FINAL REPORT
BENTHIC MACROINVERTEBRATE SURVEY
WOLF CREEK RESERVOIR PROJECT
FALL 2003

FOR
US ARMY CORPS OF ENGINEERS
NASHVILLE DISTRICT

PREPARED BY

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SUMMARY

On October 7 and 21, 2003, personnel from the Nashville District Corps of Engineers, Water Management Section (Hydrology and Hydraulic Branch, Engineering-Construction Division) collected water quality and benthic macroinvertebrate samples from four locations (Beaver Creek Mile 21.3, 3WOL10040; Little South Fork Mile 5.2, 3WOL10035; Bark Camp Creek Mile 2.0, 3WOL10023; and Pitman Creek Mile 4.9, 3WOL10026) in the Wolf Creek Reservoir Project drainage.

Benthic macroinvertebrate community structure at each location and comparison of the sites were assessed using: taxa richness, Shannon's Index of Diversity, evenness, taxa richness, EPT taxa, North Carolina Biotic Index, percent EPT, modified percent EPT abundance, percent Ephemeroptera, percent Oligochaeta and Chironomidae, percent contribution of dominant taxa, percent clingers, Jaccard's Coefficient and percent similarity. Cluster analyses were accomplished using 1-Jaccard's Coefficient and percent dissimilarity. The clusters were interpreted graphically to relate similar communities. The number of organisms and taxa per Hess were also evaluated statistically using analyses of variance and means separation tests.

A minimum of 94 species of benthic macroinvertebrates was taken from all sites within the Wolf Creek Project drainage. The highest number of species was found in Beaver Creek Mile 21.3 with 55, followed by 49 species from Pitman Creek Mile 4.9, 48 from Bark Camp Creek Mile 2.0, and 44 from Little South Fork Mile 5.2. The greatest densities were found in Beaver Creek with an estimate of 3,908/m^2, while Bark Camp Creek had the least with ~1,512/m^2.

All sites had species rich and diverse benthic macroinvertebrate populations residing under "Good" (Beaver Creek Mile 21.3, Bark Camp Creek Mile 2.0, and Pitman Creek Mile 4.9) to "Very Good" (Little South Fork Mile 5.2) water quality conditions.

All sites scored as non-impaired when compared to the state of Tennessee reference streams and as having benthic faunas existing under fair water quality conditions when compared to the state of Kentucky reference database.

A statistical comparison of the four locations using number of individuals/m^2 and number of species/m^2 found no significant differences at the 0.05 confidence level between any of the sites.

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INTRODUCTION

On October 7 and 21, 2003, personnel from the Nashville District, Corps of Engineers Water Management Section (Hydrology and Hydraulics Branch, Engineering-Construction Division) collected water quality and benthic macroinvertebrate samples from four locations in the Wolf Creek Reservoir drainage. The Water Management Section maintains a baseline, water quality data collection and monitoring program. A wide range of physical, chemical and biological data is collected, analyzed and reported from various locations representing tailwaters, impounded sites and reservoir inflows for the ten Nashville District reservoirs in the Cumberland River Basin. During calendar year 2003, biological data collections included extensive quantitative sampling for benthic macroinvertebrates at five Cumberland River Basin projects.

SAMPLING LOCATIONS

Sampling locations in the Wolf Creek Reservoir drainage are shown in Figure 1. The following is a brief description of the four-benthic macroinvertebrate sampling sites.

3WOL10040 – Beaver Creek Mile 21.3, Latitude $36^0$49'05", Longitude $84^0$52'47", Reservoir inflow location,

3WOL10035 – Little South Fork Mile 5.2, Latitude $36^0$48'00", Longitude $84^0$35'48", Reservoir inflow location

3WOL10023 – Bark Camp Creek Mile 2.0, Latitude $36^0$54'38", Longitude $84^0$16'44", Reservoir inflow location.

3WOL10026 – Pitman Creek Mile 4.9, Latitude $37^0$02"35", Longitude $84^0$35'42", Reservoir inflow location

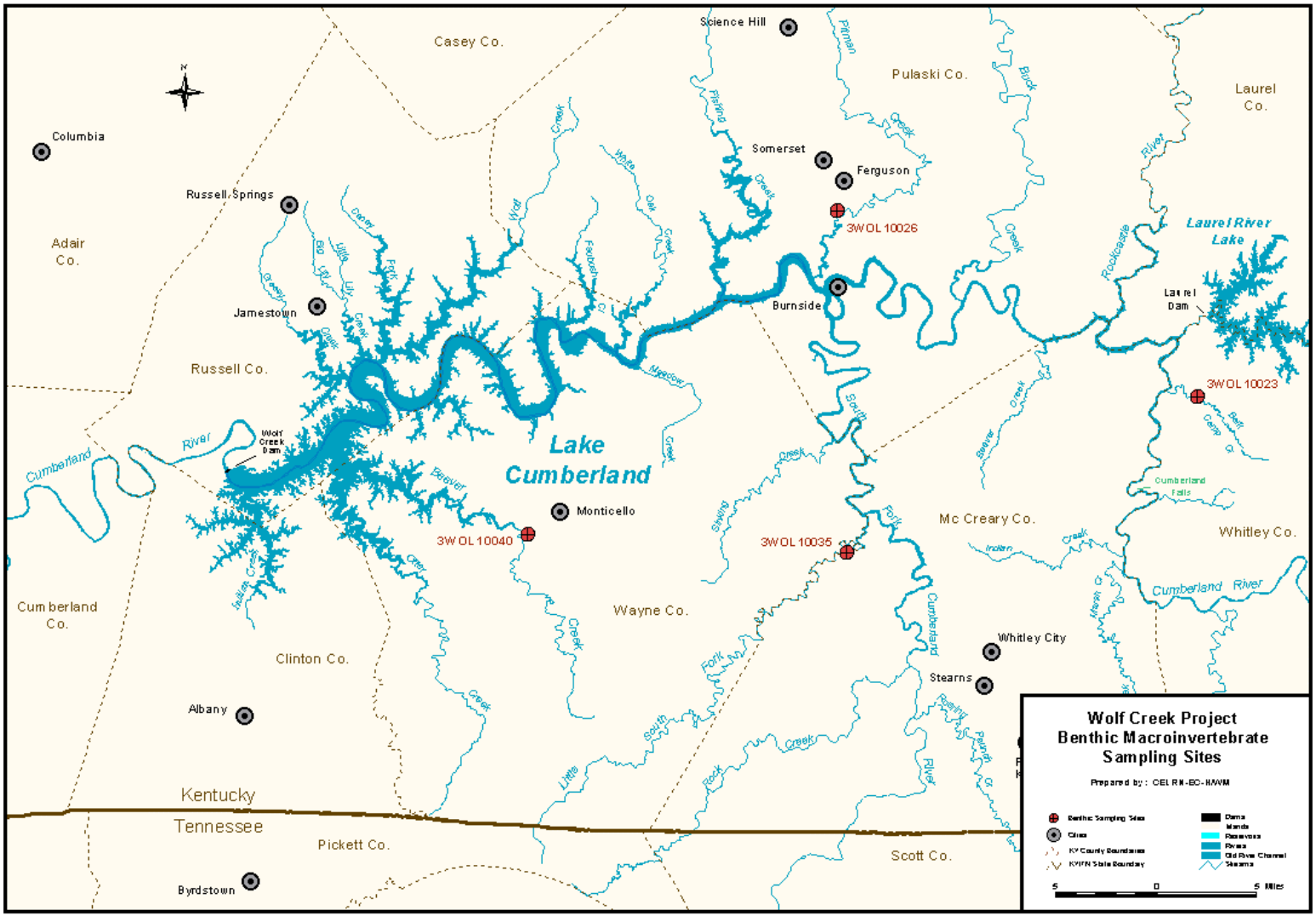

Figure 1. Site map.

BACKGROUND

As found in similar studies, the alteration of the physical or chemical norms of an aquatic environment has the potential to influence nearly all organisms residing in that environment (Goodnight 1973). A community represented by numerous species with no particular numerical domination evident in the population is usually indicative of an unstressed environment (Weber 1973, Klemm et al. 1990). Conversely, a benthic community composed of a few species with large numbers of individuals typifies a stressed community from which intolerant species have been reduced or eliminated by a pollutant or substrate change. The populations of tolerant species expand due to reduced competition or increased resources, or both. The often-dramatic benthic community shifts, which can occur in stressed ecosystems, are due to the varying sensitivities of the different macroinvertebrate species. Mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera), or EPT species, which spend most of their lives in an aquatic environment, are generally less tolerant of most types of pollution, whereas many flies (Diptera) and worms (Oligochaeta) are more tolerant of environmental stress conditions (Brinkhurst 1962, Beck 1977, Mason 1971, and Merritt and Cummins 1996). Stream reaches may be divided into several ecological categories depending upon whether or not they are subject to stressful agents and, if they are, to what extent or type. They can also be divided into these categories on the basis of the benthic fauna that is supported in that reach.

Attention is usually focused on the macroinvertebrate species because they are more indicative of the relative health of a stream. In addition, macroinvertebrates are found in all habitats, less mobile than other groups of aquatic organisms, easily collected, and most have

relatively long periods of development in the aquatic environment. Thus, macroinvertebrate species can be used to indicate deleterious events that have occurred in an aquatic system during any stage of their development.

Clean water streams with variable habitat features often have a high diversity of species with each species represented by a few individuals. Streams receiving organic pollution generally show a decrease in diversity and an increase in density (Gaufin and Tarzwell 1956), while streams receiving toxic products frequently show a decrease in both diversity and density (Cairns et al., 1971).

Increased sedimentation in streams is a problem most often the result of poor agriculture practices and construction activity in the vicinity streams (Waters, 1995). The effects of increased sedimentation vary, but the primary effect is habitat loss caused by the filling of cracks and crevices with sand and silt and general decrease in habitat diversity.

MATERIALS AND METHODS

At each station, four replicate quantitative samples were taken with a 500-micron mesh Hess sampler (0.09 m^2) from the riffle/run habitat of the stream. Organisms within each area encompassed by the Hess were collected by physically detaching them from the substrate (usually by hand picking or gently sweeping substrate materials with a brush) and/or by agitating the substrate and allowing the current to carry dislodged organisms into the net. No sorting of organisms and debris was attempted in the field. Organisms and debris were carefully transferred into a storage jar and the entire contents preserved with formalin. Labels bearing unique numbers were applied to the exterior of the jars. These numbers and associated information were then recorded on a chain of custody form. All samples were returned to the Nashville District's Water Management Support Center for storage before delivery to Pennington and Associates, Inc. Storage was approximately seven months. No deterioration of sample quality was observed during this holding time.

In the laboratory, all benthic samples were washed in a 120-micron mesh screen. After washing, the macroinvertebrates were removed from the detritus under 5x magnification and preserved in 85% ethanol. The organisms were identified to the lowest practical taxonomic level using available keys (Pennington and Associates, Inc. 1994) and counted. Identifications were made with a stereomicroscope (7X to 60X). Slide mounts were made of the chironomids, simuliids, oligochaetes, and small crustaceans, and identifications were made with a compound microscope. The chironomids, simuliids, and oligochaetes were cleared for 24 hours in cold 10% KOH. Temporary mounts were made in glycerin and the animals returned to 80% ethanol

after identification. When permanent mounts were desired, the organisms were transferred to 95% ethanol for 30 minutes and mounted in euperol.

COMMUNITY STRUCTURE MEASURES

Core benthic macroinvertebrate community metrics were calculated for each station for comparison to Tennessee and Kentucky ecoregion reference data (TDEC 2002 and KDOW 2002). Nine core metrics were calculated and include:

1. **Taxa Richness** – Total number of distinct taxa (genera for comparison to Tennessee ecoregion data). In general, increasing taxa richness reflects increasing water quality, habitat diversity and habitat suitability (KDOW 2002).

2. **Ephemeroptera, Plecoptera, and Trichoptera Richness** (EPT) – Total number of distinct taxa within the generally pollution sensitive insect orders of EPT. This index value will usually increase with increasing water quality, habitat diversity and habitat stability. (Plafkin et al. 1989).

3. **North Carolina Biotic Index** (NCBI) – The Biotic Index was originally developed by Hilsenhoff (1982) as a rapid method for evaluating water quality in Wisconsin streams by summarizing the overall pollution tolerance of a benthic arthropod community with a single value from 0-5. Hilsenhoff (1987) later refined the index and expanded the scale from 0-10. The biotic index is an average of tolerance values, and measures saprobity (pertaining to tolerance of organic enrichment) and to some extent trophism. Range of the index ranges from 0 (no apparent organic pollution) to 10 (severe organic pollution). Tennessee and KDOW use tolerance values developed by North Carolina Division of Environmental Management (NCDEM) (NCDENR 2001) and these values were used in this study. An increasing Biotic Index value indicates decreasing water quality. The formula for the Biotic Index is as follows:

$$NCBI = \sum \frac{x_i t_i}{n}$$

Where: x_i = number of individuals within a taxon
t_i = tolerance value of a taxon
n = total number of individuals in the sample

According to Hilsenhoff (1987) the calculated Biotic Index values for Wisconsin streams reflect the following:

Biotic Index	Water Quality	Degree of Organic Pollution
0.00 - 3.50	Excellent	No apparent organic pollution
3.51 - 4.50	Very Good	Possibly slight organic pollution
4.51 - 5.50	Good	Some Organic Pollution
5.51 - 6.50	Fair	Fairly significant organic pollution
6.51 - 7.50	Fairly Poor	Significant organic pollution
7.51 - 8.50	Poor	Very significant organic pollution
8.51 - 10.00	Very Poor	Severe organic pollution

Historically, NCDEM used the following modified Hilsenhoff Biotic Index scale to assign water quality condition in North Carolina streams of three ecoregions.

Condition	Mountain	Piedmont	Coastal Plain
Excellent	<4.05	<5.19	<5.47
Good	4.06-4.88	5.19-5.78	5.47-6.05
Good to Fair	4.89-5.74	5.79-6.48	6.06-6.72
Fair	5.75-7.00	6.49-7.48	6.73-7.73
Poor	>7.00	>7.48	>7.73

The state of Tennessee uses a four tier scoring criteria which is based of Hilsenhoff's values calibrated for each Tennessee ecoregion. TDEC's scoring criteria for biotic index values for streams of the interior plateau ecoregions are as follows.

Ecoregion	Non-impaired	Slightly Impaired	Moderately Impaired	Severely Impaired
Western Pennyroyal Karst (71e)	<5.05	5.05-6.69	6.70-8.34	>8.34
Western Highland Rim (71g)	<4.74	4.74-6.49	6.50-8.25	>8.25
Eastern Highland Rim (71f)	"	"	"	"
Outer Nashville Basin (71h)	"	"	"	"
Inner Nashville Basin (71i)	<5.54	5.54-7.02	7.03-8.51	>8.51

4. **Percent Ephemeroptera, Plecoptera and Trichoptera** (EPT Abundance):

$$\% \text{ EPT} = \frac{\text{Number of EPT individuals}}{\text{Total Number of individuals}} \text{ X } 100$$

5. **Modified Percent EPT abundance** (m% EPT) – Calculate as % EPT abundance with the relatively tolerant and ubiquitous caddisfly *Cheumatopsyche sp.* excluded from the calculation. As with %EPT, increasing values indicate increasing water quality and habitat conditions.

6. **Percent Ephemeroptera** (%E) – The abundance of mayflies (Ephemeroptera) is calculated by KDOW (2002) to show impacts of metals and high conductivity associated with mining and oil well impacts. Mayfly abundances normally declines in the presence of brine, metal and other toxic contaminants. Any increased perturbation in the environment also decreases the numbers of mayflies.

7. **Percent Oligochaeta and Chironomidae** (%OC) – This metric measures the relative abundance of these generally pollution tolerant organisms. Increasing abundances of oligochaetes and chironomids suggests decreasing water quality and/or habitat conditions.

8. **Percent Dominant** (Percent contribution of the most dominant taxon) –

$$\% \text{ Dominant} = \frac{\text{Total number of individuals of most dominant taxon}}{\text{Total individuals in sample}} \text{ X100}$$

9. **Percent Clingers** (Percent contribution of organisms that build fixed retreats or have adaptations to attach to surfaces in flowing water). The percentage of clingers is predicted to decrease with increasing perturbation (Barbour etal. 1999).

$$\% \text{ Clingers} = \frac{\text{Total number of clinger individuals}}{\text{Total individuals in sample}} \text{ X100}$$

The seven metrics; **1**. Taxa richness, **2**. EPT taxa, **3**. NCBI, **4**. % EPT, **7**. %OC, **8**. % Dominant and **9**. % Clingers calculated for the four stream locations in the Martins Fork Project drainage were compared to the Tennessee reference streams for the Cumberland Mountains ecoregion (69d). The data for the four streams were equalized by assigning a score of 6 (non-impaired), 4 (slightly impaired), 2 (moderately impaired), or 0 (severely impaired) based on comparison to the Tennessee Ecoregion reference data base (TDEC 2002). The scores were summed to determine biological condition of each of the four streams.

The metrics 1. Taxa Richness; 2. EPT taxa; 3. NCBI; 4. M %EPT; 5. %OC; and 6. % Clingers derived from the four stream locations in Wolf Creek Reservoir Project drainage were compared to Kentucky's reference streams for the Pennyroyal Bioregion (Pond etal. 2003). The

data for the four wadable streams was scored as Excellent, Good, Fair, Poor or Very poor when compared to the reference data.

Brower and Zar (1984) provide a detailed discussion of a variety of techniques for measuring community structure. The use of diversity indices is based upon the observation that normally undisturbed environments support communities with large numbers of species having no individuals present in overwhelming abundance. If the species of a disturbed community are ranked by numerical abundance, there may be relatively few species with large numbers of individuals. Mean diversity is affected by both "richness" of species (or abundance of different species) and by the distribution of individuals among the species. High species diversity indicates a highly complex community.

Species diversity was estimated using Shannon's Index of Diversity (H):

$$H = -\sum p_i \log p_i$$

where p_i is the proportion of the total number of individuals occurring in species i ($p_i=n_i/N$), N is the total number of individuals in all species.

Diversity indices take into account both the species richness and the evenness of the individuals' distribution among the species. Separate measures of these two components of diversity are often desirable. Species richness can be expressed simply as the number of species in the community. Evenness may be expressed by considering how close a set of observed species abundance are to those from an aggregation of species having maximum possible diversity for a given N and s (Brower and Zar 1984).

Evenness is calculated as follows:

$$\text{Pielou } J' = H/H_{max}$$

where H is calculated diversity and H_{max} is maximum possible diversity.

Community similarity between sites is measured by Jaccards Coefficient, and Percent Similarity.

$$\text{Jaccards Coefficient} = \frac{C}{S_1 + S_2 - C}$$

where S = Species in each community (S_1 is reference Community)

and C = Species common to both communities

Percent Similarity, for a two-community comparison, is calculated as follows: The number of individuals in each species is calculated as a fractional portion of the total community. The value for species i in community 1 is compared to the value for species i in community 2. The lower of the two is tabulated. This procedure is followed for each species. The tabulated list (of the lower of each pair of values) is summed. The sum is defined as the Percent Similarity of the two communities.

The software package Number Cruncher Statistical Systems version 5.03 was used to evaluate community similarity (Hintze 1992). Cluster analysis sorts sampling units into groups based on the overall resemblance to each other (Lundwig and Reynolds 1988). By using 1-Jaccards Coefficient and Percent Dissimilarity, sampling units are sorted to permit grouping. The cluster analysis combines the distances between sampling units into a matrix table, and two strategies of clustering are used to calculate a distance for N-1 cycles (N=number of sampling

units). The cluster analysis is interpreted graphically on a dendrogram to relate the similar communities (Hintze 1992, Ludwig and Reynolds 1988).

STATISTICAL EVALUATION

Sampling efficiency of the field techniques was calculated via a statistical analysis of the quantitative samples. The mean number of organisms per sample, the standard deviation, the standard error, and the sampling precision of the mean were calculated for the benthic samples from each station (Elliot 1977). The sampling precision is the primary parameter evaluated and represents the percentage of the actual mean of the population within which the sample mean lies and indicates how accurately the macroinvertebrate community was sampled. According to Elliot (1977), a sampling precision of 20% (80% confidence) or less is usually acceptable in biological studies. The sampling precision (D) is the ratio of the standard error to the arithmetic mean:

$$D = (S.E./Mean)\ 100$$

Since four quantitative samples were taken in each area, some of the population estimates may not be sampled with 80% or greater confidence. As stated by Elliot (1977), the simplest solution to this problem is to take many samples (over 50 samples), but this is not usually an acceptable allocation of resources.

An analysis of variance (F test) was used to compare the stations using the number of organisms and species per sample. According to Sokal and Rohlf (1981), analysis of variance is a technique in statistics where the total variation in a set of data is partitioned into components associated with possible sources of variability. The relative importance of the different sources is then assessed by F-tests between each component of variation and the "error" variation. If the calculated F-value is greater than the tabular F-value at the 0.05 level of significance, then a difference between data sets is greater than the variation within a data set. Following the

approach of Chew (1977), mean separation tests are applied to separate and rank the mean values of each data set developed from benthic enumeration

RESULTS AND DISCUSSION

A list of all aquatic benthic macroinvertebrate species, assigned tolerance values, functional feeding groups and numbers of individuals of each species collected from each stream location are presented in Table 1. Complete listings of all data by sample, station and month are found in the Appendix. A summary of benthic community measures is presented in Table 2. Determination of biological condition using the State of Tennessee scoring criteria is found in Table 3, while the scoring criteria used by the State of Kentucky is listed in Table 4. A statistical analysis of sampling efficiency and a comparison of the stations using mean number of organisms per Hess sampler is presented in Table 5. A similar comparison using mean number of species per Hess sampler is found in Table 6. A comparison of the stations using Percent Dissimilarity is in Figure 2 while similar comparisons using 1-Jaccard's Coefficient is clustered in Figure 3.

A minimum of 94 species of aquatic benthic macroinvertebrates was taken from the four stations within the Wolf Creek watershed (Table 1). The benthic macroinvertebrate populations from the four sites represented five phyla and 37 families. As in 1998 and 2000, the highest number of species (55) was found at Beaver Creek Mile 21.3, followed by 49 from Pitman Creek Mile 4.9, 48 from Bark Camp Creek Mile 2.0, and 44 from Little South Fork River Mile 5.2. The greatest densities (no./m^2) were found in Beaver Creek Mile 21.3 with an estimated ~3,980/m^2 followed by ~3,216/m^2 at Pitman Creek Mile 4.9, 1,971/m^2 at Little South Fork Mile 5.2 and 1,5121/m^2 at Bark Camp Creek Mile 2.0.

Beaver Creek Mile 21.3 (3WOL10040), as in 1998 and 2000, produced the most species from the four Hess samples with 55. This site also had the highest density estimates of the four sites with ~3,908/m^2 (Table 1). This site had high numbers of the caddisfly *Cheumatopsyche sp.* (19.8%) and the snail *Elimia sp*. (11.8%) in the riffle/runs. The chironomid *Cricotopus sp*. (9.3%) and the mayflies *Baetis cf. flavistriga* (7.7%) and *Stenonema sp*. (7.6%) were also common at this site. Diversity (4.2) and Evenness (0.7) were high at this location. There were 21 EPT species at this site, which was only slightly less than the high of 23 found at Bark Camp Creek Mile 2.0. The Biotic Index value (5.15) is considered indicative of "Good" water quality with some organic pollution. When scored against Tennessee bioregion reference streams this site scored as non-impaired (Table 3). The state of Kentucky index rating for this location scored as "Fair" when compared to reference stream data (Table 4).

Little South Fork Mile 5.2 (3WOL10035), had a minimum of 44 species, including 18 EPT species (similar to the 19 found during the 1998 survey) in all the Hess samples taken. This site had density estimates of 1,971/m^2. As in previous studies, no species were dominant in the fauna, but the mayflies *Isonychia sp.* (21.3%) and *Stenonema sp.* (18.8%), and the caddisfly *Cheumatopsyche sp*. (12.6%) were abundant (Table 1). The Biotic Index value (4.44) is considered representative of "Very Good" water quality with possibly slight organic pollution. This site scored as non-impaired when compared to Tennessee ecoregion database (Table 3) and as "Fair" when scored against Kentucky reference streams (Table 4).

Bark Camp Creek Mile 2.0 (3WOL10023) had 48 species and 23 EPT species, which was the highest number of EPT found at the four locations in the Wolf Creek Watershed (Tables 1 and 2). The population densities were again low at this location with an estimate of ~1,512 individuals/m^2. The caddisfly *Cheumatopsyche sp*. (30%) was dominant with *Stenonema spp.*

(10.7%) also common in the benthic fauna. The value of diversity (4.14) for this location was high, indicative of a fairly even distribution of individuals among the species present. The Biotic Index value 4.60 is indicative of a fauna existing under "Good" water quality with some organic pollution. The benthic fauna at this location scored as non-impaired by the Tennessee reference stream data (Table 3) and "Fair" by the Kentucky bioregion score (Table 4).

Pitman Creek Mile 4.9 (3WOL10026), as in 2000, had 49 species of benthic macroinvertebrates and 19 EPT species (Table 1). Estimates of population densities were higher than previous years at this location with 3,216 individuals/m^2. The caddisfly *Cheumatopsyche sp.* (18.0%) was the most abundant species followed by the chironomid *Cricotopus sp*. (8.0%). Diversity was high (4.93) at this site and the Biotic Index value (4.97) for this site is indicative of "Good" water quality. Pitman Creek was scored as non-impaired using Tennessee reference streams (Table 3) and "Fair" when compared to Kentucky reference streams (Table 4).

Statistical comparisons of the four sites in the Wolf Creek drainage using mean number of individuals/Hess sample (Table 5) found all locations not significantly different at a 0.05 confidence level. A comparison of the sites using mean number of species/Hess sample (Table 6) also found no significant differences between the four sites at the 0.05 confidence level.

A comparison of the four sites using percent dissimilarity (species shared including a density component) is presented in Figure 2. Bark Camp Creek Mile 2.0 and Beaver Creek Mile 21.3 cluster first while Little South Fork River Mile 5.2 and Pitman Creek Mile 4.9 formed a second cluster.

A similar comparison using only species shared (Jaccards Coefficient) is presented in Figure 3. In terms of species shared, Bark Camp Creek Mile 2.0 and Little South Fork Mile 5.2 clustered first followed by Beaver Creek Mile 21.3 and Pitman Creek Mile 4.9 second.

Table 1. Summary of Benthic Macroinvertebrates Collected from Wolf Creek Project Drainage, 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023		Pitman Creek 3WOL10026		Beaver Creek 3WOL10040		Little South Fork 3WOL10035	
				Count	Density No./m²	Count	Density No./m²	Count	Density No./m²	Count	Density No./m²
PLATYHELMINTHES											
Turbellaria											
Tricladida											
Planariidae											
Cura foremanii	**5**					2	5.56				
NEMATODA	**6**					7	19.46	1	2.78		
MOLLUSCA											
Bivalvia											
Veneroida											
Corbiculidae											
Corbicula fluminea	**6.1**	**FC**						2	5.56	2	5.56
Sphaeriidae	***8**	**FC**									
Pisidium sp.	**6.5**	**FC**				1	2.78	1	2.78		
Gastropoda											
Mesogastropoda											
Pleuroceridae											
Elimia sp.	**2.5**	**SC**				25	69.5	166	461.48	34	94.52
ANNELIDA											
Oligochaeta	***10**	**CG**									
Tubificida											
Lumbricidae		**CG**				2	5.56			4	11.12
Naididae	***8**	**CG**						2	5.56		
Tubificidae w.o.h.c.	**7.1**	**CG**						20	55.6		
ARTHROPODA											
Crustacea											
Isopoda											
Asellidae		**SH**									
Caecidotea sp.	**9.1**	**CG**						6	16.68		
Amphipoda											
Crangonyctidae											
Crangonyx sp.	**7.9**	**CG**						85	236.3	1	2.78
Decapoda											
Cambaridae	**7.5**							2	5.56	1	2.78
Cambarus bartonii	**4.6**			1	2.78	1	2.78				
Orconectes sp.	**2.6**	**SH**		1	2.78						
Orconectes placidus	**2.6**	**SH**						1	2.78		
Insecta											
Ephemeroptera											
Baetidae		**CG**									
Acentrella ampla	**3.6**	**CG**				1	2.78	29	80.62	2	5.56

Table 1. Summary of Benthic Macroinvertebrates Collected from Wolf Creek Project Drainage, 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023		Pitman Creek 3WOL10026		Beaver Creek 3WOL10040		Little South Fork 3WOL10035	
				Count	Density No./m²	Count	Density No./m²	Count	Density No./m²	Count	Density No./m²
Baetis c.f. flavistriga	**7**	**CG**		1	2.78	16	44.48	108	300.24	6	16.68
Baetis intercalaris	**7**	**CG**				3	8.34	9	25.02	3	8.34
Baetis tricaudatus	**1.6**	**CG**						45	125.1		
Baetis sp.	***4**	**CG**						6	16.68	11	30.58
Caenidae		**CG**									
Caenis sp.	**7.4**	**CG**				2	5.56	6	16.68	7	19.46
Ephemeridae		**CG**									
Ephemera sp.	**2**	**CG**						3	8.34		
Ephemerellidae		**SC**						2	5.56		
Ephemerella sp.	**2**	**SC**	**CL**	6	16.68						
Heptageniidae		**SC**	**CL**	31	86.18						
Leucrocuta sp.	**2.4**	**SC**				3	8.34				
Stenacron interpunctatum	**6.9**	**SC**	**CL**					1	2.78		
Stenonema sp.	***4**	**SC**	**CL**	58	161.24	42	116.76	107	297.46	133	369.74
Stenonema mediopunctatum	**3.8**	**SC**	**CL**					1	2.78		
Stenonema modestum	**5.5**	**SC**	**CL**					19	52.82	9	25.02
Stenonema terminatum	**4.1**	**SC**	**CL**			4	11.12	60	166.8		
Stenonema vicarium	**1.3**	**SC**	**CL**	2	5.56						
Isonychiidae		**FC**									
Isonychia sp.	**3.5**	**FC**		15	41.7			16	44.48	151	419.78
Leptophlebiidae		**CG**		5	13.9						
Paraleptophlebia sp.	**0.9**	**CG**		20	55.6						
Odonata											
Coenagrionidae		**P**								1	2.78
Argia sp.	**8.2**	**P**	**CL**			1	2.78			1	2.78
Gomphidae	***1**	**P**		2	5.56						
Plecoptera											
Capniidae		**SH**		1	2.78	3	8.34				
Perlidae		**P**	**CL**	1	2.78						
Acroneuria sp.	***1**	**P**	**CL**	10	27.8						
Acroneuria abnormis	**2.1**	**P**	**CL**	9	25.02					1	2.78
Taeniopterygidae		**SH**									
Taeniopteryx sp.	**5.4**	**SH**		3	8.34	49	136.22			24	66.72
Megaloptera											
Corydalidae		**P**									
Corydalus cornutus	**5.2**	**P**	**CL**	4	11.12			1	2.78	7	19.46
Nigronia serricornis	**5**	**P**	**CL**							1	2.78
Trichoptera											
Glossosomatidae		**SC**	**CL**								
Glossosoma sp.	**1.6**	**SC**	**CL**	1	2.78						

Table 1. Summary of Benthic Macroinvertebrates Collected from Wolf Creek Project Drainage, 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023		Pitman Creek 3WOL10026		Beaver Creek 3WOL10040		Little South Fork 3WOL10035	
				Count	Density No./m²	Count	Density No./m²	Count	Density No./m²	Count	Density No./m²
Helicopsychidae		SC									
Helicopsyche borealis	0	SC	CL					4	11.12		
Hydropsychidae		FC	CL	15	41.7	89	247.42			19	52.82
Ceratopsyche sp.	*4	FC	CL	14	38.92	64	177.92	47	130.66	15	41.7
Ceratopsyche morosa	2.6	FC	CL			84	233.52				
Ceratopsyche sparna	2.7	FC	CL			26	72.28				
Cheumatopsyche sp.	6.2	FC	CL	163	453.14	208	578.24	279	775.62	89	247.42
Diplectrona modesta	2.2	FC	CL	4	11.12	1	2.78				
Hydropsyche betteni gp.	7.8	FC	CL	1	2.78	13	36.14	13	36.14		
Hydropsyche sp.	*5	FC	CL	16	44.48	2	5.56	2	5.56	15	41.7
Philopotamidae		FC	CL								
Chimarra aterrima	2.8	FC	CL	6	16.68	1	2.78			3	8.34
Chimarra obscurus	2.8	FC	CL			5	13.9			31	86.18
Chimarra sp.	2.8	FC	CL							3	8.34
Chimarra socia	2.8		CL							1	2.78
Dolophilodes sp.	0.8	FC	CL	4	11.12						
Polycentropodidae		FC	CL								
Polycentropus sp.	3.5	FC	CL					1	2.78		
Rhyacophilidae		P	CL								
Rhyacophila sp.	*1	P	CL	9	25.02						
Rhyacophila fuscula	1.9	P	CL					1	2.78		
Lepidoptera											
Pyralidae		SH									
Petrophila sp.	2.1	SC				1	2.78			4	11.12
Coleoptera											
Elmidae		CG									
Microcylloepus pusillus	2.1	SC	CL							4	11.12
Oulimnius latiusculus	1.8	CG	CL	2	5.56			1	2.78		
Optioservus ovalis	2.4	SC	CL	1	2.78						
Optioservus sp.	2.4	SC	CL	1	2.78	57	158.46	11	30.58		
Optioservus trivittatus	2.4	SC	CL			3	8.34				
Stenelmis sp.	5.1	SC	CL	1	2.78	69	191.82	19	52.82	3	8.34
Limnichidae											
Lutrochus luteus										2	5.56
Psephenidae		SC									
Ectopria sp.	*4	SC	CL					2	5.56		
Psephenus herricki	2.4	SC	CL	3	8.34	67	186.26	41	113.98	1	2.78
Diptera											
Chironomidae				18	50.04	32	88.96	27	75.06	7	19.46
Ablabesmyia rhamphe gp.	7.2	P						2	5.56		

Table 1. Summary of Benthic Macroinvertebrates Collected from Wolf Creek Project Drainage, 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023		Pitman Creek 3WOL10026		Beaver Creek 3WOL10040		Little South Fork 3WOL10035	
				Count	Density No./m²	Count	Density No./m²	Count	Density No./m²	Count	Density No./m²
Brillia flavifrons	**5.2**	**SH**				3	8.34				
Cardiocladius obscurus	**5.87**	**P**				23	63.94	7	19.46	4	11.12
Conchapelopia sp.	**8.4**	**P**		1	2.78						
Corynoneura sp.	**6**	**CG**				17	47.26				
Cricotopus bicinctus	**8.5**	**CG**	**CL**	2	5.56	29	80.62	21	58.38	5	13.9
Cricotopus sp.	***7**	**CG**	**CL**			92	255.76	131	364.18	22	61.16
Cricotopus trifascia	**2.8**	**CG**	**CL**					45	125.1	2	5.56
Dicrotendipes sp.	**8.1**	**CG**				3	8.34				
Eukiefferiella claripennis gp.	**5.6**	**CG**				10	27.8	1	2.78	1	2.78
Eukiefferiella devonica gp.	**2.6**	**CG**				5	13.9				
Microtendipes pedellus gp.	**5.5**	**CG**	**CL**	6	16.68			5	13.9		
Parakiefferiella sp.	**5.4**	**CG**				1	2.78				
Parametriocnemus sp.	***4**	**CG**		19	52.82	2	5.56				
Polypedilum flavum	**4.9**	**SH**		30	83.4	13	36.14	7	19.46		
Rheocricotopus robacki	**7.3**	**CG**								5	13.9
Rheotanytarsus sp.	**5.9**	**FC**	**CL**	8	22.24	7	19.46	3	8.34	7	19.46
Stictochironomus devinctus		**CG**						2	5.56		
Synorthocladius semivirens	**4.36**	**CG**						2	5.56	3	8.34
Tanytarsus sp.	**6.8**	**FC**		4	11.12			5	13.9		
Thienemanniella xena	**5.9**	**CG**		2	5.56	28	77.84	2	5.56		
Tvetenia bavarica gp.	**3.7**	**CG**		22	61.16						
Tvetenia discoloripes gp.	**3.6**	**CG**						1	2.78	42	116.76
Zavrelia sp.	**5.3**	**CG**						9	25.02	1	2.78
Empididae	**7.6**	**P**									
Hemerodromia sp.	***6**	**P**		1	2.78	2	5.56				
Simuliidae		**FC**	**CL**								
Simulium sp.	**6**	**FC**	**CL**	11	30.58	34	94.52	13	36.14	21	58.38
Tipulidae		**SH**									
Antocha sp.	**4.3**	**CG**	**CL**	3	8.34	3	8.34	3	8.34		
Dicranota sp.	**0**	**P**		1	2.78						
Hexatoma sp.	**4.3**	**P**		3	8.34						
Tipula sp.	**7.3**	**SH**		2	5.56	1	2.78				
TOTAL NO. OF ORGANISMS				**544**	**1512.32**	**1157**	**3216.46**	**1406**	**3908.68**	**709**	**1971.02**
TOTAL NO. OF TAXA				**48**	**48**	**49**	**49**	**55**	**55**	**44**	**44**

Table 2. Summary of Benthic Macroinvertebrate Community Structure Collected from Wolf Creek Project Drainage, Fall 2003.

	Bark Camp	Pitman Creek	Beaver Creek	Little South Fork
	3WOL10023	**3WOL10026**	**3WOL10040**	**3WOL10035**
1. Taxa Richness (Genera)	48 (44)	49 (39)	55 (45)	44 (35)
2. EPT Taxa (Genera)	23 (20)	19 (12)	21 (13)	18 (11)
3. %EPT	68.20%	48.75%	54.11%	70.24%
4. %OC	20.59%	22.97%	19.77%	14.17%
5. NCBI	4.60	4.97	5.15	4.44
6. % Dominant	29.96%	17.98%	19.84%	21.30%
7. % Clingers	72.06%	77.87%	59.10%	55.43%
8. M% EPT (minus Cheumatopsyche)	42.65%	35.26%	34.14%	61.21%
9. Percent Ephemeroptera	25.37%	6.14%	29.30%	45.42%
10. Number/m^2	1512.32	3216.46	3908.68	1971.02
11. Diversity Index (Shannon base 2)	4.15	4.39	4.23	3.96
12. Pielou's Index	0.7	0.8	0.7	0.7

Table 3. Determination of Biological Condition Based on Index Scores for Tennessee Bioregions (TDEC 2002)								
METRIC	**Beaver Creek**		**Little South Fork**		**Bark Camp Creek**		**Pitman Creek**	
	Mile 21.3		**Mile 5.2**		**Mile 2.0**		**Mile 4.9**	
	3WOL10040		**3WOL10035**		**3WOL10023**		**3WOL10026**	
	Value	**Score**	**Value**	**Score**	**Value**	**Score**	**Value**	**Score**
Taxa Richness (genera)	45	6	35	6	44	6	39	6
EPT Taxa (genera)	13	4	11	4	20	6	12	4
% EPT	54.11	4	70.24	6	68.20	6	48.75	4
%OC	19.77	6	14.17	6	20.59	6	22.97	6
NCBI	5.15	4	4.44	4	4.60	4	4.97	4
%Dominant	19.84	6	21.30	6	29.96	6	17.98	6
%Clingers	59.10	6	55.43	4	72.06	6	77.87	6
TOTAL SCORE	**36**		**36**		**40**		**36**	
INDEX RATING	**Non-Impaired**		**Non-Impaired**		**Non-Impaired**		**Non-Impaired**	
	Supporting		**Supporting**		**Supporting**		**Supporting**	

Target Score for Bioregion 69d (July-December) =32

Table 4. Determination of Biological Condition Based on Index Scores for Kentucky Bioregions (Pond etal. 2003).								
METRIC	**Beaver Creek**		**Little South Fork**		**Bark Camp Creek**		**Pitman Creek**	
	Mile 21.3		**Mile 5.2**		**Mile 2.0**		**Mile 4.9**	
	3WOL10040		**3WOL10035**		**3WOL10023**		**3WOL10026**	
	Metric Value	**Score**	**Metric Value**	**Score**	**Metric Value**	**Score**	**Metric Value**	**Score**
Taxa Richness (genera)	45	60.8	35	47.3	44	60	39	52.7
Reference	74		74		74		74	
EPT Taxa (genera)	13	43.3	11	36.7	20	66.7	12	40.0
Reference	30		30		30		30	
NCBI	5.15	70.4	4.44	80.7	4.60	78.4	4.97	73.0
Reference	3.11		3.11		3.11		3.11	
M %EPT	34.14	46.1	61.21	82.7	34.14	46.1	61.21	82.7
Reference	74		74		74		74	
%OC	19.77%	81.0	14.17%	86.7	20.59%	80.2	22.97%	77.8
Reference	1.0		1.0		1.0		1.0	
% Clingers	59.10%	79.9	55.43%	74.9	72.06%	97.4	77.87%	100.0
Reference	74		74		74		74	
AVERAGE SCORE	**63.6**		**68.2**		**71.5**		**71.0**	
INDEX RATING	**Fair**		**Fair**		**Fair**		**Fair**	

Table 5. Statistical Analyses of Sampling Efficiency and Comparison of the Stations Using Mean Number of Organisms [a] Wolf Creek Project Drainage, Summer 2003.					
Station	No. of Samples	Mean No. of Organisms	Standard Deviation	Standard Error of the Mean	Precision of Sampling Mean
Bark Camp Creek	4	136	78.59	19.65	14.45%
3WOL10023					
Pitman Creek	4	289.25	302.86	151.43	52.35%
3WOL10026					
Beaver Creek	4	351.50	153.42	76.70	21.82%
3WOL10040					
Little South Fork	4	177.25	86.98	43.49	24.54%
3WOL10035					

Calculated F = 1.22

Beaver Creek	**Pitman Creek**	**Little South Fork**	**Bark Camp Creek**
3WOL10040	**3WOL10026**	**3WOL10035**	**3WOL10023**
351.50	289.25	177.25	136

[a] Stations underlined are statistically comparable at a 0.05 confidence level.

Table 5. Statistical Analyses of Sampling Efficiency and Comparison of the Stations Using Mean Number of Taxa [a] , Wolf Creek Project Drainage, Summer 2003.					
Station	No. of Samples	Mean No. of Organisms	Standard Deviation	Standard Error of the Mean	Precision of Sampling Mean
Bark Camp Creek	4	23	7.53	3.76	16.36%
3WOL10023					
Pitman Creek	4	26	5.59	2.80	10.76%
3WOL10026					
Beaver Creek	4	28.5	11.62	5.81	20.38%
3WOL10040					
Little South Fork	4	23.75	5.5	2.75	11.58%
3WOL10035					

Calculated F = 0.39

Beaver Creek	**Pitman Creek**	**Little South Fork**	**Bark Camp Creek**
3WOL10040	**3WOL10026**	**3WOL10035**	**3WOL10023**
28.5	26	23.75	23

[a] Stations underlined are statistically comparable at a 0.05 confidence level.

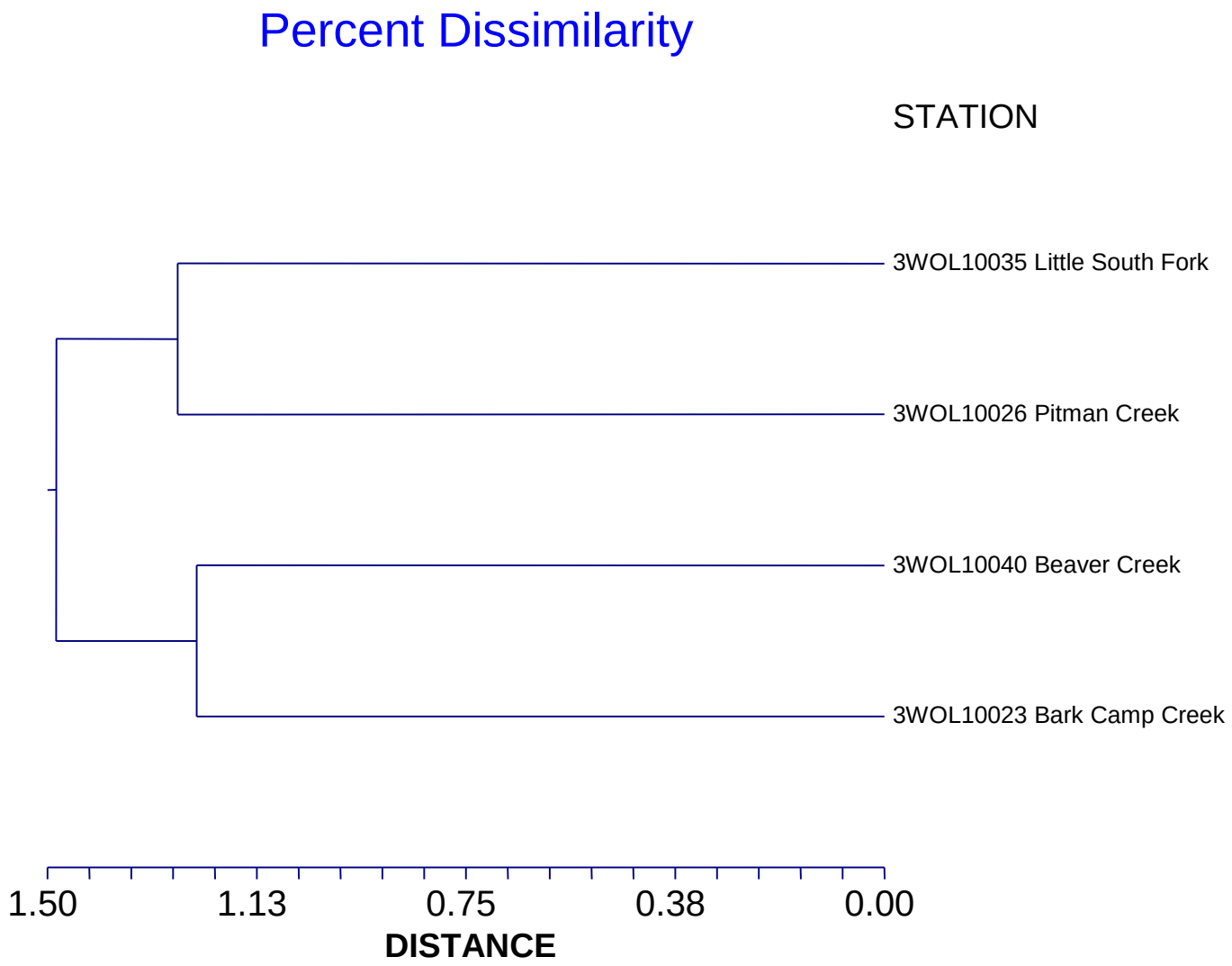

Figure 2. Percent Dissimilarity Cluster Analysis, Wolf Creek Reservoir Project, 2003.

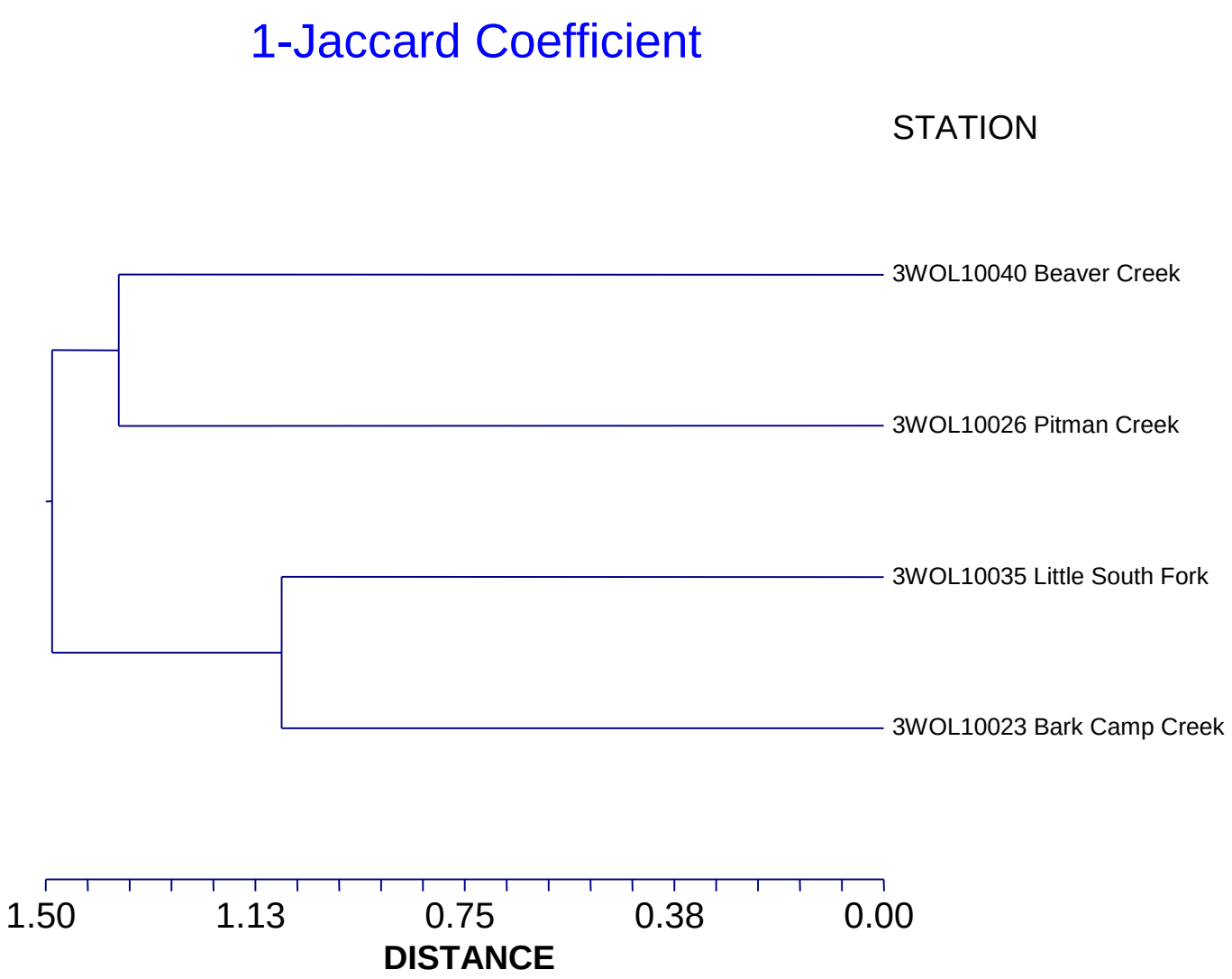

Figure 3. 1-Jaccard's Coefficient Cluster Analysis, Wolf Creek Reservoir Project, 2003.

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APPENDIX

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023					
				1	2	3	4	Total	No./m^2
PLATYHELMINTHES									
Turbellaria									
Tricladida									
Planariidae									
Cura foremanii	**5**								
NEMATODA	**6**								
MOLLUSCA									
Bivalvia									
Veneroida									
Corbiculidae									
Corbicula fluminea	**6.1**	**FC**							
Sphaeriidae	***8**	**FC**							
Pisidium sp.	**6.5**	**FC**							
Gastropoda									
Mesogastropoda									
Pleuroceridae									
Elimia sp.	**2.5**	**SC**							
ANNELIDA									
Oligochaeta	***10**	**CG**							
Tubificida									
Lumbricidae		**CG**							
Naididae	***8**	**CG**							
Tubificidae w.o.h.c.	**7.1**	**CG**							
ARTHROPODA									
Crustacea									
Isopoda									
Asellidae		**SH**							
Caecidotea sp.	**9.1**	**CG**							
Amphipoda									
Crangonyctidae									
Crangonyx sp.	**7.9**	**CG**							
Decapoda									
Cambaridae	**7.5**								
Cambarus bartonii	**4.6**					1		**1**	**2.78**
Orconectes sp.	**2.6**	**SH**				1		**1**	**2.78**
Orconectes palcidus	**2.6**	**SH**							
Insecta									
Ephemeroptera									
Baetidae		**CG**							
Acentrella ampla	**3.6**	**CG**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023					
				1	2	3	4	Total	No./m^2
Baetis c.f. flavistriga	**7**	**CG**		1				**1**	**2.78**
Baetis intercalaris	**7**	**CG**							
Baetis tricaudatus	**1.6**	**CG**							
Baetis sp.	***4**	**CG**							
Caenidae		**CG**							
Caenis sp.	**7.4**	**CG**							
Ephemeridae		**CG**							
Ephemera sp.	**2**	**CG**							
Ephemerellidae		**SC**							
Ephemerella sp.	**2**	**SC**	**CL**		6			**6**	**16.68**
Heptageniidae		**SC**	**CL**		31			**31**	**86.18**
Leucrocuta sp.	**2.4**	**SC**							
Stenacron interpunctatum	**6.9**	**SC**	**CL**						
Stenonema sp.	***4**	**SC**	**CL**	23	21	1	13	**58**	**161.24**
Stenonema mediopunctatum	**3.8**	**SC**	**CL**						
Stenonema modestum	**5.5**	**SC**	**CL**						
Stenonema terminatum	**4.1**	**SC**	**CL**						
Stenonema vicarium	**1.3**	**SC**	**CL**	1	1			**2**	**5.56**
Isonychiidae		**FC**							
Isonychia sp.	**3.5**	**FC**		2	9	3	1	**15**	**41.7**
Leptophlebiidae		**CG**			5			**5**	**13.9**
Paraleptophlebia sp.	**0.9**	**CG**		11	5		4	**20**	**55.6**
Odonata									
Coenagrionidae		**P**							
Argia sp.	**8.2**	**P**	**CL**						
Gomphidae	***1**	**P**				1	1	**2**	**5.56**
Plecoptera									
Capnidae		**SH**			1			**1**	**2.78**
Perlidae		**P**	**CL**				1	**1**	**2.78**
Acroneuria sp.	***1**	**P**	**CL**		7	2	1	**10**	**27.8**
Acroneuria abnormis	**2.1**	**P**	**CL**	9				**9**	**25.02**
Taeniopterygidae		**SH**							
Taeniopteryx sp.	**5.4**	**SH**		1	2			**3**	**8.34**
Megaloptera									
Corydalidae		**P**							
Corydalus cornutus	**5.2**	**P**	**CL**		2	1	1	**4**	**11.12**
Nigronia serricornis	**5**	**P**	**CL**						
Trichoptera									
Glossosomatidae		**SC**	**CL**						
Glossosoma sp.	**1.6**	**SC**	**CL**	1				**1**	**2.78**
Helicopsychidae		**SC**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023					
				1	2	3	4	Total	No./m^2
Helicopsyche borealis	**0**	**SC**	**CL**						
Hydropsychidae		**FC**	**CL**		15			**15**	**41.7**
Ceratopsyche sp.	***4**	**FC**	**CL**	2	8		4	**14**	**38.92**
Ceratopsyche morosa	**2.6**	**FC**	**CL**						
Ceratopsyche sparna	**2.7**	**FC**	**CL**						
Cheumatopsyche sp.	**6.2**	**FC**	**CL**	21	69	54	19	**163**	**453.14**
Diplectrona modesta	**2.2**	**FC**	**CL**	1	3			**4**	**11.12**
Hydropsyche betteni gp.	**7.8**	**FC**	**CL**		1			**1**	**2.78**
Hydropsyche sp.	***5**	**FC**	**CL**	5	4	7		**16**	**44.48**
Philopotamidae		**FC**	**CL**						
Chimarra aterrima	**2.8**	**FC**	**CL**	1	4		1	**6**	**16.68**
Chimarra obscurus	**2.8**	**FC**	**CL**						
Chimarra sp.	**2.8**	**FC**	**CL**						
Chimarra socia	**2.8**		**CL**						
Dolophilodes sp.	**0.8**	**FC**	**CL**		4			**4**	**11.12**
Polycentropodidae		**FC**	**CL**						
Polycentropus sp.	**3.5**	**FC**	**CL**						
Rhyacophilidae		**P**	**CL**						
Rhyacophila sp.	***1**	**P**	**CL**		5		4	**9**	**25.02**
Rhyacophila fuscula	**1.9**	**P**	**CL**						
Lepidoptera									
Pyralidae		**SH**							
Petrophila sp.	**2.1**	**SC**							
Coleoptera									
Elmidae		**CG**							
Microcylloepus pusillus	**2.1**	**SC**	**CL**						
Oulimnius latiusculus	**1.8**	**CG**	**CL**		2			**2**	**5.56**
Optioservus ovalis	**2.4**	**SC**	**CL**	1				**1**	**2.78**
Optioservus sp.	**2.4**	**SC**	**CL**			1		**1**	**2.78**
Optioservus trivittatus	**2.4**	**SC**	**CL**						
Stenelmis sp.	**5.1**	**SC**	**CL**			1		**1**	**2.78**
Limnichidae									
Lutrochus luteus									
Psephenidae		**SC**							
Ectopria sp.	***4**	**SC**	**CL**						
Psephenus herricki	**2.4**	**SC**	**CL**	1		1	1	**3**	**8.34**
Diptera									
Chironomidae				7	5	4	2	**18**	**50.04**
Ablabesmyia rhamphe gp.	**7.2**	**P**							
Brillia flavifrons	**5.2**	**SH**							
Cardiocladius obscurus	**5.87**	**P**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Bark Camp 3WOL10023					
				1	2	3	4	Total	No./m^2
Conchapelopia sp.	8.4	P			1			1	2.78
Corynoneura sp.	6	CG							
Cricotopus bicinctus	8.5	CG	CL	1			1	2	5.56
Cricotopus sp.	*7	CG	CL						
Cricotopus trifascia	2.8	CG	CL						
Dicrotendipes sp.	8.1	CG							
Eukiefferiella claripennis gp.	5.6	CG							
Eukiefferiella devonica gp.	2.6	CG							
Microtendipes pedellus gp.	5.5	CG	CL	6				6	16.68
Parakiefferiella sp.	5.4	CG							
Parametriocnemus sp.	*4	CG		17	1	1		19	52.82
Polypedilum flavum	4.9	SH		22	4	3	1	30	83.4
Rheocricotopus robacki	7.3	CG							
Rheotanytarsus sp.	5.9	FC	CL	2	3	3		8	22.24
Stictochironomus devinctus		CG							
Synorthocladius semivirens	4.36	CG							
Tanytarsus sp.	6.8	FC		2	1	1		4	11.12
Thienemanniella xena	5.9	CG			2			2	5.56
Tvetenia bavarica gp.	3.7	CG		3	10	9		22	61.16
Tvetenia discoloripes gp.	3.6	CG							
Zavrelia sp.	5.3	CG							
Empididae	7.6	P							
Hemerodromia sp.	*6	P			1			1	2.78
Simuliidae		FC	CL						
Simulium sp.	6	FC	CL	9	2			11	30.58
Tipulidae		SH							
Antocha sp.	4.3	CG	CL			3		3	8.34
Dicranota sp.	0	P		1				1	2.78
Hexatoma sp.	4.3	P		3				3	8.34
Tipula sp.	7.3	SH			2			2	5.56
TOTAL NO. OF ORGANISMS				**154**	**237**	**98**	**55**	**544**	**1512.32**
TOTAL NO. OF TAXA				**26**	**32**	**19**	**15**	**48**	**48**
EPT TAXA									23
% EPT									68.20%
m % ept									42.65%
%EPHEMEROPTERA									25.37%
%oc									20.59%
% Dominant									29.96%
% clingers									72.06%

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Pitman Creek 3WOL10026					
				1	2	3	4	Total	No./m^2
PLATYHELMINTHES									
Turbellaria									
Tricladida									
Planariidae									
Cura foremanii	**5**						2	**2**	**5.56**
NEMATODA	**6**				7			**7**	**19.46**
MOLLUSCA									
Bivalvia									
Veneroida									
Corbiculidae									
Corbicula fluminea	**6.1**	**FC**							
Sphaeriidae	***8**	**FC**							
Pisidium sp.	**6.5**	**FC**		1				**1**	**2.78**
Gastropoda									
Mesogastropoda									
Pleuroceridae									
Elimia sp.	**2.5**	**SC**		4	11	3	7	**25**	**69.5**
ANNELIDA									
Oligochaeta	***10**	**CG**							
Tubificida									
Lumbricidae		**CG**			1		1	**2**	**5.56**
Naididae	***8**	**CG**							
Tubificidae w.o.h.c.	**7.1**	**CG**							
ARTHROPODA									
Crustacea									
Isopoda									
Asellidae		**SH**							
Caecidotea sp.	**9.1**	**CG**							
Amphipoda									
Crangonyctidae									
Crangonyx sp.	**7.9**	**CG**							
Decapoda									
Cambaridae	**7.5**								
Cambarus bartonii	**4.6**			1				**1**	**2.78**
Orconectes sp.	**2.6**	**SH**							
Orconectes palcidus	**2.6**	**SH**							
Insecta									
Ephemeroptera									
Baetidae		**CG**							
Acentrella ampla	**3.6**	**CG**		1				**1**	**2.78**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Pitman Creek 3WOL10026					
				1	2	3	4	Total	No./m^2
Baetis c.f. flavistriga	**7**	**CG**		2	10	3	1	**16**	**44.48**
Baetis intercalaris	**7**	**CG**			3			**3**	**8.34**
Baetis tricaudatus	**1.6**	**CG**							
Baetis sp.	***4**	**CG**							
Caenidae		**CG**							
Caenis sp.	**7.4**	**CG**					2	**2**	**5.56**
Ephemeridae		**CG**							
Ephemera sp.	**2**	**CG**							
Ephemerellidae		**SC**							
Ephemerella sp.	**2**	**SC**	**CL**						
Heptageniidae		**SC**	**CL**						
Leucrocuta sp.	**2.4**	**SC**			3			**3**	**8.34**
Stenacron interpunctatum	**6.9**	**SC**	**CL**						
Stenonema sp.	***4**	**SC**	**CL**	2	31		9	**42**	**116.76**
Stenonema mediopunctatum	**3.8**	**SC**	**CL**						
Stenonema modestum	**5.5**	**SC**	**CL**						
Stenonema terminatum	**4.1**	**SC**	**CL**		1	3		**4**	**11.12**
Stenonema vicarium	**1.3**	**SC**	**CL**						
Isonychiidae		**FC**							
Isonychia sp.	**3.5**	**FC**							
Leptophlebiidae		**CG**							
Paraleptophlebia sp.	**0.9**	**CG**							
Odonata									
Coenagrionidae		**P**							
Argia sp.	**8.2**	**P**	**CL**		1			**1**	**2.78**
Gomphidae	***1**	**P**							
Plecoptera									
Capnidae		**SH**			3			**3**	**8.34**
Perlidae		**P**	**CL**						
Acroneuria sp.	***1**	**P**	**CL**						
Acroneuria abnormis	**2.1**	**P**	**CL**						
Taeniopterygidae		**SH**							
Taeniopteryx sp.	**5.4**	**SH**			40	5	4	**49**	**136.22**
Megaloptera									
Corydalidae		**P**							
Corydalus cornutus	**5.2**	**P**	**CL**						
Nigronia serricornis	**5**	**P**	**CL**						
Trichoptera									
Glossosomatidae		**SC**	**CL**						
Glossosoma sp.	**1.6**	**SC**	**CL**						
Helicopsychidae		**SC**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Pitman Creek 3WOL10026					
				1	2	3	4	Total	No./m^2
Helicopsyche borealis	**0**	**SC**	**CL**						
Hydropsychidae		**FC**	**CL**		73	13	3	**89**	**247.42**
Ceratopsyche sp.	***4**	**FC**	**CL**	6	20	38		**64**	**177.92**
Ceratopsyche morosa	**2.6**	**FC**	**CL**	14	43	8	19	**84**	**233.52**
Ceratopsyche sparna	**2.7**	**FC**	**CL**		20		6	**26**	**72.28**
Cheumatopsyche sp.	**6.2**	**FC**	**CL**	11	137	26	34	**208**	**578.24**
Diplectrona modesta	**2.2**	**FC**	**CL**			1		**1**	**2.78**
Hydropsyche betteni gp.	**7.8**	**FC**	**CL**	1	4	5	3	**13**	**36.14**
Hydropsyche sp.	***5**	**FC**	**CL**			1	1	**2**	**5.56**
Philopotamidae		**FC**	**CL**						
Chimarra aterrima	**2.8**	**FC**	**CL**			1		**1**	**2.78**
Chimarra obscurus	**2.8**	**FC**	**CL**		3	1	1	**5**	**13.9**
Chimarra sp.	**2.8**	**FC**	**CL**						
Chimarra socia	**2.8**		**CL**						
Dolophilodes sp.	**0.8**	**FC**	**CL**						
Polycentropodidae		**FC**	**CL**						
Polycentropus sp.	**3.5**	**FC**	**CL**						
Rhyacophilidae		**P**	**CL**						
Rhyacophila sp.	***1**	**P**	**CL**						
Rhyacophila fuscula	**1.9**	**P**	**CL**						
Lepidoptera									
Pyralidae		**SH**							
Petrophila sp.	**2.1**	**SC**				1		**1**	**2.78**
Coleoptera									
Elmidae		**CG**							
Microcylloepus pusillus	**2.1**	**SC**	**CL**						
Oulimnius latiusculus	**1.8**	**CG**	**CL**						
Optioservus ovalis	**2.4**	**SC**	**CL**						
Optioservus sp.	**2.4**	**SC**	**CL**	3	41		13	**57**	**158.46**
Optioservus trivittatus	**2.4**	**SC**	**CL**			3		**3**	**8.34**
Stenelmis sp.	**5.1**	**SC**	**CL**	1	47		21	**69**	**191.82**
Limnichidae									
Lutrochus luteus									
Psephenidae		**SC**							
Ectopria sp.	***4**	**SC**	**CL**						
Psephenus herricki	**2.4**	**SC**	**CL**	3	28	5	31	**67**	**186.26**
Diptera									
Chironomidae				3	27		2	**32**	**88.96**
Ablabesmyia rhamphe gp.	**7.2**	**P**							
Brillia flavifrons	**5.2**	**SH**			3			**3**	**8.34**
Cardiocladius obscurus	**5.87**	**P**			17	4	2	**23**	**63.94**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Pitman Creek 3WOL10026					
				1	2	3	4	Total	No./m^2
Conchapelopia sp.	**8.4**	**P**							
Corynoneura sp.	**6**	**CG**			17			**17**	**47.26**
Cricotopus bicinctus	**8.5**	**CG**	**CL**	1	27		1	**29**	**80.62**
Cricotopus sp.	***7**	**CG**	**CL**	25	43	13	11	**92**	**255.76**
Cricotopus trifascia	**2.8**	**CG**	**CL**						
Dicrotendipes sp.	**8.1**	**CG**			3			**3**	**8.34**
Eukiefferiella claripennis gp.	**5.6**	**CG**			7	2	1	**10**	**27.8**
Eukiefferiella devonica gp.	**2.6**	**CG**		4		1		**5**	**13.9**
Microtendipes pedellus gp.	**5.5**	**CG**	**CL**						
Parakiefferiella sp.	**5.4**	**CG**				1		**1**	**2.78**
Parametriocnemus sp.	***4**	**CG**		1			1	**2**	**5.56**
Polypedilum flavum	**4.9**	**SH**			13			**13**	**36.14**
Rheocricotopus robacki	**7.3**	**CG**							
Rheotanytarsus sp.	**5.9**	**FC**	**CL**		7			**7**	**19.46**
Stictochironomus devinctus		**CG**							
Synorthocladius semivirens	**4.36**	**CG**							
Tanytarsus sp.	**6.8**	**FC**							
Thienemanniella xena	**5.9**	**CG**		1	23	3	1	**28**	**77.84**
Tvetenia bavarica gp.	**3.7**	**CG**							
Tvetenia discoloripes gp.	**3.6**	**CG**							
Zavrelia sp.	**5.3**	**CG**							
Empididae	**7.6**	**P**							
Hemerodromia sp.	***6**	**P**		1		1		**2**	**5.56**
Simuliidae		**FC**	**CL**						
Simulium sp.	**6**	**FC**	**CL**	2	23	9		**34**	**94.52**
Tipulidae		**SH**							
Antocha sp.	**4.3**	**CG**	**CL**		3			**3**	**8.34**
Dicranota sp.	**0**	**P**							
Hexatoma sp.	**4.3**	**P**							
Tipula sp.	**7.3**	**SH**					1	**1**	**2.78**
TOTAL NO. OF ORGANISMS				**88**	**740**	**151**	**178**	**1157**	**3216.46**
TOTAL NO. OF TAXA				**21**	**34**	**24**	**25**	**49**	**49**
EPT TAXA									19
% EPT									48.75%
m % ept									35.26%
%EPHEMEROPTERA									6.14%
%oc									22.97%
% Dominant									17.98%
% clingers									77.87%

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Beaver Creek 3WOL10040					
				1	2	3	4	Total	No./m^2
PLATYHELMINTHES									
Turbellaria									
Tricladida									
Planariidae									
Cura foremanii	**5**								
NEMATODA	**6**				1			**1**	**2.78**
MOLLUSCA									
Bivalvia									
Veneroida									
Corbiculidae									
Corbicula fluminea	**6.1**	**FC**				2		**2**	**5.56**
Sphaeriidae	***8**	**FC**							
Pisidium sp.	**6.5**	**FC**				1		**1**	**2.78**
Gastropoda									
Mesogastropoda									
Pleuroceridae									
Elimia sp.	**2.5**	**SC**		23		40	103	**166**	**461.48**
ANNELIDA									
Oligochaeta	***10**	**CG**							
Tubificida									
Lumbricidae		**CG**							
Naididae	***8**	**CG**		1		1		**2**	**5.56**
Tubificidae w.o.h.c.	**7.1**	**CG**		4	9	7		**20**	**55.6**
ARTHROPODA									
Crustacea									
Isopoda									
Asellidae		**SH**							
Caecidotea sp.	**9.1**	**CG**		3	2	1		**6**	**16.68**
Amphipoda									
Crangonyctidae									
Crangonyx sp.	**7.9**	**CG**		60	23	2		**85**	**236.3**
Decapoda									
Cambaridae	**7.5**					2		**2**	**5.56**
Cambarus bartonii	**4.6**								
Orconectes sp.	**2.6**	**SH**							
Orconectes palcidus	**2.6**	**SH**		1				**1**	**2.78**
Insecta									
Ephemeroptera									
Baetidae		**CG**							
Acentrella ampla	**3.6**	**CG**		20	7	2		**29**	**80.62**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Beaver Creek 3WOL10040					
				1	2	3	4	Total	No./m^2
Baetis c.f. flavistriga	**7**	**CG**		25	42	9	32	**108**	**300.24**
Baetis intercalaris	**7**	**CG**		4		5		**9**	**25.02**
Baetis tricaudatus	**1.6**	**CG**		45				**45**	**125.1**
Baetis sp.	***4**	**CG**				6		**6**	**16.68**
Caenidae		**CG**							
Caenis sp.	**7.4**	**CG**				6		**6**	**16.68**
Ephemeridae		**CG**							
Ephemera sp.	**2**	**CG**				3		**3**	**8.34**
Ephemerellidae		**SC**				2		**2**	**5.56**
Ephemerella sp.	**2**	**SC**	**CL**						
Heptageniidae		**SC**	**CL**						
Leucrocuta sp.	**2.4**	**SC**							
Stenacron interpunctatum	**6.9**	**SC**	**CL**				1	**1**	**2.78**
Stenonema sp.	***4**	**SC**	**CL**	25		82		**107**	**297.46**
Stenonema mediopunctatum	**3.8**	**SC**	**CL**	1				**1**	**2.78**
Stenonema modestum	**5.5**	**SC**	**CL**	19				**19**	**52.82**
Stenonema terminatum	**4.1**	**SC**	**CL**	24	21	15		**60**	**166.8**
Stenonema vicarium	**1.3**	**SC**	**CL**						
Isonychiidae		**FC**							
Isonychia sp.	**3.5**	**FC**		3	2	11		**16**	**44.48**
Leptophlebiidae		**CG**							
Paraleptophlebia sp.	**0.9**	**CG**							
Odonata									
Coenagrionidae		**P**							
Argia sp.	**8.2**	**P**	**CL**						
Gomphidae	***1**	**P**							
Plecoptera									
Capnidae		**SH**							
Perlidae		**P**	**CL**						
Acroneuria sp.	***1**	**P**	**CL**						
Acroneuria abnormis	**2.1**	**P**	**CL**						
Taeniopterygidae		**SH**							
Taeniopteryx sp.	**5.4**	**SH**							
Megaloptera									
Corydalidae		**P**							
Corydalus cornutus	**5.2**	**P**	**CL**	1				**1**	**2.78**
Nigronia serricornis	**5**	**P**	**CL**						
Trichoptera									
Glossosomatidae		**SC**	**CL**						
Glossosoma sp.	**1.6**	**SC**	**CL**						
Helicopsychidae		**SC**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Beaver Creek 3WOL10040					
				1	2	3	4	Total	No./m^2
Helicopsyche borealis	**0**	**SC**	**CL**	2		1	1	**4**	**11.12**
Hydropsychidae		**FC**	**CL**						
Ceratopsyche sp.	***4**	**FC**	**CL**	38	3	1	5	**47**	**130.66**
Ceratopsyche morosa	**2.6**	**FC**	**CL**						
Ceratopsyche sparna	**2.7**	**FC**	**CL**						
Cheumatopsyche sp.	**6.2**	**FC**	**CL**	202	67	10		**279**	**775.62**
Diplectrona modesta	**2.2**	**FC**	**CL**						
Hydropsyche betteni gp.	**7.8**	**FC**	**CL**	6	5		2	**13**	**36.14**
Hydropsyche sp.	***5**	**FC**	**CL**	1	1			**2**	**5.56**
Philopotamidae		**FC**	**CL**						
Chimarra aterrima	**2.8**	**FC**	**CL**						
Chimarra obscurus	**2.8**	**FC**	**CL**						
Chimarra sp.	**2.8**	**FC**	**CL**						
Chimarra socia	**2.8**		**CL**						
Dolophilodes sp.	**0.8**	**FC**	**CL**						
Polycentropodidae		**FC**	**CL**						
Polycentropus sp.	**3.5**	**FC**	**CL**			1		**1**	**2.78**
Rhyacophilidae		**P**	**CL**						
Rhyacophila sp.	***1**	**P**	**CL**						
Rhyacophila fuscula	**1.9**	**P**	**CL**	1				**1**	**2.78**
Lepidoptera									
Pyralidae		**SH**							
Petrophila sp.	**2.1**	**SC**							
Coleoptera									
Elmidae		**CG**							
Microcylloepus pusillus	**2.1**	**SC**	**CL**						
Oulimnius latiusculus	**1.8**	**CG**	**CL**			1		**1**	**2.78**
Optioservus ovalis	**2.4**	**SC**	**CL**						
Optioservus sp.	**2.4**	**SC**	**CL**	5	3	3		**11**	**30.58**
Optioservus trivittatus	**2.4**	**SC**	**CL**						
Stenelmis sp.	**5.1**	**SC**	**CL**	1	1	17		**19**	**52.82**
Limnichidae									
Lutrochus luteus									
Psephenidae		**SC**							
Ectopria sp.	***4**	**SC**	**CL**			2		**2**	**5.56**
Psephenus herricki	**2.4**	**SC**	**CL**	13	6	21	1	**41**	**113.98**
Diptera									
Chironomidae				5	14	6	2	**27**	**75.06**
Ablabesmyia rhamphe gp.	**7.2**	**P**				2		**2**	**5.56**
Brillia flavifrons	**5.2**	**SH**							
Cardiocladius obscurus	**5.87**	**P**		2	4	1		**7**	**19.46**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Beaver Creek 3WOL10040					
				1	2	3	4	Total	No./m^2
Conchapelopia sp.	**8.4**	**P**							
Corynoneura sp.	**6**	**CG**							
Cricotopus bicinctus	**8.5**	**CG**	**CL**	1	5	8	7	**21**	**58.38**
Cricotopus sp.	***7**	**CG**	**CL**	9	52	46	24	**131**	**364.18**
Cricotopus trifascia	**2.8**	**CG**	**CL**	6	18		21	**45**	**125.1**
Dicrotendipes sp.	**8.1**	**CG**							
Eukiefferiella claripennis gp.	**5.6**	**CG**			1			**1**	**2.78**
Eukiefferiella devonica gp.	**2.6**	**CG**							
Microtendipes pedellus gp.	**5.5**	**CG**	**CL**	1	1	3		**5**	**13.9**
Parakiefferiella sp.	**5.4**	**CG**							
Parametriocnemus sp.	***4**	**CG**							
Polypedilum flavum	**4.9**	**SH**			7			**7**	**19.46**
Rheocricotopus robacki	**7.3**	**CG**							
Rheotanytarsus sp.	**5.9**	**FC**	**CL**			3		**3**	**8.34**
Stictochironomus devinctus		**CG**			1	1		**2**	**5.56**
Synorthocladius semivirens	**4.36**	**CG**			1	1		**2**	**5.56**
Tanytarsus sp.	**6.8**	**FC**		3	1	1		**5**	**13.9**
Thienemanniella xena	**5.9**	**CG**		2				**2**	**5.56**
Tvetenia bavarica gp.	**3.7**	**CG**							
Tvetenia discoloripes gp.	**3.6**	**CG**			1			**1**	**2.78**
Zavrelia sp.	**5.3**	**CG**			1	8		**9**	**25.02**
Empididae	**7.6**	**P**							
Hemerodromia sp.	***6**	**P**							
Simuliidae		**FC**	**CL**						
Simulium sp.	**6**	**FC**	**CL**	7	6			**13**	**36.14**
Tipulidae		**SH**							
Antocha sp.	**4.3**	**CG**	**CL**	1			2	**3**	**8.34**
Dicranota sp.	**0**	**P**							
Hexatoma sp.	**4.3**	**P**							
Tipula sp.	**7.3**	**SH**							
TOTAL NO. OF ORGANISMS				**565**	**306**	**334**	**201**	**1406**	**3908.68**
TOTAL NO. OF TAXA				**35**	**29**	**38**	**12**	**55**	**55**
EPT TAXA									21
% EPT									54.11%
m % ept									34.14%
%EPHEMEROPTERA									29.30%
%oc									19.77%
% Dominant									19.84%
% clingers									59.10%

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Little South Fork 3WOL10035					
				1	2	3	4	Total	No./m^2
PLATYHELMINTHES									
Turbellaria									
Tricladida									
Planariidae									
Cura foremanii	**5**								
NEMATODA	**6**								
MOLLUSCA									
Bivalvia									
Veneroida									
Corbiculidae									
Corbicula fluminea	**6.1**	**FC**		2				**2**	**5.56**
Sphaeriidae	***8**	**FC**							
Pisidium sp.	**6.5**	**FC**							
Gastropoda									
Mesogastropoda									
Pleuroceridae									
Elimia sp.	**2.5**	**SC**		1	9	11	13	**34**	**94.52**
ANNELIDA									
Oligochaeta	***10**	**CG**							
Tubificida									
Lumbricidae		**CG**		1	1	2		**4**	**11.12**
Naididae	***8**	**CG**							
Tubificidae w.o.h.c.	**7.1**	**CG**							
ARTHROPODA									
Crustacea									
Isopoda									
Asellidae		**SH**							
Caecidotea sp.	**9.1**	**CG**							
Amphipoda									
Crangonyctidae									
Crangonyx sp.	**7.9**	**CG**		1				**1**	**2.78**
Decapoda									
Cambaridae	**7.5**						1	**1**	**2.78**
Cambarus bartonii	**4.6**								
Orconectes sp.	**2.6**	**SH**							
Orconectes palcidus	**2.6**	**SH**							
Insecta									
Ephemeroptera									
Baetidae		**CG**							
Acentrella ampla	**3.6**	**CG**		2				**2**	**5.56**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Little South Fork 3WOL10035					
				1	2	3	4	Total	No./m^2
Baetis c.f. flavistriga	**7**	**CG**			4		2	**6**	**16.68**
Baetis intercalaris	**7**	**CG**		2	1			**3**	**8.34**
Baetis tricaudatus	**1.6**	**CG**							
Baetis sp.	***4**	**CG**		1		5	5	**11**	**30.58**
Caenidae		**CG**							
Caenis sp.	**7.4**	**CG**		1	1	5		**7**	**19.46**
Ephemeridae		**CG**							
Ephemera sp.	**2**	**CG**							
Ephemerellidae		**SC**							
Ephemerella sp.	**2**	**SC**	**CL**						
Heptageniidae		**SC**	**CL**						
Leucrocuta sp.	**2.4**	**SC**							
Stenacron interpunctatum	**6.9**	**SC**	**CL**						
Stenonema sp.	***4**	**SC**	**CL**	74	16	18	25	**133**	**369.74**
Stenonema mediopunctatum	**3.8**	**SC**	**CL**						
Stenonema modestum	**5.5**	**SC**	**CL**		3	1	5	**9**	**25.02**
Stenonema terminatum	**4.1**	**SC**	**CL**						
Stenonema vicarium	**1.3**	**SC**	**CL**						
Isonychiidae		**FC**							
Isonychia sp.	**3.5**	**FC**		73	19	23	36	**151**	**419.78**
Leptophlebiidae		**CG**							
Paraleptophlebia sp.	**0.9**	**CG**							
Odonata									
Coenagrionidae		**P**					1	**1**	**2.78**
Argia sp.	**8.2**	**P**	**CL**			1		**1**	**2.78**
Gomphidae	***1**	**P**							
Plecoptera									
Capnidae		**SH**							
Perlidae		**P**	**CL**						
Acroneuria sp.	***1**	**P**	**CL**						
Acroneuria abnormis	**2.1**	**P**	**CL**				1	**1**	**2.78**
Taeniopterygidae		**SH**							
Taeniopteryx sp.	**5.4**	**SH**		5	13	3	3	**24**	**66.72**
Megaloptera									
Corydalidae		**P**							
Corydalus cornutus	**5.2**	**P**	**CL**	4	2		1	**7**	**19.46**
Nigronia serricornis	**5**	**P**	**CL**		1			**1**	**2.78**
Trichoptera									
Glossosomatidae		**SC**	**CL**						
Glossosoma sp.	**1.6**	**SC**	**CL**						
Helicopsychidae		**SC**							

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Little South Fork 3WOL10035					
				1	2	3	4	Total	No./m^2
Helicopsyche borealis	**0**	**SC**	**CL**						
Hydropsychidae		**FC**	**CL**	19				**19**	**52.82**
Ceratopsyche sp.	***4**	**FC**	**CL**	7			8	**15**	**41.7**
Ceratopsyche morosa	**2.6**	**FC**	**CL**						
Ceratopsyche sparna	**2.7**	**FC**	**CL**						
Cheumatopsyche sp.	**6.2**	**FC**	**CL**	22	12	14	41	**89**	**247.42**
Diplectrona modesta	**2.2**	**FC**	**CL**						
Hydropsyche betteni gp.	**7.8**	**FC**	**CL**						
Hydropsyche sp.	***5**	**FC**	**CL**	11			4	**15**	**41.7**
Philopotamidae		**FC**	**CL**						
Chimarra aterrima	**2.8**	**FC**	**CL**	3				**3**	**8.34**
Chimarra obscurus	**2.8**	**FC**	**CL**	26	4		1	**31**	**86.18**
Chimarra sp.	**2.8**	**FC**	**CL**	3				**3**	**8.34**
Chimarra socia	**2.8**		**CL**	1				**1**	**2.78**
Dolophilodes sp.	**0.8**	**FC**	**CL**						
Polycentropodidae		**FC**	**CL**						
Polycentropus sp.	**3.5**	**FC**	**CL**						
Rhyacophilidae		**P**	**CL**						
Rhyacophila sp.	***1**	**P**	**CL**						
Rhyacophila fuscula	**1.9**	**P**	**CL**						
Lepidoptera									
Pyralidae		**SH**							
Petrophila sp.	**2.1**	**SC**		1		2	1	**4**	**11.12**
Coleoptera									
Elmidae		**CG**							
Microcylloepus pusillus	**2.1**	**SC**	**CL**	3			1	**4**	**11.12**
Oulimnius latiusculus	**1.8**	**CG**	**CL**						
Optioservus ovalis	**2.4**	**SC**	**CL**						
Optioservus sp.	**2.4**	**SC**	**CL**						
Optioservus trivittatus	**2.4**	**SC**	**CL**						
Stenelmis sp.	**5.1**	**SC**	**CL**	1		2		**3**	**8.34**
Limnichidae									
Lutrochus luteus							2	**2**	**5.56**
Psephenidae		**SC**							
Ectopria sp.	***4**	**SC**	**CL**						
Psephenus herricki	**2.4**	**SC**	**CL**			1		**1**	**2.78**
Diptera									
Chironomidae				3	3		1	**7**	**19.46**
Ablabesmyia rhamphe gp.	**7.2**	**P**							
Brillia flavifrons	**5.2**	**SH**							
Cardiocladius obscurus	**5.87**	**P**		3			1	**4**	**11.12**

Table 1A. Benthic Macroinvertebrates, Wolf Creek Project Drainage, Fall 2003.

SPECIES	T.V.	F.F.G	CL	Little South Fork 3WOL10035					
				1	2	3	4	Total	No./m^2
Conchapelopia sp.	**8.4**	**P**							
Corynoneura sp.	**6**	**CG**							
Cricotopus bicinctus	**8.5**	**CG**	**CL**			4	1	**5**	**13.9**
Cricotopus sp.	***7**	**CG**	**CL**	1	6	12	3	**22**	**61.16**
Cricotopus trifascia	**2.8**	**CG**	**CL**			2		**2**	**5.56**
Dicrotendipes sp.	**8.1**	**CG**							
Eukiefferiella claripennis gp.	**5.6**	**CG**		1				**1**	**2.78**
Eukiefferiella devonica gp.	**2.6**	**CG**							
Microtendipes pedellus gp.	**5.5**	**CG**	**CL**						
Parakiefferiella sp.	**5.4**	**CG**							
Parametriocnemus sp.	***4**	**CG**							
Polypedilum flavum	**4.9**	**SH**							
Rheocricotopus robacki	**7.3**	**CG**			5			**5**	**13.9**
Rheotanytarsus sp.	**5.9**	**FC**	**CL**	2	3	1	1	**7**	**19.46**
Stictochironomus devinctus		**CG**							
Synorthocladius semivirens	**4.36**	**CG**				3		**3**	**8.34**
Tanytarsus sp.	**6.8**	**FC**							
Thienemanniella xena	**5.9**	**CG**							
Tvetenia bavarica gp.	**3.7**	**CG**							
Tvetenia discoloripes gp.	**3.6**	**CG**		13	5	5	19	**42**	**116.76**
Zavrelia sp.	**5.3**	**CG**		1				**1**	**2.78**
Empididae	**7.6**	**P**							
Hemerodromia sp.	***6**	**P**							
Simuliidae		**FC**	**CL**						
Simulium sp.	**6**	**FC**	**CL**	12	7	1	1	**21**	**58.38**
Tipulidae		**SH**							
Antocha sp.	**4.3**	**CG**	**CL**						
Dicranota sp.	**0**	**P**							
Hexatoma sp.	**4.3**	**P**							
Tipula sp.	**7.3**	**SH**							
TOTAL NO. OF ORGANISMS				**300**	**115**	**116**	**178**	**709**	**1971.02**
TOTAL NO. OF TAXA				**31**	**19**	**20**	**25**	**44**	**44**
EPT TAXA									18
% EPT									70.24%
m % ept									61.21%
%EPHEMEROPTERA									45.42%
%oc									14.17%
% Dominant									21.30%
% clingers									55.43%