



**Aquatic Benthic Macroinvertebrate Communities in Streams from  
the North Shore of Lake Superior, 2005 and 2007**

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**Prepared for**



**Study Our Streams**  
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**Introduction**

Benthic macroinvertebrates respond to ecosystem changes faster than other members of the aquatic community, and are therefore commonly used as indicator species to assess the health of aquatic ecosystems. Trends and changes in aquatic macroinvertebrate populations and their community structure can serve as indicators of short-term stresses that may ultimately influence the aquatic community of Lake Superior.

The goals of this part of the project were fourfold: to locate reference sites for minimally impacted streams along the north shore of Lake Superior, to sample benthic macroinvertebrates at two sites that had previously been sampled in an attempt to determine the effect of season/year on the composition of the benthic macroinvertebrate community, to assess the biological health of a remediated stream by comparing the community structure with that found in minimally impacted reference sites with similar physiographic features, and to compare the normal range of biotic indices for benthic macroinvertebrate communities along the north shore of Lake Superior with those of communities in Southern Ontario.

**Procedure**

We examined all watersheds draining into Lake Superior between Thunder Bay and Sault Ste. Marie to find rivers and streams that were minimally impacted and of variable size, stream order, substrate and other physiographic features. The criteria used to determine whether or not a site was minimally impacted were outlined by the Ontario Benthos Biomonitoring Network (Jones *et al.*, 2005). The factors considered included:

- point-source contamination
- dams, impoundments, regulation of water level
- loss of natural riparian vegetation
- catchment deforestation
- aquatic habitat disruption (dredging, stream channel alteration)
- development of urban land use in catchment
- agricultural land use in catchment
- artificial drainage/ imperviousness (asphalt) in catchment
- anthropogenic acidification, and

-water chemistry.

Additionally, the stream or river had to be accessible by road and safe to sample.

We sampled the Jackpine River, Black Sturgeon River, Little Pic River and Steel River (Fig. 1) in late September and early October of 2005. These rivers appeared to be candidates for minimally impacted reference sites according to OBBN protocol. We also sampled the Current River at the end of June 2005. This site had been sampled in October of 2004; therefore, we hoped to determine if any widespread changes had occurred in community structure due to season. No streams were sampled in 2006 because of lack of funds.



**Figure 1.** Aquatic benthic macroinvertebrate sampling sites, north shore of Lake Superior, 2005.

In 2007, the benthic communities in Speckled Trout Creek, Barrett Creek, Coldwater River, Old Woman River, Cypress River, Furcate Creek, and Coldwater Creek were sampled. Four sites were sampled in late May and early June, and three sites were sampled in mid-September. These watercourses appeared to be suitable candidates for reference sites for the north shore of the Lake Superior basin. We also sampled the Jackpine River in September 2007. This site had been sampled in September of 2005; therefore, we wanted to determine if any widespread changes had occurred in community structure over time. A rehabilitated portion of McVicar Creek, a stream within the city limits of Thunder Bay, was sampled in June 2007 (Fig. 2).



**Figure 2.** Aquatic benthic macroinvertebrate sampling sites, north shore of Lake Superior, 2007.

Benthic macroinvertebrates were sampled at each site according to OBBN protocols (Jones *et al.*, 2005), using a traveling kick-and-sweep with a 500-micron D-net. Three sub-samples were collected at each of the sites and each sub-sample was preserved in 70% ethanol.

Approximately 100 benthic macroinvertebrates were randomly picked from each of the sub-samples using the 'bucket method' (Jones *et al.*, 2005) with a Nikon SMZ1500 at 10X magnification. The specimens were identified at genus-level when possible (Appendix 1A - Appendix 14B), using Merritt and Cummins (1996) and Wiggins (1996). The biotic indices for the sites were calculated based on identification of 27-taxa, as outlined by the OBBN (Jones *et al.*, 2005).

The OBBN Biotic Indices (Table 1) (Jones *et al.*, 2005) used to analyse the 27-taxa identified from the candidate sites provide an insight into present and past conditions experienced by the aquatic macroinvertebrate communities. Some of the Biotic Indices (% Worms, % Chironomids) are useful for characterising sites that are heavily impacted by nutrient enrichment. Nutrient enrichment will cause premature eutrophication resulting in low dissolved oxygen in the water, with consequent degradation of the habitat. Other biotic indices (% EPT, Hilsenhoff

Table 1. Biotic Indices: calculations and descriptions.

Subcategory	Index	How to Calculate:	Indication
Richness/Diversity	ABUNDANCE	Sum of Organisms	possibly impaired if extremely low or high value
	RICHNESS	Count of taxa found in a sample	the greater the number of taxa the higher the quality of the habitat
	INSECT RICHNESS	Count of Chironomidae+Culicidae +Ceratopogonidae +Tipulidae +Tabanidae +Simuliidae+Odonates(Zygoptera and Anisoptera) + Coleoptera + Ephemeroptera + Hemiptera + Lepidoptera + Megaloptera + Plecoptera + Trichoptera + misc Dipterans	the greater the number of taxa the higher the quality of the habitat
	DIPTERIAN RICHNESS	Count of Chironomidae+Culicidae +Ceratopogonidae+Tipulidae+Tabanidae+Simuliidae	the greater the number of taxa the higher the quality of the habitat
	SIMPSON'S INDEX	Proportion of species $i$ relative to the total number of species ( $p_i$ ), squared Squared proportions for all the species summed, and the reciprocal is taken	probability that two individuals will belong to the same taxon
	SHANNON'S H' DIVERSITY	$H' = -\sum(p_i * \ln(p_i))$ where $p_i$ =proportion of the count of each taxa	high values indicate increased evenness of the counts among the taxa and higher quality habitat
Composition	%AMPHIPODA	Sum of amphipoda /abundance *100	associated with eutrophic conditions
	%CHIRONOMIDAE	Sum of Chironomidae / Abundance*100	extremely abundant in highly eutrophic situations, but present in all habitats
	%CRUSTACEANS and MOLLUSCA	(Sum of Amphipoda+Decapoda+Isopoda +Gastropoda + Pelecypoda) /Abundance*100	associated with eutrophic conditions, but present in many habitats
	%CRUSTACEANS	(Sum of Amphipoda+Decapoda+Isopoda) /abundance*100	associated with eutrophic conditions, but present in many habitats
	%EPHEMEROPTERA	Sum of Ephemeroptera /abundance*100	the greater the value the higher the quality of the habitat
	%GASTROPODS	Sum of Gastropoda /abundance*100	associated with eutrophic conditions, but present in many habitats
	%HIRUDINEA	Sum of Hirudinea /abundance*100	associated with eutrophic conditions, but present in many habitats
	%ISOPODA	Sum of Isopoda /abundance*100	associated with eutrophic conditions
	%MOLLUSCA	(Sum of Gastropoda + Pelcypoda) /abundance*100	associated with eutrophic conditions, but present in many habitats
	%ODONATES	(Sum of Anisoptera and Zygoptera) /abundance*100	the greater the value the higher the quality of the habitat
	%OLIGOCHAETES	Sum of Oligochaetes /abundance*100	abundant in highly eutrophic situations, but present in many habitats
	%PELECYPODA	Sum of Pelecypoda /abundance*100	the greater the value the healthier the habitat
	%TIPULIDAE	Sum of Tipulidae /abundance*100	possibly impaired if extremely high value, but present in many habitats
	%TABANIDAE	Sum of Tabanidae /abundance*100	possibly impaired if extremely high value, but present in many habitats
	%SIMULIDAE	Sum of Simuliidae /abundance*100	possibly impaired if extremely high value, but present in many habitats
	%DIPTERA	(Sum of Chironomidae+Culicidae +Ceratopogonidae +Tipulidae+Tabanidae+Simuliidae +misc Dipterans) / Total Abundance* 100	possibly impaired if extremely low or high value
	%INSECTS	(Sum of abundance of Chironomidae+Culicidae +Ceratopogonidae +Tipulidae+Tabanidae+Simuliidae+Odonates (Zygoptera and Anisoptera) + Coleoptera + Ephemeroptera + Hemiptera + Lepidoptera + Megaloptera + Plecoptera + Trichoptera + misc Dipterans)/ Total Abundance* 100%	possibly impaired if extremely low or high value
	%NON-DIPTERIAN INSECTS	(Sum of Zygoptera + Anisoptera + Coleoptera + Ephemeroptera + Hemiptera + Lepidoptera + Megaloptera + Plecoptera + Trichoptera)/Total Abundance* 100	a high value indicates higher water quality than a lower value
%EPT	(Sum of Ephemeroptera + Plecoptera + Trichoptera) / Abundance * 100	a high value indicates higher water quality than a lower value	
%EOT	(Sum of Ephemeroptera + Anisoptera + Zygoptera + Trichoptera) / Total Abundance * 100	a high value indicates higher water quality than a lower value	
Tolerance	%DOMINANT	Abundance of the Most Common Taxon / abundance * 100	the dominance of a pollution tolerant group indicates an impaired site
	HILSENHOFF'S BIOTIC INDEX	$=\sum(x_i \cdot t_i) / \text{Total abundance}$ where $x_i$ =abundance of each taxa and $t_i$ = tolerance value for each taxa.	a low value implies low nutrient conditons. Values above 6.0 are of concern

Biotic Index) help to confirm high water quality at the site. Each biotic index provides a separate insight about the quality of the habitat. The combination of several indices makes it possible to evaluate the relative, long-term health of the site. However, not all biotic indices are necessary to determine whether a site is impaired, or whether it should be considered a suitable reference site.

The biotic indices used to evaluate all the sites were: Richness, Shannon's H' Diversity, Hilsenhoff Biotic Index, % Dominant, % EPT, % Chironomids, and % Worms (Table 1). These biotic indices were compared with results from southern Ontario (CEW Data Manual, 2005) and data from the Lake Superior basin (Deacon & Lavoie, 2005).

## Observations

### 2005 REGIONAL REFERENCE SITES

The Jackpine River site (JP-1) (Table 2) had moderate values for northern Ontario for Richness (8.00), Shannon's H' Diversity (1.52), Hilsenhoff Biotic Index (5.76), % Dominants (40.87), and % Chironomids (34.14) The % Worms (9.29) was higher than seen in any of the other sites sampled during 2005, possibly indicating nutrient enrichment causing eutrophication. However, the % EPT (49.72) was moderate and combined with the above values indicated that this community of organisms came from a healthy, although unusual ecosystem. Site JP-1 should be included in the OBBN Reference Site database.

Table 2. Summary of Biotic Indices at Five Sites, Thunder Bay, November 2007.

Site Name	Site Code	Subsample Number	Sampling Date	Total Abundance	Richness	H' Diversity	Hilsenhoff's Biotic Index	% Dominants	% EPT	% Chironomids	% Worms
Current River	CU-14	Mean	29-Jun-05	118	12.33	1.93	6.22	30.54	30.19	29.06	4.81
Jackpine River	JP-1	Mean	20-Sep-05	106	8.00	1.52	5.76	40.87	49.72	34.14	9.29
Black Sturgeon R.	BS-4	Mean	04-Oct-05	112	9.00	1.46	5.73	49.05	47.42	37.51	6.70
Steel River	SR-3	Mean	05-Oct-05	119	11.00	1.63	5.76	41.73	39.04	41.73	3.98
Little Pic River	LP-8	Mean	05-Oct-05	104	9.00	1.41	6.01	51.45	35.17	51.45	2.95

The Black Sturgeon River site (BS-4) (Table 2) had a moderate Richness (9.00), Shannon's H' Diversity (1.46), Hilsenhoff Biotic Index (5.73), % Dominants (49.05), % Chironomids (37.51), and % Worms (6.70). The % EPT (47.42) was moderate and considered indicative of a healthy ecosystem. Site BS-4 should be included in the OBBN Reference Site database.

The Steel River site (SR-3) (Table 2) had a moderately high Richness (11.00), and a moderate Shannon's H' Diversity (1.63), Hilsenhoff Biotic Index (5.76), % Dominants (41.73), % Chironomids (41.73), and % Worms (3.98). The % EPT (39.04) was also moderate and considered indicative of a healthy ecosystem. Site SR-3 should be included in the OBBN Reference Site database.

The Little Pic River site (LP-8) (Table 2) had a moderate Richness (9.00), but a lower Shannon's H' Diversity (1.41) than any of the other sites. As well, the Hilsenhoff Biotic Index (6.01) was high, as were % Dominants (51.45), and % Chironomids (51.45). The % EPT (35.17) was moderately low for this survey, but % Worms (2.95) was the lowest found during 2005; therefore, site LP-8 was considered a healthy ecosystem. Site LP-8 should be included in the OBBN Reference Site database

## 2007 REGIONAL REFERENCE SITES

The Speckled Trout Creek site (ST-1) (Table 3) had a moderate Richness (9.33), Shannon's H' Diversity (1.52), Hilsenhoff Biotic Index (5.61), % Dominants (46.67), and % Chironomids (45.71). The % EPT (27.54) was moderately low, as was the % Worms (2.18). Site ST-1 should be included in the OBBN Reference Site database.

Table 3. Summary of Biotic Indices at Candidate Reference Condition Sites and McVicar Ck. Test Site, Thunder Bay, 2007.

Site Name	Site Code	Subsample Number	Sampling Date	Total Abundance	Richness	H' Diversity	Hilsenhoff's Biotic Index	% Dominants	% EPT	% Chironomids	% Worms
Speckled Trout Ck	ST-1	Mean	30-May-07	106	9.33	1.52	5.61	46.67	27.54	45.71	2.18
Barrett River	B-1	Mean	31-May-07	106	8.33	1.19	6.20	61.97	29.15	61.97	0.62
Coldwater River	CW-1	Mean	31-May-07	106	9.33	1.31	6.23	58.47	28.29	58.47	5.04
Old Woman River	OW-1	Mean	31-May-07	107	10.67	1.94	5.60	27.86	30.64	26.01	8.03
Jackpine River	JP-1	Mean	15-Sep-07	101	8.67	1.38	5.85	53.35	47.56	34.20	11.62
Cypress River	CY-1	Mean	15-Sep-07	125	7.67	1.39	5.58	49.58	55.19	29.81	7.09
Furcate Creek	FC-1	Mean	16-Sep-07	109	10.67	1.47	6.06	55.10	28.11	55.10	2.50
Coldwater Creek	CC-8	Mean	16-Sep-07	108	9.33	1.47	6.21	50.77	25.74	49.51	16.55
McVicar Creek Test Site	MV-T1	Mean	13-Jun-07	118	6.33	1.22	6.96	52.79	11.39	27.99	36.20

The Barrett River site (B-1) (Table 3) had a moderate Richness (8.33), but a very low Shannon's H' Diversity (1.19). The Hilsenhoff Biotic Index (6.20) was high, as was the % Dominants (61.97), and % Chironomids (61.97). The % EPT (29.15) was moderately low, possibly indicating that the site experienced nutrient enrichment; however, the % Worms (0.62) was also very low. If both the % Chironomids and % Worms had been high, then the site would have been considered impaired. Site B-1 is located in Lake Superior Provincial Park (LSPP) in an area unlikely to experience anthropogenic nutrient enrichment. The combination of low % EPT and low % Worms makes the Barrett River site a healthy, but unusual ecosystem. Site B-1 should be sampled again prior to inclusion in the OBBN Reference Site database

The Coldwater River site (CW-1) (Table 3) had a moderate Richness (9.33), and a moderately low Shannon's H' Diversity (1.31). The Hilsenhoff Biotic Index (6.23) was high, as was the % Dominants (58.47), and % Chironomids (58.47). The % EPT (28.29) was moderately low and the % Worms (5.04) was moderate,

all of which indicate that the site possibly experienced nutrient enrichment. This Coldwater River site had a similar combination of indices, as well as physiography as the Barrett River site (B-1). The Coldwater River site is also in LSPP, which is unlikely to experience nutrient enrichment. These sites probably provide similar habitat for an unusual, but healthy ecosystem. Site CW-1 should be sampled again prior to inclusion in OBBN Reference Site database

The Old Woman River site (OW-1) (Table 3) had a high Richness (10.67), and a very high Shannon's H' Diversity (1.94). The Hilsenhoff Biotic Index (5.60) was moderate. The % Dominants (27.86) and % Chironomids (26.01) were low, but the % Worms (8.03) was moderately high. The % EPT (30.64) was moderately low. The Old Woman River was considered a healthy ecosystem. Site OW-1 should be included in the OBBN Reference Site database.

The Cypress River site (CY-1) (Table 3) had a moderate Richness (7.67), and a moderately low Shannon's H' Diversity (1.39). The Hilsenhoff Biotic Index (5.58) was moderate, as was the % Dominants (49.58). The % Chironomids (29.81) was low, but the % Worms (7.09) was moderate. The % EPT (55.19) was high which indicated a healthy ecosystem. Site CY-1 should be included in OBBN Reference Site database

The Furcate Creek site (FC-1) (Table 3) had a high Richness (10.67), and a moderately low Shannon's H' Diversity (1.47). The Hilsenhoff Biotic Index (6.06) was high, as was the % Dominants (55.10), and % Chironomids (55.10). The % EPT (28.11) was low but so was the % Worms (2.50). Furcate Creek has a healthy ecosystem. Site FC-1 should be included in the OBBN Reference Site database.

The Coldwater Creek site (CC-8) (Table 3) had a moderate Richness (9.33) and Shannon's H' Diversity (1.47). The Hilsenhoff Biotic Index (6.21) was high, but the % Dominants (50.77) and % Chironomids (49.51) was moderate. The % EPT (25.74) was low and the % Worms (16.55) was high, indicating that Coldwater Creek has an unusual ecosystem possibly resulting from the high organic matter found in the stream. Site CC-8 should be sampled again prior to inclusion in the OBBN Reference Site database.

## RESAMPLED SITES

The Current River site (CU-14) (Table 2) was sampled on 14 October 2004 and again on 29 June 2005. The 2004 sample had a high Richness (10.67) and Shannon's H' Diversity (1.85), and a moderate Hilsenhoff Biotic Index (5.43). The % Dominants (32.12) and % Chironomids (29.46) was moderately low. The % EPT (48.64) was moderate, as was the % Worms (5.38). Overall this site apparently supported a healthy ecosystem and was recommended for the OBBN Reference Site database in 2004 (Deacon & Lavoie 2005).

The 2005 Current River site CU-14 sample also had a high Richness (12.33), Shannon's H' Diversity (1.93), and Hilsenhoff Biotic Index (6.22). The % Dominants (30.54) and % Chironomids (29.06) was moderately low. The % EPT (30.19) was also moderately low, whereas the % Worms (4.81) was moderate. These data differ only slightly from those collected during 2004. The Hilsenhoff Biotic Index is higher and the % EPT is slightly lower, perhaps related to the difference in the community associated with changes related to the different seasons. The other biotic indices are remarkably similar. Evidently no significant changes had yet occurred in the community between October 2004 and June 2005. These results also increased our confidence in the OBBN sampling protocols and analysis using the 27 Taxa Biotic Indices.

The Jackpine River site (JP-1) (Table 2) was first sampled on 20 September 2005 (see above) and was recommended for the OBBN Reference Site database. Site JP-1 (Table 3) was sampled again on 15 September 2007. The 2007 sample had a moderate Richness (8.67), Shannon's H' Diversity (1.38), Hilsenhoff Biotic Index (5.85), and % Dominants (53.35). The % Chironomids (34.20) was moderately low. The % EPT (47.56) was moderate; however, the % Worms (11.62) was high, as noted during 2005. The biotic indices were similar between years, as one would expect for samples collected during the same season. Apparently the OBBN sampling protocols and analysis using the 27-Taxa Biotic Indices are providing replicable results from year-to-year.

## TEST SITE

The McVicar Creek test site (MV-T1) (Table 3) had a very low Richness (6.33), Shannon's H' Diversity (1.22), and a very high Hilsenhoff Biotic Index (6.96). The % Dominants (52.79) was moderate; however, the % Chironomids (27.99) was low and % EPT (11.39) was very low. The % Worms (36.20) was higher than found in any of the other 23 sites sampled to date. Amphipoda were also found at this site (Appendix 14). Amphipoda are characteristically found in habitats rich in organics. The biotic indices from site MV-T1 indicate a community composition associated with nutrient enrichment causing eutrophication. Although this site has been rehabilitated, it supports a community indicative of a moderately impacted site. Re-sampling of Site MV-T1 should occur to determine whether or not recovery is occurring. An additional site on McVicar Creek within the urban environment should be sampled for comparison to account for variation in benthic populations associated with urban impact on the stream.

## Conclusion

The first goal of this project was to locate reference sites for minimally impacted streams along the north shore of Lake Superior. The Jackpine River (JP-1), Black Sturgeon River (BS-4), Steel River (SR-3), Little Pic (LP-8), Speckled Trout

Creek (ST-1), Old Woman River (OW-1), Cypress River (CY-1), and Furcate Creek (FC-1) sites warrant inclusion in the OBBN Reference Site database. Streams that fit the OBBN criteria as minimally impacted reference sites have now been sampled along the entire length of the north shore of Lake Superior. The Barrett River (B-1), Coldwater River (CW-1), and Coldwater Creek (CC-1) sites should be sampled again before inclusion in the OBBN database. These sites are possibly experiencing some form of nutrient enrichment.

The second goal of this project was to sample benthic macroinvertebrates at two sites that had previously been sampled in an attempt to determine the effect of season/year on the composition of the benthic macroinvertebrate community. The OBBN sampling protocol and analysis using the 27-Taxa Biotic Indices are providing meaningful results. Current River (CU-14) and Jackpine River (JP-1) had communities that had a similar structure (Tables 2 and 3) from autumn to spring and from autumn to autumn, respectively.

The third goal was to assess the biological health of a remediated stream by comparing the community structure with that found in minimally impacted reference sites with similar physiographic features. The OBBN Reference Site database is still not large enough to permit statistical analyses of Test Sites for the north shore of the Lake Superior basin; however, McVicar Creek (MV-T1) is obviously very different in community structure from those sites that have been included in the OBBN Reference Site database. Re-sampling of Site MV-T1 should occur to determine whether or not recovery is occurring. An additional site on McVicar Creek within the urban environment should be sampled for comparison to account for variation in benthic populations associated with urban impact on the stream.

Finally, we wanted to compare the normal range of biotic indices for benthic macroinvertebrate communities along the north shore of Lake Superior with those of communities in Southern Ontario. The normal range of biotic indices of macroinvertebrate communities in this survey obviously differ from those of southern Ontario. The Richness and Shannon's  $H'$  are lower, whereas the % Dominant seems consistently higher than found in southern Ontario. As well, the % EPT is very high as is the % Chironomids when compared to biotic indices in Southern Ontario stream communities. The Hilsenhoff Biotic Index was almost consistently below 6.0. A value above 6.0 is considered indicative of eutrophication in southern Ontario (CEWDM 2005). The Hilsenhoff Biotic Index values sometimes exceeded 6.0 in our sites even when the community was considered unaffected by eutrophication. These differences were noted previously (Deacon & Lavoie 2005) and seem generally consistent. These differences are probably indicative of healthy benthic macroinvertebrate communities of northern Ontario; however, further data are required before a definitive conclusion can be made.

## Literature Cited

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Appendix 1A. Benthic macroinvertebrates from the Jackpine River, 2005.

		Jackpine	Jackpine	Jackpine
		River	River	River
		Site	Site	Site
		JP1	JP1	JP1
		#1 riffle	#2 pool	#3 riffle
		20-Sep	20-Sep	20-Sep
<b>PLATYHELMINTHES</b>				
<b>NEMATODA</b>				
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Ancylidae				
Hydrobiidae				
Planorbidae		4		
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		15	7	8
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		1	4	
<b>Amphipoda</b>				
Hyalellidae	<i>Hyalella</i>			
<b>Decapoda</b>				
Cambaridae				
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	1		
	<i>Baetis</i>			
Isonychiidae				
	<i>Isonychia</i>			
Heptageniidae	Juvenile/damaged	22	3	10
	<i>Epeorus (Iron)</i>			
	<i>Rhythrogena</i>			1
	<i>Stenacron</i>			
	<i>Stenonema</i>	2	4	2
Ephemerellidae	Juvenile/damaged			
	<i>Attenella</i>	4	12	6
	<i>Ephemerella</i>			
	<i>Eurylophella</i> (s str.)		1	
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>		1	
Baetiscidae	<i>Baetisca</i>		1	
Leptophlebiidae	Juvenile/damaged	18	2	8
	<i>Leptophlebia</i>			
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
	<i>Ophiogomphus</i>			
Calopterygidae	<i>Calopteryx</i>			
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			
Taeniopterygidae	<i>Taeniopteryx</i>	1		
Nemouridae	Juvenile/damaged			

Appendix 1B. Benthic macroinvertebrates from the Jackpine River, 2005.				
		Jackpine	Jackpine	Jackpine
		River	River	River
		Site	Site	Site
		JP1	JP1	JP1
		#1 riffle	#2 pool	#3 riffle
		20-Sep	20-Sep	20-Sep
<b>Plecoptera</b>				
Leuctridae	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
	<i>Paragnetina</i>			
Perlodidae	Juvenile/damaged			
Chloroperliidae	Juvenile/damaged			2
	<i>Alloperla</i>			
<b>Hemiptera</b>				
Corixidae				
<b>Megaloptera</b>				
Corydalidae	<i>Nigronia</i>			
<b>Neuroptera</b>				
Sisyriidae	<i>Climacia</i>			
<b>Coleoptera</b>				
Halplidae	<i>Halplus</i>			
Dytiscidae				
Elmidae	Juvenile/damaged		1	1
<b>Trichoptera</b>	Juvenile/damaged/ Pupa			
Philopotamidae	<i>Dolophilodes</i>			1
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Neureclipsis</i>			
	<i>Polycentropus</i>		1	
Dipseudopsidae	<i>Phylocentropus</i>	1		
Hydropsychidae	Juvenile		1	
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>			7
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>	3		1
	<i>Ithytrichia</i>			
	<i>Leucotrichia</i>			
	<i>Oxyethira</i>			2
Lepidostomatidae	<i>Lepidostoma</i>	13	12	16
Helicopsychidae	<i>Helicopsyche</i>			
Leptoceridae	Juvenile/damaged			
	<i>Ceraclea</i>			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
	<i>Triaenodes</i>			

Appendix 1C. Benthic macroinvertebrates from the Jackpine River, 2005.				
		Jackpine	Jackpine	Jackpine
		River	River	River
		Site	Site	Site
		JP1	JP1	JP1
		#1 riffle	#2 pool	#3 riffle
		20-Sep	20-Sep	20-Sep
<b>Diptera</b>	Damaged/pupa			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Probezzia</i>	1		
	<i>Stilobezia</i>			
Chironomidae		24	49	34
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Twinnia</i>			
Tipulidae	<i>Antocha</i>			
	<i>Hexatoma</i>	2		
	<i>Tipula</i>			
Empididae	Juvenile/pupa			
	<i>Chelifera</i>		1	
	<i>Hemerodromia</i>	2	2	3
<b>Total number of individuals</b>		78804	78792	78792
<b>% Sorted</b>		5.6	6.8	3.4

Appendix 2A. Benthic macroinvertebrates from the Black Sturgeon River, 2005.

		Black Sturgeon BS4 #1 riffle 04-Oct	Black Sturgeon BS4 #2 pool 04-Oct	Black Sturgeon BS4 #3 riffle 04-Oct
<b>PLATYHELMINTHES</b>				
<b>NEMATODA</b>		4		
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Ancylidae			1	
Hydrobiidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae			3	
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		11	4	7
<b>ARTHROPODA</b>				
<b>Hydracarina</b>			1	2
<b>Amphipoda</b>				
Hyalellidae	<i>Hyalella</i>			
<b>Decapoda</b>				
Cambaridae		2		
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Juvenile				2
Baetidae	Juvenile/damaged	2		2
	<i>Baetis</i>			
Isonychiidae				
	<i>Isonychia</i>		1	1
Heptageniidae	Juvenile/damaged	12	9	4
	<i>Epeorus (Iron)</i>			3
	<i>Rhithrogena</i>			
	<i>Stenacron</i>	8	4	7
	<i>Stenonema</i>		2	2
Ephemerellidae	Juvenile/damaged			1
	<i>Attenella</i>	1		
	<i>Ephemerella</i>			
	<i>Eurylophella</i> (s str.)	1		
	<i>Serratella</i>		4	6
Caenidae	<i>Caenis</i>	2		
Baetiscidae	<i>Baetisca</i>			
Leptophlebiidae	Juvenile/damaged	10		
	<i>Leptophlebia</i>	19		
<b>Odonata</b>				
Gomphidae				
	Juvenile/damaged			
	<i>Ophiogomphus</i>			
Calopterygidae	<i>Calopteryx</i>			
<b>Plecoptera</b>	Juvenile/damaged			7
Pteronarcyidae	<i>Pteronarcys</i>			
Taeniopterygidae	<i>Taeniopteryx</i>			
Nemouridae	Juvenile/damaged			

Appendix 2B. Benthic macroinvertebrates from the Black Sturgeon River, 2005.

		Black Sturgeon BS4 #1 riffle 04-Oct	Black Sturgeon BS4 #2 pool 04-Oct	Black Sturgeon BS4 #3 riffle 04-Oct
<b>Plecoptera</b>				
Leuctridae	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
Perlidae	Juvenile/damaged		1	
	<i>Acroneuria</i>	1	1	
	<i>Paragnetina</i>			
Perlodidae	Juvenile/damaged		3	
Chloroperlidae	Juvenile/damaged			
	<i>Alloperla</i>			1
<b>Hemiptera</b>				
Corixidae		2		
<b>Megaloptera</b>				
Corydalidae	<i>Nigronia</i>			
<b>Neuroptera</b>				
Sisyridae	<i>Climacia</i>			
<b>Coleoptera</b>				
Halplidae	<i>Haliphus</i>			
Dytiscidae				
Elmidae	Juvenile/damaged	6	1	
<b>Trichoptera</b>	Juvenile/damaged/ Pupa			
Philopotamidae	<i>Dolophilodes</i>			
	<i>Chimarra</i>		3	
Polycentropodidae	Juvenile/damaged			1
	<i>Neureclipsis</i>			
	<i>Polycentropus</i>			2
Dipseudopsidae	<i>Phylocentropus</i>			
Hydropsychidae	Juvenile		1	5
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>		4	2
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>		1	
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			
	<i>Ithytrichia</i>			
	<i>Leucotrichia</i>		2	20
	<i>Oxyethira</i>			
Lepidostomatidae	<i>Lepidostoma</i>			
Helicopsychidae	<i>Helicopsyche</i>			
Leptoceridae	Juvenile/damaged			
	<i>Ceraclea</i>			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
	<i>Triaenodes</i>			

Appendix 2C. Benthic macroinvertebrates from the Black Sturgeon River, 2005.

		<b>Black Sturgeon BS4 #1 riffle 04-Oct</b>	<b>Black Sturgeon BS4 #2 pool 04-Oct</b>	<b>Black Sturgeon BS4 #3 riffle 04-Oct</b>
<b>Diptera</b>	Damaged/pupa			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Probezzia</i>	1		
	<i>Stilobezia</i>	1		
Chironomidae		19	69	40
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Twinnia</i>			
Tipulidae	<i>Antocha</i>	1		
	<i>Hexatoma</i>			
	<i>Tipula</i>			
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>	1	1	
<b>Total number of individuals</b>		104	116	115
<b>% Sorted</b>		7.5	2.5	12.5

Appendix 3A. Benthic macroinvertebrates from the Steel River, 2005.

		Steel River SR3 #1 riffle 05-Oct	Steel River SR3 #2 pool 05-Oct	Steel River SR3 #3 riffle 05-Oct
<b>PLATYHELMINTHES</b>				
<b>NEMATODA</b>		2	2	1
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Ancylidae		2		
Hydrobiidae			1	
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae		4		2
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		12	1	2
<b>ARTHROPODA</b>				
<b>Hydracarina</b>				
<b>Amphipoda</b>				
Hyalellidae	<i>Hyalella</i>			
<b>Decapoda</b>				
Cambaridae				
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Juvenile				
Baetidae	Juvenile/damaged	2	1	3
	<i>Baetis</i>			
Isonychiidae				
	<i>Isonychia</i>			
Heptageniidae	Juvenile/damaged	6	2	10
	<i>Epeorus (Iron)</i>			
	<i>Rhithrogena</i>			1
	<i>Stenacron</i>			
	<i>Stenonema</i>			2
Ephemerellidae	Juvenile/damaged			
	<i>Attenella</i>			2
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>			
	<i>Serratella</i>	1		3
Caenidae	<i>Caenis</i>			
Baetiscidae	<i>Baetisca</i>		6	1
Leptophlebiidae	Juvenile/damaged	4		8
	<i>Leptophlebia</i>	4		2
<b>Odonata</b>				
Gomphidae	Juvenile/damaged	1	2	1
	<i>Ophiogomphus</i>	1	1	1
Calopterygidae	<i>Calopteryx</i>			1
<b>Plecoptera</b>				
Juvenile/damaged				
Pteronarcyidae	<i>Pteronarcys</i>			
Taeniopterygidae	<i>Taeniopteryx</i>			4
Nemouridae	Juvenile/damaged			1

Appendix 3B. Benthic macroinvertebrates from the Steel River, 2005.

		Steel River SR3 #1 riffle 05-Oct	Steel River SR3 #2 pool 05-Oct	Steel River SR3 #3 riffle 05-Oct
<b>Plecoptera</b>				
Leuctridae	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
	<i>Paragnetina</i>			
Perlodidae	Juvenile/damaged			
Chloroperlidae	Juvenile/damaged			
	<i>Alloperla</i>			
<b>Hemiptera</b>				
Corixidae				
<b>Megaloptera</b>				
Corydalidae	<i>Nigronia</i>			
<b>Neuroptera</b>				
Sisyridae	<i>Climacia</i>			
<b>Coleoptera</b>				
Haliplidae	<i>Halipilus</i>			2
Dytiscidae				1
Elmidae	Juvenile/damaged	2	2	4
<b>Trichoptera</b>	Juvenile/damaged/ Pupa	2	1	1
Philopotamidae	<i>Dolophilodes</i>			
	<i>Chimarra</i>	5	3	5
Polycentropodidae	Juvenile/damaged			
	<i>Neureclipsis</i>			
	<i>Polycentropus</i>	1		
Dipseudopsidae	<i>Phylocentropus</i>			
Hydropsychidae	Juvenile	1		
	<i>Cheumatopsyche</i>	1		
	<i>Hydropsyche</i>	1	1	2
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			
	<i>Ithytrichia</i>			
	<i>Leucotrichia</i>			
	<i>Oxyethira</i>			2
Lepidostomatidae	<i>Lepidostoma</i>	22	10	15
Helicopsychidae	<i>Helicopsyche</i>			
Leptoceridae	Juvenile/damaged	3	2	
	<i>Ceraclea</i>			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
	<i>Triaenodes</i>			1

Appendix 3C. Benthic macroinvertebrates from the Steel River, 2005.

		Steel River SR3 #1 riffle 05-Oct	Steel River SR3 #2 pool 05-Oct	Steel River SR3 #3 riffle 05-Oct
<b>Diptera</b>	Damaged/pupa			1
Ceratopogonidae	Juvenile/damaged		1	
	<i>Bezzia/Palpomyia</i>			
	<i>Probezzia</i>			
	<i>Stilobezia</i>			
Chironomidae		39	66	41
Psychodidae	<i>Psychoda</i>	1		
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Twinnia</i>			
Tipulidae	<i>Antocha</i>			
	<i>Hexatoma</i>			
	<i>Tipula</i>	1		
Empididae	Juvenile/pupa			
	<i>Chelifera</i>	2	3	
	<i>Hemerodromia</i>	8	3	2
<b>Total number of individuals</b>		128	108	122
<b>% Sorted</b>		4.5	7.9	5.6

Appendix 4A. Benthic macroinvertebrates from the Little Pic River, 2005.

		Little Pic River LP8 #1 riffle 05-Oct	Little Pic River LP8 #2 pool 05-Oct	Little Pic River LP8 #3 riffle 05-Oct
<b>PLATYHELMINTHES</b>			1	
<b>NEMATODA</b>			1	1
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Ancylidae				
Hydrobiidae				
Planorbidae		1		
<b>Bivalvia</b>				
Sphaeriidae		2	2	7
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		6	3	
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		1		
<b>Amphipoda</b>				
Hyalellidae	<i>Hyalella</i>	3		
<b>Decapoda</b>				
Cambaridae				
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged			
	<i>Baetis</i>			
Isonychiidae				
	<i>Isonychia</i>			
Heptageniidae	Juvenile/damaged		3	2
	<i>Epeorus (Iron)</i>			
	<i>Rhithrogena</i>			
	<i>Stenacron</i>			2
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged			7
	<i>Attenella</i>		2	
	<i>Ephemerella</i>		1	
	<i>Eurylophella</i> (s str.)	2		
	<i>Serratella</i>	1	10	11
Caenidae	<i>Caenis</i>	1		
Baetiscidae	<i>Baetisca</i>			
Leptophlebiidae	Juvenile/damaged			6
	<i>Leptophlebia</i>		1	
<b>Odonata</b>				
Gomphidae	Juvenile/damaged		3	2
	<i>Ophiogomphus</i>			
Calopterygidae	<i>Calopteryx</i>			
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			2
Taeniopterygidae	<i>Taeniopteryx</i>			1
Nemouridae	Juvenile/damaged			

Appendix 4B. Benthic macroinvertebrates from the Little Pic River, 2005.

		Little Pic River LP8 #1 riffle 05-Oct	Little Pic River LP8 #2 pool 05-Oct	Little Pic River LP8 #3 riffle 05-Oct
<b>Plecoptera</b>				
Leuctridae	<i>Leuctra</i>			
Capniidae	Juvenile/damaged		1	
Perlidae	Juvenile/damaged			1
	<i>Acroneuria</i>			
	<i>Paragnetina</i>		1	
Perlodidae	Juvenile/damaged			
Chloroperlidae	Juvenile/damaged			
	<i>Alloperla</i>			
<b>Hemiptera</b>				
Corixidae				
<b>Megaloptera</b>				
Corydalidae	<i>Nigronia</i>			
<b>Neuroptera</b>				
Sisyridae	<i>Climacia</i>		1*	
<b>Coleoptera</b>				
Haliplidae	<i>Haliphus</i>			
Dytiscidae				
Elmidae	Juvenile/damaged	3		
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		2	
Philopotamidae	<i>Dolophilodes</i>			
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Neureclipsis</i>			1
	<i>Polycentropus</i>			
Dipseudopsidae	<i>Phylocentropus</i>			
Hydropsychidae	Juvenile			
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>		4	11
Rhyacophilidae	<i>Rhyacophila</i>		1	4
Glossosomatidae	<i>Glossosoma</i>		2	
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>	3	7	6
	<i>Ithytrichia</i>			
	<i>Leucotrichia</i>			
	<i>Oxyethira</i>	4	1	1
Lepidostomatidae	<i>Lepidostoma</i>	1		
Helicopsychidae	<i>Helicopsyche</i>		1	
Leptoceridae	Juvenile/damaged			
	<i>Ceraclea</i>	2		
	<i>Mystacides</i>	2		
	<i>Oecetis</i>	2		
	<i>Triaenodes</i>			

Appendix 4C. Benthic macroinvertebrates from the Little Pic River, 2005.

		Little Pic River LP8 #1 riffle 05-Oct	Little Pic River LP8 #2 pool 05-Oct	Little Pic River LP8 #3 riffle 05-Oct
<b>Diptera</b>	Damaged/pupa			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Probezzia</i>			
	<i>Stilobezia</i>			
Chironomidae		63	65	32
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Twinnia</i>			2
Tipulidae	<i>Antocha</i>			
	<i>Hexatoma</i>			
	<i>Tipula</i>			
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>			3
<b>Total number of individuals</b>		97	112	102
<b>% Sorted</b>		1.3	1.6	5.0

\* Not included in the 27-Taxa Biotic Indices calculations

Appendix 5A. Benthic macroinvertebrates from Speckled Trout Creek, 2007.

		Speckled Trout Ck ST-1 #1 riffle 30-May	Speckled Trout Ck ST-1 #2 pool 30-May	Speckled Trout Ck ST-1 #3 riffle 30-May
<b>NEMATODA</b>				
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		3	1	3
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		1	2	7
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	5		6
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged		2	
	<i>Epeorus (Iron)</i>	3		2
	<i>Leucrocuta</i>	2		
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged	2	1	
	<i>Attenella</i>			
	<i>Ephemerella</i>	2	3	1
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged			
	<i>Leptophlebia</i>			
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			1
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged	4	1	
	<i>Despaxia</i>	10	6	11
	<i>Leuctra</i>			1

Appendix 5B. Benthic macroinvertebrates from Speckled Trout Creek, 2007.

		Speckled Trout Ck ST-1 #1 riffle 30-May	Speckled Trout Ck ST-1 #2 pool 30-May	Speckled Trout Ck ST-1 #3 riffle 30-May
<b>Plecoptera</b>				
Capniidae	Juvenile/damaged	3		3
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged	1		
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged			
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		1	1
Philopotamidae	Pupa			
	<i>Dolophilodes</i>			
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>	1		
Hydropsychidae	Juvenile			
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>			
Rhyacophilidae	<i>Rhyacophila</i>			1
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	2	8	1
Limnephilidae	Juvenile/damaged			
	<i>Onocosmoecus</i>		2	1
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			1
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>	1		
	<i>Dasyhelea</i>			
	<i>Probezzia</i>		1	
Chironomidae		44	71	29
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged	6		
	<i>Prosimulium</i>			
	<i>Simulium</i>	19	1	32
Tipulidae	Juvenile/damaged	1		
	<i>Antocha</i>			
	<i>Dicronata</i>			1
	<i>Hexatoma</i>			

Appendix 5C. Benthic macroinvertebrates from Speckled Trout Creek, 2007.

		Speckled Trout Ck	Speckled Trout Ck	Speckled Trout Ck
		ST-1 #1 riffle 30-May	ST-1 #2 pool 30-May	ST-1 #3 riffle 30-May
<b>Diptera</b>				
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>	3	1	2
	<i>Hemerodromia</i>			
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		113	101	104
<b>% Sorted</b>		5.6	5.6	9.0

Appendix 6A. Benthic macroinvertebrates from the Barrett River, 2007.

		Barrett River B-1 #1 riffle 31-May	Barrett River B-1 #2 pool 31-May	Barrett River B-1 #3 riffle 31-May
<b>NEMATODA</b>				
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		1	1	
<b>Hirudinea</b>		1	2	2
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		1	4	3
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	10	14	9
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	1	3	8
	<i>Epeorus (Iron)</i>	1		2
	<i>Leucrocuta</i>	3	5	3
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged	1	5	
	<i>Attenella</i>			
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>	1	1	
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged			
	<i>Leptophlebia</i>		2	
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>	Juvenile/damaged		1	
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged	2		
	<i>Nemoura</i>		1	
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>	1	1	
	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>	2		

Appendix 6B. Benthic macroinvertebrates from the Barrett River, 2007.

		Barrett River B-1 #1 riffle 31-May	Barrett River B-1 #2 pool 31-May	Barrett River B-1 #3 riffle 31-May
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged	1		
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		1	1
Philopotamidae	Pupa			
	<i>Dolophilodes</i>			
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			4
Hydropsychidae	Juvenile			
	<i>Cheumatopsyche</i>	2		
	<i>Hydropsyche</i>			
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>	1		
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>		1	
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	2	1	3
Limnephilidae	Juvenile/damaged			
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>	1		
Chironomidae		62	69	66
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			1
	<i>Prosimulium</i>			
	<i>Simulium</i>	5	1	1
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>	2		
	<i>Hemerodromia</i>	1		
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		102	113	103
<b>% Sorted</b>		6.8	6.8	6.8

Appendix 7A. Benthic macroinvertebrates from the Coldwater River, 2007.

		Coldwater River CW-1 #1 pool 31-May	Coldwater River CW-1 #2 riffle 31-May	Coldwater River CW-1 #3 riffle 31-May
<b>NEMATODA</b>		1	1	
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae		1	1	
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		6	9	1
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>				1
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	1	4	5
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged		1	3
	<i>Epeorus (Iron)</i>		1	
	<i>Leucrocuta</i>			
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged			1
	<i>Attenella</i>			
	<i>Ephemerella</i>	3		
	<i>Eurylophella (s str.)</i>	5	2	
	<i>Drunella</i>			
	<i>Serratella</i>	3		
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged		3	5
	<i>Leptophlebia</i>		5	13
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>	1	1	
	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 7B. Benthic macroinvertebrates from the Coldwater River, 2007.

		Coldwater River CW-1 #1 pool 31-May	Coldwater River CW-1 #2 riffle 31-May	Coldwater River CW-1 #3 riffle 31-May
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged			
<b>Trichoptera</b>	Juvenile/damaged/ Pupa	3		2
Philopotamidae	Pupa			
	<i>Dolophilodes</i>		1	6
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>		1	
Hydropsychidae	Juvenile			1
	<i>Cheumatopsyche</i>		1	3
	<i>Hydropsyche</i>			
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			1
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	5	3	3
Limnephilidae	Juvenile/damaged	1		1
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa	1		
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			2
	<i>Probezzia</i>	5	2	
Chironomidae		74	62	50
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Simulium</i>			2
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			1
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>		1	
	<i>Hemerodromia</i>		4	2
Tabanidae				
	<i>Chrysops</i>	1		
<b>Total number of individuals</b>		111	103	103
<b>% Sorted</b>		7.9	4.5	4.5

Appendix 8A. Benthic macroinvertebrates from the Old Woman River, 2007.

		Old Woman River OW-1 #1 riffle 01-Jun	Old Woman River OW-1 #2 pool 01-Jun	Old Woman River OW-1 #3 riffle 01-Jun
<b>NEMATODA</b>		5		1
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		14	3	9
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		6	4	1
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	13	5	19
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	1		4
	<i>Epeorus (Iron)</i>	1		2
	<i>Leucrocuta</i>		2	
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged	5		1
	<i>Attenella</i>			
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>	1		
	<i>Serratella</i>	1	2	
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged	1	1	1
	<i>Leptophlebia</i>			
<b>Odonata</b>				
Gomphidae	Juvenile/damaged	1	1	
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			1
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>	1		
Leuctridae	Juvenile/damaged		1	
	<i>Despaxia</i>			7
	<i>Leuctra</i>			1
Capniidae	Juvenile/damaged	3		
	<i>Paracapnia</i>	1		
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>		1	1
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			3
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 8B. Benthic macroinvertebrates from the Old Woman River, 2007.

		Old Woman River OW-1 #1 riffle 01-Jun	Old Woman River OW-1 #2 pool 01-Jun	Old Woman River OW-1 #3 riffle 01-Jun
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged	3		
<b>Trichoptera</b>	Juvenile/damaged/ Pupa	1		
Philopotamidae	Pupa			
	<i>Dolophilodes</i>			
	<i>Chimarra</i>			1
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			1
Hydropsychidae	Juvenile			
	<i>Cheumatopsyche</i>			2
	<i>Hydropsyche</i>	1		
Rhyacophilidae	<i>Rhyacophila</i>	1		
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>		6	1
	<i>Ochrotrichia</i>	1		
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>	1		
Lepidostomatidae	<i>Lepidostoma</i>	1		2
Limnephilidae	Juvenile/damaged	1		
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>	2		
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>	2	3	2
	<i>Probezzia</i>	2	2	
Chironomidae		20	39	24
Psychodidae	<i>Psychoda</i>	1		
Simuliidae	Pupa/damaged			9
	<i>Prosimulium</i>			
	<i>Simulium</i>	5		4
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa		2	2
	<i>Chelifera</i>	12	3	
	<i>Hemerodromia</i>		29	10
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		108	104	109
<b>% Sorted</b>		27.0	14.6	9.0

Appendix 9A. Benthic macroinvertebrates from Cypress River, 2007.

		Cypress River CY-1 #1 riffle 15-Sep	Cypress River CY-1 #2 pool 15-Sep	Cypress River CY-1 #3 riffle 15-Sep
<b>NEMATODA</b>			1	
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		8	13	6
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		4		2
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	9		14
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	5	1	
	<i>Epeorus (Iron)</i>	1		
	<i>Leucrocuta</i>	1		
	<i>Rhithrogena</i>			1
	<i>Stenonema</i>	2	5	1
Ephemerellidae	Juvenile/damaged	5	6	7
	<i>Attenella</i>			
	<i>Ephemerella</i>	5	2	10
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged	7	3	7
	<i>Leptophlebia</i>	8	11	6
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>	Juvenile/damaged	1	1	
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged	1		
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>			
	<i>Leuctra</i>			
Capniidae	Juvenile/damaged	1		1
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 9B. Benthic macroinvertebrates from Cypress River, 2007.

		Cypress River CY-1 #1 riffle 15-Sep	Cypress River CY-1 #2 pool 15-Sep	Cypress River CY-1 #3 riffle 15-Sep
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged			
<b>Trichoptera</b>	Juvenile/damaged/ Pupa			
Philopotamidae	Pupa			
	<i>Dolophilodes</i>	1		
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>	1		1
Hydropsychidae	Juvenile	1		15
	<i>Cheumatopsyche</i>	4		7
	<i>Hydropsyche</i>	6		1
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>		1	
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>	2	6	
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	12	2	6
Limnephilidae	Juvenile/damaged			
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>		1	
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>		3	1
Chironomidae		15	105	11
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Simulium</i>			
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>	2		
	<i>Hemerodromia</i>	2	1	11
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		104	162	108
<b>% Sorted</b>		2.3	2.3	2.3

Appendix 10A. Benthic macroinvertebrates from Furcate Creek, 2007.

		Furcate Creek FC-1 #1 riffle 16-Sep	Furcate Creek FC-1 #2 pool 16-Sep	Furcate Creek FC-1 #3 riffle 16-Sep
<b>NEMATODA</b>		2		2
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae			2	
Planorbidae			20	1
<b>Bivalvia</b>				
Sphaeriidae		2	1	
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		2	1	5
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>			1	3
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged			1
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	2	4	3
	<i>Epeorus (Iron)</i>			
	<i>Leucrocuta</i>	3	2	4
	<i>Rhithrogena</i>			
	<i>Stenonema</i>		4	2
Ephemerellidae	Juvenile/damaged		1	
	<i>Attenella</i>	2	4	4
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>		1	2
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged	1		2
	<i>Leptophlebia</i>	2		5
<b>Odonata</b>				
Gomphidae	Juvenile/damaged		1	
Aeshnidae	<i>Boyeria</i>	1		1
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>	Juvenile/damaged			3
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>	2		
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>		3	
	<i>Leuctra</i>	1		2
Capniidae	Juvenile/damaged			
	<i>Paracapnia</i>			1
Perlidae	Juvenile/damaged		1	
	<i>Acroneuria</i>	5	1	
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 10B. Benthic macroinvertebrates from Furcate Creek, 2007.

		Furcate Creek FC-1 #1 riffle 16-Sep	Furcate Creek FC-1 #2 pool 16-Sep	Furcate Creek FC-1 #3 riffle 16-Sep
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged	3		2
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		3	1
Philopotamidae	Pupa			
	<i>Dolophilodes</i>	5		1
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			
Hydropsychidae	Juvenile	1		1
	<i>Cheumatopsyche</i>	1		
	<i>Hydropsyche</i>			
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>	1	1	
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	3	5	
Limnephilidae	Juvenile/damaged			
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>		1	
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>	1		
Chironomidae		63	59	58
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Simulium</i>			
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>	1	2	2
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		104	118	106
<b>% Sorted</b>		2.3	5.6	9.0

Appendix 11A. Benthic macroinvertebrates from Coldwater Creek, 2007.

		Coldwater Creek CC-8 #1 riffle 16-Sep	Coldwater Creek CC-8 #2 pool 16-Sep	Coldwater Creek CC-8 #3 riffle 16-Sep
<b>NEMATODA</b>			1	
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				2
Planorbidae		1		
<b>Bivalvia</b>				
Sphaeriidae				3
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		19	5	28
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>				4
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged		2	3
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	3		
	<i>Epeorus (Iron)</i>			
	<i>Leucrocuta</i>			
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged			
	<i>Attenella</i>		6	4
	<i>Ephemerella</i>	1		3
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>		4	
Leptophlebiidae	Juvenile/damaged		2	2
	<i>Leptophlebia</i>		6	2
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			2
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			1
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged			2
	<i>Despaxia</i>			
	<i>Leuctra</i>			2
Capniidae	Juvenile/damaged			
	<i>Paracapnia</i>	5	1	7
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>	2		1
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 11B. Benthic macroinvertebrates from Coldwater Creek, 2007.

		Coldwater Creek CC-8 #1 riffle 16-Sep	Coldwater Creek CC-8 #2 pool 16-Sep	Coldwater Creek CC-8 #3 riffle 16-Sep
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged	1		3
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		1	
Philopotamidae	Pupa	1		
	<i>Dolophilodes</i>			
	<i>Chimarra</i>	3		3
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			
Hydropsychidae	Juvenile	4		
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>	4		
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			2
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			1
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>			1
Limnephilidae	Juvenile/damaged		1	
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>		2	2
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>		1	2
Chironomidae		53	86	24
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Simulium</i>	1		
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>	2		2
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		100	118	106
<b>% Sorted</b>		5.6	3.4	45.0

Appendix 12A. Benthic macroinvertebrates from the Current River, 2005.

		Current River CU14 #1 riffle 29-Jun	Current River CU14 #2 pool 29-Jun	Current River CU14 #3 riffle 29-Jun
<b>PLATYHELMINTHES</b>				
<b>NEMATODA</b>		3	1	
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Ancylidae				
Hydrobiidae				1
Planorbidae			12	
<b>Bivalvia</b>				
Sphaeriidae		36	19	23
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		6	4	7
<b>ARTHROPODA</b>				
<b>Hydracarina</b>			5	1
<b>Amphipoda</b>				
Hyalellidae	<i>Hyalella</i>			
<b>Decapoda</b>				
Cambaridae				
<b>Insecta</b>				
<b>Ephemeroptera</b>			1	
Baetidae	Juvenile/damaged	5	5	6
	<i>Baetis</i>			
Isonychiidae				
	<i>Isonychia</i>			
Heptageniidae	Juvenile/damaged	5		
	<i>Epeorus (Iron)</i>			1
	<i>Rhithrogena</i>			
	<i>Stenacron</i>			
	<i>Stenonema</i>	1	1	
Ephemerellidae	Juvenile/damaged			
	<i>Attenella</i>		5	
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>			
	<i>Serratella</i>			2
Caenidae	<i>Caenis</i>		3	
Baetiscidae	<i>Baetisca</i>			
Leptophlebiidae	Juvenile/damaged	1	2	2
	<i>Leptophlebia</i>			3
<b>Odonata</b>				
Gomphidae	Juvenile/damaged		1	
	<i>Ophiogomphus</i>			
Calopterygidae	<i>Calopteryx</i>			
<b>Plecoptera</b>			1	
Pteronarcyidae	<i>Pteronarcys</i>			
Taeniopterygidae	<i>Taeniopteryx</i>			
Nemouridae	Juvenile/damaged			
Leuctridae	<i>Leuctra</i>	2	2	3
Capniidae	Juvenile/damaged			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>	1		1
	<i>Paragnetina</i>			
Perlodidae	Juvenile/damaged			
Chloroperlidae	Juvenile/damaged			
	<i>Alloperla</i>			

Appendix 12B. Benthic macroinvertebrates from the Current River, 2005.

		Current River CU14 #1 riffle 29-Jun	Current River CU14 #2 pool 29-Jun	Current River CU14 #3 riffle 29-Jun
<b>Hemiptera</b>				
Corixidae				
<b>Megaloptera</b>				
Corydalidae	<i>Nigronia</i>	1		1
<b>Neuroptera</b>				
Sisyridae	<i>Climacia</i>			
<b>Coleoptera</b>				
Haliplidae	<i>Haliphus</i>			
Dytiscidae				
Elmidae	Juvenile/damaged	3	2	1
<b>Trichoptera</b>	Juvenile/damaged/ Pupa	1	2	1
Philopotamidae	<i>Dolophilodes</i>			10
	<i>Chimarra</i>	6		5
Polycentropodidae	Juvenile/damaged		1	
	<i>Neureclipsis</i>			
	<i>Polycentropus</i>			
Dipseudopsidae	<i>Phylocentropus</i>			
Hydropsychidae	Juvenile	4		
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>			6
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			2
	<i>Hydroptila</i>		2	
	<i>Ithytrichia</i>		1	4
	<i>Leucotrichia</i>			
	<i>Oxyethira</i>		4	
Lepidostomatidae	<i>Lepidostoma</i>	1		1
Helicopsychidae	<i>Helicopsyche</i>			1
Leptoceridae	Juvenile/damaged			
	<i>Ceraclea</i>			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
	<i>Triaenodes</i>			
<b>Diptera</b>	Damaged/pupa			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>		1	
	<i>Probezzia</i>	3		
	<i>Stilobezia</i>			
Chironomidae		46	33	25
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged		1	
	<i>Prosimulium</i>	1		
	<i>Twinnia</i>			
Tipulidae	<i>Antocha</i>			
	<i>Hexatoma</i>			
	<i>Tipula</i>			
Empididae	Juvenile/pupa	4	1	
	<i>Chelifera</i>	1		1
	<i>Hemerodromia</i>	1		4
<b>Total number of individuals</b>		132	110	112
<b>% Sorted</b>		3.4	15.8	10.1

Appendix 13A. Benthic macroinvertebrates from the Jackpine River, 2007.

		Jackpine River JP-1 #1 riffle 15-Sep	Jackpine River JP-1 #2 pool 15-Sep	Jackpine River JP-1 #3 riffle 15-Sep
<b>NEMATODA</b>				
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae				
Lymnaeidae				
Planorbidae				1
<b>Bivalvia</b>				
Sphaeriidae				
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		8	21	6
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>		3	1	3
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>			
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	2		5
	<i>Baetis</i>			
Heptageniidae	Juvenile/damaged	18		7
	<i>Epeorus (Iron)</i>			
	<i>Leucrocuta</i>			2
	<i>Rhithrogena</i>			1
	<i>Stenonema</i>	5		
Ephemerellidae	Juvenile/damaged	8		7
	<i>Attenella</i>	7		14
	<i>Ephemerella</i>	2		
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged	3	1	5
	<i>Leptophlebia</i>	4	3	7
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>	Juvenile/damaged			1
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			2
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>			1
	<i>Leuctra</i>			
Capniidae	Juvenile/damaged		1	
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 13B. Benthic macroinvertebrates from the Jackpine River, 2007.

		Jackpine River JP-1 #1 riffle 15-Sep	Jackpine River JP-1 #2 pool 15-Sep	Jackpine River JP-1 #3 riffle 15-Sep
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged		1	
<b>Trichoptera</b>	Juvenile/damaged/ Pupa	1		
Philopotamidae	Pupa			
	<i>Dolophilodes</i>	2		
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			
Hydropsychidae	Juvenile	1		2
	<i>Cheumatopsyche</i>			2
	<i>Hydropsyche</i>			1
Rhyacophilidae	<i>Rhyacophila</i>			
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>	1		
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>	12	3	11
Limnephilidae	Juvenile/damaged		1	
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>		1	
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>			
Chironomidae		19	64	20
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>			
	<i>Simulium</i>			1
Tipulidae	Juvenile/damaged		1	
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>	1		1
Dolichopodidae				
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>	4	2	1
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		101	100	101
<b>% Sorted</b>		3.4	4.5	7.9

Appendix 14A. Benthic macroinvertebrates from McVicar Creek Test Site, 2007.

		McVicar Creek MV-T1 #1 pool 13-Jun	McVicar Creek MV-T1 #2 riffle 13-Jun	McVicar Creek MV-T1 #3 riffle 13-Jun
<b>NEMATODA</b>		1		
<b>MOLLUSCA</b>				
<b>Gastropoda</b>				
Bithyniidae		2		
Lymnaeidae		2		
Planorbidae		1		
<b>Bivalvia</b>				
Sphaeriidae		8		
<b>ANNELIDA</b>				
<b>Oligochaeta</b>		18	44	68
<b>Hirudinea</b>				
<b>ARTHROPODA</b>				
<b>Hydracarina</b>				
<b>Amphipoda</b>				
Gammaridae	<i>Gammarus</i>	53	6	1
<b>Insecta</b>				
<b>Ephemeroptera</b>				
Baetidae	Juvenile/damaged	2	22	16
	<i>Baetis</i>			1
Heptageniidae	Juvenile/damaged			
	<i>Epeorus (Iron)</i>			
	<i>Leucrocuta</i>			
	<i>Rhithrogena</i>			
	<i>Stenonema</i>			
Ephemerellidae	Juvenile/damaged			
	<i>Attenella</i>			
	<i>Ephemerella</i>			
	<i>Eurylophella (s str.)</i>			
	<i>Drunella</i>			
	<i>Serratella</i>			
Caenidae	<i>Caenis</i>			
Leptophlebiidae	Juvenile/damaged			
	<i>Leptophlebia</i>			
<b>Odonata</b>				
Gomphidae	Juvenile/damaged			
Aeshnidae	<i>Boyeria</i>			
<b>Odonata</b>				
Cordulegastridae	<i>Cordulegaster</i>			
<b>Plecoptera</b>				
Pteronarcyidae	<i>Pteronarcys</i>			
Nemouridae	Juvenile/damaged			
	<i>Nemoura</i>			
Leuctridae	Juvenile/damaged			
	<i>Despaxia</i>			
	<i>Leuctra</i>			
Capniidae	Juvenile/damaged			
	<i>Paracapnia</i>			
Perlidae	Juvenile/damaged			
	<i>Acroneuria</i>			
Perlodidae	Juvenile/damaged			
	<i>Isoperla</i>			
Chloroperlidae				
	<i>Alloperla</i>			

Appendix 14B. Benthic macroinvertebrates from McVicar Creek Test Site, 2007.

		McVicar Creek MV-T1 #1 pool 13-Jun	McVicar Creek MV-T1 #2 riffle 13-Jun	McVicar Creek MV-T1 #3 riffle 13-Jun
<b>Coleoptera</b>				
Elmidae	Juvenile/damaged			
<b>Trichoptera</b>	Juvenile/damaged/ Pupa		1	
Philopotamidae	Pupa			
	<i>Dolophilodes</i>			
	<i>Chimarra</i>			
Polycentropodidae	Juvenile/damaged			
	<i>Polycentropus</i>			
Hydropsychidae	Juvenile			
	<i>Cheumatopsyche</i>			
	<i>Hydropsyche</i>			
Rhyacophilidae	<i>Rhyacophila</i>			1
Glossosomatidae	<i>Glossosoma</i>			
Hydroptilidae	Juvenile/damaged			
	<i>Hydroptila</i>			
	<i>Ochrotrichia</i>			
	<i>Oxyethira</i>			
Brachycentridae	Juvenile			
	<i>Micrasema</i>			
Lepidostomatidae	<i>Lepidostoma</i>			
Limnephilidae	Juvenile/damaged			
Leptoceridae	Juvenile/damaged			
	<i>Mystacides</i>			
	<i>Oecetis</i>			
<b>Diptera</b>	Damaged/pupa			
Blephariceridae	<i>Blepharicera</i>			
Ceratopogonidae	Juvenile/damaged			
	<i>Bezzia/Palpomyia</i>			
	<i>Dasyhelea</i>			
	<i>Probezzia</i>			
Chironomidae		13	65	28
Psychodidae	<i>Psychoda</i>			
Simuliidae	Pupa/damaged			
	<i>Prosimulium</i>		1	
	<i>Simulium</i>			
Tipulidae	Juvenile/damaged			
	<i>Antocha</i>			
	<i>Dicronata</i>			
	<i>Hexatoma</i>			
Dolichopodidae		1		
Empididae	Juvenile/pupa			
	<i>Chelifera</i>			
	<i>Hemerodromia</i>			
Tabanidae				
	<i>Chrysops</i>			
<b>Total number of individuals</b>		101	139	115
<b>% Sorted</b>		15.8	3.4	2.3