Instream Biological Assessment of NPDES Point Source Discharges at the Savannah River Site, 1997-1998

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Executive Summary

Fish and macroinvertebrates were collected at unimpacted reference locations and downstream of NPDES discharges in Upper Three Runs and its tributaries, Fourmile Branch, Pen Branch/Indian Grave Branch, and Steel Creek to determine if the receiving streams have been impacted by the NPDES discharges. The results of the macroinvertebrate and fish surveys conducted during this study were generally in close agreement. Both indicated that most SRS streams were characterized by high biotic integrity and unaffected by SRS NPDES discharges. A prominent exception was Crouch Branch which, as indicated by both the macroinvertebrate and fish data, was significantly degraded. Further research will be required to determine whether this degradation was related to NPDES discharges, habitat, or other factors. Degradation was also observed in upper Fourmile Branch and upper Steel Creek, but in these cases was probably related to factors other than NPDES discharges. Factors that may have depressed biotic integrity in these streams reaches included previous thermal impacts, reservoir impoundment related effects, possible construction impacts, and naturally occurring habitat factors.

1.0 Introduction

The Savannah River Site (SRS) currently has 33 permitted NPDES outfalls that that have been permitted by the South Carolina Department of Health and Environmental Control (SCDHEC) to discharge to SRS streams and the Savannah River. In order to determine the cumulative impacts of these discharges to the receiving streams, a study plan was developed to perform in-stream assessments of the fish assemblages, macroinvertebrate assemblages, and habitats of the receiving streams. These studies were designed to detect biological impacts due to point source discharges. Sampling was conducted between November 1997 and July 1998. Sampling will be repeated in 2000. A total of 18 locations were sampled (Table 1, Figure 1). Sampling locations for fish and macroinvertebrates were generally the same. However, different locations were sampled for fish (Road A-2) and macroinvertebrates (Road C) in the lower portion of Upper Three Runs, to avoid interference with ongoing fisheries studies at Road C. Also, fish were sampled in Fourmile Branch at Road 4 rather than at Road F because the stream at Road F was too narrow and shallow to support many fish. Sampling locations and parameters are detailed in Sections 2 and 3 of this report. In general, sampling locations were selected that would permit comparisons upstream and downstream of NPDES outfalls. In instances where this approach was not feasible because effluents discharge into the headwaters of a stream, appropriate unimpacted reference were used for comparison purposes.

2.0 Descriptions of Streams, Effluents, and Sampling Locations.

2.1 Upper Three Runs and Its Tributaries

Upper Three Runs is a fifth order stream that originates approximately 12 km north of the northern boundary of SRS and flows generally south, entering the Savannah River at River Mile (RM) 157.2 (Figure 1). Tributaries of Upper Three Runs that enter the stream along its flow path from north to south through the Savannah River Site include Tinker Creek, with its major tributaries of Mill Creek, Reedy Branch and McQueen

Table 1. Sampling Locations for NPDES Biological Monitoring

LOCATION	SITE #	STATUS
Upper Three Runs Watershed		
Upper Three Runs, Road 8-1 (macroinvertebrates only)	3	Reference
Upper Three Runs, Tyler Bridge (fish only)	17	Reference
Upper Three Runs, Road C (macroinvertebrates only)	2	Downstream from all discharges
Upper Three Runs, near Road A-2 (fish only)	18	Downstream from all discharges
Tims Branch near Road 2	1	Downstream from all discharges
Mill Creek, Monroe Owens Road	4	Reference
McQueen Branch near Z-Area	5	Downstream from all discharges
Crouch Branch, Road 4	6	Downstream from all discharges
Fourmile Branch Watershed		
Fourmile Branch, Road F (macroinvertebrates only)	7	Reference
Fourmile Branch Road 4 (fish only)	19	Downstream from H-Area
Fourmile Branch, Road C	8	Downstream from F/H Areas
Fourmile Branch, Road A-7	9	Downstream from all discharges but C-Area
Fourmile Branch, Road A	16	Downstream from all discharges
Pen Branch Watershed		
Pen Branch, Road C	10	Reference
Pen Branch, Road B	11	Reference
Indian Grave Br. near cooling tower	12	Downstream from all discharges
Pen Branch, Road A	13	Downstream from all discharges
Steel Creek Watershed		
Steel Creek, near Road C	14	Downstream from P-Area; upstream from L Lake
Meyers Branch, Old Dunbarton Rd.	15	Reference

Branch; Crouch Branch; and Tims Branch. With the exception of McQueen Branch, which enters Tinker Creek just before its confluence with Upper Three Runs, Tinker Creek and its tributaries have been largely uninfluenced by SRS activities, and these streams receive no NPDES discharges.

McQueen Branch originates just east of H-Area and flows generally northwest for about 4 km to its confluence with Tinker Creek. As shown in Table 2, McQueen Branch receives the discharge from the H-07 and S-04 NPDES discharges. These discharges

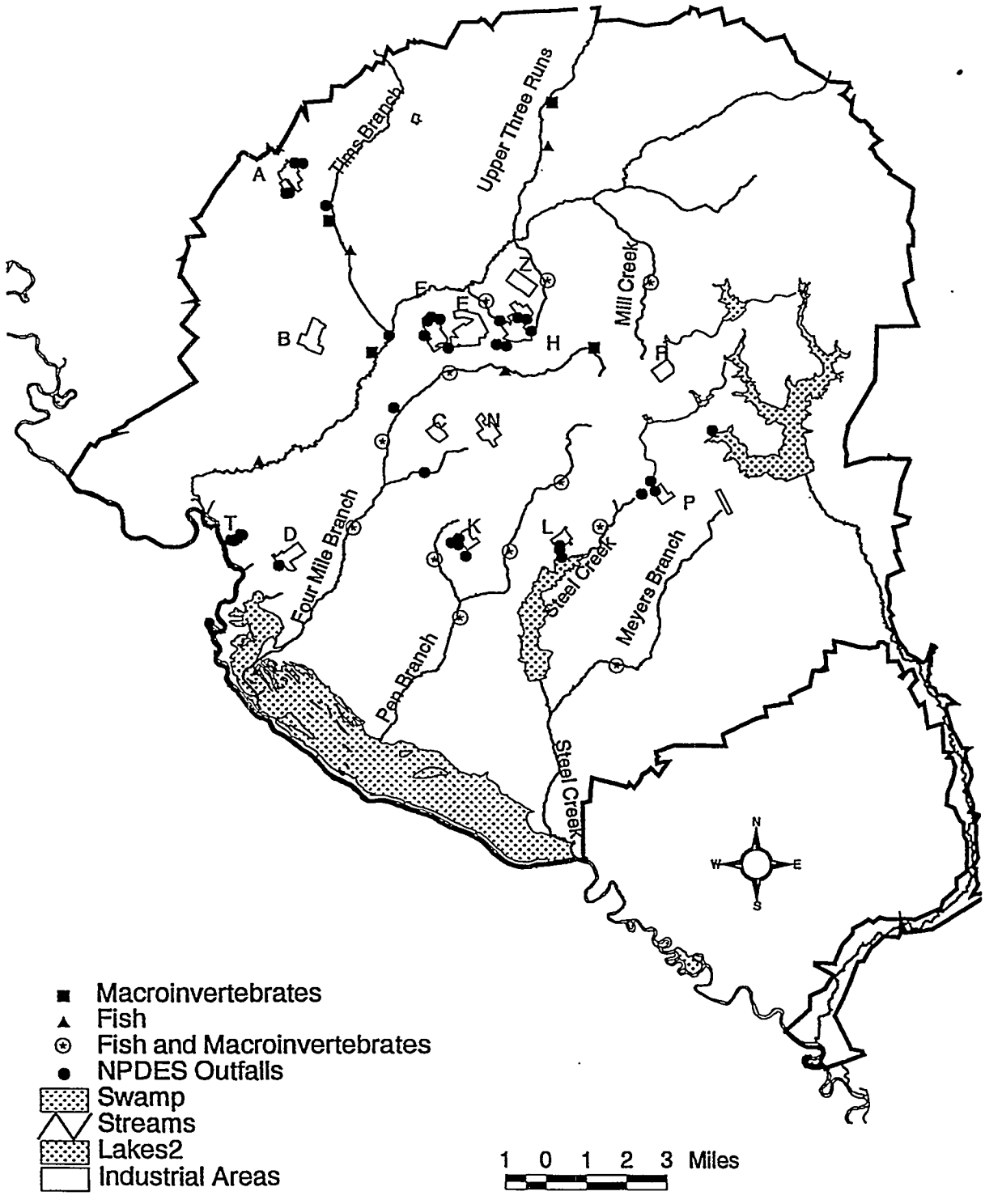

Figure 1. Map of the Savannah River site showing sampling stations for fish and macroinvertebrates

Table 2. SRS NPDES Outfalls, Receiving Streams and Contributing Waste Streams

Outfall	Receiving Stream	Inputs
Upper Three Runs Watershed		
A-01	Tims Branch	cooling water, lab drains, air stripper effluent from A-01A, steam & A/C condensates
A-01A	Tims Branch via A-01	air stripper
A-11	Tims Branch	floor drains, condensate. Well flush water, cooling water, treated wastewater from M-04 and M-05
M-04	Tims Branch via A-11	LETF process wastewater
M-05	Tims Branch via A-11	air stripper effluent
F-01	UTR tributary	cooling water, blowdown, storm water
F-02	UTR tributary	cooling water, blowdown, storm water
F-03	UTR tributary	cooling water, steam condensate, blowdown, process water
F-05	UTR tributary	cooling water, steam condensate, storm water
H-02	Crouch Branch	cooling water, storm water
H-04	Crouch Branch	cooling water, storm water, CIF wastewater, steam condensate
H-07	McQueen Branch	cooling water, blowdown, storm water
S-04	McQueen Br. tributary	neutralization waste water, cooling water, storm water
H-16	UTR	F/H ETF
Beaver Dam Creek Watershed		
D-01A	BDC via D-01	sanitary effluent
Fourmile Branch Watershed		
F-08	FMB tributary	cooling water, steam condensate, process wastewater, laundry effluent, water tank overflow, storm water
G-10	FMB	sanitary
H-08	FMB tributary	cooling water, steam condensate, ash basin, lab drains, storm water
H-12	FMB tributary	cooling water, ITP neutralized flush water, storm water
Pen Branch Watershed		
K-06	IGB tributary	cooling water, blowdown, powerhouse waste, storm water
K-10	IBG	Infrequent diversion from K-18
K-12	IGB via K-18	sanitary
K-18	IGB	186 basins, cooling water, sanitary from K-12
Steel Creek Watershed		
L-07	L-Lake	sanitary from L-07A, 186 basins, floor drains, storm water
L-07A	L-Lake via L-07	sanitary
L-08	L-Lake	cooling water, storm water
Lower Three Runs Watershed		
PP-01	Par Pond	rinse water and backwash from drinking water filter system
Savannah River		
X-04	SR swamp	welding quench sink water, steam condensate, storm water
X-08	SR	cooling water, sanitary from X-08A, process water, TNX ETF effluent from X-08B, air stripper effluent from X-08C
X-08A	SR via X-08	sanitary
X-08B	SR via X-08	TNX ETF effluent
X-08C	SR via X-08	air stripper effluent
X-19	SR	treated groundwater

UTR- Upper Three Runs; BDC- Beaver Dam Creek; FMB- Fourmile Branch; IGB- Indian Grave Branch; SR- Savannah River

consist primarily of neutralized wastewater, cooling water and storm water. McQueen Branch was also impacted by scouring and siltation during construction of the DWPF during the 1980's and early 1990's. Crouch Branch is a small tributary of Upper Three Runs that originates just northwest of H-Area and flows northwest for about 2 km to Upper Three Runs.

Crouch Branch receives NPDES discharges from the H-02 and H-04 outfalls, which primarily contain cooling water, steam condensate, Consolidated Incinerator Facility (CIF) treated wastewater, and stormwater. Crouch Branch was also impacted by scouring and siltation during construction of the DWPF.

Tims Branch originates near A Area and flows southeast for about 8 km, entering Upper Three Runs just upstream from the Road C bridge. Tims Branch is the receiving stream for 5 NPDES outfalls (A-01, A-01A, A-11, M-04, and M-05), and a large portion of the flow in Tims Branch is comprised of NPDES effluents. These effluents include cooling water condensates, and water from lab drains, floor drains, two air strippers, an effluent treatment facility, and various other sources (see Table 2). Tims Branch also received inputs of metals from M Area during its early years of operation, and some of the metals (primarily aluminum, nickel, and uranium) are present in elevated concentrations in the depositional areas of Tims Branch.

Four NPDES discharges from F-Area (F-01, F-02, F-03 and F-05), consisting mainly of noncontact cooling water, blowdown, and steam condensate are discharged to flow paths that lead to Upper Three Runs. The H-16 outfall, which is the effluent from the F/H Effluent Treatment Facility (ETF) is the only NPDES outfall that discharges directly into Upper Three Runs. H-16 enters the stream just downstream from the Road C bridge. All NPDES effluents enter the portion of Upper Three Runs between its confluence with Tinker Creek and just downstream from the Road C bridge. In all, 14 NPDES outfalls enter the Upper Three Runs watershed (see Table 2).

Upstream reference locations in the Upper Three Runs were the Road 8-1 bridge (macroinvertebrates only) and Tyler Bridge (fish only). Fish were sampled at Tyler Bridge instead of Road 8-1 because fish are routinely collected at Road 8-1 by the Environmental Monitoring Section (EMS) of WSRC, which may alter the community structure of the fish community at this location. Sampling locations located downstream from SRS discharges include the Road C bridge (macroinvertebrates only), which is just downstream from the most-downstream NPDES discharge (H-16) as well as just downstream from Tims Branch, the most downstream tributary that contains NPDES discharges (Figure 1, Table 2) and near Road A-2 (fish only). Fish were sampled near Road A-2 instead of Road C because EMS also collects fish at Road C. Also sampled were McQueen Branch behind Z-Area, Crouch Branch at Road 4, and Tims Branch near Road 2. Upstream reference locations for these streams were not available, since effluents discharge into the headwaters of all three of these tributaries. However, Mill Creek, an unimpacted tributary of Upper Three Runs, was sampled as a reference location for the tributaries of Upper Three Runs.

2.2 Fourmile Branch

Fourmile Branch is a third order stream that originates southeast of H-Area and flows generally west and southwest for about 25 km, entering the Savannah River at RM 150.6, just across the river from the Vogtle Nuclear Power Plant. The first five km of the stream receive no NPDES discharges. Four NPDES outfalls (F-08, G-10, H-08 and H-12) discharge to Fourmile Branch and all of the discharges are to the portion of the stream located between just upstream from Road 4 to approximately 1 km upstream from Road A-7. NPDES discharges to the stream include cooling water, ash basin overflows, treated sanitary waste from the new central sanitary treatment plant, storm water and other miscellaneous sources (see Table 2). Fourmile Branch also receives inputs from the F/H seepline, which is primarily encompassed by the area between Roads 4 and C-4. Shallow groundwater from the old F/H seepage basins and the old Burial Ground outcrops near this section of Fourmile Branch. This water contains elevated levels of tritium, as well as above-background concentrations of some metals and other contaminants. The portion of Fourmile Branch from approximately 0.5 km downstream from Road 3 to the Savannah River was subject to very high temperatures and flows until 1984, when the operation of C Reactor was discontinued. The habitat of the post-thermal streams still differs substantially from the habitat in streams that were not exposed to high temperatures and flows, primarily with respect to canopy cover, the composition of stream substrate, in-stream structure (size and amount of woody debris, etc.), and riparian vegetation. These habitat differences have had lasting influence on the biotic communities of the post-thermal streams.

Sampling locations in Fourmile Branch included Road F, which is upstream from all SRS discharges; Road C, which is downstream from the H-Area discharges; Road A-7 which is downstream from the F-Area outfall and sanitary treatment plant, but upstream of where the C-Area outfalls previously entered Fourmile Branch, and Road A, which is downstream from all SRS discharges, and is a post-thermal location.

2.3 Pen Branch/Indian Grave Branch

Pen Branch is a third order stream that originates near the intersection of Roads F and 6 and flows generally southwest for approximately 17 km to the Savannah River swamp, exiting the swamp to the Savannah River via Steel Creek. Indian Grave Branch is a small tributary of Pen Branch that is located just west of K Area. It is about 4 km long and flows generally south, merging with Pen Branch approximately one km upstream of Road A. Four NPDES discharges (K-06, K-10, K-12, and K-18) enter Indian Grave Branch from K Area (Table 2); no effluents discharge directly to Pen Branch. The discharges to Indian Grave Branch consist primarily of cooling water, powerhouse waste, storm water, and a small quantity of treated sanitary effluent. Indian Grave Branch was also the receiving stream for the thermal discharge from K Reactor, which operated until 1988. Like Fourmile Branch, Indian Grave Branch and the portion of Pen Branch that was impacted by thermal discharge have very different habitat than the non-thermal streams. These habitat differences need to be considered when interpreting biological data from the post-thermal streams.

Sampling locations in Pen Branch and Indian Grave Branch included Pen Branch at Roads C and B, which are both upstream from all SRS discharges, Pen Branch at

Road A, which is downstream from Indian Grave Branch and all SRS discharges, and Indian Grave Branch near the cooling tower, which is downstream of all existing K-Area NPDES discharges to this tributary. Because effluents discharge into the headwaters of the stream, no upstream reference location could be sampled in Indian Grave Branch.

2.4 Steel Creek/Meyers Branch

Steel Creek is a third order stream that originates west of P Reactor and flows south for about 18 km, entering the Savannah River at RM 141.6. A portion of Steel Creek was impounded in 1985 to form L Lake, a 1000 acre cooling reservoir. The lake has not received thermal discharges since 1988. Meyers Branch is a major tributary of Steel Creek that originates east of P Reactor and flows generally southwest for about 12 km, merging with Steel Creek approximately one km downstream from the L-Lake dam. Steel Creek is the receiving stream for three NPDES outfalls (L-07, L-07A, and L-08; Table 2). The discharges consist primarily of cooling water, building drains, stormwater, and a small volume of treated sanitary effluent. Meyers Branch has been largely unimpacted by SRS activities. In the past, small quantities of effluent were discharged into the swamp near the headwaters of Meyers Branch, but the stream presently receives no NPDES discharges.

Sampling locations in Steel Creek and Meyers Branch included Steel Creek near Road C, which is downstream from the P-Area discharges into Steel Creek and Meyers Branch at old Dunbarton Road. Two NPDES outfalls from L Area discharge to L Lake, which is located downstream from the sampling location in Steel Creek. However, the volume of the discharges is small and would be diluted by the entire volume of L Lake prior to discharging into lower Steel Creek. Lower Steel Creek was not sampled because previous studies indicated that the stream community was influenced by the lentic community of L Lake, and it would be impossible to distinguish between possible outfall impacts and the greater influence of L Lake discharges into the stream. Meyers Branch at old Dunbarton Road was sampled as a reference location for Steel Creek and some of the other sampling locations.

2.5 Other Water Bodies/NPDES Discharges

A number of NPDES outfalls discharge to other locations on the SRS (Table 2). Outfall D-01A consists of treated sanitary discharge that is discharged to the D-01 outfall. Outfall PP-01 consists of a very small amount of backwash water from a drinking water filter system at the Par Pond laboratory that discharges to Par Pond. However, neither Beaver Dam Creek nor Par Pond/Lower Three Runs were included in the permit condition that requires biological sampling. Six outfalls from TNX discharge indirectly to the Savannah River. Due to the small volume of effluent in relation to the large dilution factor provided by the river, and because previous studies have not detected any impact from SRS operations to the Savannah River, studies in the Savannah River were not included in this study, but a discussion of previous biological studies conducted on the Savannah River is presented in Section 4.5.

3.0 Methods

3.1 Habitat Evaluation/Water Chemistry

Physical habitat data were collected from each fish assemblage sample site to assist in the interpretation of the biological data. These data were collected from transects running across the stream perpendicular to the direction of water flow. Except at the sample sites in Upper Three Runs, there were three transects evenly spaced within each 50 m section for a total of nine habitat transects per site. Because of the difficulty in obtaining habitat data from Upper Three Runs, which was comparatively deep and wide, there were only two evenly spaced habitat transects per site in this stream. The following habitat data were collected at each transect:

1) Stream width (distance from waters edge to waters edge).
2) Depth of the stream (nearest 0.01 m) at a minimum of approximately 20%, 40%, 60%, and 80% of the distance from the left bank to the right bank.
3) Current velocity (cm/s) at each point where depth was measured. Where depth equaled or exceeded 0.6 m, two current velocity measurements were taken, one at 0.2 times the depth and one at 0.8 times the depth. Where the depth was less than 0.6 m, only one measurement was taken at 0.6 times the distance from the surface.
4) Predominant substrate types (mud, sand, gravel, rocks) in the vicinity of the transect (i.e., 3 m upstream from the transect and 3 m downstream from the transect). Visual estimate.
5) Bottom area (nearest 5%) covered by debris (detritus and leaves). Visual estimate.
6) Number of logs (i.e., recumbent wood in excess of 6 cm in diameter) in the vicinity of the transect.
7) Number of stumps in the vicinity of the transect.
8) Number of cypress knees in the vicinity of the transect.
9) Bottom area (nearest 5%) covered by fibrous root systems. Visual estimate.
10) Bottom area (nearest 5%) covered by brush piles/log jams. Visual estimate.
11) Aquatic macrophyte cover (nearest 5%) and the predominant types (submerged, emergent, floating) in the vicinity of the transect. Visual estimate.
12) Amount of stream surface (nearest 5%) overhung by low growing riparian vegetation (e.g. shrubs, grasses, and small trees) in the vicinity of the transect. Visual estimate.
13) Canopy cover (nearest 5%) and the predominant canopy types (cypress/tupelo forest, hardwood forest, pine forest) in the vicinity of the transect. Visual estimate.
14) Bank erosion on a scale of zero (none) to severe (three). Visual Estimate.

To maintain consistency and facilitate comparisons among sample reaches, all habitat variables requiring visual estimation (i.e., 4, 5, 8, 9, 10, 11, and 12) were recorded by the same person.

Physical and chemical data collected in conjunction with the biological data included water temperature, dissolved oxygen, pH and specific conductance. These data were collected by ETT Environmental, Greenville, SC (SCDHEC Certification # 23104) at the time that the multiplate samples were retrieved. Temperature was measured to the nearest degree using a mercury thermometer, dissolved oxygen was measured using a YSI Model 51B dissolved oxygen meter, pH was measured using a Fisher Model 1001

pH meter, and specific conductance was measured using a VWR Model 604 conductivity meter.

3.2 Macroinvertebrates

3.2.1 Sampling Methods

Sampling and identification of macroinvertebrates for this sampling program were performed by ETT Environmental (SCDHEC Certification # 23104). At each sampling location, five replicate Hester-Dendy multiplate samplers (Figure 2), each having a surface area of 0.179 m^2 were deployed and allowed to colonize for 28 days. The samplers were retrieved and returned to the laboratory for processing. In the laboratory, the samplers were disassembled and organisms gently removed from the plates using a soft brush or a stream of water from a wash bottle. Organisms were preserved in 70% ethanol until identified to the lowest practical taxon (usually genus).

Although multiplate samplers provide a uniform substrate for macroinvertebrate sampling, the species composition and relative abundance of macroinvertebrate assemblages collected from multiplate samplers differ from natural substrates. Some taxa are over-represented on multiplate samplers, while other taxa are under-represented or completely absent. In order to perform a thorough assessment of the macroinvertebrate community at each sampling site, qualitative sampling of natural substrates was also performed. At the time that the multiplates were retrieved, sampling of natural substrates (leaf packs, snags, root mats, woody debris, etc.) present at the sampling site was performed for one man hour per sampling station, and macroinvertebrates present on the substrates were collected, preserved, and returned to the laboratory for identification.

3.2.2 Data Analysis

Descriptive Parameters - The multiplate data was analyzed for the parameters listed in Table 3. In addition, the total number of taxa collected from each location was tallied for the quantitative and qualitative data combined.

Statistical Analyses - Although data were collected from six locations that are upstream from all SRS discharges, data from two of the locations were not included in the statistical analyses. Upper Three Runs at Road 8-1 was excluded because Upper Three Runs is a much larger stream (fifth order) than the other streams that were sampled (mostly second and third order). However, this location was used as a comparison for the downstream location on Upper Three Runs (Road C). Data from Fourmile Branch at Road F were excluded because data from this location indicated obvious perturbation, probably due to low dissolved oxygen concentrations. Multiplate data from the four remaining reference stations were compared to stations that are downstream from SRS NPDES outfalls. Because the data were not normally distributed and/or did not have homogenous variances, nonparametric tests were performed, using the Kruskal-Wallis one way ANOVA on ranks. Parameters that were compared included total number of taxa, total number of EPT taxa, density of organisms, and NCBI. Details of the statistical analyses are presented in Appendix A.

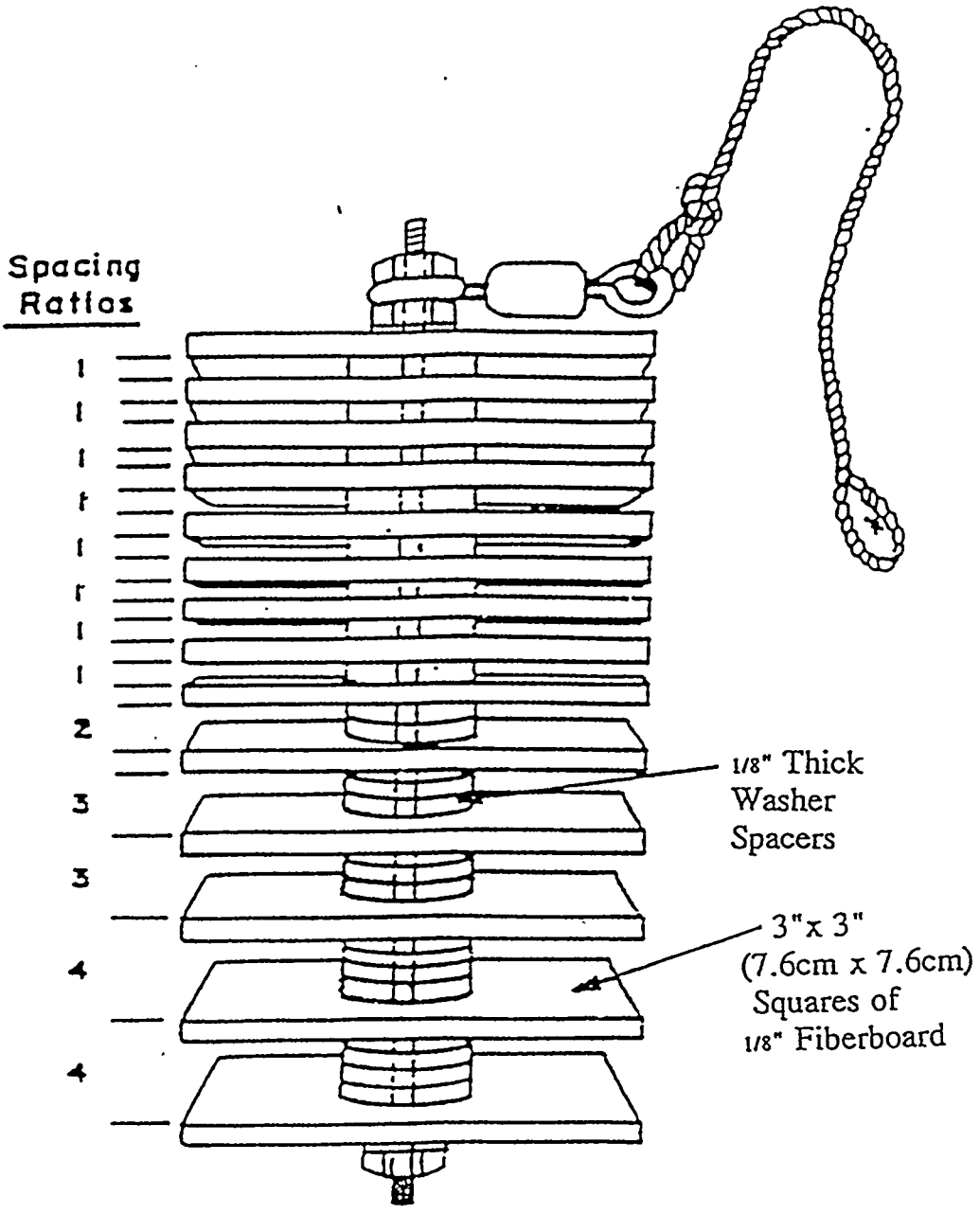

Figure 2. Hester-Dendy Multiplate Sampler

Table 3. Metrics for Macroinvertebrate Multiplate and Qualitative Data

Quantitative (Multiplate) Data

Total number of taxa
Mean Number of taxa/sampler
Mean density of organisms (number/m^2)
Biomass (g ash-free dry weight/m^2)
Total number of EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa
Relative abundance (%) of major taxonomic groups
Relative abundance (%) of functional feeding groups
Relative abundance (%) of functional feeding group biomass
Listing of dominant taxa (>5% abundance)
North Carolina Biotic Index (NCBI; Lenat, 1993)

Qualitative Data

Total number of taxa
Total number of EPT taxa
North Carolina Biotic Index (NCBI)

3.3 Fish

3.3.1 Sampling Methods

Fish assemblages were sampled at 16 sites. Five of these (one in Mill Creek, one in Meyers Branch, two in Pen Branch, and one in Upper Three Runs) were located upstream from SRS NPDES outfalls (Figure 1). The other sites were located in areas potentially impacted by SRS NPDES discharges. With the exception of the uppermost portion of Four Mile Creek, all stream reaches sampled for macroinvertebrates were also sampled for fish; although, in some cases, the exact locations sampled differed somewhat (Figure 1). Reasons for differences between fish and macroinvertebrate sampling locations will be discussed in greater detail later in this report.

Three 50 m stream segments were electrofished at each sample site. All sites except for those in Upper Three Runs were sampled with a Coffelt backpack electrofisher powered by a generator, a Smith-Root backpack electrofisher powered by a battery, or a Smith-Root backpack electrofisher powered by a generator. A single pass was made through each 50 m segment at each site while moving upstream. All microhabitats were carefully sampled in an effort to obtain as many species and individuals as possible by collecting them with dip nets after they had been stunned by DC current. At relatively narrow sites (under 4-5 m) we used one backpack electrofisher and a two or three person crew. At wider sites, two back pack electrofishers and two crews were used, with a crew covering each bank as both moved upstream simultaneously. To sample Upper Three Runs, the widest (up to 20 m in the sample areas) and deepest stream (up to 2.1 m), a 4.5 m boat with a boat mounted generator and a Smith-Root

electrofisher was used. Each bank was sampled separately in Upper Three Runs using the previously described protocol. All fish were identified to species and released.

3.3.2 Data Analysis

Fish assemblage data were analyzed using the Index of Biotic Integrity (IBI). The IBI is a bioassessment method used to assess the biotic integrity of streams. Biotic integrity is the ability of a stream to support a self sustaining biological community and ecological processes typical of undisturbed, natural conditions (Angermeier and Karr 1994). The IBI uses fish assemblage data to assess biotic integrity. It is composed of a number of community, population, and organism level variables that are ecologically important and sensitive to environmental disturbances of various types. These variables are measured at assessment sites, compared to those in a range of similar but undisturbed benchmark streams, and the results summarized in a single number that reflects the extent to which the assessment site resembles the benchmark. The IBI has been endorsed by the USEPA (Plafkin et al. 1989) and has been adapted for use throughout the United States and in a number of foreign countries. It has been modified for use in SRS streams where it accurately discriminated undisturbed sites from sites affected by physical habitat alterations and chemical pollution (Paller et al. 1996).

The IBI was calculated using methods presented in Paller et al. 1996 and Paller and Dyer 1997. IBI metrics and scoring criteria for the metrics are listed in Table 4. This methodology adjusts for differences in stream size and sample area making it possible to directly compare IBI values from streams and sample areas of different size. The highest IBI value that can be obtained using the methods of Paller et al. (1996) is 50. The IBI was calculated for each 50 m segment at each location. The statistical significance of differences between the average IBI at the undisturbed sample sites and the average IBI at the sample receiving NPDES discharges was assessed with the Kruskal-Wallis test ($P \leq 0.05$). In addition, the average IBI at each sample site was compared to IBI values at 29 undisturbed locations sampled during previous sampling programs. This data (hereafter referred to as historical data) is described more fully in Paller and Dyer (1997).

4.0 Results

4.1 Upper Three Runs Watershed

4.1.1 Macroinvertebrates

As discussed in Section 2.1, sampling was performed at two locations in Upper Three Runs: Road 8-1, which is upstream from all NPDES discharges to the stream and just downstream from Road C, which is downstream from all NPDES discharges and tributaries that receive discharges. With respect to most of the parameters that were measured, the Road C site appears to support a more diverse and higher quality macroinvertebrate community than the Road 8-1 site. The total number of taxa collected, for qualitative and quantitative sampling combined was 81 at Road C and 51 at Road 8-1 (Table 5). A total of 16 EPT taxa were collected from multiplate samplers at Road C, as compared to 15 at Road 8-1. However, the NC biotic index for

Table 4. Metrics and scoring criteria used in the Index of Biotic Integrity (IBI) as modified by Paller et al (1995). The modified IBI is calculated by summing the scores for the individual metrics.

Metrics	Scoring criteria 1	3	5
Species richness			
Adjusted number species[a]	<70	70-90	>90
Adjusted number cyprinid species[a]	<55	55-80	>80
Adjusted number piscivorous species[a]	<65	65-85	>85
Number darter species	0	1-2	≥3
Number madtom species	0	1	≥2
Number intolerant species	0	1	≥2
Species composition			
Percent tolerant species	>15	5-15	<5
Percent sunfish species	>45	25-45	<25
Trophic composition			
Percent insectivorous cyprinids	<20	20-35	>35
Percent generalized insectivores	>75	50-75	<50
Fish abundance (Number/100 $m^{2)}$			
Stream orders 1-3, ≥4 passes	<25		≥25
Stream orders 1-3, 1 pass	<10		≥10
Stream order 4, ≥4 passes	<5		≥5
Stream order 4, 1 pass		<2	
Fish condition			
Percent with disease or anomalies	>5	>2-5	0-2

[a] Species number expressed as a percentage of the number of species expected in an unimpacted stream after adjusting for the effects of sample area, stream order, and sampling effort (Paller et al. 1995). Maximum percentage equals 100.

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the multiplate data was lower (better) at Road 8-1 (3.70) than at Road C (4.84). Dominant groups of taxa at both locations included dipteran midges, Trichoptera, Plecoptera, and Ephemeroptera (Table 6). The mean density of macroinvertebrates on multiplate samplers was higher at Road C (232 organisms/m^2) than at Road 8-1 (93.3 organisms/m^2), but biomass (ash-free dry weight) was similar at both sites, equaling 0.2590 g/m^2 at Road 8-1 and 0.2582 g/m^2 at Road C. With respect to functional feeding groups, shredders were abundant at both locations (32.3% at Road C ; 35.7% at Road 8-1),but collector-gatherers were more abundant at Road C (40%) than at Road 8-1, while collector-filterers were more abundant at Road 8-1 (32.7%) than at Road C (11%). An abundance of collector-filterers is often an indication of organic

Table 5. Summary of Macroinvertebrate Data, Upper Three Runs and Tributaries, November 1997

	Upper Three Runs at Rd. 8-1	Upper Three Runs at Rd. C	Mill Creek at Telephone Cable Crossing	Tims Branch Rd. 2	McQueens Br. near Z Area	Crouch Br. Rd. 4
	Site 3	Site 2	Site 4	Site 1	Site 5	Site 6
MULTIPLATE (QUANTITATIVE DATA)						
Total # species	27	37	20	17	11	5
Mean # species/replicate	5.4	7.4	4.0	3.4	2.2	1.0
EPT Index	15	16	9	3	5	0
Density (organisms/m^2)	93.3	232.0	112.0	73.3	53.3	8.9
Total biomass (g/m^2)	0.2590	0.2582	0.0518	1.0685	0.0317	0.0006
NC Biotic Index	3.70	4.84	4.87	6.72	5.18	8.88
Relative Abundance of Major Taxonomic Groups						
Annelida (worms)	0.0	0.5	0.0	25.8	0.0	0.0
Mollusca (clams, snails)	0.0	0.0	0.0	0.0	0.0	0.0
Crustacea	0.0	0.0	0.0	0.0	0.0	0.0
Ephemeroptera	10.7	11.0	55.4	1.5	64.6	0.0
Plecoptera	34.5	18.2	21.8	0.0	8.3	0.0
Trichoptera	23.8	9.6	5.0	9.1	10.4	0.0
Odonata	1.2	0.0	1.0	0.0	0.0	25.0
Hemiptera		0.0	0.0	0.0	0.0	0.0
Coleoptera	2.4	1.9	1.0	0.0	0.0	0.0
Diptera (excluding midges)	8.3	1.0	0.0	22.7	0.0	0.0
Diptera (midges)	16.7	57.9	12.9	39.4	12.5	75.0
Chironomini	3.6	6.2	8.9	1.5	0.0	62.5
Orthocladiinae	3.6	45.9	2.0	12.1	12.5	0.0
Tanypodinae	1.2	0.0	2.0	10.6	0.0	12.5
Tanytarsini	8.3	5.7	0.0	15.2	0.0	0.0
Other	2.4	0.0	2.9	1.5	4.2	0.0
Relative Abundance of Functional Feeding Groups						
Collector-gatherers	10.7	40.0	36.6	37.1	52.1	25.0
Collector-filterers	32.7	11.0	0.0	45.5	2.1	0.0
Predators	15.5	11.5	12.9	12.1	6.3	37.5
Scrapers	5.4	6.0	28.2	0.8	32.3	0.0
Shredders	35.7	32.3	24.3	4.5	7.3	37.5
Relative Abundance of Functional Feeding Group Biomass						
Collector-gatherers	0.3	7.8	22.6	0.3	26.4	<0.1
Collector-filterers	3.3	4.9	<0.1	0.8	2.0	<0.1
Predators	94.5	54.3	50.8	98.9	42.3	100.0
Scrapers	1.6	6.8	22.6	<0.1	26.4	<0.1
Shredders	0.3	26.2	4.1	<0.1	2.9	<0.1
QUALITATIVE DATA						
total # species	41	61	39	33	33	3
EPT Index	18	20	9	3	12	0
NC Biotic Index	4.76	4.45	5.62	6.37	5.39	7.6
QUALITATIVE AND QUANTITATIVE DATA COMBINED						
total # species	51	81	50	41	38	8

Table 6. Dominant Taxa Collected from Hester-Dendy Multiplate Samplers, Savannah River Site, November 1997

	Upper Three Runs System						Fourmile Branch System				Pen Branch System				Steel Creek System	
	Tims Branch Rd. 2	Mill Creek at Telephone Cable Crossing	McQueens Br. near Z Area	Crouch Br. Rd. 4	Upper Three Runs at Rd. 8-1	Upper Three Runs at Rd. C	Fourmile Br. Rd. F	Fourmile Br. Rd. C	Fourmile Br. Rd. A-7	Fourmile Br. Rd. A	Pen Br. Rd. C	Pen Br. Rd. B	Indian Grave Br. Rd. B	Pen Br. Rd. A	Steel Creek east of Rd. C	Meyers Br. at Old Dunbarton Rd.
	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Tubificidae	x															
Lumbriculidae							x									
Gastropoda																
Ferrissia							x									
Ephemeroptera																
Baetis intercalaris									x							
Stenonema modestum/smithae		x	x		x	x			x	x	x	x	x		x	x
Plecoptera																
Acroneuria lycorias					x											
Allocapnia		x									x					
Taeniopteryx metequi												x			x	
Trichoptera																
Brachycentrus chelatus					x											
Brachycentrus numerosus						x										
Cheumatopsyche									x			x				
Non-Chironomid Dipterans																
Chrysops							x									
Simulium nr. verecundum	x															
Simulium tuberosum complex									x							
Chironomidae																
Chironomini																
Microtendipes nr. pedellus		x									x					
Phaenopsectra flavipes				x												
Polypedilum aviceps															x	x
Tribelos jucundum													x	x		
Orthocladiinae																
Corynoneura										x						
Parakiefferiella										x						
Parametriocnemus lundbecki																x
Rheocricotopus robacki						x										
Tvetenia discoloripes gp.							x									
Tanypodinae																
Conchapelopia	x															
Tanytarsini																
Paratanytarsus								x								
Rheotanytarsus distinctissimus gp.	x				x	x		x		x						
Tanytarsus							x							x		x

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enrichment or of pooled water, both of which can result in higher concentrations of phytoplankton, which along with other fine particulate organic matter, are used as food by collector-filterers. Upper Three Runs does not receive any inputs of treated sanitary discharges north of the SRS, but increased development in the off-site headwaters of the stream may be resulting in increased nutrient loading. It is also possible that there are beaver dams upstream of Road 8-1 that are forming small impoundments on the stream. The qualitative data from natural substrates also indicated that both species richness and EPT richness were higher at Road C (61 and 20, respectively) than at Road 8-1 (41 and 18, respectively; Table 5). Unlike the multiplate data, the qualitative data also indicated that Road C had a lower biotic index value (4.45) than Road 8-1 (4.76), which further substantiates that the macroinvertebrate community at Road C is somewhat more diverse than the community at Road 8-1.

Tributaries of Upper Three Runs that were sampled include McQueen Branch, Crouch Branch, Tims Branch, and Mill Creek. Of these only Mill Creek receives no NPDES discharges. Mill Creek is a high quality stream, and has a drainage area that is fairly similar to the size of the Tims Branch watershed, but is considerably larger than the watersheds of McQueen Branch and Crouch Branch. Since taxonomic richness generally increases with stream size, McQueen Branch and Crouch Branch would not be expected to have macroinvertebrate communities that are quite as diverse as Mill Creek. The macroinvertebrate data for these tributaries of Upper Three Runs are summarized in Table 5. The data from most of the parameters that were measured indicate that Mill Creek supports a richer macroinvertebrate community than the tributaries than receive NPDES discharges; however two of the three tributaries support relatively diverse communities. A total of 20 taxa were collected from the multiplate samplers in Mill Creek, as compared to 17 in Tims Branch, 11 in McQueen Branch and 5 in Crouch Branch. For qualitative and quantitative combined, 50 taxa were collected from Mill Creek, 41 from Tims Branch, 38 from McQueen Branch, and 8 from Crouch Branch. More EPT taxa were also collected from multiplates in Mill Creek (9) than the other tributaries (0 to 5). The density of organisms on the multiplates averaged 112 organisms/m^2 in Mill Creek, as compared to 73.3 in Tims Branch, 53.3 in McQueen Branch and just 8.9 organisms/m^2 in Crouch Branch. The community of Mill Creek was dominated by Ephemeroptera (55.4%; primarily *Stenonema;* Table 6), Plecoptera (21.8%; primarily *Allocapnia*) and midges (12.9%). McQueen Branch was also dominated by these same groups, and also by Trichoptera, while dominant groups in Tims Branch were Annelida, midges, other dipterans, and Trichoptera (hydropsychids). In Crouch Branch, only midges (75%) and odonates (25%) were collected from the multiplates. With respect to functional feeding groups, Mill Creek was somewhat unusual in that no collector-filterers were collected from the multiplates. Feeding groups were fairly evenly divided between collector-gatherers 36.6%, scrapers (28.2% and shredders (24.3%), with predators comprising 12.9% of the organisms collected. Tims Branch was dominated by collector-filterers (45.5%) and collector-gatherers (37.1%), while McQueen Branch was dominated by collector-gatherers (52.1%) and scrapers (32.3%). In Crouch Branch, both predators and shredders accounted for 37.5% of the organisms collected, while 25% of the organisms were collector-gatherers.

For the qualitative data, 39 species were collected from Mill Creek, 33 were collected from both Tims Branch and McQueen Branch, and just 3 were collected in Crouch

Branch. More EPT taxa were collected in the qualitative samples from McQueen Branch (12) than Mill Creek (9). Tims Branch had 3 EPT taxa in the qualitative sample and none were found in Crouch Branch.

The data for the Upper Three Runs tributaries indicates that none of the tributaries that receive NPDES discharges support macroinvertebrate communities that are of the quality of that found in Mill Creek. However, the differences may be due, at least in part, to influences other than the NPDES discharges. The location that was sampled in Tims Branch is located just downstream from the old Steed's Pond dam. Although the dam no longer impounds what was Steed's Pond, the portion of the stream that flows through the old pond bed of Steed's Pond is braided and has little canopy. The high percentage of collector-filterers that was found in Tims Branch is probably directly related to algal production in the braided channels upstream from the sampling location. In addition, earlier investigations indicated that, at times, dissolved oxygen concentrations are very low in portions of Tims Branch upstream from the Steed's Pond. Intermittently low dissolved oxygen levels could explain the high percentage of annelids that were collected at this location.

Earlier macroinvertebrate surveys that were conducted in McQueen Branch in 1993 and 1994 (Specht, 1995a; Specht and Paller, 1995) both indicated that the macroinvertebrate community of the stream was more perturbed than was found in this study. As described in Section 2.1, both McQueen Branch and Crouch Branch were subject to intense scouring and siltation during construction of the DWPF. It appears that although McQueen Branch has largely recovered, some residual effects of the earlier perturbation may remain at this time.

Crouch Branch appears to be severely perturbed, as evidenced by the low number of taxa, total absence of EPT taxa, and very low numbers of organisms that were collected. Although Crouch Branch was also perturbed during construction of the DWPF, and it was sampled much closer to its headwaters than was McQueen Branch, a much more diverse community should be present if the stream is not subject to ongoing perturbations. Further studies may be necessary to identify the source of the perturbation, but possible effects from the NPDES discharges to the stream cannot be ruled out at this time.

The results of statistical analyses (Appendix A) indicate that Crouch Branch was significantly different than the reference locations with respect to the four parameters that were compared (total number of taxa, number of EPT taxa, density of organisms, and biotic index). Tims Branch had significantly fewer EPT taxa and a higher biotic index value than the reference stations. McQueen Branch was not significantly different that the reference locations with respect to any of the four parameters that were compared. In all, the macroinvertebrate data for Upper Three Runs indicated that Upper Three Runs contained a diverse macroinvertebrate community at both of the locations that were sampled, and there is no indication that SRS operations have impacted the macroinvertebrate community at Road C. In fact, the community at Road C was found to be more diverse than Road 8-1. Two of the three tributaries of Upper Three Runs that receive NPDES discharges contain relatively diverse macroinvertebrate communities, whereas one (Crouch Branch) does not. Further investigations will be initiated to determine the source of the perturbation in this stream.

4.1.2 Fish

Fish assemblage samples in the Upper Three Runs Creek drainage were collected from Upper Three Runs near Tyler Bridge Road, Upper Three Runs near Road A.2, Crouch Branch, McQueen Branch, Tims Branch, and Mill Creek (Appendix C). These sample locations generally corresponded to the macroinvertebrate sampling locations except that the macroinvertebrate samples from lower Upper Three Runs (i.e., the portion of Upper Three Runs potentially affected by NPDES discharges) were collected from near Road C rather than from near Road A.2. Fish assemblages were not sampled near Road C to avoid interfering with other fish sampling programs being conducted in that area. The sample stations at Upper Three Runs near Road C, Crouch Branch, Tims Branch and McQueen Branch were located downstream from NPDES outfalls (Figure 1). Because Mill Creek does not receive NPDES discharges and is largely undisturbed, it was considered a control site and was pooled with the other control sites for statistical comparisons. The sample station at Upper Three Runs near Tyler Bridge Road was located upstream from the NPDES outfalls associated with the SRS. However, Upper Three Runs near Tyler Bridge may be influenced by offsite point or nonpoint pollution. For this and other reasons (discussed below), it was not considered a control site.

The average IBI at Upper Three Runs near Road A2 was 37.3 (Table 7). This value was not significantly different from control site values and was within the range of IBIs for unimpacted sites in the historical data set. In contrast, the IBI at Upper Three Runs near Tyler Bridge (average of 27.3), located upstream of all SRS NPDES outfalls and industrial areas, was significantly lower than at the control sites (average of 46.0 for Pen Branch Rd B, Pen Branch Rd. C, Meyers Branch, and Mill Creek) and below the values for undisturbed streams calculated for the historical data set (Figure 3). These results parallel those of the macroinvertebrate survey.

There are several possible reasons for depressed or apparently depressed biotic integrity at Upper Three Runs near Tyler Bridge. Offsite point or nonpoint discharges are a possibility, especially considering the fact that both fish and macroinvertebrate assemblages were depressed at Tyler Bridge. Further study would be necessary to confirm this hypothesis. Another factor that may have influenced the IBI results is the unusual habitat at Upper Three Runs near Tyler Bridge. This portion of the stream was characterized by extensive overhanging brush (an average of 43% of the stream surface area) which made electrofishing difficult and may have reduced sampling efficiency. Reduced sampling efficiency could result in an apparent, rather than real, reduction in biotic integrity. Whether apparent or real, relatively low biotic integrity near Tyler Bridge was not the result of SRS NPDES discharges since all SRS NPDES outfalls were located downstream from Tyler Bridge.

The IBI for Mill Creek was 40, slightly below the IBI at the other three control sites (Table 7) but well within the upper half of the IBI values in the historical data set, as expected for this undisturbed stream. The average IBIs at McQueen Branch and Tims Branch (38.7 and 38.7, respectively), both of which receives NPDES discharges were not significantly different from the IBIs at the control sites and within the range of IBIs for undisturbed streams in the historical data set. However, the IBI at Crouch Branch (29.3) was significantly lower than the IBI at the control sites and lower than any of the

Table 7. IBI values from stream sites receiving NPDES discharges (Y) and sites unaffected by NPDES discharges (N). There were three replicates at each sample site except for Four Mile Branch near Rd. C where there was insufficient space for three replicates.

Sample site	NPDES	Rep. 1	Rep. 2	Rep. 3	Average	St. dev.	St. error	Median	Max	Min
Four Mile Branch Rd. 4	Y	18	26	22	22.0	4.0	2.3	22	26	18
Four Mile Branch Rd. C	Y	36	46		41.0	7.1	5.0	41	46	36
Four Mile Branch Rd. A6	Y	42	48	38	42.7	5.0	2.9	42	48	38
Four Mile Branch Rd. A	Y	42	40	50	44.0	5.3	3.1	42	50	40
Steel Creek	Y	38	30	30	32.7	4.6	2.7	30	38	30
Pen Branch Rd. B	N	46	48	48	47.3	1.2	0.7	48	48	46
Pen Branch Rd. C	N	50	50	46	48.7	2.3	1.3	50	50	46
McQueens Branch	Y	44	42	30	38.7	7.6	4.4	42	44	30
Tims Branch	Y	40	38	38	38.7	1.2	0.7	38	40	38
Pen Branch Rd. A	Y	44	46	46	45.3	1.2	0.7	46	46	44
Indian Grave Branch	Y	44	46	44	44.7	1.2	0.7	44	46	44
Meyers Branch	N	44	46	46	45.3	1.2	0.7	46	46	44
Crouch Branch	Y	28	36	24	29.3	6.1	3.5	28	36	24
Upper Three Runs Rd. A2	Y	40	42	30	37.3	6.4	3.7	40	42	30
Upper Three Runs Tyler Br.	N	22	30	30	27.3	4.6	2.7	30	30	22
Mill Creek	Y	44	44	40	42.7	2.3	1.3	44	44	40

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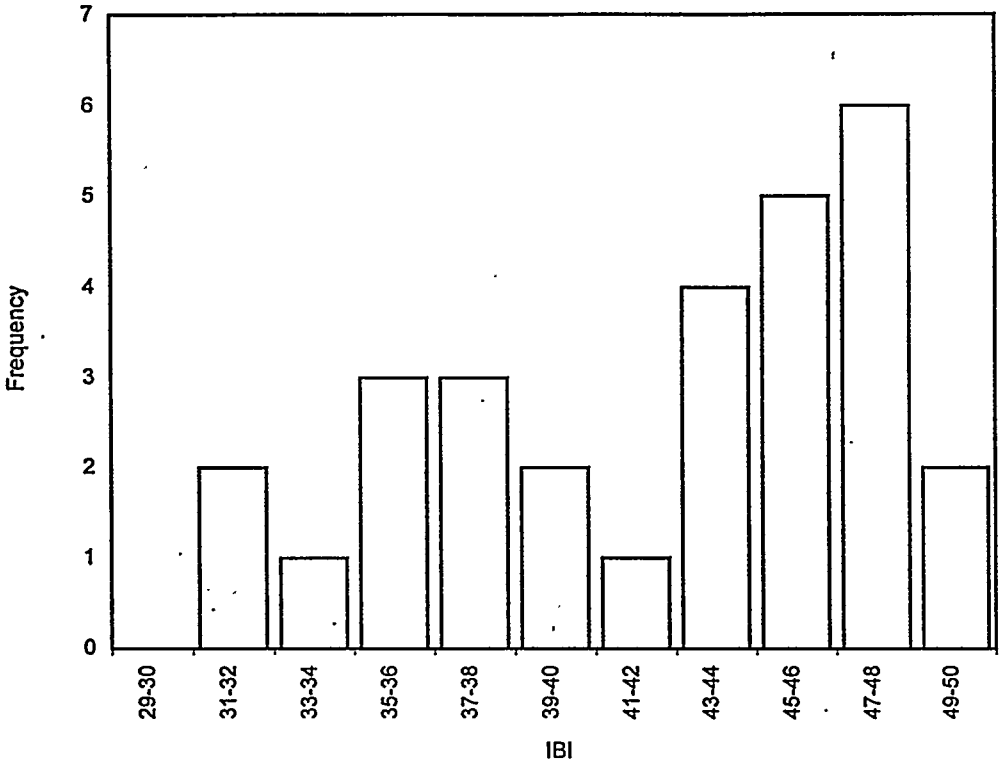

Figure 3. IBI values at 29 undisturbed stream sites located on and near the SRS. Samples are described more fully in Paller and Dyer (1997).

IBIs for undisturbed streams in the historical data set (Figure 3). This low IBI value was matched by the macroinvertebrate data, which also indicated that numerous metrics were significantly depressed in Crouch Branch.

As indicated in the discussion of the macroinvertebrate data, there are several possible reasons for depressed biotic integrity in Crouch Branch including construction related impacts and NPDES discharges. It is also important to recognize that the habitat in Crouch Branch differed from that in the other streams included in this study. Crouch Branch was the shallowest and narrowest stream and characterized by considerable erosion (Table 8). The latter factor may be related to the comparatively steep gradient in Crouch Branch but might also be at least partly the result of stormwater runoff from

H area located in the Crouch Branch headwaters. Further investigation may be necessary to definitively identify the factor or factors responsible for low biotic integrity in Crouch Branch.

4.2 Fourmile Branch Watershed

4.2.1 Macroinvertebrates

As described in Section 2.2, macroinvertebrates were collected from four locations in Fourmile Branch. Road F is located upstream from all SRS discharges, Road A is located downstream from all NPDES outfalls, and Roads C and A-7 are located intermediately (Figure 1). All of the parameters that were measured indicate that the quality of Fourmile Branch's macroinvertebrate community improves in a downstream direction, and that the location that is upstream from all NPDES discharges is the most perturbed location that was sampled in Fourmile Branch (Table 9). For the multiplate data, a total of five taxa were collected at Road F, 11 were collected at Road C, 26 were collected at Road A-7 and 29 were collected at Road A. No EPT were collected at Road F, 1 was found at Road C, 9 at Road A-7 and 7 at Road A. The density of organisms on the multiplate samplers was also very low at Road F (5.6 organisms/m^2, increasing to 17.8 at Road C, 341 at Road A-7, and 229 at Road A. The biotic index was highest at Road F (8.15) and lowest at Road A (5.95). The qualitative data showed similar patterns, with 15 species collected at Road F, 11 at Road C, 20 at Road A-7, and 27 at Road A. No EPT were found at Road F, 1 at Road C, and 6 at both Road A-7 and Road A. The biotic index values for the qualitative data showed a similar trend declining from 7.47 at Road F to 5.95 at Road A. For both the qualitative and quantitative sampling combined, a total of 18 taxa were collected at Road F, 19 at Road C, 36 at Road A-7, and 41 at Road A.. Dipterans, annelids, and mollusks were the only taxa collected at Road F. The community at Road C was dominated by midges (62.5%), Coleoptera (12.5%), and annelids (12.5%). Caddisflies (primarily *Cheumatopsyche*) were the most abundant order collected at Road A-7, accounting for 69.1% of the organisms collected from the multiplate samplers (Tables 6 and 9). Mayflies (11.1%; mostly *Stenonema*), and dipterans were also common. At Road A, the community was dominated by midges (59.7%; primarily *Parakiefferiella*, *Rheotanytarsus*, and *Corynoneura*) and mayflies (32.5%; primarily *Stenonema*).

Table 8. Means for habitat variables. Variables were measured at nine transects at each sample station except at Four Mile Creek Rd. C, Upper Three Runs Tyler Bridge, and Upper Three Runs Road A.2 where variables were measured at six transects.

Variable	Tims Branch	Upper Three Runs Tyler Bridge	Upper Three Runs Road A.2	Mill Creek	McQueens Branch	Crouch Branch	Four Mile Creek Road 4	Four Mile Creek Road C	Four Mile Creek Road A-7	Four Mile Creek Road A	Pen Branch Road C	Pen Branch Road B	Indian Grave Branch	Pen Branch Road A	Steel Creek	Meyers Branch
Width (m)	2.7	13.9	16.5	3.4	2.4	1.4	3.8	8.0	5.3	5.1	1.7	4.3	5.2	9.4	3.1	2.9
Depth (cm)	16.0	44.1	111.3	21.4	13.7	6.7	35.1	33.7	35.6	64.1	10.8	9.5	35.3	37.4	12.8	12.4
Current velocity (m/s)	0.18	0.21	0.38	0.19	0.27	0.24	0.08	0.22	0.18	0.12	0.03	0.16	0.12	0.11	0.14	0.36
Wood debris and leaves (%)*	8	12	10	14	4	3	4	13	9	17	27	5	3	3	13	13
Number logs and stumps**	2.3	1.2	3.7	3.4	1.4	1.8	3.0	6.5	2.6	4.0	1.2	2.2	2.9	2.8	1.2	1.6
Brush piles (%)*	22	23	14	17	9	6	14	13	13	12	16	9	8	6	12	22
Root masses (%)*	12	5	1	7	7	4	4	7	9	4	8	6	3	2	6	10
Macrophytes (%)*	1	19	0	2	3	0	12	17	10	3	0	0	9	59	4	0
Overhanging bank vegetation (%)	8	43	3	12	32	3	14	28	26	22	5	11	19	22	10	5
Bank overhang (%)*	7	0	0	6	8	2	1	0	6	2	11	3	2	1	4	4
Canopy cover (%)*	85	20	72	89	82	87	73	76	82	31	100	85	51	38	72	93
Bank erosion***	0.8	0.0	0.0	0.0	0.3	3.0	0.1	0.0	0.6	0.0	0.2	0.1	0.8	0.0	2.0	0.4

* Percent variables refer to percent of stream bottom area covered by or overhung by the indicated variable

** Number of logs and stumps within a 3m band on either side of the transect (6 m in total).

*** Estimated on a scale of 0-3 with 3 most severe

Table 9. Summary of Macroinvertebrate Data, Fourmile Branch, November 1997

	Fourmile Br.Rd. F	Fourmile Br.Rd. C	Fourmile Br. Rd. A-7	Fourmile Br. Rd. A
	Site 7	Site 8	Site 9	Site 16
MULTIPLATE (QUANTITATIVE DATA)				
Total # species	5	11	26	29
Mean # species/replicate	1.0	2.2	5.2	5.8
EPT Index	0	1	9	7
Density (organisms/m^2)	5.6	17.8	341.0	229.0
Total biomass (g/m^2)	0.0061	0.0054	0.1226	0.0315
NC Biotic index	8.15	7.15	6.40	5.95
Relative Abundance of Major Taxonomic Groups				
Annelida (worms)	20.0	12.5	0.0	0.0
Mollusca (clams, snails)	20.0	0.0	1.0	1.9
Crustacea	0.0	0.0	0.0	1.5
Ephemeroptera	0.0	0.0	11.1	32.5
Plecoptera	0.0	6.3	2.9	0.5
Trichoptera	0.0	0.0	69.1	2.4
Odonata	0.0	6.3	0.0	0.5
Hemiptera	0.0	0.0	0.0	0.0
Coleoptera	0.0	12.5	2.3	0.5
Diptera (excluding midges)	20.0	0.0	7.2	0.0
Diptera (midges)	40.0	62.5	6.2	59.7
Chironomini	0.0	12.5	2.9	2.4
Orthocladiinae	20.0	6.3	3.3	37.9
Tanypodinae	0.0	6.3	0.0	1.0
Tanytarsini	20.0	37.5	0.0	18.4
Other	0.0	0.0	0.0	0.5
Relative Abundance of Functional Feeding Groups				
Collector-gatherers	40.0	28.1	11.1	58.0
Collector-filterers	20.0	37.5	74.9	20.4
Predators	20.0	18.8	1.0	2.4
Scrapers	20.0	3.1	7.7	14.8
Shredders	0.0	12.5	5.4	4.6
Relative Abundance of Functional Feeding Group Biomass				
Collector-gatherers	<0.1	9.3	7.4	42.5
Collector-filterers	<0.1	<0.1	63.1	5.4
Predators	100.0	81.5	15.9	7.0
Scrapers	<0.1	9.3	11.7	45.1
Shredders	<0.1	<0.1	1.9	<0.1
QUALITATIVE DATA				
Total # species	15	11	20	27
EPT Index	0	1	6	6
NC Biotic index	7.47	6.63	6.56	5.95
QUALITATIVE AND QUANTITATIVE DATA COMBINED				
Total # species	18	19	36	41

These data clearly indicate that Fourmile Branch is perturbed upstream from all NPDES discharges and that the quality of the stream increases in a downstream direction. The portion of Fourmile Branch just upstream from Road F is a shallow marshy area that generally has low water velocity. Although dissolved oxygen in the stream at Road F was 8.9 mg/l at the time of sampling (Table 10), it is likely that oxygen levels are low during the summer months. Data collected from Fourmile Branch at Road C during the summer of 1993 (Specht, 1995a) indicated that this portion of the stream had a dissolved oxygen concentration of 0.8 mg/l at the time of sampling. Numerous portions of Fourmile Branch have been impounded by beaver dams, and it is likely that these dams result in low dissolved oxygen concentrations downstream from the impounded areas during the summer months. If the macroinvertebrate community is subjected to low dissolved oxygen concentrations periodically, it is likely that the community does not have time to recover completely during the cooler months.

Table 10. Physical/Chemical Data for SRS Stream Sampling Locations, December 8, 1997

Location	Dissolved Oxygen (mg/l)	pH	Specific Conductance (µmhos/cm)	Temperature (°C)
Upper Three Runs				
Tims Branch	11.8	6.79	63	4.0
Mill Creek	11.4	6.80	61	7.0
McQueen Br.	10.1	6.47	50	7.5
Crouch Br.	9.9	6.81	72	13.5
UTR Rd. 8-1	10.8	5.74	21	9.8
UTR Rd. C	11.9	5.85	27	8.2
Fourmile Branch				
Rd. F	8.9	5.16	30	4.5
Rd. C	10.0	6.33	52	8.7
Rd. A-7	11.0	6.49	67	6.1
Rd. A	10.1	6.61	70	7.8
Pen Branch				
Rd. C	10.6	6.39	42	6.2
Rd. B	9.8	6.80	55	9.0
Indian Grave Br.	9.6	5.83	119	10.0
Rd. A	10.2	6.72	63	8.9
Steel Creek				
Steel Cr. Near Rd. C	9.7	6.47	42	11.0
Meyers Br.	9.2	6.39	53	8.5

Other studies conducted in Fourmile Branch at Road F indicate that *Ceriodaphnia dubia* does poorly when cultured in water from Fourmile Branch (Specht 1995b). During an investigation conducted for 12 months during 1994, water collected from this location was always either acutely or chronically toxic to *Ceriodaphnia*. In 1995, a Toxicity Identification Evaluation was performed to determine the cause of the toxicity (ETT Environmental, 1995a, 1995b). The results of the TIE indicated that naturally

occurring iron was responsible for the observed toxicity. The iron is believed to leach from wetland soils, as a result of the low pH of the water.

As discussed in Section 3.2.2, data from Fourmile Branch at Road F was not included as data from reference locations for statistical comparisons, since this location was obviously perturbed. A statistical analysis of the data indicated that Fourmile Branch at Road C was significantly different from the reference locations with respect to three of the four parameters that were measured. This location had fewer macroinvertebrates, fewer EPT taxa, and a higher biotic index value than the reference locations. The other two locations in Fourmile Branch (Road A-7 and Road A were not significantly different that the reference locations with respect to any of the four parameters that were compared. In conclusion, the macroinvertebrate data from Fourmile Branch indicated that the upstream portions of Fourmile Branch are perturbed, but the perturbation does not appear to be related to SRS discharges, since the most upstream station, which is above all discharges to the stream, is the most perturbed. The impacts are most likely due to periodically low levels of dissolved oxygen, and possibly elevated concentrations of naturally occurring iron.

4.2.2 Fish

Fish sampling station locations differed slightly from macroinvertebrate sampling locations in Four Mile Creek. Both fish and macroinvertebrate surveys were conducted near Road C, Road A-7, and Road A (Figure 1) (Appendix C). Macroinvertebrate surveys were also conducted near Road F; however, fish were not sampled at this location because the stream was too shallow and narrow (except in beaver ponds) to support many fish. Instead, an additional fish survey was conducted near Road 4 (Figure 1). There were no fish sampling stations on Four Mile Creek located upstream from all NPDES discharges. The control sites used for statistical analysis of the Four Mile Creek sampling stations were the four in Pen Branch, Meyers Branch, and Mill Creek.

Average IBI values at the Four Mile Creek sampling stations were 44.0 at Road A, 42.7 at Road A-6, 41.0 at Road C, and 22.0 at Road 4 (Table 7). Only the IBI from Four Mile Creek near Road 4 was significantly lower than the mean IBI for the control sites. Comparison of this value (22.0) with the historical data indicated that it was substantially below any IBI recorded in an undisturbed stream (Figure 3). These findings paralleled those of the macroinvertebrate survey which also indicated a progressive decrease in biotic integrity in an upstream direction with an unusually low biotic integrity occurring at the most upstream site (Road F).

The results of the macroinvertebrate survey indicated depressed biotic integrity at Road F, which was upstream of all of the NPDES outfalls, possibly as a result of low dissolved oxygen levels in water discharged from beaver dams during the summer or naturally occurring high iron levels. These factors may have also acted to depress the fish based IBI at Road 4, which is approximately 4.5 km downstream from Road F (Figure 1). A beaver pond was located approximately 50 m upstream from the uppermost fish sampling segment at Road 4, and a reddish flock that may have precipitated ferric iron was observed in some of the fish sampling areas near Road C.

Definitive identification of factors responsible for decreased biotic integrity in Four Mile Creek near Roads 4 and C will require water quality and/or bioassay studies.

4.3 Pen Branch Watershed

4.3.1 Macroinvertebrates

Macroinvertebrates were collected at four locations in the Pen Branch watershed: Pen Branch at Road C and Road B, both of which are upstream from all SRS discharges; Indian Grave Branch just downstream from the new cooling tower, which is downstream from all NPDES discharges from K Area, and Pen Branch at Road A, which is downstream from the confluence of Indian Grave Branch with Pen Branch, and therefore downstream from all NPDES discharges to Pen Branch. No upstream reference location could be sampled on Indian Grave Branch, since the discharges from K Area enter the headwaters of the stream.

The macroinvertebrate data collected from the three locations in Pen Branch and from one location in Indian Grave Branch indicate that the locations were fairly similar with respect to many of the metrics that were measured (Table 11). Fewer taxa were collected from the headwater station in Pen Branch (Road C) than at the other locations, but this location was tied with Road B for the most taxa collected during qualitative sampling (34). For qualitative and quantitative sampling combined, the total number of taxa collected ranged from 38 to 45. Fewer EPT taxa were collected with multiplate samplers from Indian Grave Branch (4) and Road A (3) than at the upstream stations, but the number of EPT collected in the qualitative sampling was similar. Seven EPT taxa were collected at Road A, Road B, and in Indian Grave Branch, while 9 were collected at Road C. The density of organisms collected from the multiplates was somewhat lower at the two locations that are post-thermal (Indian Grave Branch and Pen Branch at Road A) than at the two unimpacted locations. The biotic index values for the post-thermal stations (6.54 to 6.58) were also higher than for the stations that had never received thermal discharges (5.16 and 5.51). Species composition was the most obvious difference among the four locations. The most upstream location (Road C) was dominated by mayflies (62.5%; primarily *Stenonema;* Table 6). The relative abundance of mayflies declined in a downstream direction, to 46.9% at Road B and 9.3% at A, while the relative abundance of dipterans increased from 20.5% at Road C to 76.7% at Road A. Plecoptera (primarily *Allocapnia* and *Taeniopteryx*), which accounted for 20.5% and 15% of the macroinvertebrates collected from Roads C and B, respectively, were conspicuously absent from the post-thermal stations. Trichoptera (primarily *Cheumatopsyche*) were relatively common at Road B (12.2%) but relatively uncommon at the other three sites (0 to 3.5%). Collector-gatherers and shredders were the most abundant feeding groups at all four sites.

A statistical analysis of the data (Appendix A) indicated that Pen Branch at Road A had significantly fewer EPT taxa and a higher biotic index value that the reference locations and Indian Grave Branch had a higher biotic index value than the reference locations. These data indicated that the macroinvertebrate communities of Indian Grave Branch and Pen Branch at Road A differed somewhat from the communities at Roads C and B. Both Indian Grave Branch and Pen Branch are downstream from NPDES discharges from K Area, but both of these locations were also exposed to a severe thermal regime

Table 11. Summary of Macroinvertebrate Data, Pen Branch and Steel Creek, November 1997

	Pen Branch System				Steel Creek System	
	Pen Br. Rd. C	Pen Br. Rd. B	Indian Grave Br. Rd. B	Pen Br. Rd. A	Steel Creek east of Rd. C	Meyers Br. at Old Dunbarton Rd.
	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
MULTIPLATE (QUANTITATIVE DATA)						
Total # species	10	21	23	22	17	18
Mean # species/replicate	2.0	4.2	4.6	4.4	3.4	3.6
EPT Index	7	7	4	3	4	6
Density (organisms/m^2)	124.0	163.0	101.0	95.6	71.1	180.0
Total biomass (g/m^2)	0.0513	0.0654	0.0702	0.1356	0.0428	0.0221
NC Biotic index	5.51	5.16	6.58	6.54	5.81	4.81
Relative Abundance of Major Taxonomic Groups						
Annelida (worms)	0.0	0.0	1.1	0.0	0.0	0.6
Mollusca (clams, snails)	0.0	0.7	1.1	2.3	3.1	0.0
Crustacea	0.0	0.7	1.1	0.0	0.0	0.0
Ephemeroptera	62.5	46.9	28.6	9.3	35.9	14.2
Plecoptera	15.2	19.7	0.0	0.0	23.4	9.3
Trichoptera	0.0	12.2	2.2	3.5	0.0	2.5
Odonata	1.8	0.0	2.2	3.5	1.6	0.0
Hemiptera	0.0	0.0	0.0	0.0	0.0	0.0
Coleoptera	0.0	4.8	3.3	2.3	0.0	0.0
Diptera (excluding midges)	0.0	0.0	0.0	0.0	1.6	0.6
Diptera (midges)	20.5	15.0	60.4	76.7	32.8	72.8
Chironomini	19.6	2.0	42.9	32.6	17.2	29.6
Orthocladiinae	0.0	10.2	7.7	24.4	9.4	26.5
Tanypodinae	0.0	7.0	7.7	2.3	3.1	3.1
Tanytarsini	0.9	2.0	2.2	17.4	3.1	13.6
Other	0.0	0.0	0.0	2.4	1.6	0.0
Relative Abundance of Functional Feeding Groups						
Collector-gatherers	42.4	36.4	46.2	40.7	34.4	49.4
Collector-filterers	0.9	15.0	3.3	20.9	4.7	15.4
Predators	3.6	5.4	12.1	8.1	9.4	6.2
Scrapers	29.9	23.1	16.5	8.1	21.1	6.8
Shredders	23.2	20.1	22.5	22.1	30.5	22.2
Relative Abundance of Functional Feeding Group Biomass						
Collector-gatherers	39.2	<0.1	87.0	3.3	23.6	50.7
Collector-filterers	1.4	50.5	1.1	0.9	<0.1	6.8
Predators	14.6	0.9	2.6	93.0	46.3	10.4
Scrapers	37.8	39.1	9.3	2.3	23.6	29.4
Shredders	7.0	9.5	<0.1	0.5	6.5	2.7
QUALITATIVE DATA						
Total # species	34	34	25	30	33	40
EPT Index	9	7	7	7	6	17
NC Biotic Index	6.1	6.07	7.05	6.82	6.77	5.68
QUALITATIVE AND QUANTITATIVE DATA COMBINED						
Total # species	38	44	38	45	41	47

and high flows until K Reactor was shut down in 1988. Specht and Paller (1995) found that macroinvertebrate communities of SRS's post-thermal streams differed substantially from the streams that had never received thermal discharges, primarily due to differences in stream habitat. Therefore, it is likely that the differences were due to habitat differences resulting from the thermal history of the streams rather than to the effects of NPDES discharges.

4.3.2 Fish

NPDES outfalls within the Pen Branch watershed discharge into Indian Grave Branch, a tributary of Pen Branch (Figure 1). One fish sampling station was located within Indian Grave Branch downstream of the outfalls and one was located in Pen Branch downstream from the confluence of Pen Branch and Indian Grave (Appendix C). Both were potentially subject to impacts from the NPDES outfalls, particularly the Indian Grave Branch station which was closest to the outfalls. There were two additional fish sampling stations in the Pen Branch drainage located above the confluence of Indian Grave Branch and Pen Branch (Pen Branch Rd. B and Pen Branch Rd. C) Because they were located in undisturbed areas and did not receive NPDES discharges, these sampling stations were considered control sites and grouped with the other two control sites for statistical testing.

Mean IBI values at the Indian Grave Branch and Pen Branch sample stations that received NPDES discharges averaged 44.7 and 45.3, respectively. These values were not significantly different from the mean IBI for the four control sites (i.e., 46.0, Table 7). In addition, the mean IBI values at these two stations were well within the range of IBI values characteristic of undisturbed streams as indicated by the historical data (Figure 3). These results indicate that the NPDES outfalls on Indian Grave Branch have not deleteriously affected biotic integrity in Pen Branch or Indian Grave Branch.

4.4 Steel Creek Watershed

4.4.1 Macroinvertebrates

Macroinvertebrates were collected from two locations in the Steel Creek watershed: Steel Creek near Road C, which is downstream from all P-Area discharges to the stream and approximately one km upstream from the upper end of L Lake; and Meyers Branch at Old Dunbarton Road, which is essentially unimpacted by SRS activities. As discussed in Section 2.4, sampling was not performed farther downstream in Steel Creek, because NPDES discharges enter directly into L Lake, the discharges are minimal, and it would not be possible to distinguish between ecosystem changes resulting from the impoundment of Steel Creek and effluent effects. In Steel Creek, 17 taxa were collected from the multiplate samplers, 33 were collected from qualitative sampling, and 41 were collected in all (Table 11). In Meyers Branch, 18 taxa were collected from the multiplates, 40 were collected during qualitative sampling, and 47 taxa were collected in all. More EPT taxa were collected from Meyers Branch than in Steel Creek from both the multiplate sampling (6 taxa vs. 4) and the qualitative sampling (17 taxa vs. 6). The density of organisms on the multiplates was higher in Meyers Branch (180 organisms/m^2) than in Steel Creek (71.1 organisms/m^2). The biotic index values were lower in Meyers Branch than Steel Creek for both the multiplate data

(4.81 vs. 5.81) and the qualitative sampling (5.68 vs. 6.77). The macroinvertebrate community on the multiplate samplers in Steel Creek was dominated by mayflies (35.9%; primarily *Stenonema*), midges (32.8%; primarily *Polypedilum*), and stoneflies (23.4%; primarily *Taeniopteryx*). In Meyers Branch, 72.8% of the organisms collected were midges (primarily *Polypedilum* and *Parametriocnemus*), with mayflies and stoneflies accounting for 14.2 and 9.3% of the organisms collected, respectively.

The results of statistical analyses of the data indicate that Steel Creek did not differ significantly from the reference stations for any of the four parameters that were measured (density, number of taxa, number of EPT taxa, and NCBI). The macroinvertebrate data for Steel Creek indicated that the stream supports a reasonably diverse macroinvertebrate community that is not dominated by pollution tolerant taxa. However, the community is not of the quality supported by Meyers Branch. Steel Creek received thermal discharges from P Reactor prior to the construction of Par Pond, and it is possible that there are still differences in habitat between the two streams.

4.4.2 Fish

Fish were collected from sample stations in the portion of Steel Creek upstream from L Lake and Meyers Branch. The sample station in Steel Creek was located approximately 1.75 km downstream from several NPDES outfalls. The Meyers Branch station, in contrast, does not receive NPDES discharges and is largely undisturbed. It was considered a control site and grouped with the other three control sites for statistical analysis.

The mean IBI value for the portion of Steel Creek upstream from L Lake was 32.7. This value was significantly lower than the mean IBI for the four control sites (46.0, Table 7). Furthermore, it was at the lower end of the range of IBI values calculated for undisturbed streams in the historical data base (Figure 3). These results indicate that biotic integrity in upper Steel Creek is below that expected in most, but not all, undisturbed streams.

It is possible that the relatively low biotic integrity observed in Steel Creek was habitat related. The banks of Steel Creek were severely eroded (Table 8). The stream channel was cut more deeply than is typical of most SRS streams and bank collapse was evident in a number of areas raising the possibility of intermittent siltation and general habitat instability. Also, the upper portion of Steel Creek is isolated from the rest of the stream by L Lake, which serves as a source pool for emigrating lake fishes. The only shiner found in upper Steel Creek was the coastal shiner (Appendix C). This species is typically uncommon in small streams but common in L Lake (Paller 1996).

Lastly, it is possible that the somewhat degraded fish community in Steel Creek was the result of previous discharges from the P-014 sanitary outfall, which constitutes the headwaters of Steel Creek. Discharge from this outfall was chlorinated until 1995 when effluent chlorination was halted at all SRS outfalls (Rhonda Huffines, personal communication). Residual chlorine concentrations were never measured at the P-014 outfall, but often reached very high concentrations (in excess of 10 mg/l) in other SRS sanitary discharges. Such concentrations are highly toxic and may eliminate fish from long segments of the receiving stream (Paller et al. 1987). Therefore, it is possible that

many fish species were eliminated by previous (but not current) effluent toxicity. When effluent chlorination was discontinued, recolonization of upper Steel Creek by a full range of typical stream fishes was prevented by L Lake which blocked the immigration of fishes from lower Steel Creek. In contrast, colonization by insects, many of which are capable of flight, would have been easier, perhaps accounting for the somewhat higher biotic integrity indicated by the macroinvertebrate data.

4.5 Savannah River

All discharges from SRS NPDES outfalls ultimately flow into the Savannah River because all SRS streams are tributaries of the Savannah River. However, NPDES outfalls on SRS streams discharge into the upper or midreaches of these streams (Table 2), resulting in a long flow path to the Savannah River and considerable dilution of the effluents before they reach the river. Biological sampling has demonstrated that most of these outfalls have not affected their receiving streams. In the few cases where possible effects were observed (e.g., Crouch Branch), they were confined to headwaters and did not persist downstream. Therefore, it is reasonable to conclude that NPDES outfalls located on SRS streams have not affected the Savannah River.

Unlike the majority of the SRS NPDES outfalls, which discharge into tributary streams, there are six NPDES outfalls (Table 2) that are located near the Savannah River. Effluents from these outfalls are discharged into the Savannah River Swamp or flow directly into the Savannah River through a relatively short ditch. Upon entering the river, all effluents are highly diluted by mixing with Savannah River water. Previous biological surveys (1983 to 1985) indicated the presence of diverse and healthy fish and macroinvertebrate communities in the Savannah River with no evidence of impacts related to SRS NPDES discharges (Specht 1987).

5.0 Conclusions

The results of the macroinvertebrate and fish surveys conducted during this study were generally in close agreement. Both indicated that most SRS streams were characterized by high biotic integrity and unaffected by SRS NPDES discharges. A prominent exception was Crouch Branch which, as indicated by both the macroinvertebrate and fish data, was significantly degraded. Further research will be required to determine whether this degradation was related to NPDES discharges, habitat, or other factors. Degradation was also observed in upper Fourmile Branch and upper Steel Creek, but in these cases was probably related to factors other than NPDES discharges. Factors that may have depressed biotic integrity in these streams reaches included previous thermal impacts, reservoir impoundment related effects, possible construction impacts, and naturally occurring habitat factors.

6.0 References

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APPENDIX A

Statistical Results for Macroinvertebrate Data

Statistical Analyses for Density of Organisms

One Way Analysis of Variance Tuesday, March 24, 1998, 08:41:49

Data source: Data 1 in Notebook

Normality Test: Failed (P = <0.001)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks Tuesday, March 24, 1998, 08:41:49

Data source: Data 1 in Notebook

Group	N	Missing
C	20	0
MCQ	5	0
CR	5	0
FM-C	5	0
FM-A7	5	0
IG-B	5	0
PB-A	5	0
SC	5	0
FM-A	5	0
TB	5	0

Group	Median	25%	75%
C	127.750	102.800	155.550
MCQ	61.100	33.350	73.600
CR	5.600	4.200	11.150
FM-C	16.700	9.725	27.800
FM-A7	344.400	286.075	401.400
IG-B	83.300	62.525	120.850
PB-A	55.600	26.400	170.875
SC	50.000	22.250	95.875
FM-A	227.800	115.250	333.350
TB	83.300	37.500	105.600

H = 43.750 with 9 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (Dunn's Method) :

Comparison	Diff of Ranks	p	Q	P<0.05
CR vs C	37.375	10	3.957	Yes
FM-C vs C	33.475	9	3.544	Yes
MCQ vs C	21.775	8	2.305	No
SC vs C	20.275	7	2.146	No Test Needed
FM-A7 vs C	18.425	6	1.951	No Test Needed
TB vs C	14.775	5	1.564	No Test Needed
PB-A vs C	13.175	4	1.395	No Test Needed
IG-B vs C	10.475	3	1.109	No Test Needed
FM-A vs C	8.425	2	0.892	No Test Needed

Statistical Analyses for Density of Organisms (continued)

Mann-Whitney Rank Sum Test Tuesday, March 24, 1998, 08:42:38

Normality Test: Failed (P = 0.002)

Group	N	Missing
C	20	0
UTR-8	5	0

Group	Median	25%	75%
C	127.750	102.800	155.550
UTR-8	61.100	55.600	123.600

T = 38.500 n(small)= 5 n(big)= 20 (P = 0.077)

The differences in the median values among the two groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.077)

Statistical Analyses for Taxa Richness

One Way Analysis of Variance Monday, March 23, 1998, 15:42:20

Data source: Data 1 in Notebook

Normality Test: Failed (P = 0.023)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks Monday, March 23, 1998, 15:42:20

Data source: Data 1 in Notebook

Group	N	Missing
C	20	0
MCQ	5	0
CR	5	0
FM-C	5	0
FM-A7	5	0
IG-B	5	0
PB-A	5	0
SC	5	0
FM-A	5	0
TB	5	0

Group	Median	25%	75%
C	7.000	5.500	8.500
MCQ	4.000	2.750	5.000
CR	1.000	0.750	1.500
FM-C	3.000	1.750	3.500
FM-A7	10.000	9.000	12.250
IG-B	5.000	4.500	9.000
PB-A	7.000	4.250	11.250
SC	4.000	2.500	5.750
FM-A	12.000	7.750	13.250
TB	6.000	4.000	6.500

H = 37.239 with 9 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (Dunn's Method) :

Comparison	Diff of Ranks	p	Q	P<0.05
CR vs C	33.625	10	3.571	Yes
FM-C vs C	25.825	9	2.743	No
MCQ vs C	19.925	8	2.116	No Test Needed
FM-A7 vs C	16.775	7	1.782	No Test Needed
SC vs C	16.725	6	1.776	No Test Needed
FM-A vs C	15.775	5	1.675	No Test Needed
TB vs C	7.825	4	0.831	No Test Needed
IG-B vs C	4.025	3	0.427	No Test Needed
PB-A vs C	0.325	2	0.0345	No Test Needed

Statistical Analyses for Taxa Richness (continued)

Mann-Whitney Rank Sum Test Monday, March 23, 1998, 15:45:04

Data source: Data 1 in Notebook

Normality Test: Passed (P = 0.710)

Equal Variance Test: Passed (P = 0.450)

Group	N	Missing
UTR-8	5	0
UTR-C	5	0

Group	Median	25%	75%
UTR-8	8.000	6.500	12.000
UTR-C	16.000	9.250	18.750

T = 23.000 n(small)= 5 n(big)= 5 P(est.)= 0.403 P(exact)= 0.421

The differences in the median values among the two groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.421)

Statistical Analyses for Number of EPT Taxa

One Way Analysis of Variance Monday, March 23, 1998, 16:06:35

Data source: Data 1 in Notebook

Normality Test: Failed (P = 0.004)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks Monday, March 23, 1998, 16:06:35

Data source: Data 1 in Notebook

Group	N	Missing
C	20	0
MCQ	5	0
CR	5	0
FM-C	5	0
FM-A7	5	0
IG-B	5	0
PB-A	5	0
SC	5	0
FM-A	5	0
TB	5	0

Group	Median	25%	75%
C	4.000	3.000	4.000
MCQ	3.000	1.750	3.000
CR	0.000	0.000	0.000
FM-C	0.000	0.000	0.250
FM-A7	5.000	4.750	6.500
IG-B	2.000	0.750	2.000
PB-A	1.000	0.000	1.500
SC	1.000	0.750	2.500
FM-A	2.000	2.000	4.000
TB	1.000	0.750	1.000

H = 48.502 with 9 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (Dunn's Method) :

Comparison	Diff of Ranks	p	Q	P<0.05
CR vs C	40.200	10	4.315	Yes
FM-C vs C	37.700	9	4.047	Yes
TB vs C	30.200	8	3.242	Yes
PB-A vs C	28.500	7	3.059	Yes
IG-B vs C	23.600	6	2.533	No
SC vs C	21.700	5	2.329	No Test Needed
MCQ vs C	12.900	4	1.385	No Test Needed
FM-A7 vs C	12.200	3	1.310	No Test Needed
FM-A vs C	8.500	2	0.912	No Test Needed

Statistical Analyses for Number of EPT Taxa (continued)

t-test Monday, March 23, 1998, 16:08:11

Normality Test: Passed (P = 0.273)

Equal Variance Test: Passed (P = 0.966)

Group	N	Missing
UTR-8	5	0
UTR-C	5	0

Group	Mean	Std Dev	SEM
UTR-8	6.000	3.674	1.643
UTR-C	7.000	3.937	1.761

Difference -1.000

t = -0.415 with 8 degrees of freedom. (P = 0.689)

95 percent confidence interval for difference of means: -6.554 to 4.554

The difference in the mean values of the two groups is not great enough to reject the possibility that the difference is due to random sampling variability. There is not a statistically significant difference between the i nput groups (P = 0.689).

Power of performed test with alpha = 0.050: 0.050

The power of the performed test (0.050) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

Statistical Analyses for North Carolina Biotic Index (NCBI)

One Way Analysis of Variance Monday, March 23, 1998, 16:29:56

Data source: Data 1 in Notebook

Normality Test: Passed (P = 0.052)

Equal Variance Test: Failed (P = 0.002)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks Monday, March 23, 1998, 16:29:56

Data source: Data 1 in Notebook

Group	N	Missing
C	20	0
MCQ	5	0
CR	5	0
FM-C	5	0
FM-A7	5	0
IG-B	5	0
PB-A	5	0
SC	5	0
FM-A	5	0
TB	5	0

Group	Median	25%	75%
C	5.055	4.735	5.525
MCQ	5.390	5.018	5.595
CR	8.700	8.420	9.250
FM-C	7.120	6.338	8.045
FM-A7	6.350	6.252	6.537
IG-B	6.540	6.475	6.705
PB-A	6.720	5.902	7.033
SC	6.020	5.150	6.423
FM-A	6.060	5.645	6.180
TB	6.820	5.630	7.813

H = 44.562 with 9 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (Dunn's Method) :

Comparison	Diff of Ranks	p	Q	P<0.05
CR vs C	47.400	10	5.014	Yes
FM-C vs C	34.600	9	3.660	Yes
IG-B vs C	31.600	8	3.343	Yes
PB-A vs C	29.100	7	3.078	Yes
FM-A7 vs C	27.700	6	2.930	Yes
TB vs C	27.300	5	2.888	Yes
FM-A vs C	18.500	4	1.957	No
SC vs C	15.800	3	1.671	No Test Needed

Statistical Analyses for North Carolina Biotic Index (NCBI) (continued)

Mann-Whitney Rank Sum Test Monday, March 23, 1998, 16:37:27

Data source: Data 1 in Notebook

Normality Test: Passed (P = 0.622)

Equal Variance Test: Passed (P = 0.919)

Group	N	Missing
UTR-8	5	0
UTR-C	5	0

Group	Median	25%	75%
UTR-8	4.040	2.942	4.353
UTR-C	4.570	4.195	5.652

T = 20.000 n(small)= 5 n(big)= 5 P(est.)= 0.144 P(exact)= 0.151

The differences in the median values among the two groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.151)

APPENDIX B

Macroinvertebrate Data

Appendix Table B-1. Species List, Hester-Dendy Multiplate Samplers

Sitewide Study
5 Nov. - 8 Dec 1997

		Site / # of Organisms															
		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER EPHEMEROPTERA (mayflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Acentrella ampla	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Baetis sp.	N	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Baetis intercalaris	N	0	0	0	0	0	2	0	0	12	0	0	1	0	0	1	0
Ephemerella (immature / damaged)	N	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1
Eurylophella (immature / damaged)	N	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Eurylophella doris	N	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0
Habrophlebia vibrans	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Heptagenia	N	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
Leptophlebia	N	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Paraleptophlebia	N	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Stenacron interpunctatum	N	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0
Stenonema modestum/smithae	N	0	53	31	0	8	14	0	0	22	53	58	62	25	7	22	22

ORDER PLECOPTERA (stoneflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Acroneuria abnormis	N	0	0	0	0	2	9	0	0	0	0	0	0	0	0	0	0
Acroneuria lycorias	N	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
Acroneuria mela	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Allocapnia	N	0	19	3	0	0	4	0	1	0	0	14	9	0	0	0	11
Clioperla clio	N	0	2	0	0	0	0	0	0	0	0	1	0	0	0	2	4
Helopicus subvarians	N	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Isoperla dicala	N	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0
Isoperla sp.	N	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Paraleuctra sara	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Paragnetina fumosa	N	0	0	0	0	4	3	0	0	1	0	0	0	0	0	0	0
Perlesta placida	N	0	1	1	0	3	3	0	0	0	0	0	5	0	0	0	0
Perlinella ephyre	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pteronarcys	N	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
Taeniopteryx metequi	N	0	0	0	0	4	1	0	0	8	0	1	15	0	0	13	0

Appendix Table B-1. Species List, Hester-Dendy Multiplate Samplers

Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER TRICHOPTERA (caddisflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Brachycentrus chelatus	L	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus numerosus	L	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
Ceroclea nr. resurgens	L	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cernotina spicata	L	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Cheumatopsyche	L	4	0	1	0	2	2	0	0	199	1	0	18	1	3	0	3
Chimarra aterrima	L	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Diplectrona modesta	L	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche betteni	L	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Hydropsyche elissoma	L	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche venularis	L	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Lype diversa	L	0	1	4	0	0	0	0	0	2	0	0	0	0	0	0	1
Micrasema nr. rusticum	L	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Oxyethira	L	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Paramyctophylax	L	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phylocentropus	L	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Triaenodes	L	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

ORDER ODONATA (dragonflies)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Argia sedula	N	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Argia tibialis	N	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Boyeria vinosa	N	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Epitheca (Epicordulia)	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Erythrodiplax connata	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Enallagma sp.	N	0	0	0	1	0	0	0	0	0	1	0	0	0	3	0	0

O. MEGALOPTERA (heligrammites)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Corydalus cornutus	L	0	2	1	0	0	0	0	0	1	1	0	0	0	2	1	0
Nigronia serricornis	L	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0

ORDER COLEOPTERA (beetles)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Ancyronyx variegatus	L, A	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0
Dineutus discolor	A	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ectopria nervosa	L	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Helocombus sp.	A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Macronychus glabratus	L, A	0	0	0	0	0	2	0	0	5	1	0	3	0	2	0	0
Optioservus	L	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Stenelmis crenata	A	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Stenelmis sp.	L	0	0	0	0	0	1	0	1	1	0	0	1	2	0	0	0

Appendix Table B-1. Species List, Hester-Dendy Multiplate Samplers

Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER DIPTERA - other than midges	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Atherix lantha	L	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Hemerodromia	L	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Ephydridae	L	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnia invenusta	L	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Crysops sp.	L	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Simulium vittatum complex	L	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Simulium nr. verecundum	L	15	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Simulium tuberosum complex	L	1	0	0	0	2	0	0	0	17	0	0	0	0	0	1	0

ORDER DIPTERA - (Tanypodinae)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Ablabesmyia mallochi	L	0	0	0	0	0	0	0	0	0	1	0	0	5	0	1	0
Ablabesmyia janta gp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Conchapelopia	L	7	1	0	1	1	0	0	1	0	1	0	1	1	0	0	5
Labrundinia pilosella	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Paramerina	L	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zavrelimyia	L	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

ORDER DIPTERA - (Orthocladiinae)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Brillia flavifrons	L	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0
Corynoneura	L	2	0	0	0	0	1	0	0	0	20	0	0	2	1	0	0
(Diamesinae)-Potthastia longimana	L	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Cricotopus bicinctus	L	2	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Eukiefferiella claripennis gp.	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Kiefferulus dux	L	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Nanocladius	L	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrobaenus *	L	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Orthocladius nr. carlatus	L	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
Orthocladius sp.	L	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
Orthocladius nr. annectens	L	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Orthocladius (Symposiocladius) lignicola	L	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Orthocladius obumbratus	L	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0
Parakiefferiella	L	0	0	0	0	0	2	0	0	1	36	0	0	2	8	3	0
Parametriocnemus lundbecki	L, P	0	1	3	0	0	9	0	0	3	11	0	6	2	6	1	37
Rheocricotopus robacki	L	1	0	1	0	2	65	0	0	1	6	0	5	0	4	0	1
Synorthocladius semivirens	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Thienemanniella xena gp.	L	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
Thienemanniella fusca gp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Tvetenia paucunca gp.	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Tvetenia discoloripes gp.	L	0	0	0	0	1	6	1	0	0	0	0	0	0	0	0	0
Unniella multivirga	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

ORDER DIPTERA - (Chironomini)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Dicrotendipes nr. neomodestus	L	0	0	0	0	0	0	0	0	5	1	0	0	3	4	0	0
Microtendipes nr. pedellus	L	0	7	0	0	0	0	0	0	0	0	22	0	1	0	0	0
Microtendipes nr. rydalensis	L	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0
Phaenopsectra flavipes	L	0	1	0	4	0	0	0	1	1	0	0	0	0	1	0	0
Tribelos jucundum	L	1	0	0	0	0	0	0	0	0	0	0	0	35	14	0	0
Polypedilum aviceps	L	0	1	0	0	1	0	0	1	1	2	0	3	0	0	11	47
Polypedilum fallax	L	0	0	0	1	0	0	0	0	0	1	0	0	0	6	0	1
Polypedilum aviceps	L	0	0	0	0	0	7	0	0	0	0	0	0	0	3	0	0
Polypedilum illinoense	L	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
Polypedilum fallax	L	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0

Appendix Table B-1. Species List, Hester-Dendy Multiplate Samplers

Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER DIPTERA - (Tanytarsini)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Paratanytarsus	L	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0
Rheotanytarsus distinctissimus gp.	L	7	0	0	0	7	11	0	3	0	22	1	3	1	0	2	4
Tanytarsus	L,P	3	0	0	0	0	0	1	0	0	16	0	0	1	15	0	18

PHYLUM ANNELIDA (worms,leeches)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Lumbriculidae		0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Phylum Nematoda		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Uncinais uncinata		0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Stylaria fossularis		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Nais communis		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae (w/o cap. setae)		6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

CLASS CRUSTACEA (crayfish, shrimp)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Caecidotea	J, A	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Cambarinae	J,A	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Hyallela azteca	J	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0

PHYLUM MOLLUSCA (clams, snails)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Amnicola limosa	snail	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Corbicula fluminea	clam	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Ferrissia	snail	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0
Gyraulis parvulus	snail	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Sphaerium	clam	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Physella heterostropha	snail	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	0

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Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

Site/# of Organisms

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER EPHEMEROPTERA (mayflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Baetis dubium	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Baetis frondalis	N	0	0	0	0	1	0	0	0	25	0	0	0	0	1	0	5
Baetis intercalaris	N	0	0	3	0	0	0	0	0	1	0	0	1	0	1	0	1
Baetis propinquus	N	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
Callibaetis	N	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Caenis diminuta	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella (immature / damaged)	N	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Eurylophella (immature / damaged)	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Eurylophella doris	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hexagenia limbata	N	0	3	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Leptophlebia	N	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Neoephemera youngi	N	0	0	0	0	1	3	0	0	0	0	0	0	0	1	0	0
Paraleptophlebia	N	0	4	0	0	0	9	0	0	1	0	0	1	2	0	0	0
Stenacron interpunctatum	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Stenonema modestum/smithae	N	0	5	9	0	1	10	0	0	4	1	1	4	2	0	1	9

ORDER PLECOPTERA (stoneflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Acroneuria abnormis	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Acroneuria lycorias	N	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Acroneuria mela	N	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocapnia	N	0	0	5	0	0	0	0	0	0	0	13	3	0	0	0	3
Clioperla clio	N	0	4	1	0	0	4	0	0	0	0	0	0	0	0	2	1
Isoperla dicala	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Isoperla sp.	N	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Leuctra	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Paragnetina fumosa	N	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Perlesta placida	N	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
Pteronarcys	N	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	1
Taeniopteryx metequi	N	0	1	5	0	2	0	0	0	15	1	0	3	0	0	0	6

Appendix Table B-2. Species List, Qualitative Sampling of Natural Substrates

Westinghouse Savannah River Company
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Site/# of Organisms

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER TRICHOPTERA (caddisflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Brachycentrus chelatus	L	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Brachycentrus numerosus	L	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
Anisocentropus pyraloides	L	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0
Cernotina spicata	L	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cheumatopsyche	L	3	0	6	0	4	6	0	0	12	1	3	5	3	1	6	1
Chimarra aterrima	L	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	1
Diplectrona modesta	L	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche betteni	L	6	0	2	0	0	0	0	0	0	0	1	0	0	0	4	1
Hydropsyche elissoma	L	0	0	0	0	7	41	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp. 2	L	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
Lype diversa	L	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Micrasema nr. rusticum	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Neureclipsis	L	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0
Oxyethira	L	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Paranyctiophylax	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Phylocentropus	L	0	1	9	0	0	1	0	0	0	0	0	0	0	0	0	1
Psilotreta sp.	L	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Psilostomis	L	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
Pycnopsyche luculenta/sonso	L	0	0	0	0	1	1	0	0	0	0	2	0	0	2	0	0
Pycnopsyche sp. 2 (w/ 3 sided case)	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Nectopsyche	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Triaenodes	L	0	1	0	0	0	5	0	0	0	0	0	0	0	1	1	1

ORDER ODONATA (dragonflies)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Argia sedula	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Argia sp	N	0	0	0	0	1	0	0	0	1	0	0	2	0	1	0	0
Boyeria vinosa	N	0	1	2	0	3	2	0	0	0	1	0	1	1	0	7	0
Calopteryx dimidiata	N	1	1	4	0	2	2	0	1	2	1	1	2	0	1	9	1
Cordulegaster sp.	N	0	1	1	0	0	0	0	2	0	0	0	0	0	0	0	0
Cordulegaster maculata	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
Enallagma nr. divagans	N	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
Enallagma sp.	N	1	1	0	0	3	0	0	1	2	2	0	0	0	1	2	4
Gomphus rogersi	N	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphus lividus	N	2	3	0	0	0	1	0	0	0	0	2	8	0	0	1	1
Gomphus (Stylurus) notatus	N	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0
Hagenius brevistylus	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Libellula	N	2	0	0	0	0	2	0	0	0	2	1	0	1	0	0	0
Lanthus vernalis	N	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Macromia georgina / illinoiensis	N	1	1	0	0	1	2	0	0	0	0	0	1	0	3	0	0
Neurocordulia virginiensis	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ophlogomphus mainensis	N	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	N	0	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0

ORDER HETEROPTERA (true bugs)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Belostoma lutarium	N	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Mesovelia	N	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Rhagovelia obesa	N	0	0	1	0	0	1	0	0	0	0	0	0	0	0	14	0

Appendix Table B-2. Species List, Qualitative Sampling of Natural Substrates

Westinghouse Savannah River Company
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Site/# of Organisms

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER EPHEMEROPTERA (mayflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Baetis dubium	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Baetis frondalis	N	0	0	0	0	1	0	0	0	25	0	0	0	0	1	0	5
Baetis intercalaris	N	0	0	3	0	0	0	0	0	1	0	0	1	0	1	0	1
Baetis propinquus	N	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0
Callibaetis	N	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
Caenis diminuta	N	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemerella (immature / damaged)	N	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1
Eurylophella (immature / damaged)	N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Eurylophella doris	N	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Hexagenia limbata	N	0	3	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Leptophlebia	N	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
Neoephemera youngi	N	0	0	0	0	1	3	0	0	0	0	0	0	0	1	0	0
Paraleptophlebia	N	0	4	0	0	0	9	0	0	1	0	0	1	2	0	0	0
Stenacron interpunctatum	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Stenonema modestum/smithae	N	0	5	9	0	1	10	0	0	4	1	1	4	2	0	1	9

ORDER PLECOPTERA (stoneflies)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Acroneuria abnormis	N	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Acroneuria lycorias	N	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Acroneuria mela	N	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Allocapnia	N	0	0	5	0	0	0	0	0	0	0	13	3	0	0	0	3
Clioperla clio	N	0	4	1	0	0	4	0	0	0	0	0	0	0	0	2	1
Isoperla dicala	N	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Isoperla sp.	N	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Leuctra	N	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Paragnetina fumosa	N	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
Perlesta placida	N	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
Pteronarcys	N	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	1
Taeniopteryx metequi	N	0	1	5	0	2	0	0	0	15	1	0	3	0	0	0	6

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		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
O. MEGALOPTERA (hellgrammites)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Sialis	L	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Corydalus cornutus	N	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nigronia serricornis	N	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	0

ORDER COLEOPTERA (beetles)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Anchytarsus bicolor	L, A	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancyronyx variegatus	A	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Berosus	L	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Coptotomus interrogatus	A	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dineutus discolor	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Dineutus ciliatus	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Dubiraphia vittata	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dubiraphia sp.	A	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ectopria nervosa	A	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gonielmis dietrichi	A	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Helichus lithophilus	A	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Hydroporus sp.	A	2	0	0	0	0	0	6	0	0	0	3	0	0	0	0	0
Hydroporus nr. pilatei	A	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroporus vittatipennis	A	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Macronychus glabratus	A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Microcylloepus pusillus	A	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Optioservus	A	0	0	0	0	6	2	0	0	0	0	1	0	0	0	0	0
Stenelmis sp.	A	2	0	0	0	0	0	0	0	0	0	0	2	0	0	6	0

ORDER DIPTERA - other than midges	Stage	Tims Site 1	Mill Site 4	McQ Site 5	Crouch Site 6	U3R Site 3	U3R Site 2	FMB Site 7	FMB Site 8	FMB Site 9	FMB Site 16	Pen Site 10	Pen Site 11	Ind. Gr. Site 12	Pen Site 13	Steel Site 14	Meyers Site 15
Hemerodromia	L	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ephydridae	L	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Palpomyia sp.	L	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ectemnia invenusta	L	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0
Genus nr. Cryptolabis	L	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bezzia	L	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cryptops sp.	L	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Hexatoma	L	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pilaria	L	0	0	0	0	0	1	3	0	0	0	0	1	0	0	0	0
Probezzia	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Dixa sp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Simulium jonesi	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Simulium vittatum complex	L	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Simulium venustum	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Simulium nr. verecundum	L	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	2
Simulium tuberosum complex	L	1	0	0	0	6	0	0	0	0	0	0	2	0	0	1	1
Stilobezzia nr. lutea	L	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Tipula sp.	L	1	0	1	1	0	1	0	4	0	0	2	1	1	0	1	0
Tipula (Nippotipula) nr. abdominalis	L	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tipula sp. 2	L	0	1	3	0	0	0	0	0	0	0	0	0	1	0	0	0

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		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
ORDER DIPTERA - (Tanypodinae)	Stage	Tims Site 1	Mill Site 4	McQ Site 5	Crouch Site 6	U3R Site 3	U3R Site 2	FMB Site 7	FMB Site 8	FMB Site 9	FMB Site 16	Pen Site 10	Pen Site 11	Ind. Gr. Site 12	Pen Site 13	Steel Site 14	Meyers Site 15
Ablabesmyia mallochi	L	0	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0
Ablabesmyia janta gp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ablabesmyia nr. peleensis	L	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Clinotanypus pinguis	L	0	0	0	0	3	0	1	0	0	0	3	0	0	2	0	0
Conchapelopia	L	6	0	0	0	1	8	0	0	0	0	0	0	0	0	0	0
Labrundinia pilosella	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Natarsia	L	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Paramerina	L	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0
Zavrelimyia	L	0	0	0	0	0	1	0	0	0	0	2	1	0	0	0	0
Procladius	L	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0
Tanypus punctipennis	L	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

ORDER DIPTERA - (Orthocladiinae)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Brillia flavifrons	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Corynoneura	L	1	1	0	0	0	0	0	0	0	0	0	2	3	0	1	0
(Diamesinae)-Potthastia longimana	L	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus tremulus gp.	L	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Cricotopus bicinctus	L	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0
Eukiefferiella claripennis gp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Genus nr. Nanocladius B	L	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Heterotrissocladius marcidus gp.	L	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nanocladius	L	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
Orthocladius sp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Orthocladius obumbratus	L	0	0	0	0	0	0	0	0	0	20	0	0	0	8	0	1
Parakiefferiella	L	0	0	0	0	0	1	0	0	0	2	0	1	1	0	0	0
Parametriocnemus lundbecki	L	3	1	2	0	1	1	0	0	0	0	3	2	1	1	0	3
Pseudorthocladius sp.	L	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Rheocricotopus robacki	L	10	1	1	0	0	10	0	0	0	1	0	0	0	0	3	0
Thienemanniella xena gp.	L	4	0	0	0	0	1	0	0	2	2	0	0	2	0	0	2
Thienemanniella fusca gp.	L	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0
Tvetenia paucunca gp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Tvetenia discoloripes gp.	L	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0
Unniella multivirga	L	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	2

ORDER DIPTERA - (Chironomini)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Cryptochironomus fulvus gp.	L	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Chironomus	L	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0
Dicrotendipes nr. neomodestus	L	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0
Einfeldia	L	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes nr. pedellus	L	0	1	0	0	0	2	0	0	0	0	61	0	2	0	0	0
Microtendipes nr. rydalensis	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Nilothauma	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Pagastiella	L	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Parachironomus monochromus	L	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Paralauterborniella nigrohalteralis	L	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Phaenopsectra flavipes	L	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Tribelos jucundum	L	0	0	0	0	0	0	0	0	0	0	0	0	2	9	0	0
Pseudochironomus	L	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Polypedilum aviceps	L	11	11	8	0	0	0	0	0	3	0	4	1	0	0	5	1
Polypedilum aviceps	L	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0
Polypedilum illinoense	L	2	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Tims Branch (Site 1)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis sp.	N	0	0	0	0	1	1	0.2	0
Caenis diminuta	N	0	0	0	0	0	0	0	1
ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cheumatopsyche	L	1	3	0	0	0	4	0.8	3
Hydropsyche betteni	L	0	0	0	2	0	2	0.4	6
ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1
Enallagma sp.	N	0	0	0	0	0	0	0	1
Gomphus lividus	N	0	0	0	0	0	0	0	2
Libellula	N	0	0	0	0	0	0	0	2
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	1
O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corydalus cornutus	L	0	0	0	0	0	0	0	2
Nigronia serricornis	L	1	0	0	0	0	1	0.2	0
ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Berosus	L	0	0	0	0	0	0	0	2
Coptotomus interrogatus	A	0	0	0	0	0	0	0	3
Hydroporus sp.	A	0	0	0	0	0	0	0	2
Hydroporus nr. pilatei	A	0	0	0	0	0	0	0	2
Stenelmis sp.	L	0	0	0	0	0	0	0	2
ORDER DIPTERA - other than midge	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ephydridae	L	0	0	0	0	1	1	0.2	0
Palpomyia sp.	L	0	0	0	0	0	0	0	1
Bezzia	L	0	0	0	0	0	0	0	2
Simulium vittatum complex	L	0	0	0	0	0	0	0	2
Simulium venustum	L	0	0	0	0	0	0	0	9
Simulium nr. verecundum	L	0	8	1	0	4	13	2.6	0
Simulium tuberosum complex	L	1	0	0	0	0	1	0.2	1
Tipula sp.	L	0	0	0	0	0	0	0	1

Appendix Table B-2. Species List, Qualitative Sampling of Natural Substrates

Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

Site/# of Organisms

		Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
		Tims	Mill	McQ	Crouch	U3R	U3R	FMB	FMB	FMB	FMB	Pen	Pen	Ind. Gr.	Pen	Steel	Meyers
ORDER DIPTERA - (Tanytarsini)	Stage	Site 1	Site 4	Site 5	Site 6	Site 3	Site 2	Site 7	Site 8	Site 9	Site 16	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
Cladotanytarsus sp.	L	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Paratanytarsus	L	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Rheotanytarsus distinctissimus gp.	L,P	29	1	2	0	9	5	0	0	0	3	1	4	1	10	4	2
Rheotanytarsus exiguus gp.	L,P	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Tanytarsus	L,P	9	2	1	0	0	5	3	0	0	5	1	0	2	0	1	8
PHYLUM ANNELIDA (worms,leeches)		Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Tubificidae (w/o cap. setae)		3	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0
CLASS CRUSTACEA (crayfish, shrimp)	Stage	Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Cambarinae	J,A	0	4	0	3	4	3	0	0	0	1	0	7	0	2	14	4
Hyallela azteca	J	3	0	0	0	0	0	0	0	0	26	0	0	38	2	0	1
Crangonyx obliquus-richmondensis	J	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Palaemonetes paludosus	J	0	10	1	0	0	4	0	0	0	0	3	10	0	28	0	16
ORDER LEPIDOPTERA (moths)		Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Parapoynx obscuralis	L	0	0	0	0	9	11	0	0	1	1	0	0	0	1	1	0
PHYLUM MOLLUSCA (clams, snails)		Site1	Site4	Site5	Site6	Site3	Site2	Site7	Site8	Site9	Site16	Site10	Site11	Site12	Site13	Site14	Site15
Aunicola limosa	snail	0	0	0	0	0	4	0	0	0	3	0	0	0	1	0	0
Campeloma decisum	snail	0	9	2	0	0	3	0	1	0	0	10	0	0	0	0	0
Corbicula fluminea	clam	0	1	0	0	0	0	0	0	2	10	0	2	1	12	1	0
Helisoma anceps	snail	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0
Sphaerium	clam	0	0	0	0	0	0	1	1	0	0	3	3	1	6	0	2
Physella heterostropha	snail	0	0	0	0	0	0	0	0	25	3	0	0	0	0	3	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Tims Branch (Site 1)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Conchapelopia	L	0	2	0	5	0	7	1.4	6

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corynoneura	L	0	0	0	2	0	2	0.4	4
Cricotopus bicinctus	L	0	1	0	1	0	2	0.4	0
Nanocladius	L	0	0	0	0	0	0	0	1
Parametriocnemus lundbecki	L, P	0	0	0	0	0	0	0	3
Rheocricotopus robacki	L	0	0	1	0	0	1	0.2	0
Thienemanniella xena gp.	L	1	1	0	1	0	3	0.6	4

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cryptochironomus fulvus gp.	L	0	0	0	0	0	0	0	2
Einfeldia	L	0	0	0	0	0	0	0	1
Tribelos jucundum	L	0	0	0	1	0	1	0.2	0
Polypedilum aviceps	L	0	0	0	0	0	0	0	11
Polypedilum illinoense	L	0	0	0	0	0	0	0	52

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	1	4	0	1	1	7	1.4	29
Tanytarsus	P	0	0	1	2	0	3	0.6	9

PHYLUM ANNELIDA (worms,leeches		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Nais communis		1	0	0	0	0	1	0.2	0
Tubificidae (w/o cap. setae)		0	0	16	0	0	16	3.2	3

CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hyallela azteca	J	0	0	0	0	0	0	0	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflie	stage	RepA	RepB	RepC	RepD	RepE	total	Mean	Qualitative
Acentrella ampla	N	1	0	0	0	0	1	0.2	0
Baetis intercalaris	N	1	0	1	0	0	2	0.4	0
Baetis propinquus	N	0	0	0	0	0	0	0	7
Eurylophella (immature / damaged)	N	1	0	0	0	0	1	0.2	0
Heptagenia	N	2	1	0	2	0	5	1	0
Hexagenia limbata	N	0	0	0	0	0	0	0	8
Neoephemera youngi	N	0	0	0	0	0	0	0	3
Paraleptophlebia	N	0	0	0	0	0	0	0	9
Stenonema modestum/smithae	N	4	7	3	0	0	14	2.8	10

ORDER PLECOPTERA (stoneflies)	stage	RepA	RepB	RepC	RepD	RepE	total	Mean	Qualitative
Acroneuria abnormis	N	1	2	1	4	1	9	1.8	0
Acroneuria mela	N	0	0	1	0	0	1	0.2	0
Allocapnia	N	2	0	2	0	0	4	0.8	0
Clioperla clio	N	0	0	0	0	0	0	0	4
Isoperla dicala	N	2	1	9	2	0	14	2.8	1
Paragnetina fumosa	N	1	0	1	1	0	3	0.6	1
Perlesta placida	N	0	1	2	0	0	3	0.6	2
Pteronarcys	N	0	0	1	0	2	3	0.6	6
Taeniopteryx metequi	N	0	0	1	0	0	1	0.2	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

ORDER COLEOPTERA (beetles)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Dineutus discolor	A	0	1	0	0	0	1	0.2	1
Macronychus glabratus	L, A	1	1	0	0	0	2	0.4	0
Optioservus	L	0	0	0	0	0	0	0	2
Stenelmis sp.	L	0	0	0	1	0	1	0.2	0

ORDER DIPTERA - other than midges	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Atherix lantha	L	0	2	0	0	0	2	0.4	0
Palpomyia sp.	L	0	0	0	0	0	0	0	1
Ectemnia invenusta	L	0	0	0	0	0	0	0	5
Pilaria	L	0	0	0	0	0	0	0	1
Simulium jonesi	L	0	0	0	0	0	0	0	1
Stilobezzia nr. lutea	L	0	0	0	0	0	0	0	1
Tipula sp.	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Tanypodinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Ablabesmyia mallochi	L	0	0	0	0	0	0	0	1
Conchapelopia	L	0	0	0	0	0	0	0	8
Labrundinia pilosella	L	0	0	0	0	0	0	0	1
Zavrelimyia	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Orthocladiinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Brillia flavifrons	L	0	0	2	0	0	2	0.4	0
Corynoneura	L	0	0	1	0	0	1	0.2	0
Eukiefferiella claripennis gp.	L	1	0	0	0	0	1	0.2	0
Orthocladius nr. carlatus	L	0	0	6	1	0	7	1.4	0
Parakiefferiella	L	0	0	2	0	0	2	0.4	1
Parametriocnemus lundbecki	L, P	1	0	6	2	0	9	1.8	1
Rheocricotopus robacki	L	6	10	40	7	2	65	13	10
Synorthocladius semivirens	L	0	1	0	0	0	1	0.2	0
Thienemanniella xena gp.	L	0	1	0	0	0	1	0.2	1
Thienemanniella fusca gp.	L	0	0	0	0	0	0	0	1
Tvetenia paucunca gp.	L	0	0	1	0	0	1	0.2	0
Tvetenia discoloripes gp.	L	0	1	3	2	0	6	1.2	6
Unniella multivirga	L	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Brachycentrus numerosus	L	11	0	0	6	0	17	3.4	17
Cheumatopsyche	L	0	1	1	0	0	2	0.4	6
Chimarra aterrima	L	0	0	0	0	0	0	0	2
Hydropsyche elissoma	L	0	0	0	0	0	0	0	41
Micrasema nr. rusticum	L	1	0	0	0	0	1	0.2	1
Neureclipsis	L	0	0	0	0	0	0	0	5
Paranyctiophylax	L	0	0	0	0	0	0	0	1
Phylocentropus	L	0	0	0	0	0	0	0	1
Pycnopsyche sp.	L	0	0	0	0	0	0	0	1
Triaenodes	L	0	0	0	0	0	0	0	5

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Boyeria vinosa	N	0	0	0	0	0	0	0	2
Calopteryx dimidiata	N	0	0	0	0	0	0	0	2
Gomphus lividus	N	0	0	0	0	0	0	0	1
Libellula	N	0	0	0	0	0	0	0	2
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	2
Neurocordulia virginiensis	N	0	0	0	0	0	0	0	1

ORDER HETEROPTERA (true bugs)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rhagovelia obesa	A	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflie	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis dubium	N	0	0	0	0	0	0	0	1
Baetis frondalis	N	0	0	0	0	0	0	0	1
Habrophlebia vibrans	N	0	1	0	0	0	1	0.2	0
Hexagenia limbata	N	0	0	0	0	0	0	0	3
Neoephemera youngi	N	0	0	0	0	0	0	0	1
Stenonema modestum/smithae	N	2	0	4	1	1	8	1.6	1

ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Acroneuria abnormis	N	0	0	1	0	1	2	0.4	1
Acroneuria lycorias	N	1	4	1	4	0	10	2	2
Helopicus subvarians	N	1	0	0	0	1	2	0.4	0
Perlidae	N	1	0	2	0	1	4	0.8	2
Paragnetina fumosa	N	1	0	0	3	0	4	0.8	2
Perlesta placida	N	0	0	0	1	2	3	0.6	4
Pteronarcys	N	0	0	0	0	0	0	0	1
Taeniopteryx metequi	N	1	0	1	0	2	4	0.8	2

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	total	Mean	Qualitative
Cryptochironomus fulvus gp.	L	0	0	0	0	0	0	0	1
Microtendipes nr. pedellus	L	0	0	0	0	0	0	0	2
Microtendipes nr. rydalensis	L	0	2	2	0	0	4	0.8	1
Nilothauma	L	0	0	0	0	0	0	0	1
Paralauterborniella nigrohalteralis	L	0	0	0	0	0	0	0	1
Polypedilum aviceps	L	0	2	5	0	0	7	1.4	28
Polypedilum illinoense	L	0	0	0	0	0	0	0	2
Polypedilum fallax	L	0	0	2	0	0	2	0.4	0

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Paratanytarsus	L	0	1	0	0	0	1	0.2	0
Rheotanytarsus distinctissimus gp.	L	1	1	5	3	1	11	2.2	52
Rheotanytarsus exiguus gp.	L	0	0	0	0	0	0	0	4
Tanytarsus	P	0	0	0	0	0	0	0	5

PHYLUM ANNELIDA (worms,leeches		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Nematoda		0	0	1	0	0	1	0.2	0

CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	3
Palaemonetes paludosus	A	0	0	0	0	0	0	0	4

ORDER LEPIDOPTERA (moths)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	101

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Amnicola limosa	snail	0	0	0	0	0	0	0	4
Campeloma decisum	snail	0	0	0	0	0	0	0	5

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Clinotanypus pinguis	L	0	0	0	0	0	0	0	3
Conchapelopia	L	0	1	0	0	0	1	0.2	1

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Nanocladius	L	0	0	0	0	0	0	0	1
Parametriocnemus lundbecki	L, P	0	0	0	0	0	0	0	1
Rheocricotopus robacki	L	0	1	0	0	1	2	0.4	0
Tvetenia discoloripes gp.	L	0	0	0	0	1	1	0.2	1

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Microtendipes nr. rydalensis	L	0	1	1	0	0	2	0.4	0
Polypedilum aviceps	L	0	0	0	0	1	1	0.2	0

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	2	1	4	0	0	7	1.4	9

CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	4

ORDER LEPIDOPTERA (moths)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	9

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Site / # of Organisms

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Brachycentrus chelatus	L	0	0	0	2	6	8	1.6	6
Cernotina spicata	L	0	0	0	0	0	0	0	1
Cheumatopsyche	L	0	0	0	0	2	2	0.4	4
Diplectrona modesta	L	0	0	0	0	1	1	0.2	0
Hydropsyche elissoma	L	0	0	0	0	6	6	1.2	7
Micrasema nr. rusticum	L	0	0	0	0	1	1	0.2	0
Neureclipsis	L	0	0	0	0	0	0	0	1
Phylocentropus	L	0	0	0	0	2	2	0.4	0
Pycnopsyche sp.	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia sp	N	0	0	0	0	0	0	0	1
Boyeria vinosa	N	0	0	0	0	1	1	0.2	3
Calopteryx dimidiata	N	0	0	0	0	0	0	0	2
Enallagma sp.	N	0	0	0	0	0	0	0	3
Gomphus (Stylurus) notatus	N	0	0	0	0	0	0	0	2
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	1

O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Nigronia serricornis	L	1	0	1	0	0	2	0.4	0

ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Gonielmis dietrichi	L	0	0	0	0	0	0	0	1
Optioservus	L	0	0	1	0	0	1	0.2	6
Stenelmis sinuata	A	0	1	0	0	0	1	0.2	0

ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hemerodromia	L	0	0	0	0	0	0	0	1
Ephydridae	L	0	0	0	0	0	0	0	2
Ectemnia invenusta	L	0	0	2	0	3	5	1	3
Bezzia	L	0	0	0	0	0	0	0	1
Simulium nr. podostemi	L	0	0	0	0	0	0	0	1
Simulium tuberosum complex	L	0	0	0	0	2	2	0.4	6
Stilobezzia nr. lutea	L	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Sialis	L	0	0	0	0	0	0	0	1
Corydalus cornutus	L	1	0	1	0	0	2	0.4	0
Nigronia serricornis	L	0	0	0	0	1	1	0.2	2
ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Dubiraphia sp.	L, A	0	0	0	0	0	0	0	1
Ectopria nervosa	L	0	0	0	0	0	0	0	1
Optioservus	L	0	0	0	1	0	1	0.2	0
ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hexatoma	L	0	0	0	0	0	0	0	2
Stilobezzia nr. lutea	L	0	0	0	0	0	0	0	1
Tipula (Nippotipula) nr. abdominalis	L	0	0	0	0	0	0	0	2
Tipula sp. 2	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ablabesmyia mallochi	L	0	0	0	0	0	0	0	1
Conchapelopia	L	0	0	0	0	1	1	0.2	0
Paramerina	L	0	0	1	0	0	1	0.2	1
ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corynoneura	L	0	0	0	0	0	0	0	1
Nanocladius	L	0	0	0	0	1	1	0.2	0
Parametriocnemus lundbecki	L, P	0	0	1	0	0	1	0.2	1
Rheocricotopus robacki	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cryptochironomus fulvus gp.	L	0	0	0	0	0	0	0	1
Microtendipes nr. pedellus	L	2	5	0	0	0	7	1.4	1
Phaenopsectra flavipes	L	0	0	0	0	1	1	0.2	0
Polypedilum aviceps	L	0	0	0	0	1	1	0.2	11

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Eurylophella (immature / damaged)	N	0	0	0	0	1	1	0.2	0
Hexagenia limbata	N	0	0	0	0	0	0	0	3
Paraleptophlebia	N	2	0	0	0	0	2	0.4	4
Stenonema modestum/smithae	N	41	8	8	12	14	53	10.6	5

ORDER PLECOPTERA (stoneflies)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Acroneuria mela	N	0	0	0	0	0	0	0	1
Allocapnia	N	2	5	8	1	3	19	3.8	0
Clioperla clio	N	0	1	0	1	0	2	0.4	4
Perlesta placida	N	0	0	0	0	1	1	0.2	0
Taeniopteryx metequi	N	0	0	0	0	0	0	0	1

ORDER TRICHOPTERA (caddisflies)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Anisocentropus pyraloides	L	0	0	0	0	0	0	0	1
Ceraclea nr. resurgens	L	1	0	0	0	0	1	0.2	0
Lype diversa	L	1	0	0	0	0	1	0.2	0
Paranyctiophylax	L	0	0	2	1	0	3	0.6	0
Phylocentropus	L	0	0	0	0	0	0	0	1
Triaenodes	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Boyeria vinosa	N	0	0	1	0	0	1	0.2	1
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1
Cordulegaster sp.	N	0	0	0	0	0	0	0	1
Enallagma sp.	N	0	0	0	0	0	0	0	1
Gomphus rogersi	N	0	0	0	0	0	0	0	3
Gomphus lividus	N	0	0	0	0	0	0	0	5
Lanthus vernalis	N	0	0	0	0	0	0	0	1
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: McQueen Branch (Site 5)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Totals	Means	Qualitative
Baetis intercalaris	N	0	0	0	0	0	0	0	3
Stenonema modestum/smithae	N	9	9	0	4	9	31	6.2	9

ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Totals	Means	Qualitative
Acroneuria mela	N	0	0	0	0	0	0	0	1
Allocapnia	N	2	0	0	0	1	3	0.6	5
Clioperla clio	N	0	0	0	0	0	0	0	1
Perlesta placida	N	0	1	0	0	0	1	0.2	0
Taeniopteryx metequi	N	0	0	0	0	0	0	0	5

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Totals	Means	Qualitative
Anisocentropus pyraloides	L	0	0	0	0	0	0	0	2
Cheumatopsyche	L	0	0	0	1	0	1	0.2	6
Diplectrona modesta	L	0	0	0	0	0	0	0	1
Hydropsyche betteni	L	0	0	0	0	0	0	0	2
Lype diversa	L	1	1	1	0	1	4	0.8	0
Phylocentropus	L	0	0	0	0	0	0	0	9
Psilotreta sp.	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Totals	Means	Qualitative
Boyeria vinosa	N	0	0	0	0	0	0	0	2
Calopteryx dimidiata	N	0	0	0	0	0	0	0	4
Cordulegaster sp.	N	0	0	0	0	0	0	0	1
Gomphus (Stylurus) notatus	N	0	0	0	0	0	0	0	1
Ophiogomphus mainensis	N	0	0	0	0	0	0	0	2
Progomphus	N	0	0	0	0	0	0	0	5

ORDER HETEROPTERA (true bugs)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Totals	Means	Qualitative
Rhagovelia obesa	A	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

	Site / # of Organisms								
ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	0	0	0	0	0	1
Tanytarsus	L	0	0	0	0	0	0	0	2

CLASS CRUSTACEA (crayfish, shrimp)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	4
Palaemonetes paludosus	A	0	0	0	0	0	0	0	10

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Campeloma decisum	snail	0	0	0	0	0	0	0	9
Corbicula fluminea	clam	0	0	0	0	0	0	0	11

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: McQueen Branch (Site 5)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corydalus cornutus	L	1	0	0	0	0	1	0.2	0
Nigronia serricornis	L	0	1	0	0	0	1	0.2	2
ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Anchytarsus bicolor	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Genus nr. Cryptolabis	L	0	0	0	0	0	0	0	1
Tipula sp.	L	0	0	0	0	0	0	0	1
Tipula sp. 2	L	0	0	0	0	0	0	0	3
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Paramerina	L	0	0	0	0	0	0	0	2
ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
(Diamesinae)-Potthastia longimana	L	0	0	0	0	0	0	0	1
Nanocladius	L	0	1	0	0	0	1	0.2	0
Parametriocnemus lundbecki	L, P	0	0	2	1	0	3	0.6	2
Rheocricotopus robacki	L	1	0	0	0	0	1	0.2	1
Thienemanniella xena gp.	L	0	0	0	1	0	1	0.2	0
ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Polypedilum aviceps	L	0	0	0	0	0	0	0	8
ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	0	0	0	0	0	2
Tanytarsus	P	0	0	0	0	0	0	0	1
CLASS CRUSTACEA (crayfish, shrimp)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Palaemonetes paludosus	A	0	0	0	0	0	0	0	1
PHYLUM MOLLUSCA (clams, snails)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Campeloma decisum	snail	0	0	0	0	0	0	0	2

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Crouch Branch (Site 6)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

	Site / # of Organisms								
ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia sedula	N	0	0	0	0	1	1	0.2	0
Enallagma sp.	N	1	0	0	0	0	1	0.2	0
ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tipula sp.	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Conchapelopia	L	0	0	1	0	0	1	0.2	0
ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cricotopus bicinctus	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Phaenopsectra flavipes	L	0	0	0	1	3	4	0.8	0
Polypedilum fallax	L	0	0	0	0	1	1	0.2	0
CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 8)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayfli	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative

		Site / # of Organisms							
ORDER PLECOPTERA (stoneflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Allocapnia	N	0	0	1	0	0	1	0.2	0
ORDER TRICHOPTERA (caddisflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Ptilostomis	L	0	0	0	0	0	0	0	1
ORDER ODONATA (dragonflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Calopteryx dimidiata	N	0	0	0	0	1	1	0.2	1
Cordulegaster sp.	N	0	0	0	0	0	0	0	2
Enallagma sp.	N	0	0	0	0	0	0	0	1
O. MEGALOPTERA (hellgrammites)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Sialis	L	0	0	0	0	0	0	0	1
ORDER COLEOPTERA (beetles)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Anchytarsus bicolor	L	1	0	0	0	0	1	0.2	1
Stenelmis sp.	L	1	0	0	0	0	1	0.2	0
ORDER DIPTERA - other than midge	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Tipula sp.	L	0	0	0	0	0	0	0	4
ORDER DIPTERA - (Tanypodinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Conchapelopia	L	0	0	0	1	0	1	0.2	0
ORDER DIPTERA - (Orthocladiinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Genus nr. Nanocladius B	L	0	0	0	0	0	0	0	1
Kiefferulus dux	L	1	0	0	0	0	1	0.2	2
ORDER DIPTERA - (Chironomini)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Phaenopsectra flavipes	L	1	0	0	0	0	1	0.2	0
Polypedilum avlceps	L	0	1	0	0	0	1	0.2	0
ORDER DIPTERA - (Tanytarsini)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Paratanytarsus	L	0	1	1	1	0	3	0.6	1
Rheotanytarsus distinctissimus gp.	L	0	0	0	3	0	3	0.6	0
PHYLUM ANNELIDA (worms,leeche	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Uncinais uncinata		1	0	1	0	0	2	0.4	0
PHYLUM MOLLUSCA (clams, snails	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Campeloma decisum	snail	0	0	0	0	0	0	0	1
Sphaerium	clam	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 7)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Site / # of Organisms

ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Berosus	L	0	0	0	0	0	0	0	3
Hydroporus sp.	A	0	0	0	0	0	0	0	6

ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Crysops sp.	L	0	0	0	0	1	1	0.2	2
Pilaria	L	0	0	0	0	0	0	0	3

ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ablabesmyia nr. peleensis	L	0	0	0	0	0	0	0	1
Clinotanypus pinguis	L	0	0	0	0	0	0	0	4
Procladius	L	0	0	0	0	0	0	0	1
Tanypus punctipennis	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Pseudorthocladius sp.	L	0	0	0	0	0	0	0	2
Tvetenia discoloripes gp.	L	0	0	0	1	0	1	0.2	0

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Chironomus	L	0	0	0	0	0	0	0	7
Parachironomus monochromus	L	0	0	0	0	0	0	0	3
Pseudochironomus	L	0	0	0	0	0	0	0	1
Polypedilum illinoense	L	0	0	0	0	0	0	0	5

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tanytarsus	P	0	0	0	1	0	1	0.2	3

PHYLUM ANNELIDA (worms,leeches)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Lumbriculidae		0	0	0	1	0	1	0.2	0

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ferrissia	snail	0	1	0	0	0	1	0.2	0
Sphaerium	clam	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 9)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis frondalis	N	0	0	0	0	0	0	0	25
Baetis intercalaris	N	2	1	0	7	2	12	2.4	1
Paraleptophlebia	N	0	0	0	0	0	0	0	1
Stenonema modestum/smithae	N	3	3	4	8	4	22	4.4	14
ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Paragnetina fumosa	N	0	0	0	0	1	1	0.2	0
Taeniopteryx metequi	N	0	3	1	1	3	8	1.6	15
ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cheumatopsyche	L	39	54	58	24	24	199	39.8	12
Chimarra aterrima	L	0	2	1	0	1	4	0.8	0
Hydropsyche betteni	L	3	2	0	1	0	6	1.2	0
Lype diversa	L	0	0	1	0	1	2	0.4	0
Triaenodes	L	0	0	0	0	1	1	0.2	0
ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia sp	N	0	0	0	0	0	0	0	1
Calopteryx dimidiata	N	0	0	0	0	0	0	0	2
Enallagma sp.	N	0	0	0	0	0	0	0	2
O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corydalus cornutus	L	0	0	0	0	1	1	0.2	0
ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Macronychus glabratus	L, A	0	3	1	1	0	5	1	0
Stenelmis crenata	A	0	0	1	0	0	1	0.2	0
Stenelmis sp.	L	0	0	0	0	1	1	0.2	0
ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hemerodromia	L	0	1	0	0	0	1	0.2	0
Simulium vittatum complex	L	1	0	0	0	0	1	0.2	0
Simulium nr. verecundum	L	0	0	0	1	2	3	0.6	7
Simulium tuberosum complex	L	2	0	1	0	14	17	3.4	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 9)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Paramerina	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cricotopus bicinctus	L	1	2	0	0	2	5	1	5
Parakiefferiella	L	0	0	1	0	0	1	0.2	10
Parametriocnemus lundbecki	L, P	0	0	0	0	3	3	0.6	20
Rheocricotopus robacki	L	0	0	0	1	0	1	0.2	10
Thienemanniella xena gp.	L	0	0	0	0	0	0	0	0
ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Dicrotendipes nr. neomodestus	L	0	0	1	3	1	5	1	5
Phaenopsectra flavipes	L	1	0	0	0	0	1	0.2	1
Polypedilum aviceps	L	0	0	0	0	1	1	0.2	5
Polypedilum illinoense	L	0	2	0	0	0	2	0.4	10
CLASS CRUSTACEA (crayfish, shrimp)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Crangonyx obliquus-richmondensis	A	0	0	0	0	0	0	0	1
ORDER LEPIDOPTERA (moths)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	1
PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corbicula fluminea	clam	0	0	0	0	0	0	0	2
Physella heterostropha	snail	1	0	2	0	0	3	0.6	25

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflie	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Leptophlebia	N	0	1	0	2	0	3	0.6	14
Stenacron interpunctatum	N	2	3	0	3	1	9	1.8	11
Stenonema modestum/smithae	N	16	8	8	8	18	58	11.6	11

ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Allocapnia	N	1	3	5	3	2	14	2.8	13
Clioperla clio	N	1	0	0	0	0	1	0.2	10
Leuctra	N	0	0	0	0	0	0	0	11
Perlinella ephyre	N	0	0	0	1	0	1	0.2	10
Taeniopteryx metequi	N	1	0	0	0	0	1	0.2	10

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Anisocentropus pyraloides	L	0	0	0	0	0	0	0	11
Cheumatopsyche	L	0	0	0	0	0	0	0	13
Hydropsyche betteni	L	0	0	0	0	0	0	0	11
Pycnopsyche sp.	L	0	0	0	0	0	0	0	12

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia tibialis	N	0	1	0	0	1	2	0.4	10
Calopteryx dimidiata	N	0	0	0	0	0	0	0	11
Enallagma nr. divagans	N	0	0	0	0	0	0	0	17
Gomphus lividus	N	0	0	0	0	0	0	0	12
Libellula	N	0	0	0	0	0	0	0	11
Lanthus vernalis	N	0	0	0	0	0	0	0	11

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hydroporus sp.	A	0	0	0	0	0	0	0	3
Hydroporus vittatipennis	A	0	0	0	0	0	0	0	1
Optioservus	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tipula sp.	L	0	0	0	0	0	0	0	2

ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Clinotanypus pinguis	L	0	0	0	0	0	0	0	3
Natarsia	L	0	0	0	0	0	0	0	1
Zavrelimyia	L	0	0	0	0	0	0	0	2
Procladius	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Heterotrissocladius marcidus gp.	L	0	0	0	0	0	0	0	1
Parametriocnemus lundbecki	L, P	0	0	0	0	0	0	0	3
Unniella multivirga	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Microtendipes nr. pedellus	L	1	7	1	3	10	22	4.4	61
Phaenopsectra flavipes	L	0	0	0	0	0	0	0	1
Polypedilum aviceps	L	0	0	0	0	0	0	0	4

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	1	0	0	0	1	0.2	1
Tanytarsus	P	0	0	0	0	0	0	0	1
PHYLUM ANNELIDA (worms,leeches)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tubificidae (w/o cap. setae)		0	0	0	0	0	0	0	2
CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Palaemonetes paludosus	A	0	0	0	0	0	0	0	3
PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Campeloma decisum	snail	0	0	0	0	0	0	0	10
Sphaeriuim	clam	0	0	0	0	0	0	0	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis intercalaris	N	0	0	0	1	0	1	0.2	1
Ephemerella (immature / damaged)	N	0	0	0	6	0	6	1.2	2
Paraleptophlebia	N	0	0	0	0	0	0	0	1
Stenonema modestum/smithae	N	11	14	18	16	3	62	12.4	4
ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Allocapnia	N	1	3	0	3	2	9	1.8	3
Perlesta placida	N	0	2	1	1	1	5	1	20
Taeniopteryx metequi	N	0	1	4	9	1	15	3	3
ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cheumatopsyche	L	0	1	0	17	0	18	3.6	5
ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia sp	N	0	0	0	0	0	0	0	2
Boyeria vinosa	N	0	0	0	0	0	0	0	31
Calopteryx dimidiata	N	0	0	0	0	0	0	0	52
Gomphus lividus	N	0	0	0	0	0	0	0	18
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	21
ORDER HETEROPTERA (true bugs)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Mesovelia	A	0	0	0	0	0	0	0	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
O. MEGALOPTERA (hellgrammites)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Sialis	L	0	0	0	0	0	0	0	1
Nigronia serricornis	L	0	0	0	0	0	0	0	1
ORDER COLEOPTERA (beetles)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Ancyronyx variegatus	L, A	0	0	1	1	0	2	0.4	0
Dubiraphia sp.	L, A	0	0	0	0	0	0	0	1
Ectopria nervosa	L	0	0	0	1	0	1	0.2	0
Helichus lithophilus	A	0	0	0	0	0	0	0	1
Macronychus glabratus	L, A	1	1	0	1	0	3	0.6	0
Stenelmis sp.	L	1	0	0	0	0	1	0.2	2
ORDER DIPTERA - other than midges	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Pilaria	L	0	0	0	0	0	0	0	1
Simulium tuberosum complex	L	0	0	0	0	0	0	0	2
Tipula sp.	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Tanypodinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Conchapelopia	L	0	0	0	1	0	1	0.2	0
Zavrelimyia	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Orthocladiinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Corynoneura	L	0	0	0	0	0	0	0	2
Nanocladius	L	0	0	0	0	0	0	0	1
Orthocladius nr. annectens	L	0	1	0	0	0	1	0.2	0
Orthocladius (Symposiocladius) lignicola	L	0	1	0	0	0	1	0.2	0
Orthocladius obumbratus	L	0	2	0	0	0	2	0.4	0
Parakiefferiella	L	0	0	0	0	0	0	0	1
Parametriocnemus lundbecki	L, P	0	3	0	2	1	6	1.2	2
Rheocricotopus robacki	L	0	1	1	2	1	5	1	0
Thienemanniella fusca gp.	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Chironomini)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Pagastiella	L	0	0	0	0	0	0	0	1
Polypedilum aviceps	L	0	0	0	3	0	3	0.6	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

	Site / # of Organisms							
ORDER DIPTERA - (Tanytarsini)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	0	2	1	3	0.6	4
CLASS CRUSTACEA (crayfish, shrimp)	Stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Caecidotea	J, A	0	0	1	0	0	1	0.2	10
Cambarinae	A	0	0	0	0	0	0	0	7
Palaemonetes paludosus	A	0	0	0	0	0	0	0	10
PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corbicula fluminea	clam	0	0	0	1	0	1	0.2	12
Sphaerium	clam	0	0	0	0	0	0	0	13

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Indian Grave Branch (Site 12)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflie	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Callibaetis	N	0	0	0	0	0	0	0	1
Paraleptophlebia	N	0	0	1	0	0	1	0.2	2
Stenonema modestum/smithae	N	3	0	11	4	7	25	5	2

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cernotina spicata	L	0	0	0	1	0	1	0.2	0
Cheumatopsyche	L	0	0	0	0	1	1	0.2	3
Chimarra aterrima	L	0	0	0	0	0	0	0	2
Lype diversa	L	0	0	0	0	0	0	0	1
Oxyethira	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Boyeria vinosa	N	0	0	0	0	0	0	0	1
Epitheca (Epicordulia)	N	0	0	1	0	0	1	0.2	0
Erythrodiplax connata	N	0	0	0	1	0	1	0.2	0
Libellula	N	0	0	0	0	0	0	0	1

ORDER HETEROPTERA (true bugs)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Belostoma lutarium	A	0	0	0	0	0	0	0	1

ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hydroporus sp.	A	0	0	1	0	0	1	0.2	0
Stenelmis sp.	L	1	1	0	0	0	2	0.4	0

ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tipula (Nippotipula) nr. abdominalis	L	0	0	0	0	0	0	0	1
Tipula sp. 2	L	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Indian Grave Branch (Site 12)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ablabesmyia mallochi	L	1	2	2	0	0	5	1	0
Conchapelopia	L	0	0	0	0	1	1	0.2	0
Zavrelimyia	L	0	0	0	1	0	1	0.2	0

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corynoneura	L	0	0	2	0	0	2	0.4	3
(Diamesinae)-Potthastia longimana	L	0	0	0	0	1	1	0.2	0
Parakiefferiella	L	0	0	2	0	0	2	0.4	1
Parametriocnemus lundbecki	L, P	0	0	2	0	0	2	0.4	1
Thienemanniella xena gp.	L	0	0	0	0	0	0	0	2

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Dicrotendipes nr. neomodestus	L	0	0	3	0	0	3	0.6	0
Microtendipes nr. pedellus	L	0	0	0	1	0	1	0.2	2
Tribelos jucundum	L	3	12	12	6	2	35	7	2

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	1	0	0	1	0.2	1
Tanytarsus	P	0	0	0	1	0	1	0.2	2

PHYLUM ANNELIDA (worms,leeches		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Stylaria fossularis		0	0	0	1	0	1	0.2	0
Tubificidae (w/o cap. setae)		0	0	0	0	0	0	0	1

CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	1	0	0	0	0	1	0.2	0
Hyallela azteca	J	0	0	0	0	0	0	0	38

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corbicula fluminea	clam	0	0	0	0	0	0	0	1
Helisoma anceps	snail	0	0	0	0	0	0	0	6
Sphaerium	clam	0	0	0	0	0	0	0	1
Physella heterostropha	snail	0	0	1	0	0	1	0.2	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 13)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Baetis sp.	N	0	0	0	1	0	1	0.2	0
Baetis frondalis	N	0	0	0	0	0	0	0	1
Baetis intercalaris	N	0	0	0	0	0	0	0	1
Neoephemera youngi	N	0	0	0	0	0	0	0	1
Stenonema modestum/smithae	N	0	1	0	5	1	7	1.4	0

ORDER TRICHOPTERA (caddisflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Cheumatopsyche	L	0	0	0	3	0	3	0.6	1
Hydrospyche sp. 2	L	0	0	0	0	0	0	0	1
Pycnopsyche	L	0	0	0	0	0	0	0	2
Triaenodes	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Argia sp	N	0	0	0	0	0	0	0	1
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1
Enallagma sp.	N	1	2	0	0	0	3	0.6	1
Macromia georgina / illinoiensis	N	0	0	0	0	0	0	0	3

O. MEGALOPTERA (hellgrammites)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Corydalus cornutus	L	0	0	0	1	1	2	0.4	0

ORDER COLEOPTERA (beetles)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Macronychus glabratus	L, A	0	0	0	1	1	2	0.4	0

ORDER DIPTERA - (Tanypodinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Ablabesmyia janta gp.	L	0	0	1	0	0	1	0.2	0
Clinotanypus pinguis	L	0	0	0	0	0	0	0	2
Zavrelimyia	L	0	0	0	0	1	1	0.2	0
Procladius	L	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 13)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corynoneura	L	0	1	0	0	0	1	0.2	0
Cricotopus bicinctus	L	0	0	0	0	0	0	0	1
Hydrobaenus	L	0	0	1	0	0	1	0.2	0
Orthocladius sp.	L	0	0	0	0	0	0	0	2
Orthocladius obumbratus	L	0	0	1	0	0	1	0.2	8
Parakiefferiella	L	0	0	6	2	0	8	1.6	0
Parametriocnemus lundbecki	L, P	0	0	2	3	1	6	1.2	1
Rheocricotopus robacki	L	0	0	1	3	0	4	0.8	0
Thienemanniella fusca gp.	L	0	0	0	0	0	0	0	1
Tvetenia paucunca gp.	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Dicrotendipes nr. neomodestus	L	0	0	3	1	0	4	0.8	0
Phaenopsectra flavipes	L	0	0	1	0	0	1	0.2	0
Tribelos jucundum	L	0	2	12	0	0	14	2.8	9
Polypedilum fallax	L	3	0	0	3	0	6	1.2	0
Polypedilum aviceps	L	0	0	1	2	0	3	0.6	0

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cladotanytarsus sp.	L	0	0	0	0	0	0	0	1
Rheotanytarsus distinctissimus gp.	L	0	0	0	0	0	0	0	10
Tanytarsus	L	0	2	10	3	0	15	3	0

CLASS CRUSTACEA (crayfish, shrimp)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	2
Hyallela azteca	J	0	0	0	0	0	0	0	2
Palaemonetes paludosus	A	0	0	0	0	0	0	0	28

ORDER LEPIDOPTERA (moths)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	1

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Amnicola limosa	snail	0	1	0	0	0	1	0.2	1
Corbicula fluminea	clam	0	0	0	0	0	0	0	12
Helisoma anceps	snail	0	0	0	0	0	0	0	2
Sphaerium	clam	0	1	0	0	0	1	0.2	6

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis intercalaris	N	0	0	0	0	1	1	0.2	10
Stenonema modestum/smithae	N	0	8	3	2	9	22	4.4	11

ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Clioperla clio	N	0	1	0	0	1	2	0.4	12
Taeniopteryx metequi	N	0	0	0	0	13	13	2.6	10

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cheumatopsyche	L	0	0	0	0	0	0	0	8
Hydropsyche betteni	L	0	0	0	0	0	0	0	4
Nectopsyche	L	0	0	0	0	0	0	0	1
Triaenodes	L	0	0	0	0	0	0	0	1

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Boyeria vinosa	N	0	0	1	0	0	1	0.2	7
Calopteryx dimidiata	N	0	0	0	0	0	0	0	9
Cordulegaster maculata	N	0	0	0	0	0	0	0	2
Enallagma sp.	N	0	0	0	0	0	0	0	2
Gomphus lividus	N	0	0	0	0	0	0	0	1
Hagenius brevistylus	N	0	0	0	0	0	0	0	1
Progomphus	N	0	0	0	0	0	0	0	1

ORDER HETEROPTERA (true bugs)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rhagovelia obesa	A	0	0	0	0	0	0	0	14

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
O. MEGALOPTERA (hellgrammites)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Corydalus cornutus	L	0	0	0	1	0	1	0.2	0
ORDER COLEOPTERA (beetles)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Dineutus discolor	A	0	0	0	0	0	0	0	1
Dineutus ciliatus	A	0	0	0	0	0	0	0	1
Stenelmis sp.	L	0	0	0	0	0	0	0	6
ORDER DIPTERA - other than midges	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Probezzia	L	0	0	0	0	0	0	0	1
Dixa sp.	L	0	0	0	0	0	0	0	1
Simulium tuberosum complex	L	0	0	0	0	1	1	0.2	1
Tipula sp.	L	0	0	0	0	0	0	0	1
ORDER DIPTERA - (Tanypodinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Ablabesmyia mallochi	L	1	0	0	0	0	1	0.2	0
Labrundinia pilosella	L	0	0	0	1	0	1	0.2	0
ORDER DIPTERA - (Orthocladiinae)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Brillia flavifrons	L	0	0	1	0	0	1	0.2	1
Corynoneura	L	0	0	0	0	0	0	0	1
Eukiefferiella claripennis gp.	L	0	0	0	0	0	0	0	1
Parakiefferiella	L	0	0	3	0	0	3	0.6	0
Parametriocnemus lundbecki	L, P	0	0	1	0	0	1	0.2	0
Rheocricotopus robacki	L	0	0	0	0	0	0	0	3
Tvetenia paucunca gp.	L	0	0	0	0	1	1	0.2	1
ORDER DIPTERA - (Chironomini)	stage	RepA	RepB	RepC	RepD	RepE	Total	Mean	Qualitative
Polypedilum aviceps	L	0	0	0	0	11	11	2.2	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	0	0	2	2	0.4	3
Tanytarsus	L	0	0	0	0	0	0	0	1
CLASS CRUSTACEA (crayfish, shrimp)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	4
ORDER LEPIDOPTERA (moths)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	1
PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corbicula fluminea	clam	0	0	0	0	0	0	0	1
Ferrissia	snail	0	0	0	1	0	1	0.2	0
Physella heterostropha	snail	0	1	0	0	0	1	0.2	3

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayflie	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Baetis frondalis	N	0	0	0	0	0	0	0	5
Baetis intercalaris	N	0	0	0	0	0	0	0	3
Ephemerella (immature / damaged)	N	0	1	0	0	0	1	0.2	1
Eurylophella (immature / damaged)	N	0	0	0	0	0	0	0	1
Stenacron interpunctatum	N	0	0	0	0	0	0	0	1
Stenonema modestum/smithae	N	5	3	4	5	5	22	4.4	9
ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Allocapnia	N	1	4	2	1	3	11	2.2	3
Clioperla clio	N	1	2	0	1	0	4	0.8	1
Pteronarcys	N	0	0	0	0	0	0	0	1
Taeniopteryx metequi	N	0	0	0	0	0	0	0	6
ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cheumatopsyche	L	0	0	0	0	3	3	0.6	4
Chimarra aterrima	L	0	0	0	0	0	0	0	1
Hydropsyche betteni	L	0	0	0	0	0	0	0	1
Lype diversa	L	1	0	0	0	0	1	0.2	0
Phylocentropus	L	0	0	0	0	0	0	0	1
Ptilostomis	L	0	0	0	0	0	0	0	2
Pycnopsyche sp.	L	0	0	0	0	0	0	0	2
Triaenodes	L	0	0	0	0	0	0	0	1
ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1
Cordulegaster maculata	N	0	0	0	0	0	0	0	1
Enallagma sp.	N	0	0	0	0	0	0	0	4
Gomphus lividus	N	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ancyronyx variegatus	L, A	0	0	0	0	0	0	0	1
Dubiraphia vittata	A	0	0	0	0	0	0	0	1
Macronychus glabratus	L, A	0	0	0	0	0	0	0	2
Microcylloepus pusillus	A	0	0	0	0	0	0	0	1

ORDER DIPTERA - other than midges	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Hemerodromia	L	0	0	1	0	0	1	0.2	0
Simulium nr. verecundum	L	0	0	0	0	0	0	0	2
Simulium tuberosum complex	L	0	0	0	0	0	0	0	1

ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ablabesmyia janta gp.	L	0	0	0	0	0	0	0	1
Conchapelopia	L	2	3	0	0	0	5	1	0

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Orthocladius obumbratus	L	0	0	0	0	0	0	0	1
Parametriocnemus lundbecki	L, P	4	2	9	11	11	37	7.4	3
Rheocricotopus robacki	L	0	0	0	1	0	1	0.2	0
Thienemanniella xena gp.	L	0	0	0	0	2	2	0.4	2
Thienemanniella fusca gp.	L	0	0	0	0	1	1	0.2	0
Unniella multivirga	L	0	0	0	1	1	2	0.4	2

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Polypedilum aviceps	L	0	6	9	17	15	47	9.4	1
Polypedilum fallax	L	0	0	0	0	1	1	0.2	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	0	0	1	0	3	4	0.8	2
Tanytarsus	L	4	2	0	3	9	18	3.6	8

PHYLUM ANNELIDA (worms,leeches)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Tubificidae (w/o cap. setae)		0	1	0	0	0	1	0.2	0

CLASS CRUSTACEA (crayfish, shrim	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	4
Hyallela azteca	J	0	0	0	0	0	0	0	1
Palaemonetes paludosus	A	0	0	0	0	0	0	0	16

PHYLUM MOLLUSCA (clams, snails)		Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Sphaerium	clam	0	0	0	0	0	0	0	2
Physella heterostropha	snail	0	0	0	0	0	0	0	1

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile (Site 16)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER EPHEMEROPTERA (mayfli	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Callibaetis	N	0	0	0	0	0	0	0	1
Eurylophella doris	N	0	8	2	2	2	14	2.8	1
Stenonema modestum/smithae	N	8	15	9	12	9	53	10.6	1

ORDER PLECOPTERA (stoneflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Paraleuctra sara	N	0	0	0	1	0	1	0.2	0
Taeniopteryx metequi	N	0	0	0	0	0	0	0	1

ORDER TRICHOPTERA (caddisflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cernotina spicata	L	0	0	0	1	0	1	0.2	0
Cheumatopsyche	L	0	0	0	0	1	1	0.2	1
Hydropsyche venularis	L	0	0	0	0	2	2	0.4	0
Oxyethira	L	1	0	0	0	0	1	0.2	1

ORDER ODONATA (dragonflies)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Argia sedula	N	0	0	0	0	0	0	0	1
Boyeria vinosa	N	0	0	0	0	0	0	0	1
Calopteryx dimidiata	N	0	0	0	0	0	0	0	1
Enallagma sp.	N	1	0	0	0	0	1	0.2	2
Libellula	N	0	0	0	0	0	0	0	2

O. MEGALOPTERA (hellgrammites)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corydalus cornutus	L	0	0	1	0	0	1	0.2	0

ORDER COLEOPTERA (beetles)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Macronychus glabratus	L, A	1	0	0	0	0	1	0.2	0

Appendix Table B-3. Macroinvertebrate Data, by Replicate

Client: Westinghouse Savannah River Company
Stream: Four Mile (Site 16)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

		Site / # of Organisms							
ORDER DIPTERA - (Tanypodinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Ablabesmyia mallochi	L	0	0	0	0	1	1	0.2	2
Conchapelopia	L	0	0	0	0	1	1	0.2	0

ORDER DIPTERA - (Orthocladiinae)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Corynoneura	L	0	11	1	0	8	20	4	0
Cricotopus tremulus gp.	L	0	0	0	0	0	0	0	2
Hydrobaenus	L	0	0	1	0	0	1	0.2	0
Orthocladius sp.	L	0	0	1	0	3	4	0.8	0
Orthocladius obumbratus	L	0	0	0	0	0	0	0	20
Parakiefferiella	L	0	16	10	0	10	36	7.2	2
Parametriocnemus lundbecki	L, P	1	7	0	0	3	11	2.2	0
Rheocricotopus robacki	L	0	2	3	0	1	6	1.2	1
Thienemanniella xena gp.	L	0	0	0	0	0	0	0	2

ORDER DIPTERA - (Chironomini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Dicrotendipes nr. neomodestus	L	0	1	0	0	0	1	0.2	1
Polypedilum aviceps	L	0	0	0	1	1	2	0.4	0
Polypedilum fallax	L	0	1	0	0	0	1	0.2	0
Polypedilum illinoense	L	0	0	1	0	0	1	0.2	1

ORDER DIPTERA - (Tanytarsini)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Rheotanytarsus distinctissimus gp.	L	3	3	2	2	12	22	4.4	3
Tanytarsus	L	0	2	8	3	3	16	3.2	5

CLASS CRUSTACEA (crayfish, shri	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Cambarinae	A	0	0	0	0	0	0	0	1
Hyallela azteca	J	0	1	2	0	0	3	0.6	26

ORDER LEPIDOPTERA (moths)	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Parapoynx obscuralis	L	0	0	0	0	0	0	0	1

PHYLUM MOLLUSCA (clams, snails	stage	Rep A	Rep B	Rep C	Rep D	Rep E	Total	Mean	Qualitative
Amnicola limosa	snail	0	1	0	0	0	1	0.2	3
Corbicula fluminea	clam	1	0	0	0	0	1	0.2	10
Ferrissia	snail	0	1	0	0	0	1	0.2	0
Gyraulis parvulus	snail	1	0	0	0	0	1	0.2	0
Physella heterostropha	snail	0	0	0	0	0	0	0	3

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Tims Branch (Site 1)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	16.7%	0.0%	84.2%	0.0%	0.0%	25.8%	20.2%	2.3%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%
Ephemeroptera	0.0%	0.0%	0.0%	0.0%	14.3%	1.5%	2.9%	0.8%
Plecoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Trichoptera	16.7%	15.8%	0.0%	13.3%	0.0%	9.1%	9.2%	7.0%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.5%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.1%
Diptera (excl. midges)	16.7%	42.1%	5.3%	0.0%	71.4%	22.7%	27.1%	12.5%
Diptera (midges)	33.3%	42.1%	10.5%	86.7%	14.3%	39.4%	37.4%	53.9%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxonomic	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	1.0%	0.0%	0.0%	0.5%	0.2%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%
Ephemeroptera	24.3%	22.2%	4.0%	6.5%	0.0%	11.0%	11.4%	12.5%
Plecoptera	16.2%	11.1%	18.2%	22.6%	50.0%	18.2%	23.6%	5.5%
Trichoptera	32.4%	2.8%	1.0%	19.4%	0.0%	9.6%	11.1%	31.4%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.9%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%
Coleoptera	2.7%	5.6%	0.0%	3.2%	0.0%	1.9%	2.3%	1.2%
Diptera (excl. midges)	0.0%	5.6%	0.0%	0.0%	0.0%	1.0%	1.1%	3.1%
Diptera (midges)	24.3%	52.8%	75.8%	48.4%	50.0%	57.9%	50.2%	32.2%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.8%
Ephemeroptera	20.0%	10.0%	22.2%	9.1%	2.9%	10.7%	12.8%	6.7%
Plecoptera	50.0%	40.0%	27.8%	72.7%	20.0%	34.5%	42.1%	13.5%
Trichoptera	0.0%	0.0%	0.0%	18.2%	51.4%	23.8%	13.9%	19.2%
Odonata	0.0%	0.0%	0.0%	0.0%	2.9%	1.2%	0.6%	11.5%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	10.0%	5.6%	0.0%	0.0%	2.4%	3.1%	6.7%
Diptera (excl. midges)	0.0%	0.0%	11.1%	0.0%	14.3%	8.3%	5.1%	14.4%
Diptera (midges)	20.0%	40.0%	27.8%	0.0%	8.6%	16.7%	19.3%	15.4%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.2%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.7%
Ephemeroptera	65.0%	42.1%	36.4%	75.0%	62.5%	55.4%	56.2%	13.5%
Plecoptera	10.0%	31.6%	36.4%	12.5%	16.7%	21.8%	21.4%	6.7%
Trichoptera	10.0%	0.0%	9.1%	6.3%	0.0%	5.0%	5.1%	3.4%
Odonata	0.0%	0.0%	4.5%	0.0%	0.0%	1.0%	0.9%	13.5%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	6.3%	0.0%	1.0%	1.3%	2.2%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%
Diptera (midges)	10.0%	26.3%	9.1%	0.0%	16.7%	12.9%	12.4%	23.6%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: McQueen Branch (Site 5)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
Ephemeroptera	64.3%	69.2%	0.0%	57.1%	81.8%	64.6%	54.5%	12.1%
Plecoptera	14.3%	7.7%	0.0%	0.0%	9.1%	8.3%	6.2%	12.1%
Trichoptera	7.1%	7.7%	33.3%	14.3%	9.1%	10.4%	14.3%	21.2%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.2%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.1%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.1%
Diptera (midges)	7.1%	7.7%	66.7%	28.6%	0.0%	12.5%	22.0%	17.2%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Crouch Branch (Site 6)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	60.0%
Ephemeroptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Plecoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Trichoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Odonata	100.0%	0.0%	0.0%	0.0%	20.0%	25.0%	24.0%	0.0%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20.0%
Diptera (midges)	0.0%	0.0%	100.0%	100.0%	80.0%	75.0%	56.0%	20.0%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 7)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	6.7%	0.0%
Mollusca (clams, snails)	0.0%	100.0%	0.0%	0.0%	0.0%	20.0%	20.0%	3.1%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ephemeroptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Plecoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Trichoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	21.9%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	100.0%	20.0%	20.0%	15.6%
Diptera (midges)	0.0%	0.0%	0.0%	66.7%	0.0%	40.0%	13.3%	59.4%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 8)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	20.0%	0.0%	33.3%	0.0%	0.0%	12.5%	10.7%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	13.3%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ephemeroptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Plecoptera	0.0%	0.0%	33.3%	0.0%	0.0%	6.3%	6.7%	0.0%
Trichoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%
Odonata	0.0%	0.0%	0.0%	0.0%	100.0%	6.3%	20.0%	26.7%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	40.0%	0.0%	0.0%	0.0%	0.0%	12.5%	8.0%	6.7%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	26.7%
Diptera (midges)	40.0%	100.0%	33.3%	100.0%	0.0%	62.5%	54.7%	13.3%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 9)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	1.9%	0.0%	2.8%	0.0%	0.0%	1.0%	0.9%	24.8%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%
Ephemeroptera	9.4%	5.5%	5.6%	31.9%	9.7%	11.1%	12.4%	28.4%
Plecoptera	0.0%	4.1%	1.4%	2.1%	6.5%	2.9%	2.8%	13.8%
Trichoptera	79.2%	79.5%	83.3%	53.2%	43.5%	69.1%	67.8%	11.0%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.6%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	4.1%	2.8%	2.1%	1.6%	2.3%	2.1%	0.0%
Diptera (excl. midges)	5.7%	1.4%	1.4%	2.1%	25.8%	7.2%	7.3%	6.4%
Diptera (midges)	3.8%	5.5%	2.8%	8.5%	11.3%	6.2%	6.4%	9.2%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.4%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%
Ephemeroptera	81.8%	50.0%	57.1%	68.4%	57.6%	62.5%	63.0%	10.3%
Plecoptera	13.6%	12.5%	35.7%	15.8%	9.1%	15.2%	17.3%	9.7%
Trichoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.5%
Odonata	0.0%	4.2%	0.0%	0.0%	3.0%	1.8%	1.4%	7.7%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%
Diptera (midges)	4.5%	33.3%	7.1%	15.8%	30.3%	20.5%	18.2%	51.6%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	1.5%	0.0%	0.7%	0.3%	6.3%
Crustacea (crayfish, shrimp)	0.0%	0.0%	3.8%	0.0%	0.0%	0.7%	0.8%	21.3%
Ephemeroptera	78.6%	46.7%	69.2%	34.3%	30.0%	46.9%	51.8%	10.0%
Plecoptera	7.1%	20.0%	19.2%	19.4%	40.0%	19.7%	21.2%	7.5%
Trichoptera	0.0%	3.3%	0.0%	25.4%	0.0%	12.2%	5.7%	6.3%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17.5%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%
Coleoptera	14.3%	3.3%	3.8%	4.5%	0.0%	4.8%	5.2%	5.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%
Diptera (midges)	0.0%	26.7%	3.8%	14.9%	30.0%	15.0%	15.1%	17.5%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Indian Grave Branch (Site 12)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	6.3%	0.0%	1.1%	1.3%	1.3%
Mollusca (clams, snails)	0.0%	0.0%	2.6%	0.0%	0.0%	1.1%	0.5%	10.3%
Crustacea (crayfish, shrimp)	11.1%	0.0%	0.0%	0.0%	0.0%	1.1%	2.2%	48.7%
Ephemeroptera	33.3%	0.0%	30.8%	25.0%	58.3%	28.6%	29.5%	6.4%
Plecoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Trichoptera	0.0%	0.0%	0.0%	6.3%	8.3%	2.2%	2.9%	9.0%
Odonata	0.0%	0.0%	2.6%	6.3%	0.0%	2.2%	1.8%	2.6%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.3%
Coleoptera	11.1%	6.7%	2.6%	0.0%	0.0%	3.3%	4.1%	0.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%
Diptera (midges)	44.4%	93.3%	61.5%	56.3%	33.3%	60.4%	57.8%	17.9%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 13)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	20.0%	0.0%	0.0%	0.0%	2.3%	4.0%	19.4%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	29.6%
Ephemeroptera	0.0%	10.0%	0.0%	21.4%	20.0%	9.3%	10.3%	2.8%
Plecoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Trichoptera	0.0%	0.0%	0.0%	10.7%	0.0%	3.5%	2.1%	7.4%
Odonata	25.0%	20.0%	0.0%	0.0%	0.0%	3.5%	9.0%	5.6%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	3.6%	20.0%	2.3%	4.7%	0.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diptera (midges)	75.0%	50.0%	100.0%	60.7%	40.0%	76.7%	65.1%	34.3%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	RepA	RepB	RepC	RepD	RepE	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	0.0%	10.0%	0.0%	20.0%	0.0%	3.1%	6.0%	4.0%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.0%
Ephemeroptera	0.0%	80.0%	33.3%	40.0%	25.6%	35.9%	35.8%	1.0%
Plecoptera	0.0%	10.0%	0.0%	0.0%	35.9%	23.4%	9.2%	2.0%
Trichoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	12.0%
Odonata	0.0%	0.0%	11.1%	0.0%	0.0%	1.6%	2.2%	23.0%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	2.6%	1.6%	0.5%	4.0%
Diptera (midges)	100.0%	0.0%	55.6%	20.0%	35.9%	32.8%	42.3%	17.0%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	4.2%	0.0%	0.0%	0.0%	0.6%	0.8%	0.0%
Mollusca (clams, snails)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%
Crustacea (crayfish, shrimp)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	21.6%
Ephemeroptera	27.8%	16.7%	15.4%	12.5%	9.3%	14.2%	16.3%	18.6%
Plecoptera	11.1%	25.0%	7.7%	5.0%	5.6%	9.3%	10.9%	11.3%
Trichoptera	5.6%	0.0%	0.0%	0.0%	5.6%	2.5%	2.2%	9.3%
Odonata	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.2%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.2%
Diptera (excl. midges)	0.0%	0.0%	3.8%	0.0%	0.0%	0.6%	0.8%	3.1%
Diptera (midges)	55.6%	54.2%	73.1%	82.5%	79.6%	72.8%	69.0%	20.6%

Appendix Table B-4. Percent Composition by Major Taxonomic Group

Client: Westinghouse Savannah River Company
Stream: Four Mile (Site 16)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Taxon	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Annelida (worms)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mollusca (clams, snails)	11.8%	2.9%	0.0%	0.0%	0.0%	1.9%	2.9%	16.7%
Crustacea (crayfish, shrimp)	0.0%	1.4%	4.9%	0.0%	0.0%	1.5%	1.3%	28.1%
Ephemeroptera	47.1%	33.3%	26.8%	63.6%	19.3%	32.5%	38.0%	3.1%
Plecoptera	0.0%	0.0%	0.0%	4.5%	0.0%	0.5%	0.9%	1.0%
Trichoptera	5.9%	0.0%	0.0%	4.5%	5.3%	2.4%	3.1%	2.1%
Odonata	5.9%	0.0%	0.0%	0.0%	0.0%	0.5%	1.2%	7.3%
Hemiptera	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coleoptera	5.9%	0.0%	0.0%	0.0%	0.0%	0.5%	1.2%	0.0%
Diptera (excl. midges)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diptera (midges)	23.5%	62.3%	65.9%	27.3%	75.4%	59.7%	50.9%	40.6%

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Tims Branch (Site 1)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	33.3%	7.9%	86.8%	26.7%	7.1%	37.1%	32.4%	19.5%
Collector - Filterers	50.0%	78.9%	10.5%	33.3%	71.4%	45.5%	48.8%	46.9%
Predators	16.7%	10.5%	0.0%	33.3%	0.0%	12.1%	12.1%	24.6%
Scrapers	0.0%	0.0%	0.0%	0.0%	7.1%	0.8%	1.4%	0.8%
Shredders	0.0%	2.6%	2.6%	6.7%	14.3%	4.5%	5.2%	8.2%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						0.3%		
Collector - Filterers						0.8%		
Predators						98.9%		
Scrapers						<0.1%		
Shredders						<0.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

TABLE . Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	RepA	RepB	RepC	RepD	RepE	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	27.0%	40.3%	47.5%	32.3%	33.3%	40.0%	36.1%	28.8%
Collector - Filterers	18.9%	8.3%	6.1%	19.4%	16.7%	11.0%	13.9%	30.2%
Predators	8.1%	13.9%	13.1%	9.7%	0.0%	11.5%	9.0%	14.9%
Scrapers	12.2%	12.5%	2.0%	4.8%	0.0%	6.0%	6.3%	7.8%
Shredders	33.8%	25.0%	31.8%	33.9%	66.7%	32.3%	38.2%	20.6%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						7.8%		
Collector - Filterers						4.9%		
Predators						54.3%		
Scrapers						6.8%		
Shredders						26.2%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	10.0%	25.0%	13.9%	4.5%	7.1%	10.7%	12.1%	18.3%
Collector - Filterers	20.0%	10.0%	33.3%	9.1%	50.0%	32.7%	24.5%	31.7%
Predators	30.0%	10.0%	5.6%	36.4%	11.4%	15.5%	18.7%	26.0%
Scrapers	10.0%	5.0%	11.1%	4.5%	1.4%	5.4%	6.4%	4.3%
Shredders	30.0%	50.0%	36.1%	45.5%	30.0%	35.7%	38.3%	21.2%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						0.3%		
Collector - Filterers						3.3%		
Predators						94.5%		
Scrapers						1.6%		
Shredders						0.3%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	47.5%	34.2%	22.7%	37.5%	41.7%	36.6%	36.7%	28.1%
Collector - Filterers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.7%
Predators	10.0%	5.3%	22.7%	12.5%	12.5%	12.9%	12.6%	25.8%
Scrapers	30.0%	21.1%	22.7%	37.5%	29.2%	28.2%	28.1%	15.7%
Shredders	15.0%	39.5%	36.4%	12.5%	16.7%	24.3%	24.0%	23.6%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						22.6%		
Collector - Filterers						<0.1%		
Predators						50.8%		
Scrapers						22.6%		
Shredders						4.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: McQueen Branch (Site 5)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	42.9%	50.0%	100.0%	57.1%	50.0%	52.1%	60.0%	19.7%
Collector - Filterers	0.0%	0.0%	0.0%	14.3%	0.0%	2.1%	2.9%	13.1%
Predators	7.1%	15.4%	0.0%	0.0%	0.0%	6.3%	4.5%	22.2%
Scrapers	32.1%	34.6%	0.0%	28.6%	40.9%	32.3%	27.2%	14.1%
Shredders	17.9%	0.0%	0.0%	0.0%	9.1%	7.3%	5.4%	30.8%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						26.4%		
Collector - Filterers						2.0%		
Predators						42.3%		
Scrapers						26.4%		
Shredders						2.9%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Crouch Branch (Site 6)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	0.0%	0.0%	0.0%	50.0%	30.0%	25.0%	16.0%	40.0%
Collector - Filterers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Predators	100.0%	0.0%	100.0%	0.0%	20.0%	37.5%	44.0%	0.0%
Scrapers	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Shredders	0.0%	0.0%	0.0%	50.0%	50.0%	37.5%	20.0%	60.0%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						<0.1%		
Collector - Filterers						<0.1%		
Predators						100.0%		
Scrapers						<0.1%		
Shredders						<0.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 7)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	0.0%	0.0%	0.0%	66.7%	0.0%	40.0%	13.3%	21.9%
Collector - Filterers	0.0%	0.0%	0.0%	33.3%	0.0%	20.0%	6.7%	9.4%
Predators	0.0%	0.0%	0.0%	0.0%	100.0%	20.0%	20.0%	40.6%
Scrapers	0.0%	100.0%	0.0%	0.0%	0.0%	20.0%	20.0%	3.1%
Shredders	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						<0.1%		
Collector - Filterers						<0.1%		
Predators						100.0%		
Scrapers						<0.1%		
Shredders						<0.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 8)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	60.0%	25.0%	33.3%	0.0%	0.0%	28.1%	23.7%	6.7%
Collector - Filterers	0.0%	50.0%	33.3%	80.0%	0.0%	37.5%	32.7%	6.7%
Predators	20.0%	0.0%	0.0%	20.0%	100.0%	18.8%	28.0%	40.0%
Scrapers	10.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.0%	13.3%
Shredders	10.0%	25.0%	33.3%	0.0%	0.0%	12.5%	13.7%	33.3%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						9.3%		
Collector - Filterers						<0.1%		
Predators						81.5%		
Scrapers						9.3%		
Shredders						<0.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 9)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	6.6%	7.5%	7.6%	21.3%	15.3%	11.1%	11.7%	21.1%
Collector - Filterers	84.9%	79.5%	83.3%	55.3%	66.1%	74.9%	73.8%	19.3%
Predators	0.0%	1.4%	0.0%	0.0%	3.2%	1.0%	0.9%	5.5%
Scrapers	6.6%	4.8%	6.9%	17.0%	5.6%	7.7%	8.2%	36.7%
Shredders	1.9%	6.8%	2.1%	6.4%	9.7%	5.4%	5.4%	17.4%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						7.4%		
Collector - Filterers						63.1%		
Predators						15.9%		
Scrapers						11.7%		
Shredders						1.9%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	43.2%	41.7%	32.1%	45.0%	45.3%	42.4%	41.5%	36.7%
Collector - Filterers	0.0%	4.2%	0.0%	0.0%	0.0%	0.9%	0.8%	3.9%
Predators	4.5%	4.2%	0.0%	5.0%	3.1%	3.6%	3.4%	14.9%
Scrapers	40.9%	22.9%	28.6%	27.5%	29.7%	29.9%	29.9%	9.1%
Shredders	11.4%	27.1%	39.3%	22.5%	21.9%	23.2%	24.4%	35.4%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						39.2%		
Collector - Filterers						1.4%		
Predators						14.6%		
Scrapers						37.8%		
Shredders						7.0%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	46.4%	46.7%	38.5%	29.9%	30.0%	36.4%	38.3%	29.4%
Collector - Filterers	0.0%	3.3%	0.0%	29.9%	10.0%	15.0%	8.6%	16.3%
Predators	0.0%	6.7%	7.7%	4.5%	10.0%	5.4%	5.8%	22.5%
Scrapers	46.4%	25.0%	34.6%	14.2%	15.0%	23.1%	27.0%	8.8%
Shredders	7.1%	18.3%	19.2%	21.6%	35.0%	20.1%	20.3%	23.1%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						<0.1%		
Collector - Filterers						50.5%		
Predators						0.9%		
Scrapers						39.1%		
Shredders						9.5%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Indian Grave Branch (Site 12)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gathierers	44.4%	43.3%	51.3%	39.3%	42.9%	46.2%	44.2%	42.9%
Collector - Filterers	0.0%	0.0%	2.6%	7.1%	7.1%	3.3%	3.4%	11.5%
Predators	11.1%	13.3%	10.3%	14.3%	14.3%	12.1%	12.7%	3.8%
Scrapers	22.2%	3.3%	16.7%	14.3%	25.0%	16.5%	16.3%	10.9%
Shredders	22.2%	40.0%	19.2%	25.0%	10.7%	22.5%	23.4%	30.8%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						87.0%		
Collector - Filterers						1.1%		
Predators						2.6%		
Scrapers						9.3%		
Shredders						<0.1%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 13)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	0.0%	25.0%	48.7%	41.1%	40.0%	40.7%	31.0%	34.3%
Collector - Filterers	0.0%	20.0%	25.6%	21.4%	0.0%	20.9%	13.4%	25.9%
Predators	25.0%	20.0%	2.6%	3.6%	40.0%	8.1%	18.2%	8.3%
Scrapers	0.0%	25.0%	0.0%	12.5%	20.0%	8.1%	11.5%	9.3%
Shredders	75.0%	10.0%	23.1%	21.4%	0.0%	22.1%	25.9%	22.2%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						3.3%		
Collector - Filterers						0.9%		
Predators						93.0%		
Scrapers						2.3%		
Shredders						0.5%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	0.0%	40.0%	61.1%	20.0%	29.5%	34.4%	30.1%	18.0%
Collector - Filterers	0.0%	0.0%	0.0%	0.0%	7.7%	4.7%	1.5%	18.0%
Predators	100.0%	10.0%	11.1%	40.0%	2.6%	9.4%	32.7%	43.0%
Scrapers	0.0%	50.0%	16.7%	40.0%	12.8%	21.1%	23.9%	6.5%
Shredders	0.0%	0.0%	11.1%	0.0%	47.4%	30.5%	11.7%	14.5%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						23.6%		
Collector - Filterers						<0.1%		
Predators						46.3%		
Scrapers						23.6%		
Shredders						6.5%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	41.7%	35.4%	59.6%	58.8%	46.3%	49.4%	48.3%	32.5%
Collector - Filterers	22.2%	8.3%	3.8%	7.5%	27.8%	15.4%	13.9%	16.5%
Predators	16.7%	20.8%	3.8%	2.5%	0.0%	6.2%	8.8%	10.3%
Scrapers	13.9%	6.3%	7.7%	6.3%	4.6%	6.8%	7.7%	13.4%
Shredders	5.6%	29.2%	25.0%	25.0%	21.3%	22.2%	21.2%	27.8%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						50.7%		
Collector - Filterers						6.8%		
Predators						10.4%		
Scrapers						29.4%		
Shredders						2.7%		

Appendix Table B-5. Functional Feeding Group Analysis

Client: Westinghouse Savannah River Company
Stream: Four Mile (Site 16)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

Analysis by Number of Organisms

Trophic Groups	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative
Collector - Gatherers	32.4%	74.6%	54.9%	38.6%	55.3%	58.0%	51.2%	44.8%
Collector - Filterers	23.5%	7.2%	24.4%	22.7%	31.6%	20.4%	21.9%	19.8%
Predators	5.9%	0.0%	2.4%	4.5%	3.5%	2.4%	3.3%	9.4%
Scrapers	32.4%	13.8%	11.0%	27.3%	7.9%	14.8%	18.5%	7.3%
Shredders	5.9%	4.3%	7.3%	6.8%	1.8%	4.6%	5.2%	18.8%

Analysis by Biomass

Trophic Groups						Total w/o Qual		
Collector - Gatherers						42.5%		
Collector - Filterers						5.4%		
Predators						7.0%		
Scrapers						45.1%		
Shredders						<0.1%		

Appendix Table B-6. Summary of Biological Indices for Macroinvertebrate Data
Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

	Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
Parameter	Tims Site 1	Mill Site 4	McQ Site 5	Crouch Site 6	U3R Site 3	U3R Site 2	FMB Site 7	FMB Site 8	FMB Site 9	FMB Site 16	Pen Site 10	Pen Site 11	Ind. Gr. Site 12	Pen Site 13	Steel Site 14	Meyers Site 15
Total # of Species	17	20	11	5	27	37	5	11	26	29	10	21	23	22	17	18
Mean Species per Replicate	3.4	4.0	2.2	1.0	5.4	7.4	1.0	2.2	5.2	5.8	2.0	4.2	4.6	4.4	3.4	3.6
EPT Index	3	9	5	0	15	16	0	1	9	7	7	7	4	3	4	6
Density (organisms/m2)	73.3	112	53.3	8.9	93.3	232	5.6	17.8	341	229	124	163	101	95.6	71.1	180
Total Biomass (g)	1.0685	0.0518	0.0317	0.0006	0.2590	0.2582	0.0061	0.0054	0.1226	0.0315	0.0513	0.0654	0.0702	0.1356	0.0428	0.0221
Biotic Index	6.72	4.87	5.18	8.88	3.70	4.84	8.15	7.15	6.40	5.95	5.51	5.16	6.58	6.54	5.81	4.81

Appendix Table B-6. Summary of Biological Indices for Macroinvertebrate Data

Westinghouse Savannah River Company
Sitewide Study
5 Nov. - 8 Dec 1997

	Upper Three Runs Creek System						Four Mile Branch System				Pen Branch System				Steel Cr. System	
Parameter	Tims Site 1	Mill Site 4	McQ Site 5	Crouch Site 6	U3R Site 3	U3R Site 2	FMB Site 7	FMB Site 8	FMB Site 9	FMB Site 16	Pen Site 10	Pen Site 11	Ind. Gr. Site 12	Pen Site 13	Steel Site 14	Meyers Site 15
Total # of Species (Qualitative)	33	39	33	3	41	61	15	11	20	27	34	34	25	30	33	40
Total # of Species (Qual. & Quant.)	41	50	38	8	51	81	18	19	36	41	38	44	38	45	41	47
EPT Index	3	9	12	0	18	20	0	1	6	6	9	7	7	7	6	17
Biotic Index	6.37	5.62	5.39	7.60	4.76	4.45	7.47	6.63	6.56	5.95	6.10	6.07	7.05	6.82	6.77	5.68

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Tims Branch (Site 1)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameter	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/Qual
1. Taxa Richness	6	6	4	8	4	17	3.4	33	41
(Total Number of Organisms / Site)	6	19	19	15	7	66	13.2	128	194
2. EPT Index	1.0	1.0	0.0	1.0	1.0	NA	0.8	3.0	NA
3. EPT / Chironomid Ratio	0.5	0.4	0.0	0.1538462	1	NA	0.4	0.1	NA
4. Scraper / Filterer Ratio	0.00	0.00	0.00	0.00	0.10	NA	0.02	0.02	NA
5. Biotic Index	6.82	5.93	8.57	7.56	4.73	NA	6.72	6.37	NA
6. % Dominant Taxon	17%	42%	84%	33%	57%	NA	47%	23%	NA
7. Shredder / Total # of Organisms Ratio	0.00	0.03	0.03	0.07	0.14	NA	0.05	0.08	NA
8. Density (organisms/m2)	73.33	105.56	105.56	83.33	38.89	73.33	73.33	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 2)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS: Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/Qual
1. Taxa Richness	16	17	24	11	4	37	7.4	61	81
(Total Number of Organisms / Site)	37	36	99	31	6	209	41.8	255	464
2. EPT Index	11.0	6.0	11.0	5.0	2.0	NA	7.0	20.0	NA
3. EPT / Chironomid Ratio	3.0	0.7	0.3	1	1	NA	1.2	1.5	NA
4. Scraper / Filterer Ratio	0.64	1.50	0.33	0.25	0.00	NA	0.55	0.26	NA
5. Biotic Index	3.94	5.61	5.78	4.28	4.57	NA	4.84	4.45	NA
6. % Dominant Taxon	30%	28%	40%	23%	33%	NA	31%	16%	NA
7. Shredder / Total # of Organisms Ratio	0.34	0.25	0.32	0.34	0.67	NA	0.38	0.21	NA
8. Density (organisms/m2)	205.56	200.00	550.00	172.22	33.33	1161.11	232.22	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Upper Three Runs Creek (Site 3)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameter	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	8	7	10	5	18	27	5.4	41	51
(Total Number of Organisms / Site)	10	10	18	11	35	84	16.8	104	188
2. EPT Index	6.0	2.0	5.0	5.0	12.0	NA	6.0	18.0	NA
3. EPT / Chironomid Ratio	3.5	1.3	1.8	NA	8.7	NA	3.0	2.6	NA
4. Scraper / Filterer Ratio	0.50	0.50	0.33	0.50	0.03	NA	0.37	0.14	NA
5. Biotic Index	4.26	4.04	4.63	2.47	3.10	NA	3.70	4.76	NA
6. % Dominant Taxon	20%	40%	22%	36%	17%	NA	27%	9%	NA
7. Shredder / Total # of Organisms Ratio	0.30	0.50	0.36	0.45	0.30	NA	0.38	0.21	NA
8. Density (organisms/m2)	55.56	55.56	100.00	61.11	194.44	93.33	93.33	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Mill Creek (Site 4)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS: Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	7	4	7	5	9	20	4	39	50
(Total Number of Organisms / Site)	20	19	22	16	24	101	20.2	89	190
2. EPT Index	5.0	3.0	3.0	4.0	4.0	NA	3.8	9.0	NA
3. EPT / Chironomid Ratio	8.5	2.8	9.0	NA	4.75	NA	5.0	1.0	NA
4. Scraper / Filterer Ratio	NA	ERR	NA	NA	NA	NA	ERR	2.33	NA
5. Biotic Index	4.71	5.06	4.05	5.05	5.50	NA	4.87	5.62	NA
6. % Dominant Taxon	55%	42%	36%	75%	58%	NA	53%	12%	NA
7. Shredder / Total # of Organisms Ratio	0.15	0.39	0.36	0.13	0.17	NA	0.24	0.24	NA
8. Density (organisms/m2)	111.11	105.56	122.22	88.89	133.33	111.11	112.22	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: McQueen Branch (Site 5)
County: Aiken, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	5	5	2	4	3	11	2.2	33	38
(Total Number of Organisms / Site)	14	13	3	7	11	48	9.6	99	147
2. EPT Index	3.0	3.0	1.0	2.0	3.0	NA	2.4	12.0	NA
3. EPT / Chironomid Ratio	12.0	11.0	0.5	2.5	NA	NA	5.2	2.6	NA
4. Scraper / Filterer Ratio	NA	NA	NA	2.00	NA	NA	0.40	1.08	NA
5. Biotic Index	5.39	5.58	3.90	5.64	5.39	NA	5.18	5.39	NA
6. % Dominant Taxon	64%	69%	67%	57%	82%	NA	68%	11%	NA
7. Shredder / Total # of Organisms Ratio	0.18	0.00	0.00	0.00	0.09	NA	0.05	0.31	NA
8. Density (organisms/m2)	77.78	72.22	16.67	38.89	61.11	253.33	53.33	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Crouch Branch (Site 6)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	1	0	1	1	3	5	1	3	8
(Total Number of Organisms / Site)	1	0	1	1	5	8	1.6	5	13
2. EPT Index	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0	NA
3. EPT / Chironomid Ratio	0.0	0.0	0.0	0	0	NA	0.0	0.0	NA
4. Scraper / Filterer Ratio	NA	0.00	NA	NA	NA	NA	0.00	NA	NA
5. Biotic Index	9.00	10.00	8.70	8.50	8.18	NA	8.88	7.60	NA
6. % Dominant Taxon	100%	100%	100%	100%	60%	NA	92%	60%	NA
7. Shredder / Total # of Organisms Ratio	0.00	0.00	0.00	0.50	0.50	NA	0.20	0.60	NA
8. Density (organisms/m2)	5.56	0.00	5.56	5.56	27.78	44.39	8.89	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 7)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	0	1	0	3	1	5	1	15	18
(Total Number of Organisms / Site)	0	1	0	3	1	5	1	32	37
2. EPT Index	0.0	0.0	0.0	0.0	0.0	NA	0.0	0.0	NA
3. EPT / Chironomid Ratio	0.0	0.0	0.0	0	0	NA	0.0	0.0	NA
4. Scraper / Filterer Ratio	NA	NA	NA	0.00	NA	NA	0.00	0.33	NA
5. Biotic Index	10.00	6.90	10.00	6.53	7.30	NA	8.15	7.47	NA
6. % Dominant Taxon	100%	100%	100%	33%	100%	NA	87%	22%	NA
7. Shredder / Total # of Organisms Ratio	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.25	NA
8. Density (organisms/m2)	0.00	5.56	0.00	16.67	5.56	27.86	5.56	N/A	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 8)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	5	2	3	3	1	11	2.2	11	19
(Total Number of Organisms / Site)	5	2	3	5	1	16	3.2	15	31
2. EPT Index	0.0	0.0	1.0	0.0	0.0	NA	0.2	1.0	NA
3. EPT / Chironomid Ratio	0.0	0.0	1.0	0	0	NA	0.2	0.5	NA
4. Scraper / Filterer Ratio	NA	0.00	0.00	0.00	NA	NA	0.00	2.00	NA
5. Biotic Index	7.96	5.85	6.50	7.12	8.30	NA	7.15	6.63	NA
6. % Dominant Taxon	20%	50%	33%	60%	100%	NA	53%	27%	NA
7. Shredder / Total # of Organisms Ratio	0.10	0.25	0.33	0.00	0.00	NA	0.14	0.33	NA
8. Density (organisms/m2)	27.78	11.11	16.67	27.78	5.56	17.78	17.78	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Four Mile Branch (Site 9)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameter	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/Qual
1. Taxa Richness	9	10	11	9	16	26	5.2	20	36
(Total Number of Organisms / Site)	53	73	72	47	62	307	61.4	109	416
2. EPT Index	4.0	6.0	5.0	5.0	8.0	NA	5.6	6.0	NA
3. EPT / Chironomid Ratio	23.5	16.3	32.5	10.25	5.2857143	NA	17.6	5.8	NA
4. Scraper / Filterer Ratio	0.08	0.06	0.08	0.31	0.09	NA	0.12	1.90	NA
5. Biotic Index	6.80	6.35	6.45	6.31	6.08	NA	6.40	6.56	NA
6. % Dominant Taxon	74%	74%	81%	51%	39%	NA	64%	23%	NA
7. Shredder / Total # of Organisms Ratio	0.02	0.07	0.02	0.06	0.10	NA	0.05	0.17	NA
8. Density (organisms/m2)	294.44	405.56	400.00	261.11	344.44	341.11	341.11	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 10)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS / Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	6	7	3	5	6	10	2	34	38
(Total Number of Organisms / Site)	22	24	14	19	33	112	22.4	155	267
2. EPT Index	5.0	4.0	2.0	4.0	4.0	NA	3.8	9.0	NA
3. EPT / Chironomid Ratio	21.0	1.9	13.0	5.3	2.2	NA	8.7	0.5	NA
4. Scraper / Filterer Ratio	NA	5.50	NA	NA	NA	NA	1.10	2.33	NA
5. Biotic Index	5.55	5.88	4.76	5.66	5.69	NA	5.51	6.10	NA
6. % Dominant Taxon	73%	33%	57%	42%	55%	NA	52%	39%	NA
7. Shredder / Total # of Organisms Ratio	0.11	0.27	0.39	0.24	0.21	NA	0.25	0.36	NA
8. Density (organisms / m2)	122.22	133.33	77.78	105.56	183.33	124.44	124.44	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 11)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	4	11	6	16	7	21	4.2	34	44
(Total Number of Organisms / Site)	14	30	26	67	10	147	29.4	80	227
2. EPT Index	2.0	5.0	3.0	7.0	4.0	NA	4.2	7.0	NA
3. EPT / Chironomid Ratio	NA	2.6	23.0	5.3	2.33	NA	6.7	1.4	NA
4. Scraper / Filterer Ratio	NA	7.50	NA	0.48	1.50	NA	1.90	0.54	NA
5. Biotic Index	5.48	5.40	5.29	4.91	4.71	NA	5.16	6.07	NA
6. % Dominant Taxon	79%	47%	69%	25%	30%	NA	50%	13%	NA
7. Shredder / Total # of Organisms Ratio	0.07	0.18	0.19	0.22	0.35	NA	0.20	0.23	NA
8. Density (organisms/m2)	77.78	166.67	144.44	372.22	55.56	816.67	163.33	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Indian Grave Branch (Site 12)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/Qual
1. Taxa Richness	5	3	12	8	5	23	4.6	25	38
(Total Number of Organisms / Site)	9	15	39	16	12	91	18.2	78	169
2. EPT Index	1.0	0.0	2.0	2.0	2.0	NA	1.4	7.0	NA
3. EPT / Chironomid Ratio	0.8	0.0	0.5	0.56	2	NA	0.8	0.9	NA
4. Scraper / Filterer Ratio	NA	NA	6.50	2.00	3.50	NA	2.40	0.94	NA
5. Biotic Index	6.54	6.81	6.34	6.67	6.52	NA	6.58	7.05	NA
6. % Dominant Taxon	33%	80%	31%	38%	58%	NA	48%	49%	NA
7. Shredder / Total # of Organisms Ratio	0.22	0.40	0.19	0.22	0.13	NA	0.23	0.31	NA
8. Density (organisms/m2)	50.00	83.33	216.67	88.89	66.67	101.11	101.11	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Pen Branch (Site 13)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	2	7	11	12	5	22	4.4	30	45
(Total Number of Organisms / Site)	4	10	39	28	5	86	17.2	108	194
2. EPT Index	0.0	1.0	0.0	3.0	1.0	NA	1.0	7.0	NA
3. EPT / Chironomid Ratio	0.0	0.2	0.0	0.5294118	0.5	NA	0.2	0.3	NA
4. Scraper / Filterer Ratio	NA	1.25	0.00	0.58	NA	NA	0.37	0.36	NA
5. Biotic Index	7.28	6.95	6.72	5.93	5.82	NA	6.54	6.82	NA
6. % Dominant Taxon	75%	20%	31%	18%	20%	NA	33%	26%	NA
7. Shredder / Total # of Organisms Ratio	0.75	0.10	0.23	0.21	0.00	NA	0.26	0.22	NA
8. Density (organisms/m2)	22.22	55.56	216.67	155.56	27.78	95.56	95.56	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Steel Creek (Site 14)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	1	3	5	4	8	17	3.4	33	41
(Total Number of Organisms / Site)	1	10	9	5	39	64	12.8	100	164
2. EPT Index	0.0	2.0	1.0	1.0	4.0	NA	1.6	6.0	NA
3. EPT / Chironomid Ratio	0.0	NA	0.6	2	1.71	NA	0.9	0.9	NA
4. Scraper / Filterer Ratio	NA	NA	NA	NA	1.67	NA	0.33	0.36	NA
5. Biotic Index	7.60	6.03	5.59	6.02	3.83	NA	5.81	6.77	NA
6. % Dominant Taxon	100%	80%	33%	40%	33%	NA	57%	14%	NA
7. Shredder / Total # of Organisms Ratio	0.00	0.00	0.11	0.00	0.47	NA	0.12	0.15	NA
8. Density (organisms/m2)	55.56	55.56	50.00	27.78	216.67	NA	71.11	NA	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Meyers Branch (Site 15)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS (Parameters)	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual	Mean	Qualitative	Total w/ Qual
1. Taxa Richness	7	9	6	8	11	18	3.6	40	47
(Total Number of Organisms / Site)	18	24	26	40	54	162	32.4	97	259
2. EPT Index	4.0	4.0	2.0	3.0	3.0	NA	3.2	17.0	NA
3. EPT / Chironomid Ratio	0.8	0.8	0.3	0.2121212	0.255814	NA	0.5	1.9	NA
4. Scraper / Filterer Ratio	0.63	0.75	2.00	0.83	0.17	NA	0.88	0.81	NA
5. Biotic Index	5.55	5.00	4.33	4.33	4.85	NA	4.81	5.68	NA
6. % Dominant Taxon	28%	25%	35%	43%	28%	NA	32%	16%	NA
7. Shredder / Total # of Organisms Ratio	0.06	0.29	0.25	0.25	0.21	NA	0.21	0.28	NA
8. Density (organisms/m2)	100.00	133.33	144.44	222.22	300.00	180.00	180.00	N/A	NA

Appendix Table B-7. Biological Parameter Results and Water Quality Ratings

Client: Westinghouse Savannah River Company
Stream: Four Mile (Site 16)
County: Barnwell, SC
Collection Date: 5 Nov - 8 Dec 1997

BIOLOGICAL PARAMETER RESULTS Parameters	Rep A	Rep B	Rep C	Rep D	Rep E	Total w/o Qual.	Mean	Qualitative	Total w/Qual.
1. Taxa Richness	8	13	12	7	14	29	5.8	27	41
(Total Number of Organisms / Site)	17	69	41	22	57	206	41.2	96	302
2. EPT Index	2.0	2.0	2.0	4.0	4.0	NA	2.8	6.0	NA
3. EPT / Chironomid Ratio	2.3	0.5	0.4	2.67	0.33	NA	1.2	0.2	NA
4. Scraper / Filterer Ratio	1.38	1.90	0.45	1.20	0.25	NA	1.04	0.37	NA
5. Biotic Index	6.06	5.72	6.45	5.42	6.09	NA	5.95	7.55	NA
6. % Dominant Taxon	47%	23%	24%	55%	21%	NA	34%	27%	NA
7. Shredder / Total # of Organisms Ratio	0.06	0.04	0.07	0.07	0.02	NA	0.05	0.19	NA
8. Density (organisms/m2)	94.44	383.33	227.78	122.22	316.67	1144.44	228.89	N/A	NA

APPENDIX C

FISH ASSEMBLAGE DATA

Summary of fish assemblage data from Four Mile Creek near Rd. 4

Species		Replicate A	Replicate B	Replicate C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfish	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus				
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon		1	4	5
dollar sunfish	Lepomis marginatus		2	3	5
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis	7	2		9
pirate perch	Aphredoderus sayanus		1	4	5
redbreast sunfish	Lepomis auritus		3	1	4
redfin pickerel	Esox americanus		1		1
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus			1	1
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus			1	1
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis		2	1	3
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	2			2

Summary of fish assemblage data from Four Mile Creek near Rd. C

Species		Replicate A	Replicate B	Totals
American eel	Anguilla rostrata			
banded pygmy sunfish	Elassoma zonatum			
blackbanded darter	Percina nigrofasciata	1		1
bluegill	Lepomis macrochirus			
bluehead chub	Nocomis leptocephalus	4	11	15
bowfin	amia calva			
brook silverside	Labidesthes sicculus			
chain pickerel	esox niger			
coastal shiner	Notropis petersoni			
creek chub	Notropis atromaculatus			
creek chubsucker	Erimyzon			
dollar sunfish	Lepomis marginatus	1	1	2
dusky shiner	Notropis cummingsae		5	5
flat bullhead	Ameiurus platycephalus			
golden shiner	Notemigonus crysoleucas			
largemouth bass	Micropterus salmoides		3	3
lined topminnow	Fundulus lineolatus			
longnose gar	Lepisosteus osseus			
margined madtom	Noturus insignis	1		1
mosquitofish	Gambusia affinis			
pirate perch	Aphredoderus sayanus	1	4	5
redbreast sunfish	Lepomis auritus		3	3
redfin pickerel	Esox americanus	3	3	6
sailfin shiner	Pteronotropis hypselopterus			
Savannah darter	Etheostoma fricksium			
speckled madtom	Noturus leptacanthus			
spottail shiner	Notropis hudsonius			
spotted sucker	Minytrema melanops			
spotted sunfish	Lepomis punctatus	1	2	3
striped bass	Morone saxatilis			
tadpole madtom	Noturus gyrinus	1		1
tesselated darter	Etheostoma olmstedi			
warmouth	Lepomis gulosus			
yellow bullhead	Ameiurus natalis	2	3	5
yellow perch	Perca flavescens			
yellowfin shiner	Notropis lutipinnis	19	30	49

Summary of fish assemblage data from Four Mile Creek near Rd. A.7

Species		Replicate A	Replicate B	Replicate C	Totals
American eel	Anguilla rostrata			2	2
banded pygmy sunfis	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	1	4		5
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus		5	1	6
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae	1	1	35	37
flat bullhead	Ameiurus platycephalus	3			3
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	3	1	1	5
redbreast sunfish	Lepomis auritus	4	1		5
redfin pickerel	Esox americanus		3		3
sailfin shiner	Pteronotropis hypselopterus		5		5
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops	4			4
spotted sunfish	Lepomis punctatus	1	4	5	10
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi	3	13		16
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis			2	2
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	12	29	25	66

Summary of fish assemblage data from Steel Creek near Rd. B

Species		Replicate A	Replicate B	Replicate C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfis	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus				
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni	8	5	5	18
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus	8	10	4	22
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides	1	1	1	3
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis	1	4		5
pirate perch	Aphredoderus sayanus	6	4	4	14
redbreast sunfish	Lepomis auritus	3	7	2	12
redfin pickerel	Esox americanus				
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops	1	3		4
spotted sunfish	Lepomis punctatus		3		3
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis		1		1
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis				

Summary of fish assemblage data from Four Mile Creek near Rd. A

Species		Replicate A	B	C	Totals
American eel	Anguilla rostrata	6		2	8
banded pygmy sunfish	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	2	6	3	11
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus		1		1
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger	1			1
coastal shiner	Notropis petersoni		1	3	4
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon			1	1
dollar sunfish	Lepomis marginatus		1		1
dusky shiner	Notropis cummingsae	1		14	15
flat bullhead	Ameiurus platycephalus	1	2		3
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides		1		1
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	1	1	1	3
redbreast sunfish	Lepomis auritus	10	14	3	27
redfin pickerel	Esox americanus	2		1	3
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium		1		1
speckled madtom	Noturus leptacanthus	1	2		3
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops	3		1	4
spotted sunfish	Lepomis punctatus	1	4	3	8
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus		2		2
tesselated darter	Etheostoma olmstedi		4	4	8
warmouth	Lepomis gulosus			1	1
yellow bullhead	Ameiurus natalis	1	3		4
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	5	15		20

Summary of fish assemblage data from Pen Branch near Rd. B

Species		Replicate A	Replicate B	Replicate C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfi	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	2	2		4
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	1	2	2	5
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus	4	2	1	7
creek chubsucker	Erimyzon	1	1		2
dollar sunfish	Lepomis marginatus	2	2	1	5
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	1	1	1	3
redbreast sunfish	Lepomis auritus	1	3	4	8
redfin pickerel	Esox americanus		1	2	3
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium		1	1	2
speckled madtom	Noturus leptacanthus			1	1
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus	4	3	4	11
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus		1		1
tesselated darter	Etheostoma olmstedi	2	1	4	7
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis		2		2
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	33	30	25	88

Summary of fish assemblage data from Pen Branch near Rd. C

Species		Replicate A	B	C	Totals
American eel	Anguilla rostrata	1	1	1	3
banded pygmy sunfish	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	3	13	14	30
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus		3	1	4
creek chubsucker	Erimyzon	3			3
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis	1			1
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	15	4	8	27
redbreast sunfish	Lepomis auritus	4	2		6
redfin pickerel	Esox americanus	3	2		5
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium		1		1
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops			1	1
spotted sunfish	Lepomis punctatus	7	3		10
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus			1	1
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus			2	2
yellow bullhead	Ameiurus natalis	2		3	5
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	26	26	38	90

Summary of fish assemblage data from Mill Creek

Species		Replicate A	Replicate B	Replicate C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfi	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	4	4	1	9
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	10	9	5	24
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon	1	1		2
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	3	3	5	11
redbreast sunfish	Lepomis auritus	1	1		2
redfin pickerel	Esox americanus	5	5	1	11
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus	3	3	2	8
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops	1			1
spotted sunfish	Lepomis punctatus		1		1
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi	1	1		2
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	50	88	68	206

Summary of fish assemblage data from McQueen's Branch

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata		1		1
banded pygmy sunfis	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	27	18	7	52
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus	3	4	1	8
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis	2	1		3
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	1	2		3
redbreast sunfish	Lepomis auritus				
redfin pickerel	Esox americanus	1			1
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus				
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus	1	1		2
tesselated darter	Etheostoma olmstedi	1			1
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis			1	1
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	40	27	9	76

Summary of fish assemblage data from Tim's Branch

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfis	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	8	7	5	20
bowfin	amia calva			1	1
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus			3	3
creek chubsucker	Erimyzon	3	8	13	24
dollar sunfish	Lepomis marginatus	3	3	1	7
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas	8	30	60	98
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis		1	1	2
pirate perch	Aphredoderus sayanus	6	10	15	31
redbreast sunfish	Lepomis auritus	6	19	27	52
redfin pickerel	Esox americanus	1	1	3	5
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus	2	1		3
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus	1	1	1	3
yellow bullhead	Ameiurus natalis	12	9	20	41
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	15	11	23	49

Summary of fish assemblage data from Pen Branch near Rd. A

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata		2	1	3
banded pygmy sunfi	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	2	3	3	8
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus				
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon	2	1		3
dollar sunfish	Lepomis marginatus			1	1
dusky shiner	Notropis cummingsae	44	38	16	98
flat bullhead	Ameiurus platycephalus		1		1
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides		1	2	3
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus			4	4
margined madtom	Noturus insignis			1	1
mosquitofish	Gambusia affinis	3			3
pirate perch	Aphredoderus sayanus	3	1	1	5
redbreast sunfish	Lepomis auritus	1		5	6
redfin pickerel	Esox americanus	2	2		4
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus	1	1		2
spottail shiner	Notropis hudsonius	5	8	4	17
spotted sucker	Minytrema melanops	4	10	4	18
spotted sunfish	Lepomis punctatus	9	2	1	12
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus	1			1
tesselated darter	Etheostoma olmstedi		4	4	8
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	21	4		25

Summary of fish assemblage data from Indian Grave Branch

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata	1			1
banded pygmy sunfi	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	16	42	26	84
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus		1	3	4
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon		1		1
dollar sunfish	Lepomis marginatus		2		2
dusky shiner	Notropis cummingsae	13	7	11	31
flat bullhead	Ameiurus platycephalus	1	6	24	31
golden shiner	Notemigonus crysoleucas			1	1
largemouth bass	Micropterus salmoides		2		2
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus		1	1	2
margined madtom	Noturus insignis	2	4	10	16
mosquitofish	Gambusia affinis	6	4	8	18
pirate perch	Aphredoderus sayanus		1		1
redbreast sunfish	Lepomis auritus	2	4	9	15
redfin pickerel	Esox americanus				
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus	1		5	6
spottail shiner	Notropis hudsonius	3	6	4	13
spotted sucker	Minytrema melanops	7	4	3	14
spotted sunfish	Lepomis punctatus	3	2	6	11
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi	1			1
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	8	18	96	122

Summary of fish assemblage data from Meyer's Branch

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata			1	1
banded pygmy sun	Elassoma zonatum				
blackbanded darte	Percina nigrofasciata		1	1	2
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus	7	9	7	23
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus	2	7	1	10
creek chubsucker	Erimyzon	3	4	8	15
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae		2	2	4
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis			1	1
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus		4	4	8
redbreast sunfish	Lepomis auritus				
redfin pickerel	Esox americanus	2	2	1	5
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium		1	6	7
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus	1			1
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus	1			1
tesselated darter	Etheostoma olmstedi	2	4	4	10
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	53	72	30	155

Summary of fish assemblage data from Crouch Branch

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata				
banded pygmy sunfish	Elassoma zonatum		1		1
blackbanded darter	Percina nigrofasciata				
bluegill	Lepomis macrochirus				
bluehead chub	Nocomis leptocephalus			1	1
bowfin	amia calva				
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger				
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus	5	4	2	11
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae				
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus				
redbreast sunfish	Lepomis auritus				
redfin pickerel	Esox americanus				
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops				
spotted sunfish	Lepomis punctatus				
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens				
yellowfin shiner	Notropis lutipinnis	2	3		5

Summary of fish assemblage data from Upper Three Runs near Rd. A.2

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata	7		2	9
banded pygmy sunfish	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata	1			1
bluegill	Lepomis macrochirus	5	1	11	17
bluehead chub	Nocomis leptocephalus		1		1
bowfin	amia calva			6	6
brook silverside	Labidesthes sicculus				
chain pickerel	esox niger		2	5	7
coastal shiner	Notropis petersoni	8	6	7	21
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae	2			2
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides				
lined topminnow	Fundulus lineolatus				
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus	1	1	2	4
redbreast sunfish	Lepomis auritus	4	2	4	10
redfin pickerel	Esox americanus	1	1	4	6
sailfin shiner	Pteronotropis hypselopterus				
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius	1			1
spotted sucker	Minytrema melanops	3	3	15	21
spotted sunfish	Lepomis punctatus	6		1	7
striped bass	Morone saxatilis	1	4		5
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus	7	1	4	12
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens			1	1
yellowfin shiner	Notropis lutipinnis				

Summary of fish assemblage data from Upper Three Runs Tyler Bridge

Species		Replicates A	B	C	Totals
American eel	Anguilla rostrata	3		1	4
banded pygmy sunfish	Elassoma zonatum				
blackbanded darter	Percina nigrofasciata			1	1
bluegill	Lepomis macrochirus	1		1	2
bluehead chub	Nocomis leptocephalus				
bowfin	amia calva				
brook silverside	Labidesthes sicculus	1			1
chain pickerel	esox niger		1		1
coastal shiner	Notropis petersoni				
creek chub	Notropis atromaculatus				
creek chubsucker	Erimyzon				
dollar sunfish	Lepomis marginatus				
dusky shiner	Notropis cummingsae	31	4	14	49
flat bullhead	Ameiurus platycephalus				
golden shiner	Notemigonus crysoleucas				
largemouth bass	Micropterus salmoides	1	2		3
lined topminnow	Fundulus lineolatus	1			1
longnose gar	Lepisosteus osseus				
margined madtom	Noturus insignis				
mosquitofish	Gambusia affinis				
pirate perch	Aphredoderus sayanus		1		1
redbreast sunfish	Lepomis auritus	1			1
redfin pickerel	Esox americanus				
sailfin shiner	Pteronotropis hypselopterus		6	25	31
Savannah darter	Etheostoma fricksium				
speckled madtom	Noturus leptacanthus				
spottail shiner	Notropis hudsonius				
spotted sucker	Minytrema melanops	5		1	6
spotted sunfish	Lepomis punctatus				
striped bass	Morone saxatilis				
tadpole madtom	Noturus gyrinus				
tesselated darter	Etheostoma olmstedi				
warmouth	Lepomis gulosus				
yellow bullhead	Ameiurus natalis				
yellow perch	Perca flavescens		1		1
yellowfin shiner	Notropis lutipinnis		12	16	28