FINAL REPORT
BENTHIC MACROINVERTEBRATE SURVEY
OLD HICKORY PROJECT
OCTOBER 1997

FOR
US ARMY CORPS OF ENGINEERS
NASHVILLE DISTRICT

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EXECUTIVE SUMMARY

On September 8 and 9, and October 15, 1997, personnel from the Nashville District, Corps of Engineers Water Management Section (Hydrology and Hydraulics Branch, Engineering-Planning Division) collected water quality and benthic macroinvertebrate samples from six locations (Drakes Creek Miles 1.9 and 4.9, Bledsoe Creek Mile 10.3, Barton's Creek Mile 7.1 and Cumberland River Miles 216.9 and 245.0) in the Old Hickory Project area.

Benthic macroinvertebrate community structure at each location and comparison of the sites were assessed using: taxa richness, Shannon's Index of Diversity, evenness, percent contribution of dominant taxa, EPT taxa, scraper and filtering collectors ratio, EPT to Chironomidae abundance ratio, Hilsenhoff's Biotic Index, 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 87 species of benthic macroinvertebrates was taken from the six sites within the Old Hickory Project area. Fifty-five species were taken from Barton's Creek Mile 7.1, 51 from Drake's Creek Mile 4.9, 46 at Barton's Creek Mile 10.3, 21 from Cumberland River Mile 245.0, 17 from Cumberland River Mile 216.9 and 15 from Drake's Creek Mile 1.9. In terms of density, Bledsoe Creek Mile 10.3 had the most with 6906 individuals/m^2, followed by Barton's Creek Mile 7.1 (6199/m^2), Drake's Creek Mile 4.9 (3201/m^2), Drake's Creek Mile 1.9 (21912/m^2), CRM 216.9 (1389/m^2) and the least at CRM 245.0 with 1301/m^2.

The three inflow (wadable) sites (Barton's Creek Mile 7.1, Drake's Creek Mile 4.9 and Bledsoe Creek Mile 10.3) were fairly species rich with high density and diverse with an abundance of sensitive species. The three inflow locations supported benthic communities representative of "Good" to "Very Good" water quality conditions. Conversely, the three main-stem/embayment sites (Cumberland River Miles 216.9 and 245.0 and Drake's Creek Mile 1.9) supported fewer species and benthic communities dominated by tubificid worms and other species tolerant to degraded conditions. The benthic communities at the three main

stem/embayment locations are indicative of “Fairly Poor” to “Very Poor” water quality conditions with significant to severe organic pollution.

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INTRODUCTION

On September 8 and 9 and October 15, 1997, personnel from the Nashville District, Corps of Engineers Water Management Section (Hydrology and Hydraulics Branch, Engineering-Planning Division) collected water quality and benthic macroinvertebrate samples from six locations in the Old Hickory Reservoir Project area. 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 1997, biological data collections included extensive quantitative sampling for benthic macroinvertebrates at eight of the ten Cumberland River Basin projects.

SAMPLING LOCATIONS

Sampling locations in the Old Hickory Project area in the Cumberland River Basin are shown in Figure 1. The following is a brief description of the six benthic macroinvertebrate sampling sites.

3OLD10050-Drake's Creek Mile 4.9, Latitude $36^0$19'00", Longitude $86^0$23'10", inflow location.

3OLD10054-Bledsoe Creek Mile 10.3, Latitude $36^0$26'45", Longitude $86^0$19'57", inflow location.

3OLD10056-Barton's Creek Mile 7.1, Latitude $36^0$15'12", Longitude $86^0$19'54", inflow location

3OLD20002-Cumberland River Mile 216.9, Latitude $36^0$17'26", Longitude $86^0$39'48", main channel location.

3OLD20006-Cumberland River Mile 245.0, Latitude $36^0$19'46", longitude $86^0$23'52", main channel location

3OLD20013-Drake's Creek Mile 1.9, Latitude $36^0$16'16", Longitude $86^0$36'04", embayment location.

BACKGROUND

As found in other 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 etal. 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 stations Drakes Creek Mile 4.9, Bledsoe Creek Mile 10.3 and Barton's Creek Mile 7.1, five replicate quantitative samples were taken with 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) 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 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 times ranged from a maximum of eight months to a minimum of four months. No deterioration of sample quality was observed during this holding time.

At stations Cumberland River Miles 216.9 and 245.0 and Drake's Creek Mile 1.9, samples were collected by use of a standard 9" x 9" Ponar grab (0.5625 ft^2 or 0.0522m^2) lowered from a boat. Reservoir sites were sampled on a transect at multiple locations. Sampling sites on the transect represented the old main channel (thalweg), right overbank, and left overbank, although at some sites the right or left overbank was lacking (i.e., old main channel located immediately adjacent the shore). Typically the sampling process involved anchoring and then lowering the Ponar to the bottom, taking care to allow the Ponar to gently contact the bottom. This was done to minimize "blow out" of the topmost sediments and associated organisms. The Ponar was then retrieved and the contents brought to the surface, dumped into a plastic tub, and processed through a sieve bucket with a 583-micron stainless steel mesh screen. Retained debris and organisms were then placed in a container. The normal procedure used was to collect three grab samples at each site, which were then composited into one sample for laboratory analysis. The samples were preserved with formalin, labeled with a unique number, and recorded on a chain of custody form. Brief field notes were made. All samples were returned to the Nashville

District's Water Management Support Center for storage prior to delivery to the analytical laboratory. Storage times for samples taken at reservoir sites were approximately four months.

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 glycerine 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.

SUBSTRATE DETERMINATION

A classification of substrate based on the size scale proposed by Wentworth (Compton 1962) was used to make field observations of the substrate present at each station. This classification of detrital sediments is by grain diameter and is as follows:

Diameters	Approximate Inch Equivalents	Name of Loose Aggregate
>256 mm	>10 inch	Boulder
64 to 256 mm	2.5 to 10 inch	Cobble
2 to 64 mm	0.08 to 2.5 inch	Gravel
1/16 to 2 mm	0.002 to 0.08 inch	Sand
1/256 to 1/16 mm	0.00015 to 0.002 inch	Silt
<1/256 mm	<0.00015 inch	Clay

Substrate types encountered at the five sites vary somewhat. In general substrate types at the inflow (wadeable stream) sites consisted of cobble and gravel. Reservoir sites consisted of sand, silt, and clay with varying amounts of plant detritus.

COMMUNITY STRUCTURE MEASURES

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, Community Loss Index, and Percent Similarity.

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

$$\text{Community Loss Index} = \frac{S_1 - C}{S_2}$$

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

C = Species common to both communities

The Community Loss Index is an index of dissimilarity with values increasing as the degree of dissimilarity from the reference station (S_1) increases (Plafkin et al. 1989). Values range from 0 to infinity. Community Loss was not calculated because no station was designated as a reference site.

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).

The percent contribution of the numerically dominant taxon to the total number of organisms in the community is a rough measure of community balance at the lowest possible taxonomic level (Plafkin et al. 1989). A community, which is dominated by a few species, may be under environmental stress.

The total number of species within the pollution sensitive groups Ephemeroptera, Plecoptera, and Trichoptera is generally considered a measure of water quality and is listed as the EPT Index (Plafkin et al. 1989). The EPT Index generally increases with increasing water quality.

According to Plafkin et al. (1989) the scraper and filtering collector ratio (Sc/FC) reflects the riffle/run community food base and may provide insights into the nature of potential disturbance factors. The ratio of scraper abundance to the combined totals of scrapers and filtering collectors (scrapers / scrapers and filtering collectors) is an adjustment of the scrapers / filtering collectors from a ratio to a measure of percent contribution (Barbour et al. 1992).

The ratio of shredder functional feeding group and total number of individuals (Sh/Total) in the CPOM sample, allows evaluation of potential impairment as indicated by the shredder community. Shredders are considered sensitive to riparian zone impacts and are believed to be good indicators of toxic effects when toxicants are absorbed by or associated with the course particulate organic matter (CPOM) (Plafkin et al 1989). This metric was not included in this study because no CPOM samples were obtained at each station.

The EPT and Chironomidae abundance ratio (EPT/Chironomidae) is the relative abundance of the pollution sensitive groups Ephemeroptera, Plecoptera, and Trichoptera to the more tolerant Chironomidae as a measure of community balance (Plafkin et al. 1989). It is believed that good biotic condition is reflected in benthic communities with an even distribution of species among all four major groups and with substantial representation of Ephemeroptera, Plecoptera, and Trichoptera. Populations with a disproportional number of Chironomidae relative to the sensitive groups is most likely an indication of environmental stress (Plafkin et al. 1989).

A scoring approach developed by Plafkin et al. (1989) to estimate community health utilizes many of the community measures previously discussed. This rapid bioassessment is presented in flow chart format in Figure 2.

Metric	Biological Condition Scoring Criteria			
	6	4	2	0
1. Taxa Richness[a]	>80%	60-80%	40-60%	<40%
2. Hilsenhoff Biotic Index (modified)[b]	>85%	70-85%	50-70%	<50%
3. Ratio of Scrapers/Filt. Collectors[a,c]	>50%	35-50%	20-35%	<20%
4. Ratio of EPT and Chironomid Abundance[a]	>75%	50-75%	25-50%	<25%
5. % Contribution of Dominant Taxon[d]	<20%	20-30%	30-40%	>40%
6. EPT Index[a]	>90%	80-90%	70-80%	<70%
7. Community Loss Index[e]	<0.5	0.5-1.5	1.5-4.0	>4.0
8. Ratio of Shredders/Total[a,c]	>50%	35-50%	20-35%	<20%

[a] Score is a ratio of study site to reference site X 100.

[b] Score is a ratio of reference site to study site X 100.

[c] Determination of Functional Feeding Group is independent of taxonomic grouping.

[d] Scoring criteria evaluate actual percent contribution, not percent comparability to the reference station.

[e] Range of values obtained. A comparison to the reference station is incorporated in these indices.

BIOASSESSMENT		
% Comp. to Ref. Score[a]	Biological Condition Category	Attributes
>83%	**Nonimpaired**	Comparable to the best situation to be expected within an ecoregion. Balanced trophic structure. Optimum community structure (composition and dominance) for stream size and habitat quality.
54-79%	Slightly impaired	Community structure less than expected. Composition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.
21-50%	Moderately impaired	Fewer species due to loss of most intolerant forms. Reduction in EPT index.
<17%	Severely impaired	Few species present. If high densities of organisms, then dominated by one or two taxa.

[a] Percentage values obtained that are intermediate to the above ranges will require subjective judgement as to the correct placement. Use of the habitat assessment and physiochemical data may be necessary to aid in the decision process.

Figure 2. Biological Condition Scoring Criteria (Plafkin et al. 1989)

BIOTIC INDEX

Both the evenness and diversity indices are based on information of community structure and do not reflect any knowledge of the physiological attributes or ecological affinities of the organisms comprising the community (Howmiller and Scott 1977). Howmiller and Scott (1977) suggest the use of a trophic index for assessing ecological stress using Oligochaete species. After a two-year study of 53 Wisconsin streams, Hilsenhoff (1982) proposed using a biotic index of arthropod populations as a rapid method for evaluating water quality. Hilsenhoff (1987) expanded and improved his biotic index and this index, which is a measure of organic and nutrient pollution, was used in this study.

To calculate the biotic index, species are assigned pollution tolerance values of 0 to 10. A value of 0 is assigned to species found only in unaltered streams of very high water quality, and a value of 10 is assigned to species known to occur in severely polluted or disturbed streams. Intermediate values are assigned to species that occur in streams with intermediate degrees of pollution or disturbance. Where species cannot be identified, genera are assigned values instead. The biotic index is calculated from the formula:

$$BI = \sum \frac{n_i a_i}{N}$$

where n_i is the number of individuals of each species, a_i is the tolerance value assigned to that species and N is the total number of individuals in the sample (Hilsenhoff 1982). The index is an average of tolerance values, and measures saprobity (pertaining to tolerance of organic enrichment) and to some extent trophism.

According to Hilsenhoff (1987) the calculated Biotic Index values 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

In response to previous requests of the Tennessee Department of Environment and Conservation, Division of Water Pollution Control, Biotic Index values are calculated using tolerance values provided in North Carolina Department of Environment, Health and Natural Resources, Division of Environmental Management Water Quality Section, Standard Operating Procedures Biological Monitoring, Environmental Sciences Branch Ecosystems Analysis Unit, Biological Assessment Group, January, 1997 (North Carolina, Department of Environment, Health and Natural Resources 1997).

Since North Carolina provides water quality classifications for Biotic Index values based on three geographic regions (mountains, piedmont and coastal) it is probably more appropriate to use scoring criteria for the piedmont region. North Carolina's scoring criteria for water quality assessment for the piedmont region are as follows:

NC Biotic Index (Piedmont)	Water Quality
< 5.19	Excellent
5.19 - 5.78	Good
5.79 - 6.48	Good - Fair
6.49 - 7.48	Fair
> 7.48	Poor

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 five 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. A statistical analysis of sampling efficiency and a comparison of the stations using mean number of organisms per Hess Sampler is presented in Table 3. A similar comparison using mean number of species per Hess Sampler is found in Table 4. A comparison of the stations using Percent Dissimilarity is found in Figures 3 and 5 while similar comparisons using 1-Jaccard's Coefficient is clustered in Figures 4 and 6.

A minimum of 87 species of benthic macroinvertebrates was taken from the six locations in the Old Hickory Project area (Table 1, Appendix). The fauna represented five phyla, 22 orders and 45 families with 29 families being aquatic insects. As expected, the inflow or wadable location had the highest numbers of species while main channel and embayment sites had the least. Barton's Creek Mile 7.1 had the most with 55 species followed by Drake's Creek Mile 4.9 (51), Bledsoe Creek Mile 10.3 (46), Cumberland River Mile (CRM) 245.0 (21), CRM 216.9 (17), and Drake's Creek Mile 1.9 (15). In terms of density, the inflow locations were the most productive with Bledsoe Creek Mile 10.3 having the highest densities at 6906 individuals/m^2, Barton's Creek Mile 7.1 with 6199/m^2, and Drake's Creek Mile 4.9 with 3201/m^2. The embayment location, Drake's Creek Mile 1.9 had population densities of 2192/m^2 followed by Cumberland River Mile 216.9 with 1388.76/m^2 and the least at CRM 245.0 with 1301/m^2.

Barton's Creek Mile 7.1 (3OLD10056), had the highest number of species with 55 and the second highest population density estimate of 6199 individuals/m^2. This site had an abundance of the pleurocerid snail *Elimia sp.* (46.0%), with the riffle beetle *Stenelmis sp*. (17.1%) and the Asiatic clam *Corbicula flumine*a (9.2%) also a common species in the benthic community. There were 13 EPT species present and the Biotic Index value for this location is considered representative of "Very Good" water quality conditions with possibly slight organic pollution.

Drake's Creek Mile 4.9 (3OLD10050), an inflow location in the lower reservoir, also supported a fairly species rich (51) and diverse benthic macroinvertebrate fauna. However, the population densities for this location (3201/m2) were the lowest of the inflow locations. The mayfly *Stenonema sp.* (27.2%) and the riffle beetle *Stenelmis sp*. (22.1%) were the most common species present at this location. This site also produced 16 EPT species that are considered sensitive to environmental degradation. The Biotic Index value at Drake's Creek Mile 4.9 is representative of a benthic fauna existing under "Good" water quality with some organic pollution

Bledsoe Creek Mile 10.3 (3OLD1054), an inflow site draining mostly undeveloped rural land, had a minimum of 46 benthic macroinvertebrate species present in the Hess samples (Table 1, Appendix). Population densities were highest at this site with estimates of 6906/m^2. No species was dominant at this location as evident by the high diversity (4.05 Shannon Diversity). The riffle beetle, *Stenelmis sp.* (15.8%) and the mayflies *Baetis intercalaris* (13.4%) and *Tricorythodes sp*. (13.4%) were the most common species in the fauna. This location also produced a high number of EPT species (16) and a Biotic Index value representative of "Good" water quality with some organic pollution.

The main stem location, Cumberland River Mile 245.0 (3OLD2006), the most upstream main channel location, had 21 benthic species present and overall population densities of 1301 individuals/m^2 (Table 1, Appendix). Tubificid worms were dominant at the mid-channel (81.7%) and left overbank (45.2%) locations while the caddisfly *Cyrnellus fraternus* (45.9%) and the midge *Eukiefferiella devonica gp*. (29.7%) were the dominant species at the right overbank. There were 3 EPT species taken and the fauna is considered to exist under "Fairly Poor" to "Very Poor" water quality conditions with significant to severely organic pollution.

Cumberland River Mile 216.9 (3OLD20002), just upstream of Old Hickory Lock and Dam, had 17 species of benthic macroinvertebrates present in the nine Ponar Grab samples (Table 1, Appendix). Tubificid worms (71.5%) were dominant throughout the site with the midge *Coelotanypus tricolor* (17.9%) also very common. There was one EPT species found in the Ponar Grab samples. The Biotic Index values for CRM 216.9 are indicative of "Very Poor" water quality conditions with severe organic pollution.

The embayment location near the mouth of Drake's Creek at Mile 1.9 (3OLD20013), had a low number of species present with 15. Population densities ranged from 1461 individuals/m2

at the left overbank location to 2890/m2 in the mid-channel (Table 1). Tubificid worms were abundant at all locations and dominant at the right overbank (74.1%) and left overbank (33.6%) and secondary in mid-channel (31.1%). The phantom midge *Chaoborus punctipennis* was dominant in mid-channel consisting of 54.8% of the individuals present. There were no EPT species found at this site and the Biotic Index values indicated "Poor" to "Very Poor" water quality conditions with very significant to severe organic pollution.

Statistical comparisons of the inflow, or wadable, sites sampled by Hess sampler were accomplished on the number of individuals and number of species per sample. The Ponar Grab samples were composited so no statistical analyses were attempted on these samples. Statistical comparisons using mean number of individuals (Table 3) and number of species (Table 4) found no significant differences among the three inflow sites.

A comparison of the six locations, with all data combined, using Percent Dissimilarity (Figure 3) and Jaccard's Coefficient (Figure 4) groups the locations as inflow (wadable) or main stem/embayment (non-wadable) sites which is a function of two distinct habitat types (high velocity riffle/run at the wadable sites as opposed to low velocities and soft sediments of the non-wadable locations). When each location within the main channel/embayment sites is treated independently (Figures 5 and 6) the sites still cluster primarily by site. The secondary clusters between locations of the main channel/embayment sites is a reflection of similarity of species and habitat type between the various locations.

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 216.9							
			30LD20002							
SPECIES	**T.V.****	**F.F.G.*****	**Left Overbank**		**Right Overbank**		**Main Channel**		**TOTAL**	
			Count	**Density**	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
PLATYHELMINTHES										
Turbellaria										
Tricladida										
Planariidae										
Cura foremanii	**4.97**									
Phagocata sp.										
NEMATODA										
MOLLUSCA										
Bivalvia										
Veneroida										
Corbicula fluminea	**6.12**	**FC**								
Sphaeriidae										
Pisidium sp.	**6.48**	**FC**								
Sphaerium sp.	**7.58**	**FC**					5	31.9	5	10.65
Gastropoda										
Mesogastropoda										
Pleuroceridae										
Elimia sp.	**2.46**	**SC**								
Elimia laqueata	**2.46**	**SC**								
ANNELIDA										
Oligochaeta										
Haplotaxida										
Lumbricidae		**CG**								
Tubificidae w.h.c.	**7.11**	**CG**	4	25.52	4	25.52	16	102.08	24	51.12
Branchiura sowerbyi	**8.58**	**CG**	4	25.52					4	8.52
Tubificidae w.o.h.c.	**7.11**	**CG**	47	299.86	54	344.52	204	1301.5	305	649.65
Limnodrilus cervix	**9.9**	**CG**			4	25.52			4	8.52
Limnodrilus hoffmeisteri	**9.47**	**CG**	23	146.74	12	76.56	94	599.72	129	274.77

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 216.9							
			30LD20002							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Branchiobdellida										
Hirudinea										
Rhynchobdellida										
Glossiphoniidae	***8**	**P**								
Arhynchobdellida										
Erpodbellidae	***8**	**P**					1	6.38	1	2.13
ARTHROPODA										
Arachnoidea										
Acariformes										
Sperchonidae										
Sperchon sp.	**5.53**									
Crustacea										
Copepoda										
Cyclopoida							6	38.28	6	12.78
Cladocera										
Daphnidae										
Daphnia lumholtzi										
Isopoda										
Asellidae										
Lirceus sp.	**7.85**	**CG**								
Amphipoda										
Crangonyctidae										
Crangonyx sp.	**7.87**	**CG**								
Decapoda										
Cambaridae										
Orconectes sp.	**2.6**	**SH**								
Orconectes putnami	**2.6**	**SH**								
Insecta										
Ephemeroptera										

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.

			Cumberland RM 216.9							
			30LD20002							
SPECIES	**T.V.****	**F.F.G.*****	**Left Overbank**		**Right Overbank**		**Main Channel**		**TOTAL**	
			Count	**Density**	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Baetidae										
Baetis sp.	***4**	**CG**								
Baetis intercalaris	**4.99**	**CG**								
Centroptilum sp.	**6.6**	**CG**								
Caenidae										
Caenis sp.	**7.41**	**CG**								
Ephemeridae										
Hexagenia munda	**4.9**	**CG**								
Heptageniidae										
Leucrocuta sp.	**2.4**	**SC**								
Stenacron interpunctatum	**6.87**	**SC**								
Stenonema sp.	***4**	**SC**								
Isonychiidae										
Isonychia sp.	**3.45**	**FC**								
Leptophlebiidae										
Choroterpes sp.	***2**	**CG**								
Potamanthidae										
Anthopotamus sp.	**1.53**	**CG**								
Tricorythidae										
Tricorythodes sp.	**5.06**	**CG**								
Odonata										
Coenagrionidae										
Argia sp.	**8.17**	**P**								
Plecoptera										
Leuctridae										
Leuctra sp.	**0.67**	**SH**								
Megaloptera										
Corydalidae										
Corydalus cornutus	**5.16**	**P**								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 216.9							
			30LD20002							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Nigronia serricornis	4.95	P								
Sialidae										
Sialis sp.	7.17	PI	1	6.38					1	2.13
Hemiptera										
Veliidae										
Rhagovelia obesa		P								
Trichoptera										
Helicopsychidae										
Helicopsyche borealis	0	SC								
Hydroptilidae										
Hydroptila sp.	6.22	PI								
Hydropsychidae										
Cheumatopsyche sp.	6.22	FC								
Hydropsyche betteni gp.	7.78	FC								
Hydropsyche sp.	*5	FC								
Leptoceridae										
Oecetis sp.	4.7	P								
Philopotamidae										
Chimarra sp.	2.76	FC								
Polycentropodidae										
Cyrnellus fraternus	7.34	FC								
Coleoptera										
Elmidae										
Optioservus sp.	2.36	SC								
Stenelmis sp.	5.1	SC								
Hydrophilidae	8.43	CG								
Berosus sp.	8.43	CG								
Psephenidae										
Ectopria sp.	4.16	SC								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 216.9							
			30LD20002							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Psephenus herricki	2.35	SC								
Staphylinidae										
Diptera										
Ceratopogonidae										
Bezzia/Palpomyia gp.	6.86	P			2	12.76			2	4.26
Chaoboridae										
Chaoborus punctipennis	8.5	P	2	12.76			3	19.14	5	10.65
Chironomidae							1	6.38	1	2.13
Ablabesmyia annulata	2.04	P					2	12.76	2	4.26
Ablabesmyia mallochi	7.19	P								
Axarus sp.	*6	CG			2	12.76			2	4.26
Cardiocladius obscurus	5.87	P								
Chironomus sp.	9.63	CG	19	121.22	12	76.56	11	70.18	42	89.46
Coelotanypus tricolor	8	P	58	370.04			59	376.42	117	249.21
Conchapelopia sp.	8.42	P								
Corynoneura sp.	6.01	CG								
Cricotopus sp.	*7	CG								
Cryptochironomus fulvus	6.38	P			2	12.76			2	4.26
Dicrotendipes sp.	8.1	CG								
Epicocladius sp.	0	CG								
Eukiefferiella devonica gp.	2.59	CG								
Glyptotendipes sp.	9.47	FC								
Nilotanypus sp.	3.9	P								
Polypedilum convictum	4.93	SH								
Polypedilum fallax	6.39	SH								
Polypedilum halterale	7.31	SH								
Polypedilum illinoense	9	SH								
Procladius bellus	9.1	P								
Psectrocladius sp.	3.59	SH								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 216.9							
			30LD20002							
SPECIES	**T.V.****	**F.F.G.*****	**Left Overbank**		**Right Overbank**		**Main Channel**		**TOTAL**	
			Count	**Density**	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Rheotanytarsus sp.	**5.89**	**FC**								
Stenochironomus sp.	**6.45**	**SH**								
Synorthocladius semivirens	**4.36**	**Cg**								
Tanytarsus sp.	**6.76**	**FC**								
Thienemanniella xena	**5.86**	**CG**								
Thienemannimyia gp.	**8.42**	**P**								
Zavrelia sp.	**5.3**	**CG**								
Empididae										
Hemerodromia sp.	**7.57**	**P**								
Simuliidae										
Simulium sp.	**4**	**FC**								
Tipulidae										
Hexatoma sp.	**4.31**	**P**								
Limnophila sp.	***4**	**P**								
CHORDATA****										
Osteichthyes										
Perciformes										
Percidae										
Etheostoma sp.										
Scorpaeniformes										
Cottidae										
Cottus carolinae										
Cyprinodontiformes										
Poeciliidae										
Gambusia sp.										
TOTAL NO. OF ORGANISMS			**158**		**92**		**402**		**652**	
TOTAL NO. OF SPECIES			**8**		**8**		**11**		**17**	
TOTAL DENSITY OF ORG./M^2				**1008**		**586.96**		**2564.8**		**1388.76**

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
PLATYHELMINTHES										
Turbellaria										
Tricladida										
Planariidae										
Cura foremanii	**4.97**									
Phagocata sp.										
NEMATODA							1	6.38	1	2.13
MOLLUSCA										
Bivalvia										
Veneroida										
Corbicula fluminea	**6.12**	**FC**								
Sphaeriidae										
Pisidium sp.	**6.48**	**FC**								
Sphaerium sp.	**7.58**	**FC**	52	331.76	12	76.56	29	185.02	93	198.09
Gastropoda										
Mesogastropoda										
Pleuroceridae										
Elimia sp.	**2.46**	**SC**								
Elimia laqueata	**2.46**	**SC**								
ANNELIDA										
Oligochaeta										
Haplotaxida										
Lumbricidae		**CG**								
Tubificidae w.h.c.	**7.11**	**CG**	4	25.52			35	223.3	39	83.07
Branchiura sowerbyi	**8.58**	**CG**	8	51.04			14	89.32	22	46.86
Tubificidae w.o.h.c.	**7.11**	**CG**	65	414.7	206	1314.28	92	586.96	363	773.19
Limnodrilus cervix	**9.9**	**CG**								
Limnodrilus hoffmeisteri	**9.47**	**CG**			51	325.38			51	108.63
Branchiobdellida										

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Hirudinea										
Rhynchobdellida										
Glossiphoniidae	***8**	**P**								
Arhynchobdellida										
Erpodbellidae	***8**	**P**								
ARTHROPODA										
Arachnoidea										
Acariformes										
Sperchonidae										
Sperchon sp.	**5.53**									
Crustacea										
Copepoda										
Cyclopoida							4	25.52	4	8.52
Cladocera										
Daphnidae										
Daphnia lumholtzi							9	57.42	9	19.17
Isopoda										
Asellidae										
Lirceus sp.	**7.85**	**CG**								
Amphipoda										
Crangonyctidae										
Crangonyx sp.	**7.87**	**CG**								
Decapoda										
Cambaridae										
Orconectes sp.	**2.6**	**SH**								
Orconectes putnami	**2.6**	**SH**								
Insecta										
Ephemeroptera										
Baetidae										

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Baetis sp.	***4**	**CG**								
Baetis intercalaris	**4.99**	**CG**								
Centroptilum sp.	**6.6**	**CG**								
Caenidae										
Caenis sp.	**7.41**	**CG**								
Ephemeridae										
Hexagenia munda	**4.9**	**CG**								
Heptageniidae										
Leucrocuta sp.	**2.4**	**SC**								
Stenacron interpunctatum	**6.87**	**SC**								
Stenonema sp.	***4**	**SC**								
Isonychiidae										
Isonychia sp.	**3.45**	**FC**								
Leptophlebiidae										
Choroterpes sp.	***2**	**CG**								
Potamanthidae										
Anthopotamus sp.	**1.53**	**CG**								
Tricorythidae										
Tricorythodes sp.	**5.06**	**CG**								
Odonata										
Coenagrionidae										
Argia sp.	**8.17**	**P**								
Plecoptera										
Leuctridae										
Leuctra sp.	**0.67**	**SH**								
Megaloptera										
Corydalidae										
Corydalus cornutus	**5.16**	**P**								
Nigronia serricornis	**4.95**	**P**								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	**T.V.****	**F.F.G.*****	**Left Overbank**		**Right Overbank**		**Main Channel**		**TOTAL**	
			Count	**Density**	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Sialidae										
Sialis sp.	**7.17**	**PI**								
Hemiptera										
Veliidae										
Rhagovelia obesa		**P**								
Trichoptera										
Helicopsychidae										
Helicopsyche borealis	**0**	**SC**								
Hydroptilidae										
Hydroptila sp.	**6.22**	**PI**								
Hydropsychidae										
Cheumatopsyche sp.	**6.22**	**FC**								
Hydropsyche betteni gp.	**7.78**	**FC**								
Hydropsyche sp.	***5**	**FC**								
Leptoceridae										
Oecetis sp.	**4.7**	**P**								
Philopotamidae										
Chimarra sp.	**2.76**	**FC**								
Polycentropodidae										
Cyrnellus fraternus	**7.34**	**FC**								
Coleoptera										
Elmidae										
Optioservus sp.	**2.36**	**SC**								
Stenelmis sp.	**5.1**	**SC**								
Hydrophilidae	**8.43**	**CG**								
Berosus sp.	**8.43**	**CG**								
Psephenidae										
Ectopria sp.	**4.16**	**SC**								
Psephenus herricki	**2.35**	**SC**								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Staphylinidae										
Diptera										
Ceratopogonidae										
Bezzia/Palpomyia gp.	**6.86**	**P**	1	6.38					1	2.13
Chaoboridae										
Chaoborus punctipennis	**8.5**	**P**	53	338.14	43	274.34	248	1582.24	344	732.72
Chironomidae			2	12.76	2	12.76			4	8.52
Ablabesmyia annulata	**2.04**	**P**								
Ablabesmyia mallochi	**7.19**	**P**								
Axarus sp.	***6**	**CG**								
Cardiocladius obscurus	**5.87**	**P**								
Chironomus sp.	**9.63**	**CG**	42	267.96	27	172.26	18	114.84	87	185.31
Coelotanypus tricolor	**8**	**P**	1	6.38	3	19.14	2	12.76	6	12.78
Conchapelopia sp.	**8.42**	**P**								
Corynoneura sp.	**6.01**	**CG**								
Cricotopus sp.	***7**	**CG**								
Cryptochironomus fulvus	**6.38**	**P**								
Dicrotendipes sp.	**8.1**	**CG**	1	6.38					1	2.13
Epicocladius sp.	**0**	**CG**								
Eukiefferiella devonica gp.	**2.59**	**CG**								
Glyptotendipes sp.	**9.47**	**FC**								
Nilotanypus sp.	**3.9**	**P**								
Polypedilum convictum	**4.93**	**SH**								
Polypedilum fallax	**6.39**	**SH**								
Polypedilum halterale	**7.31**	**SH**								
Polypedilum illinoense	**9**	**SH**								
Procladius bellus	**9.1**	**P**			3	19.14	1	6.38	4	8.52
Psectrocladius sp.	**3.59**	**SH**								
Rheotanytarsus sp.	**5.89**	**FC**								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Drakes Creek Mile 1.9							
			3OLD20013							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Stenochironomus sp.	6.45	SH								
Synorthocladius semivirens	4.36	Cg								
Tanytarsus sp.	6.76	FC								
Thienemanniella xena	5.86	CG								
Thienemannimyia gp.	8.42	P								
Zavrelia sp.	5.3	CG								
Empididae										
Hemerodromia sp.	7.57	P								
Simuliidae										
Simulium sp.	4	FC								
Tipulidae										
Hexatoma sp.	4.31	P								
Limnophila sp.	*4	P								
CHORDATA**										
Osteichthyes										
Perciformes										
Percidae										
Etheostoma sp.										
Scorpaeniformes										
Cottidae										
Cottus carolinae										
Cyprinodontiformes										
Poeciliidae										
Gambusia sp.										
TOTAL NO. OF ORGANISMS			229		347		453		1029	
TOTAL NO. OF SPECIES			10		8		11		15	
TOTAL DENSITY OF ORG./M^2				1461.02		2213.86		2890.14		2191.8

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
PLATYHELMINTHES										
Turbellaria										
Tricladida										
Planariidae										
Cura foremanii	**4.97**									
Phagocata sp.										
NEMATODA					2	12.76			2	4.26
MOLLUSCA										
Bivalvia										
Veneroida										
Corbicula fluminea	**6.12**	**FC**								
Sphaeriidae										
Pisidium sp.	**6.48**	**FC**								
Sphaerium sp.	**7.58**	**FC**	29	185.02	3	19.14	11	70.18	43	91.59
Gastropoda										
Mesogastropoda										
Pleuroceridae										
Elimia sp.	**2.46**	**SC**								
Elimia laqueata	**2.46**	**SC**								
ANNELIDA										
Oligochaeta										
Haplotaxida										
Lumbricidae		**CG**								
Tubificidae w.h.c.	**7.11**	**CG**	3	19.14			18	114.84	21	44.73
Branchiura sowerbyi	**8.58**	**CG**					36	229.68	36	76.68
Tubificidae w.o.h.c.	**7.11**	**CG**	40	255.2			196	1250.5	236	502.68
Limnodrilus cervix	**9.9**	**CG**					36	229.68	36	76.68
Limnodrilus hoffmeisteri	**9.47**	**CG**	19	121.22			71	452.98	90	191.7
Branchiobdellida										

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Hirudinea										
Rhynchobdellida										
Glossiphoniidae	***8**	**P**								
Arhynchobdellida										
Erpodbellidae	***8**	**P**								
ARTHROPODA										
Arachnoidea										
Acariformes										
Sperchonidae										
Sperchon sp.	**5.53**									
Crustacea										
Copepoda										
Cyclopoida										
Cladocera										
Daphnidae										
Daphnia lumholtzi										
Isopoda										
Asellidae										
Lirceus sp.	**7.85**	**CG**								
Amphipoda										
Crangonyctidae										
Crangonyx sp.	**7.87**	**CG**								
Decapoda										
Cambaridae										
Orconectes sp.	**2.6**	**SH**								
Orconectes putnami	**2.6**	**SH**								
Insecta										
Ephemeroptera										
Baetidae										

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Baetis sp.	*4	CG								
Baetis intercalaris	4.99	CG								
Centroptilum sp.	6.6	CG								
Caenidae										
Caenis sp.	7.41	CG								
Ephemeridae										
Hexagenia munda	4.9	CG	18	114.84			17	108.46	35	74.55
Heptageniidae										
Leucrocuta sp.	2.4	SC								
Stenacron interpunctatum	6.87	SC								
Stenonema sp.	*4	SC								
Isonychiidae										
Isonychia sp.	3.45	FC								
Leptophlebiidae										
Choroterpes sp.	*2	CG								
Potamanthidae										
Anthopotamus sp.	1.53	CG								
Tricorythidae										
Tricorythodes sp.	5.06	CG								
Odonata										
Coenagrionidae										
Argia sp.	8.17	P								
Plecoptera										
Leuctridae										
Leuctra sp.	0.67	SH								
Megaloptera										
Corydalidae										
Corydalus cornutus	5.16	P								
Nigronia serricornis	4.95	P								

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Sialidae										
Sialis sp.	**7.17**	**PI**	5	31.9					5	10.65
Hemiptera										
Veliidae										
Rhagovelia obesa		**P**								
Trichoptera										
Helicopsychidae										
Helicopsyche borealis	**0**	**SC**								
Hydroptilidae										
Hydroptila sp.	**6.22**	**PI**								
Hydropsychidae										
Cheumatopsyche sp.	**6.22**	**FC**								
Hydropsyche betteni gp.	**7.78**	**FC**								
Hydropsyche sp.	***5**	**FC**								
Leptoceridae										
Oecetis sp.	**4.7**	**P**			1	6.38			1	2.13
Philopotamidae										
Chimarra sp.	**2.76**	**FC**								
Polycentropodidae										
Cyrnellus fraternus	**7.34**	**FC**			17	108.46			17	36.21
Coleoptera										
Elmidae										
Optioservus sp.	**2.36**	**SC**								
Stenelmis sp.	**5.1**	**SC**								
Hydrophilidae	**8.43**	**CG**								
Berosus sp.	**8.43**	**CG**								
Psephenidae										
Ectopria sp.	**4.16**	**SC**								
Psephenus herricki	**2.35**	**SC**								

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Staphylinidae										
Diptera										
Ceratopogonidae										
Bezzia/Palpomyia gp.	**6.86**	**P**								
Chaoboridae										
Chaoborus punctipennis	**8.5**	**P**								
Chironomidae			2	12.76					2	4.26
Ablabesmyia annulata	**2.04**	**P**	14	89.32			3	19.14	17	36.21
Ablabesmyia mallochi	**7.19**	**P**								
Axarus sp.	***6**	**CG**								
Cardiocladius obscurus	**5.87**	**P**								
Chironomus sp.	**9.63**	**CG**	4	25.52	2	12.76	17	108.46	23	48.99
Coelotanypus tricolor	**8**	**P**	1	6.38					1	2.13
Conchapelopia sp.	**8.42**	**P**								
Corynoneura sp.	**6.01**	**CG**								
Cricotopus sp.	***7**	**CG**								
Cryptochironomus fulvus	**6.38**	**P**	1	6.38	1	6.38			2	4.26
Dicrotendipes sp.	**8.1**	**CG**								
Epicocladius sp.	**0**	**CG**					3	19.14	3	6.39
Eukiefferiella devonica gp.	**2.59**	**CG**								
Glyptotendipes sp.	**9.47**	**FC**			11	70.18			11	23.43
Nilotanypus sp.	**3.9**	**P**								
Polypedilum convictum	**4.93**	**SH**								
Polypedilum fallax	**6.39**	**SH**								
Polypedilum halterale	**7.31**	**SH**					3	19.14	3	6.39
Polypedilum illinoense	**9**	**SH**								
Procladius bellus	**9.1**	**P**					26	165.88	26	55.38
Psectrocladius sp.	**3.59**	**SH**								
Rheotanytarsus sp.	**5.89**	**FC**								

TABLE 1. SUMMARY OF BENCHIC MACROINVERTEBRATES OOLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.										
			Cumberland RM 245.0							
			3OLD20006							
SPECIES	T.V.**	F.F.G.***	Left Overbank		Right Overbank		Main Channel		TOTAL	
			Count	Density	Count	Density	Count	Density	Count	Density
Stenochironomus sp.	6.45	SH								
Synorthocladius semivirens	4.36	Cg								
Tanytarsus sp.	6.76	FC	1	6.38					1	2.13
Thienemanniella xena	5.86	CG								
Thienemannimyia gp.	8.42	P								
Zavrelia sp.	5.3	CG								
Empididae										
Hemerodromia sp.	7.57	P								
Simuliidae										
Simulium sp.	4	FC								
Tipulidae										
Hexatoma sp.	4.31	P								
Limnophila sp.	*4	P								
CHORDATA**										
Osteichthyes										
Perciformes										
Percidae										
Etheostoma sp.										
Scorpaeniformes										
Cottidae										
Cottus carolinae										
Cyprinodontiformes										
Poeciliidae										
Gambusia sp.										
TOTAL NO. OF ORGANISMS			**137**		**37**		**437**		**611**	
TOTAL NO. OF SPECIES			**12**		**7**		**12**		**21**	
TOTAL DENSITY OF ORG./M^2				**874.06**		**236.06**		**2788.1**		**1301.43**

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae					2	4.4	2	4.4
Cura foremanii	**4.97**		23	50.6	1	2.2		
Phagocata sp.					4	8.8		
NEMATODA							1	2.2
MOLLUSCA								
Bivalvia								
Veneroida								
Corbicula fluminea	**6.12**	**FC**	260	572	38	83.6	77	169.4
Sphaeriidae					3	6.6	10	22
Pisidium sp.	**6.48**	**FC**	16	35.2				
Sphaerium sp.	**7.58**	**FC**						
Gastropoda								
Mesogastropoda								
Pleuroceridae								
Elimia sp.	**2.46**	**SC**	283	622.6	38	83.6	5	11
Elimia laqueata	**2.46**	**SC**	1036	2279.2	19	41.8	150	330
ANNELIDA								
Oligochaeta								
Haplotaxida								
Lumbricidae		**CG**			4	8.8	4	8.8
Tubificidae w.h.c.	**7.11**	**CG**	1	2.2				
Branchiura sowerbyi	**8.58**	**CG**	1	2.2	1	2.2		
Tubificidae w.o.h.c.	**7.11**	**CG**	22	48.4	2	4.4		
Limnodrilus cervix	**9.9**	**CG**						
Limnodrilus hoffmeisteri	**9.47**	**CG**						
Branchiobdellida			6	13.2	5	11		

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Hirudinea								
Rhynchobdellida								
Glossiphoniidae	***8**	**P**	1	2.2				
Arhynchobdellida								
Erpodbellidae	***8**	**P**						
ARTHROPODA								
Arachnoidea								
Acariformes			2	4.4				
Sperchonidae								
Sperchon sp.	**5.53**		1	2.2			1	2.2
Crustacea								
Copepoda								
Cyclopoida								
Cladocera								
Daphnidae								
Daphnia lumholtzi								
Isopoda								
Asellidae								
Lirceus sp.	**7.85**	**CG**			12	26.4		
Amphipoda								
Crangonyctidae								
Crangonyx sp.	**7.87**	**CG**	8	17.6	39	85.8		
Decapoda								
Cambaridae								
Orconectes sp.	**2.6**	**SH**	5	11	3	6.6	2	4.4
Orconectes putnami	**2.6**	**SH**	4	8.8				
Insecta								
Ephemeroptera								
Baetidae					1	2.2	15	33
Baetis sp.	***4**	**CG**	14	30.8	15	33	21	46.2

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Baetis intercalaris	**4.99**	**CG**	234	514.8	294	646.8	420	924
Centroptilum sp.	**6.6**	**CG**					5	11
Caenidae								
Caenis sp.	**7.41**	**CG**			280	616	234	514.8
Ephemeridae								
Hexagenia munda	**4.9**	**CG**						
Heptageniidae			8	17.6	5	11	5	11
Leucrocuta sp.	**2.4**	**SC**			3	6.6	125	275
Stenacron interpunctatum	**6.87**	**SC**	2	4.4	7	15.4		
Stenonema sp.	***4**	**SC**	7	15.4	871	1916.2	121	266.2
Isonychiidae								
Isonychia sp.	**3.45**	**FC**			32	70.4	17	37.4
Leptophlebiidae					8	17.6		
Choroterpes sp.	***2**	**CG**					6	13.2
Potamanthidae								
Anthopotamus sp.	**1.53**	**CG**	1	2.2				
Tricorythidae								
Tricorythodes sp.	**5.06**	**CG**	2	4.4	36	79.2	422	928.4
Odonata								
Coenagrionidae					18	39.6		
Argia sp.	**8.17**	**P**	66	145.2	32	70.4	50	110
Plecoptera								
Leuctridae								
Leuctra sp.	**0.67**	**SH**			5	11	6	13.2
Megaloptera								
Corydalidae								
Corydalus cornutus	**5.16**	**P**	2	4.4	15	33	17	37.4
Nigronia serricornis	**4.95**	**P**			2	4.4		
Sialidae								
Sialis sp.	**7.17**	**PI**						

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Hemiptera								
Veliidae								
Rhagovelia obesa		**P**	1	2.2				
Trichoptera								
Helicopsychidae								
Helicopsyche borealis	**0**	**SC**	36	79.2			1	2.2
Hydroptilidae								
Hydroptila sp.	**6.22**	**PI**	5	11				
Hydropsychidae			2	4.4	1	2.2	1	2.2
Cheumatopsyche sp.	**6.22**	**FC**	6	13.2	270	594	180	396
Hydropsyche betteni gp.	**7.78**	**FC**			1	2.2		
Hydropsyche sp.	***5**	**FC**	1	2.2				
Leptoceridae								
Oecetis sp.	**4.7**	**P**						
Philopotamidae								
Chimarra sp.	**2.76**	**FC**	6	13.2	4	8.8	144	316.8
Polycentropodidae								
Cyrnellus fraternus	**7.34**	**FC**						
Coleoptera								
Elmidae								
Optioservus sp.	**2.36**	**SC**			1	2.2		
Stenelmis sp.	**5.1**	**SC**	483	1062.6	706	1553.2	489	1075.8
Hydrophilidae	**8.43**	**CG**						
Berosus sp.	**8.43**	**CG**	4	8.8				
Psephenidae								
Ectopria sp.	**4.16**	**SC**	2	4.4				
Psephenus herricki	**2.35**	**SC**	41	90.2	137	301.4	90	198
Staphylinidae							3	6.6
Diptera								
Ceratopogonidae								

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Bezzia/Palpomyia gp.	**6.86**	**P**						
Chaoboridae								
Chaoborus punctipennis	**8.5**	**P**						
Chironomidae			24	52.8	11	24.2	33	72.6
Ablabesmyia annulata	**2.04**	**P**						
Ablabesmyia mallochi	**7.19**	**P**	1	2.2				
Axarus sp.	***6**	**CG**						
Cardiocladius obscurus	**5.87**	**P**			1	2.2		
Chironomus sp.	**9.63**	**CG**						
Coelotanypus tricolor	**8**	**P**						
Conchapelopia sp.	**8.42**	**P**	41	90.2	31	68.2	77	169.4
Corynoneura sp.	**6.01**	**CG**	5	11	2	4.4	2	4.4
Cricotopus sp.	***7**	**CG**					2	4.4
Cryptochironomus fulvus	**6.38**	**P**	1	2.2			3	6.6
Dicrotendipes sp.	**8.1**	**CG**						
Epicocladius sp.	**0**	**CG**						
Eukiefferiella devonica gp.	**2.59**	**CG**	2	4.4	1	2.2		
Glyptotendipes sp.	**9.47**	**FC**						
Nilotanypus sp.	**3.9**	**P**	1	2.2			4	8.8
Polypedilum convictum	**4.93**	**SH**	30	66	32	70.4	236	519.2
Polypedilum fallax	**6.39**	**SH**	3	6.6				
Polypedilum halterale	**7.31**	**SH**	14	30.8	1	2.2		
Polypedilum illinoense	**9**	**SH**					11	24.2
Procladius bellus	**9.1**	**P**	2	4.4				
Psectrocladius sp.	**3.59**	**SH**			2	4.4		
Rheotanytarsus sp.	**5.89**	**FC**	3	6.6	48	105.6	47	103.4
Stenochironomus sp.	**6.45**	**SH**	1	2.2				
Synorthocladius semivirens	**4.36**	**Cg**	1	2.2				
Tanytarsus sp.	**6.76**	**FC**	12	26.4	15	33	40	88
Thienemanniella xena	**5.86**	**CG**	1	2.2	13	28.6	11	24.2

TABLE 1. SUMMARY OF BENTHIC MACROINVERTEBRATES COLLECTED FROM OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTONS Ck. Mile 7.1		DRAKES Ck. Mile 4.9		BLEDSOE Ck. Mile 10.3	
			3OLD10056		3OLD10050		3OLD10054	
SPECIES	**T.V.****	**F.F.G.*****	**Count**	**Density**	**Count**	**Density**	**Count**	**Density**
Thienemannimyia gp.	**8.42**	**P**	11	24.2				
Zavrelia sp.	**5.3**	**CG**	71	156.2	124	272.8	33	72.6
Empididae							2	4.4
Hemerodromia sp.	**7.57**	**P**	1	2.2			6	13.2
Simuliidae								
Simulium sp.	**4**	**FC**	1	2.2				
Tipulidae								
Hexatoma sp.	**4.31**	**P**			4	8.8	1	2.2
Limnophila sp.	***4**	**P**			1	2.2	7	15.4
CHORDATA****								
Osteichthyes								
Perciformes								
Percidae								
Etheostoma sp.					2	4.4	2	4.4
Scorpaeniformes								
Cottidae								
Cottus carolinae					1	2.2		
Cyprinodontiformes								
Poeciliidae								
Gambusia sp.			1	2.2				
TOTAL NO. OF ORGANISMS			**2818**		**3201**		**3139**	
TOTAL NO. OF SPECIES			**55**		**51**		**46**	
TOTAL DENSITY OF ORG./M^2				**6199.6**		**7042.2**		**6905.8**

TABLE 2. SUMMARY OF RBPIII METRICS, OLD HICKORY RESERVOIR DRAINAGE, OCTOBER 1997.												
	CRM 216.9 3OLD20002				Drakes RM 1.9 3OLD20013				CRM 245.0 3OLD20006			
METRIC	LOB	ROB	MC	TOTAL	LOB	ROB	MC	TOTAL	LOB	ROB	MC	TOTAL
Taxa Richness	8	8	11	17	10	8	11	15	12	7	12	21
Hilsenhoff Biotic Index	8.63	9.04	8.82	7.93	8.49	9.00	8.48	8.01	6.65	8.06	8.67	7.67
Ratio of Scrapers/Filtering Collectors	0	0	0	0	0	0	0	0	0	0	0	0
Ratio of EPT/Chironomidae abundance	0.013	0	0	0	0	0	0	0	1	1.29	0.33	0
Percent Contribution of Dominant Taxon	36.7%	58.7%	50.7%	46.8%	28.4%	59.4%	54.7%	35.3%	21.2%	45.9%	44.9%	38.6%
EPT Index	1	0	0	0	0	0	0	0	2	2	1	3
Shannon Diversity (H')	2.218	1.971	2.023	2.256	2.372	1.842	2.068	2.412	2.797	2.066	2.616	3.114
Pielou Evenness (J')	0.739	0.657	0.585	0.552	0.714	0.614	0.598	0.617	0.780	0.736	0.730	0.709

TABLE 2. SUMMARY OF RBPIII METRICS, OLD HICKORY RESERVOIR DRAINAGE, OCTOBER 1997.

	Barton's CM 7.1	Drakes CM 4.9	Bledsoe CM 10.3
METRIC	3OLD10056	3OLD10050	3OLD10054
Taxa Richness	54	51	46
Hilsenhoff Biotic Index	3.98	5.03	5.01
Ratio of Scrapers/Filtering Collectors	6.2	4.38	1.94
Ratio of EPT/Chironomidae abundance	1.74	6.64	3.47
Percent Contribution of Dominant Taxon	36.8%	27.2%	15.8%
EPT Index	13	16	16
Shannon Diversity (H')	3.560	3.466	4.047
Pielou Evenness (J')	0.619	0.611	0.733

TABLE 3. STATISTICAL ANALYSES OF SAMPLING EFFICIENCY AND COMPARISON OF THE STATIONS USING MEAN UMBER OF ORGANISMS, OLD HICKORY RESERVOIR DRAINAGE, OCTOBER 1997.					
STATION	**NO. OF SAMPLES**	**MEAN NO. OF ORGANISMS**	**STANDARD DEVIATION**	**STANDARD ERROR OF THE MEAN**	**PRECISION OF SAMPLING MEAN**
Barton's Creek Mile 7.1 (30OL10056)	5	563.6	379.50	169.72	30.11%
Drakes Creek Mile 4.9 (3OLD10050)	5	640.8	200.04	89.46	13.96%
Bledsoe Creek Mile 10.3 (3OLD10054)	5	628.2	115.69	51.74	8.24%

Calculated F=0.13

Barton's Creek Mile 7.1	Bledsoe Creek Mile 10.3	Drakes Creek Mile 4.9
563.6	628.2	640.8

*Stations underlined are statistically comparable at a 0.05 confidence level

TABLE 4. STATISTICAL ANALYSES OF SAMPLING EFFICIENCY AND COMPARISON OF THE STATIONS USING MEAN NUMBER OF SPECIES, OLD HICKORY RESERVOIR DRAINAGE, OCTOBER 1997.					
STATION	**NO. OF SAMPLES**	**MEAN NO. OF SPECIES**	**STANDARD DEVIATION**	**STANDARD ERROR OF THE MEAN**	**PRECISION OF SAMPLING MEAN**
Barton's Creek Mile 7.1 (30OL10056)	5	25.0	12.86	5.75	23.01%
Drakes Creek Mile 4.9 (3OLD10050)	5	28.0	7.11	3.18	11.35%
Bledsoe Creek Mile 10.3 (3OLD10054)	5	25.2	2.68	1.20	4.76%

Calculated F=0.19

Barton's Creek	Bledsoe Creek	Drakes Creek
Mile 7.1	Mile 10.3	Mile 4.9
25	25.2	28

*Stations underlined are statistically comparable at a 0.05 confidence level

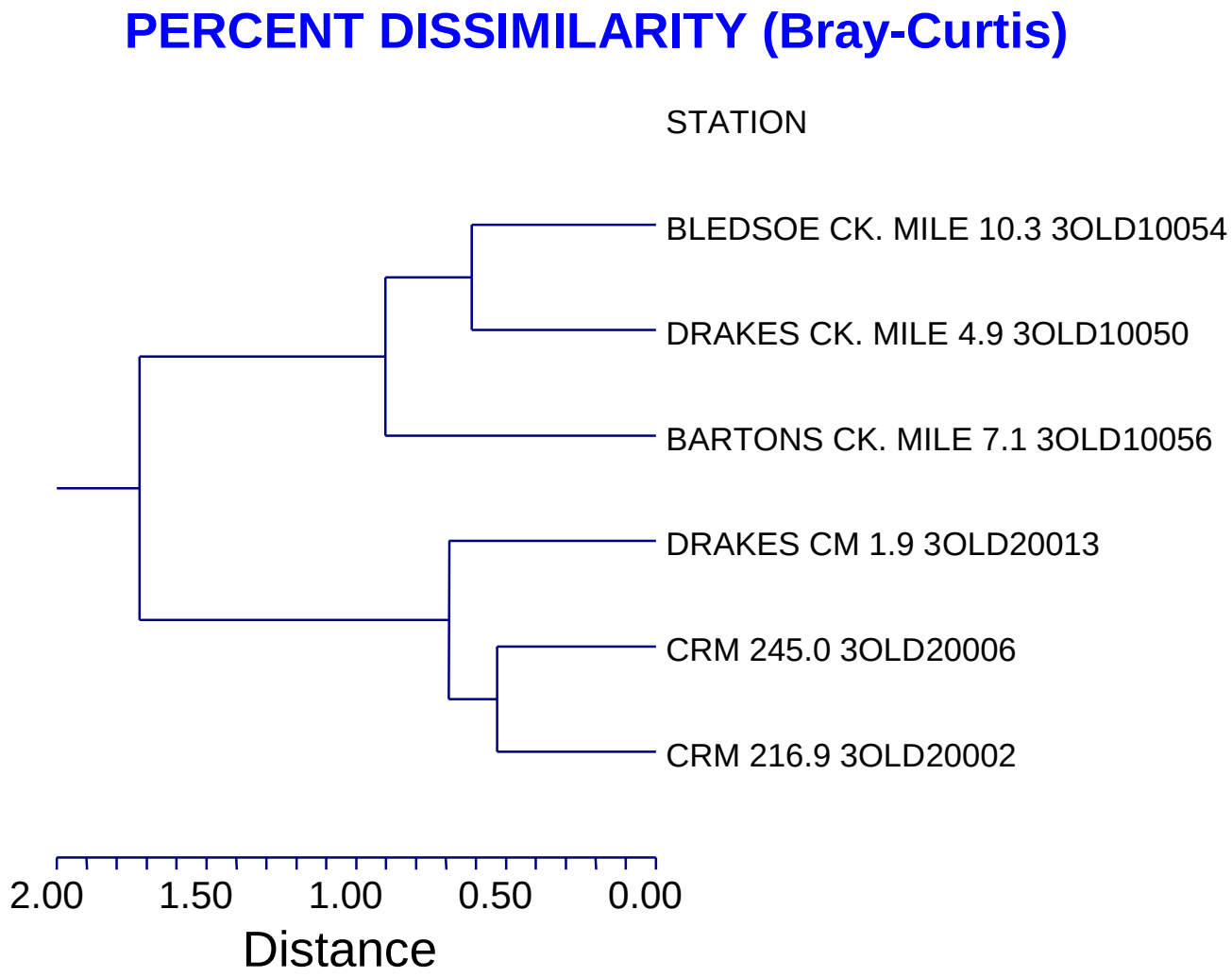

Figure 3. Percent Dissimilarity (Bray-Curtis) Cluster Analysis, Old Hickory Reservoir Drainage, Fall, 1997 (CRM=Cumberland River Mile).

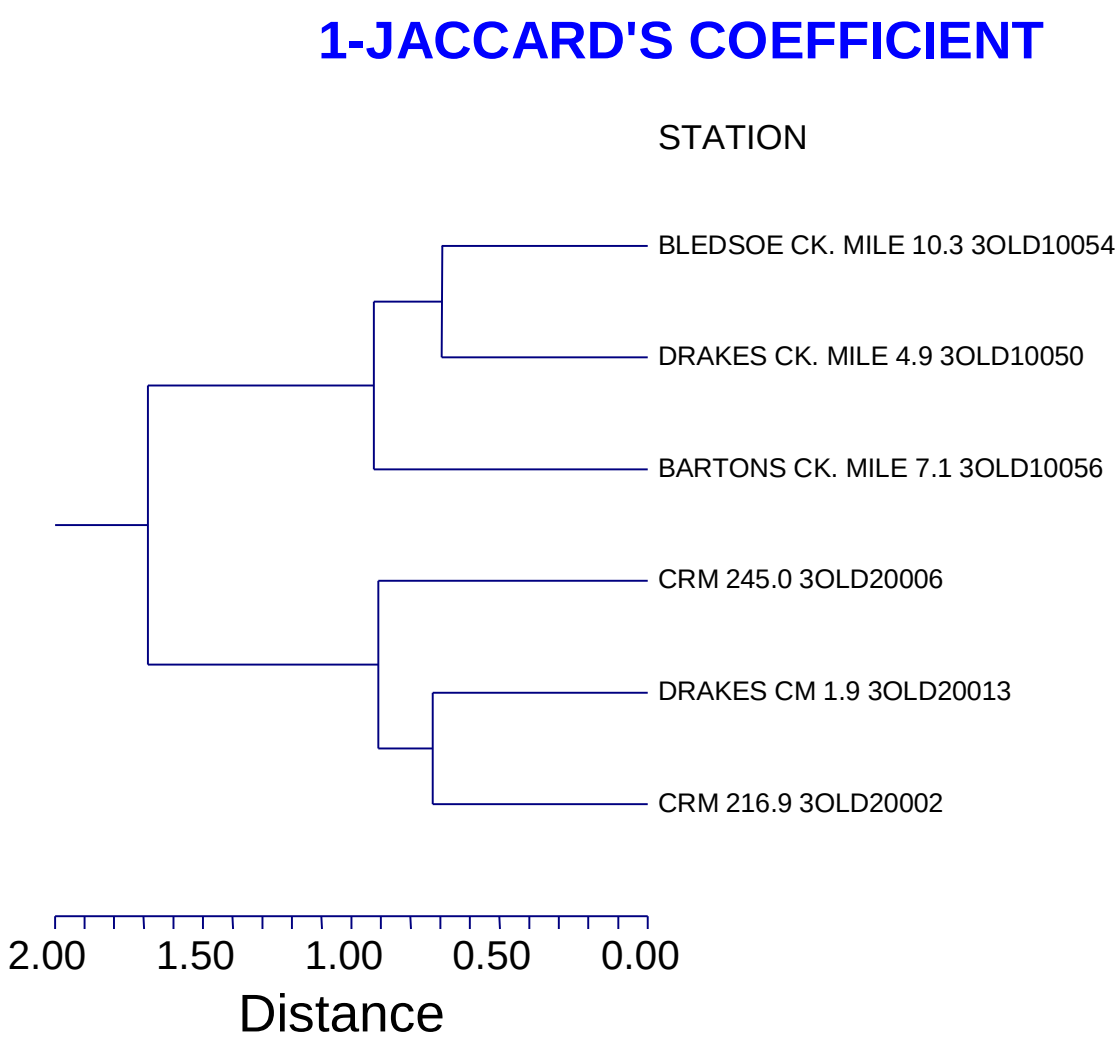

Figure 4. 1-Jaccard's Coefficient Cluster Analysis, Old Hickory Reservoir Drainage, Fall 1997 (CRM=Cumberland River Mile).

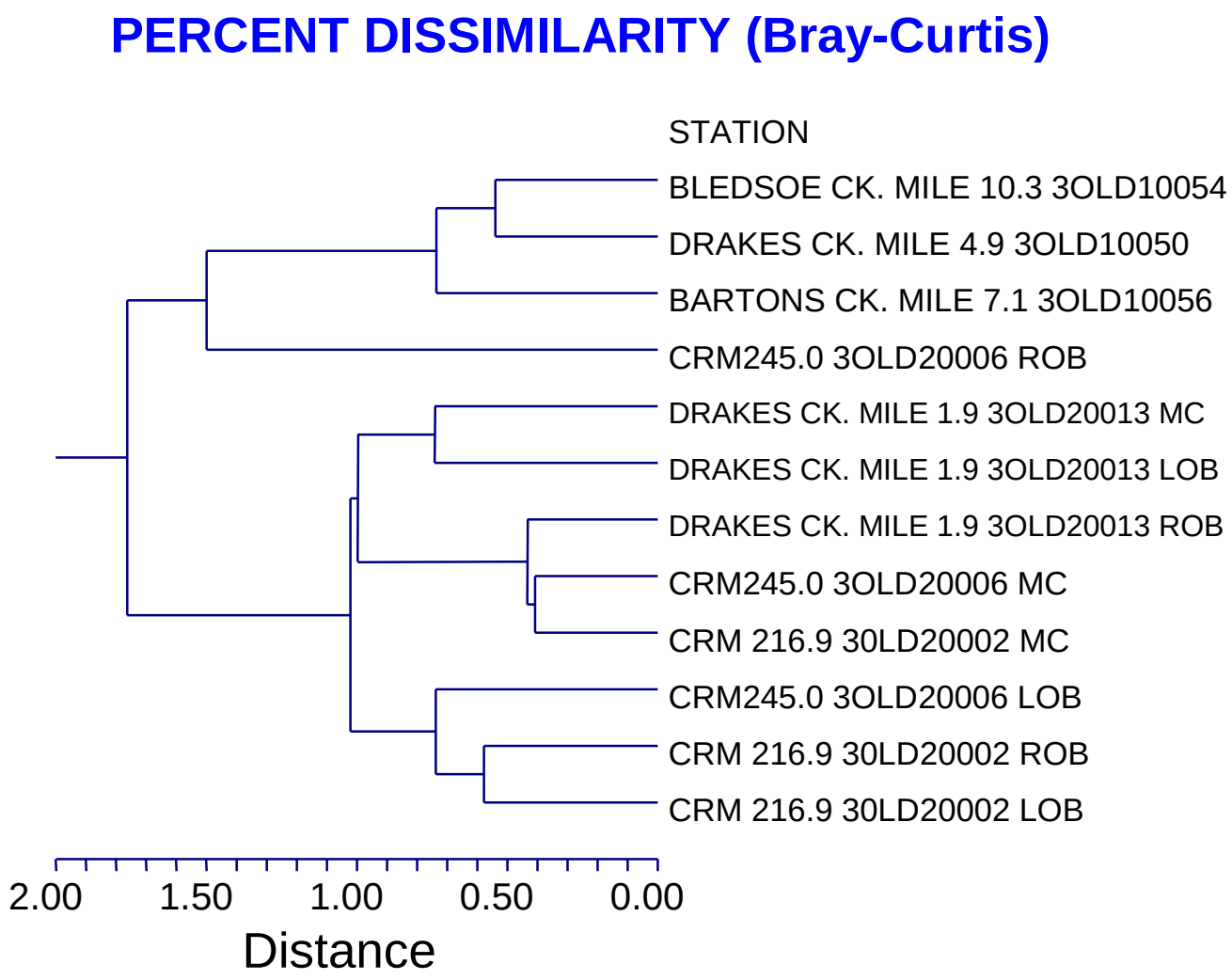

Figure 5. Percent Dissimilarity (Bray-Curtis) Cluster Analysis, Old Hickory Reservoir Drainage, Fall 1997 (CRM=Cumberland River Mile, MC=mid-channel, ROB=right overbank and LOB=left overbank.

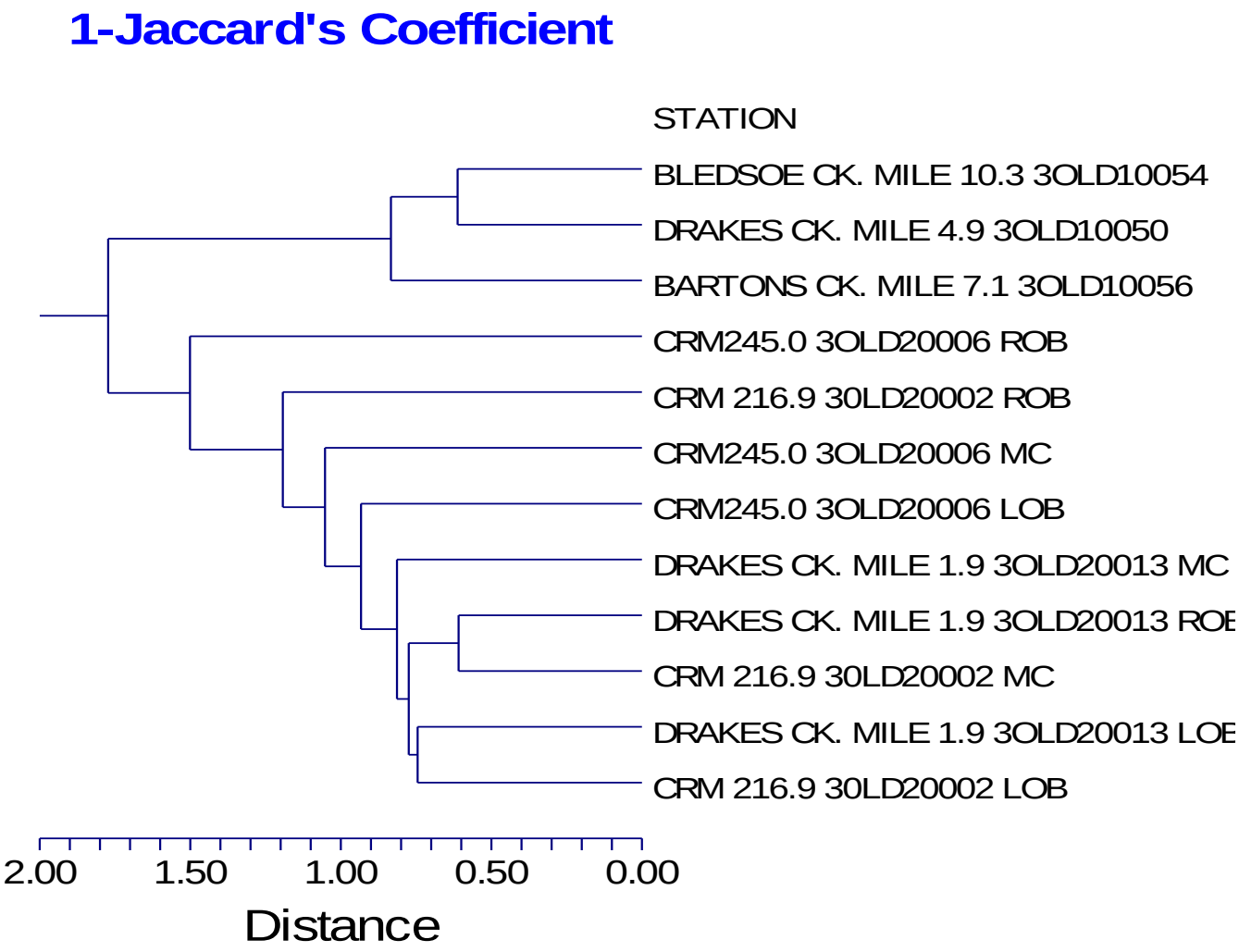

Figure 6. 1-Jaccard's Coefficient Cluster Analysis, Old Hickory Reservoir Drainage, kFall 1997. (CRM=Cumberland River Mile, MC=mid-channel, ROB=right overbank and LOB=left overbank.

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APPENDIX

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.											
			Cumberland RM 216.9			Drakes Creek Mile 1.9			Cumberland RM 245.0		
			3OLD20002			3OLD20013			3OLD20006		
SPECIES	T.V.**	F.F.G.***	76315	76316	76317	76318	76319	76320	76321	76322	76323
PLATYHELMINTHES											
Turbellaria											
Tricladida											
Planariidae											
Cura foremanii	**4.97**										
Phagocata sp.											
NEMATODA								1		2	
MOLLUSCA											
Bivalvia											
Veneroida											
Corbicula fluminea	**6.12**	**FC**									
Sphaeriidae											
Pisidium sp.	**6.48**	**FC**									
Sphaerium sp.	**7.58**	**FC**			5	52	12	29	29	3	11
Gastropoda											
Mesogastropoda											
Pleuroceridae											
Elimia sp.	**2.46**	**SC**									
Elimia laqueata	**2.46**	**SC**									
ANNELIDA											
Oligochaeta											
Haplotaxida											
Lumbricidae		**CG**									
Tubificidae w.h.c.	**7.11**	**CG**	4	4	16	4		35	3		18
Branchiura sowerbyi	**8.58**	**CG**	4			8		14			36
Tubificidae w.o.h.c.	**7.11**	**CG**	47	54	204	65	206	92	40		196
Limnodrilus cervix	**9.9**	**CG**		4							36
Limnodrilus hoffmeisteri	**9.47**	**CG**	23	12	94		51		19		71
Branchiobdellida											
Hirudinea											
Rhynchobdellida											
Glossiphoniidae	***8**	**P**									
Arhynchobdellida											
Erpodbellidae	***8**	**P**			1						
ARTHROPODA											
Arachnoidea											
Acariformes											
Sperchonidae											
Sperchon sp.	**5.53**										
Crustacea											
Copepoda											
Cyclopoida					6			4			
Cladocera											
Daphnidae											

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.											
			Cumberland RM 216.9			Drakes Creek Mile 1.9			Cumberland RM 245.0		
			3OLD20002			3OLD20013			3OLD20006		
SPECIES	T.V.**	F.F.G.***	76315	76316	76317	76318	76319	76320	76321	76322	76323
Daphnia lumholtzi								9			
Isopoda											
Asellidae											
Lirceus sp.	**7.85**	**CG**									
Amphipoda											
Crangonyctidae											
Crangonyx sp.	**7.87**	**CG**									
Decapoda											
Cambaridae											
Orconectes sp.	**2.6**	**SH**									
Orconectes putnami	**2.6**	**SH**									
Insecta											
Ephemeroptera											
Baetidae											
Baetis sp.	***4**	**CG**									
Baetis intercalaris	**4.99**	**CG**									
Centroptilum sp.	**6.6**	**CG**									
Caenidae											
Caenis sp.	**7.41**	**CG**									
Ephemeridae											
Hexagenia munda	**4.9**	**CG**							18		17
Heptageniidae											
Leucrocuta sp.	**2.4**	**SC**									
Stenacron interpunctatum	**6.87**	**SC**									
Stenonema sp.	***4**	**SC**									
Isonychiidae											
Isonychia sp.	**3.45**	**FC**									
Leptophlebiidae											
Choroterpes sp.	***2**	**CG**									
Potamanthidae											
Anthopotamus sp.	**1.53**	**CG**									
Tricorythidae											
Tricorythodes sp.	**5.06**	**CG**									
Odonata											
Coenagrionidae											
Argia sp.	**8.17**	**P**									
Plecoptera											
Leuctridae											
Leuctra sp.	**0.67**	**SH**									
Megaloptera											
Corydalidae											
Corydalus cornutus	**5.16**	**P**									
Nigronia serricornis	**4.95**	**P**									
Sialidae											
Sialis sp.	**7.17**	**PI**	1						5		

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.

			Cumberland RM 216.9			Drakes Creek Mile 1.9			Cumberland RM 245.0		
			3OLD20002			3OLD20013			3OLD20006		
SPECIES	**T.V.****	**F.F.G.*****	**76315**	**76316**	**76317**	**76318**	**76319**	**76320**	**76321**	**76322**	**76323**
Hemiptera											
Veliidae											
Rhagovelia obesa		**P**									
Trichoptera											
Helicopsychidae											
Helicopsyche borealis	**0**	**SC**									
Hydroptilidae											
Hydroptila sp.	**6.22**	**PI**									
Hydropsychidae											
Cheumatopsyche sp.	**6.22**	**FC**									
Hydropsyche betteni gp.	**7.78**	**FC**									
Hydropsyche sp.	***5**	**FC**									
Leptoceridae											
Oecetis sp.	**4.7**	**P**								1	
Philopotamidae											
Chimarra sp.	**2.76**	**FC**									
Polycentropodidae											
Cyrnellus fraternus	**7.34**	**FC**								17	
Coleoptera											
Elmidae											
Optioservus sp.	**2.36**	**SC**									
Stenelmis sp.	**5.1**	**SC**									
Hydrophilidae	**8.43**	**CG**									
Berosus sp.	**8.43**	**CG**									
Psephenidae											
Ectopria sp.	**4.16**	**SC**									
Psephenus herricki	**2.35**	**SC**									
Staphylinidae											
Diptera											
Ceratopogonidae											
Bezzia/Palpomyia gp.	**6.86**	**P**		2		1					
Chaoboridae											
Chaoborus punctipennis	**8.5**	**P**	2		3	53	43	248			
Chironomidae					1	2	2		2		
Ablabesmyia annulata	**2.04**	**P**			2				14		3
Ablabesmyia mallochi	**7.19**	**P**									
Axarus sp.	***6**	**CG**		2							
Cardiocladius obscurus	**5.87**	**P**									
Chironomus sp.	**9.63**	**CG**	19	12	11	42	27	18	4	2	17
Coelotanypus tricolor	**8**	**P**	58		59	1	3	2	1		
Conchapelopia sp.	**8.42**	**P**									
Corynoneura sp.	**6.01**	**CG**									
Cricotopus sp.	***7**	**CG**									
Cryptochironomus fulvus	**6.38**	**P**		2					1	1	
Dicrotendipes sp.	**8.1**	**CG**				1					

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.											
			Cumberland RM 216.9			Drakes Creek Mile 1.9			Cumberland RM 245.0		
			3OLD20002			3OLD20013			3OLD20006		
SPECIES	**T.V.****	**F.F.G.*****	**76315**	**76316**	**76317**	**76318**	**76319**	**76320**	**76321**	**76322**	**76323**
Epicocladius sp.	**0**	**CG**									3
Eukiefferiella devonica gp.	**2.59**	**CG**									
Glyptotendipes sp.	**9.47**	**FC**								11	
Nilotanypus sp.	**3.9**	**P**									
Polypedilum convictum	**4.93**	**SH**									
Polypedilum fallax	**6.39**	**SH**									
Polypedilum halterale	**7.31**	**SH**									3
Polypedilum illinoense	**9**	**SH**									
Procladius bellus	**9.1**	**P**					3	1			26
Psectrocladius sp.	**3.59**	**SH**									
Rheotanytarsus sp.	**5.89**	**FC**									
Stenochironomus sp.	**6.45**	**SH**									
Synorthocladius semivirens	**4.36**	**Cg**									
Tanytarsus sp.	**6.76**	**FC**							1		
Thienemanniella xena	**5.86**	**CG**									
Thienemannimyia gp.	**8.42**	**P**									
Zavrelia sp.	**5.3**	**CG**									
Empididae											
Hemerodromia sp.	**7.57**	**P**									
Simuliidae											
Simulium sp.	**4**	**FC**									
Tipulidae											
Hexatoma sp.	**4.31**	**P**									
Limnophila sp.	***4**	**P**									
CHORDATA****											
Osteichthyes											
Perciformes											
Percidae											
Etheostoma sp.											
Scorpaeniformes											
Cottidae											
Cottus carolinae											
Cyprinodontiformes											
Poeciliidae											
Gambusia sp.											
TOTAL NO. OF ORGANISMS			**158**	**92**	**402**	**229**	**347**	**453**	**137**	**37**	**437**
TOTAL NO. OF SPECIES			**8**	**8**	**11**	**10**	**8**	**11**	**12**	**7**	**12**

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTON'S CREEK Mile 7.1					
			3OLD10056					
SPECIES	T.V.**	F.F.G.***	76304-1	76304-2	76304-3	76304-4	76304-5	TOTAL
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae								
Cura foremanii	**4.97**		2	4	2		15	23
Phagocata sp.								
NEMATODA								
MOLLUSCA								
Bivalvia								
Veneroida								
Corbicula fluminea	**6.12**	**FC**	68	44	39		109	260
Sphaeriidae								
Pisidium sp.	**6.48**	**FC**	11	4			1	16
Sphaerium sp.	**7.58**	**FC**						
Gastropoda								
Mesogastropoda								
Pleuroceridae								
Elimia sp.	**2.46**	**SC**				21	262	283
Elimia laqueata	**2.46**	**SC**	397	260	51	90	238	1036
ANNELIDA								
Oligochaeta								
Haplotaxida								
Lumbricidae		**CG**						
Tubificidae w.h.c.	**7.11**	**CG**		1				1
Branchiura sowerbyi	**8.58**	**CG**			1			1
Tubificidae w.o.h.c.	**7.11**	**CG**	8	8	4		2	22
Limnodrilus cervix	**9.9**	**CG**						
Limnodrilus hoffmeisteri	**9.47**	**CG**						
Branchiobdellida							6	6
Hirudinea								
Rhynchobdellida								
Glossiphoniidae	***8**	**P**					1	1
Arhynchobdellida								
Erpodbellidae	***8**	**P**						
ARTHROPODA								
Arachnoidea								
Acariformes							2	2
Sperchonidae								
Sperchon sp.	**5.53**					1		1
Crustacea								
Copepoda								
Cyclopoida								
Cladocera								
Daphnidae								

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTON'S CREEK Mile 7.1					
			3OLD10056					
SPECIES	**T.V.****	**F.F.G.*****	**76304-1**	**76304-2**	**76304-3**	**76304-4**	**76304-5**	**TOTAL**
Daphnia lumholtzi								
Isopoda								
Asellidae								
Lirceus sp.	**7.85**	**CG**						
Amphipoda								
Crangonyctidae								
Crangonyx sp.	**7.87**	**CG**		1			7	8
Decapoda								
Cambaridae								
Orconectes sp.	**2.6**	**SH**	3	2				5
Orconectes putnami	**2.6**	**SH**					4	4
Insecta								
Ephemeroptera								
Baetidae								
Baetis sp.	***4**	**CG**			13	1		14
Baetis intercalaris	**4.99**	**CG**	60	71			103	234
Centroptilum sp.	**6.6**	**CG**						
Caenidae								
Caenis sp.	**7.41**	**CG**						
Ephemeridae								
Hexagenia munda	**4.9**	**CG**						
Heptageniidae			5				3	8
Leucrocuta sp.	**2.4**	**SC**						
Stenacron interpunctatum	**6.87**	**SC**		1			1	2
Stenonema sp.	***4**	**SC**	1	3	1		2	7
Isonychiidae								
Isonychia sp.	**3.45**	**FC**						
Leptophlebiidae								
Choroterpes sp.	***2**	**CG**						
Potamanthidae								
Anthopotamus sp.	**1.53**	**CG**		1				1
Tricorythidae								
Tricorythodes sp.	**5.06**	**CG**		1			1	2
Odonata								
Coenagrionidae								
Argia sp.	**8.17**	**P**	22	16	21	4	3	66
Plecoptera								
Leuctridae								
Leuctra sp.	**0.67**	**SH**						
Megaloptera								
Corydalidae								
Corydalus cornutus	**5.16**	**P**		1			1	2
Nigronia serricornis	**4.95**	**P**						
Sialidae								
Sialis sp.	**7.17**	**PI**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTON'S CREEK Mile 7.1					
			3OLD10056					
SPECIES	**T.V.****	**F.F.G.*****	**76304-1**	**76304-2**	**76304-3**	**76304-4**	**76304-5**	**TOTAL**
Hemiptera								
Veliidae								
Rhagovelia obesa		**P**		1				1
Trichoptera								
Helicopsychidae								
Helicopsyche borealis	**0**	**SC**	9	11			16	36
Hydroptilidae								
Hydroptila sp.	**6.22**	**PI**	1				4	5
Hydropsychidae			1				1	2
Cheumatopsyche sp.	**6.22**	**FC**	2	2			2	6
Hydropsyche betteni gp.	**7.78**	**FC**						
Hydropsyche sp.	***5**	**FC**					1	1
Leptoceridae								
Oecetis sp.	**4.7**	**P**						
Philopotamidae								
Chimarra sp.	**2.76**	**FC**	2	2	2			6
Polycentropodidae								
Cyrnellus fraternus	**7.34**	**FC**						
Coleoptera								
Elmidae								
Optioservus sp.	**2.36**	**SC**						
Stenelmis sp.	**5.1**	**SC**	103	168	88	2	122	483
Hydrophilidae	**8.43**	**CG**						
Berosus sp.	**8.43**	**CG**	1		2		1	4
Psephenidae								
Ectopria sp.	**4.16**	**SC**		1	1			2
Psephenus herricki	**2.35**	**SC**	8	8	3	2	20	41
Staphylinidae								
Diptera								
Ceratopogonidae								
Bezzia/Palpomyia gp.	**6.86**	**P**						
Chaoboridae								
Chaoborus punctipennis	**8.5**	**P**						
Chironomidae			7	9	1	1	6	24
Ablabesmyia annulata	**2.04**	**P**						
Ablabesmyia mallochi	**7.19**	**P**					1	1
Axarus sp.	***6**	**CG**						
Cardiocladius obscurus	**5.87**	**P**						
Chironomus sp.	**9.63**	**CG**						
Coelotanypus tricolor	**8**	**P**						
Conchapelopia sp.	**8.42**	**P**		14	4		23	41
Corynoneura sp.	**6.01**	**CG**		2			3	5
Cricotopus sp.	***7**	**CG**						
Cryptochironomus fulvus	**6.38**	**P**					1	1
Dicrotendipes sp.	**8.1**	**CG**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BARTON'S CREEK Mile 7.1					
			3OLD10056					
SPECIES	**T.V.****	**F.F.G.*****	**76304-1**	**76304-2**	**76304-3**	**76304-4**	**76304-5**	**TOTAL**
Epicocladius sp.	**0**	**CG**						
Eukiefferiella devonica gp.	**2.59**	**CG**	1				1	2
Glyptotendipes sp.	**9.47**	**FC**						
Nilotanypus sp.	**3.9**	**P**					1	1
Polypedilum convictum	**4.93**	**SH**	3				27	30
Polypedilum fallax	**6.39**	**SH**				1	2	3
Polypedilum halterale	**7.31**	**SH**	2	6	3		3	14
Polypedilum illinoense	**9**	**SH**						
Procladius bellus	**9.1**	**P**					2	2
Psectrocladius sp.	**3.59**	**SH**						
Rheotanytarsus sp.	**5.89**	**FC**	1				2	3
Stenochironomus sp.	**6.45**	**SH**					1	1
Synorthocladius semivirens	**4.36**	**Cg**	1					1
Tanytarsus sp.	**6.76**	**FC**	1	2			9	12
Thienemanniella xena	**5.86**	**CG**					1	1
Thienemannimyia gp.	**8.42**	**P**	11					11
Zavrelia sp.	**5.3**	**CG**	12	23	2		34	71
Empididae								
Hemerodromia sp.	**7.57**	**P**					1	1
Simuliidae								
Simulium sp.	**4**	**FC**	1					1
Tipulidae								
Hexatoma sp.	**4.31**	**P**						
Limnophila sp.	***4**	**P**						
CHORDATA****								
Osteichthyes								
Perciformes								
Percidae								
Etheostoma sp.								
Scorpaeniformes								
Cottidae								
Cottus carolinae								
Cyprinodontiformes								
Poeciliidae								
Gambusia sp.			1					1
TOTAL NO. OF ORGANISMS			**744**	**667**	**238**	**123**	**1046**	**2818**
TOTAL NO. OF SPECIES			**28**	**28**	**17**	**9**	**43**	**55**

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			DRAKES CREEK Mile 1.9					
			3OLD10050					
SPECIES	T.V.**	F.F.G.***	76305-1	76305-2	76305-3	76305-4	76305-5	TOTAL
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae			2					2
Cura foremanii	**4.97**				1			1
Phagocata sp.				4				4
NEMATODA								
MOLLUSCA								
Bivalvia								
Veneroida								
Corbicula fluminea	**6.12**	**FC**	5	6	2	25		38
Sphaeriidae			2		1			3
Pisidium sp.	**6.48**	**FC**						
Sphaerium sp.	**7.58**	**FC**						
Gastropoda								
Mesogastropoda								
Pleuroceridae								
Elimia sp.	**2.46**	**SC**	9	10	1	13	5	38
Elimia laqueata	**2.46**	**SC**	2	3	2	1	11	19
ANNELIDA								
Oligochaeta								
Haplotaxida								
Lumbricidae		**CG**	2	2				4
Tubificidae w.h.c.	**7.11**	**CG**						
Branchiura sowerbyi	**8.58**	**CG**					1	1
Tubificidae w.o.h.c.	**7.11**	**CG**	2					2
Limnodrilus cervix	**9.9**	**CG**						
Limnodrilus hoffmeisteri	**9.47**	**CG**						
Branchiobdellida							5	5
Hirudinea								
Rhynchobdellida								
Glossiphoniidae	***8**	**P**						
Arhynchobdellida								
Erpodbellidae	***8**	**P**						
ARTHROPODA								
Arachnoidea								
Acariformes								
Sperchonidae								
Sperchon sp.	**5.53**							
Crustacea								
Copepoda								
Cyclopoida								
Cladocera								
Daphnidae								

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			DRAKES CREEK Mile 1.9					
			3OLD10050					
SPECIES	T.V.**	F.F.G.***	76305-1	76305-2	76305-3	76305-4	76305-5	TOTAL
Daphnia lumholtzi								
Isopoda								
Asellidae								
Lirceus sp.	**7.85**	**CG**	6		1	5		12
Amphipoda								
Crangonyctidae								
Crangonyx sp.	**7.87**	**CG**	8	1		20	10	39
Decapoda								
Cambaridae								
Orconectes sp.	**2.6**	**SH**	1			1	1	3
Orconectes putnami	**2.6**	**SH**						
Insecta								
Ephemeroptera								
Baetidae					1			1
Baetis sp.	***4**	**CG**	1	14				15
Baetis intercalaris	**4.99**	**CG**	52		32	118	92	294
Centroptilum sp.	**6.6**	**CG**						
Caenidae								
Caenis sp.	**7.41**	**CG**	38	53	47	62	80	280
Ephemeridae								
Hexagenia munda	**4.9**	**CG**						
Heptageniidae						5		5
Leucrocuta sp.	**2.4**	**SC**	2		1			3
Stenacron interpunctatum	**6.87**	**SC**	2				5	7
Stenonema sp.	***4**	**SC**	80	123	131	186	351	871
Isonychiidae								
Isonychia sp.	**3.45**	**FC**	7	2	8	5	10	32
Leptophlebiidae				2	1	5		8
Choroterpes sp.	***2**	**CG**						
Potamanthidae								
Anthopotamus sp.	**1.53**	**CG**						
Tricorythidae								
Tricorythodes sp.	**5.06**	**CG**	7	8	10	11		36
Odonata								
Coenagrionidae					18			18
Argia sp.	**8.17**	**P**	9	16		6	1	32
Plecoptera								
Leuctridae								
Leuctra sp.	**0.67**	**SH**				5		5
Megaloptera								
Corydalidae								
Corydalus cornutus	**5.16**	**P**	4	2	2	2	5	15
Nigronia serricornis	**4.95**	**P**				2		2
Sialidae								
Sialis sp.	**7.17**	**PI**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			DRAKES CREEK Mile 1.9					
			3OLD10050					
SPECIES	T.V.**	F.F.G.***	76305-1	76305-2	76305-3	76305-4	76305-5	TOTAL
Hemiptera								
Veliidae								
Rhagovelia obesa		**P**						
Trichoptera								
Helicopsychidae								
Helicopsyche borealis	**0**	**SC**						
Hydroptilidae								
Hydroptila sp.	**6.22**	**PI**						
Hydropsychidae			1					1
Cheumatopsyche sp.	**6.22**	**FC**	57	35	18	78	82	270
Hydropsyche betteni gp.	**7.78**	**FC**					1	1
Hydropsyche sp.	***5**	**FC**						
Leptoceridae								
Oecetis sp.	**4.7**	**P**						
Philopotamidae								
Chimarra sp.	**2.76**	**FC**	3	1				4
Polycentropodidae								
Cyrnellus fraternus	**7.34**	**FC**						
Coleoptera								
Elmidae								
Optioservus sp.	**2.36**	**SC**			1			1
Stenelmis sp.	**5.1**	**SC**	161	147	107	104	187	706
Hydrophilidae	**8.43**	**CG**						
Berosus sp.	**8.43**	**CG**						
Psephenidae								
Ectopria sp.	**4.16**	**SC**						
Psephenus herricki	**2.35**	**SC**	11	24	21	61	20	137
Staphylinidae								
Diptera								
Ceratopogonidae								
Bezzia/Palpomyia gp.	**6.86**	**P**						
Chaoboridae								
Chaoborus punctipennis	**8.5**	**P**						
Chironomidae			3		3	5		11
Ablabesmyia annulata	**2.04**	**P**						
Ablabesmyia mallochi	**7.19**	**P**						
Axarus sp.	***6**	**CG**						
Cardiocladius obscurus	**5.87**	**P**		1				1
Chironomus sp.	**9.63**	**CG**						
Coelotanypus tricolor	**8**	**P**						
Conchapelopia sp.	**8.42**	**P**	5	14	7	5		31
Corynoneura sp.	**6.01**	**CG**	1	1				2
Cricotopus sp.	***7**	**CG**						
Cryptochironomus fulvus	**6.38**	**P**						
Dicrotendipes sp.	**8.1**	**CG**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			DRAKES CREEK Mile 1.9					
			3OLD10050					
SPECIES	**T.V.****	**F.F.G.*****	**76305-1**	**76305-2**	**76305-3**	**76305-4**	**76305-5**	**TOTAL**
Epicocladius sp.	**0**	**CG**						
Eukiefferiella devonica gp.	**2.59**	**CG**	1					1
Glyptotendipes sp.	**9.47**	**FC**						
Nilotanypus sp.	**3.9**	**P**						
Polypedilum convictum	**4.93**	**SH**	10	4	3	15		32
Polypedilum fallax	**6.39**	**SH**						
Polypedilum halterale	**7.31**	**SH**			1			1
Polypedilum illinoense	**9**	**SH**						
Procladius bellus	**9.1**	**P**						
Psectrocladius sp.	**3.59**	**SH**	1	1				2
Rheotanytarsus sp.	**5.89**	**FC**	15	3		30		48
Stenochironomus sp.	**6.45**	**SH**						
Synorthocladius semivirens	**4.36**	**Cg**						
Tanytarsus sp.	**6.76**	**FC**	2	1	2	10		15
Thienemanniella xena	**5.86**	**CG**	2		1	10		13
Thienemannimyia gp.	**8.42**	**P**						
Zavrelia sp.	**5.3**	**CG**	27	19	28	20	30	124
Empididae								
Hemerodromia sp.	**7.57**	**P**						
Simuliidae								
Simulium sp.	**4**	**FC**						
Tipulidae								
Hexatoma sp.	**4.31**	**P**	1	2		1		4
Limnophila sp.	***4**	**P**			1			1
CHORDATA****								
Osteichthyes								
Perciformes								
Percidae								
Etheostoma sp.			1			1		2
Scorpaeniformes								
Cottidae								
Cottus carolinae			1					1
Cyprinodontiformes								
Poeciliidae								
Gambusia sp.								
TOTAL NO. OF ORGANISMS			**542**	**499**	**452**	**811**	**897**	**3201**
TOTAL NO. OF SPECIES			**36**	**27**	**28**	**28**	**18**	**51**

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BLEDSOE CREEK Mile 10.3					
			3OLD10054					
SPECIES	**T.V.****	**F.F.G.*****	**76306-1**	**76306-2**	**76306-3**	**76306-4**	**76306-5**	**TOTAL**
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae					1		1	2
Cura foremanii	**4.97**							
Phagocata sp.								
NEMATODA					1			1
MOLLUSCA								
Bivalvia								
Veneroida								
Corbicula fluminea	**6.12**	**FC**		11	5	53	8	77
Sphaeriidae			10					10
Pisidium sp.	**6.48**	**FC**						
Sphaerium sp.	**7.58**	**FC**						
Gastropoda								
Mesogastropoda								
Pleuroceridae								
Elimia sp.	**2.46**	**SC**	5					5
Elimia laqueata	**2.46**	**SC**	5	19	10	25	91	150
ANNELIDA								
Oligochaeta								
Haplotaxida								
Lumbricidae		**CG**	1			3		4
Tubificidae w.h.c.	**7.11**	**CG**						
Branchiura sowerbyi	**8.58**	**CG**						
Tubificidae w.o.h.c.	**7.11**	**CG**						
Limnodrilus cervix	**9.9**	**CG**						
Limnodrilus hoffmeisteri	**9.47**	**CG**						
Branchiobdellida								
Hirudinea								
Rhynchobdellida								
Glossiphoniidae	***8**	**P**						
Arhynchobdellida								
Erpodbellidae	***8**	**P**						
ARTHROPODA								
Arachnoidea								
Acariformes								
Sperchonidae								
Sperchon sp.	**5.53**		1					1
Crustacea								
Copepoda								
Cyclopoida								
Cladocera								
Daphnidae								

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BLEDSOE CREEK Mile 10.3					
			3OLD10054					
SPECIES	**T.V.****	**F.F.G.*****	**76306-1**	**76306-2**	**76306-3**	**76306-4**	**76306-5**	**TOTAL**
Daphnia lumholtzi								
Isopoda								
Asellidae								
Lirceus sp.	**7.85**	**CG**						
Amphipoda								
Crangonyctidae								
Crangonyx sp.	**7.87**	**CG**						
Decapoda								
Cambaridae								
Orconectes sp.	**2.6**	**SH**		1	1			2
Orconectes putnami	**2.6**	**SH**						
Insecta								
Ephemeroptera								
Baetidae				15				15
Baetis sp.	***4**	**CG**	21					21
Baetis intercalaris	**4.99**	**CG**		154	74	105	87	420
Centroptilum sp.	**6.6**	**CG**	5					5
Caenidae								
Caenis sp.	**7.41**	**CG**	75	52	25	52	30	234
Ephemeridae								
Hexagenia munda	**4.9**	**CG**						
Heptageniidae			5					5
Leucrocuta sp.	**2.4**	**SC**	39	27	14	18	27	125
Stenacron interpunctatum	**6.87**	**SC**						
Stenonema sp.	***4**	**SC**	33	21	9	24	34	121
Isonychiidae								
Isonychia sp.	**3.45**	**FC**		5	4	1	7	17
Leptophlebiidae								
Choroterpes sp.	***2**	**CG**	6					6
Potamanthidae								
Anthopotamus sp.	**1.53**	**CG**						
Tricorythidae								
Tricorythodes sp.	**5.06**	**CG**	271	30	31	61	29	422
Odonata								
Coenagrionidae								
Argia sp.	**8.17**	**P**	40		3	3	4	50
Plecoptera								
Leuctridae								
Leuctra sp.	**0.67**	**SH**					6	6
Megaloptera								
Corydalidae								
Corydalus cornutus	**5.16**	**P**		6	4		7	17
Nigronia serricornis	**4.95**	**P**						
Sialidae								
Sialis sp.	**7.17**	**PI**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BLEDSOE CREEK Mile 10.3					
			3OLD10054					
SPECIES	T.V.**	F.F.G.***	76306-1	76306-2	76306-3	76306-4	76306-5	TOTAL
Hemiptera								
Veliidae								
Rhagovelia obesa		**P**						
Trichoptera								
Helicopsychidae								
Helicopsyche borealis	**0**	**SC**			1			1
Hydroptilidae								
Hydroptila sp.	**6.22**	**PI**						
Hydropsychidae					1			1
Cheumatopsyche sp.	**6.22**	**FC**	12	81	47	10	30	180
Hydropsyche betteni gp.	**7.78**	**FC**						
Hydropsyche sp.	***5**	**FC**						
Leptoceridae								
Oecetis sp.	**4.7**	**P**						
Philopotamidae								
Chimarra sp.	**2.76**	**FC**	11	63	43	4	23	144
Polycentropodidae								
Cyrnellus fraternus	**7.34**	**FC**						
Coleoptera								
Elmidae								
Optioservus sp.	**2.36**	**SC**						
Stenelmis sp.	**5.1**	**SC**	155	51	126	103	54	489
Hydrophilidae	**8.43**	**CG**						
Berosus sp.	**8.43**	**CG**						
Psephenidae								
Ectopria sp.	**4.16**	**SC**						
Psephenus herricki	**2.35**	**SC**	30	10	6	4	40	90
Staphylinidae						3		3
Diptera								
Ceratopogonidae								
Bezzia/Palpomyia gp.	**6.86**	**P**						
Chaoboridae								
Chaoborus punctipennis	**8.5**	**P**						
Chironomidae			15	9	4	3	2	33
Ablabesmyia annulata	**2.04**	**P**						
Ablabesmyia mallochi	**7.19**	**P**						
Axarus sp.	***6**	**CG**						
Cardiocladius obscurus	**5.87**	**P**						
Chironomus sp.	**9.63**	**CG**						
Coelotanypus tricolor	**8**	**P**						
Conchapelopia sp.	**8.42**	**P**	23	11	21	5	17	77
Corynoneura sp.	**6.01**	**CG**			2			2
Cricotopus sp.	***7**	**CG**					2	2
Cryptochironomus fulvus	**6.38**	**P**				3		3
Dicrotendipes sp.	**8.1**	**CG**						

TABLE 1A. BENTHIC MACROINVERTEBRATES, OLD HICKORY DRAINAGE, OCTOBER 1997.								
			BLEDSOE CREEK Mile 10.3					
			3OLD10054					
SPECIES	**T.V.****	**F.F.G.*****	**76306-1**	**76306-2**	**76306-3**	**76306-4**	**76306-5**	**TOTAL**
Epicocladius sp.	**0**	**CG**						
Eukiefferiella devonica gp.	**2.59**	**CG**						
Glyptotendipes sp.	**9.47**	**FC**						
Nilotanypus sp.	**3.9**	**P**		1	2	1		4
Polypedilum convictum	**4.93**	**SH**	11	45	154	20	6	236
Polypedilum fallax	**6.39**	**SH**						
Polypedilum halterale	**7.31**	**SH**						
Polypedilum illinoense	**9**	**SH**					11	11
Procladius bellus	**9.1**	**P**						
Psectrocladius sp.	**3.59**	**SH**						
Rheotanytarsus sp.	**5.89**	**FC**		4	40		3	47
Stenochironomus sp.	**6.45**	**SH**						
Synorthocladius semivirens	**4.36**	**Cg**						
Tanytarsus sp.	**6.76**	**FC**	5		17	13	5	40
Thienemanniella xena	**5.86**	**CG**		1	6		4	11
Thienemannimyia gp.	**8.42**	**P**						
Zavrelia sp.	**5.3**	**CG**	30	1			2	33
Empididae							2	2
Hemerodromia sp.	**7.57**	**P**			1	3	2	6
Simuliidae								
Simulium sp.	**4**	**FC**						
Tipulidae								
Hexatoma sp.	**4.31**	**P**			1			1
Limnophila sp.	***4**	**P**				7		7
CHORDATA****								
Osteichthyes								
Perciformes								
Percidae								
Etheostoma sp.			1	1				2
Scorpaeniformes								
Cottidae								
Cottus carolinae								
Cyprinodontiformes								
Poeciliidae								
Gambusia sp.								
TOTAL NO. OF ORGANISMS			**809**	**618**	**654**	**524**	**534**	**3139**
TOTAL NO. OF SPECIES			**23**	**22**	**29**	**23**	**27**	**46**