

AUGUST 2012

BIOLOGICAL ASSESSMENT and SEASONAL COMPARISONS
of SITES in the
GALLATIN RIVER DRAINAGE,
GALLATIN COUNTY, MONTANA:
MACROINVERTEBRATE ASSEMBLAGES

A REPORT TO
THE BLUE WATER TASK FORCE



PREPARED BY
Wease Bollman
Rhithron Associates, Inc.
Missoula, Montana

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 can help to detect changes, which may suggest that impacts and degradation are in fact 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 impacts and hydrologic alterations, and changes to the natural morphology of river channels and riparian zones.

In September 2011, 4 sites in the Gallatin River watershed were sampled for benthic macroinvertebrates, and in March 2012, 4 sites, including 3 sites sampled during the previous event, were sampled. For both sampling events, single samples of macroinvertebrates were collected. The 3 sites sampled in both September 2011 and March 2012 were the Gallatin River at the Park Boundary, Gallatin River upstream of the West Fork confluence, and Gallatin River above the Jack Smith Bridge.

This report begins by describing the methods for processing and identifying these samples. Data resulting from that work were translated into a multimetric index, and scores were calculated. These scores were used to assign impairment classes to the sites. Narrative interpretations of the ecological condition of the macroinvertebrate assemblages are reported. 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: they do not rely solely on a single cumulative index score which may mask the effects of stressors on the biota.

METHODS

Sample processing

Eight macroinvertebrate samples, collected at sites in the Gallatin River drainage in 2 seasons, were delivered to Rhithron's laboratory facility in Missoula, Montana. All samples arrived in good condition.

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 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 25% 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 from each season project 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 (RAILIS 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).

RESULTS

Quality Control Procedures

Results of quality control procedures for subsampling and taxonomy are given in Table 1. Sorting efficiency averaged 98.76% for all samples, taxonomic precision for identification and enumeration averaged 97.48% for the 2 randomly selected samples.

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

Site name	Sample date	Sorting efficiency (%)	Bray-Curtis similarity for taxonomy and enumeration (%)
Beaver Creek: 100 yards upstream of Fall 2010 sample site	9/10/2011	100	
Gallatin River at Park boundary (North)	9/10/2011	96.97	96.20
	3/27/2012	100	
Gallatin River just upstream of West Fork confluence	9/10/2011	100	
	3/27/2012	95.20	
Gallatin River above Jack Smith bridge	9/10/2011	98.48	
	3/27/2012	99.39	
West Fork of the Gallatin River, upstream of Big Sky Spur Road bridge	3/27/2012	100	98.76

Bioassessment

Table 2 summarizes values and scores for metrics in the MVFP bioassessment index (Bollman 1998), which was used to evaluate the aquatic invertebrate assemblages. Results for each sample are reported, and impairment classifications are assigned. Bioassessment scores, as percent of maximum score, are graphed in Figure 1.

When this method is applied to the invertebrate assemblage data, the results suggest that 3 sites (Beaver Creek, Gallatin River at Park boundary, and Gallatin River upstream of West Fork confluence) were unimpaired. Total scores obtained for these 2 Gallatin River sites were consistent between seasons.

Two sites (Gallatin River above Jack Smith bridge and West Fork Gallatin River upstream of Big Sky spur road bridge) achieved scores suggesting that slight impairment of biotic integrity was present. The Gallatin River site scored similarly in both sampling seasons.

Table 2. Bioassessment index (MVFP: Bollman 1998) and individual metrics and scores for samples collected at sites in the Gallatin River watershed, September 2011 and March 2012.

	Beaver Creek	Gallatin River: at Park boundary (North)		Gallatin River: just upstream of West Fork confluence		Gallatin River: above Jack Smith bridge		West Fork of the Gallatin River, upstream of Big Sky Spur Rd. bridge
	Sept 2011	Sept 2011	Mar 2012	Sept 2011	Mar 2012	Sept 2011	Mar 2012	Mar 2012
METRICS								
Ephemeroptera richness	8	8	5	4	4	1	3	3
Plecoptera richness	5	4	5	3	5	2	0	4
Trichoptera richness	6	5	7	6	9	5	6	2
Number of sensitive taxa	4	6	5	2	5	2	4	3
Percent filterers	3.5	31.2	6.5	1.7	6.5	2.3	<1	0
Percent tolerant taxa	1.6	<1	1.7	4.7	4.0	6.3	7.1	1.2
Ephemeroptera richness	3	3	2	2	2	0	1	1
Plecoptera richness	3	3	3	2	3	2	0	3
Trichoptera richness	3	3	3	3	3	3	3	1
Number of sensitive taxa	3	3	3	2	3	2	3	2
Percent filterers	3	0	2	3	2	3	3	3
Percent tolerant taxa	3	3	3	3	3	2	2	3
TOTAL SCORE (max.=18)	18	15	16	15	16	12	12	13
PERCENT OF MAX.	100	83	89	83	89	67	67	72
Impairment classification*	NON	NON	NON	NON	NON	SLI	SLI	SLI

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

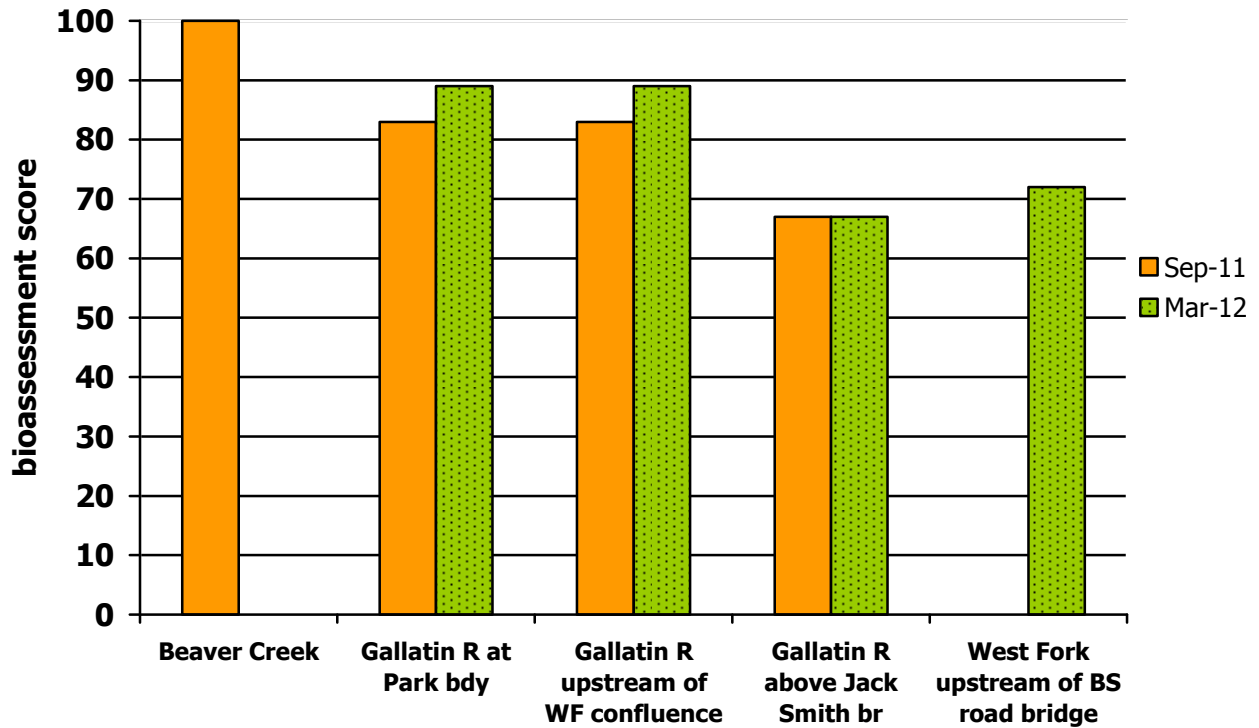


Figure 1. Bioassessment scores (MVFP: Bollman 1998) for sites in the Gallatin River drainage. Samples were collected in September 2011 (orange bars) and March 2012 (green bars). Scores are given as percent of maximum score.

Aquatic invertebrate assemblages

Beaver Creek

This site was sampled in September 2011. High mayfly taxa richness (8 taxa) suggests that water quality was excellent at this site. The mayfly fauna included the sensitive ephemereid *Drunella doddsii*. The biotic index value (4.36) was higher than expected for a low-order montane stream, but the performance of the metric appears to be influenced by the abundance of the oligochaete *Mesenchytraeus* sp., which was the dominant organism in the sample, accounting for 23% of organisms collected here. This oligochaete has been assigned a high tolerance value. Like many other enchytraeid worms collected in the western US, *Mesenchytraeus* sp. is associated with higher elevations and colder and cleaner water than tubificid worms in the subfamilies Naidinae and Tubificinae. The tolerance value assigned to this taxon is probably excessively high, and in this case, it may have resulted in an overestimation of the tolerance of the invertebrate assemblage, the composition of which suggests good water quality. The thermal preference of the assemblage was calculated at 13.0°C. A few specimens of the turbellarian *Polycelis coronata* were present in the sample, suggesting that groundwater may influence surface flow to some extent in the sampled reach.

At least 19 "clinger" taxa and 6 caddisfly taxa were present at this site. It seems likely that sediment deposition did not interfere with colonization of stony substrates.

The FSBI value calculated for the site was 4.57, indicating a moderately sediment-tolerant assemblage. Overall taxa richness (43) was high, suggesting diverse instream habitats. The presence of at least 5 stonefly taxa may be related to intact reach-scale habitat features: stable streambanks, functioning riparian zones, and natural channel morphology may be indicated. Long-lived taxa, such as the elmids *Heterlimnius* sp. and *Cleptelmis addenda*, were common: 6 such taxa were collected. It seems unlikely that dewatering, thermal extremes, or scouring sediment pulses were influential in the reach. All expected functional groups were represented in the sample.

Gallatin River: at Park boundary (North)

This site was sampled in September 2011 and in March 2012.

The composition of the aquatic invertebrate assemblage at this site shifted significantly between seasons. In September, the blackfly *Simulium* spp. dominated the taxonomic composition of the sample, and sensitive dipterans in the family Blephariceridae were abundant. In March, chironomids were dominant, accounting for 53% of collected organisms. The fall sample contained at least 8 mayfly taxa, while 5 were counted in the spring collection. Sensitive mayflies were present here in both seasons: these included *Drunella doddsii* in the fall and *Caudatella* sp. in the spring. The biotic index values calculated for the assemblages (2.98 in fall, 4.91 in spring) reflect the seasonal shift in composition, and suggest that the assemblage present in March was somewhat more tolerant. It seems likely that water quality was very good in this reach, since sensitive taxa persisted over the sampling season. Cold water temperatures are indicated by the abundance and richness of cold stenotherm taxa. The calculated thermal preferences of the assemblages were 13.4° C in September and 12.8° C in March.

"Clinger" richness (17 taxa in fall, 19 taxa in spring) and caddisfly taxa richness (5 in fall, 7 in spring) suggest that sediment deposition did not significantly influence colonization of stony substrate habitats. The FSBI values calculated for the site (5.09 in fall and 5.40 in spring) indicate moderately sediment-intolerant assemblages. Overall taxa richness was high in both seasons: instream habitats may have been diverse. Stonefly taxa richness was high. Diversity in this group may be related to the condition of reach-scale habitat features. In this case, stable streambanks, functional riparian zones, and natural stream morphology may be indicated. Long-lived taxa were well-represented, indicating year-round surface flow and stable instream conditions. The functional composition of the assemblages reflect the seasonal shift in taxon dominance: in September, scrapers (especially the flies in the family Blephariceridae) and filterers (especially *Simulium* spp.) dominated the functional mix, suggesting the availability of algal films and suspended organic material, while in spring, gatherers were more abundant, consistent with higher flow conditions.

Gallatin River: upstream of West Fork confluence

This site was sampled in September 2011 and in March 2012.

Mayfly taxa richness was moderately depressed in both seasons, with 4 taxa counted in each sample. In the fall, midges, especially *Orthocladius* spp., dominated the assemblage, suggesting the presence of filamentous algae. The elevated value for the biotic index (4.32) in this season also suggests that nutrients may have influenced water quality. The springtime assemblage displayed a shift in taxonomic composition; the caddisfly *Glossosoma* sp. and the mayfly *Rhithrogena* sp. were abundant, and the biotic

index value was 1.73, well within expectations for a site with excellent water quality. Increased spring flow conditions may account for the improved performance of metric water quality indicators. Cold stenotherm taxa were more abundant in the spring sample, compared to the fall assemblage. Thermal preference was 15.5°C for the fall assemblage and 13.6°C for the spring assemblage.

Both "clingers" and caddisflies were diverse, suggesting that stony substrate habitats were not excessively contaminated by deposited sediment. The FSBI value was 5.94 for the fall assemblage and 6.06 for the spring assemblage: moderately sediment-intolerant communities are indicated in both seasons. Overall taxa richness was somewhat lower than expected in the fall, when 26 unique taxa were counted in the sample. This blunted diversity may reflect the warmer water temperatures and reduced flow conditions likely encountered in the fall. At least 35 unique taxa were present in the spring sample, indicating diverse instream habitats. Stoneflies, including the salmonfly *Pteronarcys californica*, were represented in both seasons, suggesting intact reach-scale habitat features. Stable streambanks, functional riparian zones, and natural channel morphology may be indicated. The persistence of long-lived taxa suggests that there were no catastrophic events, such as dewatering, thermal extremes, or scouring sediment pulses, which would abort long life cycles. Gatherers dominated the functional composition of the assemblage in the fall. This pattern is sometimes interpreted as evidence of slight-to-moderate water quality impairment. In the spring, however, scrapers were dominant. All expected functional groups were present in both seasons.

Gallatin River: above Jack Smith bridge

This site was sampled in September 2011 and in March 2012.

Chironomids overwhelmed the taxonomic composition of samples collected in both seasons at this site. Dominant among these were *Orthocladius* spp. and *Micropsectra* spp., taxa often associated with filamentous algae. Mayfly taxa richness was lower than expected; a single taxon was present in the fall-collected sample, and only 3 taxa, none of which were abundant, were present in the spring sample. The biotic index value was high: 6.10 in fall and 6.06 in spring. Hemoglobin-bearing taxa, including the midge *Stictochironomus* sp., were present in both collections. These findings suggest that water quality may have been impaired by nutrients, elevated water temperatures, or both. Thermal preferences were calculated at 16.1°C for the fall assemblage and 13.2°C for the spring assemblage.

"Clingers" were not well-represented in either fall (10 taxa) or spring (12 taxa), and, although caddisfly richness was within expectations in both seasons, the group was never abundant. The FSBI values ranged between 5.94, indicating moderate sediment-intolerance in the fall, and 4.23, indicating moderate sediment-tolerance in the spring. These findings suggest that sediment deposition may have limited colonization of stony substrates in the reach, at least seasonally. Overall taxa richness was low and may reflect monotonous instream habitats. One specimen in each of 2 stonefly taxa were counted in the fall-collected sample; stoneflies were absent in the spring sample. Low diversity among the stoneflies may be related to impaired riparian zone function, unstable streambanks, or altered channel morphology. Semivoltine taxa were also poorly represented: thermal extremes or dewatering cannot be ruled out. Gatherers, mostly among the midges, accounted for the greatest proportion of the functional composition. This pattern is sometimes interpreted as evidence of water quality impairment.

Gallatin River: West Fork: upstream of the Big Sky Spur Road

This site was sampled in March 2012.

The sample collected here was overwhelmed by midges, especially *Micropsectra* sp., and oligochaetes. Mayfly richness was lower than expected, only 3 taxa were counted, and none of these were abundant. The biotic index value (4.05) was somewhat higher than expected for a montane river. These findings suggest that water quality was impaired in the reach. The thermal preference of the assemblage was calculated at 11.9°C.

Sediment deposition may have been an additional stressor at this site: "clingers" and caddisflies were poorly represented in the sample. The FSBI value (4.19) indicated a moderately sediment-tolerant assemblage. Overall taxa richness (23) was low, and may reflect monotonous instream habitats. Three stonefly taxa were collected. Reach-scale habitat features may have been disrupted to a mild degree: streambanks may have been destabilized, riparian zones disturbed, or natural channel morphology may have been altered. A single individual in a semivoltine taxon was collected. Near absence of these long-lived taxa suggests that the site may have been influenced by dewatering, thermal extremes, or scouring sediment pulses. Gatherers, especially among the midges, overwhelmed the functional composition of the sample. This pattern is sometimes interpreted as evidence of water quality impairment.

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APPENDIX

Taxa lists and metric summaries

**Blue Water Task Force
Gallatin River Watershed**

September 2011 and March 2012

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2001

RAI No.: BWTF11GR2001

Sta. Name: Gallatin River above Jack Smith bridge

Client ID: DOWN2

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Sphaeriidae							
Sphaeriidae	1	0.33%	Yes	Unknown		8	CF
Oligochaeta							
Naididae							
Naididae (Naidinae)	1	0.33%	Yes	Unknown	Damaged	8	CG
Naididae (Tubificinae) - without capillary setae	9	2.97%	Yes	Immature		11	CG
<i>Nais</i> sp.	4	1.32%	Yes	Unknown		8	CG
Ephemeroptera							
Ephemerellidae							
<i>Drunella grandis</i>	2	0.66%	Yes	Larva		2	PR
Plecoptera							
Perlidae							
<i>Hesperoperla pacifica</i>	1	0.33%	Yes	Larva		1	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	1	0.33%	Yes	Larva	Early Instar	2	SH
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	5	1.65%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus</i> sp.	1	0.33%	No	Larva	Early Instar	1	CF
<i>Brachycentrus occidentalis</i>	4	1.32%	Yes	Larva		2	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.33%	Yes	Larva		1	SH
Leptoceridae							
<i>Ceraclea</i> sp.	1	0.33%	Yes	Larva		3	CG
Rhyacophilidae							
<i>Rhyacophila</i> sp.	1	0.33%	Yes	Larva	Early Instar	1	PR
Diptera							
Athericidae							
<i>Atherix</i> sp.	1	0.33%	Yes	Larva		5	PR
Tipulidae							
<i>Limnophila</i> sp.	1	0.33%	Yes	Larva		3	PR

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2001

RAI No.: BWTF11GR2001

Sta. Name: Gallatin River above Jack Smith bridge

Client ID: DOWN2

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Chironomidae	15	4.95%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	9	2.97%	Yes	Larva		7	CG
<i>Cricotopus (Cricotopus)</i> sp.	19	6.27%	Yes	Larva		7	SH
<i>Cricotopus trifascia</i>	7	2.31%	Yes	Larva		7	SH
<i>Eukiefferiella Devonica</i> Gr.	8	2.64%	Yes	Larva		8	CG
<i>Eukiefferiella Gracei</i> Gr.	1	0.33%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	12	3.96%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	20	6.60%	Yes	Larva		4	CG
<i>Orthocladius</i> sp.	162	53.47%	Yes	Larva		6	CG
<i>Polypedilum</i> sp.	5	1.65%	Yes	Larva		6	SH
<i>Rheotanytarsus</i> sp.	1	0.33%	Yes	Larva		6	CF
<i>Stictochironomus</i> sp.	9	2.97%	Yes	Larva		5	CG
<i>Tvetenia Bavarica</i> Gr.	1	0.33%	Yes	Larva		5	CG
Sample Count	303						

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2002

RAI No.: BWTF11GR2002

Sta. Name: Gallatin River at Park Boundary (North)

Client ID: PARK

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Nemata	2	0.62%	Yes	Unknown		5	UN
Oligochaeta							
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	21	6.46%	Yes	Unknown		4	CG
Ephemeroptera							
Baetidae							
<i>Acentrella</i> sp.	5	1.54%	Yes	Larva		4	CG
Baetidae	1	0.31%	Yes	Larva	Damaged	4	CG
<i>Baetis</i> sp.	3	0.92%	No	Larva	Damaged	5	CG
<i>Baetis tricaudatus</i>	3	0.92%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella</i> sp.	2	0.62%	Yes	Larva	Early Instar	1	SC
<i>Drunella doddsii</i>	32	9.85%	Yes	Larva		1	SC
<i>Ephemerella</i> sp.	2	0.62%	Yes	Larva	Early Instar	1.5	SC
Heptageniidae							
<i>Epeorus</i> sp.	1	0.31%	No	Larva	Damaged	2	CG
<i>Epeorus deceptivus</i>	2	0.62%	Yes	Larva		0	SC
<i>Rhithrogena</i> sp.	37	11.38%	Yes	Larva		0	SC
Plecoptera							
Perlidae							
<i>Hesperoperla pacifica</i>	2	0.62%	Yes	Larva		1	PR
Perlodidae							
Perlodidae	1	0.31%	No	Larva	Damaged	2	PR
<i>Skwala</i> sp.	1	0.31%	Yes	Larva		3	PR
Pteronarcyidae							
<i>Pteronarcys californica</i>	1	0.31%	Yes	Larva		2	SH
Taeniopterygidae							
Taeniopterygidae	2	0.62%	Yes	Larva	Early Instar	2	SH
Trichoptera							
Brachycentridae							
<i>Brachycentrus americanus</i>	17	5.23%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	2	0.62%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	16	4.92%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	8	2.46%	Yes	Larva		2	PR
Rhyacophilidae							
<i>Rhyacophila pellisa</i>	2	0.62%	Yes	Larva		0	PR
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	1	0.31%	Yes	Adult		5	SC

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2002

RAI No.: BWTF11GR2002

Sta. Name: Gallatin River at Park Boundary (North)

Client ID: PARK

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Blephariceridae							
Blephariceridae	38	11.69%	Yes	Larva	Early Instar	0	SC
Deuterophlebiidae							
<i>Deuterophlebia</i> sp.	2	0.62%	No	Pupa		0	SC
<i>Deuterophlebia</i> sp.	1	0.31%	Yes	Larva		0	SC
Simuliidae							
<i>Simulium</i> sp.	58	17.85%	Yes	Larva		6	CF
<i>Simulium</i> sp.	25	7.69%	No	Pupa		6	CF
Tipulidae							
<i>Hexatoma</i> sp.	1	0.31%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
Chironomidae	4	1.23%	No	Pupa		10	CG
<i>Cricotopus (Nostococladius)</i> sp.	2	0.62%	Yes	Larva		6	SH
Eukiefferiella Gracei Gr.	7	2.15%	Yes	Larva		8	CG
<i>Orthocladus</i> sp.	18	5.54%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	3	0.92%	Yes	Larva		1	CG
<i>Stempellinella</i> sp.	1	0.31%	Yes	Larva		4	CG
Tvetenia Bavarica Gr.	1	0.31%	Yes	Larva		5	CG
	Sample Count	325					

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2003

RAI No.: BWTF11GR2003

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

Client ID: UPSTREAM

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Nemata	2	0.66%	Yes	Unknown		5	UN
Sperchonidae							
<i>Sperchon</i> sp.	1	0.33%	Yes	Adult		11	PR
Oligochaeta							
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	1	0.33%	Yes	Unknown		4	CG
Ephemeroptera							
Baetidae							
Baetidae	1	0.33%	No	Larva	Early Instar	4	CG
<i>Baetis tricaudatus</i>	3	1.00%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella doddsii</i>	10	3.32%	Yes	Larva		1	SC
<i>Drunella grandis</i>	4	1.33%	Yes	Larva		2	PR
Heptageniidae							
<i>Rhithrogena</i> sp.	42	13.95%	Yes	Larva		0	SC
Plecoptera							
Chloroperlidae							
<i>Sweltsa</i> sp.	1	0.33%	Yes	Larva		0	PR
Perlidae							
<i>Hesperoperla pacifica</i>	2	0.66%	Yes	Larva		1	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	12	3.99%	No	Larva	Early Instar	2	SH
<i>Pteronarcys californica</i>	3	1.00%	Yes	Larva		2	SH
Trichoptera							
Brachycentridae							
<i>Brachycentrus americanus</i>	1	0.33%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	1	0.33%	Yes	Larva		2	CF
Glossosomatidae							
<i>Glossosoma</i> sp.	33	10.96%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	2	0.66%	Yes	Larva		2	PR
<i>Hydropsyche</i> sp.	1	0.33%	Yes	Larva		5	CF
Rhyacophilidae							
<i>Rhyacophila</i> sp.	3	1.00%	Yes	Larva	Early Instar	1	PR
Coleoptera							
Elmidae							
<i>Optioservus</i> sp.	4	1.33%	Yes	Adult		5	SC
<i>Zaitzevia</i> sp.	2	0.66%	Yes	Larva		5	CG
Diptera							
Athericidae							
<i>Atherix</i> sp.	8	2.66%	Yes	Larva		5	PR
Simuliidae							
<i>Simulium</i> sp.	1	0.33%	Yes	Larva		6	CF
<i>Simulium</i> sp.	1	0.33%	No	Pupa		6	CF

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2003

RAI No.: BWTF11GR2003

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

Client ID: UPSTREAM

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Chironomidae	8	2.66%	No	Pupa		10	CG
<i>Cricotopus bicinctus</i>	8	2.66%	Yes	Larva		7	SH
<i>Cricotopus trifascia</i>	31	10.30%	Yes	Larva		7	SH
Eukiefferiella Claripennis Gr.	3	1.00%	Yes	Larva		8	CG
Eukiefferiella Devonica Gr.	34	11.30%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	1	0.33%	Yes	Larva		8	CG
<i>Orthocladius</i> sp.	77	25.58%	Yes	Larva		6	CG
Sample Count	301						

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2004

RAI No.: BWTF11GR2004

Sta. Name: Beaver Creek 100 yds upstream of Fall 2010 sample site

Client ID: BEAVERUP

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Nemata	1	0.32%	Yes	Unknown		5	UN
Lebertiidae							
<i>Lebertia</i> sp.	1	0.32%	Yes	Adult		8	PR
Planariidae							
<i>Polycelis coronata</i>	2	0.64%	Yes	Unknown		1	OM
Torrenticolidae							
<i>Torrenticola</i> sp.	20	6.41%	Yes	Adult		8	PR
Oligochaeta							
Enchytraeidae							
<i>Enchytraeus</i> sp.	1	0.32%	Yes	Unknown		4	CG
<i>Mesenchytraeus</i> sp.	71	22.76%	Yes	Unknown		4	CG
Ephemeroptera							
Ameletidae							
<i>Ameletus</i> sp.	2	0.64%	Yes	Larva		0	SC
Baetidae							
<i>Baetis</i> sp.	4	1.28%	No	Larva	Early Instar	5	CG
<i>Baetis tricaudatus</i>	12	3.85%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella</i> sp.	3	0.96%	Yes	Larva	Early Instar	1	SC
<i>Drunella doddsii</i>	3	0.96%	Yes	Larva		1	SC
<i>Ephemerella</i> sp.	2	0.64%	Yes	Larva	Early Instar	1.5	SC
Heptageniidae							
<i>Epeorus longimanus</i>	1	0.32%	Yes	Larva		1	SC
Heptageniidae	6	1.92%	No	Larva	Early Instar	4	SC
<i>Rhithrogena</i> sp.	12	3.85%	Yes	Larva		0	SC
Leptophlebiidae							
<i>Paraleptophlebia</i> sp.	2	0.64%	Yes	Larva		1	CG
Plecoptera							
Chloroperlidae							
<i>Sweltsa</i> sp.	10	3.21%	Yes	Larva		0	PR
Nemouridae							
<i>Zapada cinctipes</i>	14	4.49%	Yes	Larva		3	SH
Perlidae							
<i>Doroneuria</i> sp.	2	0.64%	Yes	Larva		0	PR
Perlidae	3	0.96%	No	Larva	Early Instar	2	PR
Perlodidae							
<i>Skwala</i> sp.	1	0.32%	Yes	Larva		3	PR
Taeniopterygidae							
Taeniopterygidae	1	0.32%	Yes	Larva	Early Instar	2	SH

Taxa Listing

Project ID: BWTF11GR2
RAI No.: BWTF11GR2004

RAI No.: BWTF11GR2004

Sta. Name: Beaver Creek 100 yds upstream of Fall 2010 sample site

Client ID: BEAVERUP

Date Coll.: 9/10/2011

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Trichoptera							
Brachycentridae							
<i>Brachycentrus americanus</i>	2	0.64%	Yes	Larva		1	CF
<i>Micrasema</i> sp.	5	1.60%	Yes	Larva		1	SH
Hydropsychidae							
<i>Arctopsyche grandis</i>	2	0.64%	Yes	Larva		2	PR
Hydropsychidae	1	0.32%	No	Larva	Early Instar	4	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.32%	Yes	Larva		1	SH
Rhyacophilidae							
<i>Rhyacophila</i> sp.	1	0.32%	Yes	Larva	Early Instar	1	PR
<i>Rhyacophila Brunnea</i> Gr.	5	1.60%	Yes	Larva		2	PR
Coleoptera							
Elmidae							
<i>Cleptelmis addenda</i>	1	0.32%	Yes	Larva		4	CG
Elmidae	4	1.28%	No	Larva	Early Instar	4	CG
Elmidae	1	0.32%	No	Adult	Damaged	4	CG
<i>Heterlimnius</i> sp.	12	3.85%	No	Larva		3	CG
<i>Heterlimnius</i> sp.	1	0.32%	Yes	Adult		3	CG
<i>Optioservus</i> sp.	1	0.32%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	4	1.28%	No	Larva		5	SC
Diptera							
Empididae							
Empididae	2	0.64%	Yes	Larva	Early Instar	6	PR
Psychodidae							
<i>Pericoma / Telmatoscopus</i>	6	1.92%	Yes	Larva		4	CG
Simuliidae							
<i>Simulium</i> sp.	8	2.56%	Yes	Larva		6	CF
Chironomidae							
Chironomidae							
<i>Chaetocladius</i> sp.	2	0.64%	Yes	Larva		6	CG
Chironomidae	21	6.73%	No	Pupa		10	CG
<i>Cricotopus (Nostococcladius)</i> sp.	3	0.96%	Yes	Larva		6	SH
<i>Diamesa</i> sp.	1	0.32%	Yes	Larva		5	CG
<i>Eukiefferiella Devonica</i> Gr.	1	0.32%	Yes	Larva		8	CG
<i>Eukiefferiella Gracei</i> Gr.	2	0.64%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	6	1.92%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	4	1.28%	Yes	Larva		4	CG
<i>Orthocladius</i> sp.	8	2.56%	Yes	Larva		6	CG
<i>Parametriocnemus</i> sp.	1	0.32%	Yes	Larva		5	CG
<i>Rheocricotopus</i> sp.	5	1.60%	Yes	Larva		4	CG
<i>Thienemannimyia</i> Gr.	2	0.64%	Yes	Larva		5	PR
<i>Tvetenia Bavarica</i> Gr.	25	8.01%	Yes	Larva		5	CG
Sample Count	312						

Metrics Report

Project ID: BWTF11GR2
RAI No.: BWTF11GR2001
Sta. Name: Gallatin River above Jack Smith bridge
Client ID: DOWN2
STORET ID
Coll. Date: 9/10/2011

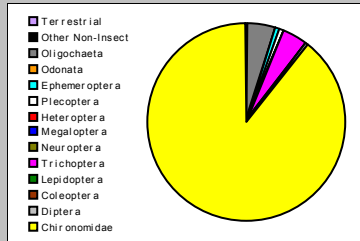
Abundance Measures

Sample Count: 303
Sample Abundance: 5,194.29 5.83% of sample used

Coll. Procedure: KICK
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	1	1	0.33%
Oligochaeta	3	14	4.62%
Odonata			
Ephemeroptera	1	2	0.66%
Plecoptera	2	2	0.66%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	5	13	4.29%
Lepidoptera			
Coleoptera			
Diptera	2	2	0.66%
Chironomidae	12	269	88.78%

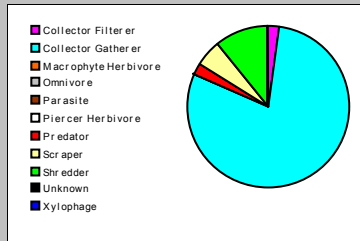


Dominant Taxa

Category	A	PRA
Orthocladius	162	53.47%
Micropsectra	20	6.60%
Cricotopus (Cricotopus)	19	6.27%
Chironomidae	15	4.95%
Hydrobaenus	12	3.96%
Stictochironomus	9	2.97%
Naididae (Tubificinae) - without c	9	2.97%
Cladotanytarsus	9	2.97%
Eukiefferiella Devonica Gr.	8	2.64%
Cricotopus trifascia	7	2.31%
Polypedilum	5	1.65%
Apatania	5	1.65%
Nais	4	1.32%
Brachycentrus occidentalis	4	1.32%
Drunella grandis	2	0.66%

Functional Composition

Category	R	A	PRA
Predator	5	6	1.98%
Parasite			
Collector Gatherer	11	240	79.21%
Collector Filterer	3	7	2.31%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	2	17	5.61%
Shredder	5	33	10.89%
Omnivore			
Unknown			

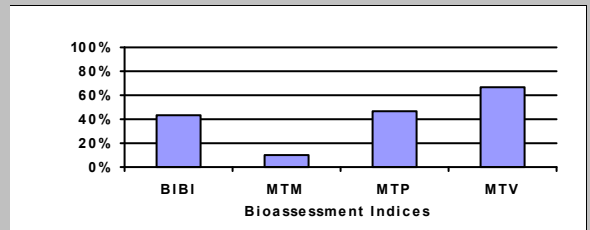


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	26	3	3		2
E Richness	1	1		0	
P Richness	2	1		2	
T Richness	5	3		3	
EPT Richness	8		2		0
EPT Percent	5.61%		0		0
All Non-Insect Abundance	15				
All Non-Insect Richness	4				
All Non-Insect Percent	4.95%				
Oligochaeta+Hirudinea Percent	4.62%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	53.47%		1		0
Dominant Taxa (2) Percent	60.07%				
Dominant Taxa (3) Percent	66.34%	3			
Dominant Taxa (10) Percent	89.11%				
<i>Diversity</i>					
Shannon H (loge)	1.868				
Shannon H (log2)	2.696		2		
Margalef D	4.417				
Simpson D	0.333				
Evenness	0.072				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	1.98%	1			
Filterer Richness	3				
Filterer Percent	2.31%			3	
Collector Percent	81.52%		1		0
Scraper+Shredder Percent	16.50%		2		0
Scraper/Filterer	2.429				
Scraper/Scraper+Filterer	0.708				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	3.30%				
Swimmer Richness	0				
Swimmer Percent	0.00%				
Clinger Richness	10	1			
Clinger Percent	20.46%				
<i>Characteristics</i>					
Cold Stenotherm Richness	1				
Cold Stenotherm Percent	1.65%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	4.62%				
Air Breather Richness	1				
Air Breather Percent	0.33%				
<i>Voltinism</i>					
Univoltine Richness	9				
Semivoltine Richness	3	3			
Multivoltine Percent	88.78%			0	
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.33%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	4.383				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	6.27%	5		2	
Hilsenhoff Biotic Index	6.099		1		0
Intolerant Percent	3.63%				
Supertolerant Percent	13.86%				
CTQa	66.900				

Bioassessment Indices

BiIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	22	44.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	14	46.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	2	9.52%	Severe



Metrics Report

Project ID: BWTF11GR2
RAI No.: BWTF11GR2002
Sta. Name: Gallatin River at Park Boundary (North)
Client ID: PARK
STORET ID
Coll. Date: 9/10/2011

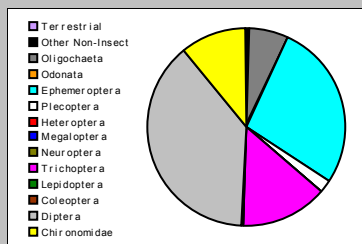
Abundance Measures

Sample Count: 325
Sample Abundance: 1,083.33 30.00% of sample used

Coll. Procedure: KICK
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	1	2	0.62%
Oligochaeta	1	21	6.46%
Odonata			
Ephemeroptera	8	88	27.08%
Plecoptera	4	7	2.15%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	5	45	13.85%
Lepidoptera			
Coleoptera	1	1	0.31%
Diptera	4	125	38.46%
Chironomidae	6	36	11.08%

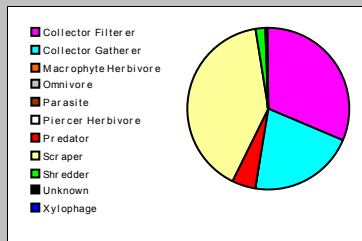


Dominant Taxa

Category	A	PRA
Simulium	83	25.54%
Blephariceridae	38	11.69%
Rhithrogena	37	11.38%
Drunella doddsii	32	9.85%
Mesenchytraeus	21	6.46%
Orthocladius	18	5.54%
Brachycentrus americanus	17	5.23%
Glossosoma	16	4.92%
Arctopsyche grandis	8	2.46%
Eukiefferiella Gracei Gr.	7	2.15%
Acentrella	5	1.54%
Chironomidae	4	1.23%
Paqastia	3	0.92%
Baetis tricaudatus	3	0.92%
Baetis	3	0.92%

Functional Composition

Category	R	A	PRA
Predator	5	15	4.62%
Parasite			
Collector Gatherer	9	68	20.92%
Collector Filterer	3	102	31.38%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	9	133	40.92%
Shredder	3	5	1.54%
Omnivore			
Unknown	1	2	0.62%

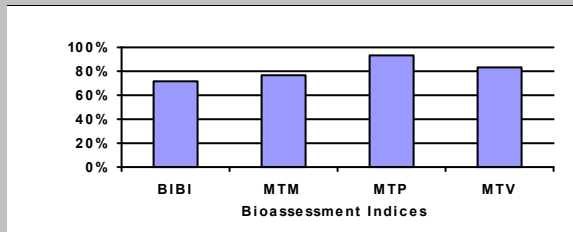


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	30	3	3		3
E Richness	8	3		3	
P Richness	4	3		3	
T Richness	5	3		3	
EPT Richness	17		3		2
EPT Percent	43.08%		2		1
All Non-Insect Abundance	23				
All Non-Insect Richness	2				
All Non-Insect Percent	7.08%				
Oligochaeta+Hirudinea Percent	6.46%				
Baetidae/Ephemeroptera	0.136				
Hydropsychidae/Trichoptera	0.178				
<i>Dominance</i>					
Dominant Taxon Percent	25.54%		3		2
Dominant Taxa (2) Percent	37.23%				
Dominant Taxa (3) Percent	48.62%	5			
Dominant Taxa (10) Percent	85.23%				
<i>Diversity</i>					
Shannon H (loge)	2.607				
Shannon H (log2)	3.761		3		
Margalef D	5.118				
Simpson D	0.101				
Evenness	0.063				
<i>Function</i>					
Predator Richness	5		2		
Predator Percent	4.62%	1			
Filterer Richness	3				
Filterer Percent	31.38%			0	
Collector Percent	52.31%		3		3
Scraper+Shredder Percent	42.46%		3		2
Scraper/Filterer	1.304				
Scraper/Scraper+Filterer	0.566				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	0.92%				
Swimmer Richness	2				
Swimmer Percent	3.38%				
Clinger Richness	17	3			
Clinger Percent	76.92%				
<i>Characteristics</i>					
Cold Stenotherm Richness	5				
Cold Stenotherm Percent	23.69%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	0.31%				
<i>Voltinism</i>					
Univoltine Richness	14				
Semivoltine Richness	6	5			
Multivoltine Percent	15.38%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.31%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	8.00%				
Metals Tolerance Index	3.342				
Pollution Sensitive Richness	6	5		3	
Pollution Tolerant Percent	0.31%	5		3	
Hilsenhoff Biotic Index	2.975		3		3
Intolerant Percent	52.92%				
Supertolerant Percent	3.38%				
CTQa	55.889				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	15	83.33%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	16	76.19%	Slight



Metrics Report

Project ID: BWTF11GR2
 RAI No.: BWTF11GR2003
 Sta. Name: Gallatin River just upstream of West Fork confluence
 Client ID: UPSTREAM
 STORET ID
 Coll. Date: 9/10/2011

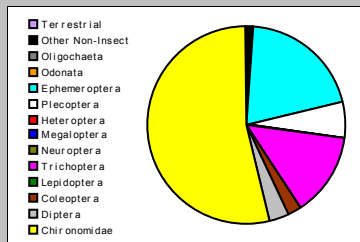
Abundance Measures

Sample Count: 301
 Sample Abundance: 475.26 63.33% of sample used

Coll. Procedure: KICK
 Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	2	3	1.00%
Oligochaeta	1	1	0.33%
Odonata			
Ephemeroptera	4	60	19.93%
Plecoptera	3	18	5.98%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	6	41	13.62%
Lepidoptera			
Coleoptera	2	6	1.99%
Diptera	2	10	3.32%
Chironomidae	6	162	53.82%

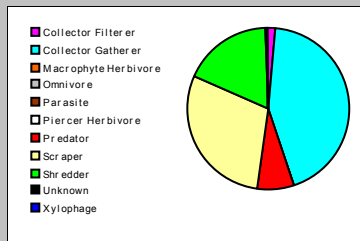


Dominant Taxa

Category	A	PRA
Orthocladius	77	25.58%
Rhithroena	42	13.95%
Eukiefferiella Devonica Gr.	34	11.30%
Glossosoma	33	10.96%
Cricotopus trifascia	31	10.30%
Pteronarcys	12	3.99%
Drunella doddsii	10	3.32%
Cricotopus binctus	8	2.66%
Chironomidae	8	2.66%
Atherix	8	2.66%
Optioservus	4	1.33%
Drunella arandis	4	1.33%
Rhyacophila	3	1.00%
Pteronarcys californica	3	1.00%
Baetis tricaudatus	3	1.00%

Functional Composition

Category	R	A	PRA
Predator	7	21	6.98%
Parasite			
Collector Gatherer	7	130	43.19%
Collector Filterer	4	5	1.66%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	4	89	29.57%
Shredder	3	54	17.94%
Omnivore			
Unknown	1	2	0.66%

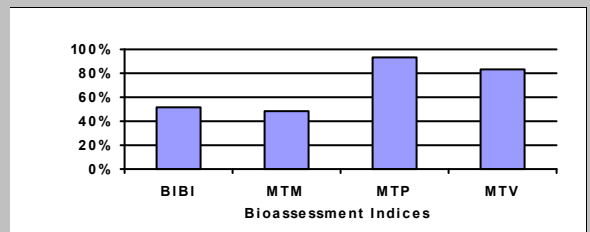


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	26	3	3		2
E Richness	4	1		2	
P Richness	3	1		2	
T Richness	6	3		3	
EPT Richness	13		3		0
EPT Percent	39.54%		2		0
All Non-Insect Abundance	4				
All Non-Insect Richness	3				
All Non-Insect Percent	1.33%				
Oligochaeta+Hirudinea Percent	0.33%				
Baetidae/Ephemeroptera	0.067				
Hydropsychidae/Trichoptera	0.073				
<i>Dominance</i>					
Dominant Taxon Percent	25.58%		3		2
Dominant Taxa (2) Percent	39.53%				
Dominant Taxa (3) Percent	50.83%	3			
Dominant Taxa (10) Percent	87.38%				
<i>Diversity</i>					
Shannon H (loge)	2.336				
Shannon H (log2)	3.370		3		
Margalef D	4.440				
Simpson D	0.141				
Evenness	0.075				
<i>Function</i>					
Predator Richness	7		3		
Predator Percent	6.98%	1			
Filterer Richness	4				
Filterer Percent	1.66%			3	
Collector Percent	44.85%		3		3
Scraper+Shredder Percent	47.51%		3		2
Scraper/Filterer	17.800				
Scraper/Scraper+Filterer	0.947				
<i>Habit</i>					
Burrower Richness	0				
Burrower Percent	0.00%				
Swimmer Richness	1				
Swimmer Percent	1.00%				
Clinger Richness	17	3			
Clinger Percent	53.82%				
<i>Characteristics</i>					
Cold Stenotherm Richness	1				
Cold Stenotherm Percent	3.32%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	0				
Air Breather Percent	0.00%				
<i>Voltinism</i>					
Univoltine Richness	10				
Semivoltine Richness	7	5			
Multivoltine Percent	56.15%		2		
<i>Tolerance</i>					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	11.63%				
Metals Tolerance Index	3.830				
Pollution Sensitive Richness	2	1		2	
Pollution Tolerant Percent	4.65%	5		3	
Hilsenhoff Biotic Index	4.320		3		1
Intolerant Percent	37.87%				
Supertolerant Percent	15.28%				
CTQa	55.667				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	26	52.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	28	93.33%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	15	83.33%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	10	47.62%	Moderate



Metrics Report

Project ID: BWTF11GR2
RAI No.: BWTF11GR2004
Sta. Name: Beaver Creek 100 yds upstream of Fall 2010 sample site
Client ID: BEAVERUP
STORET ID
Coll. Date: 9/10/2011

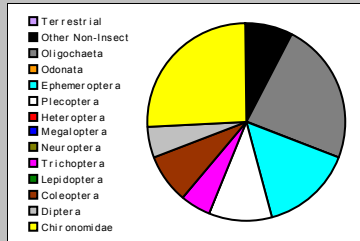
Abundance Measures

Sample Count: 312
Sample Abundance: 668.57 46.67% of sample used

Coll. Procedure: KICK
Sample Notes:

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	4	24	7.69%
Oligochaeta	2	72	23.08%
Odonata			
Ephemeroptera	8	47	15.06%
Plecoptera	5	31	9.94%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	6	17	5.45%
Lepidoptera			
Coleoptera	3	24	7.69%
Diptera	3	16	5.13%
Chironomidae	12	81	25.96%

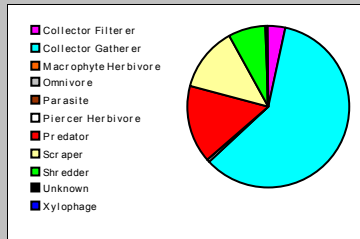


Dominant Taxa

Category	A	PRA
Mesenchytraeus	71	22.76%
Tvetenia Bavarica Gr.	25	8.01%
Chironomidae	21	6.73%
Torrenicola	20	6.41%
Zapada cinctipes	14	4.49%
Heterlimnius	13	4.17%
Rhithroqena	12	3.85%
Baetis tricaudatus	12	3.85%
Sweltsa	10	3.21%
Simulium	8	2.56%
Orthocladus	8	2.56%
Pericoma / Telmatoscopus	6	1.92%
Hydrobaenus	6	1.92%
Heptageniidae	6	1.92%
Optioservus	5	1.60%

Functional Composition

Category	R	A	PRA
Predator	10	49	15.71%
Parasite			
Collector Gatherer	16	185	59.29%
Collector Filterer	2	11	3.53%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	8	40	12.82%
Shredder	5	24	7.69%
Omnivore	1	2	0.64%
Unknown	1	1	0.32%

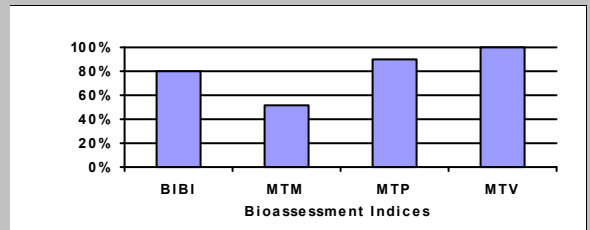


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	43	5	3		3
E Richness	8	3		3	
P Richness	5	3		3	
T Richness	6	3		3	
EPT Richness	19		3		2
EPT Percent	30.45%		2		0
All Non-Insect Abundance	96				
All Non-Insect Richness	6				
All Non-Insect Percent	30.77%				
Oligochaeta+Hirudinea Percent	23.08%				
Baetidae/Ephemeroptera	0.340				
Hydropsychidae/Trichoptera	0.176				
<i>Dominance</i>					
Dominant Taxon Percent	22.76%		3		3
Dominant Taxa (2) Percent	30.77%				
Dominant Taxa (3) Percent	37.50%	5			
Dominant Taxa (10) Percent	66.03%				
<i>Diversity</i>					
Shannon H (loge)	2.919				
Shannon H (log2)	4.212		3		
Margalef D	7.574				
Simpson D	0.104				
Evenness	0.049				
<i>Function</i>					
Predator Richness	10		3		
Predator Percent	15.71%	3			
Filterer Richness	2				
Filterer Percent	3.53%			3	
Collector Percent	62.82%		2		2
Scraper+Shredder Percent	20.51%		2		0
Scraper/Filterer	3.636				
Scraper/Scraper+Filterer	0.784				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	2.88%				
Swimmer Richness	3				
Swimmer Percent	6.41%				
Clinger Richness	19	3			
Clinger Percent	34.62%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	2.56%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	0				
Air Breather Percent	0.00%				
<i>Voltinism</i>					
Univoltine Richness	19				
Semivoltine Richness	6	5			
Multivoltine Percent	38.78%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	0				
Sediment Tolerant Percent	0.00%				
Sediment Sensitive Richness	2				
Sediment Sensitive Percent	1.60%				
Metals Tolerance Index	3.409				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	1.60%	5		3	
Hilsenhoff Biotic Index	4.359		3		1
Intolerant Percent	18.91%				
Supertolerant Percent	16.35%				
CTQa	68.868				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	40	80.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	27	90.00%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	18	100.00%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	11	52.38%	Moderate



Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR001

RAI No.: BWTF12GR001

Sta. Name: Gallatin River above Jack Smith bridge

Client ID: DOWN2

Date Coll.: 3/27/2012

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Sperchonidae							
<i>Sperchon</i> sp.	1	0.31%	Yes	Adult		11	PR
Oligochaeta							
Naididae							
<i>Nais</i> sp.	2	0.62%	Yes	Unknown		8	CG
Ephemeroptera							
Baetidae							
<i>Baetis tricaudatus</i>	3	0.93%	Yes	Larva		4	CG
Ephemerellidae							
<i>Caudatella</i> sp.	1	0.31%	Yes	Larva	Early Instar	0	CG
<i>Ephemerella excrucians</i>	4	1.23%	Yes	Larva		4	SH
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	1	0.31%	Yes	Larva		3	SC
Brachycentridae							
<i>Amiocentrus aspilus</i>	1	0.31%	Yes	Larva		3	CG
<i>Brachycentrus americanus</i>	1	0.31%	Yes	Larva		1	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	4	1.23%	Yes	Larva		1	SH
Leptoceridae							
<i>Ceraclea</i> sp.	1	0.31%	Yes	Larva		3	CG
Rhyacophilidae							
Rhyacophila Hyalinata Gr.	1	0.31%	Yes	Larva		0	PR
Coleoptera							
Elmidae							
<i>Heterlimnius corpulentus</i>	2	0.62%	Yes	Larva		3	CG
<i>Optioservus</i> sp.	1	0.31%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	3	0.93%	No	Larva		5	SC
Diptera							
Empididae							
<i>Wiedemannia</i> sp.	1	0.31%	Yes	Larva		6	PR
Tipulidae							
<i>Tipula</i> sp.	1	0.31%	Yes	Larva		4	SH

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR001

RAI No.: BWTF12GR001

Sta. Name: Gallatin River above Jack Smith bridge

Client ID: DOWN2

Date Coll.: 3/27/2012

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Chironomidae							
Chironomidae							
Chironomidae	19	5.86%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	17	5.25%	Yes	Larva		7	CG
<i>Cricotopus (Nostococladius)</i> sp.	1	0.31%	Yes	Larva		6	SH
<i>Eukiefferiella Devonica</i> Gr.	8	2.47%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	75	23.15%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	80	24.69%	Yes	Larva		4	CG
<i>Monodiamesa</i> sp.	1	0.31%	Yes	Larva		7	CG
<i>Orthocladius</i> sp.	86	26.54%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	2	0.62%	Yes	Larva		1	CG
<i>Parorthocladius</i> sp.	1	0.31%	Yes	Larva		6	CG
<i>Phaenopsectra</i> sp.	2	0.62%	Yes	Larva		7	SC
<i>Potthastia Longimana</i> Gr.	1	0.31%	Yes	Larva		2	CG
<i>Rheotanytarsus</i> sp.	1	0.31%	Yes	Larva		6	CF
<i>Stictochironomus</i> sp.	2	0.62%	Yes	Larva		5	CG
Sample Count	324						

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR002

RAI No.: BWTF12GR002 Sta. Name: Gallatin River at Park Boundary (North)
Client ID: PARK
Date Coll.: 3/27/2012 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Lebertiidae							
<i>Lebertia</i> sp.	1	0.34%	Yes	Adult		8	PR
Oligochaeta							
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	21	7.22%	Yes	Unknown		4	CG
Ephemeroptera							
Baetidae							
<i>Baetis tricaudatus</i>	13	4.47%	Yes	Larva		4	CG
Ephemerellidae							
<i>Caudatella</i> sp.	4	1.37%	Yes	Larva	Early Instar	0	CG
<i>Drunella grandis</i>	12	4.12%	Yes	Larva		2	PR
<i>Ephemerella excrucians</i>	14	4.81%	Yes	Larva		4	SH
Heptageniidae							
<i>Rhithrogena</i> sp.	1	0.34%	Yes	Larva		0	SC
Plecoptera							
Chloroperlidae							
Chloroperlidae	1	0.34%	No	Larva	Damaged	1	PR
<i>Sweltsa</i> sp.	1	0.34%	Yes	Larva		0	PR
Nemouridae							
Nemouridae	2	0.69%	Yes	Larva	Early Instar	2	SH
<i>Zapada</i> sp.	1	0.34%	Yes	Larva	Early Instar	2	SH
Perlidae							
<i>Hesperoperla pacifica</i>	3	1.03%	Yes	Larva		1	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	1	0.34%	Yes	Larva	Early Instar	2	SH
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	1	0.34%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus americanus</i>	17	5.84%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	2	0.69%	Yes	Larva		2	CF
<i>Micrasema</i> sp.	17	5.84%	Yes	Larva		1	SH
Glossosomatidae							
<i>Glossosoma</i> sp.	3	1.03%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	3	1.03%	Yes	Larva		2	PR
Uenoidae							
<i>Oligophlebodes</i> sp.	1	0.34%	Yes	Larva		3	SC
Coleoptera							
Elmidae							
<i>Heterlimnius corpulentus</i>	1	0.34%	Yes	Larva		3	CG
<i>Optioservus</i> sp.	1	0.34%	Yes	Adult		5	SC

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR002

RAI No.: BWTF12GR002

Sta. Name: Gallatin River at Park Boundary (North)

Client ID: PARK

Date Coll.: 3/27/2012

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Empididae							
<i>Chelifera</i> sp.	2	0.69%	Yes	Larva		5	PR
Psychodidae							
<i>Pericoma</i> / <i>Telmatoscopus</i>	7	2.41%	Yes	Larva		4	CG
Tipulidae							
<i>Antocha monticola</i>	5	1.72%	Yes	Larva		3	CG
<i>Dicranota</i> sp.	1	0.34%	Yes	Larva		3	PR
Chironomidae							
Chironomidae							
<i>Cladotanytarsus</i> sp.	1	0.34%	Yes	Larva		7	CG
<i>Cricotopus (Nostococladius)</i> sp.	32	11.00%	Yes	Larva		6	SH
<i>Diplocladius cultriger</i>	2	0.69%	Yes	Larva		8	CG
Eukiefferiella Devonica Gr.	19	6.53%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	67	23.02%	Yes	Larva		8	CG
<i>Orthocladius</i> sp.	23	7.90%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	5	1.72%	Yes	Larva		1	CG
<i>Stictochironomus</i> sp.	3	1.03%	Yes	Larva		5	CG
<i>Thienemanniella</i> sp.	3	1.03%	Yes	Larva		6	CG
Sample Count	291						

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR003

RAI No.: BWTF12GR003

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

Client ID: WEST

Date Coll.: 3/27/2012

No. Jars: 1

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Other Non-Insect							
Nemata	1	0.31%	Yes	Unknown		5	UN
Sperchonidae							
<i>Sperchon</i> sp.	4	1.24%	Yes	Adult		11	PR
Oligochaeta							
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	69	21.36%	Yes	Unknown		4	CG
Ephemeroptera							
Baetidae							
<i>Baetis tricaudatus</i>	1	0.31%	Yes	Larva		4	CG
Ephemerellidae							
<i>Drunella grandis</i>	2	0.62%	Yes	Larva		2	PR
<i>Ephemerella excrucians</i>	7	2.17%	Yes	Larva		4	SH
Plecoptera							
Leuctridae							
Leuctridae	1	0.31%	Yes	Larva	Early Instar	0	SH
Nemouridae							
Nemouridae	3	0.93%	Yes	Larva	Early Instar	2	SH
<i>Zapada</i> sp.	1	0.31%	Yes	Larva	Damaged	2	SH
Perlodidae							
<i>Diura</i> sp.	1	0.31%	Yes	Larva		2	PR
Trichoptera							
Brachycentridae							
<i>Micrasema</i> sp.	1	0.31%	Yes	Larva		1	SH
Lepidostomatidae							
<i>Lepidostoma</i> sp.	4	1.24%	Yes	Larva		1	SH
Coleoptera							
Elmidae							
<i>Heterlimnius corpulentus</i>	1	0.31%	Yes	Larva		3	CG
Diptera							
Psychodidae							
<i>Pericoma / Telmatoscopus</i>	4	1.24%	Yes	Larva		4	CG
Tipulidae							
<i>Antocha monticola</i>	1	0.31%	Yes	Larva		3	CG
Chironomidae							
Chironomidae							
Chironomidae	1	0.31%	No	Pupa		10	CG
<i>Cladotanytarsus</i> sp.	1	0.31%	Yes	Larva		7	CG
Eukiefferiella Gracei Gr.	15	4.64%	Yes	Larva		8	CG
<i>Hydrobaenus</i> sp.	1	0.31%	Yes	Larva		8	SC
<i>Micropsectra</i> sp.	180	55.73%	Yes	Larva		4	CG
<i>Orthocladius</i> sp.	6	1.86%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	7	2.17%	Yes	Larva		1	CG
Potthastia Longimana Gr.	8	2.48%	Yes	Larva		2	CG
<i>Stictochironomus</i> sp.	3	0.93%	Yes	Larva		5	CG

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR003

RAI No.: BWTF12GR003 Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge
Client ID: WEST
Date Coll.: 3/27/2012 No. Jars: 1 STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Sample Count	323						

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR004

RAI No.: BWTF12GR004

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

Client ID: UPSTREAM

Date Coll.: 3/27/2012

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Oligochaeta							
Enchytraeidae							
<i>Mesenchytraeus</i> sp.	1	0.31%	Yes	Unknown		4	CG
Ephemeroptera							
Ephemerellidae							
<i>Drunella doddsii</i>	13	4.04%	Yes	Larva		1	SC
<i>Drunella grandis</i>	2	0.62%	Yes	Larva		2	PR
<i>Ephemerella excrucians</i>	2	0.62%	Yes	Larva		4	SH
Heptageniidae							
<i>Rhithrogena</i> sp.	59	18.32%	Yes	Larva		0	SC
Plecoptera							
Chloroperlidae							
<i>Sweltsa</i> sp.	4	1.24%	Yes	Larva		0	PR
Perlidae							
<i>Hesperoperla pacifica</i>	9	2.80%	Yes	Larva		1	PR
Perlodidae							
Perlodidae	1	0.31%	Yes	Larva	Early Instar	2	PR
Pteronarcyidae							
<i>Pteronarcys</i> sp.	7	2.17%	No	Larva	Early Instar	2	SH
<i>Pteronarcys californica</i>	20	6.21%	Yes	Larva		2	SH
Taeniopterygidae							
<i>Doddsia occidentalis</i>	1	0.31%	Yes	Larva		2	SC
Trichoptera							
Apataniidae							
<i>Apatania</i> sp.	1	0.31%	Yes	Larva		3	SC
Brachycentridae							
<i>Brachycentrus americanus</i>	7	2.17%	Yes	Larva		1	CF
<i>Brachycentrus occidentalis</i>	6	1.86%	Yes	Larva		2	CF
<i>Micrasema</i> sp.	1	0.31%	Yes	Larva		1	SH
Glossosomatidae							
<i>Glossosoma</i> sp.	89	27.64%	Yes	Larva		0	SC
Hydropsychidae							
<i>Arctopsyche grandis</i>	10	3.11%	Yes	Larva		2	PR
<i>Hydropsyche</i> sp.	8	2.48%	Yes	Larva		5	CF
Lepidostomatidae							
<i>Lepidostoma</i> sp.	1	0.31%	Yes	Larva		1	SH
Rhyacophilidae							
Rhyacophila Hyalinata Gr.	1	0.31%	Yes	Larva		0	PR
Coleoptera							
Elmidae							
<i>Heterlimnius corpulentus</i>	1	0.31%	Yes	Larva		3	CG
<i>Optioservus</i> sp.	1	0.31%	Yes	Adult		5	SC
<i>Optioservus</i> sp.	1	0.31%	No	Larva		5	SC
<i>Zaitzevia</i> sp.	1	0.31%	Yes	Adult		5	CG

Taxa Listing

Project ID: BWTF12GR
RAI No.: BWTF12GR004

RAI No.: BWTF12GR004

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

Client ID: UPSTREAM

Date Coll.: 3/27/2012

No. Jars: 2

STORET ID:

Taxonomic Name	Count	PRA	Unique	Stage	Qualifier	BI	Function
Diptera							
Athericidae							
<i>Atherix</i> sp.	9	2.80%	Yes	Larva		5	PR
Blephariceridae							
<i>Bibiocephala</i> sp.	16	4.97%	Yes	Larva		0	SC
Empididae							
<i>Wiedemannia</i> sp.	2	0.62%	Yes	Larva		6	PR
Tipulidae							
<i>Hexatoma</i> sp.	1	0.31%	Yes	Larva		2	PR
Chironomidae							
Chironomidae							
<i>Chaetocladius</i> sp.	1	0.31%	Yes	Larva		6	CG
Chironomidae	3	0.93%	No	Pupa		10	CG
<i>Cricotopus (Nostococcladius)</i> sp.	2	0.62%	Yes	Larva		6	SH
<i>Diamesa</i> sp.	1	0.31%	Yes	Larva		5	CG
Eukiefferiella Devonica Gr.	1	0.31%	Yes	Larva		8	CG
Eukiefferiella Gracei Gr.	9	2.80%	Yes	Larva		8	CG
<i>Limnophyes</i> sp.	1	0.31%	Yes	Larva		8	CG
<i>Orthocladius</i> sp.	24	7.45%	Yes	Larva		6	CG
<i>Pagastia</i> sp.	3	0.93%	Yes	Larva		1	CG
<i>Thienemanniella</i> sp.	2	0.62%	Yes	Larva		6	CG
Sample Count	322						

Metrics Report

Project ID: BWTF12GR
RAI No.: BWTF12GR001
Sta. Name: Gallatin River above Jack Smith bridge
Client ID: DOWN2
STORET ID
Coll. Date: 3/27/2012

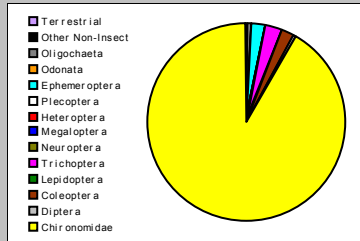
Abundance Measures

Sample Count: 324
Sample Abundance: 571.76 56.67% of sample used

Coll. Procedure: KICK
Sample Notes: 1100

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	1	1	0.31%
Oligochaeta	1	2	0.62%
Odonata			
Ephemeroptera	3	8	2.47%
Plecoptera			
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	6	9	2.78%
Lepidoptera			
Coleoptera	2	6	1.85%
Diptera	2	2	0.62%
Chironomidae	13	296	91.36%

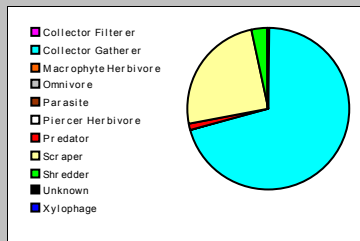


Dominant Taxa

Category	A	PRA
Orthocladius	86	26.54%
Micropsectra	80	24.69%
Hydrobaenus	75	23.15%
Chironomidae	19	5.86%
Cladotanytarsus	17	5.25%
Eukiefferiella Devonica Gr.	8	2.47%
Optioservus	4	1.23%
Lepidostoma	4	1.23%
Ephemerella excrucians	4	1.23%
Baetis tricaudatus	3	0.93%
Stictochironomus	2	0.62%
Phaenopsectra	2	0.62%
Paqastia	2	0.62%
Nais	2	0.62%
Heterolimnius corpulentus	2	0.62%

Functional Composition

Category	R	A	PRA
Predator	3	3	0.93%
Parasite			
Collector Gatherer	15	227	70.06%
Collector Filterer	2	2	0.62%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	4	82	25.31%
Shredder	4	10	3.09%
Omnivore			
Unknown			

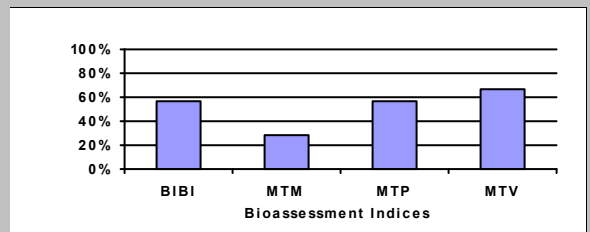


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	28	3	3		2
E Richness	3	1		1	
P Richness	0	1		0	
T Richness	6	3		3	
EPT Richness	9		3		0
EPT Percent	5.25%		0		0
All Non-Insect Abundance	3				
All Non-Insect Richness	2				
All Non-Insect Percent	0.93%				
Oligochaeta+Hirudinea Percent	0.62%				
Baetidae/Ephemeroptera	0.375				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	26.54%		3		2
Dominant Taxa (2) Percent	51.23%				
Dominant Taxa (3) Percent	74.38%	3			
Dominant Taxa (10) Percent	92.59%				
<i>Diversity</i>					
Shannon H (loge)	1.924				
Shannon H (log2)	2.775		2		
Margalef D	4.728				
Simpson D	0.215				
Evenness	0.089				
<i>Function</i>					
Predator Richness	3		1		
Predator Percent	0.93%	1			
Filterer Richness	2				
Filterer Percent	0.62%			3	
Collector Percent	70.68%		2		1
Scraper+Shredder Percent	28.40%		2		1
Scraper/Filterer	41.000				
Scraper/Scraper+Filterer	0.976				
<i>Habit</i>					
Burrower Richness	3				
Burrower Percent	1.23%				
Swimmer Richness	1				
Swimmer Percent	0.93%				
Clinger Richness	12	3			
Clinger Percent	30.56%				
<i>Characteristics</i>					
Cold Stenotherm Richness	3				
Cold Stenotherm Percent	0.93%				
Hemoglobin Bearer Richness	2				
Hemoglobin Bearer Percent	1.23%				
Air Breather Richness	1				
Air Breather Percent	0.31%				
<i>Voltinism</i>					
Univoltine Richness	10				
Semivoltine Richness	3	3			
Multivoltine Percent	92.59%		0		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.31%				
Sediment Sensitive Richness	1				
Sediment Sensitive Percent	0.31%				
Metals Tolerance Index	3.284				
Pollution Sensitive Richness	4	5		3	
Pollution Tolerant Percent	7.10%	5		2	
Hilsenhoff Biotic Index	6.056		1		0
Intolerant Percent	3.09%				
Supertolerant Percent	32.10%				
CTQa	79.654				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	28	56.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	17	56.67%	Slight
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	12	66.67%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	6	28.57%	Moderate



Metrics Report

Project ID: BWTF12GR
RAI No.: BWTF12GR002
Sta. Name: Gallatin River at Park Boundary (North)
Client ID: PARK
STORET ID
Coll. Date: 3/27/2012

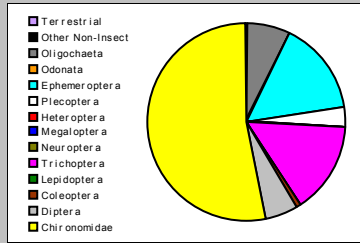
Abundance Measures

Sample Count: 291
Sample Abundance: 1,247.14 23.33% of sample used

Coll. Procedure: KICK
Sample Notes: 1000

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	1	1	0.34%
Oligochaeta	1	21	7.22%
Odonata			
Ephemeroptera	5	44	15.12%
Plecoptera	5	9	3.09%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	7	44	15.12%
Lepidoptera			
Coleoptera	2	2	0.69%
Diptera	4	15	5.15%
Chironomidae	9	155	53.26%

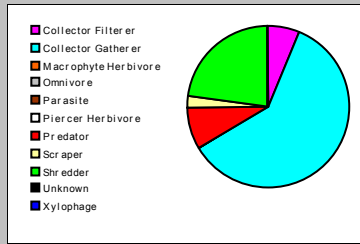


Dominant Taxa

Category	A	PRA
Eukiefferiella Gracei Gr.	67	23.02%
Cricotopus (Nostocladius)	32	11.00%
Orthocladus	23	7.90%
Mesenchytraeus	21	7.22%
Eukiefferiella Devonica Gr.	19	6.53%
Micrasema	17	5.84%
Brachycentrus americanus	17	5.84%
Ephemera exrucians	14	4.81%
Baetis tricaudatus	13	4.47%
Drunella grandis	12	4.12%
Pericoma / Telmatoscopus	7	2.41%
Paqastia	5	1.72%
Antocha monticola	5	1.72%
Caudatella	4	1.37%
Stictochironomus	3	1.03%

Functional Composition

Category	R	A	PRA
Predator	7	24	8.25%
Parasite			
Collector Gatherer	14	174	59.79%
Collector Filterer	2	19	6.53%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	5	7	2.41%
Shredder	6	67	23.02%
Omnivore			
Unknown			

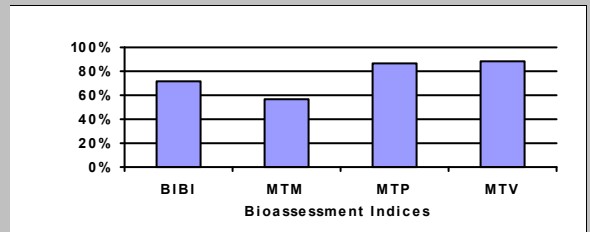


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	34	3	3		3
E Richness	5	3		2	
P Richness	5	3		3	
T Richness	7	3		3	
EPT Richness	17		3		2
EPT Percent	33.33%		2		0
All Non-Insect Abundance	22				
All Non-Insect Richness	2				
All Non-Insect Percent	7.56%				
Oligochaeta+Hirudinea Percent	7.22%				
Baetidae/Ephemeroptera	0.295				
Hydropsychidae/Trichoptera	0.068				
<i>Dominance</i>					
Dominant Taxon Percent	23.02%		3		3
Dominant Taxa (2) Percent	34.02%				
Dominant Taxa (3) Percent	41.92%	5			
Dominant Taxa (10) Percent	80.76%				
<i>Diversity</i>					
Shannon H (loge)	2.779				
Shannon H (log2)	4.009		3		
Margalef D	5.820				
Simpson D	0.093				
Evenness	0.055				
<i>Function</i>					
Predator Richness	7		3		
Predator Percent	8.25%	1			
Filterer Richness	2				
Filterer Percent	6.53%			2	
Collector Percent	66.32%		2		2
Scraper+Shredder Percent	25.43%		2		1
Scraper/Filterer	0.368				
Scraper/Scraper+Filterer	0.269				
<i>Habit</i>					
Burrower Richness	3				
Burrower Percent	14.43%				
Swimmer Richness	1				
Swimmer Percent	4.47%				
Clinger Richness	19	3			
Clinger Percent	31.27%				
<i>Characteristics</i>					
Cold Stenotherm Richness	4				
Cold Stenotherm Percent	13.06%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	1.03%				
Air Breather Richness	2				
Air Breather Percent	2.06%				
<i>Voltinism</i>					
Univoltine Richness	15				
Semivoltine Richness	7	5			
Multivoltine Percent	58.08%		2		
<i>Tolerance</i>					
Sediment Tolerant Richness	2				
Sediment Tolerant Percent	2.06%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	13.06%				
Metals Tolerance Index	4.213				
Pollution Sensitive Richness	5	5		3	
Pollution Tolerant Percent	1.72%	5		3	
Hilsenhoff Biotic Index	4.911		3		1
Intolerant Percent	25.09%				
Supertolerant Percent	30.58%				
CTQa	56.867				

Bioassessment Indices

BioIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	36	72.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	26	86.67%	None
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	16	88.89%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	12	57.14%	Slight



Metrics Report

Project ID: BWTF12GR
RAI No.: BWTF12GR003
Sta. Name: West Fork of the Gallatin River upstream of Big Sky Spur Rd. bridge
Client ID: WEST
STORET ID
Coll. Date: 3/27/2012

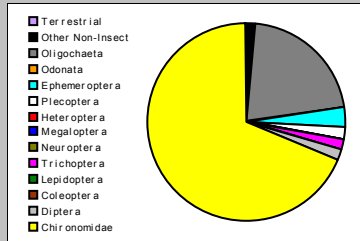
Abundance Measures

Sample Count: 323
Sample Abundance: 2,422.50 13.33% of sample used

Coll. Procedure: KICK
Sample Notes: 1130

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect	2	5	1.55%
Oligochaeta	1	69	21.36%
Odonata			
Ephemeroptera	3	10	3.10%
Plecoptera	4	6	1.86%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	2	5	1.55%
Lepidoptera			
Coleoptera	1	1	0.31%
Diptera	2	5	1.55%
Chironomidae	8	222	68.73%

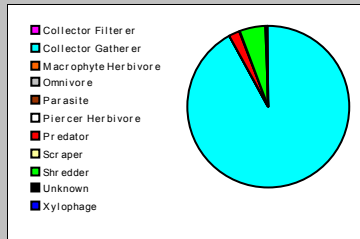


Dominant Taxa

Category	A	PRA
Microsectra	180	55.73%
Mesenchytraeus	69	21.36%
Eukiefferiella Gracei Gr.	15	4.64%
Potthastia Londimana Gr.	8	2.48%
Paqastia	7	2.17%
Ephemerella excrucians	7	2.17%
Orthocladius	6	1.86%
Sperchon	4	1.24%
Pericoma / Telmatoscopus	4	1.24%
Lepidostoma	4	1.24%
Stictochironomus	3	0.93%
Nemouridae	3	0.93%
Drunella grandis	2	0.62%
Nemata	1	0.31%
Micrasema	1	0.31%

Functional Composition

Category	R	A	PRA
Predator	3	7	2.17%
Parasite			
Collector Gatherer	12	297	91.95%
Collector Filterer			
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	1	1	0.31%
Shredder	6	17	5.26%
Omnivore			
Unknown	1	1	0.31%

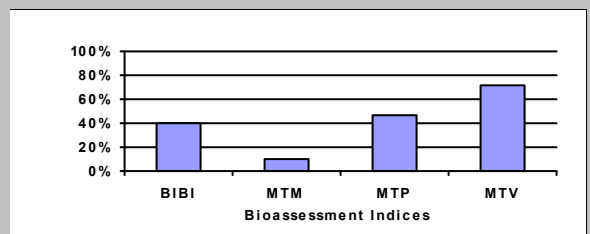


Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	23	3	2		1
E Richness	3	1		1	
P Richness	4	3		3	
T Richness	2	1		1	
EPT Richness	9		3		0
EPT Percent	6.50%		0		0
All Non-Insect Abundance	74				
All Non-Insect Richness	3				
All Non-Insect Percent	22.91%				
Oligochaeta+Hirudinea Percent	21.36%				
Baetidae/Ephemeroptera	0.100				
Hydropsychidae/Trichoptera	0.000				
<i>Dominance</i>					
Dominant Taxon Percent	55.73%		1		0
Dominant Taxa (2) Percent	77.09%				
Dominant Taxa (3) Percent	81.73%	1			
Dominant Taxa (10) Percent	94.12%				
<i>Diversity</i>					
Shannon H (loge)	1.592				
Shannon H (log2)	2.297		1		
Margalef D	3.810				
Simpson D	0.361				
Evenness	0.086				
<i>Function</i>					
Predator Richness	3		1		
Predator Percent	2.17%	1			
Filterer Richness	0				
Filterer Percent	0.00%			3	
Collector Percent	91.95%		1		0
Scraper+Shredder Percent	5.57%		1		0
Scraper/Filterer	0.000				
Scraper/Scraper+Filterer	0.000				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	2.17%				
Swimmer Richness	1				
Swimmer Percent	0.31%				
Clinger Richness	9	1			
Clinger Percent	60.99%				
<i>Characteristics</i>					
Cold Stenotherm Richness	2				
Cold Stenotherm Percent	0.62%				
Hemoglobin Bearer Richness	1				
Hemoglobin Bearer Percent	0.93%				
Air Breather Richness	1				
Air Breather Percent	0.31%				
<i>Voltinism</i>					
Univoltine Richness	10				
Semivoltine Richness	1	1			
Multivoltine Percent	70.59%		1		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.31%				
Sediment Sensitive Richness	0				
Sediment Sensitive Percent	0.00%				
Metals Tolerance Index	1.680				
Pollution Sensitive Richness	3	3		2	
Pollution Tolerant Percent	1.24%	5		3	
Hilsenhoff Biotic Index	4.053		3		1
Intolerant Percent	8.67%				
Supertolerant Percent	5.26%				
CTQa	69.200				

Bioassessment Indices

BiIndex	Description	Score	Pct	Rating
BIBI	B-IBI (Karr et al.)	20	40.00%	
MTP	Montana DEQ Plains (Bukantis 1998)	14	46.67%	Moderate
MTV	Montana Revised Valleys/Foothills (Bollman 1998)	13	72.22%	Slight
MTM	Montana DEQ Mountains (Bukantis 1998)	2	9.52%	Severe



Metrics Report

Project ID: BWTF12GR
RAI No.: BWTF12GR004
Sta. Name: Gallatin River just upstream of West Fork confluence
Client ID: UPSTREAM
STORET ID
Coll. Date: 3/27/2012

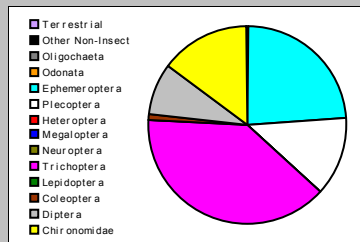
Abundance Measures

Sample Count: 322
Sample Abundance: 743.08 43.33% of sample used

Coll. Procedure: KICK
Sample Notes: 1030

Taxonomic Composition

Category	R	A	PRA
Terrestrial			
Other Non-Insect			
Oligochaeta	1	1	0.31%
Odonata			
Ephemeroptera	4	76	23.60%
Plecoptera	5	42	13.04%
Heteroptera			
Megaloptera			
Neuroptera			
Trichoptera	9	124	38.51%
Lepidoptera			
Coleoptera	3	4	1.24%
Diptera	4	28	8.70%
Chironomidae	9	47	14.60%

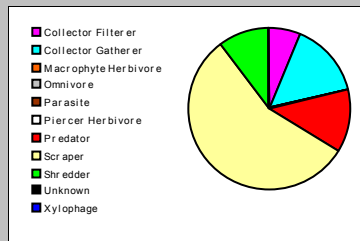


Dominant Taxa

Category	A	PRA
Glossosoma	89	27.64%
Rhithroena	59	18.32%
Orthocladus	24	7.45%
Pteronarcys californica	20	6.21%
Bibiocephala	16	4.97%
Drunella doddsii	13	4.04%
Arctopsyche grandis	10	3.11%
Hesperoperla pacifica	9	2.80%
Eukiefferiella Gracei Gr.	9	2.80%
Atherix	9	2.80%
Hydropsyche	8	2.48%
Pteronarcys	7	2.17%
Brachycentrus americanus	7	2.17%
Brachycentrus occidentalis	6	1.86%
Sweltsa	4	1.24%

Functional Composition

Category	R	A	PRA
Predator	9	39	12.11%
Parasite			
Collector Gatherer	11	48	14.91%
Collector Filterer	3	21	6.52%
Macrophyte Herbivore			
Piercer Herbivore			
Xylophage			
Scraper	7	181	56.21%
Shredder	5	33	10.25%
Omnivore			
Unknown			



Metric Values and Scores

Metric	Value	BIBI	MTP	MTV	MTM
<i>Composition</i>					
Taxa Richness	35	3	3		3
E Richness	4	1		2	
P Richness	5	3		3	
T Richness	9	3		3	
EPT Richness	18		3		2
EPT Percent	75.16%		3		3
All Non-Insect Abundance	1				
All Non-Insect Richness	1				
All Non-Insect Percent	0.31%				
Oligochaeta+Hirudinea Percent	0.31%				
Baetidae/Ephemeroptera	0.000				
Hydropsychidae/Trichoptera	0.145				
<i>Dominance</i>					
Dominant Taxon Percent	27.64%		3		2
Dominant Taxa (2) Percent	45.96%				
Dominant Taxa (3) Percent	53.42%	3			
Dominant Taxa (10) Percent	80.12%				
<i>Diversity</i>					
Shannon H (loge)	2.547				
Shannon H (log2)	3.674		3		
Margalef D	5.924				
Simpson D	0.135				
Evenness	0.063				
<i>Function</i>					
Predator Richness	9		3		
Predator Percent	12.11%	3			
Filterer Richness	3				
Filterer Percent	6.52%			2	
Collector Percent	21.43%		3		3
Scraper+Shredder Percent	66.46%		3		3
Scraper/Filterer	8.619				
Scraper/Scraper+Filterer	0.896				
<i>Habit</i>					
Burrower Richness	2				
Burrower Percent	0.93%				
Swimmer Richness	0				
Swimmer Percent	0.00%				
Clinger Richness	21	5			
Clinger Percent	81.37%				
<i>Characteristics</i>					
Cold Stenotherm Richness	4				
Cold Stenotherm Percent	9.94%				
Hemoglobin Bearer Richness					
Hemoglobin Bearer Percent					
Air Breather Richness	1				
Air Breather Percent	0.31%				
<i>Voltinism</i>					
Univoltine Richness	17				
Semivoltine Richness	8	5			
Multivoltine Percent	14.60%		3		
<i>Tolerance</i>					
Sediment Tolerant Richness	1				
Sediment Tolerant Percent	0.31%				
Sediment Sensitive Richness	3				
Sediment Sensitive Percent	31.37%				
Metals Tolerance Index	2.582				
Pollution Sensitive Richness	5	5		3	
Pollution Tolerant Percent	4.04%	5		3	
Hilsenhoff Biotic Index	1.730		3		3
Intolerant Percent	77.95%				
Supertolerant Percent	4.35%				
CTQa	56.933				

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)	16	88.89%	None
MTM	Montana DEQ Mountains (Bukantis 1998)	19	90.48%	None

