0	SC
<i>Rhithrogena</i> sp.	2	0.62%	Yes	Larva		0	CG
Plecoptera							
Nemouridae							
<i>Zapada cinctipes</i>	1	0.31%	Yes	Larva		3	SH
Perlidae							
<i>Hesperoperla pacifica</i>	1	0.31%	Yes	Larva		1	PR
Perlodidae							
<i>Skwala</i> sp.	6	1.86%	Yes	Larva		3	PR
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	6	1.86%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus occidentalis</i>	25	7.76%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	80	24.84%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	9	2.80%	Yes	Larva		2	PR
Hydropsychidae	4	1.24%	No	Larva	Early Instar	4	CF
Coleoptera							
Elmidae							
<i>Heterlimnius</i> sp.	1	0.31%	Yes	Adult		3	CG
Diptera							
Tipulidae							
<i>Hexatoma</i> sp.	10	3.11%	Yes	Larva		2	PR
<i>Tipula</i> sp.	1	0.31%	Yes	Larva		4	SH

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2004

RAI No.: BWTF08GR2004 Sta. Name: Gallatin River at Park Boundary (North) REP 2
Client ID: PARK
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Chironomidae	7	2.17%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.31%	Yes	Larva		7	CG
<i>Cricotopus (Cricotopus)</i> sp.	1	0.31%	Yes	Larva		7	SH
<i>Cricotopus (Nostococladius)</i> sp.	11	3.42%	Yes	Larva		6	SH
<i>Diamesa</i> sp.	3	0.93%	Yes	Larva		5	CG
<i>Eukiefferiella</i> sp.	2	0.62%	No	Larva	Early Instar	8	CG
<i>Eukiefferiella Brehmi</i> Gr.	1	0.31%	Yes	Larva		8	CG
<i>Eukiefferiella Gracei</i> Gr.	5	1.55%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	1	0.31%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	1	0.31%	Yes	Larva		4	CG
<i>Orthocladus</i> sp.	12	3.73%	Yes	Larva		6	CG
<i>Tvetenia Bavarica</i> Gr.	7	2.17%	Yes	Larva		5	CG
Sample Count	322						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2005

RAI No.: BWTF08GR2005

Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 1

Client ID: WEST

Date Coll.: 9/12/2008

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	11	3.37%	Yes	Unknown		5	PR
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	64	19.63%	Yes	Unknown		4	CG
Naididae							
<i>Nais</i> sp.	2	0.61%	Yes	Unknown		8	CG
Planariidae							
<i>Polycelis coronata</i>	4	1.23%	Yes	Unknown		1	OM
Ephemeroptera							
Baetidae							
<i>Acentrella</i> sp.	1	0.31%	Yes	Larva		4	CG
<i>Baetis</i> sp.	2	0.61%	No	Larva	Damaged	5	CG
<i>Baetis flavistriga</i>	3	0.92%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	5	1.53%	Yes	Larva		1	SC
<i>Drunella grandis</i>	27	8.28%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	7	2.15%	Yes	Larva		4	SH
<i>Serratella tibialis</i>	1	0.31%	Yes	Larva		2	CG
Heptageniidae							
Heptageniidae	2	0.61%	Yes	Larva	Early Instar	4	SC
Leptophlebiidae							
<i>Paraleptophlebia</i> sp.	1	0.31%	Yes	Larva		1	CG
Plecoptera							
Nemouridae							
<i>Zapada cinctipes</i>	2	0.61%	Yes	Larva		3	SH
Perlodidae							
<i>Skwala</i> sp.	3	0.92%	Yes	Larva		3	PR
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	4	1.23%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus americanus</i>	1	0.31%	Yes	Larva		1	CF
Hydropsychidae							
<i>Arctopsyche grandis</i>	3	0.92%	Yes	Larva		2	PR
Lepidostomatidae							
<i>Lepidostoma</i> sp.	5	1.53%	Yes	Larva		1	SH
Coleoptera							
Elmidae							
<i>Heterlimnius</i> sp.	1	0.31%	Yes	Larva		3	CG
<i>Optioservus</i> sp.	3	0.92%	Yes	Larva		5	SC

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2005

RAI No.: BWTF08GR2005 Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 1
Client ID: WEST
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	6	1.84%	Yes	Larva		5	PR
Psychodidae							
Psychodidae	1	0.31%	Yes	Larva		4	CG
Tipulidae							
<i>Hexatoma</i> sp.	2	0.61%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
Chironomidae	25	7.67%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.31%	Yes	Larva		7	CG
<i>Cricotopus (Cricotopus)</i> sp.	2	0.61%	Yes	Larva		7	SH
<i>Cricotopus trifascia</i>	5	1.53%	Yes	Larva		7	SH
<i>Diamesa</i> sp.	2	0.61%	Yes	Larva		5	CG
Eukiefferiella Claripennis Gr.	1	0.31%	Yes	Larva		8	CG
Eukiefferiella Devonica Gr.	6	1.84%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	23	7.06%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	2	0.61%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	32	9.82%	Yes	Larva		4	CG
<i>Orthocladus</i> sp.	42	12.88%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	2	0.61%	Yes	Larva		1	CG
Potthastia Longimana Gr.	1	0.31%	Yes	Larva		2	CG
<i>Stictochironomus</i> sp.	4	1.23%	Yes	Larva		5	CG
Tanytarsini	1	0.31%	No	Larva	Early Instar	6	CF
Tvetenia Bavarica Gr.	16	4.91%	Yes	Larva		5	CG
	Sample Count	326					

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2006

RAI No.: BWTF08GR2006 Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 2
Client ID: WEST
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	7	2.28%	Yes	Unknown		5	PR
Nematoda	1	0.33%	Yes	Unknown		5	PA
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	59	19.22%	Yes	Unknown		4	CG
Naididae							
<i>Nais</i> sp.	7	2.28%	Yes	Unknown		8	CG
Ephemeroptera							
Baetidae							
<i>Baetis</i> sp.	2	0.65%	No	Larva	Early Instar	5	CG
<i>Baetis tricaudatus</i>	1	0.33%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	4	1.30%	Yes	Larva		1	SC
<i>Drunella grandis</i>	19	6.19%	Yes	Larva		2	PR
<i>Ephemerella inermis</i>	7	2.28%	Yes	Larva		4	SH
Heptageniidae							
<i>Cinygmula</i> sp.	1	0.33%	Yes	Larva		0	SC
<i>Rhithrogena</i> sp.	3	0.98%	Yes	Larva		0	CG
Plecoptera							
Perlodidae							
<i>Skwala</i> sp.	1	0.33%	Yes	Larva		3	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	1	0.33%	Yes	Larva	Early Instar	2	SH
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	1	0.33%	Yes	Larva		3	SC
<i>Apatania</i> sp.	1	0.33%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus americanus</i>	1	0.33%	Yes	Larva		1	CF
<i>Micrasema</i> sp.	1	0.33%	Yes	Larva		1	SH
Glossosomatidae							
<i>Glossosoma</i> sp.	2	0.65%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	5	1.63%	Yes	Larva		2	PR
Hydropsychidae	2	0.65%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.33%	Yes	Larva		1	SH
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	8	2.61%	Yes	Larva		5	SC

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2006

RAI No.: BWTF08GR2006 Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 2
Client ID: WEST
Date Coll.: 9/12/2008 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	3	0.98%	Yes	Larva		5	PR
Empididae							
<i>Chelifera</i> sp.	1	0.33%	Yes	Larva		5	PR
Psychodidae							
Psychodidae	1	0.33%	Yes	Larva		4	CG
Tipulidae							
<i>Hexatoma</i> sp.	1	0.33%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
Chironomidae	16	5.21%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.33%	Yes	Larva		7	CG
<i>Cricotopus trifascia</i>	6	1.95%	Yes	Larva		7	SH
Eukiefferiella Claripennis Gr.	2	0.65%	Yes	Larva		8	CG
Eukiefferiella Devonica Gr.	24	7.82%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	18	5.86%	Yes	Larva		8	CG
<i>Micropsectra</i> sp.	15	4.89%	Yes	Larva		4	CG
<i>Orthocladus</i> sp.	63	20.52%	Yes	Larva		6	CG
<i>Parametriocnemus</i> sp.	1	0.33%	Yes	Larva		5	CG
Potthastia Longimana Gr.	1	0.33%	Yes	Larva		2	CG
<i>Stempellina</i> sp.	1	0.33%	Yes	Larva		2	CG
Tvetenia Bavarica Gr.	18	5.86%	Yes	Larva		5	CG
Sample Count	307						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2007

RAI No.: BWTF08GR2007

Sta. Name: Gallatin River just upstream of West Fork
confluence REP 1

Client ID: UPSTREAM

Date Coll.: 9/12/2008

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Non-Insect							
Acari	1	0.31%	Yes	Unknown		5	PR
Nematoda	1	0.31%	Yes	Unknown		5	PA
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	1	0.31%	Yes	Unknown		4	CG
Haplotaxidae							
<i>Haplotaxis</i> sp.	1	0.31%	Yes	Unknown		11	PR
Ephemeroptera							
Baetidae							
<i>Baetis tricaudatus</i>	44	13.84%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	20	6.29%	Yes	Larva		1	SC
<i>Drunella grandis</i>	2	0.63%	Yes	Larva		2	PR
Heptageniidae							
Heptageniidae	2	0.63%	No	Larva	Damaged	4	SC
<i>Rhithrogena</i> sp.	1	0.31%	Yes	Larva		0	CG
Plecoptera							
Chloroperlidae							
<i>Sweltsa</i> sp.	3	0.94%	Yes	Larva		0	PR
Perlidae							
<i>Claassenia sabulosa</i>	4	1.26%	Yes	Larva		3	PR
<i>Hesperoperla pacifica</i>	21	6.60%	Yes	Larva		1	PR
Pteronarcyidae							
<i>Pteronarcys californica</i>	15	4.72%	Yes	Larva		2	SH
Trichoptera							
Brachycentridae							
<i>Brachycentrus americanus</i>	7	2.20%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	19	5.97%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	14	4.40%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	7	2.20%	Yes	Larva		2	PR
<i>Hydropsyche</i> sp.	32	10.06%	Yes	Larva		5	CF
Rhyacophilidae							
<i>Rhyacophila</i> sp.	3	0.94%	Yes	Larva	Early Instar	1	PR
<i>Rhyacophila Oreia</i> Gr.	6	1.89%	Yes	Larva		11	PR
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	6	1.89%	No	Larva		5	SC
<i>Optioservus</i> sp.	3	0.94%	Yes	Adult		5	SC

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2007

RAI No.: BWTF08GR2007
Client ID: UPSTREAM
Date Coll.: 9/12/2008

Sta. Name: Gallatin River just upstream of West Fork
confluence REP 1

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	14	4.40%	Yes	Larva		5	PR
Blephariceridae							
Blephariceridae	1	0.31%	Yes	Larva	Early Instar	0	SC
Simuliidae							
Simuliidae	4	1.26%	No	Pupa		6	CF
<i>Simulium</i> sp.	65	20.44%	Yes	Larva		6	CF
Tipulidae							
<i>Hexatoma</i> sp.	4	1.26%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
<i>Cardiocladius</i> sp.	3	0.94%	Yes	Larva		5	PR
Chironomidae	5	1.57%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.31%	Yes	Larva		7	CG
<i>Diamesa</i> sp.	1	0.31%	Yes	Larva		5	CG
Orthoclaadiinae	1	0.31%	No	Larva	Early Instar	6	CG
<i>Orthocladus</i> sp.	6	1.89%	Yes	Larva		6	CG
Sample Count	318						

Taxa Listing

Project ID: BWTF08GR2
RAI No.: BWTF08GR2008

RAI No.: BWTF08GR2008
Client ID: UPSTREAM
Date Coll.: 9/12/2008

Sta. Name: Gallatin River just upstream of West Fork
confluence REP 2

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	7	2.27%	Yes	Larva		5	PR
Blephariceridae							
Blephariceridae	1	0.32%	Yes	Larva	Early Instar	0	SC
Simuliidae							
Simuliidae	18	5.84%	No	Pupa		6	CF
<i>Simulium</i> sp.	86	27.92%	Yes	Larva		6	CF
Tanyderidae							
<i>Protanyderus</i> sp.	1	0.32%	Yes	Larva		5	UN
Tipulidae							
<i>Hexatoma</i> sp.	7	2.27%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
<i>Cardiocladius</i> sp.	2	0.65%	Yes	Larva		5	PR
<i>Cladotanytarsus</i> sp.	1	0.32%	Yes	Larva		7	CG
Eukiefferiella Devonica Gr.	1	0.32%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	1	0.32%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	1	0.32%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	1	0.32%	Yes	Larva		4	CG
<i>Orthocladius</i> sp.	10	3.25%	Yes	Larva		6	CG
Tanytarsini	1	0.32%	No	Larva	Early Instar	6	CF
Tvetenia Bavarica Gr.	4	1.30%	Yes	Larva		5	CG
Sample Count	308						

Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2001
Sta. Name: Gallatin River above Jack Smith bridge REP 1
Client ID: DOWN2
STORET ID:
Coll. Date: 9/12/2008

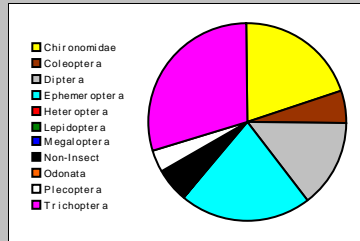
Abundance Measures

Sample Count: 319
Sample Abundance: 4,785.00 6.67% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 1832 m; Time: 2:20 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	19	5.96%
Odonata			
Ephemeroptera	6	68	21.32%
Plecoptera	3	10	3.13%
Heteroptera			
Megaloptera			
Trichoptera	5	96	30.09%
Lepidoptera			
Coleoptera	1	17	5.33%
Diptera	2	45	14.11%
Chironomidae	11	64	20.06%

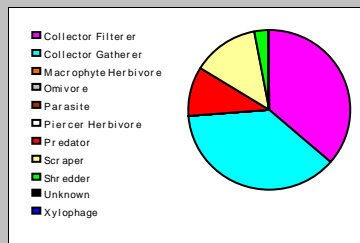


Dominant Taxa

Category	A	PRA
Baetis tricaudatus	37	11.60%
Hydropsyche	36	11.29%
Simulium	32	10.03%
Eukiefferiella Devonica Gr.	23	7.21%
Orthocladius	21	6.58%
Hydropsychidae	20	6.27%
Glossosoma	20	6.27%
Optioservus	17	5.33%
Drunella grandis	17	5.33%
Brachycentrus occidentalis	16	5.02%
Simuliidae	10	3.13%
Nais	8	2.51%
Mesenchytraeus	8	2.51%
Hesperoperla pacifica	7	2.19%
Chironomidae	7	2.19%

Functional Composition

Category	R	A	PRA
Predator	6	31	9.72%
Parasite	1	1	0.31%
Collector Gatherer	15	120	37.62%
Collector Filterer	3	115	36.05%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	4	43	13.48%
Shredder	4	9	2.82%
Omnivore			
Unknown			

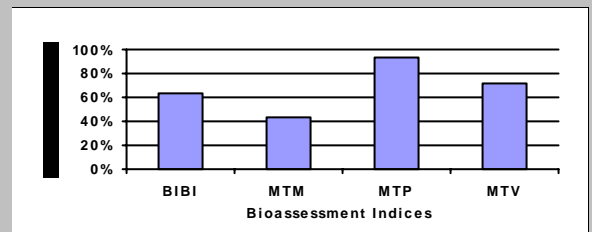


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	33	3	3		3
Non-Insect Percent	5.96%				
E Richness	6	3		3	
P Richness	3	1		2	
T Richness	5	3		3	
EPT Richness	14		3		0
EPT Percent	54.55%		3		1
Oligochaeta+Hirudinea Percent	5.33%				
Baetidae/Ephemeroptera	0.544				
Hydropsychidae/Trichoptera	0.583				
<i>Dominance</i>					
Dominant Taxon Percent	11.60%		3		3
Dominant Taxa (2) Percent	22.88%				
Dominant Taxa (3) Percent	32.92%	5			
Dominant Taxa (10) Percent	74.92%				
<i>Diversity</i>					
Shannon H (loge)	2.808				
Shannon H (log2)	4.051		3		
Margalef D	5.716				
Simpson D	0.078				
Evenness	0.054				
<i>Function</i>					
Predator Richness	6		3		
Predator Percent	9.72%	1			
Filterer Richness	3				
Filterer Percent	36.05%			0	
Collector Percent	73.67%		2		1
Scraper+Shredder Percent	16.30%		2		0
Scraper/Filterer	0.374				
Scraper/Scraper+Filterer	0.272				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	3.13%				
Swimmer Richness	1				
Swimmer Percent	11.60%				
Clinger Richness	13	3			
Clinger Percent	59.25%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	2.19%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	0.31%				
Air Breather Richness	0				
Air Breather Percent	0.00%				
<i>Voltinism</i>					
Univoltine Richness	15				
Semivoltine Richness	4	3			
Multivoltine Percent	32.29%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	6.90%				
Metals Tolerance Index	4.277				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	7.21%	5		2	
Hilsenhoff Biotic Index	4.489		3		1
Intolerant Percent	23.82%				
Supertolerant Percent	12.54%				
CTQa	70.548				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	32	64.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	13	72.22%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	9	42.86%	Moderate



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2002
Sta. Name: Gallatin River above Jack Smith bridge REP 2
Client ID: DOWN2
STORET ID:
Coll. Date: 9/12/2008

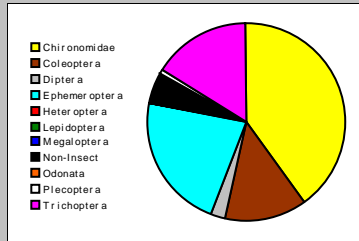
Abundance Measures

Sample Count: 322
Sample Abundance: 4,293.33 7.50% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 1832 m; Time: 2:20 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	16	4.97%
Odonata			
Ephemeroptera	10	72	22.36%
Plecoptera	3	3	0.93%
Heteroptera			
Megaloptera			
Trichoptera	10	52	16.15%
Lepidoptera			
Coleoptera	1	43	13.35%
Diptera	4	7	2.17%
Chironomidae	9	129	40.06%

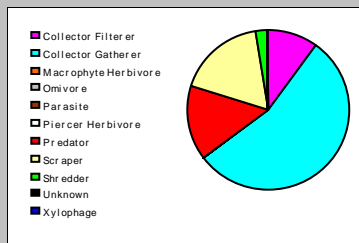


Dominant Taxa

Category	A	PRA
Orthocladus	77	23.91%
Optioservus	43	13.35%
Drunella grandis	35	10.87%
Eukiefferiella Devonica Gr.	21	6.52%
Baetis tricaudatus	18	5.59%
Chironomidae	14	4.35%
Brachycentrus occidentalis	14	4.35%
Hydropsyche	10	3.11%
Glossosoma	10	3.11%
Attenella marqarita	7	2.17%
Mesenchytraeus	5	1.55%
Hydropsychidae	5	1.55%
Eukiefferiella Gracei Gr.	5	1.55%
Nais	4	1.24%
Acari	4	1.24%

Functional Composition

Category	R	A	PRA
Predator	8	49	15.22%
Parasite			
Collector Gatherer	20	176	54.66%
Collector Filterer	3	32	9.94%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	58	18.01%
Shredder	6	7	2.17%
Omnivore			
Unknown			

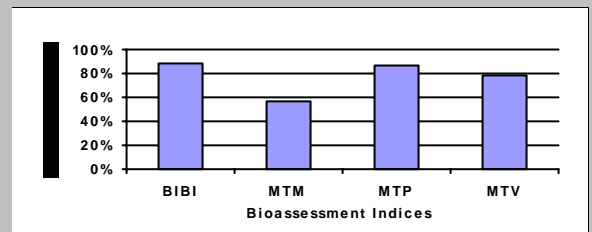


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	42	5	3		3
Non-Insect Percent	4.97%				
E Richness	10	5		3	
P Richness	3	1		2	
T Richness	10	5		3	
EPT Richness	23		3		3
EPT Percent	39.44%		2		0
Oligochaeta+Hirudinea Percent	3.73%				
Baetidae/Ephemeroptera	0.264				
Hydropsychidae/Trichoptera	0.346				
<i>Dominance</i>					
Dominant Taxon Percent	23.91%		3		3
Dominant Taxa (2) Percent	37.27%				
Dominant Taxa (3) Percent	48.14%	5			
Dominant Taxa (10) Percent	77.33%				
<i>Diversity</i>					
Shannon H (loge)	2.798				
Shannon H (log2)	4.037		3		
Margalef D	7.262				
Simpson D	0.111				
Evenness	0.053				
<i>Function</i>					
Predator Richness	8		3		
Predator Percent	15.22%	3			
Filterer Richness	3				
Filterer Percent	9.94%			2	
Collector Percent	64.60%		2		2
Scraper+Shredder Percent	20.19%		2		0
Scraper/Filterer	1.813				
Scraper/Scraper+Filterer	0.644				
<i>Habit</i>					
Burrower Richness	1				
Burrower Percent	5.28%				
Swimmer Richness	4				
Swimmer Percent	6.83%				
Clinger Richness	21	5			
Clinger Percent	46.27%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	1.24%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	0.62%				
Air Breather Richness	2				
Air Breather Percent	1.24%				
<i>Voltinism</i>					
Univoltine Richness	23				
Semivoltine Richness	5	5			
Multivoltine Percent	47.21%		2		
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	1.24%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	4.35%				
Metals Tolerance Index	4.025				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	13.66%	5		1	
Hilsenhoff Biotic Index	4.717		3		1
Intolerant Percent	25.78%				
Supertolerant Percent	14.91%				
CTQa	57.083				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	44	88.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	26	86.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	14	77.78%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	12	57.14%	Slight



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2003
Sta. Name: Gallatin River at Park Boundary (North) REP 1
Client ID: PARK
STORET ID:
Coll. Date: 9/12/2008

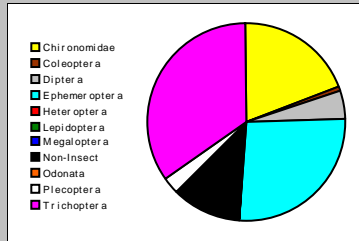
Abundance Measures

Sample Count: 329
Sample Abundance: 4,935.00 6.67% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 2045.2 m; Time: 11:40 am

Taxonomic Composition

Category	R	A	PRA
Non-Insect	5	38	11.55%
Odonata			
Ephemeroptera	7	86	26.14%
Plecoptera	3	9	2.74%
Heteroptera			
Megaloptera			
Trichoptera	6	115	34.95%
Lepidoptera			
Coleoptera	1	2	0.61%
Diptera	4	15	4.56%
Chironomidae	9	64	19.45%

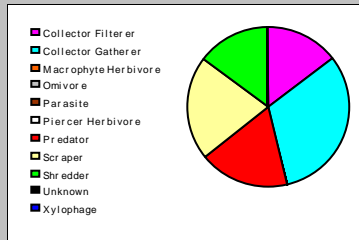


Dominant Taxa

Category	A	PRA
Glossosoma	50	15.20%
Ephemerella inermis	43	13.07%
Brachycentrus occidentalis	37	11.25%
Orthocladus	36	10.94%
Mesenchytraeus	27	8.21%
Drunella grandis	22	6.69%
Apatania	12	3.65%
Hexatoma	11	3.34%
Acentrella	9	2.74%
Baetis flavistriga	7	2.13%
Arctopsyche grandis	7	2.13%
Acari	7	2.13%
Skwala	6	1.82%
Cricotopus (Nostococladus)	6	1.82%
Micropsectra	4	1.22%

Functional Composition

Category	R	A	PRA
Predator	9	59	17.93%
Parasite	1	1	0.30%
Collector Gatherer	14	103	31.31%
Collector Filterer	4	48	14.59%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	69	20.97%
Shredder	2	49	14.89%
Omnivore			
Unknown			

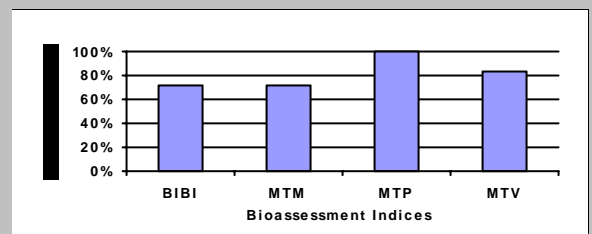


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	35	3	3		3
Non-Insect Percent	11.55%				
E Richness	7	3		3	
P Richness	3	1		2	
T Richness	6	3		3	
EPT Richness	16		3		1
EPT Percent	63.83%		3		2
Oligochaeta+Hirudinea Percent	8.51%				
Baetidae/Ephemeroptera	0.198				
Hydropsychidae/Trichoptera	0.078				
<i>Dominance</i>					
Dominant Taxon Percent	15.20%		3		3
Dominant Taxa (2) Percent	28.27%				
Dominant Taxa (3) Percent	39.51%	5			
Dominant Taxa (10) Percent	77.20%				
<i>Diversity</i>					
Shannon H (loge)	2.806				
Shannon H (log2)	4.048		3		
Margalef D	5.897				
Simpson D	0.084				
Evenness	0.054				
<i>Function</i>					
Predator Richness	9		3		
Predator Percent	17.93%	3			
Filterer Richness	4				
Filterer Percent	14.59%			1	
Collector Percent	45.90%		3		3
Scraper+Shredder Percent	35.87%		3		1
Scraper/Filterer	1.438				
Scraper/Scraper+Filterer	0.590				
<i>Habit</i>					
Burrower Richness	1				
Burrower Percent	4.26%				
Swimmer Richness	3				
Swimmer Percent	5.17%				
Clinger Richness	13	3			
Clinger Percent	58.66%				
<i>Characteristics</i>					
Cold Stenotherm Richness	4				
Cold Stenotherm Percent	6.99%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	3.34%				
<i>Voltinism</i>					
Univoltine Richness	16				
Semivoltine Richness	5	5			
Multivoltine Percent	27.05%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	3.34%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	19.15%				
Metals Tolerance Index	3.052				
Pollution Sensitive Richness	5	5		3	
Pollution Tolerant Percent	1.52%	5		3	
Hilsenhoff Biotic Index	3.261		3		2
Intolerant Percent	42.86%				
Supertolerant Percent	3.95%				
CTQa	66.250				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	30	100.00%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	15	83.33%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	15	71.43%	Slight



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2004
Sta. Name: Gallatin River at Park Boundary (North) REP 2
Client ID: PARK
STORET ID:
Coll. Date: 9/12/2008

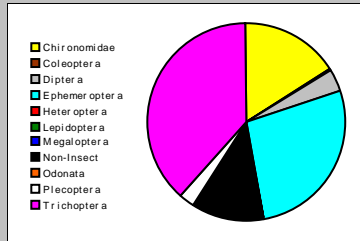
Abundance Measures

Sample Count: 322
Sample Abundance: 2,576.00 12.50% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 2045.2 m; Time: 11:40 am

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	39	12.11%
Odonata			
Ephemeroptera	8	87	27.02%
Plecoptera	3	8	2.48%
Heteroptera			
Megaloptera			
Trichoptera	4	124	38.51%
Lepidoptera			
Coleoptera	1	1	0.31%
Diptera	2	11	3.42%
Chironomidae	10	52	16.15%

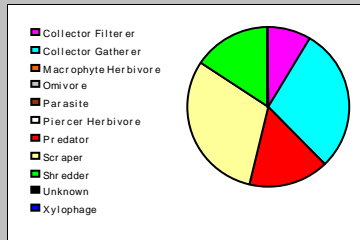


Dominant Taxa

Category	A	PRA
Glossosoma	80	24.84%
Ephemerella inermis	36	11.18%
Mesenchytraeus	31	9.63%
Brachycentrus occidentalis	25	7.76%
Drunella grandis	21	6.52%
Orthocladus	12	3.73%
Drunella doddsii	11	3.42%
Cricotopus (Nostococladus)	11	3.42%
Hexatoma	10	3.11%
Arctopsyche arandis	9	2.80%
Tvetenia Bavarica Gr.	7	2.17%
Chironomidae	7	2.17%
Acentrella	7	2.17%
Skwala	6	1.86%
Apatania	6	1.86%

Functional Composition

Category	R	A	PRA
Predator	6	52	16.15%
Parasite			
Collector Gatherer	15	92	28.57%
Collector Filterer	1	29	9.01%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	99	30.75%
Shredder	5	50	15.53%
Omnivore			
Unknown			

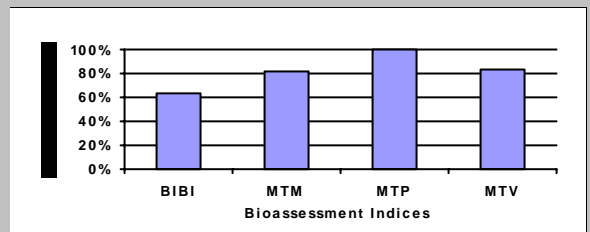


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	32	3	3		3
Non-Insect Percent	12.11%				
E Richness	8	3		3	
P Richness	3	1		2	
T Richness	4	1		2	
EPT Richness	15		3		1
EPT Percent	68.01%		3		2
Oligochaeta+Hirudinea Percent	10.56%				
Baetidae/Ephemeroptera	0.161				
Hydropsychidae/Trichoptera	0.105				
<i>Dominance</i>					
Dominant Taxon Percent	24.84%		3		3
Dominant Taxa (2) Percent	36.02%				
Dominant Taxa (3) Percent	45.65%	5			
Dominant Taxa (10) Percent	76.40%				
<i>Diversity</i>					
Shannon H (loge)	2.682				
Shannon H (log2)	3.869		3		
Margalef D	5.410				
Simpson D	0.109				
Evenness	0.059				
<i>Function</i>					
Predator Richness	6		3		
Predator Percent	16.15%	3			
Filterer Richness	1				
Filterer Percent	9.01%			2	
Collector Percent	37.58%		3		3
Scraper+Shredder Percent	46.27%		3		2
Scraper/Filterer	3.414				
Scraper/Scraper+Filterer	0.773				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	5.59%				
Swimmer Richness	2				
Swimmer Percent	4.04%				
Clinger Richness	13	3			
Clinger Percent	65.22%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	8.70%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	2				
Air Breather Percent	3.42%				
<i>Voltinism</i>					
Univoltine Richness	15				
Semivoltine Richness	4	3			
Multivoltine Percent	22.05%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	3.42%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	31.06%				
Metals Tolerance Index	2.673				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	0.31%	5		3	
Hilsenhoff Biotic Index	2.873		3		3
Intolerant Percent	50.31%				
Supertolerant Percent	5.59%				
CTQa	61.586				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	32	64.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	30	100.00%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	15	83.33%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	17	80.95%	Slight



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2005
Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 1
Client ID: WEST
STORET ID:
Coll. Date: 9/12/2008

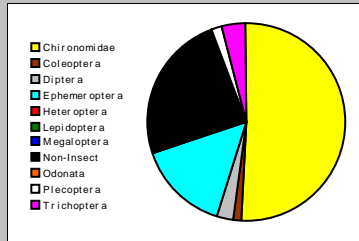
Abundance Measures

Sample Count: 326
Sample Abundance: 9,780.00 3.33% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 1839.2 m; Time: 3:20 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	81	24.85%
Odonata			
Ephemeroptera	8	49	15.03%
Plecoptera	2	5	1.53%
Heteroptera			
Megaloptera			
Trichoptera	4	13	3.99%
Lepidoptera			
Coleoptera	2	4	1.23%
Diptera	3	9	2.76%
Chironomidae	14	165	50.61%

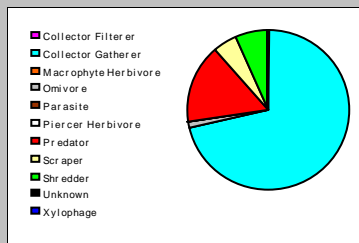


Dominant Taxa

Category	A	PRA
Mesenchytraeus	64	19.63%
Orthocladus	42	12.88%
Micropsectra	32	9.82%
Drunella grandis	27	8.28%
Chironomidae	25	7.67%
Eukiefferiella Gracei Gr.	23	7.06%
Tvetenia Bavarica Gr.	16	4.91%
Acari	11	3.37%
Ephemerella inermis	7	2.15%
Eukiefferiella Devonica Gr.	6	1.84%
Atherix	6	1.84%
Lepidostoma	5	1.53%
Drunella doddsii	5	1.53%
Cricotopus trifascia	5	1.53%
Apatania	4	1.23%

Functional Composition

Category	R	A	PRA
Predator	6	52	15.95%
Parasite			
Collector Gatherer	19	231	70.86%
Collector Filterer	1	2	0.61%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	16	4.91%
Shredder	5	21	6.44%
Omnivore	1	4	1.23%
Unknown			

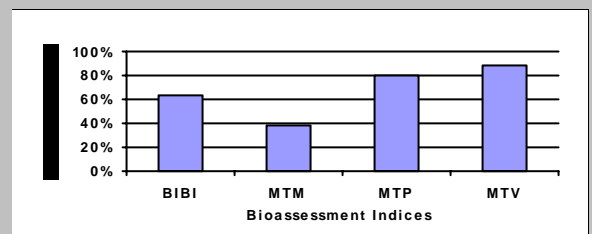


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	37	3	3		3
Non-Insect Percent	24.85%				
E Richness	8	3		3	
P Richness	2	1		2	
T Richness	4	1		2	
EPT Richness	14		3		0
EPT Percent	20.55%		1		0
Oligochaeta+Hirudinea Percent	20.25%				
Baetidae/Ephemeroptera	0.122				
Hydropsychidae/Trichoptera	0.231				
<i>Dominance</i>					
Dominant Taxon Percent	19.63%		3		3
Dominant Taxa (2) Percent	32.52%				
Dominant Taxa (3) Percent	42.33%	5			
Dominant Taxa (10) Percent	77.61%				
<i>Diversity</i>					
Shannon H (loge)	2.791				
Shannon H (log2)	4.026		3		
Margalef D	6.319				
Simpson D	0.097				
Evenness	0.055				
<i>Function</i>					
Predator Richness	6		3		
Predator Percent	15.95%	3			
Filterer Richness	1				
Filterer Percent	0.61%			3	
Collector Percent	71.47%		2		1
Scraper+Shredder Percent	11.35%		1		0
Scraper/Filterer	8.000				
Scraper/Scraper+Filterer	0.889				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	9.51%				
Swimmer Richness	3				
Swimmer Percent	2.15%				
Clinger Richness	12	3			
Clinger Percent	18.71%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	2.76%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	1.23%				
Air Breather Richness	2				
Air Breather Percent	0.92%				
<i>Voltinism</i>					
Univoltine Richness	15				
Semivoltine Richness	4	3			
Multivoltine Percent	57.06%		2		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.61%				
Sediment Sensitive Richness	1				
Sediment Sensitive Percent	0.92%				
Metals Tolerance Index	3.141				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	4.29%	5		3	
Hilsenhoff Biotic Index	4.945		3		1
Intolerant Percent	15.95%				
Supertolerant Percent	18.10%				
CTQa	66.207				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	32	64.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	24	80.00%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	16	88.89%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	8	38.10%	Moderate



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2006
Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge REP 2
Client ID: WEST
STORET ID:
Coll. Date: 9/12/2008

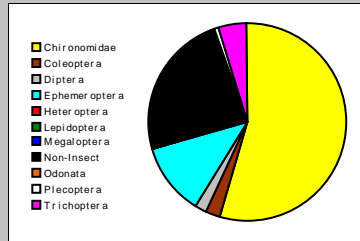
Abundance Measures

Sample Count: 307
Sample Abundance: 4,605.00 6.67% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 1839.2 m; Time: 3:20 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	74	24.10%
Odonata			
Ephemeroptera	6	37	12.05%
Plecoptera	2	2	0.65%
Heteroptera			
Megaloptera			
Trichoptera	7	14	4.56%
Lepidoptera			
Coleoptera	1	8	2.61%
Diptera	4	6	1.95%
Chironomidae	11	166	54.07%

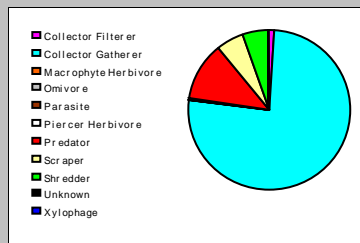


Dominant Taxa

Category	A	PRA
Orthocladus	63	20.52%
Mesenchytraeus	59	19.22%
Eukiefferiella Devonica Gr.	24	7.82%
Drunella grandis	19	6.19%
Tvetenia Bavarica Gr.	18	5.86%
Eukiefferiella Gracei Gr.	18	5.86%
Chironomidae	16	5.21%
Micropsectra	15	4.89%
Optioservus	8	2.61%
Nais	7	2.28%
Ephemera inermis	7	2.28%
Acari	7	2.28%
Cricotopus trifascia	6	1.95%
Arctopsyche grandis	5	1.63%
Drunella doddsii	4	1.30%

Functional Composition

Category	R	A	PRA
Predator	7	37	12.05%
Parasite	1	1	0.33%
Collector Gatherer	15	233	75.90%
Collector Filterer	1	3	0.98%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	6	17	5.54%
Shredder	5	16	5.21%
Omnivore			
Unknown			

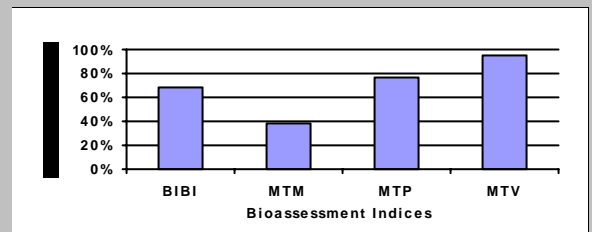


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	35	3	3		3
Non-Insect Percent	24.10%				
E Richness	6	3		3	
P Richness	2	1		2	
T Richness	7	3		3	
EPT Richness	15		3		1
EPT Percent	17.26%		1		0
Oligochaeta+Hirudinea Percent	21.50%				
Baetidae/Ephemeroptera	0.081				
Hydropsychidae/Trichoptera	0.500				
<i>Dominance</i>					
Dominant Taxon Percent	20.52%		3		3
Dominant Taxa (2) Percent	39.74%				
Dominant Taxa (3) Percent	47.56%	5			
Dominant Taxa (10) Percent	80.46%				
<i>Diversity</i>					
Shannon H (loge)	2.624				
Shannon H (log2)	3.786		3		
Margalef D	6.049				
Simpson D	0.113				
Evenness	0.061				
<i>Function</i>					
Predator Richness	7		3		
Predator Percent	12.05%	3			
Filterer Richness	1				
Filterer Percent	0.98%			3	
Collector Percent	76.87%		2		1
Scraper+Shredder Percent	10.75%		1		0
Scraper/Filterer	5.667				
Scraper/Scraper+Filterer	0.850				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	5.86%				
Swimmer Richness	1				
Swimmer Percent	0.98%				
Clinger Richness	14	3			
Clinger Percent	20.20%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	1.95%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	2				
Air Breather Percent	0.65%				
<i>Voltinism</i>					
Univoltine Richness	17				
Semivoltine Richness	4	3			
Multivoltine Percent	57.65%		2		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.33%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	2.28%				
Metals Tolerance Index	3.961				
Pollution Sensitive Richness	6	5		3	
Pollution Tolerant Percent	3.91%	5		3	
Hilsenhoff Biotic Index	5.251		2		0
Intolerant Percent	13.36%				
Supertolerant Percent	21.82%				
CTQa	60.767				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	34	68.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	23	76.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	17	94.44%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	8	38.10%	Moderate



Metrics Report

Project ID: BWTF08GR2
RAI No.: BWTF08GR2007
Sta. Name: Gallatin River just upstream of West Fork confluence REP 1
Client ID: UPSTREAM
STORET ID:
Coll. Date: 9/12/2008

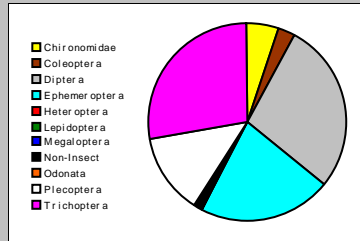
Abundance Measures

Sample Count: 318
Sample Abundance: 1,362.86 23.33% of sample used

Coll. Procedure: KICK
Sample Notes: Kick: 2 min; Elevation: 1838.9 m; Time: 12:45 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	4	1.26%
Odonata			
Ephemeroptera	4	69	21.70%
Plecoptera	4	43	13.52%
Heteroptera			
Megaloptera			
Trichoptera	7	88	27.67%
Lepidoptera			
Coleoptera	1	9	2.83%
Diptera	4	88	27.67%
Chironomidae	4	17	5.35%

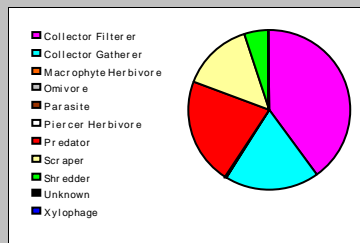


Dominant Taxa

Category	A	PRA
Simulium	65	20.44%
Baetis tricaudatus	44	13.84%
Hydropsyche	32	10.06%
Hesperoperla pacifica	21	6.60%
Drunella doddsii	20	6.29%
Brachycentrus occidentalis	19	5.97%
Pteronarcys californica	15	4.72%
Glossosoma	14	4.40%
Atherix	14	4.40%
Optioservus	9	2.83%
Brachycentrus americanus	7	2.20%
Arctopsyche grandis	7	2.20%
Rhyacophila Oreia Gr.	6	1.89%
Orthocladus	6	1.89%
Chironomidae	5	1.57%

Functional Composition

Category	R	A	PRA
Predator	12	69	21.70%
Parasite	1	1	0.31%
Collector Gatherer	6	60	18.87%
Collector Filterer	4	127	39.94%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	4	46	14.47%
Shredder	1	15	4.72%
Omnivore			
Unknown			

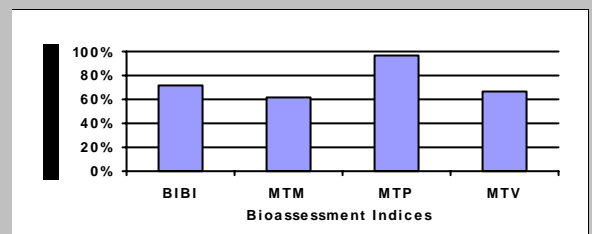


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	28	3	3		2
Non-Insect Percent	1.26%				
E Richness	4	1		2	
P Richness	4	3		3	
T Richness	7	3		3	
EPT Richness	15		3		1
EPT Percent	62.89%		3		2
Oligochaeta+Hirudinea Percent	0.63%				
Baetidae/Ephemeroptera	0.638				
Hydropsychidae/Trichoptera	0.443				
<i>Dominance</i>					
Dominant Taxon Percent	20.44%		3		3
Dominant Taxa (2) Percent	34.28%				
Dominant Taxa (3) Percent	44.34%	5			
Dominant Taxa (10) Percent	79.56%				
<i>Diversity</i>					
Shannon H (loge)	2.646				
Shannon H (log2)	3.817		3		
Margalef D	4.734				
Simpson D	0.100				
Evenness	0.062				
<i>Function</i>					
Predator Richness	12		3		
Predator Percent	21.70%	5			
Filterer Richness	4				
Filterer Percent	39.94%			0	
Collector Percent	58.81%		3		3
Scraper+Shredder Percent	19.18%		2		0
Scraper/Filterer	0.362				
Scraper/Scraper+Filterer	0.266				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	3.77%				
Swimmer Richness	1				
Swimmer Percent	13.84%				
Clinger Richness	14	3			
Clinger Percent	65.09%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	6.60%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	1.26%				
<i>Voltinism</i>					
Univoltine Richness	14				
Semivoltine Richness	7	5			
Multivoltine Percent	19.81%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	1.26%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	6.60%				
Metals Tolerance Index	3.900				
Pollution Sensitive Richness	3	3			2
Pollution Tolerant Percent	7.55%	5			2
Hilsenhoff Biotic Index	3.740		3		2
Intolerant Percent	36.79%				
Supertolerant Percent	1.57%				
CTQa	57.148				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	29	96.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	13	61.90%	Slight



Metrics Report

Project ID: BWTF08GR2
 RAI No.: BWTF08GR2008
 Sta. Name: Gallatin River just upstream of West Fork confluence REP 2
 Client ID: UPSTREAM
 STORET ID:
 Coll. Date: 9/12/2008

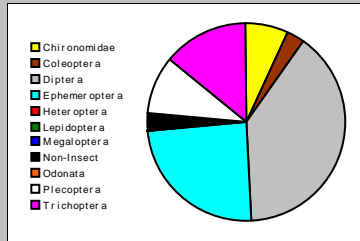
Abundance Measures

Sample Count: 308
 Sample Abundance: 770.00 40.00% of sample used

Coll. Procedure: KICK
 Sample Notes: Kick: 2 min; Elevation: 1838.9 m; Time: 12:45 pm

Taxonomic Composition

Category	R	A	PRA
Non-Insect	4	9	2.92%
Odonata			
Ephemeroptera	5	75	24.35%
Plecoptera	4	30	9.74%
Heteroptera			
Megaloptera			
Trichoptera	6	43	13.96%
Lepidoptera			
Coleoptera	2	9	2.92%
Diptera	5	120	38.96%
Chironomidae	8	22	7.14%

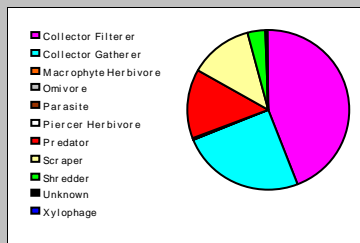


Dominant Taxa

Category	A	PRA
Simulium	86	27.92%
Baetis tricaudatus	37	12.01%
Hydropsyche	21	6.82%
Drunella doddsii	20	6.49%
Simuliidae	18	5.84%
Rhithrogena	15	4.87%
Hesperoperla pacifica	14	4.55%
Pteronarcys californica	11	3.57%
Orthocladius	10	3.25%
Optioservus	8	2.60%
Glossosoma	8	2.60%
Hexatoma	7	2.27%
Atherix	7	2.27%
Mesenchytraeus	6	1.95%
Brachycentrus	5	1.62%

Functional Composition

Category	R	A	PRA
Predator	10	44	14.29%
Parasite	1	1	0.32%
Collector Gatherer	10	77	25.00%
Collector Filterer	5	135	43.83%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	38	12.34%
Shredder	2	12	3.90%
Omnivore			
Unknown	1	1	0.32%



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	34	3	3		3
Non-Insect Percent	2.92%				
E Richness	5	3		2	
P Richness	4	3		3	
T Richness	6	3		3	
EPT Richness	15		3		1
EPT Percent	48.05%		2		1
Oligochaeta+Hirudinea Percent	2.27%				
Baetidae/Ephemeroptera	0.493				
Hydropsychidae/Trichoptera	0.605				
<i>Dominance</i>					
Dominant Taxon Percent	27.92%		3		2
Dominant Taxa (2) Percent	39.94%				
Dominant Taxa (3) Percent	46.75%	5			
Dominant Taxa (10) Percent	77.92%				
<i>Diversity</i>					
Shannon H (loge)	2.590				
Shannon H (log2)	3.737		3		
Margalef D	5.860				
Simpson D	0.132				
Evenness	0.061				
<i>Function</i>					
Predator Richness	10		3		
Predator Percent	14.29%	3			
Filterer Richness	5				
Filterer Percent	43.83%			0	
Collector Percent	68.83%		2		2
Scraper+Shredder Percent	16.23%		2		0
Scraper/Filterer	0.281				
Scraper/Scraper+Filterer	0.220				
<i>Habit</i>					
Burrower Richness	3				
Burrower Percent	3.25%				
Swimmer Richness	1				
Swimmer Percent	12.01%				
Clinger Richness	15	3			
Clinger Percent	66.88%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	6.82%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	2.27%				
<i>Voltinism</i>					
Univoltine Richness	16				
Semivoltine Richness	8	5			
Multivoltine Percent	19.48%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	2.27%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	3.90%				
Metals Tolerance Index	3.894				
Pollution Sensitive Richness	3	3			2
Pollution Tolerant Percent	5.52%	5			2
Hilsenhoff Biotic Index	4.066		3		1
Intolerant Percent	29.22%				
Supertolerant Percent	1.30%				
CTQa	63.100				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	27	90.00%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	10	47.62%	Moderate

